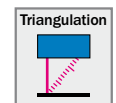# Distance Sensors

Short range (displacement)/mid range/long range distance sensors,
linear measurement sensors, ultrasonic sensors,
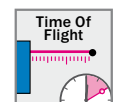double sheet detector, optical data transmission, position finders

SICK

Sensor Intelligence.

At SICK, you will find the best distance sensor for your application
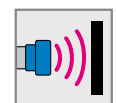
Products — Measuring ranges — Typical applications
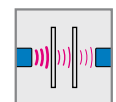
Triangulation
Precision with CMOS
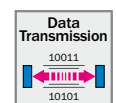
Time-of-flight
When picoseconds count

Optical linear
Precise with bar code tape

Ultrasonic
Measure flexibly with sonic

Double sheet detection
Damping makes the difference

Optical data transmission
Infrared, wireless and flexible

Position finder
2-axis positioning

Group	Sub	Product	Code		Measuring range
B	Short range	OD Value	B-24		26 … 400 mm
		OD Hi	B-38		26 … 400 mm
		OD Max	B-46		24 … 450 mm
		OD Precision	B-56		24 … 700 mm
		DT20 Hi	B-70		50 … 1,000 mm
C	Mid range	DT50	C-86		200 … 10,000 mm
		DT50 Hi	C-92		200 … 20,000 mm
		DS50	C-98		200 … 10,000 mm
		DL50	C-104	Reflector	200 … 50,000 mm
		DL50 Hi	C-110	Reflector	200 … 50,000 mm
D	Long range	DME4000	D-128	Reflector	0.15 … 220 m
		DME5000	D-140	Reflector	0.15 … 300 m
		DL100 Hi	D-152	Reflector	0.15 … 300 m
		DT500	D-158		0.2 … 70 m
		DS500	D-164		0.2 … 70 m
		DMT10-2	D-170		0.5 … 155 m
		DML40-2	D-178	Reflector	0.5 … 1,200 m
E	Linear	OLM100	E-194		0 … 10,000 m
		OLM100 Hi	E-200		0 … 10,000 m
		OLM200	E-206		0 … 10,000 m
F	Ultrasonic	UM30-2	F-222		30 … 8,000 mm
		UM18-2 Hi	F-232		20 … 1,300 mm
		UC12	F-240		20 … 350 mm
		UC4	F-246		13 … 250 mm

Measuring range scale: 0.01 m, 0.1 m, 1 m, 10 m, 100 m, 1,000 m, 10,000 m

Group	Product	Code	Description
G	UM18	G-258	Double sheet detection, installation distance 37 mm … 43 mm
H	ISD300/ISD400	H-268/H-278	Optical data transmission up to 300 m
I	DMP3/DMP2	I-288/I-294	Position finder, detection area 300 mm x 300 mm

Typical applications

B
- Quality control
- Process control
- Classification
- High-precision positioning

C
- Object detection in material handling and warehousing systems
- Distance measurement for gripper positioning
- Measurement/detection of parts

D
- Positioning of storage and retrieval systems and gantry cranes
- Anti-collision of cranes and vehicles
- Slab measurement
- Container profiling
- Checking presence
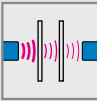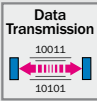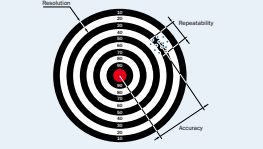
E
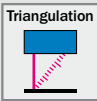- Positioning of overhead conveyors/storage and retrieval systems

F
- Level monitoring of liquid and solid materials
- Completely color-independent detection

G
- Double sheet detection

H
- Wireless data transmission

I
- Fine positioning

We deliver Sensor Intelligence.

SICK sensor solutions for industrial automation are the result of exceptional dedication and experience. From development all the way to service: The people at SICK are committed to investing all their expertise in providing with the very best sensors and system solutions possible.

A company with a culture of success

Approximately 5,000 people are on staff, with products and services available to help SICK sensor technology users increase their productivity and reduce their costs. Founded in 1946 and headquartered in Waldkirch, Germany, SICK is a global sensor specialist with more than 50 subsidiaries and representations worldwide. Our exemplary corporate culture fosters an optimum work-life balance, thus attracting the best employees from all over the world. SICK is one of the best employers – we have been among the winners of the prestigious German "Great Place to Work" award for many years in succession.

Innovation for the leading edge

SICK sensor systems simplify and optimize processes and allow for sustainable production. SICK operates thirteen research and development centers all over the world. Co-designed with customers and universities, our innovative sensor products and solutions are made to give a decisive edge. With an impressive track record of innovation, we take the key parameters of modern production to new levels: reliable process control, safety of people and environmental protection.

A corporate culture for sustainable excellence

SICK is backed by a holistic, homogeneous corporate culture. We are an independent company. And our sensor technology is open to all system environments. The power of innovation has made SICK one of the technology and market leader – sensor technology that is successful in the long term.

A

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.

A
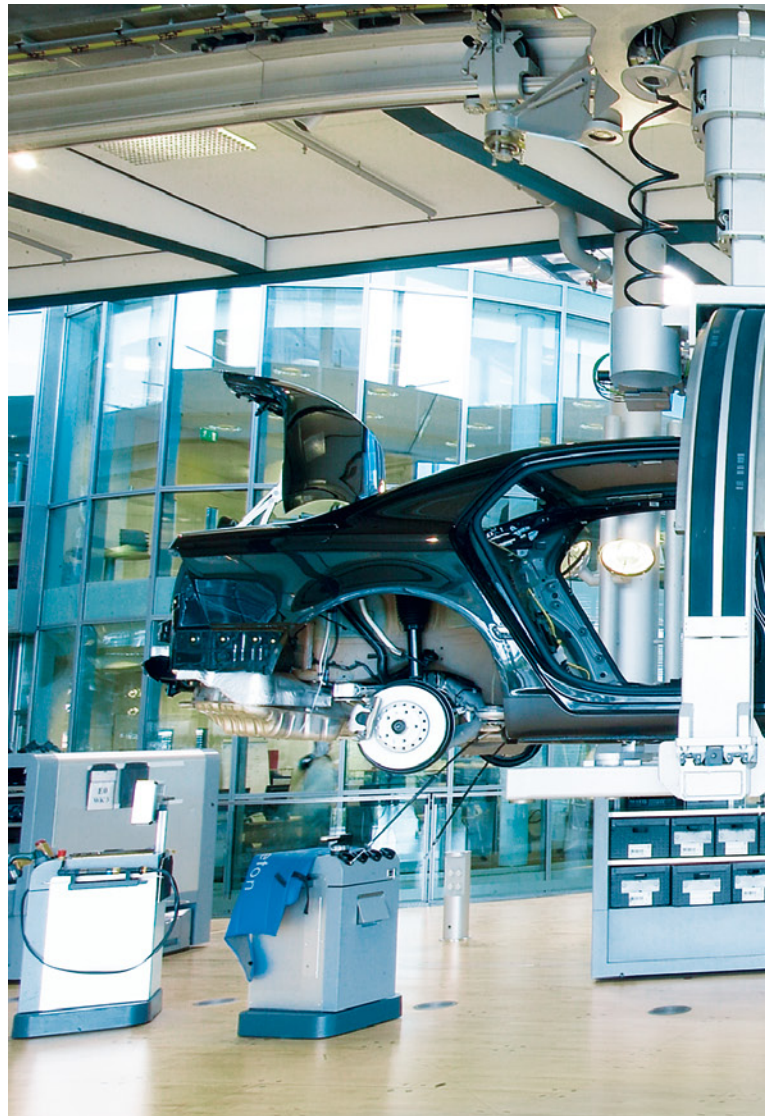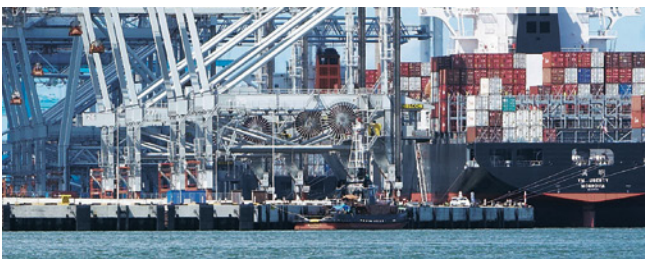
For your specific industry

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 accident protection for automated guided vehicles. SICK system solutions for analysis and flow measurement of gases and liquids enable environmental protection and sustainability in, for example, energy production, cement production or waste incineration plants.

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 innovation to solve these tasks.

www.sick.com/Industries

A

For safety and productivity: 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 system design all the way 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.

Benefit from an array of services

Each of our products and solutions is accompanied by a comprehensive range of services tuned precisely to the requirements of the product or solution – along its entire life cycle. Backed by extensive industry know-how and more than sixty years of experience, LifeTime Services stand for maximum availability and an exceptional service life of our products and solutions.

A

Training & Education

- User training
- Seminars
- WebTraining

Product & System Support

- Commissioning
- Spare parts and repairs
- Remote support
- Hotline

Verification & Optimization

- Barcode checks
- Consulting/Engineering service
- Inspection
- Maintenance
- Accident analysis
- Stop time measurement
- Noise measurement

Consulting & Design

- System inspection
- Risk assessment
- Safety concepts
- Feasibility studies
- Software and hardware design

Upgrade & Retrofits

- Machine conversion
- Sensor upgrades
- Sensor replacements
- Retrofitting of technology

www.sick.com/service

A

Versatile product range for industrial automation

From the simple acquisition task to the key sensor technology in a complex production process: with every product from its broad port-folio, SICK offers a sensor solution that best combines cost effective-ness and safety.

www.sick.com/products

Photoelectric sensors

- Miniature photoelectric sensors
- Small photoelectric sensors
- Compact photoelectric sensors
- Fiber-optic sensors and fibers
- Cylindrical photoelectric sensors
- Zone control

Proximity sensors

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

Magnetic cylinder sensors

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

Identification solutions

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

Detection and ranging solutions

- Laser measurement technology

System solutions

- Volume measurement systems
- Code reading systems
- Dimension weighing scanning systems

Fluid sensors

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

Registration sensors

- Contrast sensors
- Color sensors
- Luminescence sensors
- Fork sensors
- Array sensors

Distance sensors

- Short range distance sensors (displacement)
- Mid range distance sensors
- Long range distance sensors
- Linear measurement sensors
- Ultrasonic sensors
- Double sheet detector
- Optical data transmission
- Position finders

A

Automation light grids

- Advanced automation light grids
- Standard automation light grids
- Smart light grids

Vision

- Vision sensors
- Smart cameras
- 3D cameras
- Vision systems

Opto-electronic protective devices

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

Safety switches

- Electro-mechanical safety switches
- Non-contact safety switches
- Safety command devices

sens:Control – safe control solutions

- Safety relays
- Safety controllers
- Network solutions

A

Motor feedback systems

- Interfaces: incremental, HIPERFACE® and HIPERFACE DSL®
- Safety motor feedback systems
- Rotary and linear motor feedback systems for asynchronous, synchronous motors and linear motors

Encoders
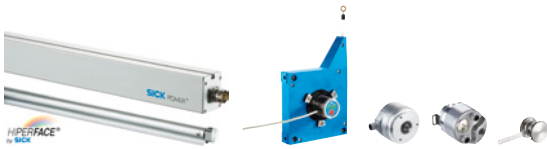
- Rotary incremental encoders
- Rotary absolute encoders
- Wire draw encoders
- Absolute linear encoders

Analyzers and systems

- Gas analyzers
- Dust measuring devices
- Analyzer systems
- Liquid analyzers
- Data acquisition systems
- Tunnel sensors

Gas flow measuring devices

- Gas flow meters
- Mass flow meters
- Volume flow meters

Improved product quality with highly accurate measurement down to sub-micron resolution

Short range distance sensors are laser sensors, which provide accurate distance measurements for applications that require a high degree of precision. They have a measurement range of up to 1,000 mm. Due to their accuracy, they are especially suited for controlling, sorting and inspection tasks used in quality control processes. Common applications include measuring dimension, position and shape and machining tolerances. Using SICK short range distance sensors can improve the quality of your end product while reducing material and downtime costs.

Your benefits

- Non-contact measurement technology allows quality inspections from a safe distance during the production process
- Faster response speed reduces process time
- 100 % inspection rate ensures consistent high product quality
- Wear and damage-free inspection, thanks to non-contact measurement
- Fast, cost-effective setup due to simple operation
- Range of interfaces for simple integration into an existing production environment
- Reliable measurement on any surface helps reduce machine downtime

Short range distance sensors (displacement)

As precise as a Swiss-made watch ...

B

SICK short range distance sensors (displacement) measure smallest deviations, cavities, planarity or position a robot precisely. They are used to guarantee maximum efficiency and effectiveness in each process step in industries where quality is critical to business success.

The technological principle: Triangulation
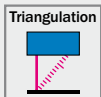
Maximum accuracy and speed requirements when measuring smallest, millimeter-size objects – SICK displacement sensors feature the appropriate high-end technology and draw from years of experience to meet this challenge.

A light spot is projected onto a measurement object, e.g. using a laser diode. By means of receiving optics, the reflection is mapped onto a light-sensitive element (CMOS). Based on the position of the mapped light spot and the known geometry, the distance to the object can be determined.

Fields of application

B
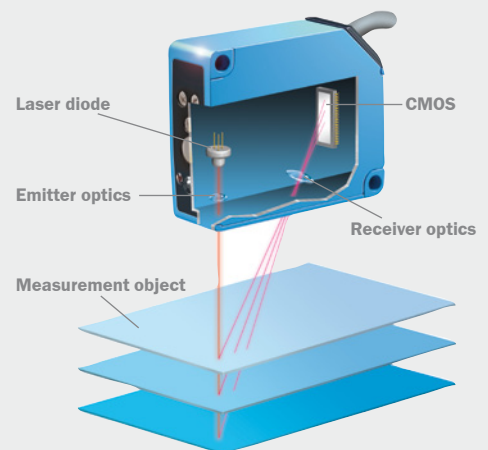
Precise analysis of surfaces

Good or bad – not a question of opinion, but of quality standards, e.g. for suppliers of die-cast, or drilled metal parts, or electronic components.

Exemplary applications
- Checking surface quality or dimensional stability
- Detecting very small or difficult to measure parts
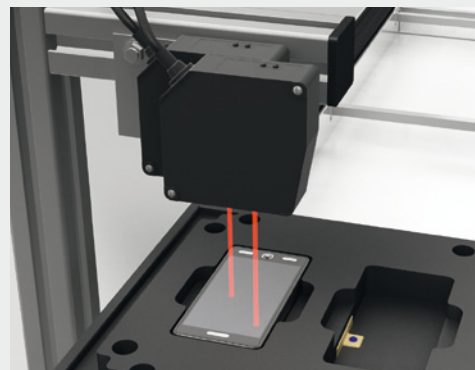
Precise positioning

Move to exactly the same position, everytime and with maximum precision. SICK non-contact displacement sensors position grippers, placement heads and cutter heads with maximum repeatability.

Exemplary applications
- Positioning of grippers of thinfilm solar cells with maximum precision
- Positioning of linear actuator with maximum precision
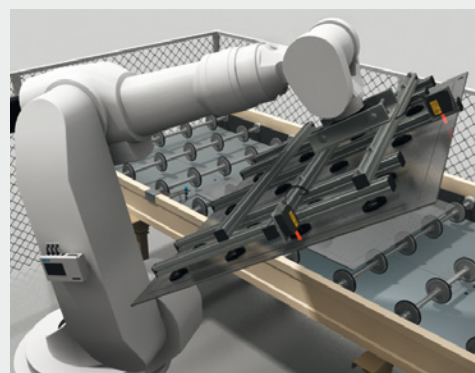
Regulating processes

Always the correct distance – relevant to the result when controlling value-added or critical processes based on distance measurement

Exemplary applications
- Controlling the distance of a soldering iron to the object
- Measuring thickness of cardboard, wooden boards, etc.
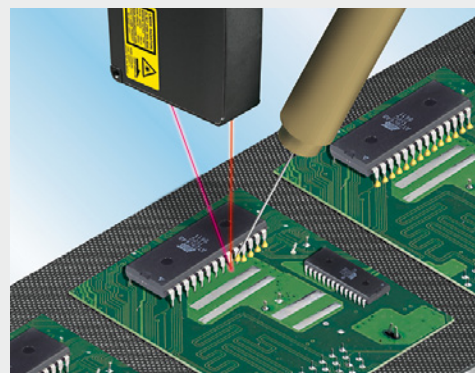
Precise classification

Group A, B or C – identifying components and allocating them to specific models is of great importance in assembly processes.
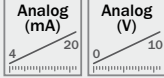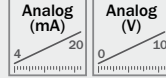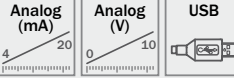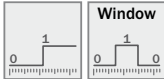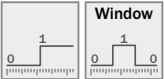
Exemplary applications
- Allocating different brake disc types to the corresponding vehicle suspension
- Classifying millimeter size screws by length

Product comparison

B

	OD Value	OD Hi	OD Max	OD Precision
Performance	Performance	Performance	Performance	Performance
Stand-alone operation possible	✔	✔	–	✔ (via RS-422)
Visuals	Bargraph	LC display	1,4" color display	4,4" color display
Interfaces	Analog (mA) 4 20 / Analog (V) 0 10 — RS-422	Analog (mA) 4 20	Analog (mA) 4 20 / Analog (V) 0 10 — RS-232	Analog (mA) 4 20 / Analog (V) 0 10 / USB — RS-232 / RS-422
Programmable switching outputs	1 0 / Window 1 0	1 0	1 0	1 0 / Window 1 0
Housing	Plastic, IP 67	Metal, IP 67	Metal, IP 67	Metal, IP 67
Sensor heads per controller unit	–	–	■■	■■■
Calculations possible	–	–	✔	✔

Product strengths

OD Value – classifies swivel joints

The classification of components according to different dimensions can be easily accomplished with a displacement sensor. For example millimeter size screws are sorted by length. In this case swivel joints are classified by thickness – with micrometer precision.

→ **The perfect solution:**
  Compact stand-alone displacement sensor OD Value, see page B-24
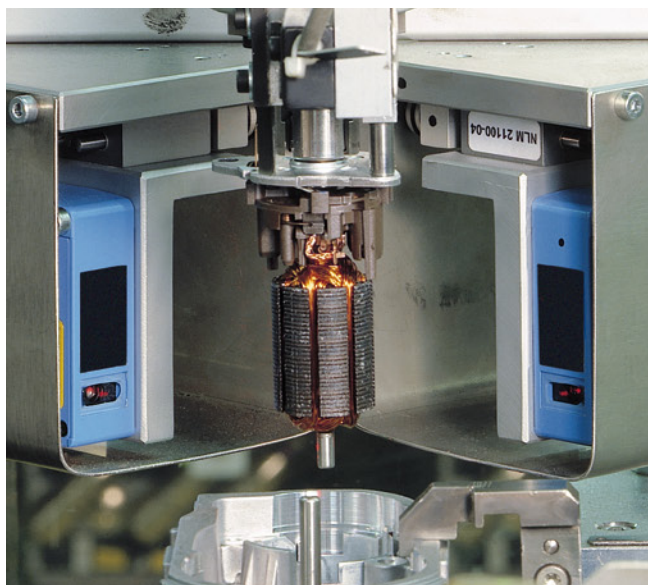
OD Hi –
controls assembly with maximum precision

A typical application for displacement sensors is positioning robots, linear actuators and grippers, e.g., as seen here, for perfect assembly of an electrical motor into the housing. It is reliable and accurate measurement on a wide variety of materials that makes up for the difference here.

➡ **The perfect solution:**
   Stand-alone displacement sensor OD Hi, see page B-38
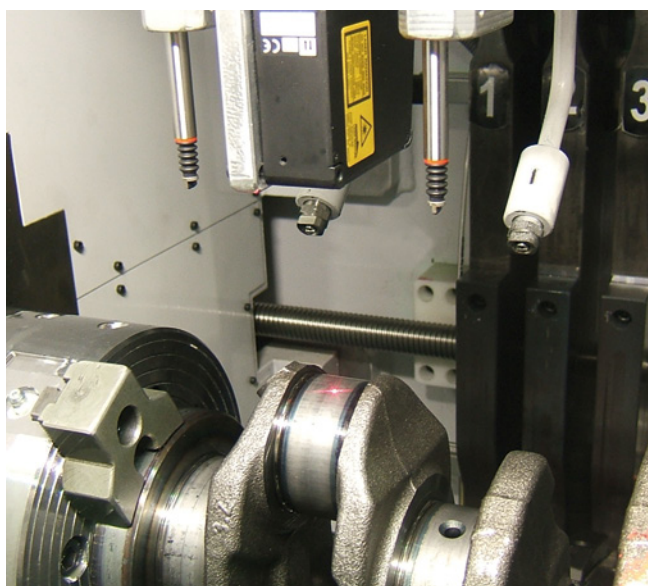
OD Max –
monitors manufacturing tolerances
of crankshafts

High-end displacement sensor systems with a repeatability of up to 0.3 µm at a measuring frequency of 10 kHz offer the ideal solution when manufacturing tolerances have to be checked dynamically in-line with maximum precision. E.g., as seen here, to ensure best quality of crankshafts.

➡ **The perfect solution:**
   High-end displacement sensor system OD Max,
   see page B-46

OD Precision –
measures planarity of surfaces

High-end displacement sensor systems come with an controller unit that offers the possibility to easily program calculations of the measurement results of the connected sensor heads. This makes them the perfect solution for measuring planarity in quality assurance, e.g. of wood, glass, or ceramic surfaces.

➡ **The perfect solution:**
   High-end displacement sensor system OD Precision,
   see page B-56

B

Triangulation	Laser protection class	Interfaces	Measuring range / Repeatability / Response time
			10 mm
OD Value — Performance — Laserklasse 2		Analog (mA) 4...20 / Analog (V) 0...10 / Window / RS-422	26 mm ... 34 mm / 6 µm / 1 ms
OD Hi — Performance — Laserklasse 2		Analog (mA) 4...20	26 mm ... 34 mm / 12 µm / 2 ms
OD Max — Performance — Laserklasse 1, Laserklasse 2		Analog (mA) 4...20 / Analog (V) 0...10 / RS-232	25 mm ... 35 mm / 3 µm / 0.5 ms — 24 mm ... 26 mm / 0.3 µm / 0.5 ms
OD Precision — Performance — Laserklasse 1, Laserklasse 2		Analog (mA) 4...20 / Analog (V) 0...10 / Window / RS-232 / RS-422 / USB	25 mm ... 35 mm / 0.6 µm / 0.1 ms — 24 mm ... 26 mm / 0.06 µm / 0.1 ms
DT20 Hi — Performance — Laserklasse 1, Laserklasse 2		Analog (mA) 4...20	
			10 mm

*) LC1 = Laser protection class 1; LC2 = Laser protection class 2.

B

100 mm　　　　　　　　　　　　　　　　　　　　　　　　　　　　**1,000 mm**

**40 mm ...
60 mm**
15 µm
1 ms

**65 mm ...
105 mm**
30 µm
1 ms

60 mm ... 180 mm
90 µm
1 ms

100 mm ... 400 mm
225 µm
2 ms

**40 mm ...
60 mm**
30 µm
2 ms

**65 mm ...
95 mm**
45 µm
2 ms

60 mm ... 140 mm
105 µm
2 ms

100 mm ... 400 mm
225 µm
2 ms

**65 mm ...
105 mm**
15 µm
0.5 ms

250 mm ... 450 mm
150 µm
0.5 ms

**65 mm ...
105 mm**
3 µm
0.1 ms

250 mm ... 450 mm
15 µm
0.8 ms

300 mm ... 700 mm
30 µm
0.8 ms

50 mm ... 150 mm
0.5 mm/0.25 mm/0.125 mm
2.5 ms/10 ms/40 ms (LC2 *))

100 mm ... 300 mm
1 mm/0.5 mm/0.25 mm
2,5 ms/10 ms/40 ms (LC1 *) and LC2 *))

100 mm ... 600 mm
2 mm/1 mm/0.5 mm
2.5 ms/10 ms/40 ms (LC2 *), 5 ms/20 ms/80 ms (LC1 *))

100 mm ... 1,000 mm
10 mm/5 mm/2.5 mm
2.5 ms/10 ms/40 ms (LC2 *))

100 mm　　　　　　　　　　　　　　　　　　　　　　　　　　　　**1,000 mm**

B

Product family overview

	OD Value	
	Simply accurate measurement	
Technical data overview		
Measuring range	26 mm ... 34 mm 40 mm ... 60 mm 65 mm ... 105 mm 60 mm ... 180 mm 100 mm ... 400 mm	
Resolution	2 µm 5 µm 10 µm 30 µm 75 µm	
Repeatability	6 µm 15 µm 30 µm 90 µm 225 µm	
Response time	1 ms / 10 ms / 35 ms 2 ms / 15 ms / 50 ms	
Measuring frequency	2 kHz 1.3 kHz	
Interfaces overview	1 x 4 mA ... 20 mA / 2 x switching output and 1 x multifunctional input 1 x 0 V ... 10 V / 2 x switching output and 1 x multifunctional input RS-422 / 1 x switching output and 1 x multifunctional input	
Ambient temperature	Operation –10 °C ... +40 °C Storage –10 °C ... +60 °C	
At a glance		
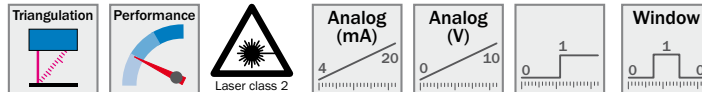
| Triangulation | Performance | Laser class 2 | Analog (mA) 4...20 | Analog (V) 0...10 | Window 1 0 | Window 1 0 0 |

RS-422 CDRH RoHS 2002/95/EC

- Several measurement ranges from 26 mm ... 34 mm to 100 mm ... 400 mm
- CMOS receiving element for measurement independent of surface
- Easy, LED-based user and teach-in concept
- Wide range of models and a wide range of standard interfaces
- Laser technology for precise measurement of very small objects
- Compact stand-alone device
- Excellent price-performance ratio

| **Detailed information** | ➜ B-24 | |

	OD Hi	OD Max
	Easy use and high accuracy	Two sensors in one controller for high accuracy measurement calculations
	26 mm … 34 mm 40 mm … 60 mm 65 mm … 95 mm 60 mm … 140 mm 100 mm … 400 mm	24 mm … 26 mm 25 mm … 35 mm 65 mm … 105 mm 250 mm … 450 mm
	4 µm 10 µm 15 µm 35 µm 75 µm	0.1 µm 1 µm 5 µm 50 µm
	12 µm 30 µm 45 µm 105 µm 225 µm	0.3 µm 3 µm 15 µm 150 µm
	2 ms	0.5 ms
	1 kHz	10 kHz
	1 x 4 mA … 20 mA, 1 x switching output, 1 x teach input, 1 x sample and hold input	2 x 4 mA … 20 mA, 2 x - 5 V … + 5 V, 5 x switching output, 2 x alarm output, RS-232, 3 x bank input, 3 x hold input and 2 x zero reset input
	Operation –10 °C … +40 °C Storage –20 °C … +60 °C	Operation –10 °C … +45 °C Storage –20 °C … +60 °C

Triangulation · Performance · Laser class 2 · Analog (mA) 4–20 · 0–1 · **CDRH** · RoHS 2002/95/EC	Triangulation · Performance · Laser class 1 · Laser class 2 · Analog (mA) 4–20 · Analog (V) 0–10 · 0–1 · **RS-232** · RoHS 2002/95/EC
• Many measurement ranges from 26 mm … 34 mm to 100 mm … 400 mm • CMOS receiving element for accurate measurement independent of surface • High-visibility LC display on the device • Laser technology for measurement of very small objects • Tough and compact stand-alone device	• Several measurement ranges from 24 … 26 mm up to 250 mm … 450 mm • CMOS receiving element for measurement independent of surface • High measurement frequency and high linearity • Variety of selectable integrated calculations based on values from two sensors • Laser technology for precise measurement or detection of very small objects • Several output options
→ B-38	→ B-46

B

Product family overview

	OD Precision
	Three sensor heads in one controller unit: measuring each dimension with high precision
Technical data overview	
Measuring range	24 mm ... 26 mm 25 mm ... 35 mm 65 mm ... 105 mm 250 mm ... 450 mm 300 mm ... 700 mm
Resolution	0.02 µm 0.2 µm 1 µm 5 µm 10 µm
Repeatability	0.06 µm 0.6 µm 3 µm 15 µm 30 µm
Response time	0.1 ms 0.8 ms
Measuring frequency	10 kHz 1.25 kHz
Interfaces overview	RS-422 (stand-alone), RS-232, 3 x 0 V ... 10 V, 3 x 4 mA ... 20 mA, 5 x switching output, 3 x alarm output and USB (controller)
Ambient temperature	Operation –10 °C ... +50 °C Storage –20 °C ... +60 °C
At a glance	
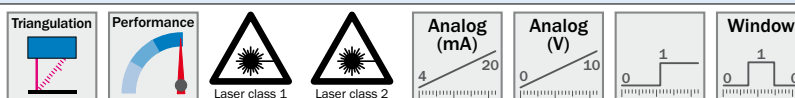
Triangulation	Performance	Laser class 1	Laser class 2	Analog (mA) 4...20	Analog (V) 0...10	0...1	Window 0...1...0

RS-232 RS-422   USB   RoHS 2002/95/EC

- Many measurement ranges from 24 mm ... 26 mm up to 300 mm ... 700 mm
- CMOS receiving element for measurement independent of surface
- High measuring accuracy and frequency
- Glass thickness measurement with just one sensor head
- Different light spot sizes
- Integrated calculations for up to three sensors
- Stand-alone use via RS-422

Detailed information	➜ B-56

DT20 Hi

Reliable, accurate distance measurement up to 1 m

50 mm ... 150 mm
100 mm ... 300 mm
100 mm ... 600 mm
100 mm ... 1,000 mm

0.1 mm
0.2 mm
0.5 mm
1 mm

0.5 mm / 0.25 mm / 0.125 mm
1 mm / 0.5 mm / 0.25 mm
2 mm / 1 mm / 0.5 mm
10 mm / 5 mm / 2.5 mm

1 ms / 8.5 ms / 32.5 ms
5 ms / 20 ms / 80 ms
400 Hz
200 Hz
1 x 4 mA ... 20 mA / 1 x switching output and 1 x multifunctional input

Operation –20 °C ... +55 °C
Storage –40 °C ... +60 °C

Triangulation | Performance | Laser class 1 | Laser class 2 | Analog (mA) 4 ... 20 | 0 ... 1
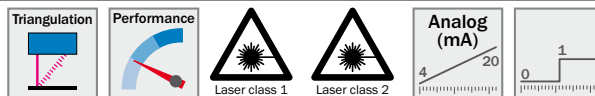
CDRH

- Four measuring ranges from 50 mm up to 1,000 mm
- Very high linearity of up to ± 0.5 mm
- CMOS receiving element enables accurate distance measurement independent of color or shininess
- Red laser
- Scaleable analog and switching output
- Display with easy to use setup menu
- Advanced settings (e.g., averaging function, external laser-off, etc.)

B

Simply accurate measurement

CE ◇III **RS-422**

CDRH RoHS 2002/95/EC

Additional information

Product description

The OD Value allows for an easy, precise and economical solution of measuring tasks.

It detects even small deviations in dimension, shape, position or excentricity directly in the machine, contactless, precise and during running operation.

OD Value convinces with its main features: reliable, user-friendly, effective, universal and efficient.

The ideal solution for everyone, who needs to check and verify quality regulary and directly in the process.

At a glance

- Several measurement ranges from 26 mm ... 34 mm to 100 mm ... 400 mm
- CMOS receiving element for measurement independent of surface
- Easy, LED-based user and teach-in concept
- Wide range of models and a wide range of standard interfaces
- Laser technology for precise measurement of very small objects
- Compact stand-alone device
- Excellent price-performance ratio

Your benefits

- Reliable measurement independent of surface, minimizes machine downtime
- Extremely simple sensor teach-in makes setup faster and more cost-effective
- Minimal space requirements and less wiring due to its compact, stand-alone design
- Many measurement ranges and output interfaces make it ideal for cost-effective integration into any production environment
- Low investment costs make consistent, regular quality inspection possible
- Non-contact measurement technology from a safe distance allows the inspection to be carried out directly during the production process
- Wear and damage-free inspection, due to non-contact measurement

→ www.mysick.com/en/OD_Value

Detailed technical data

Performance

Light source	Laser, red
Laser protection class [1]	2 (EN 60 825-1)
Additional function	Averaging 1 ... 64x Automatic sensitivity adjustment Teach-in of analog output Invertable analog output Teach-in of switching outputs Invertable switching output Multifunctional input: laser-off, external teach-in, trigger Switching mode Distance to object (DtO) Switching mode Window (Wnd)

[1] Wavelength 655 nm, max. output 1 mW.

Interfaces

Multifunctional input [1]	1 x MF

[1] MF can be used as laser-off, trigger, external teach-in or deactivated; response time ≤ 3 ms.

Mechanics/electronics

Supply voltage V_s [1]	DC 12 V ... 24 V
Power consumption [2]	≤ 2.88 W
Warm up time	≤ 5 min
Housing material	PBT housing with PMMA lens
Indication	Distance bar graph up to 8 status LEDs
Weight	70 g

[1] DC 12 V (–5 %) ... DC 24 V (+10 %); DC 18 V (–5 %) ... DC 24 V (+10 %); when using analog voltage output.

[2] Exclusive load, inclusive current output.

Ambient data

Enclosure rating	IP 67
Protection class	III
Ambient temperature	Operation: –10 °C ... +40 °C Storage: –20 °C ... +60 °C
Max. rel. humidity (not condensing)	35 % ... 95 %
Typ. ambient light safety	Artificial light: ≤ 3,000 lx Sunlight: ≤ 10,000 lx
Temperature drift	± 0.08 % FS/ °C (FS = Full Scale = Measuring range of sensor)
Vibration resistance	10 Hz ... 55 Hz (amplitude 1.5 mm, x-, y-, z-axis 2 hours each)
Shock resistance	50 G (x-, y-, z-axis 3 times each)

B

Specific data

Measuring range [1]	Resolution [2]	Repeatability [1] [2] [3] [4]	Linearity [2] [4] [5] [6]	Typ. light spot size (distance)	Model name	Ordering information
26 mm … 34 mm	2 µm	6 µm	± 8 µm	0.1 mm x 0.1 mm (30 mm)	OD2-x30W04xx	B-26
40 mm … 60 mm	5 µm	15 µm	± 20 µm	0.5 mm x 1.0 mm (50 mm)	OD2-x50W10xx	B-27
65 mm … 105 mm	10 µm	30 µm	± 40 µm	0.8 mm x 1.3 mm (85 mm)	OD2-x85W20xx	B-28
60 mm … 180 mm	30 µm	90 µm	± 120 µm	1 mm x 1.5 m (120 mm)	OD2-x120W60xx	B-29
100 mm … 400 mm	75 µm	225 µm	± 750 µm	1.8 mm x 3.5 mm (250 mm)	OD2-x250W150xx	B-30

[1] 6 % … 90 % remission.

[2] At averaging function medium.

[3] Constant ambient conditions.

[4] For best performance consider warm up time ≤ 5 min.

[5] Measurement on 90 % remission (ceramic, white).

[6] When calibrated in the application regularly.

Ordering information

OD2-x30W04xx

- **Measuring range:** 26 mm … 34 mm (6 % … 90 % remission)
- **Resolution:** 2 µm (at averaging function medium)
- **Repeatability:** 6 µm (6 % … 90 % remission; at set averaging medium; constant ambient conditions; for best performance consider warm up time ≤ 5 min)
- **Linearity:** ± 8 µm (at averaging function medium; measurement on 90 % remission [ceramic, white]; for best performance consider warm up time ≤ 5 min; when calibrated in the application regularly)
- **Typ. light spot size (distance):** 0.1 mm x 0.1 mm (30 mm)

Measuring frequency	Response time [1]	Data interface [2]	Connection type	Switching output [3]	Model name	Part no.
2 kHz	1 ms / 10 ms / 35 ms	0 V … 10 V (≥ 10 kΩ)	Cable 2 m	2 x NPN (100 mA)	OD2-N30W04U2	6036569
				2 x PNP (100 mA)	OD2-P30W04U2	6036577
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N30W04U0	6036573
				2 x PNP (100 mA)	OD2-P30W04U0	6036581
		–	Cable 2 m	2 x NPN (100 mA)	OD2-N30W04C2	6036570
				2 x PNP (100 mA)	OD2-P30W04C2	6036578
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N30W04C0	6036574
				2 x PNP (100 mA)	OD2-P30W04C0	6036582
		4 mA … 20 mA (≤ 300 Ω)	Cable 2 m	2 x NPN (100 mA)	OD2-N30W04I2	6036568
				2 x PNP (100 mA)	OD2-P30W04I2	6036576
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N30W04I0	6036572
				2 x PNP (100 mA)	OD2-P30W04I0	6036580
		RS-422	Cable 2 m	2 x NPN (100 mA)	OD2-N30W04A2	6036571
				2 x PNP (100 mA)	OD2-P30W04A2	6036579
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N30W04A0	6036575
				2 x PNP (100 mA)	OD2-P30W04A0	6036583

[1] Automatic sensitivity adjustment ≤ 4 ms, 6 ms for the models with measuring range of 100 mm … 400 mm.

[2] Resolution analog output 16 bit.

[3] PNP: HIGH = V_S - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_S.

OD2-x50W10xx

- **Measuring range:** 40 mm ... 60 mm (6 % ... 90 % remission)
- **Resolution:** 5 µm (at averaging function medium)
- **Repeatability:** 15 µm (6 % ... 90 % remission; at set averaging medium; constant ambient conditions; for best performance consider warm up time ≤ 5 min)
- **Linearity:** ± 20 µm (at averaging function medium; measurement on 90 % remission [ceramic, white]; for best performance consider warm up time ≤ 5 min; when calibrated in the application regularly)
- **Typ. light spot size (distance):** 0.5 mm x 1.0 mm (50 mm)

B

Measuring frequency	Response time [1]	Data interface [2]	Connection type	Switching output [3]	Model name	Part no.
2 kHz	1 ms / 10 ms / 35 ms	0 V ... 10 V (≥ 10 kΩ)	Cable 2 m	2 x NPN (100 mA)	OD2-N50W10U2	6036585
				2 x PNP (100 mA)	OD2-P50W10U2	6036593
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N50W10U0	6036589
				2 x PNP (100 mA)	OD2-P50W10U0	6036598
		–	Cable 2 m	2 x NPN (100 mA)	OD2-N50W10C2	6036586
				2 x PNP (100 mA)	OD2-P50W10C2	6036595
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N50W10C0	6036590
				2 x PNP (100 mA)	OD2-P50W10C0	6036599
		4 mA ... 20 mA (≤ 300 Ω)	Cable 2 m	2 x NPN (100 mA)	OD2-N50W10I2	6036584
				2 x PNP (100 mA)	OD2-P50W10I2	6036592
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N50W10I0	6036588
				2 x PNP (100 mA)	OD2-P50W10I0	6036597
		RS-422	Cable 2 m	2 x NPN (100 mA)	OD2-N50W10A2	6036587
				2 x PNP (100 mA)	OD2-P50W10A2	6036596
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N50W10A0	6036591
				2 x PNP (100 mA)	OD2-P50W10A0	6036600

[1] Automatic sensitivity adjustment ≤ 4 ms, 6 ms for the models with measuring range of 100 mm ... 400 mm.
[2] Resolution analog output 16 bit.
[3] PNP: HIGH = V_S - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_S.

B

OD2-x85W20xx

- **Measuring range:** 65 mm ... 105 mm (6 % ... 90 % remission)
- **Resolution:** 10 µm (at averaging function medium)
- **Repeatability:** 30 µm (6 % ... 90 % remission; at set averaging medium; constant ambient conditions; for best performance consider warm up time ≤ 5 min)
- **Linearity:** ± 40 µm (at averaging function medium; measurement on 90 % remission [ceramic, white]; for best performance consider warm up time ≤ 5 min; when calibrated in the application regularly)
- **Typ. light spot size (distance):** 0.8 mm x 1.3 mm (85 mm)

Measuring frequency	Response time [1]	Data interface [2]	Connection type	Switching output [3]	Model name	Part no.
2 kHz	1 ms / 10 ms / 35 ms	0 V ... 10 V (≥ 10 kΩ)	Cable 2 m	2 x NPN (100 mA)	OD2-N85W20U2	6036602
				2 x PNP (100 mA)	OD2-P85W20U2	6036610
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N85W20U0	6036606
				2 x PNP (100 mA)	OD2-P85W20U0	6036614
		–	Cable 2 m	2 x NPN (100 mA)	OD2-N85W20C2	6036603
				2 x PNP (100 mA)	OD2-P85W20C2	6036611
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N85W20C0	6036607
				2 x PNP (100 mA)	OD2-P85W20C0	6036615
		4 mA ... 20 mA (≤ 300 Ω)	Cable 2 m	2 x NPN (100 mA)	OD2-N85W20I2	6036601
				2 x PNP (100 mA)	OD2-P85W20I2	6036609
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N85W20I0	6036605
				2 x PNP (100 mA)	OD2-P85W20I0	6036613
		RS-422	Cable 2 m	2 x NPN (100 mA)	OD2-N85W20A2	6036604
				2 x PNP (100 mA)	OD2-P85W20A2	6036612
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N85W20A0	6036608
				2 x PNP (100 mA)	OD2-P85W20A0	6036616

[1] Automatic sensitivity adjustment ≤ 4 ms, 6 ms for the models with measuring range of 100 mm ... 400 mm.

[2] Resolution analog output 16 bit.

[3] PNP: HIGH = V_S - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_S.

B

OD2-x120W60xx

- **Measuring range:** 60 mm ... 180 mm (6 % ... 90 % remission)
- **Resolution:** 30 µm (at averaging function medium)
- **Repeatability:** 90 µm (6 % ... 90 % remission; at set averaging medium; constant ambient conditions; for best performance consider warm up time ≤ 5 min)
- **Linearity:** ± 120 µm (at averaging function medium; measurement on 90 % remission [ceramic, white]; for best performance consider warm up time ≤ 5 min; when calibrated in the application regularly)
- **Typ. light spot size (distance):** 1 mm x 1.5 m (120 mm)

Measuring frequency	Response time [1]	Data interface [2]	Connection type	Switching output [3]	Model name	Part no.
2 kHz	1 ms / 10 ms / 35 ms	0 V ... 10 V (≥ 10 kΩ)	Cable 2 m	2 x NPN (100 mA)	OD2-N120W60U2	6036618
				2 x PNP (100 mA)	OD2-P120W60U2	6036626
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N120W60U0	6036622
				2 x PNP (100 mA)	OD2-P120W60U0	6036630
		–	Cable 2 m	2 x NPN (100 mA)	OD2-N120W60C2	6036619
				2 x PNP (100 mA)	OD2-P120W60C2	6036627
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N120W60C0	6036623
				2 x PNP (100 mA)	OD2-P120W60C0	6036631
		4 mA ... 20 mA (≤ 300 Ω)	Cable 2 m	2 x NPN (100 mA)	OD2-N120W60I2	6036617
				2 x PNP (100 mA)	OD2-P120W60I2	6036625
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N120W60I0	6036621
				2 x PNP (100 mA)	OD2-P120W60I0	6036629
		RS-422	Cable 2 m	2 x NPN (100 mA)	OD2-N120W60A2	6036620
				2 x PNP (100 mA)	OD2-P120W60A2	6036628
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N120W60A0	6036624
				2 x PNP (100 mA)	OD2-P120W60A0	6036632

[1] Automatic sensitivity adjustment ≤ 4 ms, 6 ms for the models with measuring range of 100 mm ... 400 mm.

[2] Resolution analog output 16 bit.

[3] PNP: HIGH = V_S - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_S.

B

OD2-x250W150xx

- **Measuring range:** 100 mm … 400 mm (6 % … 90 % remission)
- **Resolution:** 75 µm (at averaging function medium)
- **Repeatability:** 225 µm (6 % … 90 % remission; at set averaging medium; constant ambient conditions; for best performance consider warm up time ≤ 5 min)
- **Linearity:** ± 750 µm (at averaging function medium; measurement on 90 % remission [ceramic, white]; for best performance consider warm up time ≤ 5 min; when calibrated in the application regularly)
- **Typ. light spot size (distance):** 1.8 mm x 3.5 mm (250 mm)

Measuring frequency	Response time [1]	Data interface [2]	Connection type	Switching output [3]	Model name	Part no.
1.3 kHz	2 ms / 15 ms / 50 ms	0 V … 10 V (≥ 10 kΩ)	Cable 2 m	2 x NPN (100 mA)	OD2-N250W150U2	6036634
				2 x PNP (100 mA)	OD2-P250W150U2	6036642
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N250W150U0	6036638
				2 x PNP (100 mA)	OD2-P250W150U0	6036646
		–	Cable 2 m	2 x NPN (100 mA)	OD2-N250W150C2	6036635
				2 x PNP (100 mA)	OD2-P250W150C2	6036643
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N250W150C0	6036639
				2 x PNP (100 mA)	OD2-P250W150C0	6036647
		4 mA … 20 mA (≤ 300 Ω)	Cable 2 m	2 x NPN (100 mA)	OD2-N250W150I2	6036633
				2 x PNP (100 mA)	OD2-P250W150I2	6036641
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N250W150I0	6036637
				2 x PNP (100 mA)	OD2-P250W150I0	6036645
		RS-422	Cable 2 m	2 x NPN (100 mA)	OD2-N250W150A2	6036636
				2 x PNP (100 mA)	OD2-P250W150A2	6036644
			Connector M12, 8-pin	2 x NPN (100 mA)	OD2-N250W150A0	6036640
				2 x PNP (100 mA)	OD2-P250W150A0	6036648

[1] Automatic sensitivity adjustment ≤ 4 ms, 6 ms for the models with measuring range of 100 mm … 400 mm.

[2] Resolution analog output 16 bit.

[3] PNP: HIGH = V_S - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_S.

Dimensional drawings

OD2-x30W04xx
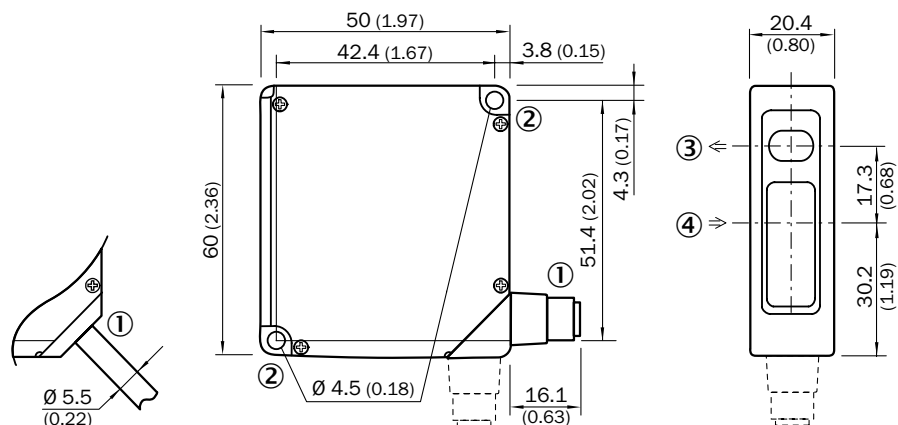
All dimensions in mm (inch)

① 2 m cable or M12 connector; 90° rotatable
② Mounting hole, Ø 4.5 mm
③ Optical axis sender
④ Optical axis receiver

OD2-x50W10xx
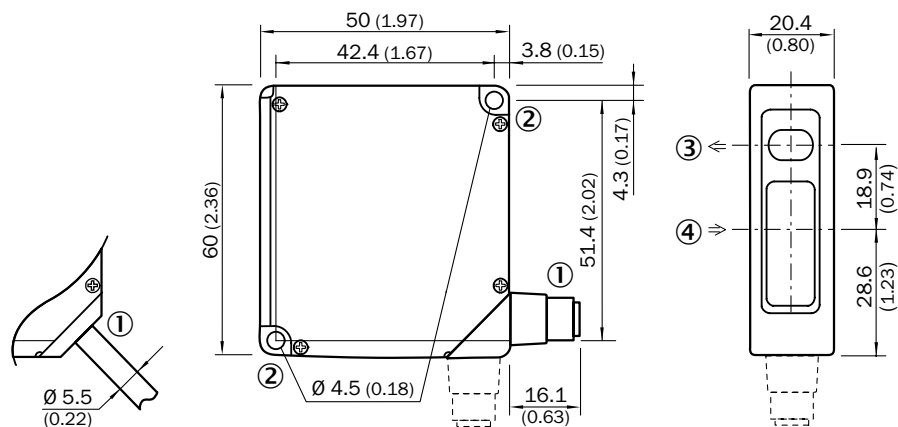
All dimensions in mm (inch)

① 2 m cable or M12 connector; 90° rotatable
② Mounting hole, Ø 4.5 mm
③ Optical axis sender
④ Optical axis receiver

B

OD2-x85W20xx
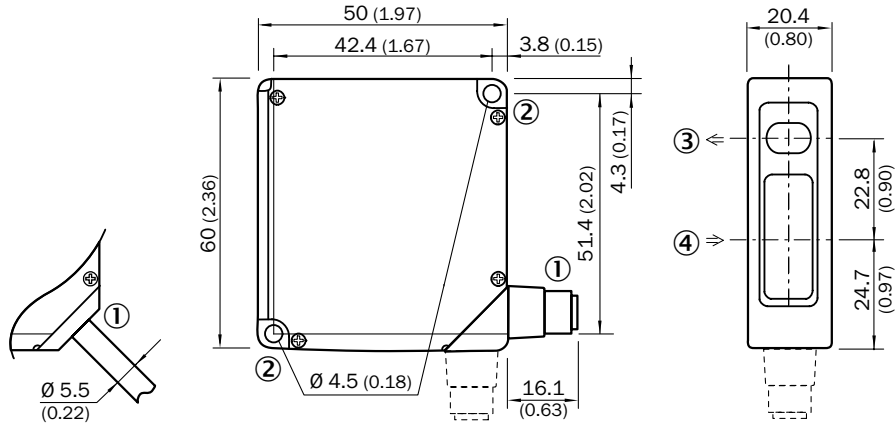
All dimensions in mm (inch)

① 2 m cable or M12 connector; 90° rotatable
② Mounting hole, Ø 4.5 mm
③ Optical axis sender
④ Optical axis receiver

OD2-x120W60xx
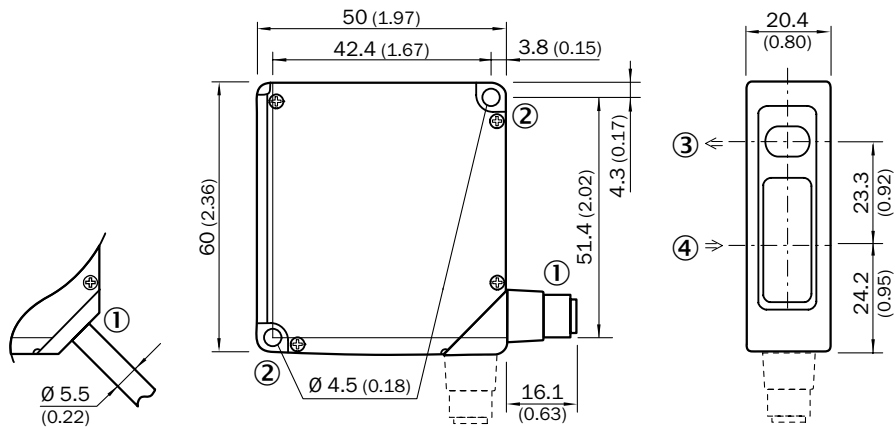
All dimensions in mm (inch)

① 2 m cable or M12 connector; 90° rotatable
② Mounting hole, Ø 4.5 mm
③ Optical axis sender
④ Optical axis receiver

OD2-x250W150xx
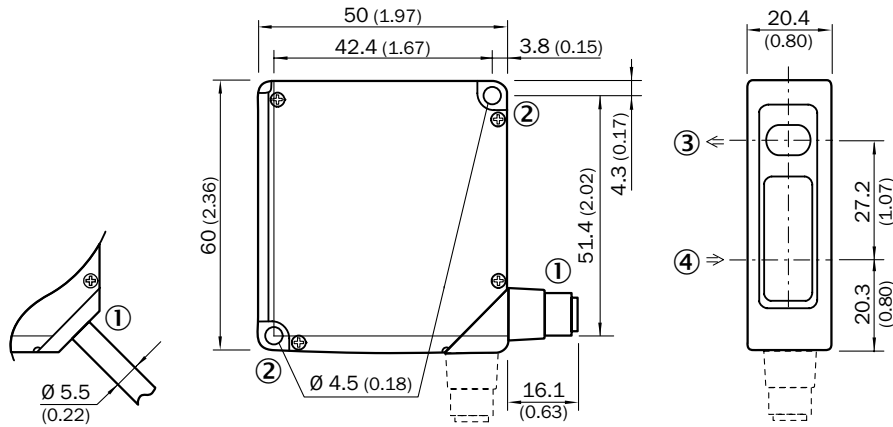
All dimensions in mm (inch)

① 2 m cable or M12 connector; 90° rotatable
② Mounting hole, Ø 4.5 mm
③ Optical axis sender
④ Optical axis receiver

Adjustments

OD2-xxxxxxAx
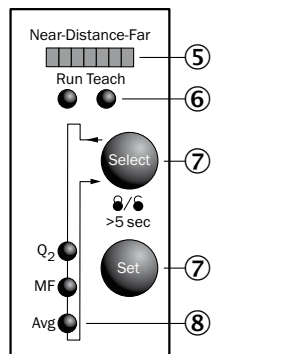
⑤ Distance indicator
⑥ Mode indicator (Run/Teach)
⑦ Control elements
⑧ Status indicator in- and outputs (Run-mode)

OD2-xxxxxxCx
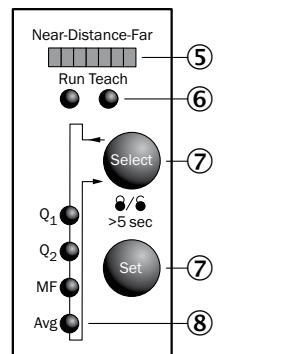
⑤ Distance indicator
⑥ Mode indicator (Run/Teach)
⑦ Control elements
⑧ Status indicator in- and outputs (Run-mode)

OD2-xxxxxxIx
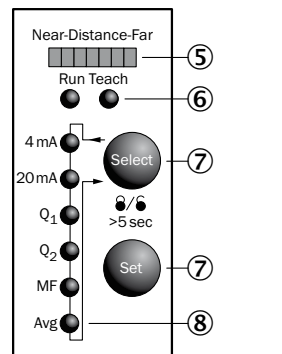
⑤ Distance indicator
⑥ Mode indicator (Run/Teach)
⑦ Control elements
⑧ Status indicator in- and outputs (Run-mode)

OD2-xxxxxxUx
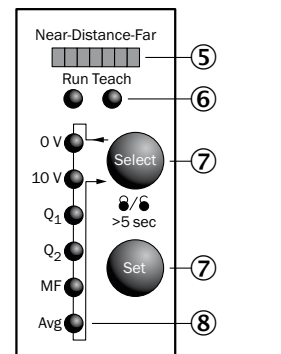
⑤ Distance indicator
⑥ Mode indicator (Run/Teach)
⑦ Control elements
⑧ Status indicator in- and outputs (Run-mode)

Connection type and diagram

Please note: Since wire color on 8-pin connection cables are not normed, always check for a correct pin to wire color assignment when using connection cables others than specified here.

B

OD2-xxxxxxA2
Cable
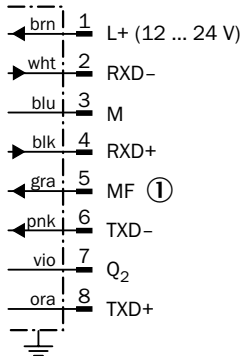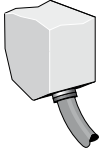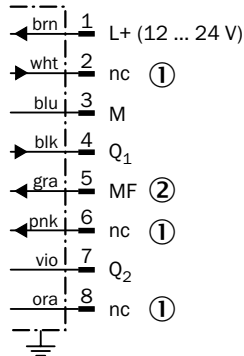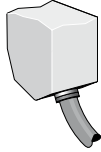
Pin	Color	Signal
1	brn	L+ (12 … 24 V)
2	wht	RXD–
3	blu	M
4	blk	RXD+
5	gra	MF ①
6	pnk	TXD–
7	vio	Q_2
8	ora	TXD+

① Multifunctional input

OD2-xxxxxxC2
Cable

Pin	Color	Signal
1	brn	L+ (12 … 24 V)
2	wht	nc ①
3	blu	M
4	blk	Q_1
5	gra	MF ②
6	pnk	nc ①
7	vio	Q_2
8	ora	nc ①

① Not connected
② Multifunctional input

OD2-xxxxxxI0
Cable

Pin	Color	Signal
1	brn	L+ (12 … 24 V)
2	wht	Q_A (4 … 20 mA)
3	blu	M
4	blk	Q_1
5	gra	MF ①
6	pnk	nc ②
7	vio	Q_2
8	ora	nc ②

① Multifunctional input
② Not connected

OD2-xxxxxxU2
Cable

Pin	Color	Signal
1	brn	L+ (18 … 24 V)
2	wht	Q_A (0 … 10 V)
3	blu	M
4	blk	Q_1
5	gra	MF ①
6	pnk	nc ②
7	vio	Q_2
8	ora	nc ②
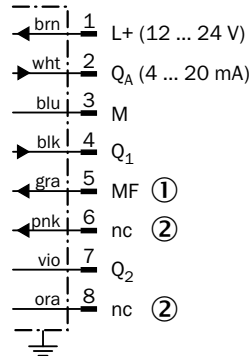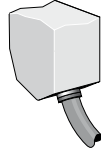
① Multifunctional input
② Not connected

OD2-xxxxxxA0
Connector
M12, 8-pin

Pin	Color	Signal
1	brn	L+ (12 … 24 V)
2	wht	RXD–
3	blu	M
4	blk	RXD+
5	gra	MF ①
6	pnk	TXD–
7	vio	Q_2
8	ora	TXD+

① Multifunctional input

OD2-xxxxxxC0
Connector
M12, 8-pin

Pin	Color	Signal
1	brn	L+ (12 … 24 V)
2	wht	nc ①
3	blu	M
4	blk	Q_1
5	gra	MF ②
6	pnk	nc ①
7	vio	Q_2
8	ora	nc ①

① Not connected
② Multifunctional input

OD2-xxxxxxI0
Connector
M12, 8-pin

Pin	Color	Signal
1	brn	L+ (12 … 24 V)
2	wht	Q_A (4 … 20 mA)
3	blu	M
4	blk	Q_1
5	gra	MF ①
6	pnk	nc ②
7	vio	Q_2
8	ora	nc ②

① Multifunctional input
② Not connected

OD2-xxxxxxU0
Connector
M12, 8-pin

Pin	Color	Signal
1	brn	L+ (18 … 24 V)
2	wht	Q_A (0 … 10 V)
3	blu	M
4	blk	Q_1
5	gra	MF ①
6	pnk	nc ②
7	vio	Q_2
8	ora	nc ②

① Multifunctional input
② Not connected

Light spot size

OD2-x30W04xx

100 x 100 µm

150 x 150 µm | 150 x 150 µm

Sensor

25 (0.98) 30 (1.18) 34 (1.34)

Distance

All dimensions in mm (inch)

OD2-x50W10xx

0.5 x 1 (0.02 x 0.04)

0.6 x 1.2 (0.02 x 0.05) | 0.4 x 0.9 (0.02 x 0.04)

Sensor

40 (1.57) 50 (1.97) 60 (2.36)

Distance

All dimensions in mm (inch)

OD2-x85W20xx

0.75 x 1.25 (0.03 x 0.05)

0.9 x 1.5 (0.04 x 0.06) | 0.6 x 1 (0.02 x 0.04)

Sensor

65 (2.56) 85 (3.35) 105 (4.13)

Distance

All dimensions in mm (inch)

OD2-x120W60xx

1 x 1.5 (0.04 x 0.06)

1.2 x 1.8 (0.05 x 0.07) | 0.5 x 0.8 (0.02 x 0.03)

Sensor

60 (2.36) 120 (4.72) 180 (7.09)

Distance

All dimensions in mm (inch)

OD2-x250W150xx

1.8 x 3.5 (0.07 x 0.14)

1.5 x 2.5 (0.06 x 0.10) | 2 x 4.5 (0.08 x 0.18)

Sensor

100 (3.94) 250 (9.84) 400 (15.75)

Distance

All dimensions in mm (inch)

B

B

Recommended accessories

Plug connectors and cables

	Brief description	Model name	Part no.
Illustration may differ	Female connector, M12, 8-pin, straight, 2 m, PVC, shielded, special color code	DOL-1208-G02MF	6020663
	Female connector, M12, 8-pin, straight, 5 m, PVC, shielded, special color code	DOL-1208-G05MF	6020664
	Female connector, M12, 8-pin, straight, 10 m, PVC, shielded, special color code	DOL-1208-G10MF	6048434

For additional accessories including dimensional drawings, please see page J-301.

B

Easy use and high accuracy

Triangulation

Performance

Laser class 2

Analog (mA)
4 ... 20

0 1

Product description

The OD Hi offers great reliability and accuracy in a compact, tough metal housing. Thanks to CMOS receiver technology, it detects small differences in dimension, shape and precision, even on glossy surfaces. The small housing makes integration into the production process simple, enabling precise measurement while the machine is running. The OD Hi is the ideal solution for harsher ambient conditions and restricted space.

At a glance

- Many measurement ranges from 26 mm ... 34 mm to 100 mm ... 400 mm
- CMOS receiving element for accurate measurement independent of surface
- High-visibility LC display on the device
- Laser technology for measurement of very small objects
- Tough and compact stand-alone device

Your benefits

- Reliably measure targets regardless of color or reflectivity, minimizing machine downtime
- Fast, cost-effective setup due to easy-to-read LC display
- Less wiring ensures low installation cost due to its compact, stand-alone design
- Tough, metal housing for reliable operation and reduced machine downtime
- Non-contact measurement enables quality inspection during production
- 100% inspection with optical distance sensors ensures consistent high product quality

CE ◇III CDRH

RoHS
2002/95/EC

Additional information

➜ www.mysick.com/en/OD_Hi

B

Detailed technical data

Performance

Response time [1]	2 ms
Measuring frequency	1 kHz
Light source	Laser, red
Laser protection class [2]	2 (EN 60 825-1)
Additional function	Averaging 1 ... 1,024x Automatic sensitivity adjustment Manual sensitivity adjustment Timer functions 3 memory banks Teach-in of switching output Teach-in of analog output Set hysteresis Switching mode Distance to object (DtO)

[1] Automatic sensitivity adjustment ≤ 15 ms.

[2] Wavelength 650 nm, max. output 1 mW.

Interfaces

Analog output	1 x 4 mA ... 20 mA (≤ 300 Ω)
Teach input	1 x ET
Trigger input	1 x trigger

Mechanics/electronics

Supply voltage V_s [1]	DC 12 V ... 24 V
Power consumption [2]	≤ 2.88 W
Warm up time	≤ 5 min
Housing material	Zinc housing with glass lens
Indication	LC display
Weight [3]	200 g

[1] DC 12 V (-5 %) ... DC 24 V (+10 %).

[2] Exclusive load, inclusive current output.

[3] 300 g with cable.

Ambient data

Enclosure rating	IP 67
Protection class	III
Ambient temperature	Operation: –10 °C ... +40 °C Storage: –20 °C ... +60 °C
Max. rel. humidity (not condensing)	35 % ... 85 %
Typ. ambient light safety	Artificial light: ≤ 3,000 lx Sunlight: ≤ 10,000 lx
Temperature drift	± 0.08 % FS/°C (FS = Full Scale = Measuring range of sensor)
Vibration resistance	10 Hz ... 55 Hz (amplitude 1.5 mm, x-, y-, z-axis 2 hours each)
Shock resistance	50 G (x-, y-, z-axis 3 times each)

B

Specific data

Measuring range [1]	Resolution [1] [2]	Repeatability [3]	Linearity [1]	Typ. light spot size (distance)	Model name	Ordering information
26 mm ... 34 mm	4 µm	12 µm	± 80 µm	0.5 mm x 0.5 mm (30 mm)	OD30-04x	B-40
40 mm ... 60 mm	10 µm	30 µm	± 200 µm	0.8 mm x 0.8 mm (50 mm)	OD50-10x	B-40
65 mm ... 95 mm	15 µm	45 µm	± 300 µm	1 mm x 1.5 mm (80 mm)	OD80-15x	B-41
60 mm ... 140 mm	35 µm	105 µm	± 800 µm	1 mm x 1.5 mm (100 mm)	OD100-40x	B-41
100 mm ... 400 mm	75 µm	225 µm	± 6 mm	1.5 mm x 3 mm (250 mm)	OD250-150x	B-41

[1] 6 % ... 90 % remission.
[2] Averaging function set to: 64.
[3] Averaging function set to: 64; constant ambient conditions.

Ordering information

OD30-04x

- **Measuring range:** 26 mm ... 34 mm (6 % ... 90 % remission)
- **Resolution:** 4 µm (6 % ... 90 % remission; averaging function set to: 64)
- **Repeatability:** 12 µm (averaging function set to: 64; constant ambient conditions)
- **Linearity:** ± 80 µm (6 % ... 90 % remission)
- **Typ. light spot size (distance):** 0.5 mm x 0.5 mm (30 mm)

Connection type	Switching output [1]	Model name	Part no.
Cable 2 m	1 x NPN (100 mA)	OD30-04N152	6025033
	1 x PNP (100 mA)	OD30-04P152	6025031
Connector M12, 8-pin	1 x NPN (100 mA)	OD30-04N850	6025034
	1 x PNP (100 mA)	OD30-04P850	6025032

[1] PNP: HIGH = V_s - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_s.

OD50-10x

- **Measuring range:** 40 mm ... 60 mm (6 % ... 90 % remission)
- **Resolution:** 10 µm (6 % ... 90 % remission; averaging function set to: 64)
- **Repeatability:** 30 µm (averaging function set to: 64; constant ambient conditions)
- **Linearity:** ± 200 µm (6 % ... 90 % remission)
- **Typ. light spot size (distance):** 0.8 mm x 0.8 mm (50 mm)

Connection type	Switching output [1]	Model name	Part no.
Cable 2 m	1 x NPN (100 mA)	OD50-10N152	6025037
	1 x PNP (100 mA)	OD50-10P152	6025035
Connector M12, 8-pin	1 x NPN (100 mA)	OD50-10N850	6025038
	1 x PNP (100 mA)	OD50-10P850	6025036

[1] PNP: HIGH = V_s - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_s.

OD80-15x

- **Measuring range:** 65 mm ... 95 mm (6 % ... 90 % remission)
- **Resolution:** 15 µm (6 % ... 90 % remission; averaging function set to: 64)
- **Repeatability:** 45 µm (averaging function set to: 64; constant ambient conditions)
- **Linearity:** ± 300 µm (6 % ... 90 % remission)
- **Typ. light spot size (distance):** 1 mm x 1.5 mm (80 mm)

Connection type	Switching output [1]	Model name	Part no.
Cable 2 m	1 x NPN (100 mA)	OD80-15N152	6025041
	1 x PNP (100 mA)	OD80-15P152	6025039
Connector M12, 8-pin	1 x NPN (100 mA)	OD80-15N850	6025042
	1 x PNP (100 mA)	OD80-15P850	6025040

[1] PNP: HIGH = V_S - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_S.

OD100-40x

- **Measuring range:** 60 mm ... 140 mm (6 % ... 90 % remission)
- **Resolution:** 35 µm (6 % ... 90 % remission; averaging function set to: 64)
- **Repeatability:** 105 µm (averaging function set to: 64; constant ambient conditions)
- **Linearity:** ± 800 µm (6 % ... 90 % remission)
- **Typ. light spot size (distance):** 1 mm x 1.5 mm (100 mm)

Connection type	Switching output [1]	Model name	Part no.
Cable 2 m	1 x NPN (100 mA)	OD100-40N152	6025045
	1 x PNP (100 mA)	OD100-40P152	6025043
Connector M12, 8-pin	1 x NPN (100 mA)	OD100-40N850	6025046
	1 x PNP (100 mA)	OD100-40P850	6025044

[1] PNP: HIGH = V_S - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_S.

OD250-150x

- **Measuring range:** 100 mm ... 400 mm (6 % ... 90 % remission)
- **Resolution:** 75 µm (6 % ... 90 % remission; averaging function set to: 64)
- **Repeatability:** 225 µm (averaging function set to: 64; constant ambient conditions)
- **Linearity:** ± 6 mm (6 % ... 90 % remission)
- **Typ. light spot size (distance):** 1.5 mm x 3 mm (250 mm)

Connection type	Switching output [1]	Model name	Part no.
Cable 2 m	1 x NPN (100 mA)	OD250-150N152	6028095
	1 x PNP (100 mA)	OD250-150P152	6028094
Connector M12, 8-pin	1 x NPN (100 mA)	OD250-150N850	6028097
	1 x PNP (100 mA)	OD250-150P850	6028096

[1] PNP: HIGH = V_S - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_S.

Dimensional drawing

B
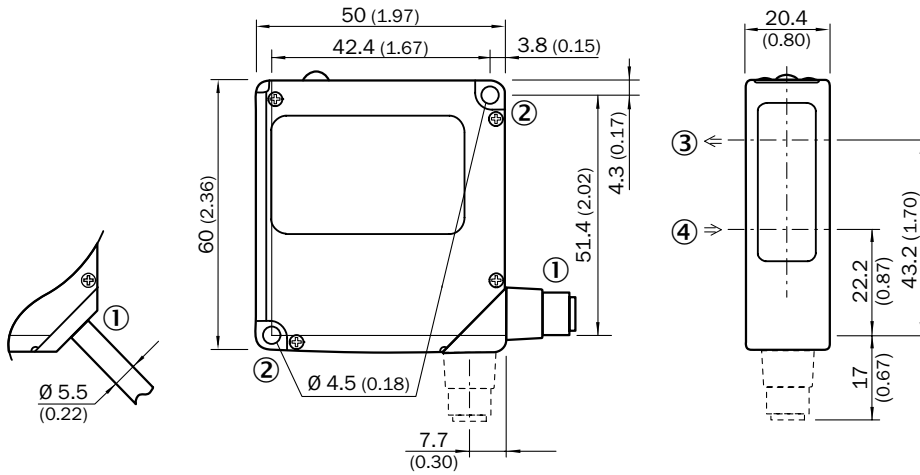
All dimensions in mm (inch)

① 2 m cable or M12 connector; 90° rotatable
② Mounting hole, Ø 4.5 mm
③ Optical axis sender
④ Optical axis receiver

Adjustments
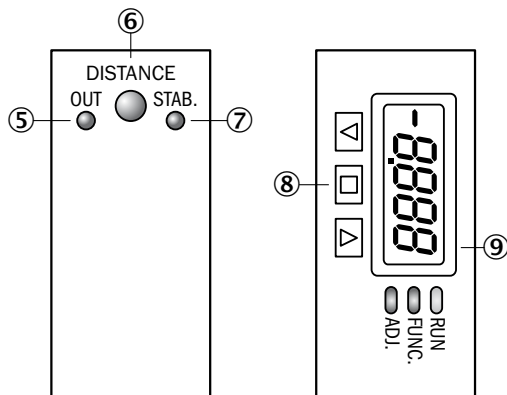
⑤ Status indicator switching output (out)
⑥ Distance indicator
⑦ Stability indicator
⑧ Control elements
⑨ LC display

Connection type and diagram

Please note: Since wire color on 8-pin connection cables are not normed, always check for a correct pin to wire color assignment when using connection cables others than specified here.

ODxx-xxxxx2
Cable
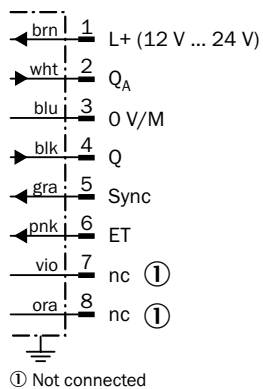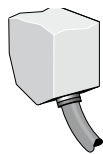
ODxx-xxxxx0
Connector
M12, 8-pin

brn	1	L+ (12 V ... 24 V)
wht	2	Q_A
blu	3	0 V/M
blk	4	Q
gra	5	Sync
pnk	6	ET
vio	7	nc ①
ora	8	nc ①

① Not connected

brn	1	L+ (12 V ... 24 V)
wht	2	Q_A
blu	3	0 V/M
blk	4	Q
gra	5	Sync
pnk	6	ET
vio	7	nc ①
ora	8	nc ①

① Not connected
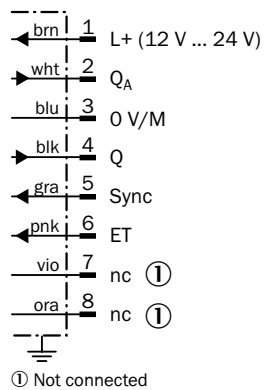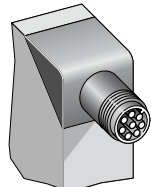
B

Light spot size

OD30-04xxxx

0.5 x 0.5
(0.02 x 0.02)

0.7 x 0.7
(0.03 x 0.03)

0.7 x 0.7
(0.03 x 0.03)

Sensor

26
(1.02)

30
(1.18)

34
(1.34)

Distance
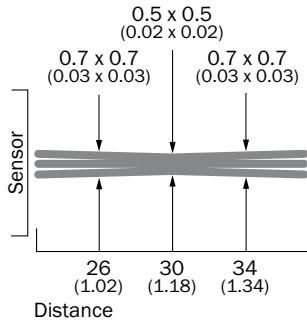
All dimensions in mm (inch)

OD50-10xxxx

0.8 x 0.8
(0.03 x 0.03)

0.8 x 1.2
(0.03 x 0.05)

0.8 x 1.2
(0.03 x 0.05)

Sensor

40
(1.57)

50
(1.97)

60
(2.36)

Distance
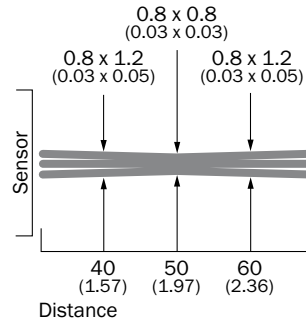
All dimensions in mm (inch)

OD80-15xxxx

1 x 1.5
(0.04 x 0.06)

1 x 2
(0.04 x 0.08)

1 x 1.2
(0.04 x 0.05)

Sensor

65
(2.56)

80
(3.15)

95
(3.74)

Distance
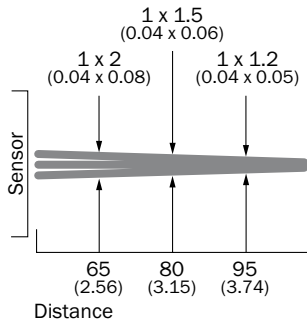
All dimensions in mm (inch)

OD100-40xxxx

1 x 1.5
(0.04 x 0.06)

1 x 2
(0.04 x 0.08)

1 x 2
(0.04 x 0.08)

Sensor

60
(2.36)

100
(3.94)

140
(5.51)

Distance
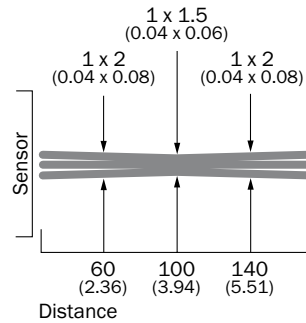
All dimensions in mm (inch)

OD250-150xxxx

1.5 x 3
(0.06 x 0.12)

2 x 4
(0.08 x 0.16)

2.5 x 5
(0.10 x 0.20)

Sensor

100
(3.94)

250
(9.84)

400
(15.75)

Distance
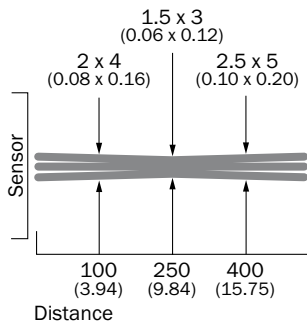
All dimensions in mm (inch)

Recommended accessories

Plug connectors and cables

	Brief description	Model name	Part no.
Illustration may differ	Female connector, M12, 8-pin, straight, 2 m, PVC, shielded, special color code	DOL-1208-G02MF	6020663
	Female connector, M12, 8-pin, straight, 5 m, PVC, shielded, special color code	DOL-1208-G05MF	6020664
	Female connector, M12, 8-pin, straight, 10 m, PVC, shielded, special color code	DOL-1208-G10MF	6048434

For additional accessories including dimensional drawings, please see page J-301.

B

B

Two sensors in one controller for high accuracy measurement calculations
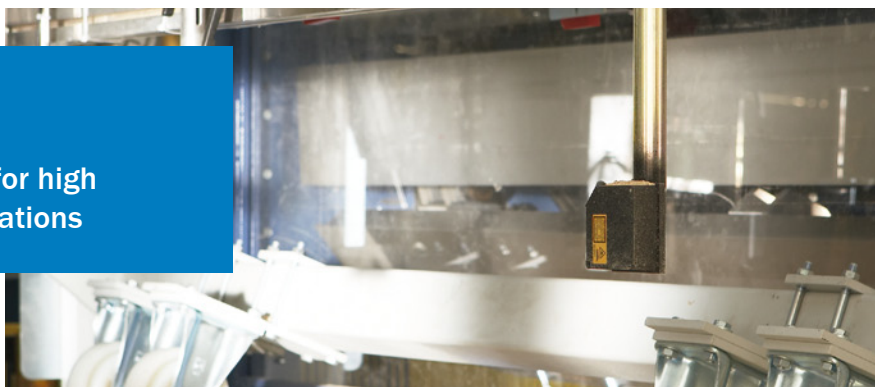
Product description

The OD Max is a highly accurate optical measuring system that is able to connect two separate sensors into one common controller. This sensing solution makes it possible to easily calculate two measurement results. Different measurements can be used to determine properties, such as the thickness or height difference of an object, even if its absolute position is fluctuating. With its high precision and speed, the OD Max is the ideal solution for challenging measurement applications.

At a glance

- Several measurement ranges from 24 ... 26 mm up to 250 ... 450 mm
- CMOS receiving element for measurement independent of surface
- High measurement frequency and high linearity
- Variety of selectable integrated calculations based on values from two sensors
- Laser technology for precise measurement or detection of very small objects
- Several output options

Your benefits

- Minimum machine downtime due to its reliability on any surface, regardless of brightness or color
- Highly accurate measurement, even during the production process, ensures high product quality
- High measuring frequency of 10 kHz increases processing speeds and reduces cycle times
- Reduce the cost to change your process by making a reference measurement using two sensors
- Comparatively low investment costs for challenging measuring tasks
- An easy-to- read LC display and simple push-button keypad programming ensures simple setup and servicing
- Reduced material costs, when using the distance sensors to control cost-relevant production processes

Triangulation | Performance | Laser class 1 | Laser class 2

Analog (mA) 4 ... 20 | Analog (V) 0 ... 10

CE ⟨III⟩ **RS-232**

RoHS 2002/95/EC

Additional information

➜ www.mysick.com/en/OD_Max

B

Detailed technical data

OD Max sensor head

Performance

Response time [1]	0.5 ms
Measuring frequency	10 kHz
Light source	Laser, red
System part	OD Max sensor head OD25-x is only to be used with AODG-P/N1; all other types (OD350-x, OD85-x, OD30-x) are to be used with AOD-P/N1

[1] Automatic sensitivity adjustment ≤ 2 ms.

Mechanics/electronics

Warm up time	≤ 5 min
Housing material	Aluminum housing with glass lens
Connection type [1] [2]	0.5 m cable with connector
Indication	LEDs, 1.4" color display on controller unit
Weight [3]	250 g

[1] Extendable by cable to max. 10 m.

[2] Sensor must be connected to controller unit.

[3] Inclusive 0.5 m cable.

Ambient data

Enclosure rating	IP 67
Protection class	III
Ambient temperature	Operation: –10 °C ... +45 °C Storage: –20 °C ... +60 °C
Max. rel. humidity (not condensing)	35 % ... 85 %
Typ. ambient light safety	Artificial light: ≤ 3,000 lx Sunlight: ≤ 10,000 lx
Temperature drift	± 0.05 % FS/°C (FS = Full Scale = Measuring range of sensor)
Vibration resistance	10 Hz ... 55 Hz (amplitude 1.5 mm, x-, y-, z-axis 2 hours each)
Shock resistance	50 G (x-, y-, z-axis 3 times each)

Specific data

Measuring range [1]	Resolution [2]	Repeatability [4]	Linearity [3]	Typ. light spot size (distance)	Model name	Ordering information
24 mm ... 26 mm	0.1 µm	0.3 µm	± 2 µm	25 µm x 35 µm (25 mm)	OD25-01T1	B-49
25 mm ... 35 mm	1 µm	3 µm	± 10 µm	30 µm x 100 µm (30 mm)	OD30-05T1	B-49
65 mm ... 105 mm	5 µm	15 µm	± 40 µm	70 µm x 290 µm (85 mm)	OD85-20T1	B-49
250 mm ... 450 mm	50 µm	150 µm	± 200 µm	300 µm x 700 µm (350 mm)	OD350-100T1	B-50

[1] 6 % ... 90 % remission.

[2] Measurement on 90 % remission (ceramic, white), for OD25-x measurement on mirror; averaging set to: 256, for OD25-x: 4,096.

[3] Measurement on 90 % remission (ceramic, white), for OD25-x measurement on mirror.

[4] Measurement on 90 % remission (ceramic, white), for OD25-x measurement on mirror; averaging set to: 256, for OD25-x: 4,096; constant ambient conditions.

B

OD Max controller unit

Performance

Response time [1]	0.5 ms
Measuring frequency	10 kHz
Output rate	0.1 ms
Additional function	Arithmetic calculations Averaging settings 1 ... 4,096x Frequency filters Automatic sensitivity adjustment Manual sensitivity adjustment Timer functions 8 memory banks Hold functions Peak to peak measurement Peak measurement Bottom measurement Teach-in of analog outputs Teach-in of switching outputs Set hysteresis Internal data recorder Switching mode Distance to object (DtO) Switching mode Window (Wnd)
System part	OD Max sensor head OD25-x is only to be used with AODG-P/N1; all other types (OD350-x, OD85-x, OD30-x) are to be used with AOD-P/N1

[1] Automatic sensitivity adjustment ≤ 2 ms.

Interfaces

Analog output [1]	2 x –5 V ... +5 V (≥ 1 kΩ) 2 x 4 mA ... 20 mA (≤ 300 Ω)
Resolution analog output	16 bit
Error output (max. output current)	2 x alarm
Reference input	2 x zero-ref
Inputs for memory bank selection	3 x bank
Hold input	2 x hold, 1 x hold-reset
Data interface	RS-232

[1] Source of analog output is either sensor heads, or calculation result.

Mechanics/electronics

Supply voltage V_s [1]	DC 12 V ... 24 V
Power consumption [2]	6 W
Warm up time	≤ 5 min
Housing material	Polycarbonate and nylon 66
Connection type	Terminal board
Indication	1,4" color display
Weight [3]	240 g

[1] DC 12 V (-5 %) ... DC 24 V (+10 %).

[2] When connected with two sensor heads, incl. analog current output.

[3] Incl. terminal board.

Ambient data

Enclosure rating	IP 20
Protection class	III
Ambient temperature	Operation: –10 °C ... +45 °C Storage: –20 °C ... +60 °C
Max. rel. humidity (not condensing)	35 % ... 85 %
Vibration resistance	10 Hz ... 55 Hz (amplitude 1.5 mm, x-, y-, z-axis 2 hours each)
Shock resistance	50 G (x-, y-, z-axis 3 times each)

B

Ordering information

OD Max sensor head

OD25-01T1

- **Measuring range:** 24 mm ... 26 mm (6 % ... 90 % remission)
- **Resolution:** 0.1 μm (measurement on 90 % remission [ceramic, white], for OD25-x measurement on mirror; averaging set to: 256, for OD25-x: 4,096)
- **Repeatability:** 0.3 μm (measurement on 90 % remission [ceramic, white], for OD25-x measurement on mirror; averaging set to: 256, for OD25-x: 4,096; constant ambient conditions)
- **Linearity:** ± 2 μm (measurement on 90 % remission [ceramic, white], for OD25-x measurement on mirror)
- **Typ. light spot size (distance):** 25 μm x 35 μm (25 mm)

Note	Laser protection class [1]	Model name	Part no.
Requires AODG-x	1 (EN 60 825-1)	OD-25-01T1	6030977

[1] Wavelength 650 nm, max. output 390 μW.

OD30-05T1

- **Measuring range:** 25 mm ... 35 mm (6 % ... 90 % remission)
- **Resolution:** 1 μm (measurement on 90 % remission [ceramic, white], for OD25-x measurement on mirror; averaging set to: 256, for OD25-x: 4,096)
- **Repeatability:** 3 μm (measurement on 90 % remission [ceramic, white], for OD25-x measurement on mirror; averaging set to: 256, for OD25-x: 4,096; constant ambient conditions)
- **Linearity:** ± 10 μm (measurement on 90 % remission [ceramic, white], for OD25-x measurement on mirror)
- **Typ. light spot size (distance):** 30 μm x 100 μm (30 mm)

Note	Laser protection class [1]	Model name	Part no.
Requires AOD-x	2 (EN 60 825-1)	OD30-05T1	6028959

[1] Wavelength 650 nm, max. output 1 mW.

OD85-20T1

- **Measuring range:** 65 mm ... 105 mm (6 % ... 90 % remission)
- **Resolution:** 5 μm (measurement on 90 % remission [ceramic, white], for OD25-x measurement on mirror; averaging set to: 256, for OD25-x: 4,096)
- **Repeatability:** 15 μm (measurement on 90 % remission [ceramic, white], for OD25-x measurement on mirror; averaging set to: 256, for OD25-x: 4,096; constant ambient conditions)
- **Linearity:** ± 40 μm (measurement on 90 % remission [ceramic, white], for OD25-x measurement on mirror)
- **Typ. light spot size (distance):** 70 μm x 290 μm (85 mm)

Note	Laser protection class [1]	Model name	Part no.
Requires AOD-x	2 (EN 60 825-1)	OD85-20T1	6028958

[1] Wavelength 650 nm, max. output 1 mW.

B

OD350-100T1

- **Measuring range:** 250 mm ... 450 mm (6 % ... 90 % remission)
- **Resolution:** 50 µm (measurement on 90 % remission [ceramic, white], for OD25-x measurement on mirror; averaging set to: 256, for OD25-x: 4,096)
- **Repeatability:** 150 µm (measurement on 90 % remission [ceramic, white], for OD25-x measurement on mirror; averaging set to: 256, for OD25-x: 4,096; constant ambient conditions)
- **Linearity:** ± 200 µm (measurement on 90 % remission [ceramic, white], for OD25-x measurement on mirror)
- **Typ. light spot size (distance):** 300 µm x 700 µm (350 mm)

Note	Laser protection class [1]	Model name	Part no.
Requires AOD-x	2 (EN 60 825-1)	OD350-100T1	6028957

[1] Wavelength 650 nm, max. output 1 mW.

OD Max controller unit

Note	Switching output [1]	Model name	Part no.
Required for OD350-x, OD85-x, OD30-x	5 x PNP (100 mA)	AOD-P1	6028960
	5 x NPN (100 mA)	AOD-N1	6028961
Required for OD25-01T1	5 x PNP (100 mA)	AODG-P1	6030978
	5 x NPN (100 mA)	AODG-N1	6030979

[1] PNP: HIGH = V_S - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_S.

Dimensional drawings

0D25-01T1
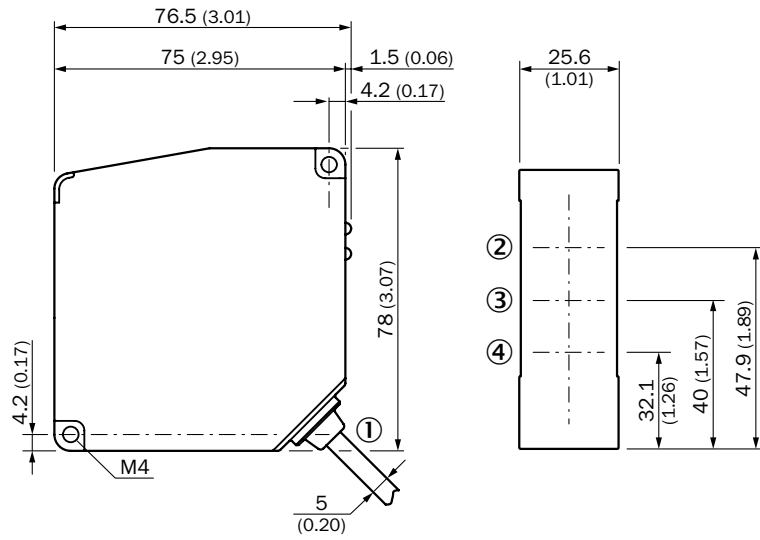
All dimensions in mm (inch)

① Cable Ø 5 mm, 0.5 m, with connector, 10-pin
② Optical axis, light spot (at 25 mm due to V-Optics with 17.5°)
③ Optical axis sender
④ Optical axis receiver
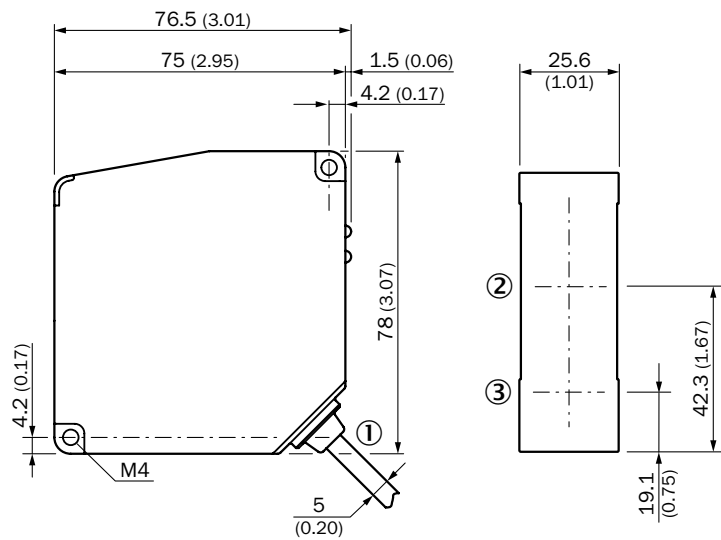
0D30-05T1
0D85-20T1

All dimensions in mm (inch)

① Cable Ø 5 mm, 0.5 m, with connector, 10-pin
② Optical axis receiver
③ Optical axis sender

B

OD350-100T1
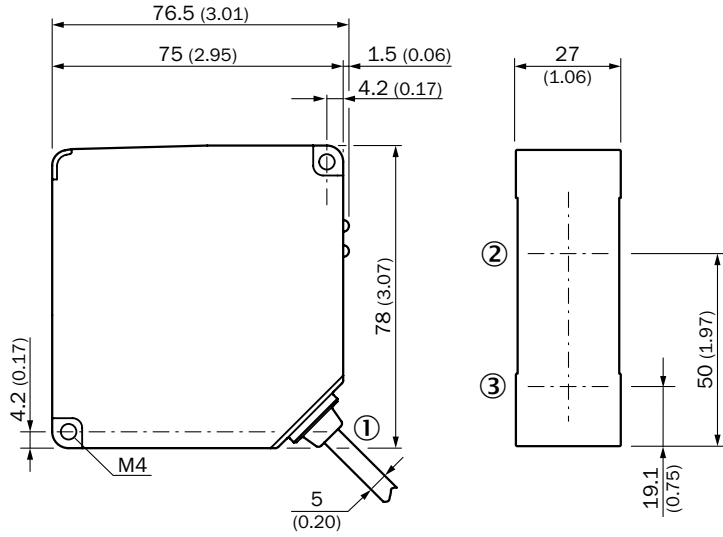
76.5 (3.01)
75 (2.95)
1.5 (0.06)
4.2 (0.17)
4.2 (0.17)
78 (3.07)
M4
5 (0.20)
①
②
③
27 (1.06)
50 (1.97)
19.1 (0.75)

All dimensions in mm (inch)

① Cable Ø 5 mm, 0.5 m, with connector, 10-pin
② Optical axis receiver
③ Optical axis sender

AOD-xx
AODG-xx

47 (1.85)
103 (4.06)
6.2 (0.24)
4.5 (0.18)
78 (3.07)
19.1 (0.75)
①
②
③ ③
14.7 (0.58)
7.7 (0.30)
65.4 (2.57)
22 (0.87)
27.4 (1.08)
27.4 (1.08)
20 (0.79)
④ ⑤ ⑥
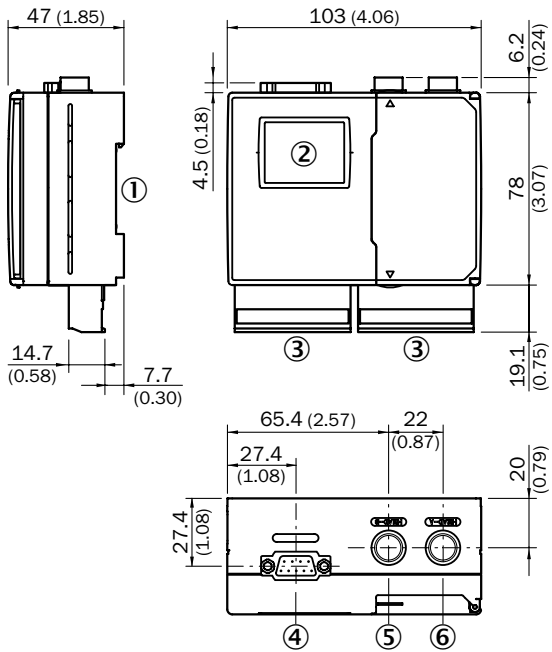
All dimensions in mm (inch)

① DIN rail mounting
② LC display
③ Terminal board (detachable)
④ RS-232C interface
⑤ Sensor head B connection port
⑥ Sensor head A connection port

Adjustments

ODxx-xxxx

Displacement-
Sensor

○ DISTANCE —④
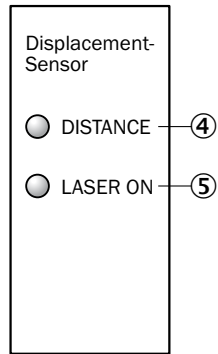
○ LASER ON —⑤

④ Distance indicator
⑤ Status indicator laser (laser on)

AOD-xx
AODG-xx

▲
◄ SELECT ►
▼
—⑦

(1 2 3) SET/RUN
ADJUST MODE

(BANK)

(LOCK) (ZERO A) (ZERO B)
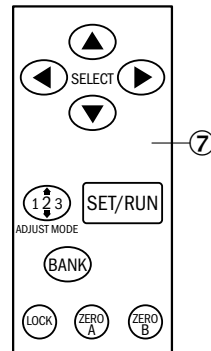
⑦ Control elements

B

Connection type and diagram

Note: Please be aware that Hirose connectors are used.

Sensor head
Hirose connector
10-pin

7	AOD
9	AOD
10	AOD
8	AOD
6	AOD
5	AOD
4	AOD
3	AOD
2	AOD
1	AOD

B

Controller unit
RS-232C

1	nc	①
2	RXD	
3	TXD	
4	nc	①
5	GND	
6	nc	①
7	nc	①
8	nc	①
9	nc	①

① Not connected

Controller unit
Terminal board

L

R

L

1	GND	①
2	12 V ... 24 V	
3	JDGE 1	②
4	JDGE 2	②
5	JDGE 3	②
6	JDGE 4	②
7	JDGE 5	②
8	ALM A	③
9	ALM B	③
10	ANG (V)	④
11	ANG (mA)	④
12	GND	①

1	GND	①
2	ANG (V)	④
3	ANG (mA)	④
4	nc	⑤
5	BANK 0	
6	BANK 1	
7	BANK 2	
8	HOLD A	
9	RST	
10	HOLD B	
11	ZERO A	
12	ZERO B	

R
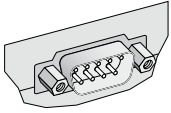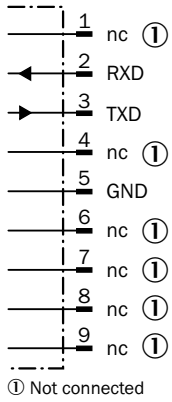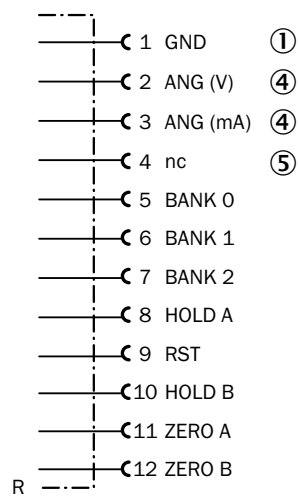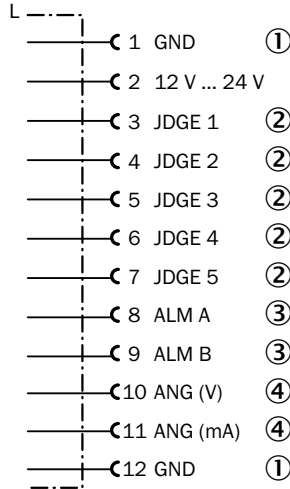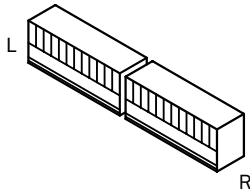
① Ground (0 V)
② Judgement Output = switching output
③ Alarm output
④ Analog output
⑤ Not connected

Light spot size

OD25-01T1
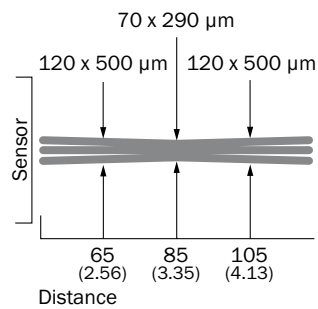
OD30-05T1

OD85-20T1

OD350-100T1

B
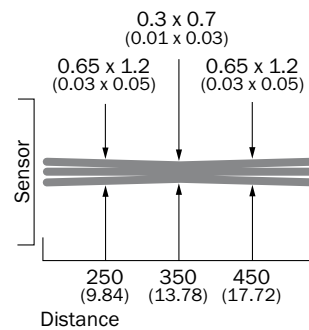
Recommended accessories

Plug connectors and cables

	Brief description	Model name	Part no.
	Connection cable, M12, 10-pin, connector straight/socket straight, 2 m	DSL-1210-G02M	6028943
	Connection cable, M12, 10-pin, connector straight/socket straight, 5 m	DSL-1210-G05M	6028944
	Connection cable, M12, 10-pin, connector straight/socket straight, 10 m	DSL-1210-G10M	6033614

Adapters/distributors

	Brief description	Model name	Part no.
	Terminal block for AOD (1 x R-coded and 1 x L-coded)	TERM.-AOD/AODG	6033129

For additional accessories including dimensional drawings, please see page J-301.

Three sensor heads in one controller unit: measuring each dimension with high precision

Triangulation	Performance		
Analog (mA) 4 ... 20	Analog (V) 0 ... 10	Laser class 1	Laser class 2
		1 0 ... 0	Window 1 0 ... 0

CE (III) **RS-232**
RS-422 USB RoHS 2002/95/EC
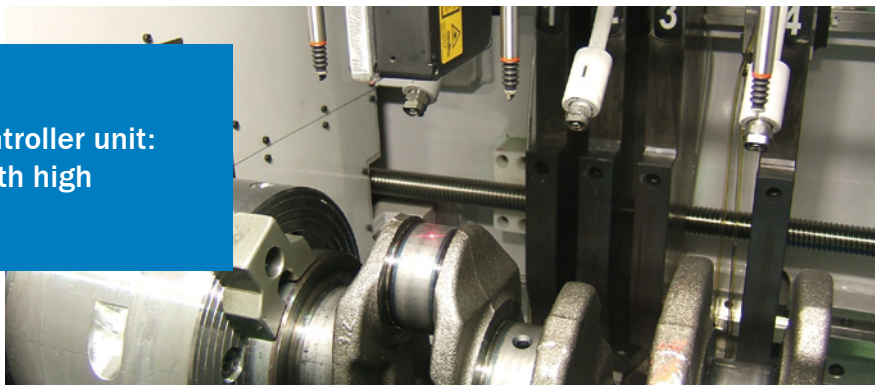
Additional information

Product description

The OD Precision is a high accuracy, optical measuring system for measuring difficult object surfaces. In addition to glossy and dark black surfaces, it can also measure transparent and semi-transparent materials. The OD Precision is the only short range distance sensor that can connect three sensors to one controller, which reduces the amount of hardware required and makes it easier to measure the x-, y- and z-axes., e.g. for measuring the evenness of surfaces. In order to reduce investment costs, the sensor can also be operated via RS-422, thus eliminating the need for controller unit.

At a glance

- Many measurement ranges from 24 mm ... 26 mm up to 300 mm ... 700 mm
- CMOS receiving element for measurement independent of surface
- High measuring accuracy and frequency
- Glass thickness measurement with just one sensor head
- Different light spot sizes
- Integrated calculations for up to three sensors
- Stand-alone use via RS-422

Your benefits

- Non-contact measurement improves quality inspection during production
- Surface-independent measurement algorithms ensure minimum machine downtime, regardless of surface gloss or color
- Reduced processing times as a result of the high measuring frequency of up to 10 kHz
- Simple, cost-effective solution for challenging measuring tasks due to a variety of sensor models
- Optional stand-alone operation via RS-422 means the OD Precision offers maximum performance at lower investment costs
- High visibility LC display enables simple, cost-effective setup
- Many interfaces for simple integration into an existing production environment

➜ www.mysick.com/en/OD_Precision

Detailed technical data

OD Precision sensor head

Performance

Light source	Laser, red
Additional function	Averaging 1 ... 4,096x Selectable measuring frequency (automatic / 0.1 ms ... 3.2 ms) Automatic sensitivity adjustment Manual sensitivity adjustment Anti interference mode Glass thickness measurement
System part	OD Precision sensor head

Interfaces

Laser-off input	1 x laser-off
Data interface	RS-422

Mechanics/electronics

Supply voltage V_s [1]	DC 12 V ... 24 V
Warm up time	≤ 5 min
Housing material	Aluminum housing with glass lens
Connection type [2]	0.5 m cable with connector
Indication	LEDs, 4" color display on optional controller unit
Weight [3]	250 g

[1] DC 12 V (-5 %) ... DC 24 V (+10 %).
[2] Extenable by cable to max. 50 m.
[3] Inclusive 0.5 m cable.

Ambient data

Enclosure rating	IP 67
Protection class	III
Ambient temperature	Operation: –10 °C ... +50 °C Storage: –20 °C ... +60 °C
Max. rel. humidity (not condensing)	35 % ... 85 %
Typ. ambient light safety	Artificial light: ≤ 3,000 lx Sunlight: ≤ 10,000 lx
Temperature drift	± 0.01 % FS/ °C (FS = Full Scale = Measuring range of sensor)
Vibration resistance	10 Hz ... 55 Hz (amplitude 1.5 mm, x-, y-, z-axis 2 hours each)
Shock resistance	50 G (x-, y-, z-axis 3 times each)

B

B

Specific data

Measuring range [1]	Resolution [2]	Repeatability [3]	Measuring frequency	Output rate [4]	Response time [5]	Model name	Ordering information
24 mm … 26 mm	0.02 µm	0.06 µm	10 kHz	0.1 ms	0.1 ms	OD5-25x01	B-60
25 mm … 35 mm	0.2 µm	0.6 µm	10 kHz	0.1 ms	0.1 ms	OD5-30x05	B-60
65 mm … 105 mm	1 µm	3 µm	10 kHz	0.1 ms	0.1 ms	OD5-85x20	B-60
250 mm … 450 mm	5 µm	15 µm	1.25 kHz	0.8 ms	0.8 ms	OD5-350x100	B-61
300 mm … 700 mm	10 µm	30 µm	1.25 kHz	0.8 ms	0.8 ms	OD5-500x200	B-61

[1] 6 % … 90 % remission.

[2] Measurement on 90 % remission (ceramic, white), for OD5-25x measurement on mirror; averaging set to: 4,096.

[3] Measurement on 90 % remission (ceramic, white), for OD5-25x measurement on mirror; averaging set to: 4,096; constant ambient conditions.

[4] Values for stand-alone use: baud rate set to 921.6 kBaud; sensitivity set manually.

[5] Automatic sensitivity adjustment ≤ 2 ms / ≤ 16 ms (OD5-350x and OD5-500x).

OD Precision controller

Performance

Measuring frequency [1]	10 kHz 1.25 kHz
Output rate	0.1 ms [1] 0.8 ms
Light source	Laser, red
Additional function	Arithmetic calculations Averaging 1 … 4,096x Selectable measuring frequency (automatic / 0.1 ms … 3.2 ms) Frequency filters Timer functions 16 memory banks Hold functions Peak to peak measurement Peak measurement Bottom measurement Teach-in of analog outputs Teach-in of switching outputs Set hysteresis Automatic sensitivity adjustment Manual sensitivity adjustment Anti interference mode Glass thickness measurement Switching mode Distance to object (DtO) Switching mode Window (Wnd)
System part	OD Precision controller unit
Note	OD Precision sensor head can be used with AOD5-P/N1 or stand-alone via RS-422

[1] Depending on connected sensor head; averaging deactivated; sensitivity set manually.

Interfaces

Analog output	3 x –10 V … +10 V (≥ 10 kΩ) 3 x 4 mA … 20 mA (≤ 300 Ω)
Resolution analog output	16 bit
Error output (max. output current) [1]	3 x alarm
Reference input [1]	4 x zero-ref
Inputs for memory bank selection [1]	4 x bank
Hold input [1]	4 x hold, 1 x hold-reset
Laser-off input [1]	3 x laser-off
Data interface	RS-232, USB

[1] With use of external 50-pin terminal (accessories).

B

Mechanics/electronics

Supply voltage V$_s$ [1]	DC 12 V ... 24 V
Power consumption [2]	≤ 10.8 W
Warm up time	≤ 5 min
Housing material	Polycarbonate and nylon 66
Connection type	Terminal board
Indication	4" color display
Weight [3]	550 g

[1] DC 12 V (-5 %) ... DC 24 V (+10 %).

[2] When connected with three sensor heads, incl. analog current output.

[3] Inclusive terminal board.

Ambient data

Enclosure rating	IP 20
Protection class	III
Ambient temperature	Operation: –10 °C ... +45 °C Storage: –20 °C ... +60 °C
Max. rel. humidity (not condensing)	35 % ... 85 %
Vibration resistance	10 Hz ... 55 Hz (amplitude 1.5 mm, x-, y-, z-axis 2 hours each)
Shock resistance	20 G (x-, y-, z-axis 3 times each)

B

Ordering information

OD Precision sensor head

OD5-25x01

- **Measuring range:** 24 mm ... 26 mm (6 % ... 90 % remission)
- **Resolution:** 0.02 μm (measurement on 90 % remission [ceramic, white], for OD5-25x measurement on mirror; averaging set to: 4,096)
- **Repeatability:** 0.06 μm (measurement on 90 % remission [ceramic, white], for OD5-25x measurement on mirror; averaging set to: 4,096; constant ambient conditions)
- **Measuring frequency:** 10 kHz
- **Output rate:** 0.1 ms (values for stand-alone use: baud rate set to 921.6 kBaud; sensitivity set manually)
- **Response time:** 0.1 ms (automatic sensitivity adjustment ≤ 2 ms / ≤ 16 ms [OD5-350x and OD5-500x])

Note	Laser protection class	Linearity [1]	Typ. light spot size (distance)	Model name	Part no.
OD Precision sensor head can be used with AOD5-P/N1 or stand-alone via RS-422	1 (EN 60 825-1)	± 1.6 μm	25 μm x 35 μm (25 mm)	OD5-25T01	6035975
			100 μm x 700 μm (25 mm)	OD5-25W01	6035976

[1] Measurement on 90 % remission (ceramic, white), for OD5-25x measurement on mirror.

OD5-30x05

- **Measuring range:** 25 mm ... 35 mm (6 % ... 90 % remission)
- **Resolution:** 0.2 μm (measurement on 90 % remission [ceramic, white], for OD5-25x measurement on mirror; averaging set to: 4,096)
- **Repeatability:** 0.6 μm (measurement on 90 % remission [ceramic, white], for OD5-25x measurement on mirror; averaging set to: 4,096; constant ambient conditions)
- **Measuring frequency:** 10 kHz
- **Output rate:** 0.1 ms (values for stand-alone use: baud rate set to 921.6 kBaud; sensitivity set manually)
- **Response time:** 0.1 ms (automatic sensitivity adjustment ≤ 2 ms / ≤ 16 ms [OD5-350x and OD5-500x])

Note	Laser protection class	Linearity [1]	Typ. light spot size (distance)	Model name	Part no.
OD Precision sensor head can be used with AOD5-P/N1 or stand-alone via RS-422	2 (EN 60 825-1)	± 10 μm	30 μm x 100 μm (30 mm)	OD5-30T05	6035977
		± 8 μm	260 μm x 1,000 μm (30 mm)	OD5-30W05	6035978

[1] Measurement on 90 % remission (ceramic, white), for OD5-25x measurement on mirror.

OD5-85x20

- **Measuring range:** 65 mm ... 105 mm (6 % ... 90 % remission)
- **Resolution:** 1 μm (measurement on 90 % remission [ceramic, white], for OD5-25x measurement on mirror; averaging set to: 4,096)
- **Repeatability:** 3 μm (measurement on 90 % remission [ceramic, white], for OD5-25x measurement on mirror; averaging set to: 4,096; constant ambient conditions)
- **Measuring frequency:** 10 kHz
- **Output rate:** 0.1 ms (values for stand-alone use: baud rate set to 921.6 kBaud; sensitivity set manually)
- **Response time:** 0.1 ms (automatic sensitivity adjustment ≤ 2 ms / ≤ 16 ms [OD5-350x and OD5-500x])

Note	Laser protection class	Linearity [1]	Typ. light spot size (distance)	Model name	Part no.
OD Precision sensor head can be used with AOD5-P/N1 or stand-alone via RS-422	2 (EN 60 825-1)	± 20 μm	70 μm x 290 μm (85 mm)	OD5-85T20	6035979
			260 μm x 1,200 μm (85 mm)	OD5-85W20	6035980

[1] Measurement on 90 % remission (ceramic, white), for OD5-25x measurement on mirror.

B

OD5-350x100

- **Measuring range:** 250 mm ... 450 mm (6 % ... 90 % remission)
- **Resolution:** 5 µm (measurement on 90 % remission [ceramic, white], for OD5-25x measurement on mirror; averaging set to: 4,096)
- **Repeatability:** 15 µm (measurement on 90 % remission [ceramic, white], for OD5-25x measurement on mirror; averaging set to: 4,096; constant ambient conditions)
- **Measuring frequency:** 1.25 kHz
- **Output rate:** 0.8 ms (values for stand-alone use: baud rate set to 921.6 kBaud; sensitivity set manually)
- **Response time:** 0.8 ms (automatic sensitivity adjustment ≤ 2 ms / ≤ 16 ms [OD5-350x and OD5-500x])

Note	Laser protection class	Linearity [1]	Typ. light spot size (distance)	Model name	Part no.
OD Precision sensor head can be used with AOD5-P/N1 or stand-alone via RS-422	2 (EN 60 825-1)	± 160 µm	700 µm x 2,400 µm (350 mm)	OD5-350W100	6035981

[1] Measurement on 90 % remission (ceramic, white), for OD5-25x measurement on mirror.

OD5-500x200

- **Measuring range:** 300 mm ... 700 mm (6 % ... 90 % remission)
- **Resolution:** 10 µm (measurement on 90 % remission [ceramic, white], for OD5-25x measurement on mirror; averaging set to: 4,096)
- **Repeatability:** 30 µm (measurement on 90 % remission [ceramic, white], for OD5-25x measurement on mirror; averaging set to: 4,096; constant ambient conditions)
- **Measuring frequency:** 1.25 kHz
- **Output rate:** 0.8 ms (values for stand-alone use: baud rate set to 921.6 kBaud; sensitivity set manually)
- **Response time:** 0.8 ms (automatic sensitivity adjustment ≤ 2 ms / ≤ 16 ms [OD5-350x and OD5-500x])

Note	Laser protection class	Linearity [1]	Typ. light spot size (distance)	Model name	Part no.
OD Precision sensor head can be used with AOD5-P/N1 or stand-alone via RS-422	2 (EN 60 825-1)	± 400 µm	1,000 µm x 3,700 µm (500 mm)	OD5-500W200	6035982

[1] Measurement on 90 % remission (ceramic, white), for OD5-25x measurement on mirror.

OD Precision controller unit

Switching output [1] [2]	Model name	Part no.
5 x PNP (100 mA)	AOD5-P1	6035985
5 x NPN (100 mA)	AOD5-N1	6035984

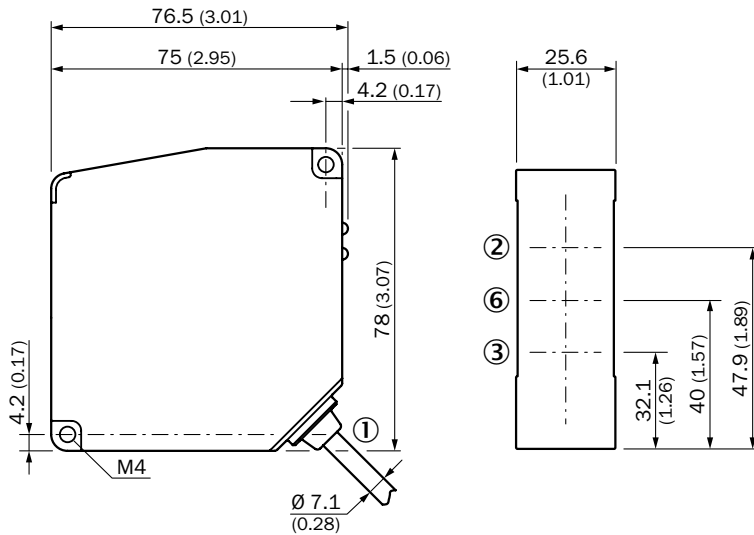[1] PNP: HIGH = V_S - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_S.
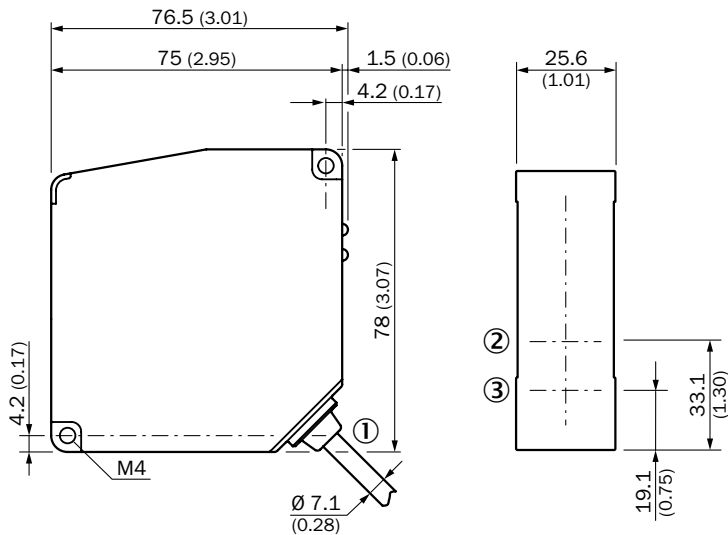[2] With use of external 50-pin terminal (accessories).

B

Dimensional drawings

OD5-25xxx

All dimensions in mm (inch)

① Cable Ø 7.1 mm, 0.5 m, with connector, 12-pin
② Optical axis receiver
③ Optical axis sender
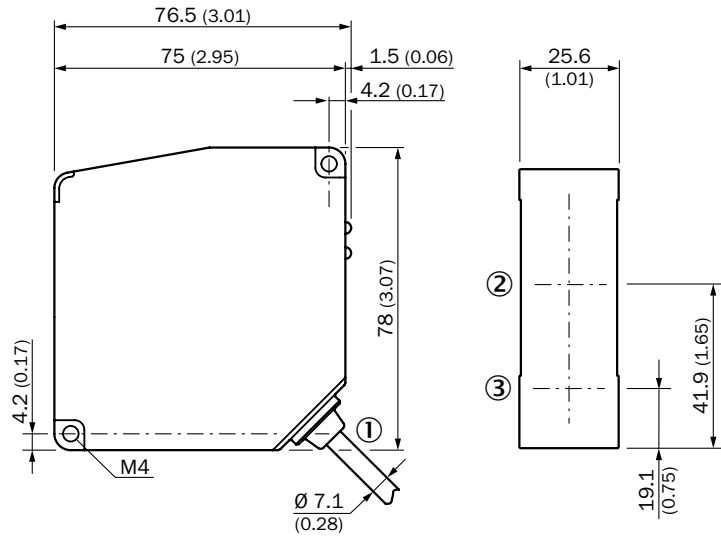⑥ Optical axis, light spot (at 25 mm due to V-Optics with 17.5°)

OD5-30xxx

All dimensions in mm (inch)

① Cable Ø 7.1 mm, 0.5 m, with connector, 12-pin
② Optical axis receiver
③ Optical axis sender

B

OD5-85xxx

76.5 (3.01)
75 (2.95)
1.5 (0.06)
4.2 (0.17)
78 (3.07)
4.2 (0.17)
M4
Ø 7.1 (0.28)
①

25.6 (1.01)
②
③
41.9 (1.65)
19.1 (0.75)
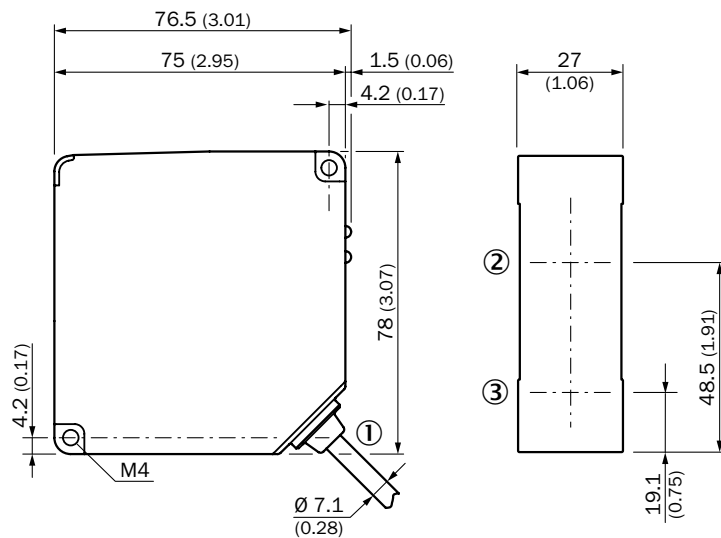
All dimensions in mm (inch)

① Cable Ø 7.1 mm, 0.5 m, with connector, 12-pin
② Optical axis receiver
③ Optical axis sender

OD5-350xxxx

76.5 (3.01)
75 (2.95)
1.5 (0.06)
4.2 (0.17)
78 (3.07)
4.2 (0.17)
M4
Ø 7.1 (0.28)
①

27 (1.06)
②
③
48.5 (1.91)
19.1 (0.75)
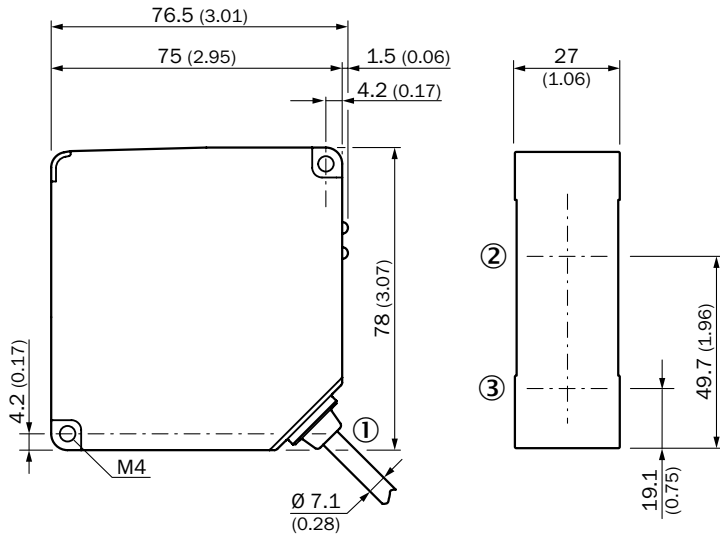
All dimensions in mm (inch)

① Cable Ø 7.1 mm, 0.5 m, with connector, 12-pin
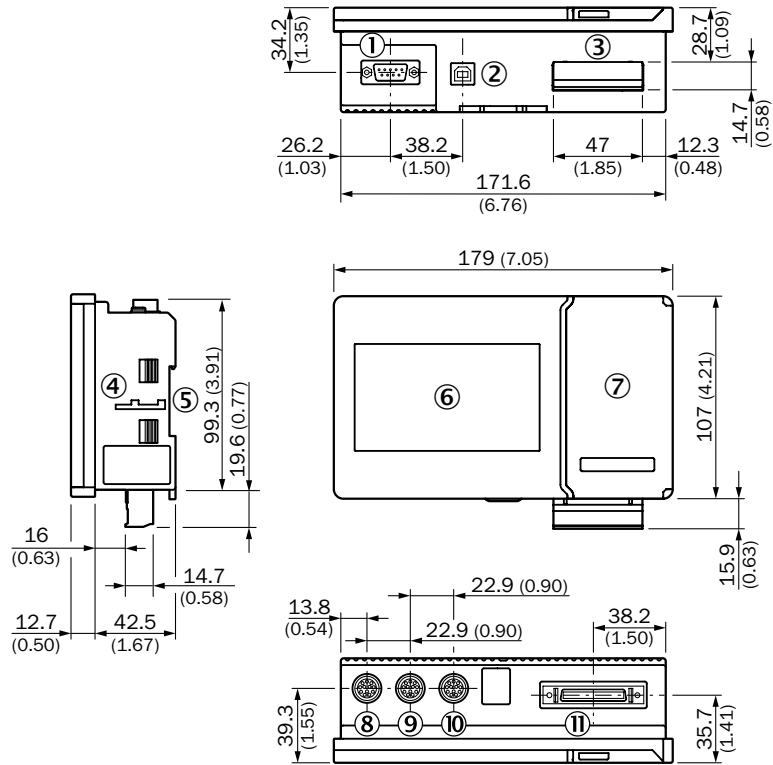② Optical axis receiver
③ Optical axis sender

OD5-500xxxx

B

All dimensions in mm (inch)

① Cable Ø 7.1 mm, 0.5 m, with connector, 12-pin
② Optical axis receiver
③ Optical axis sender

AOD5-xx
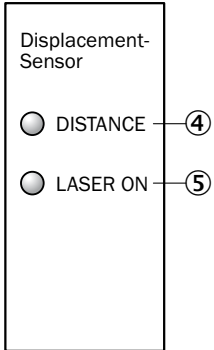

All dimensions in mm (inch)

① RS-232C interface
② USB interface
③ Terminal board (detachable)
④ For panel mounting bracket (recommended window size 173 mm x 102 mm)
⑤ DIN rail mounting
⑥ LC display
⑦ Control elements
⑧ Sensor head A connection port
⑨ Sensor head B connection port
⑩ Sensor head C connection port
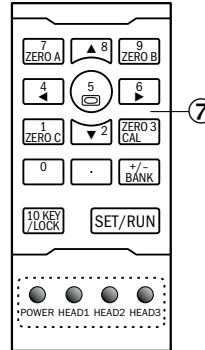⑪ External input and output terminal (see accessories IO-EXP-AOD5)

Adjustments

OD5-xxxxx

Displacement-Sensor

◯ DISTANCE —④

◯ LASER ON —⑤

④ Distance indicator
⑤ Status indicator laser (laser on)

AOD5-xx

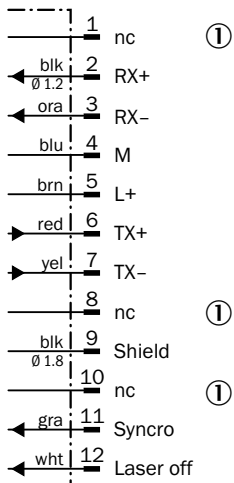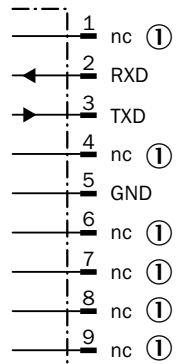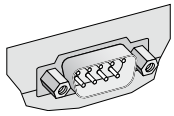| 7 ZERO A | ▲ 8 | 9 ZERO B |
4 ◄	5 ⬜	6 ►
1 ZERO C	▼ 2	ZERO 3 CAL
0	.	+/– BANK
10 KEY /LOCK		SET/RUN

POWER HEAD1 HEAD2 HEAD3 —⑦

⑦ Control elements

Connection type and diagram

Note: Please be aware that Hirose connectors are used.

Sensor head
Hirose connector
12-pin

	1	nc ①
blk Ø 1.2	2	RX+
ora	3	RX–
blu	4	M
brn	5	L+
red	6	TX+
yel	7	TX–
	8	nc ①
blk Ø 1.8	9	Shield
	10	nc ①
gra	11	Syncro
wht	12	Laser off

① Not connected

**Controller unit
RS-232C**

1	nc ①
2	RXD
3	TXD
4	nc ①
5	GND
6	nc ①
7	nc ①
8	nc ①
9	nc ①

① Not connected

**Controller unit
Terminal board**

1	24 V
2	0 V GND ①
3	Q_{A3} (mA)
4	GND ①
5	Q_{A2} (mA)
6	GND ①
7	Q_{A1} (mA)
8	Q_{A3} (V)
9	GND ①
10	Q_{A2} (V)
11	GND ①
12	Q_{A1} (V)

① Ground (0 V)

Light spot size

OD5-25T01

25 x 35 µm
85 x 120 µm | 70 x 100 µm

Sensor

24 (0.94) | 25 (0.98) | 26 (1.02)

Distance

All dimensions in mm (inch)

OD5-25W01

100 x 700 µm
200 x 700 µm | 200 x 700 µm

Sensor

24 (0.94) | 25 (0.98) | 26 (1.02)

Distance

All dimensions in mm (inch)

OD5-30T05

30 x 100 µm
60 x 270 µm | 60 x 270 µm

Sensor

25 (0.98) | 30 (1.18) | 35 (1.38)

Distance

All dimensions in mm (inch)

OD5-30W05

0.26 x 1.0 (0.01 x 0.04)
0.45 x 1.0 (0.02 x 0.04) | 0.45 x 1.0 (0.02 x 0.04)

Sensor

25 (0.98) | 30 (1.18) | 35 (1.38)

Distance

All dimensions in mm (inch)

OD5-85T20

70 x 290 µm
120 x 500 µm | 120 x 500 µm

Sensor

65 (2.56) | 85 (3.35) | 105 (4.13)

Distance

All dimensions in mm (inch)

OD5-85W20

0.26 x 1.2 (0.01 x 0.05)
0.45 x 1.2 (0.02 x 0.05) | 0.45 x 1.2 (0.02 x 0.05)

Sensor

65 (2.56) | 85 (3.35) | 105 (4.13)

Distance
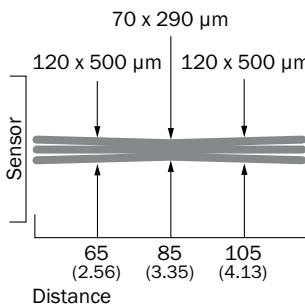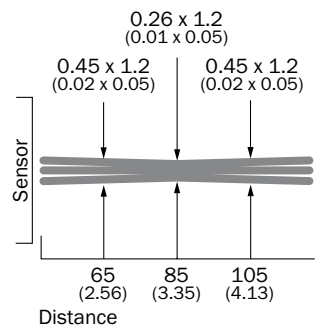
All dimensions in mm (inch)

OD5-350W100

0.7 x 2.4 (0.03 x 0.09)
0.9 x 2.3 (0.04 x 0.09) | 1.1 x 2.5 (0.04 x 0.10)

Sensor

250 (9.84) | 350 (13.78) | 450 (17.72)

Distance
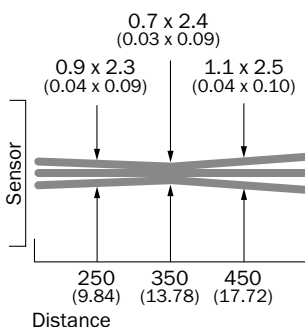
All dimensions in mm (inch)

OD5-500W200

1.0 x 3.7 (0.04 x 0.15)
1.2 x 3.1 (0.05 x 0.12) | 1.3 x 4.3 (0.05 x 0.17)

Sensor

300 (11.81) | 500 (19.69) | 700 (27.56)

Distance

All dimensions in mm (inch)

B
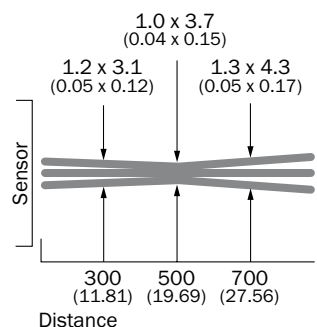
Recommended accessories

Adapters/distributors

	Brief description	Model name	Part no.
	External in- and output terminal, 50-pin, and cable, PVC, 3 m, open ends	IO-EXP-AOD5	6035990
	Terminal block for AOD5-P1/AOD5-N1 (OD Precision)	TERM.-AOD5	6035989

B

Plug connectors and cables

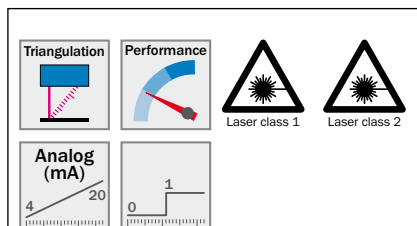|	Brief description	Model name	Part no.
Illustration may differ	Female connector, M12, 12-pin, straight, 5 m, PVC, shielded (for stand-alone use)	DOL-1212-G05M	6035988
	Connection cable, M12, 12-pin, connector straight/socket straight, 2 m	DSL-1212-G02M	6035986
	Connection cable, M12, 12-pin, connector straight/socket straight, 5 m	DSL-1212-G05M	6035987

Remark on glass thickness measurement

Model name	Min. glass thickness	Max. glass thickness	Min. glass gap	Max. thickness of glass in front of gap	Remark
OD5-25T01	0.2 mm	2 mm	Not supported	Not supported	Not supported
OD5-25W01	0.3 mm	2 mm	Not supported	Not supported	Not supported
OD5-30T05	0.7 mm	5 mm	0.5 mm	5 mm	Only half of the measuring range is available
OD5-30W05	0.9 mm	5 mm	0.6 mm	5 mm	Only half of the measuring range is available
OD5-85T20	2 mm	20 mm	1.4 mm	20 mm	Only half of the measuring range is available
OD5-85W20	2 mm	20 mm	1.4 mm	20 mm	
OD5-350W100	Not supported	Not supported	Not supported	Not supported	Not supported
OD5-500W200	Not supported	Not supported	Not supported	Not supported	Not supported

B

Reliable, accurate distance measurement up to 1 m

Triangulation

Performance

Laser class 1

Laser class 2

Analog (mA)

4 — 20

0 — 1

CE □ **CDRH**

Additional information

Product description

DT20 Hi distance sensor is the ideal choice for quality control tasks from a distance of up to 1 m. The reliable and precise distance measurement independent of any color, enables consistent check of any component. In addition, a precise red laser makes it possible to accurately detect very small objects. The DT20 Hi's exceptional measurement performance and advanced settings are ideal for solving nearly any demanding measurement task.

At a glance

- Four measuring ranges from 50 mm up to 1,000 mm
- Very high linearity of up to ± 0.5 mm
- CMOS receiving element enables accurate distance measurement independent of color or brightness
- Red laser
- Freely scaleable analog and switching output
- Display with easy-to-use setup menu
- Advanced settings (e.g., averaging function, external laser-off, etc.)

Your benefits

- Reliable, precise measurement, independent of surface, increases production quality
- Reliable and consistent measurements, regardless of color, reduce changeover time
- Advanced settings provide increased application flexibility to easily solve customer-specific applications
- Fast commissioning via button, remote or numerical teach
- Easy, precise alignment and verification based on red laser light and LC display, decreasing commissioning time
- Tough metal housing permits operation in harsh environments

→ www.mysick.com/en/DT20_Hi

Detailed technical data

Performance

Output rate	< 2.8 ms
Light source	Laser, red
Additional function	Set moving averaging: fast/medium/slow Switching mode: distance to object (DtO) Teach-in of switching output Switching output invertable Teach-in of analog output Invertible analog output Multifunctional input: laser-off, external teach-in, deactivated Switch off display Lock user interface

Interfaces

Analog output	1 x 4 mA ... 20 mA (≤ 300 Ω)
Resolution analog output	12 bit
Multifunctional input [1]	1 x MF

[1] MF can be used as laser-off, external teach-in or deactivated.

Mechanics/electronics

Supply voltage V_s [1]	DC 10 V ... 30 V
Ripple [2]	≤ 5 V_{pp}
Power consumption [3]	≤ 1.8 W
Warm up time	≤ 10 min
Housing material	Metal housing with PMMA lens
Connection type	Connector M12, 5-pin
Indication	LC display, 2 x LED
Weight	135 g

[1] Limit values, reverse-polarity protected, operation in short-circuit protected network, max. 8 A.

[2] May not fall short of or exceed V_S tolerances.

[3] Without load.

Ambient data

Enclosure rating	IP 65
Protection class	II
Ambient temperature [1]	Operation: –20 °C ... +55 °C Storage: –40 °C ... +60 °C
Temperature drift [2]	0.25 mm/K
Typ. ambient light safety	Artificial light: ≤ 3,000 lx Sunlight: ≤ 10,000 lx
Vibration resistance	EN 60068-2-6 / -2-64
Shock resistance	EN 60068-2-27 / -2-29

[1] Operating temperature at V_S = 24 V.

[2] 0.5 mm/K for distances > 600 mm.

B

Specific data

Measuring range [1]	Resolution [1]	Repeatability [1] [3] [4]	Linearity [4] [5]	Typ. light spot size (distance)	Model name	Ordering information
50 mm … 150 mm	0.1 mm	0.5 mm / 0.25 mm / 0.125 mm	± 0.5 mm	2 mm x 4 mm (150 mm)	DT20-x254Bx	B-72
100 mm … 300 mm	0.2 mm	1 mm / 0.5 mm / 0.25 mm	± 1 mm	3 mm x 6 mm (300 mm)	DT20-x244Bx	B-72
100 mm … 600 mm	0.5 mm	2 mm / 1 mm / 0.5 mm	± 2 mm	3 mm x 6 mm (600 mm)	DT20-x214Bx	B-73
100 mm … 1,000 mm	1 mm [2]	10 mm / 5 mm / 2.5 mm [2]	± 6 mm [2]	6 mm x 12 mm (1000 mm)	DT20-x224Bx	B-73

[1] 6 % … 90 % remission.

[2] The models with measuring range of 100 mm … 1,000 mm meets the specification of the models with measuring range of 100 mm … 1,000 mm for distances < 600 mm.

[3] Dependent on the set average: fast/medium/slow.

[4] When calibrated in the application regularly.

[5] 90 % remission.

Ordering information

DT20-x254Bx

- **Measuring range:** 50 mm … 150 mm (6 % … 90 % remission)
- **Resolution:** 0.1 mm (6 % … 90 % remission)
- **Repeatability:** 0.5 mm / 0.25 mm / 0.125 mm (6 % … 90 % remission; dependent on the set average: fast/medium/slow; when calibrated in the application regularly)
- **Linearity:** ± 0.5 mm (when calibrated in the application regularly; 90 % remission)
- **Typ. light spot size (distance):** 2 mm x 4 mm (150 mm)

Laser protection class	Measuring frequency	Response time [1]	Switching output [2]	Model name	Part no.
2 (EN 60 825-1)	400 Hz	2.5 ms / 10 ms / 40 ms	1 x PNP (100 mA)	DT20-P254B	1041278
			1 x NPN (100 mA)	DT20-N254B	1041279

[1] Dependent on the set average: fast/medium/slow.

[2] PNP: HIGH = V_S - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_S.

DT20-x244Bx

- **Measuring range:** 100 mm … 300 mm (6 % … 90 % remission)
- **Resolution:** 0.2 mm (6 % … 90 % remission)
- **Repeatability:** 1 mm / 0.5 mm / 0.25 mm (6 % … 90 % remission; dependent on the set average: fast/medium/slow; when calibrated in the application regularly)
- **Linearity:** ± 1 mm (when calibrated in the application regularly; 90 % remission)
- **Typ. light spot size (distance):** 3 mm x 6 mm (300 mm)

Laser protection class	Measuring frequency	Response time [1]	Switching output [2]	Model name	Part no.
2 (EN 60 825-1)	400 Hz	2.5 ms / 10 ms / 40 ms	1 x PNP (100 mA)	DT20-P244B	1040406
			1 x NPN (100 mA)	DT20-N244B	1040713
1 (EN 60 825-1)	400 Hz	2.5 ms / 10 ms / 40 ms	1 x PNP (100 mA)	DT20-P244BS04	1052829

[1] Dependent on the set average: fast/medium/slow.

[2] PNP: HIGH = V_S - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_S.

B

DT20-x214Bx

- **Measuring range:** 100 mm ... 600 mm (6 % ... 90 % remission)
- **Resolution:** 0.5 mm (6 % ... 90 % remission)
- **Repeatability:** 2 mm / 1 mm / 0.5 mm (6 % ... 90 % remission; dependent on the set average: fast/medium/slow; when calibrated in the application regularly)
- **Linearity:** ± 2 mm (when calibrated in the application regularly; 90 % remission)
- **Typ. light spot size (distance):** 3 mm x 6 mm (600 mm)

Laser protection class	Measuring frequency	Response time [1]	Switching output [2]	Model name	Part no.
2 (EN 60 825-1)	400 Hz	2.5 ms / 10 ms / 40 ms	1 x PNP (100 mA)	DT20-P214B	1040012
			1 x NPN (100 mA)	DT20-N214B	1040140
1 (EN 60 825-1)	200 Hz	5 ms / 20 ms / 80 ms	1 x PNP (100 mA)	DT20-P214BS03	1051547

[1] Dependent on the set average: fast/medium/slow.
[2] PNP: HIGH = V_S - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_S.

DT20-x224Bx

- **Measuring range:** 100 mm ... 1,000 mm (6 % ... 90 % remission)
- **Resolution:** 1 mm (6 % ... 90 % remission; the models with measuring range of 100 mm ... 1,000 mm meets the specification of the models with measuring range of 100 mm ... 1,000 mm for distances < 600 mm)
- **Repeatability:** 10 mm / 5 mm / 2.5 mm (6 % ... 90 % remission; the models with measuring range of 100 mm ... 1,000 mm meets the specification of the models with measuring range of 100 mm ... 1,000 mm for distances < 600 mm; dependent on the set average: fast/medium/slow; when calibrated in the application regularly)
- **Linearity:** ± 6 mm (the models with measuring range of 100 mm ... 1,000 mm meets the specification of the models with measuring range of 100 mm ... 1,000 mm for distances < 600 mm; when calibrated in the application regularly; 90 % remission)
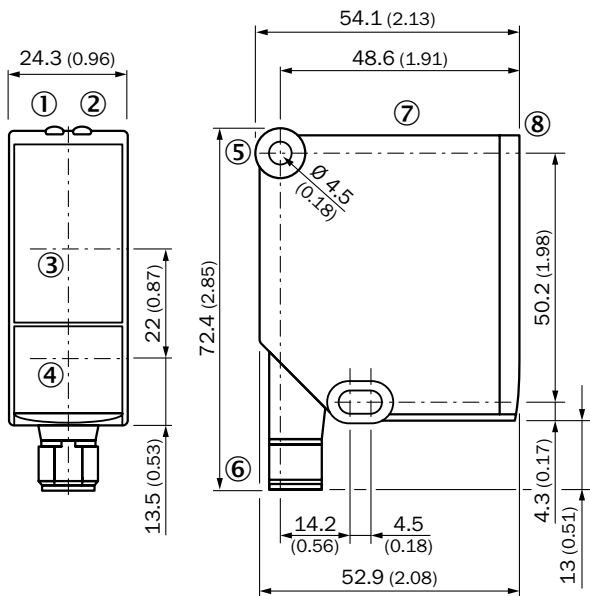- **Typ. light spot size (distance):** 6 mm x 12 mm (1000 mm)

Laser protection class	Measuring frequency	Response time [1]	Switching output [2]	Model name	Part no.
2 (EN 60 825-1)	400 Hz	2.5 ms / 10 ms / 40 ms	1 x PNP (100 mA)	DT20-P224B	1040405
			1 x NPN (100 mA)	DT20-N224B	1044216

[1] Dependent on the set average: fast/medium/slow.
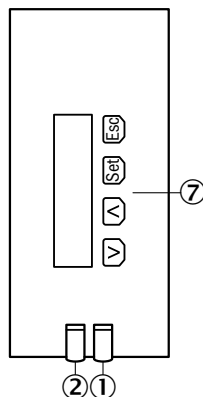[2] PNP: HIGH = V_S - (< 2 V) / LOW = < 2 V; NPN: HIGH = < 2 V / LOW = V_S.

B

Dimensional drawing

All dimensions in mm (inch)

① Status indicator power on (green)
② Status indicator switching output (orange)
③ Optical axis, receiver
④ Optical axis, sender
⑤ Mounting hole
⑥ Connector M12, 5-pin
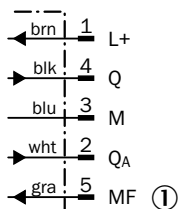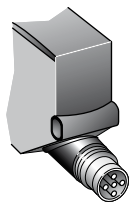⑦ Operationg keys and display
⑧ Reference surface = 0 mm

Adjustments

① Status indicator power on (green)
② Status indicator switching output (orange)
⑦ Operationg keys and display

Connection type and diagram

**Connector
M12, 5-pin**

brn	1	L+
blk	4	Q
blu	3	M
wht	2	Q_A
gra	5	MF ①

① Multifunctional input

Recommended accessories

Mounting brackets/plates

	Brief description	Model name	Part no.
	Mounting bracket, stainless steel (1.4404), without mounting material, for DT20 Hi	BEF-WN-DT20	4043524

Plug connectors and cables

	Brief description	Model name	Part no.
Illustration may differ	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899
	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544
Illustration may differ	Female connector, M12, 5-pin, angled, 2 m, PVC	DOL-1205-W02M	6008900
	Female connector, M12, 5-pin, angled, 5 m, PVC	DOL-1205-W05M	6009869
	Female connector, M12, 5-pin, angled, 10 m, PVC	DOL-1205-W10M	6010542

B

The perfect combination of range, reliability, precision and price

SICK's mid range distance sensors pro-vide sensing ranges from 80 mm up to 50,000 mm, enabling them to be used in a wide range of applications. Due to their highly reliable measurements on objects of different colors and textures, process reliability can be improved. Plus, all sensors have easy-to-understand setup and programming, ensuring they can be commissioned quickly. The perfect com-bination of range, reliability, precision and price.

Your benefits

- Many different measuring ranges make it easy to find the perfect solution
- High ambient light safety increases machine uptime
- Highly reliable measurements in-crease process quality and stability
- Simple operating concepts ensure fast and easy commissioning
- Wide range of accessories allows easy, fast and cost-effective commis-sioning
- Low investment costs and high to very high performance levels ensure a quick return on investment
- Solid mechanical sensor design per-mits operation in harsh environments
- Analog output allows one sensor to solve several applications, reducing purchasing and engineering costs

C

Mid range distance sensors

Mid range distance sensors set new standards with HDDM technology

SICK's many years of experience and the constant advances in distance sensor technology are reflected in the innovative HDDM (high definition distance measurement) products. The unique statistical pulse time-of-flight method forms the technical basis for maximum reliability and high precision with an outstanding price/performance ratio. Using this time-of-flight method, the products of the Dx50 family are able to measure distances up to 50 m with millimeter precision.

C

- High performance
- High precision
- Maximum ambient light safety
- Maximum reliability
- Excellent price/performance ratio

- Large operating temperature range
- Intuitive operation
- Solid metal housing
- Easy to up- or downgrade, which ensures great versatility and future reliability
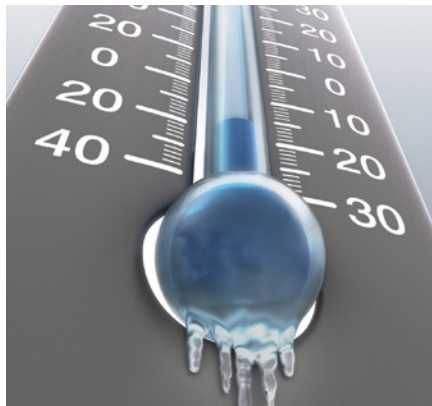- Wide variety of accessories

The advantages of the new technology make the mid range distance sensors extremely versatile.

C

Measure up to 50 m
Sensing ranges up to 50 m combined with a high-visibility laser spot provide a diverse range of application possibilities.

Large operating temperature range from –30 to +65 °C
Indoor and outdoor, summer and winter – the large operating temperature range makes the mid range distance sensors particularly flexible and suitable for a wide range of applications.

Maximum ambient light safety
The mid range distance sensors are not impacted by ambient light, guaranteeing trouble-free operation and reliable measurement of distances, both indoors and outdoors.
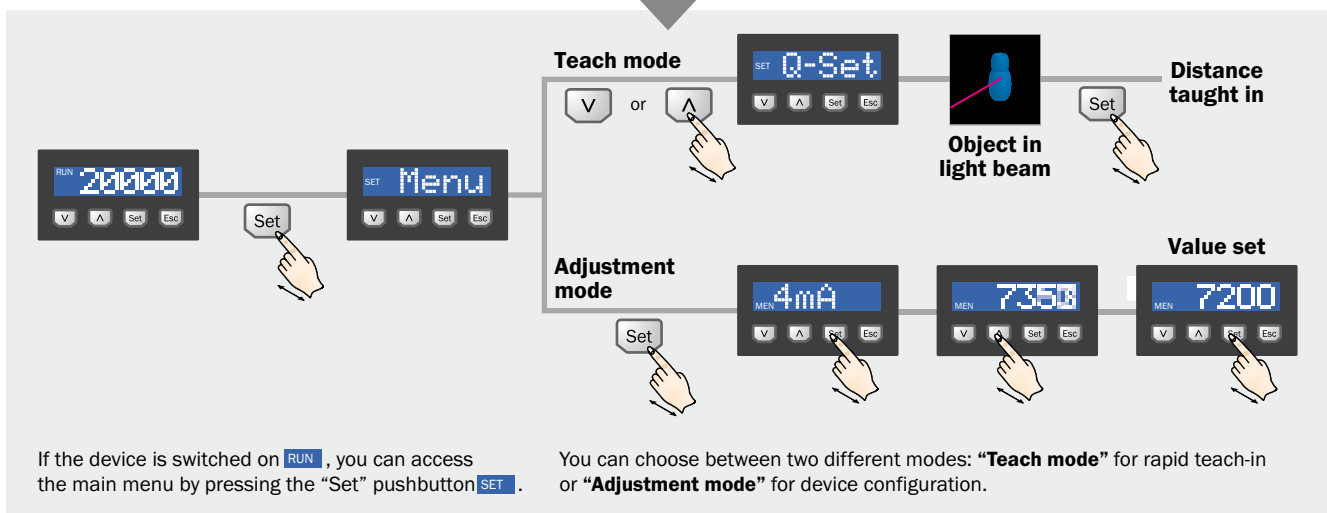
Intuitive operation
The simple and consistent operating concept of the mid range distance sensors helps you to reach your target at the speed of light.

Wide variety of accessories
Versatile connector technology, mounting brackets customized for the specific industry and a variety of protective devices complete the product offering.

If the device is switched on RUN , you can access the main menu by pressing the "Set" pushbutton SET .

You can choose between two different modes: **"Teach mode"** for rapid teach-in or **"Adjustment mode"** for device configuration.

A detailed representation of the product-specific user interface can be found in chapter C of the respective product.

C

Typical areas of application

Due to their reliability, flexibility and solid design, the mid range distance sensors are suitable for a variety of applications, e. g., in the logistics, timber and automotive industries.
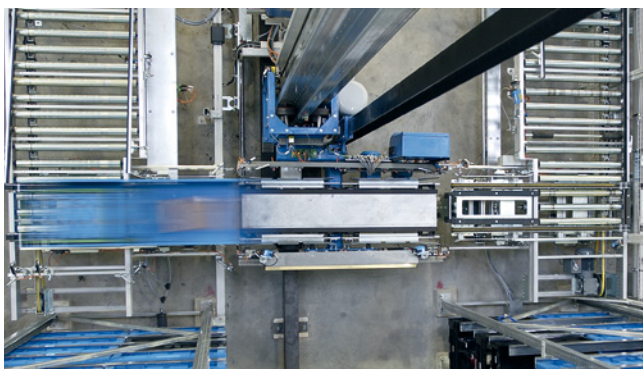
Version variety

The mid range distance sensors are available in a multitude of variations and specifications. We have the ideal product for every application:
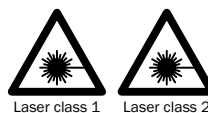
Laser classes 1 and 2
The Dx50 mid range distance sensors emit a high-precision laser beam compliant with the harmless and eye-safe class 1 and the more powerful class 2, which is also classified as safe.

Measurement to object or reflector
Outstanding features of the Dx50 distance sensors include minimal black/white offset when measuring to objects, an impressive sensing range when measuring to reflectors, and reliable background suppression.
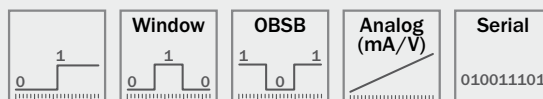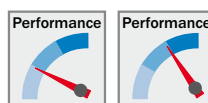
Interfaces
Analog, switching and serial interfaces are available as part of the Dx50 product family, ensuring that you will always find the right solution for your application.
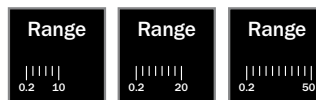
Sensing range
The maximum sensing range of the mid range distance sensors falls between 10 and 50 m. The sensors designed for reflector operation have the largest ranges.

Performance (repeatability, response time, etc.)
The measuring results of the Dx50 product family are excellent. In comparison to the standard versions, the high-end versions offer even better performance characteristics.

Interfaces

DtO: Distance to Object

Application area
- Simple detection of objects that exceed a switching threshold

Typical application
- Detecting a diverse range of objects
- Approach of a final switching point
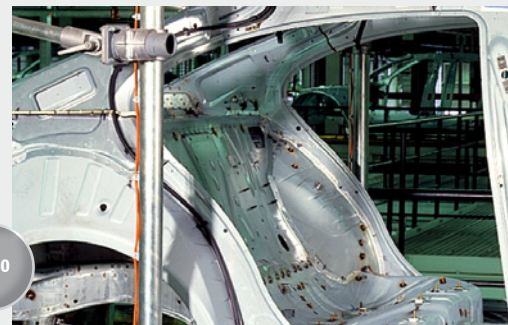- Checking storage space occupancy
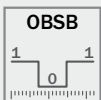
All Dx50

Wnd: window

Application area
- Precise checking of a nominal dimension
  - Teach-in of two distances that result in a window. A switching signal is generated for all measurements between these switching thresholds.

Typical application
- Checking the installation position of screws, rails or other body parts

DS50

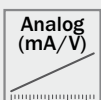### OBSB: Object Between Sensor and Background

Application area
- Detecting highly reflective or extremely dark objects
  - The background is taught in. All objects with a distance that differs from this background are reliably detected.

Typical application
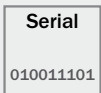- Reliable detection of vehicles for the muting of safety light curtains

DS50

Analog output

Application area
- Simple positioning or process control tasks

Typical application
- Robot positioning
- Fill level monitoring of non-liquid materials

DT50
DT50 Hi
DL50

RS-422

Application area
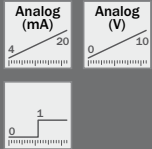- Precise positioning or control over a large measuring range
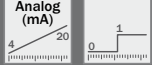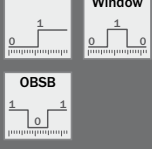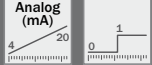
Typical application
- Positioning of pallet transfer cars
- Vertical positioning of storage and retrieval systems

DL50 Hi

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Time Of Flight		Laser protection class	Interfaces	Measuring range Repeatability Response time
				200 mm — **1,000 mm**
DT50	Performance	Laserklasse 1 / Laserklasse 2	Analog (mA) / Analog (V)	**200 mm ... 10,000 mm** **5 mm/2.5 mm** 20 ms/30 ms (LC2 *))
				200 mm ... 10,000 mm **5 mm/2.5 mm** 20 ms/30 ms (LC1 *))
DT50 Hi	Performance	Laserklasse 1 / Laserklasse 2	Analog (mA)	**200 mm ... 20,000 mm** **3 mm/2 mm/1 mm** 15 ms/30 ms/80 ms (LC2 *))
				200 mm ... 13,000 mm **3 mm/2 mm/1 mm** 15 ms/30 ms/80 ms (LC1 *))
DS50	Performance	Laserklasse 1 / Laserklasse 2	Window / OBSB	**200 mm ... 10,000 mm** **5 mm/2.5 mm** 10 ms/50 ms (LC2 *))
				200 mm ... 10,000 mm **5 mm/2.5 mm** 20 ms/100 ms (LC1 *))
DL50	Reflector / Performance	Laserklasse 1	Analog (mA)	**200 mm ... 50,000 mm** **3 mm/2 mm** 15 ms/30 ms
DL50 Hi	Reflector / Performance	Laserklasse 1	RS-422	**200 mm ... 50,000 mm** **0.5 mm/0.3 mm/0.25 mm** 10 ms/40 ms/160 ms

*) LC1 = Laser protection class 1; LC2 = Laser protection class 2.

200 mm — **1,000 mm**

10,000 mm

100 m

10,000 mm

100 m

Product family overview

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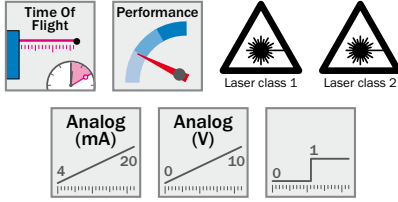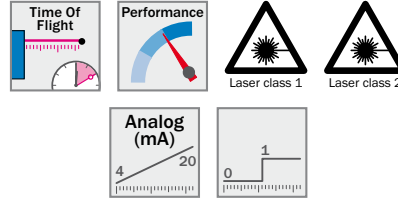
	DT50	DT50 Hi	
	The universal distance measurement solution up to 10 m	Compact size delivers exceptional performance up to 20 m	
Technical data overview			
Measuring range	200 mm ... 10,000 mm	200 mm ... 20,000 mm 200 mm ... 13,000 mm	
Repeatability	5 mm / 2.5 mm	3 mm / 2 mm / 1 mm	
Accuracy	± 10 mm	± 7 mm	
Response time	20 ms / 30 ms	15 ms / 30 ms / 80 ms	
Interfaces overview	1 x 4 mA ... 20 mA, 1 x switching output and 1 x multifunctional input 1 x 0 V ... 10 V, 1 x switching output and 1 x multifunctional input	1 x 4 mA ... 20 mA, 1 x switching output and 1 x multifunctional input	
Ambient temperature	Operation: –30 °C ... +65 °C Storage: –40 °C ... +75 °C	Operation: –30 °C ... +65 °C Storage: –40 °C ... +75 °C	
Light source	Laser, red	Laser, red	
Laser protection class	2 (EN 60825-1) 1 (EN 60825-1)	2 (EN 60825-1) 1 (EN 60825-1)	
At a glance			
	• HDDM technology provides the best reliability, safety to ambient light and price/performance ratio • Reliable measurement and detection up to 10 m • Wide choice of models: 4 mA ... 20 mA or 0 V .. 10 V; PNP or NPN and laser class 1 or 2 • High switching repeatability (2.5 mm) • Display with intuitive operating concept • Tough die-cast zinc metal housing • Wide operating temperature range from –30 °C to +65 °C	• HDDM technology provides the best reliability, safety to ambient light and price/performance ratio • Most compact sensor offering up to 20 m range directly on the object • Amazing repeatability up to 1 mm • Very fast measurement and output rate with 500 Hz • Analog output with 4 mA ... 20 mA and one switching output • Red laser light for precise alignment • Tough metal housing with LC display	
Detailed information	➜ C-86	➜ C-92	

C

	DS50	DL50	DL50 Hi
	Precise detection from a distance of up to 10 m	Looking ahead – up to 50 m on reflector	Large positioning performance up to 50 m. Small housing.
	200 mm ... 10,000 mm	200 mm ... 50,000 mm	200 mm ... 50,000 mm
	5 mm / 2.5 mm	2 mm / 3 mm	0.5 mm / 0.3 mm / 0.25 mm
	± 10 mm	± 7 mm	± 3 mm
	10 ms / 50 ms 20 ms / 100 ms	15 ms / 30 ms	10 ms / 40 ms / 160 ms
	2 x switching output and 1 x multifunctional input	1 x 4 mA ... 20 mA, 1 x switching output and 1 x multifunctional input	1 x RS-422, 1 x switching output and 1 x multifunctional in-/output
	Operation: –30 °C ... +65 °C Storage: –40 °C ... +75 °C	Operation: –30 °C ... +65 °C Storage: –40 °C ... +75 °C	Operation: –30 °C ... +65 °C Storage: –40 °C ... +75 °C
	Laser, red	Laser, red	Laser, red
	2 (EN 60825-1) 1 (EN 60825-1)	1 (EN 60825-1)	1 (EN 60825-1)

	Time Of Flight / Performance / Laser class 1 / Laser class 2 / Window / OBSB	Time Of Flight / Reflector / Performance / Laser class 1 / Analog (mA)	Time Of Flight / Reflector / Performance / Laser class 1 / **RS-422**
	• HDDM technology provides the best reliability, safety to ambient light and price/performance ratio • Reliable detection up to 10 m • High switching repeatability (2.5 mm) • Two discrete outputs with up to 50 Hz switching frequency • Three switching modes: "Distance to Object," "Window" or "Object Between Sensor and Background" – detect any object • Immune to cross talk for use with multiple sensors • Superior background suppression	• HDDM technology provides the best reliability, safety to ambient light and price/performance ratio • Up to 50 m range on diamond grade reflector • Very good repeatability for positioning tasks up to 2 mm • Fast measurement and output rate with 250 Hz • Analog output with 4 mA ... 20 mA and one switching output • Red laser light for precise alignment • Wide operating temperature range from –30 °C to +65 °C	• HDDM technology provides the best reliability, safety to ambient light and price/performance ratio • Up to 50 m range on diamond grade reflector • World's smallest sensor for high precision positioning • Highest repeatability in its class, with ≤ 0.5 mm • Fast RS-422 output rate – measurement value every 2.5 ms • Immune to cross talk for use with multiple sensors • Superior background suppression

C

The universal distance measurement solution up to 10 m

Time Of Flight	Performance		
Analog (mA) 4 20	Analog (V) 0 10	0 1	

Laser class 1   Laser class 2

CE ◇III **CDRH**
c(UL)us **LISTED**

Additional information

Product description

The DT50 is the entry-level model in the Dx50 product family. With a measurement range up to 10 m from the target, the sensor offers a solution for various applications. Analog and switching outputs ensure it is easy to integrate.

At a glance

- HDDM technology provides the best reliability, safety to ambient light and price/performance ratio
- Reliable measurement and detection up to 10 m
- Wide choice of models: 4 mA ... 20 mA or 0 V .. 10 V; PNP or NPN and laser class 1 or 2
- High switching repeatability (2.5 mm)
- Display with intuitive operating concept
- Tough die-cast zinc metal housing
- Wide operating temperature range from –30 °C to +65 °C

Your benefits

- Wide measurement range allows easy and fast integration in any production environment
- Intuitive setup via display or remote teach reduces installation time and costs
- Widest temperature range allows for outdoor use without additional cooling or heating accessories
- Immune to any type of ambient light – allows for use in optically challenging environments
- Increased process stability is achieved thanks to the small black/white shift
- Metal housing withstands harsh environments, saving replacement costs
- Low investment costs and high performance guarantee quick return on investment
- Dx50 family is based on a common platform, which offers multiple performance levels, making it easy to accommodate future changes

→ www.mysick.com/en/DT50

Detailed technical data

Performance

Resolution	1 mm
Repeatability [1] [2] [3]	5 mm / 2.5 mm
Accuracy [4]	± 10 mm
Response time [3] [5]	20 ms / 30 ms
Output rate [6]	4 ms
Light source	Laser, red
Typ. light spot size (distance)	15 mm x 15 mm (10 m)
Additional feature	Set moving average: fast/slow Switching mode: Distance to Object (DtO) Teach-in of switching outputs Set levels of switching outputs Set hysteresis Switching output invertible Teach-in of analog output Scaling of analog output Invertible analog output Multifunctional input: laser off, external teach, inactive Switch-off display Reset to factory default Lock user interface

[1] Equivalent to 1 σ.

[2] 6 % ... 90 % remission.

[3] Dependent on the set average: fast/slow.

[4] 90 % remission.

[5] Lateral entry of object into measuring range.

[6] Continuous change of distance in measuring range.

Interfaces

Resolution analog output	16 bit
Hysteresis	10 mm ... 1,000 mm

Mechanics/electronics

Supply voltage V_s [1] [2]	DC 10 V ... 30 V
Ripple [3]	≤ 5 V_{PP}
Power consumption [4]	≤ 2.1 W
Initialization time	≤ 250 ms
Warm-up time	≤ 15 min
Weight	200 g
Housing material	Die-cast zinc housing (ZNAL4CU1), acrylic glass (PMMA)
Connection type	Connector, M12, 5-pin
Indication	LC display 2 x LED

[1] Limit values, reverse-polarity protected, operation in short-circuit protected network, max. 8 A.

[2] For DT50-xxxx4: V_s > 15 V.

[3] May not fall short of or exceed V_s tolerances.

[4] Without load.

Ambient data

Enclosure rating	IP 65
Protection class	III
Ambient temperature	Operation: –30 °C ... +65 °C Storage: –40 °C ... +75 °C
Humidity (max. rel., not condensing)	≤ 95 %
Typ. ambient light safety	40 klx
Vibration resistance	EN 60068-2-6 / -2-64
Shock resistance	EN 60068-2-27 / -2-29
Average service life laser (MTTF at 25 °C)	100,000 h

C

Ordering information

Measuring range [1]	Laser protection class	Switching output (max. output current) [4] [5] [6]	Multifunctional input [7] [8] [9]	Analog output	Model name	Part no.
200 mm ... 10,000 mm/ 6,500 mm/ 4,000 mm	2 (EN 60825-1) [2]	1 x PNP (100 mA)	1 x PNP	1 x 4 mA ... 20 mA (≤ 300 Ω)	DT50-P1113	1044369
				1 x 0 V ... 10 V (≥ 5 kΩ)	DT50-P1114	1047581
		1 x NPN (100 mA)	1 x NPN	1 x 4 mA ... 20 mA (≤ 300 Ω)	DT50-N1113	1047396
				1 x 0 V ... 10 V (≥ 5 kΩ)	DT50-N1114	1047582
200 mm ... 10,000 mm/ 5,000 mm/ 2,500 mm	1 (EN 60825-1) [3]	1 x PNP (100 mA)	1 x PNP	1 x 4 mA ... 20 mA (≤ 300 Ω)	DT50-P1123	1047118
				1 x 0 V ... 10 V (≥ 5 kΩ)	DT50-P1124	1047616
		1 x NPN (100 mA)	1 x NPN	1 x 4 mA ... 20 mA (≤ 300 Ω)	DT50-N1123	1047397
				1 x 0 V ... 10 V (≥ 5 kΩ)	DT50-N1124	1047617

[1] 90 %/18 %/6 % remission.
[2] Wavelength: 658 nm; max. output: 180 mW; pulse duration: 5 ns; pulse repetition rate: 1/200.
[3] Wavelength: 658 nm; max. output: 120 mW; pulse duration: 2.5 ns; pulse repetition rate: 1/400.
[4] Output Q short-circuit protected.
[5] PNP: HIGH = V_s – (< 2.5 V) / LOW = 0 V.
[6] NPN: HIGH = < 2.5 V / LOW = V_s.
[7] Response time ≤ 15 ms.
[8] PNP: HIGH = V_s / LOW = ≤ 2.5 V.
[9] NPN: HIGH = ≤ 2.5 V / LOW = V_s.

Dimensional drawing

All dimensions in mm (inch)

① Optical axis sender
② Optical axis receiver
③ Mounting hole
④ Reference surface = 0 mm
⑤ Status indicator switching output (orange)
⑥ Status indicator power on (green)
⑦ Operating keys and display

C

Connection type and diagram

Connector
M12, 5-pin

brn	1	L+
wht	2	Q_A
blu	3	M
blk	4	Q
gra	5	MF ①

① Multifunctional input

Recommended accessories

Mounting brackets/plates

Brief description	Model name	Part no.
Mounting bracket, steel, zinc coated, incl. mounting material, for Dx50	BEF-WN-DX50	2048370

Plug connectors and cables

	Brief description	Model name	Part no.
Illustration may differ	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899
	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544
Illustration may differ	Female connector, M12, 5-pin, angled, 2 m, PVC	DOL-1205-W02M	6008900
	Female connector, M12, 5-pin, angled, 5 m, PVC	DOL-1205-W05M	6009869
	Female connector, M12, 5-pin, angled, 10 m, PVC	DOL-1205-W10M	6010542

C

DT50 – set-up – scale analog output

1. Change into teach mode

2. Select 4 mA teach

3. Teach act. distance for 4 mA

+

Object in light beam

4. Select 20 mA teach

5. Teach act. distance for 20 mA

+

Object in light beam

6. Return to run mode

Set-up finished!

C

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Compact size delivers exceptional performance up to 20 m

Time Of Flight

Performance

Laser class 1

Laser class 2

Analog (mA)
4 ... 20

0 ... 1

CE

CDRH

c UL us LISTED

Product description

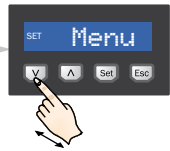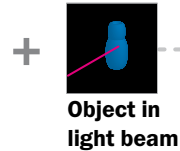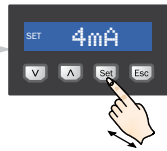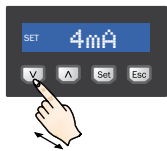The compact DT50 Hi distance sensor offers superior precision. Compared to the DT50, the Hi version offers significantly better precision. Additionally, the measurement range of this more powerful variant is twice as long.

At a glance

- HDDM technology provides the best reliability, safety to ambient light and price/performance ratio
- Most compact sensor offering up to 20 m range directly on the object
- Amazing repeatability up to 1 mm
- Very fast measurement and output rate with 500 Hz
- Analog output with 4 mA ... 20 mA and one switching output
- Red laser light for precise alignment
- Tough metal housing with LC display

Your benefits

- Improved production quality based on high precision and small black/white shift of the measurement
- The fast measurement frequency increases the production throughput
- Thanks to its compact housing size, the DT50 Hi offers precise measurement in applications with limited space
- Red light and an optional alignment bracket reduces installation time
- Intuitive setup via display or remote teach reduces installation time and costs
- Immune to any type of ambient light – allows for use in optically challenging environments
- Widest temperature range allows for outdoor use without additional cooling or heating accessories
- Metal housing withstands harsh environments, saving replacement costs

Additional information

➜ www.mysick.com/en/DT50_Hi

Detailed technical data

Performance

Resolution	1 mm
Repeatability [1] [2] [3]	3 mm / 2 mm / 1 mm
Accuracy [4]	± 7 mm
Response time [3] [5]	15 ms / 30 ms / 80 ms
Output rate [6]	2 ms
Light source	Laser, red
Typ. light spot size (distance)	15 mm x 15 mm (10 m)
Additional feature	Set moving average: fast/medium/slow Switching mode: Distance to Object (DtO) Teach-in of switching outputs Set levels of switching outputs Set hysteresis Switching output invertible Teach-in of analog output Scaling of analog output Invertible analog output Multifunctional input: laser off, external teach, inactive Switch-off display Reset to factory default Lock user interface

[1] Equivalent to 1 σ.

[2] 6 % ... 90 % remission.

[3] Dependent on the set average: fast/medium/slow.

[4] 90 % remission.

[5] Lateral entry of object into measuring range.

[6] Continuous change of distance in measuring range.

Interfaces

Resolution analog output	16 bit
Hysteresis	10 mm ... 1,000 mm

Mechanics/electronics

Supply voltage V_s [1]	DC 10 V ... 30 V
Ripple [2]	≤ 5 V_{PP}
Power consumption [3]	≤ 2.1 W
Initialization time	≤ 250 ms
Warm-up time	≤ 15 min
Weight	200 g
Housing material	Die-cast zinc housing (ZNAL4CU1), acrylic glass (PMMA)
Connection type	Connector, M12, 5-pin
Indication	LC display 2 x LED

[1] Limit values, reverse-polarity protected, operation in short-circuit protected network, max. 8 A.

[2] May not fall short of or exceed V_s tolerances.

[3] Without load.

Ambient data

Enclosure rating	IP 65
Protection class	III
Ambient temperature	Operation: –30 °C ... +65 °C Storage: –40 °C ... +75 °C
Humidity (max. rel., not condensing)	≤ 95 %
Typ. ambient light safety	40 klx
Vibration resistance	EN 60068-2-6 / -2-64
Shock resistance	EN 60068-2-27 / -2-29
Average service life laser (MTTF at 25 °C)	100,000 h

C

Ordering information

Measuring range [1]	Laser protection class	Analog output	Switching output (max. output current) [4] [5] [6]	Multifunctional input [7] [8] [9]	Model name	Part no.
200 mm ... 20,000 mm/ 8,500 mm/ 5,000 mm	2 (EN 60825-1) [2]	1 x 4 mA ... 20 mA (≤ 300 Ω)	1 x PNP (100 mA)	1 x PNP	DT50-P2113	1047314
			1 x NPN (100 mA)	1 x NPN	DT50-N2113	1047398
200 mm ... 13,000 mm/ 5,800 mm/ 3,400 mm	1 (EN 60825-1) [3]	1 x 4 mA ... 20 mA (≤ 300 Ω)	1 x PNP (100 mA)	1 x PNP	DT50-P2123	1047399
			1 x NPN (100 mA)	1 x NPN	DT50-N2123	1047400

[1] 90 %/18 %/6 % remission.

[2] Wavelength: 658 nm; max. output: 180 mW; pulse duration: 5 ns; pulse repetition rate: 1/200.

[3] Wavelength: 658 nm; max. output: 120 mW; pulse duration: 2.5 ns; pulse repetition rate: 1/400.

[4] Output Q short-circuit protected.

[5] PNP: HIGH = V_S – (< 2.5 V) / LOW = 0 V.

[6] NPN: HIGH = < 2.5 V / LOW = V_S.

[7] Response time ≤ 15 ms.

[8] PNP: HIGH = V_S / LOW = ≤ 2.5 V.

[9] NPN: HIGH = ≤ 2.5 V / LOW = V_S.

Dimensional drawing

36.1 (1.42)

72.7 (2.86)

47.1 (1.85)

27.2 (1.07)

62.7 (2.47)

4.0 (0.16)

47.4 (1.88)

③ ④

Ø 4.5 (0.18)

3.5 (0.14)

50.8 (2.0)

4.5 (0.18)

3.8 (0.15)

131.4°

③

39.2 (1.54)

6.5°

M12 x 1

⑤ ⑥

57.7 (2.27)

⑦

All dimensions in mm (inch)

① Optical axis sender
② Optical axis receiver
③ Mounting hole
④ Reference surface = 0 mm
⑤ Status indicator switching output (orange)
⑥ Status indicator power on (green)
⑦ Operating keys and display

Connection type and diagram

Connector
M12, 5-pin

brn	1	L+
wht	2	Q_A
blu	3	M
blk	4	Q
gra	5	MF ①

① Multifunctional input

C

Recommended accessories

Mounting brackets/plates

Brief description	Model name	Part no.
Mounting bracket, steel, zinc coated, incl. mounting material, for Dx50	BEF-WN-DX50	2048370

Plug connectors and cables

	Brief description	Model name	Part no.
Illustration may differ	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899
	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544
Illustration may differ	Female connector, M12, 5-pin, angled, 2 m, PVC	DOL-1205-W02M	6008900
	Female connector, M12, 5-pin, angled, 5 m, PVC	DOL-1205-W05M	6009869
	Female connector, M12, 5-pin, angled, 10 m, PVC	DOL-1205-W10M	6010542

C

DT50 Hi – set-up – scale analog output

1. Change into teach mode

2. Select 4 mA teach

3. Teach act. distance for 4 mA

Object in light beam

4. Select 20 mA teach

5. Teach act. distance for 20 mA

Object in light beam

6. Return to run mode

Set-up finished!

C

C

Precise detection from a distance of up to 10 m

Time Of Flight	Performance		
		Laser class 1	Laser class 2
1 0	Window 1 0	OBSB 1 0	

CE III CDRH
c(UL)us LISTED

Product description

The DS50 is a time-of-flight sensor that offers two switching outputs. With a range of up to 10 m, it allows reliable detection at a safe distance. Based on three different switching modes (Distance to Object, Window or Object Between Sensor and Background), any material can easily be detected with the DS50.

At a glance

- HDDM technology provides the best reliability, safety to ambient light and price/performance ratio
- Reliable detection up to 10 m
- High switching repeatability (2.5 mm)
- Two discrete outputs with up to 50 Hz switching frequency
- Three switching modes: "Distance to Object," "Window" or "Object Between Sensor and Background" – detect any object
- Immune to cross talk for use with multiple sensors
- Superior background suppression

Your benefits

- Precise detection at a safe distance reduces scrap and increases through-put
- Immune to any type of ambient light – allows for use in optically challenging environments
- Widest temperature range allows for outdoor use without additional cooling or heating
- Intuitive setup via display or remote teach reduces installation time and costs
- Red light and an optional alignment bracket reduces installation time
- Metal housing withstands harsh environments, saving replacement costs
- Dx50 product family is based on a common platform, which offers multiple performance levels, making it easy to accommodate future changes
- Low investment costs and high performance guarantee short return on investment

➜ www.mysick.com/en/DS50

Detailed technical data

Performance

Resolution [1]	1 mm
Repeatability [2] [3] [4]	5 mm / 2.5 mm
Accuracy [1] [5]	± 10 mm
Light source	Laser, red
Typ. light spot size (distance)	15 mm x 15 mm (10 m)
Additional feature	Set moving average: fast/slow
	Set switching mode: Distance to Object (DtO), switching window (Wnd), Object Between Sensor and Background (OBSB)
	Teach-in of switching outputs
	Set levels of switching outputs
	Set hysteresis
	Switching output invertible
	Multifunctional input: laser off, external teach, inactive
	Unique measurement value
	Crosstalk safety
	Switch-off display
	Reset to factory default
	Lock user interface

[1] Related to distance value on the display.

[2] Equivalent to 1 σ.

[3] 6 % ... 90 % remission.

[4] Dependent on the set average: fast/slow.

[5] 90 % remission.

Interfaces

Hysteresis	1 mm ... 9,999 mm

Mechanics/electronics

Supply voltage V$_s$ [1]	DC 10 V ... 30 V
Ripple [2]	≤ 5 V$_{PP}$
Power consumption [3]	≤ 1.85 W
Initialization time	≤ 350 ms
Warm-up time	≤ 15 min
Weight	200 g
Housing material	Die-cast zinc housing (ZNAL4CU1), acrylic glass (PMMA)
Connection type	Connector, M12, 5-pin
Indication	LC display 2 x LED

[1] Limit values, reverse-polarity protected, operation in short-circuit protected network, max. 8 A.

[2] May not fall short of or exceed V$_s$ tolerances.

[3] Without load.

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Ambient data

Enclosure rating	IP 65
Protection class	III
Ambient temperature	Operation: –30 °C ... +65 °C Storage: –40 °C ... +75 °C
Humidity (max. rel., not condensing)	≤ 95 %
Typ. ambient light safety	40 klx
Vibration resistance	EN 60068-2-6 / -2-64
Shock resistance	EN 60068-2-27 / -2-29
Average service life laser (MTTF at 25 °C)	100,000 h

C

Ordering information

Measuring range [1]	Laser protection class	Switching frequency [4]	Response time [4]	Switching output (max. output current) [5] [6] [7]	Multi-functional input [8] [9] [10]	Model name	Part no.
200 mm ... 10,000 mm / 200 mm ... 6,000 mm / 200 mm ... 4,000 mm	2 (EN 60825-1) [2]	50 Hz / 10 Hz	10 ms / 50 ms	2 x PNP (100 mA)	1 x PNP	DS50-P1112	1047402
				2 x NPN (100 mA)	1 x NPN	DS50-N1112	1047404
	1 (EN 60825-1) [3]	25 Hz / 5 Hz	20 ms / 100 ms	2 x PNP (100 mA)	1 x PNP	DS50-P1122	1047405
				2 x NPN (100 mA)	1 x NPN	DS50-N1122	1047406

[1] 90 %/18 %/6 % Remission.

[2] Wavelength: 658 nm; max. output: 180 mW; pulse duration: 5 ns; pulse repetition rate: 1/200.

[3] Wavelength: 658 nm; max. output: 120 mW; pulse duration: 5 ns; pulse repetition rate: 1/400.

[4] Dependent on the set average: fast/slow.

[5] Output Q short-circuit protected.

[6] PNP: HIGH = V_S – (< 2.5 V) / LOW = 0 V.

[7] NPN: HIGH = < 2.5 V / LOW = V_S.

[8] Response time ≤ 60 ms.

[9] PNP: HIGH = V_S / LOW = ≤ 2.5 V.

[10] NPN: HIGH = ≤ 2.5 V / LOW = V_S.

Dimensional drawing

36.1 (1.42)

4.0 (0.16)

47.4 (1.88)

③ ④

⑤ ⑥

72.7 (2.86)

47.1 (1.85)

27.2 (1.07)

62.7 (2.47)

Ø 4.5 (0.18)

3.5 (0.14)

50.8 (2.0)

4.5 (0.18)

3.8 (0.15)

131.4°

39.2 (1.54)

③

6.5°

M12 x 1

57.7 (2.27)

⑦

All dimensions in mm (inch)

① Optical axis sender
② Optical axis receiver
③ Mounting hole
④ Reference surface = 0 mm
⑤ Status indicator switching output Q_1 (orange)
⑥ Status indicator switching output Q_2 (orange)
⑦ Operating keys and display

Connection type and diagram

Connector
M12, 5-pin

brn	1	L+
blk	4	Q_1
blu	3	M
wht	2	Q_2
gra	5	MF ①

① Multifunctional input

C

Recommended accessories

Mounting brackets/plates

Brief description	Model name	Part no.
Mounting bracket, steel, zinc coated, incl. mounting material, for Dx50	BEF-WN-DX50	2048370

Plug connectors and cables

	Brief description	Model name	Part no.
Illustration may differ	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899
	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544
Illustration may differ	Female connector, M12, 5-pin, angled, 2 m, PVC	DOL-1205-W02M	6008900
	Female connector, M12, 5-pin, angled, 5 m, PVC	DOL-1205-W05M	6009869
	Female connector, M12, 5-pin, angled, 10 m, PVC	DOL-1205-W10M	6010542

C

DS50 – set-up – set-up OBSB mode

1. Change into
   teach mode

RUN **10000**
V ∧ Set Esc

2. Select parameter
   switching mode

SET **Menu**
V ∧ Set Esc
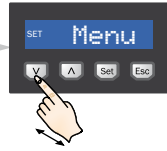
3. Open parameter
   switching mode

SET **Mode**
V ∧ Set Esc
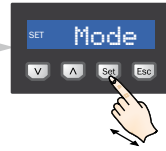
4. Select OBSB
   switching mode

SET **DtO**
V ∧ Set Esc

5. Aktivate OBSB
   switching mode

SET **OBSB**
V ∧ Set Esc

6. Select
   Q teach

SET **Mode**
V ∧ Set Esc
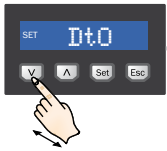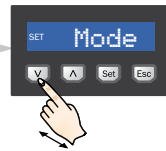
7. Teach act. distance
   as background

SET **Q1**
V ∧ Set Esc

+
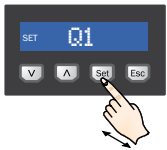
Light spot
on
background

8. Return to
   run mode

SET **Q1**
V ∧ Set Esc

Set-up finished!

C
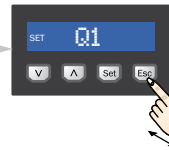
Remark:

With the so called OBSB mode objects between the sensor and a taught in background are detected. By use of this mode all objects are detected, which are different from the reference background.

This includes the detection of objects based on a changed distance and of items, which do not reflect enough light or deflect all the light away.

C

Looking ahead – up to 50 m on reflector

| Time Of Flight | Reflector | Performance | Laser class 1 |

| Analog (mA) 4 20 | 0 1 |

CE **III** **CDRH**
c(UL)us LISTED

Product description

The DL50 is the ideal solution for positioning tasks. Using a switching and an analog output, distance control can be easily implemented. Apart from a measurement range of 50 m, the sensor also offers a high level of precision.

At a glance

- HDDM technology provides the best reliability, safety to ambient light and price/performance ratio
- Up to 50 m range on diamond grade reflector
- Very good repeatability for positioning tasks up to 2 mm
- Fast measurement and output rate with 250 Hz
- Analog output with 4 mA ... 20 mA and one switching output
- Red laser light for precise alignment
- Wide operating temperature range from –30 °C to +65 °C

Your benefits

- A wide measurement range, analog and switching output create an easy, fast and flexible solution for any positioning task
- Red light and an optional alignment bracket reduces installation time
- Intuitive setup via display or remote teach reduces installation time and costs
- Widest temperature range allows for outdoor use without additional cooling or heating accessories
- Immune to any type of ambient light – allows for use in optically challenging environments
- Metal housing withstands harsh environments, saving replacement costs
- Low investment costs and high performance guarantee quick return on investment
- Dx50 product family is based on a common platform, which offers multiple performance levels, making it easy to accommodate future changes

Additional information

→ www.mysick.com/en/DL50

Detailed technical data

Performance

Resolution	1 mm
Repeatability [1] [2]	3 mm / 2 mm
Accuracy	± 7 mm
Response time [2] [3]	15 ms / 30 ms
Output rate [4]	4 ms
Light source	Laser, red
Typ. light spot size (distance)	15 mm x 15 mm (10 m)
Additional feature	Set moving average: fast/slow Switching mode: Distance to Object (DtO) Teach-in of switching outputs Set levels of switching outputs Set hysteresis Switching output invertible Teach-in of analog output Scaling of analog output Invertible analog output Multifunctional input: laser off, external teach, inactive Switch-off display Reset to factory default Lock user interface

[1] Equivalent to 1 σ.
[2] Dependent on the set average: fast/slow.
[3] Lateral entry of object into measuring range.
[4] Continuous change of distance in measuring range.

Interfaces

Resolution analog output	16 bit
Hysteresis	10 mm ... 1,000 mm

Mechanics/electronics

Supply voltage V_s [1]	DC 10 V ... 30 V
Ripple [2]	≤ 5 V_{PP}
Power consumption [3]	≤ 2.1 W
Initialization time	≤ 250 ms
Warm-up time	≤ 15 min
Weight	200 g
Housing material	Die-cast zinc housing (ZNAL4CU1), acrylic glass (PMMA)
Connection type	Connector, M12, 5-pin
Indication	LC display 2 x LED

[1] Limit values, reverse-polarity protected, operation in short-circuit protected network, max. 8 A.
[2] May not fall short of or exceed V_s tolerances.
[3] Without load.

Ambient data

Enclosure rating	IP 65
Protection class	III
Ambient temperature	Operation: –30 °C ... +65 °C Storage: –40 °C ... +75 °C
Humidity (max. rel., not condensing)	≤ 95 %
Typ. ambient light safety	40 klx
Vibration resistance	EN 60068-2-6 / -2-64
Shock resistance	EN 60068-2-27 / -2-29
Average service life laser (MTTF at 25 °C)	100,000 h

C

Ordering information

Measuring range [1]	Laser protection class [2]	Analog output	Switching output (max. output current) [3] [4] [5]	Multifunctional input [6] [7] [8]	Model name	Part no.
200 mm ... 50,000 mm	1 (EN 60825-1)	1 x 4 mA ... 20 mA (≤ 300 Ω)	1 x PNP (100 mA)	1 x PNP	DL50-P1123	1047361
			1 x NPN (100 mA)	1 x NPN	DL50-N1123	1047401

[1] On Diamond Grade.

[2] Wavelength: 658 nm; max. output: 120 mW; pulse duration: 2.5 ns; pulse repetition rate: 1/400.

[3] Output Q short-circuit protected.

[4] PNP: HIGH = V_S – (< 2.5 V) / LOW = 0 V.

[5] NPN: HIGH = < 2.5 V / LOW = V_S.

[6] Response time ≤ 15 ms.

[7] PNP: HIGH = V_S / LOW = ≤ 2.5 V.

[8] NPN: HIGH = ≤ 2.5 V / LOW = V_S.

Dimensional drawing

All dimensions in mm (inch)

① Optical axis sender
② Optical axis receiver
③ Mounting hole
④ Reference surface = 0 mm
⑤ Status indicator switching output (orange)
⑥ Status indicator power on (green)
⑦ Operating keys and display

Connection type and diagram

Connector
M12, 5-pin

brn	1	L+
wht	2	Q_A
blu	3	M
blk	4	Q
gra	5	MF ①

① Multifunctional input

C

Recommended accessories

Mounting brackets/plates

	Brief description	Model name	Part no.
	Dx50 alignment bracket, steel, zinc coated	BEF-AH-DX50	2048397
	Mounting bracket, steel, zinc coated, incl. mounting material, for Dx50	BEF-WN-DX50	2048370

Reflectors

	Brief description	Model name	Part no.
	Reflector plate, DG tape 330 mm x 330 mm, material: base plate aluminum, screw connection	PL240DG	1017910
	Reflector plate, DG tape 665 mm x 665 mm, material: base plate aluminum, screw connection	PL560DG	1016806
	Diamond Grade reflective tape, customizable by sheet, self-adhesive	REF-DG-K	4019634

Plug connectors and cables

	Brief description	Model name	Part no.
Illustration may differ	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899
	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544
Illustration may differ	Female connector, M12, 5-pin, angled, 2 m, PVC	DOL-1205-W02M	6008900
	Female connector, M12, 5-pin, angled, 5 m, PVC	DOL-1205-W05M	6009869
	Female connector, M12, 5-pin, angled, 10 m, PVC	DOL-1205-W10M	6010542

For additional accessories including dimensional drawings, please see page J-301.

DL50 – set-up – scale analog output

1. Change into teach mode

2. Select 4 mA teach

3. Teach act. distance for 4 mA

4. Select 20 mA teach

5. Teach act. distance for 20 mA

6. Return to run mode
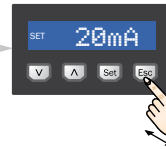
Set-up finished!

C

Large positioning performance up to 50 m. Small housing.
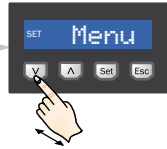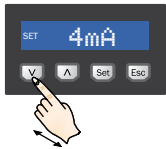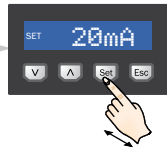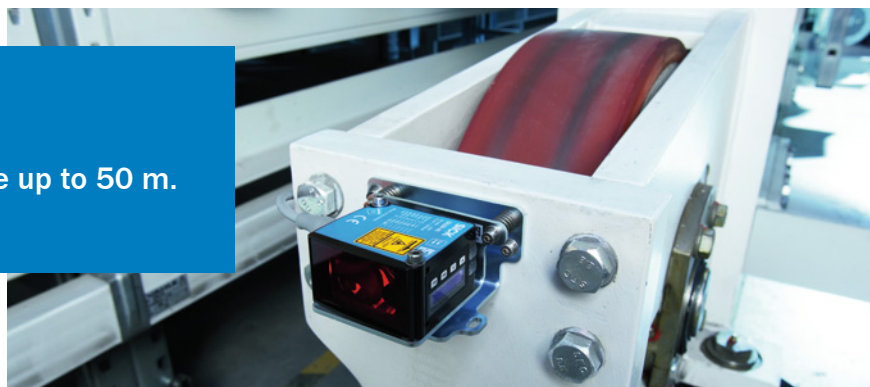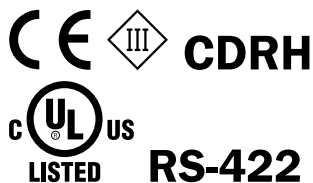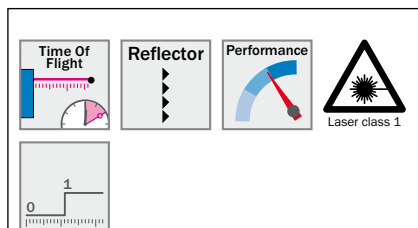
| Time Of Flight | Reflector | Performance | Laser class 1 |

C

Product description

The DL50 Hi is the world's smallest sensor for high-precision positioning. Due to its reflector-based measurement, incredibly high repeatability is achieved. In order to avoid any loss of precision, the data is provided via serial interface.

At a glance

- HDDM technology provides the best reliability, safety to ambient light and price/performance ratio
- Up to 50 m range on diamond grade reflector
- World's smallest sensor for high precision positioning
- Highest repeatability in its class, with ≤ 0.5 mm
- Fast RS-422 output rate – measurement value every 2.5 ms
- Immune to cross talk for use with multiple sensors
- Superior background suppression

Your benefits

- Precise positioning enables greater speed and accuracy, which increases throughput
- Highest performance at reasonable investment costs guarantee a short return on investment
- Immune to any type of ambient light - allows for use in optically challenging environments
- Widest temperature range allows for outdoor use without additional cooling or heating accessories
- Intuitive setup via display or remote teach reduces installation time and costs
- Red light and an optional alignment bracket reduces installation time
- Metal housing withstands harsh environments, saving replacement costs
- World's smallest sensor for high precision positioning for use in applications with limited space

CE ◇III CDRH

c(UL)us LISTED RS-422

Additional information

→ www.mysick.com/en/DL50_Hi

Detailed technical data

Performance

Resolution	0.1 mm
Repeatability [1] [2] [3]	0.5 mm / 0.3 mm / 0.25 mm
Accuracy [4]	± 3 mm
Response time [2] [5]	10 ms / 40 ms / 160 ms
Output rate [6] [7]	2.5 ms
Light source	Laser, red
Typ. light spot size (distance)	15 mm x 15 mm (10 m)
Additional feature	Set moving average: fast/medium/slow Switching mode: Distance to Object (DtO) Teach-in of switching outputs Set levels of switching outputs Set hysteresis Switching output invertible Multifunctional in- and output: laser off, external teach, switching output 2, inactive Serial data output: continuous, on request Set baud rate: 19,200; 38,400; 57,600; 115,200 bps Set parity check: none/even/odd Unique measurement value Crosstalk safety Switch-off display Reset to factory default Lock user interface

[1] Equivalent to 1 σ.

[2] Dependent on the set average: fast/medium/slow.

[3] Typical values.

[4] May reach up to ± 5 mm at limited measuring range.

[5] Lateral entry of object into measuring range.

[6] For baud rate 115,200 bps.

[7] Continuous change of distance in measuring range.

Interfaces

Hysteresis	1 mm ... 1,000 mm

Mechanics/electronics

Supply voltage V_s [1]	DC 10 V ... 30 V
Ripple [2]	≤ 5 V_{PP}
Power consumption [3]	≤ 2.1 W
Initialization time	≤ 250 ms
Warm-up time	≤ 15 min
Weight	200 g
Housing material	Die-cast zinc housing (ZNAL4CU1), acrylic glass (PMMA)
Connection type	Connector, M12, 8-pin
Indication	LC display 2 x LED

[1] Limit values, reverse-polarity protected, operation in short-circuit protected network, max. 8 A.

[2] May not fall short of or exceed V_s tolerances.

[3] Without load.

C

Ambient data

Enclosure rating	IP 65
Protection class	III
Ambient temperature	Operation: –30 °C ... +65 °C Storage: –40 °C ... +75 °C
Humidity (max. rel., not condensing)	≤ 95 %
Typ. ambient light safety	40 klx
Vibration resistance	EN 60068-2-6 / -2-64
Shock resistance	EN 60068-2-27 / -2-29
Average service life laser (MTTF at 25 °C)	100,000 h

C

Ordering information

Measuring range [1]	Laser protection class [2]	Data interface	Switching output (max. output current) [3] [4] [5] [8]	Multifunctional input [5] [6] [7] [9]	Model name	Part no.
200 mm ... 50,000 mm	1 (EN 60825-1)	RS-422	2 x / 1 x PNP (100 mA)	– / 1 x PNP	DL50-P2225	1048418
			2 x / 1 x NPN (100 mA)	– / 1 x NPN	DL50-N2225	1048419

[1] On Diamond Grade.

[2] Wavelength: 658 nm; max. output: 80 mW; pulse duration: 2.5 ns; pulse repetition rate: 1/240.

[3] Output Q short-circuit protected.

[4] PNP: HIGH = V_S – (< 2.5 V) / LOW = 0 V.

[5] Dependent on the set function MF: switching output 2 / laser off, external teach.
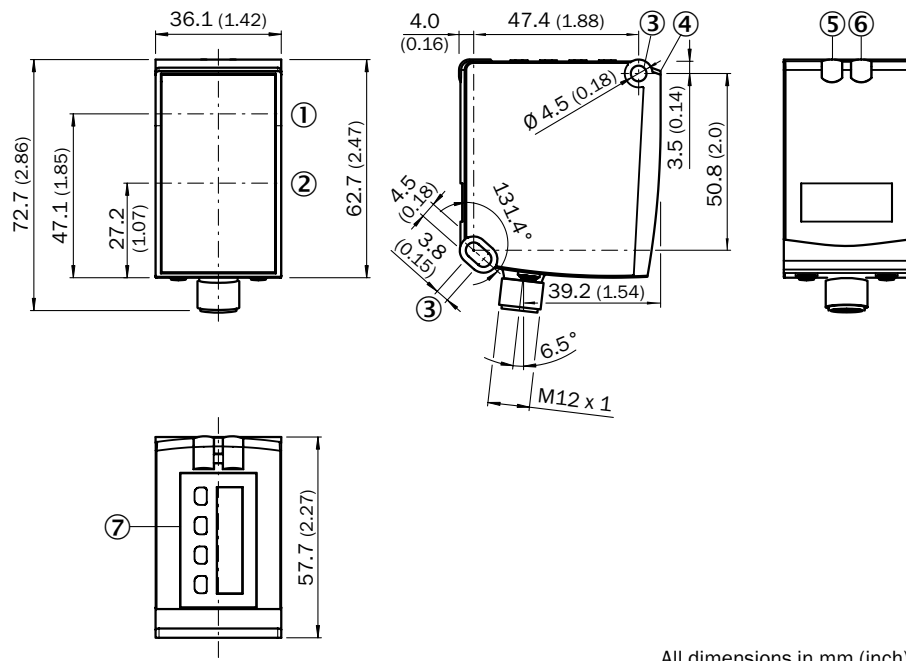
[6] Response time ≤ 60 ms.

[7] PNP: HIGH = V_S / LOW = ≤ 2.5 V.

[8] NPN: HIGH = < 2.5 V / LOW = V_S.

[9] NPN: HIGH = ≤ 2.5 V / LOW = V_S.

Dimensional drawing

All dimensions in mm (inch)

① Optical axis sender
② Optical axis receiver
③ Mounting hole
④ Reference surface = 0 mm
⑤ Status indicator switching output Q_1 (orange)
⑥ Status indicator switching output Q_2 (orange)
⑦ Operating keys and display

Connection type and diagram

Please note: Since wire color on 8-pin connection cables are not normed, always check for a correct pin to wire color assignment when using connection cables others than specified here.

Connector
M12, 8-pin

Wire	Pin	Signal
brn	2	L+
blu	7	M
wht	1	Q_1
gra	5	TX–
pnk	6	TX+
grn	3	RX–
yel	4	RX+
red	8	Q_2/MF ①
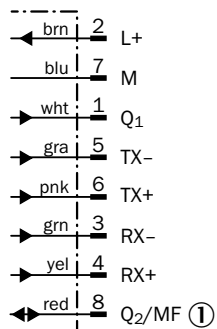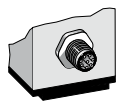
① Multifunctional in- and output

Recommended accessories

Mounting brackets/plates

	Brief description	Model name	Part no.
	Dx50 alignment bracket, steel, zinc coated	BEF-AH-DX50	2048397
	Mounting bracket, steel, zinc coated, incl. mounting material, for Dx50	BEF-WN-DX50	2048370

Reflectors

	Brief description	Model name	Part no.
	Reflector plate, DG tape 330 mm x 330 mm, material: base plate aluminum, screw connection	PL240DG	1017910
	Reflector plate, DG tape 665 mm x 665 mm, material: base plate aluminum, screw connection	PL560DG	1016806
	Diamond Grade reflective tape, customizable by sheet, self-adhesive	REF-DG-K	4019634

Plug connectors and cables

	Brief description	Model name	Part no.
	Female connector, M12, 8-pin, straight, 2 m, PUR halogen free, shielded, twisted in pairs for SSI and HIPERFACE	DOL-1208-G02MAH1	6032448
Illustration may differ	Female connector, M12, 8-pin, straight, 5 m, PUR halogen free, shielded, twisted in pairs for SSI and HIPERFACE	DOL-1208-G05MAH1	6032449
	Female connector, M12, 8-pin, straight, 10 m, PUR halogen free, shielded, twisted in pairs for SSI and DME HIPERFACE	DOL-1208-G10MAH1	6032450

DL50 Hi – set-up – activate continuous data output

1. Change to teach mode

2. Change to parameter mode
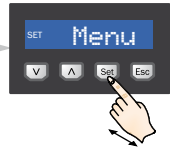
3. Select parameter serial data output

6 x
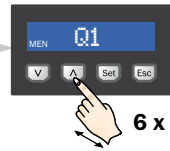
4. Open parameter serial data output

5. Select continuous data output

6. Activate continuous data output
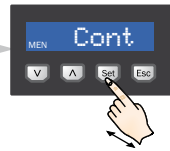
7. Return to run mode

2 x

Reflector

Set-up finished!

C

Remark:
Continuous data output can also be activated by serial command <STX>050201<ETX>.

Long range distance sensors – designed to solve applications

Long range distance sensors from SICK combine highly precise measurement results with great reliability and a wide measuring range. Long range distance sensors use time-of-flight measurement technology for linear positioning and can be used to measure a distance or to indicate a switching threshold. Due to their large measuring range, the sensors are suitable for a variety of industries and applications.

Your benefits

- Sophisticated time-of-flight technology provides precise measurement even at long ranges and ensures perfect background suppression. As a result, better machine and process control are possible – even with changing targets and environments.
- The highest precision and speed over a wide measurement range ensures reliable measurement, increasing machine productivity
- Various serial interfaces as along with analog and digital outputs offer high flexibility for easy application integration
- Tough and reliable housings offer protection even under rough ambient conditions, maximizing machine runtime
- Easy-to-use menus, accessible over a display, offer fast and cost-effective sensor setup

D

Long range distance sensors

From deep-freeze storage and steel works, to ports or mining: Demanding tasks ...

Long range distance sensors from SICK superbly master challenges posed by large distances, hot objects and rough weather conditions. This versatile sensor family can measure distances up to 1.2 km and at surface temperatures of up to 1,400 °C, both indoors and outdoors.

D

Your requirements – our solutions

Long ranges
- Long ranges from 0.15 m to 1,200 m

Extreme ambient conditions
- Use in ambient temperatures from –40 °C to +80 °C (with accessories)
- Reliable measurement on extremely hot surfaces up to 1,400 °C
- Rugged and versatile with an extensive range of accessories, such as weather hoods, cooling housing, integrated heating and lens hoods

Economical application solutions
- Simple, fast and cost-effective commissioning
- Fast, precise measurement cycles ensure maximum productivity
- High level of reliability and a long service life

Safe handling of expensive goods
- Precise reliable measurement results
- Highly repeatable switching
- Preventative maintenance information

... can be solved reliably and economically.

Long range distance sensors from SICK are rugged and versatile. These high-performance, innovative sensors enable you to easily solve your task.

D

Measuring using the time-of-flight method

All long range distance sensors from SICK use time-of-flight technology for measurement. The sensor emits light that is reflected by a reflector or by an object that must be measured. The time required by the light to travel between the sensor and the object/reflector and back again is proportional to the distance. The longer the time required, the greater the distance.

Different time-of-flight methods can be used for measurement. The **phase correlation method** emits a continuous light signal and measures the phase offset that results from the transit time. This method is ideal for applications requiring high accuracy. Sensors with **pulse time-of-flight measurement** emit a light pulse and measure the time difference between the emission of the signal and the return of the reflection. This method results in fast measurement cycles across very long distances.

Long range distance sensors from SICK use both types of time-of-flight measurement. The optimal sensor can be selected depending on the requirements of the application.

Storage and conveying technology

Positioning high-bay stacker cranes

When positioning storage and conveying vehicles, accuracy, speed and minimal downtime are what counts. The DL100 Hi was developed based on the tried-and-tested DME4000 and DME5000 product families. With its extremely fast control circuit signal processing it meets the demands of ever increasing speeds. The sensors also have preventative maintenance functions and send information to the control unit if, for example, maintenance is required because of a contaminated working environment. Additional interfaces, bus capability and an innovative assembly further improve the DL100 Hi's top performance.

➜ **The perfect solution:**
   DL100 Hi – the precise and fast distance sensor, see page D-152.

Steel industry

Slab measurement

When ambient conditions are too hot or too dangerous for personnel, measurement tasks have to be performed by extremely rugged distance sensors. In the steel industry, sensors must withstand extremely high levels of heat and provide high measurement accuracy over a long sensing range to ensure that personnel can carry out commissioning safely.
In some cases, the distance sensors must also directly measure glowing material with very high surface temperatures and countless reflections. Due to innovative technology with high-quality filters, a special version of the DMT10-2 has been developed which can measure hot surfaces up to 1,400 °C.

➜ **The perfect solutions:**
DMT10-2, for long ranges and hot surfaces, see page D-170,
DT500 for high precision, see page D-158.

D

Ports

Container profiling, positioning, anti-collision

Regardless of the measurement tasks encountered in a container terminal – long range distance sensors from SICK are ready to solve them. In these types of applications, it is particularly important that the sensors work precisely and reliably at all times to prevent damage to containers and their valuable contents. At the same time, the sensor system enables quicker turnover, which makes it possible to increase system performance for terminals with limited space and options for expansion. Due to sensing range requirements and ambient influences, distance sensors with pulse time-of-flight measurement are mainly used in these applications.

➜ **The perfect solutions:**
DS500 for anti-collision tasks, see page D-164,
DML40-2 for positioning with very long ranges, see page D-178,
DMT10-2 for height measurement and container profiling, see page D-170.

D

Time Of Flight	Laser protection class	Interfaces	Measuring range / Repeatability / Response time
			0.15 m 1 m 10 m
DME4000 — Reflector, Performance	Laserklasse 2	CANopen, DeviceNet, HIPERFACE by SICK, RS-422, SSI	150 mm ... 50,000 mm / 1 mm
			150 mm ... 130,000 mm / 2 mm
			150 mm ... 220,000 mm / 3 mm
DME5000 — Reflector, Performance	Laserklasse 2	DeviceNet, HIPERFACE by SICK, RS-422, SSI	150 mm ... 70,000 mm / 0.5 mm
			150 mm ... 150,000 mm / 1 mm
			150 mm ... 300,000 mm / 2 mm
DL100 Hi — Reflector, Performance	Laserklasse 2	RS-422, SSI	150 mm ... 100,000 mm / 0.5 mm
			150 mm ... 200,000 mm / 1 mm
			150 mm ... 300,000 mm / 2 mm
DS/DT500	Laserklasse 2	Analog (mA), CAN, RS-422	200 mm ... 7,000 mm / 1 mm / 0.15 s
			200 mm ... 30,000 mm / 1 mm / 0.25 s
			200 mm ... 70,000 mm / 1 mm / 0.15 s ... 6 s
DMT10-2	Laserklasse 1	RS-232, RS-422	500 mm ... 20,000 mm / 7 mm/10 mm / 1 ms ... 4,000 ms
			500 mm ... 155,000 mm / 7 mm/10 mm / 1 ms ... 4.000 ms
			500 mm ... 155,000 mm / 7 mm/10 mm / 1 ms ... 3,000 ms
DML40-2 — Reflector	Laserklasse 1	RS-232, RS-422	500 mm ... 1,200,000 mm / 6 mm / 1 ms ... 600 ms

0.15 m   1 m   10 m

8014441/2012-03-30
Subject to change without notice

100 m   **1 km**   **10 km**

D

100 m   **1 km**   **10 km**

Product family overview

	DME4000
	Standard sensor for measurement distances up to 220 m

Technical data overview

Measuring range	0.15 m ... 50 m 0.15 m ... 130 m 0.15 m ... 220 m
Repeatability	1 mm 2 mm 3 mm
Accuracy	± 3 mm ± 5 mm ± 6 mm
Interfaces overview	SSI PROFIBUS RS-422 DeviceNet HIPERFACE CANopen
Ambient temperature	Operation: –10 °C ... +55 °C Operation with heating: –40 °C ... +55 °C Storage: –25 °C ... +75 °C
Output rate	1 ms 2 ms 4 ms
Light source	Laser, red

At a glance
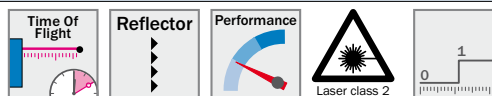
- Multiple measurement and positioning options from 0.15 m to 220 m
- High-speed output rate
- Very high resolution, repeatability and accuracy
- Illuminated LC display with measured value output and setup diagnostic information
- Visible red light and bracket with springs for alignment
- Variety of interfaces: SSI, RS-422, PROFIBUS, HIPERFACE, CANopen, DeviceNet

Detailed information	➜ D-128

D

	DME5000	DL100 Hi
	Most precise distance measurement	Reliable, fast, precise positioning
	0.15 m ... 70 m 0.15 m ... 150 m 0.15 m ... 300 m	0.15 m ... 100 m 0.15 m ... 200 m 0.15 m ... 300 m
	0.5 mm 1 mm 2 mm	0.5 mm 1 mm 2 mm
	± 2 mm ± 3 mm ± 5 mm	± 2 mm ± 2.5 mm ± 3 mm
	SSI PROFIBUS RS-422 DeviceNet HIPERFACE	SSI PROFIBUS RS-422
	Operation: –10 °C ... +55 °C Operation with heating: –40 °C ... +55 °C Storage: –25 °C ... +75 °C	Operation: –20 °C ... +55 °C Operation with heating: –40 °C ... +55 °C Storage: –40 °C ... +75 °C
	0.2 ms 1 ms 2 ms	Synchronous to PLC request
	Laser, red	Laser, red

DME5000

Time Of Flight | Reflector | Performance | Laser class 2 | 0 1

SSI | PROFIBUS | **RS-422**

DeviceNet CONFORMANCE TESTED | HIPERFACE by SICK

- Measurement range from 0.15 m to 300 m
- Very fast measurement cycles
- Highest accuracy, repeatability and system availability
- Illuminated LC display with diagnostic information
- Visible red light and bracket with springs for alignment
- Variety of interfaces: SSI, RS-422, PROFIBUS, HIPERFACE, DeviceNet

DL100 Hi

Time Of Flight | Reflector | Performance | Laser class 2 | 0 1

SSI | PROFIBUS | **RS-422**

- Measurement range up to 300 m
- Numerous fieldbus interfaces
- Pre-failure and diagnostic data available
- Display with intuitive menu and easy to see status LEDs
- Small and rugged metal housing
- 3-axis alignment bracket with quick lock system
- Elongated holes for precise adjustment of sensor offset
- SpeedCon™ and standard M12 electrical connections

Product family overview

	DT500	DS500	
	Most precise long range measurement without a reflector	Most precise switching without a reflector	
Technical data overview			
Measuring range	0.2 m ... 7 m 0.2 m ... 18 m 0.2 m ... 30 m 0.2 m ... 70 m	0.2 m ... 7 m 0.2 m ... 18 m 0.2 m ... 30 m 0.2 m ... 70 m	
Repeatability	1 mm	–	
Accuracy	± 3 mm	± 3 mm	
Interfaces overview	Q_A RS-422 CAN (Layer 2)	–	
Ambient temperature	Operation: –10 °C ... +50 °C Storage: –25 °C ... +75 °C Operation with heating: –40 °C ... +50 °C Storage: –25 °C ... +75 °C	Operation: –10 °C ... +50 °C Storage: –25 °C ... +75 °C Operation with heating –40 °C ... +50 °C Storage: –25 °C ... +75 °C	
Output rate	250 ms 150 ms 0.15 s ... 6 s	–	
Light source	Laser, red	Laser, red	
At a glance			
	RS-422 CAN	Laser class 2	
	• Measurement range 0.2 m ... 70 m • One analog output, RS-422 or CAN • Highest measurement resolution, repeatability and accuracy without a reflector • Simple adjustment using red laser light • Metal housing with integrated heating option for cold store applications • Weather protection housing optional • Alignment bracket optional	• Measurement range 0.2 m ... 70 m • Two switching outputs • Highest measurement resolution, repeatability and accuracy without a reflector • Simple adjustment using red laser light • Metal housing with integrated heating option for cold store applications • Weather protection housing optional • Alignment bracket optional	
Detailed information			

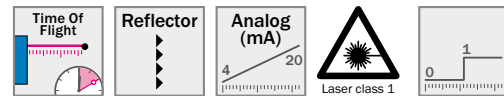|	DMT10-2	DML40-2
	The longest measurement range without a reflector for challenging applications	Master challenges precisely with a range of up to 1.200 m on a reflector
	0.5 m ... 20 m 0.5 m ... 40 m 0.5 m ... 65 m 0.5 m ... 155 m	0.5 m ... 600 m 0.5 m ... 800 m 0.5 m ... 1,200 m
	7 mm 10 mm	6 mm
	± 10 mm	± 10 mm
	RS-422, RS-232 PROFIBUS DP	RS-422, RS-232 PROFIBUS DP
	Operation: –10 °C ... +55 °C Storage: –25 °C ... +70 °C	Operation: –10 °C ... +55 °C Storage: –25 °C ... +70 °C
	1 ms ... 4,000 ms	1 ms ... 600 ms
	Laser, infrared	Laser, infrared

DMT10-2

Time Of Flight | Analog (mA) 4 20 | Laser class 1 | 0 1

RS-232 RS-422 PROFIBUS PROCESS FIELD BUS

- Measurement range from 0.5 m up to 155 m on natural targets
- Excellent accuracy thanks to time-of-flight measurement
- Easy alignment thanks to pilot laser
- Freely programmable parameters
- RS-422, RS-232, PROFIBUS, analog and two switching outputs
- Near field blanking parameter for operation through a protection window
- Models with filter for measurement of glowing, hot metal (up to 1,400 °C)

DML40-2

Time Of Flight | Reflector | Analog (mA) 4 20 | Laser class 1 | 0 1

RS-232 RS-422 PROFIBUS PROCESS FIELD BUS

- Measurement range from 0.5 m up to 1,200 m with a reflector
- Time-of-flight measurement
- Easy alignment thanks to pilot laser
- Freely programmable parameters
- RS-422, RS-232, PROFIBUS, analog and two switching outputs
- Near field blanking parameter for operation through a protection window

D

Standard sensor for measurement distances up to 220 m

D

Time Of Flight | Reflector | Performance | Laser class 2

CE | c(UL)us LISTED

SSI | PROFIBUS PROCESS FIELD BUS

RS-422 | DeviceNet CONFORMANCE TESTED

CANopen®

HIPERFACE® by SICK

Additional information

Product description

The DME4000 is a reflector-based distance sensor offering ranges of up to 220 m. Highly dynamic and precise measurement, multi-functional switching outputs and inputs for standby, preset, maintenance, and other system functions are some of the key features this sensor offers.

At a glance

- Multiple measurement and positioning options from 0.15 m to 220 m
- High-speed output rate
- Very high resolution, repeatability and accuracy
- Illuminated LC display with measured value output and setup diagnostic information
- Visible red light and bracket with springs for alignment
- Variety of interfaces: SSI, RS-422, PROFIBUS, HIPERFACE, CANopen, DeviceNet

Your benefits

- Fast measurement cycles offer optimized integration into control loops for increased productivity
- Red laser light as well as adjustable mounting brackets (optional accessory) enable fast and easy alignment, ensuring on-time and cost-effective installation
- Multi-point self checks provide maintenance and replacement warnings increasing overall machine availability
- A tough metal housing as well as heating and cooling accessories ensure reliability in rough ambient conditions
- User-friendly display with easy-to-use menu along with external PC/PLC programming offers fast and cost-efficient setup
- Multiple serial interfaces provide high-speed position output to the controller and high flexibility in application integration
- Integrated speed monitoring offers additional information for increased process reliability

➔ www.mysick.com/en/DME4000

Detailed technical data

Performance

Resolution	0.05 mm ... 5 mm 0.25 mm ... 4 mm [1]
Light source [2]	Laser, red
Laser protection class	2 (EN 60825-1 / CDRH)
Typ. light spot size (distance)	130 mm (at 70 m) 270 mm (at 150 m) 360 mm (at 220 m)
Speed (max.)	10 m/s

[1] For HIPERFACE data interface 1/32 mm ... 1/2 mm, for sin/cos 0.25 mm ... 4 mm.

[2] Average service life of 50,000 h at T_A = +25 °C.

Interfaces

Switching output [1]	Push-pull: PNP/NPN (100 mA)
Multifunctional input [2] [3]	1 x MF
CANopen application layer	CiA 301

[1] HIGH = > VS - 3 V / LOW = < 2 V.

[2] HIGH = > 12 V / LOW = < 3 V.

[3] Not reverse-polarity protected.

Mechanics/electronics

Supply voltage V_S	DC 18 V ... 30 V, limit values
Ripple [1]	< 5 V_{pp}
Initialization time	1.5 s [2] 0.9 s [3]
Indication	Display
Weight	Approx. 1,650 g
Output current I_a [4]	≤ 100 mA

[1] May not fall short of or exceed V_S tolerances.

[2] After loss of reflector < 1 s at max. speed V_{max} < 1 m/s.

[3] For HIPERFACE, after loss of reflector < 1 s at max. speed V_{max} < 1 m/s.

[4] Short-circuit / overload protected. Max. 100 nF / 20 mH.

Ambient data

Enclosure rating	IP 65
Protection class [1]	II
EMC	EN 61000-6-2, EN 55011: Class B
Effect of air pressure	0.3 ppm/hPa
Effect of air temperature	1 ppm/K
Temperature drift	Typ. 0.1 mm/K
Mechanical load	Shock: EN 600 68-2-27 / -2-29 Sine: EN 600 68-2-6 Noise: EN 600 68-2-64

[1] Reference voltage DC 32 V.

Specific data

Measuring range [1]	Accuracy	Repeatability [1] [2]	Model name	Ordering information
0.15 m … 50 m	± 3 mm	1 mm	DME4000-1xx	D-130
0.15 m … 130 m	± 5 mm	2 mm	DME4000-2xx	D-131
0.15 m … 220 m	± 6 mm	3 mm	DME4000-3xx	D-132

[1] On Diamond Grade.

[2] Statistical error 1 σ, environmental conditions constant, minimum warm-up time 10 min.

Ordering information

DME4000-1xx

- **Measuring range:** 0.15 m … 50 m (on Diamond Grade)
- **Accuracy:** ± 3 mm
- **Repeatability:** 1 mm (on Diamond Grade; statistical error 1 σ, environmental conditions constant, minimum warm-up time 10 min)

| Ambient temperature	Power consumption	Output rate	Interface	Connection type	Special characteristic	Model name	Part no.
Operation: –10 °C … +55 °C Storage: –25 °C … +75 °C	At 24 V DC < 250 mA	1 ms	SSI	Connector M16, 8-pin	–	DME4000-111	1029789
					With mounting adapter for DME5000 bracket	DME4000-111S05	1045159
		2 ms	PROFIBUS	Connector 2 x M12, 5-pin, B-coded, 1 x M16, 8-pin, B-coded	–	DME4000-112	1029788
			RS-422	Connector M16, 8-pin	–	DME4000-113	1029796
			DeviceNet	Connector 1 x M12, 4-pin, 1 x M16, 8-pin	–	DME4000-114	1029800
				Connector M12, 5-pin, A-coded	–	DME4000-115	1029801
			HIPERFACE	Connector 1 x M12, 4-pin, 1 x M12, 8-pin	–	DME4000-117	1029807
		4 ms	CANopen	Connector M12, 5-pin	–	DME4000-119	1042838
				Plug M12, 5-pin	CANopen with separate connector	DME4000-119S03	1045252
Operation with heating: –40 °C … +55 °C Storage: –25 °C … +75 °C	At 24 V DC < 1,000 mA	1 ms	SSI	Connector M16, 8-pin	–	DME4000-121	1029792
		2 ms	PROFIBUS	Connector 2 x M12, 5-pin, B-coded, 1 x M16, 8-pin, B-coded	–	DME4000-122	1029793
			RS-422	Connector M16, 8-pin	–	DME4000-123	1029797
			DeviceNet	Connector 1 x M12, 4-pin, 1 x M16, 8-pin	–	DME4000-124	1029808
			HIPERFACE	Connector 1 x M12, 4-pin, 1 x M12, 8-pin	–	DME4000-127	1029812

DME4000-2xx

- **Measuring range:** 0.15 m ... 130 m (on Diamond Grade)
- **Accuracy:** ± 5 mm
- **Repeatability:** 2 mm (on Diamond Grade; statistical error 1 σ, environmental conditions constant, minimum warm-up time 10 min)

Ambient temperature	Power consumption	Output rate	Interface	Connection type	Special characteristic	Model name	Part no.
Operation: −10 °C ... +55 °C Storage: −25 °C ... +75 °C	At 24 V DC < 250 mA	1 ms	SSI	Connector M16, 8-pin	–	DME4000-211	1029790
					With mounting adapter for DME5000 bracket	DME4000-211S06	1045160
		2 ms	PROFIBUS	Connector 2 x M12, 5-pin, B-coded, 1 x M16, 8-pin, B-coded	–	DME4000-212	1029791
			RS-422	Connector M16, 8-pin	–	DME4000-213	1029798
			DeviceNet	Connector 1 x M12, 5-pin, 1 x M16, 8-pin	–	DME4000-214	1029802
					–	DME4000-215	1029803
			HIPERFACE	Connector 1 x M12, 4-pin, 1 x M12, 8-pin	–	DME4000-217	1029806
		4 ms	CANopen	Connector M12, 5-pin	–	DME4000-219	1042839
				Plug M12, 5-pin	CANopen with separate connector	DME4000-219S04	1045253
Operation with heating: −40 °C ... +55 °C Storage: −25 °C ... +75 °C	At 24 V DC < 1,000 mA	1 ms	SSI	Connector M16, 8-pin	–	DME4000-221	1029794
		2 ms	PROFIBUS	Connector 2 x M12, 5-pin, B-coded, 1 x M16, 8-pin, B-coded	–	DME4000-222	1029795
			RS-422	Connector M16, 8-pin	–	DME4000-223	1029799
			DeviceNet	Connector 1 x M12, 4-pin, 1 x M16, 8-pin	–	DME4000-224	1029805
			HIPERFACE	Connector 1 x M12, 4-pin, 1 x M12, 8-pin	–	DME4000-227	1029804

D

D

DME4000-3xx

- **Measuring range:** 0.15 m … 220 m (on Diamond Grade)
- **Accuracy:** ± 6 mm
- **Repeatability:** 3 mm (on Diamond Grade; statistical error 1 σ, environmental conditions constant, minimum warm-up time 10 min)

Ambient temperature	Power consumption	Output rate	Interface	Connection type	Special characteristic	Model name	Part no.
Operation: –10 °C … +55 °C Storage: –25 °C … +75 °C	At 24 V DC < 250 mA	1 ms	SSI	Connector M16, 8-pin	–	DME4000-311	1041951
					With mounting adapter for DME5000 bracket	DME4000-311S01	1042733
		2 ms	PROFIBUS	Connector 2 x M12, 5-pin, B-coded, 1 x M16, 8-pin, B-coded	–	DME4000-312	1041950
			RS-422	Connector M16, 8-pin	–	DME4000-313	1041952
			DeviceNet	Connector 1 x M12, 5-pin, 1 x M16, 8-pin	–	DME4000-314	1041953
					–	DME4000-315	1041954
				Connector M12, 5-pin, A-coded	With mounting adapter for DME5000 bracket	DME4000-315S02	1042734
			HIPERFACE	Connector 1 x M12, 4-pin, 1 x M12, 8-pin	–	DME4000-317	1041955
		4 ms	CANopen	Connector M12, 5-pin	–	DME4000-319	1042841
Operation with heating: –40 °C … +55 °C Storage: –25 °C … +75 °C	At 24 V DC < 1,000 mA	1 ms	SSI	Connector M16, 8-pin	–	DME4000-321	1041957
		2 ms	PROFIBUS	Connector 2 x M12, 5-pin, B-coded, 1 x M16, 8-pin, B-coded	–	DME4000-322	1041958
			RS-422	Connector M16, 8-pin	–	DME4000-323	1041959
			DeviceNet	Connector 1 x M12, 4-pin, 1 x M16, 8-pin	–	DME4000-324	1041960
			HIPERFACE	Connector 1 x M12, 4-pin, 1 x M12, 8-pin	–	DME4000-327	1041961

Dimensional drawings

DME4000 SSI
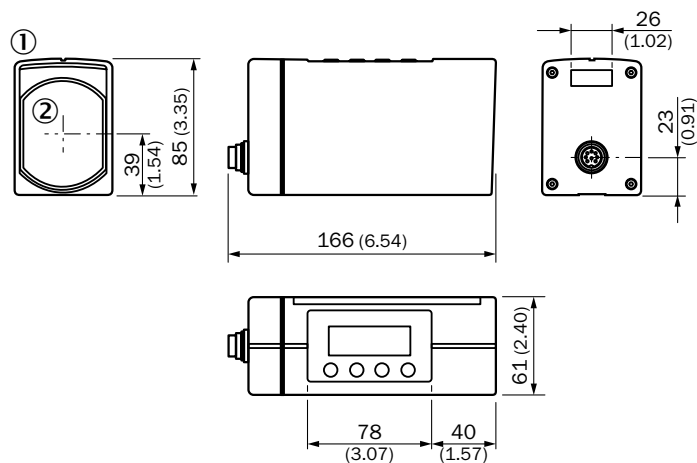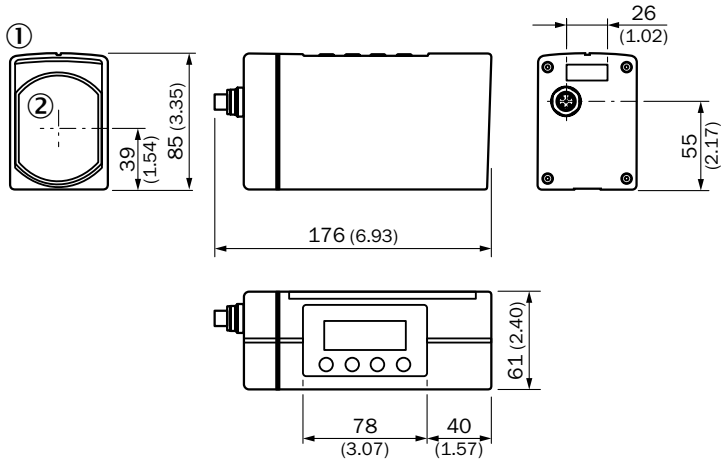
All dimensions in mm (inch)

① Liquid crystal display
② Center of optical axis

DME4000 PROFIBUS
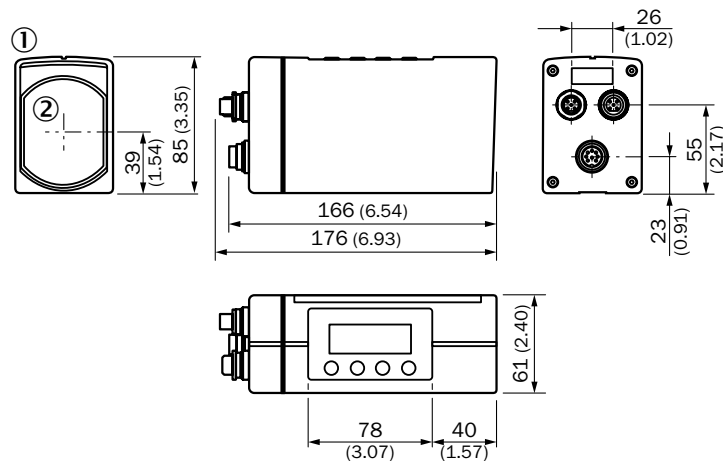
All dimensions in mm (inch)
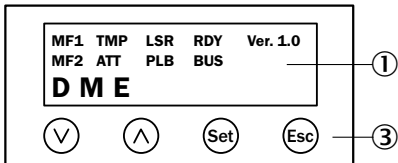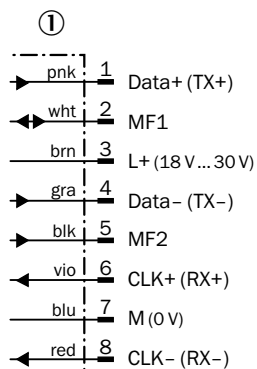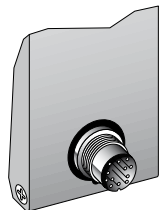
① Liquid crystal display
② Center of optical axis

D

DME4000 RS-422

All dimensions in mm (inch)

D
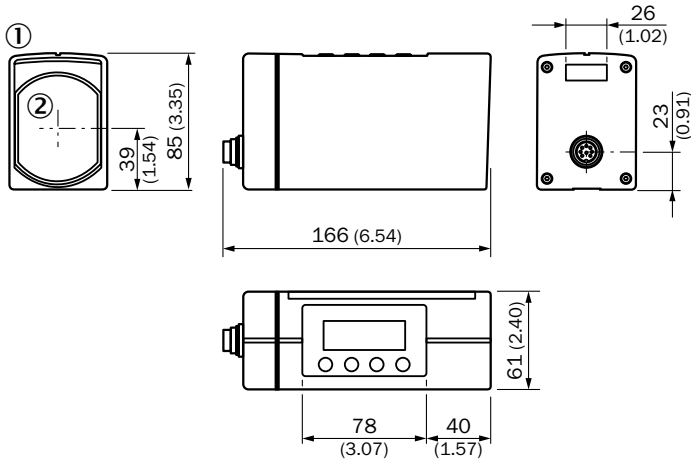
① Liquid crystal display
② Center of optical axis

DME4000-xx4 DeviceNet
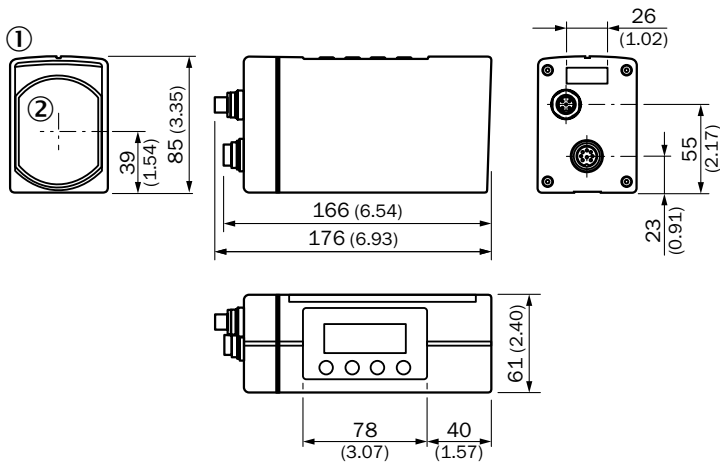
All dimensions in mm (inch)

① Liquid crystal display
② Center of optical axis

DME4000-xx5 DeviceNet
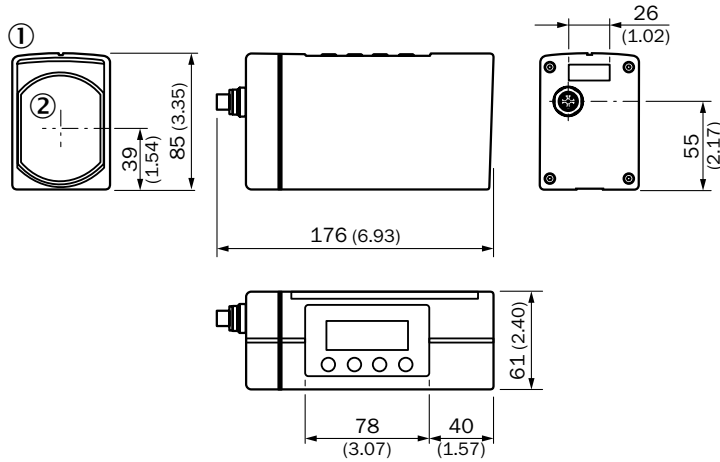
All dimensions in mm (inch)

① Liquid crystal display
② Center of optical axis

DME4000 HIPERFACE
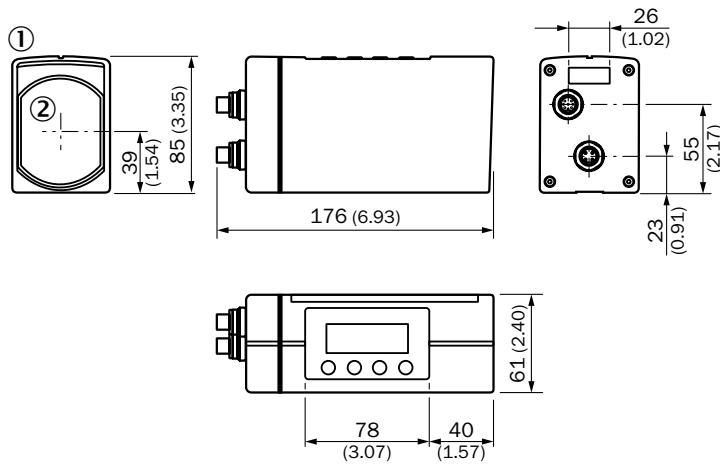
All dimensions in mm (inch)

① Liquid crystal display
② Center of optical axis

D

DME4000 CANopen

All dimensions in mm (inch)

① Liquid crystal display
② Center of optical axis

Adjustments

| MF1 | TMP | LSR | RDY | Ver. 1.0 |
| MF2 | ATT | PLB | BUS | |

D M E

① Liquid crystal display
③ Keypad

Connection type and diagram

Please note: Since wire color on 8-pin connection cables are not normed, always check for a correct pin to wire color assignment when using connection cables others than specified here.

**DME4/5xxx SSI/RS-422
Connector
M16, 8-pin**

**DME4/5xxx PROFIBUS
Connector
2 x M12, 5-pin, B-coded, BUS IN, BUS OUT
1 x M16, 8-pin**

① Connector M16, 8-pin

① Connector M16, 8-pin

pin	color	signal
1	pnk	Data+ (TX+)
2	wht	MF1
3	brn	L+ (18 V … 30 V)
4	gra	Data− (TX−)
5	blk	MF2
6	vio	CLK+ (RX+)
7	blu	M (0 V)
8	red	CLK− (RX−)

① Connector M16, 8-pin

①
pin	color	signal
1	pnk	Data+ (TX+)*)
2	wht	MF1
3	brn	L+ (18 V … 30 V)
4	gra	Data− (TX−)*)
5	blk	MF2
6	vio	CLK+ (RX+)*)
7	blu	M (0 V)
8	red	CLK− (RX−)*)

②
pin	color	signal
1		nc ④
2	grn	A
3		nc ④
4	red	B
5		nc ④

③
pin	color	signal
1		+5 V
2	grn	A
3		GND
4	red	B
5		nc ④
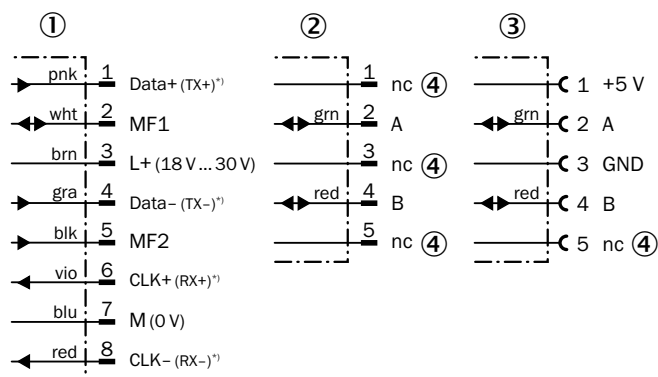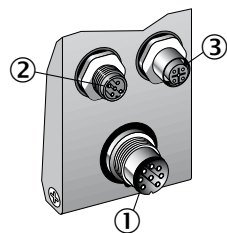
*) Internal interface, for production use only.

① Connector M16, 8-pin

② Connector M12, 5-pin, B-coded, BUS IN

③ Connector M12, 5-pin, B-coded, BUS OUT

④ Not connected

D

DME4/5xxx-xx4 DeviceNet
Connector
1 x M12, 5-pin, A-coded
1 x M16, 8-pin
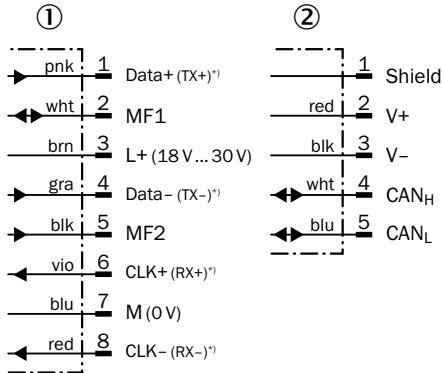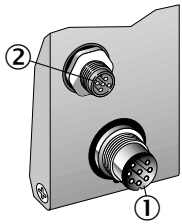
①			
pnk	1	Data+ (TX+)*)
wht	2	MF1
brn	3	L+ (18 V … 30 V)
gra	4	Data– (TX–)*)
blk	5	MF2
vio	6	CLK+ (RX+)*)
blu	7	M (0 V)
red	8	CLK– (RX–)*)

②			
	1	Shield
red	2	V+
blk	3	V–
wht	4	CAN$_H$
blu	5	CAN$_L$

*) Internal interface, for production use only.

① Connector M16, 8-pin
② Connector M12, 5-pin, A-coded

DME4/5xxx-xx5 DeviceNet
Connector M12, 5-pin,
A-coded

②			
	1	Shield
red	2	V+
blk	3	V–
wht	4	CAN$_H$
blu	5	CAN$_L$

② Connector M12, 5-pin, A-coded

DME4000 HIPERFACE
Connector
1 x M12, 4-pin
1 x M12, 8-pin

①			
brn	1	L+ (18 V … 30 V)
wht	2	MF2
blu	3	M (0 V)
blk	4	MF1

②			
wht	1	REF sin
brn	2	+sin
grn	3	REF cos
yel	4	+cos
gra	5	Data+
pnk	6	Data–
blu	7	GND
	8	nc ③
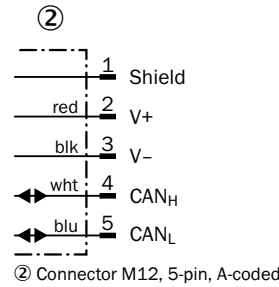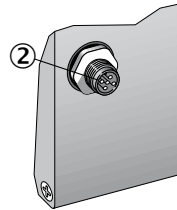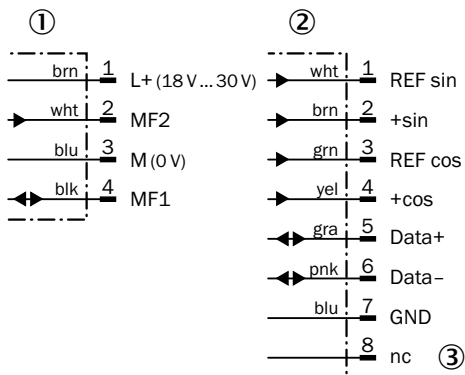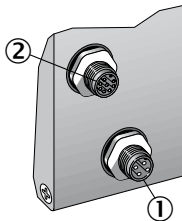
① Supply voltage M12, 4-pin
② HIPERFACE connection M12, 8-pin
③ Not connected

DME4000 CANopen
Connector
M12, 5-pin

②			
	1	Shield
red	2	V+
blk	3	V–
wht	4	CAN$_H$
blu	5	CAN$_L$

② Connector M12, 5-pin

Recommended accessories

Plug connectors and cables

|	Brief description	Model name	Part no.
	Female connector, M12, 5-pin, straight, 5 m, CAN/CANopen, shielded on pin 1	CAN cable 5 m (socket-open end)	6021166
	Female connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	DOL-1205-G05MQ	6026006
	Female connector, M12, 5-pin, straight, 10 m, PROFIBUS, shielded	DOL-1205-G10MQ	6026008
	Female connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	DOL-1205-G15MQ	6032637
	Female connector, M12, 5-pin, straight, 6 m, DeviceNet/CANopen, drop cable shielded	DOL-1205-G06MK	6028326
	Female connector, M12, 5-pin, straight, 10 m, CAN/CANopen, shielded on pin 1	DOL-1205-G10M_ Can	6021175
	Female connector, M12, 8-pin, straight, 2 m, PUR halogen free, shielded, twisted in pairs for DME HIPERFACE	DOL-1208-G02MAH1	6032448
	Female connector, M12, 8-pin, straight, 5 m, PUR halogen free, shielded, twisted in pairs for DME HIPERFACE	DOL-1208-G05MAH1	6032449
	Female connector, M12, 8-pin, straight, 10 m, PUR halogen free, shielded, twisted in pairs for DME HIPERFACE	DOL-1208-G10MAH1	6032450
	Female connector, 7/8, 5-pin, straight, DeviceNet, terminal resistor	DOS-7805-GKEND	6028329
	Male connector, M12, 4-pin, straight, PROFIBUS, terminal resistor	PR-STE-END	6021156
	Male connector, M12, 5-pin, straight, terminal resistor, DeviceNet and CANopen	STE-1205-GKEND	6037193
	Male connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	STL-1205-G05MQ	6026005
	Male connector, M12, 5-pin, straight, 10 m, PROFIBUS, shielded	STL-1205-G10MQ	6026007
	Male connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	STL-1205-G15MQ	6036898

D

Reflectors

	Brief description	Model name	Part no.
	Reflector plate, DG tape 665 mm x 665 mm, material: base plate aluminum, screw connection	PL560DG	1016806

Terminal and alignment brackets

	Brief description	Model name	Part no.
	Alignment unit for DME4000, stainless steel	BEF-DME	2040695

For additional accessories including dimensional drawings, please see page J-301.

Most precise distance measurement
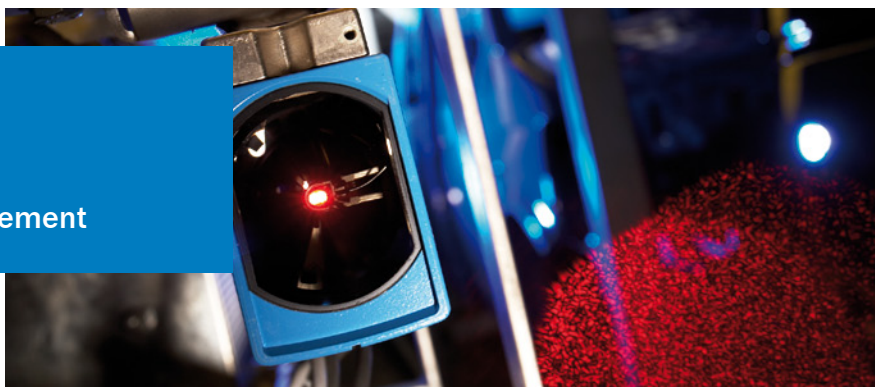
Product description

The DME5000 is a reflector-based high-performance distance sensor that provides a high degree of accuracy and repeatability, along with exceptionally quick response times. It has a range of up to 300 m. State-of-the-art, dynamic and accurate measurement; multifunctional switching outputs and inputs for standby, preset, maintenance and other system functions are some of the key features this sensor has to offer.

At a glance

- Measurement range from 0.15 m to 300 m
- Very fast measurement cycles
- Highest accuracy, repeatability and system availability
- Illuminated LC display with diagnostic information
- Visible red light and bracket with springs for alignment
- Variety of interfaces: SSI, RS-422, PROFIBUS, HIPERFACE, DeviceNet

Your benefits

- Fastest measurement rate offers optimized integration into control loops for increased productivity
- Red laser light as well as adjustable mounting brackets (optional accessory) enable fast and easy alignment, ensuring on-time and cost-effective installation
- Multi-point self checks provide maintenance and replacement warnings increasing overall machine availability
- A tough metal housing as well as heating and cooling accessories ensure reliability in rough ambient conditions
- User-friendly display with easy-to-use menu along with external PC/PLC programming offers fast and cost-efficient setup
- Multiple serial interfaces provide high-speed position output to the controller and high flexibility in application integration
- Integrated speed monitoring offers additional information for increased process reliability
- Highest degree of accuracy and repeatability ensures high machine availability

Additional information

→ www.mysick.com/en/DME5000

Detailed technical data

Performance

Resolution	0.05 mm ... 5 mm
Light source [1]	Laser, red
Laser protection class	2 (EN 60825-1 / CDRH)
Typ. light spot size (distance)	130 mm (at 70 m) 270 mm (at 150 m) 550 mm (at 300 m)
Speed (max.)	10 m/s

[1] Average service life of 50,000 h at T_A = +25 °C.

Interfaces

Switching output [1]	Push-pull: PNP/NPN (100 mA)
Multifunctional input [2] [3]	1 x MF

[1] HIGH = > VS - 3 V / LOW = < 2 V.
[2] HIGH = > 12 V / LOW = < 3 V.
[3] Not reverse-polarity protected.

Mechanics/electronics

Supply voltage V_S	DC 18 V ... 30 V, limit values
Ripple [1]	< 5 V_{pp}
Initialization time	1.5 s [2] 0.9 s [3]
Indication	Display
Weight	Approx. 1,650 g
Output current I_a [4]	≤ 100 mA

[1] May not fall short of or exceed V_S tolerances.
[2] After loss of reflector < 1 s at max. speed V_{max} < 1 m/s.
[3] For HIPERFACE, after loss of reflector < 1 s at max. speed V_{max} < 1 m/s.
[4] Short-circuit / overload protected. Max. 100 nF / 20 mH.

Ambient data

Enclosure rating	IP 65
Protection class [1]	II
EMC	EN 61000-6-2, EN 55011
Effect of air pressure	0.3 ppm/hPa
Effect of air temperature	1 ppm/K
Temperature drift	Typ. 0.1 mm/K
Mechanical load	Shock: EN 600 68-2-27 / -2-29 Sine: EN 600 68-2-6 Noise: EN 600 68-2-64

[1] Reference voltage DC 32 V.

Specific data

Measuring range [1]	Accuracy	Repeatability [1] [2]	Model name	Ordering information
0.15 m ... 70 m	± 2 mm	0.5 mm	DME5000-1xx	D-142
0.15 m ... 150 m	± 3 mm	1 mm	DME5000-2xx	D-143
0.15 m ... 300 m	± 5 mm	2 mm	DME5000-3xx	D-144

[1] On Diamond Grade.
[2] Statistical error 1 σ, environmental conditions constant, minimum warm-up time 10 min.

Ordering information

DME5000-1xx

- **Measuring range:** 0.15 m … 70 m (on Diamond Grade)
- **Accuracy:** ± 2 mm
- **Repeatability:** 0.5 mm (on Diamond Grade; statistical error 1 σ, environmental conditions constant, minimum warm-up time 10 min)

D

Ambient temperature	Power consumption	Output rate	Interface	Connection type	Special characteristic	Model name	Part no.
Operation: −10 °C … +55 °C Storage: −25 °C … +75 °C	At 24 V DC < 250 mA	1 ms	SSI	Connector M16, 8-pin	–	DME5000-111	1022949
					With special frequency F1 for parallel mounting	DME5000-111S07	1040401
		2 ms	PROFIBUS	Connector 2 x M12, 5-pin, B-coded, 1 x M16, 8-pin, B-coded	–	DME5000-112	1023668
			RS-422	Connector M16, 8-pin	–	DME5000-113	1025248
			DeviceNet	Plug 1 x M12, 4-pin, A-coded, 1 x M16, 8-pin	–	DME5000-114	1025832
				Connector M12, 5-pin	–	DME5000-115	1025833
			HIPERFACE	Connector 1 x M12, 4-pin, 1 x M12, 8-pin	–	DME5000-117	1028243
Operation with heating: −40 °C … +55 °C Storage: −25 °C … +75 °C	At 24 V DC < 1,000 mA	1 ms	SSI	Connector M16, 8-pin	–	DME5000-121	1024083
		2 ms	PROFIBUS	Connector 2 x M12, 5-pin, B-coded, 1 x M16, 8-pin, B-coded	–	DME5000-122	1024084
			RS-422	Connector M16, 8-pin	–	DME5000-123	1025249
			DeviceNet	Plug 1 x M12, 4-pin, A-coded, 1 x M16, 8-pin	–	DME5000-124	1025836
			HIPERFACE	Connector 1 x M12, 4-pin, 1 x M12, 8-pin	–	DME5000-127	1028244

DME5000-2xx

- **Measuring range:** 0.15 m ... 150 m (on Diamond Grade)
- **Accuracy:** ± 3 mm
- **Repeatability:** 1 mm (on Diamond Grade; statistical error 1 σ, environmental conditions constant, minimum warm-up time 10 min)

Ambient temperature	Power consumption	Output rate	Interface	Connection type	Special characteristic	Model name	Part no.
Operation: –10 °C ... +55 °C Storage: –25 °C ... +75 °C	At 24 V DC < 250 mA	1 ms	SSI	Connector M16, 8-pin	–	DME5000-211	1024081
					With special frequency F1 for parallel mounting	DME5000-211S04	1029571
		0.2 ms	SSI	Connector M16, 8-pin	With interpolation of measurement data for high output rate	DME5000-211S08	1047031
		2 ms	PROFIBUS	Connector 2 x M12, 5-pin, B-coded, 1 x M16, 8-pin, B-coded	–	DME5000-212	1024082
			RS-422	Connector M16, 8-pin	–	DME5000-213	1025250
					With special frequency F2 for parallel mounting	DME5000-213S05	1029572
			DeviceNet	Plug 1 x M12, 4-pin, A-coded, 1 x M16, 8-pin	–	DME5000-214	1025834
				Connector M12, 5-pin	–	DME5000-215	1025835
			HIPERFACE	Connector 1 x M12, 4-pin, 1 x M12, 8-pin	–	DME5000-217	1028245
Operation with heating: –40 °C ... +55 °C Storage: –25 °C ... +75 °C	At 24 V DC < 1,000 mA	1 ms	SSI	Connector M16, 8-pin	–	DME5000-221	1024085
		2 ms	PROFIBUS	Connector 2 x M12, 5-pin, B-coded, 1 x M16, 8-pin, B-coded	–	DME5000-222	1024086
			RS-422	Connector M16, 8-pin	–	DME5000-223	1025251
			DeviceNet	Plug 1 x M12, 4-pin, A-coded, 1 x M16, 8-pin	–	DME5000-224	1025837
			HIPERFACE	Connector 1 x M12, 4-pin, 1 x M12, 8-pin	–	DME5000-227	1028246

D

DME5000-3xx

- **Measuring range:** 0.15 m ... 300 m (on Diamond Grade)
- **Accuracy:** ± 5 mm
- **Repeatability:** 2 mm (on Diamond Grade; statistical error 1 σ, environmental conditions constant, minimum warm-up time 10 min)

Ambient temperature	Power consumption	Output rate	Interface	Connection type	Special characteristic	Model name	Part no.
Operation: –10 °C ... +55 °C Storage: –25 °C ... +75 °C	At 24 V DC < 250 mA	1 ms	SSI	Connector M16, 8-pin	–	DME5000-311	1025244
					With special frequency F1 for parallel mounting	DME5000-311S09	1050251
		2 ms	PROFIBUS	Connector 2 x M12, 5-pin, B-coded, 1 x M16, 8-pin, B-coded	–	DME5000-312	1025245
			RS-422	Connector M16, 8-pin	–	DME5000-313	1025252
			DeviceNet	Plug 1 x M12, 4-pin, A-coded, 1 x M16, 8-pin	–	DME5000-314	1026002
				Connector M12, 5-pin	–	DME5000-315	1026003
			HIPERFACE	Connector 1 x M12, 4-pin, 1 x M12, 8-pin	–	DME5000-317	1028247
Operation with heating: –40 °C ... +55 °C Storage: –25 °C ... +75 °C	At 24 V DC < 1,000 mA	1 ms	SSI	Connector M16, 8-pin	–	DME5000-321	1025246
		2 ms	PROFIBUS	Connector 2 x M12, 5-pin, B-coded, 1 x M16, 8-pin, B-coded	–	DME5000-322	1025247
			RS-422	Connector M16, 8-pin	–	DME5000-323	1025253
			DeviceNet	Plug 1 x M12, 4-pin, A-coded, 1 x M16, 8-pin	–	DME5000-324	1026004
			HIPERFACE	Connector 1 x M12, 4-pin, 1 x M12, 8-pin	–	DME5000-327	1028248

D

Dimensional drawings

DME5000 SSI
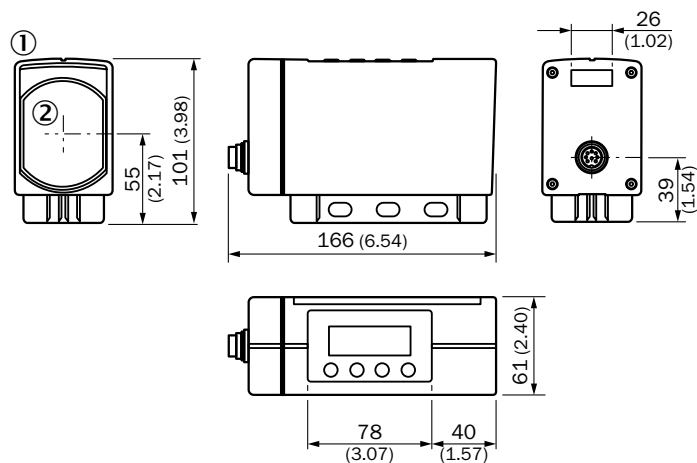
All dimensions in mm (inch)

① Liquid crystal display
② Center of optical axis

DME5000 PROFIBUS
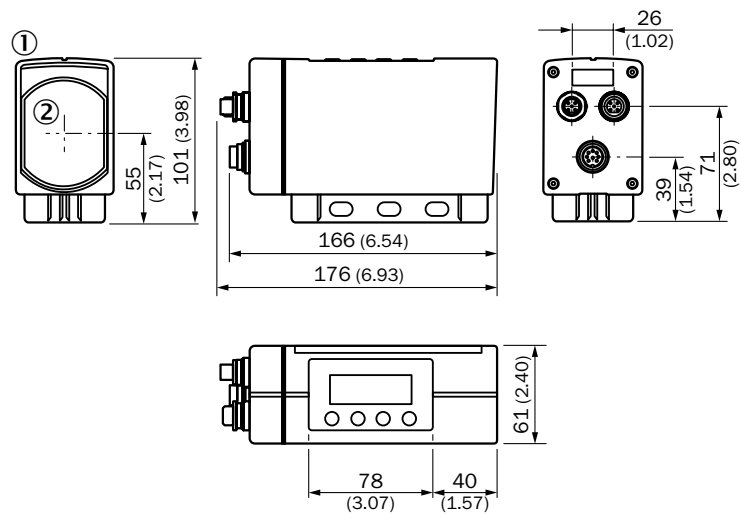
All dimensions in mm (inch)

① Liquid crystal display
② Center of optical axis

D

DME5000 RS-422

All dimensions in mm (inch)

D
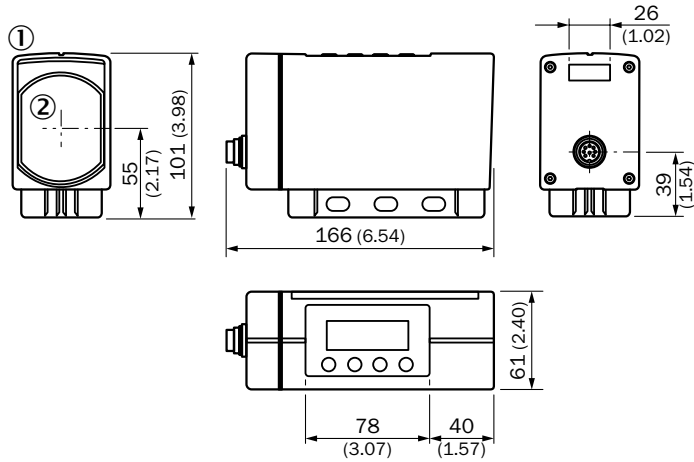
① Liquid crystal display
② Center of optical axis

DME5000-xx4 DeviceNet
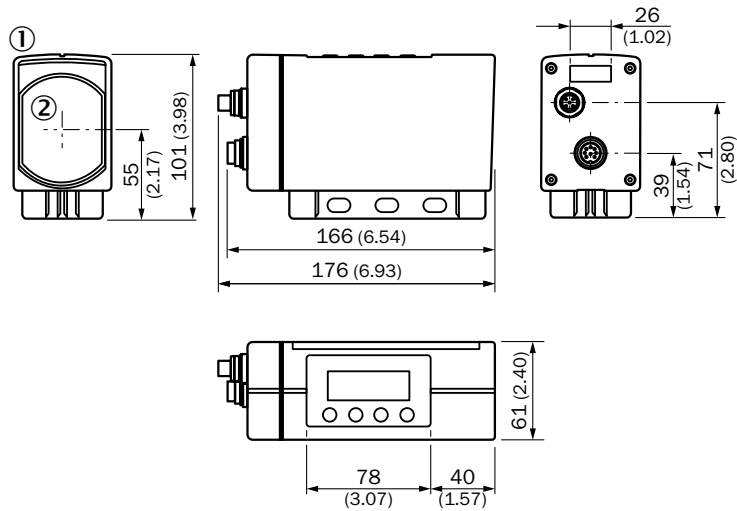
All dimensions in mm (inch)

① Liquid crystal display
② Center of optical axis

DME5000-xx5 DeviceNet
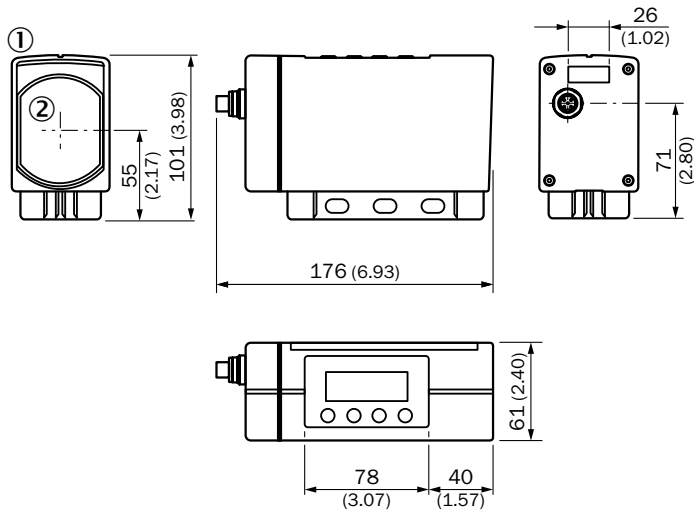
All dimensions in mm (inch)

① Liquid crystal display
② Center of optical axis

DME5000 HIPERFACE

All dimensions in mm (inch)

① Liquid crystal display
② Center of optical axis

D

Adjustments

| MF1 | TMP | LSR | RDY | Ver. 1.0 |
| MF2 | ATT | PLB | BUS | |

D M E

② Liquid crystal display
③ Keypad

Connection type and diagram

Please note: Since wire color on 8-pin connection cables are not normed, always check for a correct pin to wire color assignment when using connection cables others than specified here.

**DME4/5xxx SSI/RS-422
Connector
M16, 8-pin**

**DME4/5xxx PROFIBUS
Connector
2 x M12, 5-pin, B-coded, BUS IN, BUS OUT
1 x M16, 8-pin**

①

pnk	1	Data+ (TX+)
wht	2	MF1
brn	3	L+ (18 V ... 30 V)
gra	4	Data– (TX–)
blk	5	MF2
vio	6	CLK+ (RX+)
blu	7	M (0 V)
red	8	CLK– (RX–)

① Connector M16, 8-pin

①

pnk	1	Data+ (TX+)*)
wht	2	MF1
brn	3	L+ (18 V ... 30 V)
gra	4	Data– (TX–)*)
blk	5	MF2
vio	6	CLK+ (RX+)*)
blu	7	M (0 V)
red	8	CLK– (RX–)*)

②

	1	nc ④
grn	2	A
	3	nc ④
red	4	B
	5	nc ④

③

	1	+5 V
grn	2	A
	3	GND
red	4	B
	5	nc ④

*) For connection of interface adapter.
① Connector M16, 8-pin
② Connector M12, 5-pin, B-coded, BUS IN
③ Connector M12, 5-pin, B-coded, BUS OUT
④ Not connected

DME4/5xxx-xx4 DeviceNet
Connector
1 x M12, 5-pin, A-coded 1 x M16, 8-pin
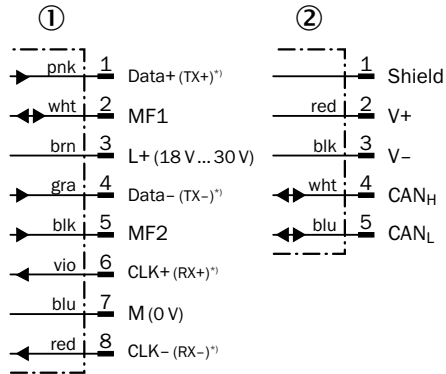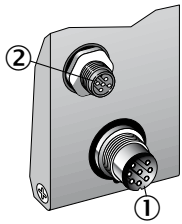
① | | | ② | |
---|---|---|---|---|---
pnk | 1 | Data+ (TX+)*) | | 1 | Shield
wht | 2 | MF1 | red | 2 | V+
brn | 3 | L+ (18 V … 30 V) | blk | 3 | V−
gra | 4 | Data− (TX−)*) | wht | 4 | CAN$_H$
blk | 5 | MF2 | blu | 5 | CAN$_L$
vio | 6 | CLK+ (RX+)*) | | |
blu | 7 | M (0 V) | | |
red | 8 | CLK− (RX−)*) | | |

*) For connection of interface adapter.
① Connector M16, 8-pin
② Connector M12, 5-pin, A-coded

DME4/5xxx-xx5 DeviceNet
Connector
M12, 5-pin, A-coded

②		
1	Shield
red	2	V+
blk	3	V−
wht	4	CAN$_H$
blu	5	CAN$_L$
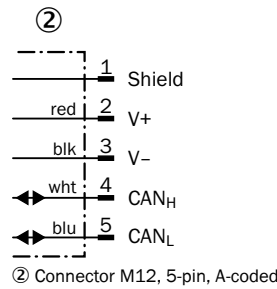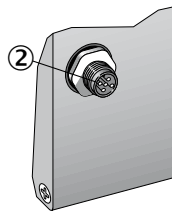
② Connector M12, 5-pin, A-coded

DME5000 HIPERFACE
Connector
1 x M12, 4-pin, A-coded
1 x M12, 8-pin, A-coded

① | | | ② | |
---|---|---|---|---|---
brn | 1 | L+ (18 V … 30 V) | wht | 1 | REF sin
wht | 2 | MF2 | brn | 2 | +sin
blu | 3 | M (0 V) | grn | 3 | REF cos
blk | 4 | MF1 | yel | 4 | +cos
| | | gra | 5 | Data+
| | | pnk | 6 | Data−
| | | blu | 7 | GND
| | | | 8 | nc ③
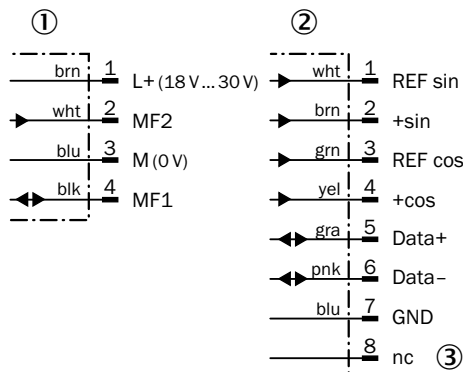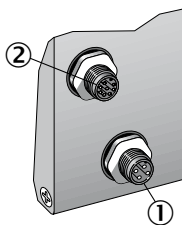
① Connector M12, 4-pin, A-coded
② Connector M12, 8-pin, A-coded
③ Not connected

D

Recommended accessories

Plug connectors and cables

	Brief description	Model name	Part no.
	Female connector, M12, 5-pin, straight, 5 m, CAN/CANopen, shielded on pin 1	CAN cable 5 m (socket-open end)	6021166
	Female connector, M12, 5-pin, straight, 6 m, DeviceNet/CANopen, drop cable shielded	DOL-1205-GO6MK	6028326
	Female connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	DOL-1205-G05MQ	6026006
	Female connector, M12, 5-pin, straight, 10 m, PROFIBUS, shielded	DOL-1205-G10MQ	6026008
	Female connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	DOL-1205-G15MQ	6032637
	Female connector, M12, 8-pin, straight, 2 m, PUR halogen free, shielded, twisted in pairs for DME HIPERFACE	DOL-1208-G02MAH1	6032448
	Female connector, M12, 8-pin, straight, 5 m, PUR halogen free, shielded, twisted in pairs for DME HIPERFACE	DOL-1208-G05MAH1	6032449
	Female connector, M12, 8-pin, straight, 10 m, PUR halogen free, shielded, twisted in pairs for DME HIPERFACE	DOL-1208-G10MAH1	6032450
	Female connector, 7/8, 5-pin, straight, DeviceNet, terminal resistor	DOS-7805-GKEND	6028329
	Male connector, M12, 4-pin, straight, PROFIBUS, terminal resistor	PR-STE-END	6021156
	Male connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	STL-1205-G05MQ	6026005
	Male connector, M12, 5-pin, straight, 10 m, PROFIBUS, shielded	STL-1205-G10MQ	6026007
	Male connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	STL-1205-G15MQ	6036898

Reflectors

	Brief description	Model name	Part no.
	Reflector plate, DG tape 665 mm x 665 mm, material: base plate aluminum, screw connection	PL560DG	1016806

Terminal and alignment brackets

	Brief description	Model name	Part no.
	Alignment unit for DME5000, stainless steel (1.4541), incl. mounting material, additional base plate mounting kit required	BEF-AH-DME5	2027721

D

D

Reliable, fast, precise positioning

Time Of Flight | Reflector | Performance | Laser class 2

RS-422

Product description

The DL100 Hi family combines leading edge technology with innovative design. The product's phase-shift measurement technology ensures the highest performance, which, in co-operation with drives manufacturers, has been optimized for perfect integration into closed control loops. Our innovative 3-axis bracket, the smallest housing in its sensor class, as well as the intelligent quick lock system with fast connectors, offers optimized handling and reduced costs of ownership.

At a glance

- Measurement range up to 300 m
- Numerous fieldbus interfaces
- Pre-failure and diagnostic data available
- Display with intuitive menu and easy to see status LEDs
- Small and rugged metal housing
- 3-axis alignment bracket with quick lock system
- Elongated holes for precise adjustment of sensor offset
- SPEEDCON™ and standard M12 electrical connections

Your benefits

- Enhanced closed-loop behavior offers highest performance and productivity
- Operating temperature down to –40 °C ensures the highest reliability in cold storage warehouses and freezers
- Numerous fieldbus and Ethernet-based interfaces offer the highest flexibility and fast communication for maximum efficiency
- Pre-failure and extensive diagnostic data allow for preventive maintenance, ensuring the highest machine uptime
- Small, rugged metal housing and SpeedCon™ compatible connectors ensure hassle-free installation – even in confined spaces
- 3-axis alignment bracket ensures fast alignment and easy exchange, reducing maintenance and setup costs
- Numerous accessories allow flexible use and guarantee high operation functionality

→ www.mysick.com/en/DL100_Hi

Detailed technical data

Performance

Response time	8 ms
Output rate	Synchronous to PLC request
Light source [1]	Laser, red
Laser protection class	2 (EN 60825-1 / CDRH)
Typ. light spot size (distance)	5 mm (+ 2 mm x distance in m)
Speed (max.)	10 m/s
Acceleration (max.)	15 m/s²
Internal measurement cycle	1 ms

[1] Average service life of 100,000 h at T_A = +25 °C.

Interfaces

Switching output [1]	Push-pull: PNP/NPN (100 mA) MF1, MF2
Multifunctional input [2]	1 x MF1

[1] HIGH = > V_S - 3 V / LOW = < 2 V.
[2] HIGH = > 12 V / LOW = < 3 V.

Mechanics/electronics

Supply voltage V_S	DC 18 V ... 30 V, limit values
Ripple [1]	< 5 V_{pp}
Initialization time [2]	Typ. 1.5 s
Connection type	Connector M12, SPEEDCON™ compatible
Indication	6 digit 5 x 7 dot matrix display
Weight [3]	Approx. 800 g ... 1,600 g
Output current I_a [4]	≤ 100 mA
Housing material	Aluminum/zinc die-cast

[1] May not fall short of or exceed V_S tolerances.

[2] After loss of reflector < 40 ms.

[3] Without mounting bracket: approx. 800 g, with mounting bracket: approx. 1,600 g.

[4] Short-circuit / overload protected. Max. 100 nF / 20 mH.

Ambient data

Enclosure rating	IP 65
Protection class	III
EMC [1]	EN 61000-6-2, EN 61000-6-4
Effect of air pressure	0.3 ppm/hPa
Effect of air temperature	1 ppm/K
Temperature drift	Typ. 0.1 mm/K
Mechanical load	Shock: EN 600 68-2-27 Sine: EN 600 68-2-6 Noise: EN 600 68-2-64

[1] This is a Class A device. This device can cause radio interference in living quarters.

D

Ordering information

Ambient temperature	Power consumption	Measuring range [1]	Accuracy	Repeat-ability [2]	Interface	Model name	Part no.
Operation: [3] −20 °C ... +55 °C Storage: −40 °C ... +75 °C	At 24 V DC < 250 mA	0.15 m ... 100 m	± 2 mm	0.5 mm	SSI	DL100-21AA2101	1052684
					PROFIBUS	DL100-21AA2102	1052686
					RS-422	DL100-21AA2103	1052688
		0.15 m ... 200 m	± 2.5 mm	1 mm	SSI	DL100-22AA2101	1052690
					PROFIBUS	DL100-22AA2102	1052692
					RS-422	DL100-22AA2103	1052694
		0.15 m ... 300 m	± 3 mm	2 mm	SSI	DL100-23AA2101	1052696
					PROFIBUS	DL100-23AA2102	1052698
					RS-422	DL100-23AA2103	1052700
Operation with heating: −40 °C ... +55 °C Storage: −40 °C ... +75 °C	At 24 V DC < 1,000 mA	0.15 m ... 100 m	± 2 mm	0.5 mm	SSI	DL100-21HA2101	1052685
					PROFIBUS	DL100-21HA2102	1052687
					RS-422	DL100-21HA2103	1052689
		0.15 m ... 200 m	± 2.5 mm	1 mm	SSI	DL100-22HA2101	1052691
					PROFIBUS	DL100-22HA2102	1052693
					RS-422	DL100-22HA2103	1052695
		0.15 m ... 300 m	± 3 mm	2 mm	SSI	DL100-23HA2101	1052697
					PROFIBUS	DL100-23HA2102	1052699
					RS-422	DL100-23HA2103	1052701

[1] On reflective tape "Diamond Grade".

[2] Statistical error 1 σ, environmental conditions constant, minimum warm-up time 10 min.

[3] Temperatures < −10 °C require warm-up time of typ. 7 minutes.

D

Dimensional drawing
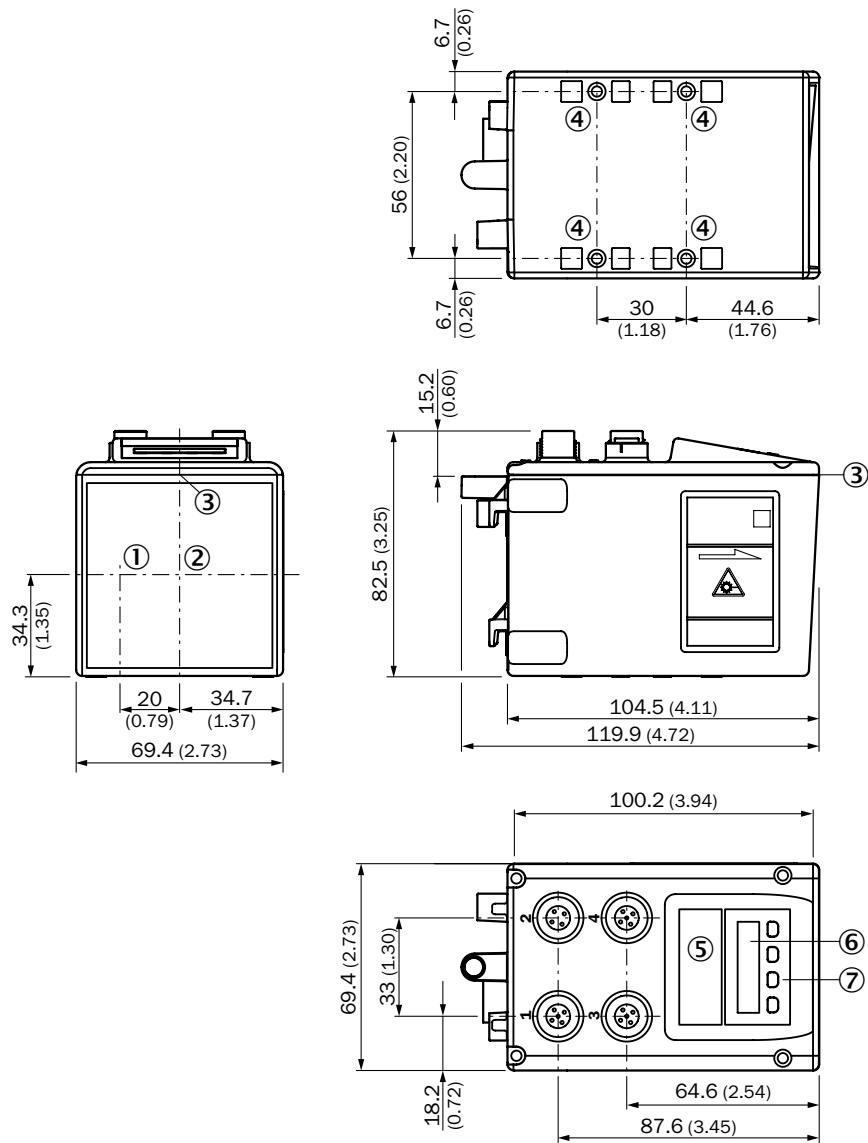
All dimensions in mm (inch)

① Optical axis, sender
② Optical axis, receiver
③ Zero level
④ Threaded mounting hole M5
⑤ Status LED [status]
⑥ Display
⑦ Control elements
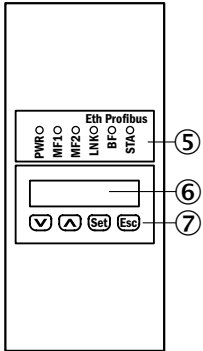
Adjustments

⑤ Status LED [status]
⑥ Display
⑦ Control elements

Connection type and diagram

Please note: Since wire color on 8-pin connection cables are not normed, always check for a correct pin to wire color assignment when using connection cables others than specified here.

DL100 Hi Ethernet Socket
M12, 4-pin, D-coded

wht/ora	1	Tx+
wht/grn	2	Rx+
ora	3	Tx−
grn	4	Rx−
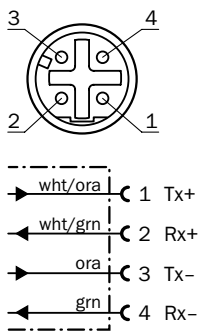
DL100 Hi SSI/RS-422 Connector
M12, 8-pin, A-coded

wht	1	MF1
brn	2	L+
grn	3	Rx−/CLK−
yel	4	Rx+/CLK+
gra	5	Tx−/DATA−
pnk	6	Tx+/DATA+
blu	7	M
red	8	MF2
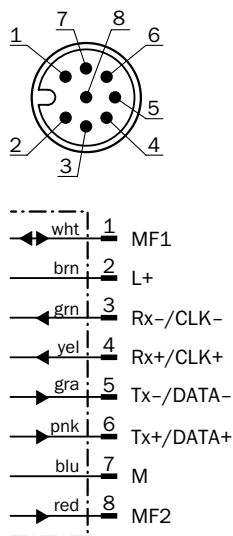
DL100 Hi PROFIBUS IN Connector
M12, 5-pin, B-coded

	1	nc ①
grn	2	A
	3	nc ①
red	4	B
	5	nc ①

① Not connected
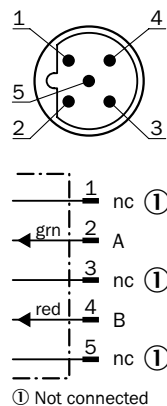
DL100 Hi PROFIBUS Socket
M12, 5-pin, B-coded

	1	+5 V
grn	2	A
	3	GND
red	4	B
	5	nc ①

① Not connected
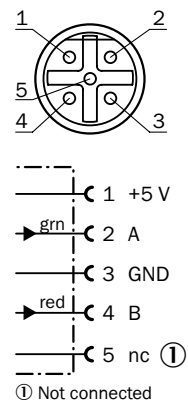
DL100 Hi power supply Connector
M12, 4-pin, A-coded

brn	1	L+
wht	2	MF2
blu	3	M
blk	4	MF1

Recommended accessories

Plug connectors and cables

	Brief description	Model name	Part no.
	Female connector, M12, 4-pin, straight, 2 m, PVC	DOL-1204-G02M	6009382
	Female connector, M12, 4-pin, straight, 5 m, PVC	DOL-1204-G05M	6009866
Illustration may differ	Female connector, M12, 4-pin, straight, 10 m, PVC	DOL-1204-G10M	6010543
	Female connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	DOL-1205-G05MQ	6026006
	Female connector, M12, 5-pin, straight, 10 m, PROFIBUS, shielded	DOL-1205-G10MQ	6026008
	Female connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	DOL-1205-G15MQ	6032637
	Female connector, M12, 8-pin, straight, 2 m, PUR halogen free, shielded, twisted in pairs for DME HIPERFACE	DOL-1208-G02MAH1	6032448
	Female connector, M12, 8-pin, straight, 5 m, PUR halogen free, shielded, twisted in pairs for DME HIPERFACE	DOL-1208-G05MAH1	6032449
	Female connector, M12, 8-pin, straight, 10 m, PUR halogen free, shielded, twisted in pairs for DME HIPERFACE	DOL-1208-G10MAH1	6032450
	Male connector, M12, 4-pin, straight, PROFIBUS, terminal resistor	PR-STE-END	6021156
	Connection cable, Ethernet patch cable, 2 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G02ME	6034414
	Connection cable, Ethernet patch cable, 5 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G05ME	6035389
	Connection cable, Ethernet patch cable, 10 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G10ME	6030928
	Male connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	STL-1205-G05MQ	6026005
	Male connector, M12, 5-pin, straight, 10 m, PROFIBUS, shielded	STL-1205-G10MQ	6026007
	Male connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	STL-1205-G15MQ	6036898

Reflectors

	Brief description	Model name	Part no.
	Reflector plate, DG tape 665 mm x 665 mm, material: base plate aluminum, screw connection	PL560DG	1016806

Terminal and alignment brackets

	Brief description	Model name	Part no.
	Alignment unit for Dx100, steel, zinc coated, incl. mounting material	BEF-AH-DX100	2058653

D

D

Most precise long range measurement without a reflector

Product description

The DT500 is a state-of-the-art distance sensor with a measurement range of up to 70 m on white targets and 30 m on black targets. The sensor has either a serial interface or an analog output.

At a glance

- Measurement range 0.2 m ... 70 m
- One analog output, RS-422 or CAN
- Highest measurement resolution, repeatability and accuracy without a reflector
- Simple adjustment using red laser light
- Metal housing with integrated heating option for cold store applications
- Weather protection housing optional
- Alignment bracket optional

Your benefits

- High-precision measurement reliably indicates product position for exact machine control, reducing scrap and increasing throughput
- Red laser light as well as adjustable mounting brackets (optional accessory) enable fast and easy alignment, ensuring on-time and cost-effective installation
- A tough metal housing with internal heating ensures reliability in rough ambient conditions, such as cold store warehouses

- User-friendly display with easy-to-use menu along with external PC/PLC programming offers fast and cost-efficient setup
- Serial interfaces or an analog output offer flexible integration into application
- Wide measurement range of 0.2 m to 70 m enables automated measurement on natural targets where reflectors can't be used

$ C \in \Box $ **RS-422 CAN**

Additional information

→ www.mysick.com/en/DT500

Detailed technical data

Performance

Repeatability [1] [2]	1 mm
Accuracy [1]	± 3 mm
Light source [3]	Laser, red
Laser protection class	2 (EN 60825/21 CFR 1.040)
Typ. light spot size (distance)	10 mm (at 7 m) 45 mm (at 30 m) 100 mm (at 70 m)

[1] 6 % ... 90 % remission.

[2] Statistical error 1 σ.

[3] Average service life of 50,000 h at T_A = +25 °C.

Interfaces

Analog output [1]	0 mA ... 20 mA / 4 mA ... 20 mA (U_V–2 V / 0.0205 A)
Multifunctional input [2]	> 12 V
Laser off inputs	> 12 V
Resolution CAN	0.1 mm
Data interfaces	Q_A RS-422 CAN (Layer 2)
Data output [3]	20,000 CR LF in mm

[1] Max. load = Uv - 2 V / 0.0205 A.

[2] Refer to function MF input.

[3] Only RS-422.

Mechanics/electronics

Supply voltage V_S	DC 10 V ... 30 V, reverse polarity protected U_S ≥ DC 24 V for devices with heating
Ripple [1]	5 V_{pp}
Initialization time	500 ms
Weight	1,000 g

[1] May not fall short of or exceed V_S tolerances.

Ambient data

Enclosure rating	IP 65
Protection class [1]	II
EMC	EN 61000-6-2, EN 55011, EN 60947-5-7: 2003-9
Temperature drift	Typ. 0.05 mm/K
Mechanical load	Shock: EN 600 68-2-27 / -2-29 Sine: EN 600 68-2-6 Noise: EN 600 68-2-64

[1] Reference voltage DC 32 V.

D

Specific data

Resolution	Connection type	Interface	CAN address	Data rate	Model name	Ordering information
12 bit	Connector M12, 5-pin	Q_A	–	–	DT500-Axx1	D-160
1 mm	Connector M12, 5-pin	RS-422	–	≤ 19.2 kbit/s	DT500-Axx2	D-161
0.1 mm	Connector M12, 8-pin	CAN (Layer 2)	11 bit, setup via display	20 kbit/s ... 1,000 kbit/s	DT500-Axx3	D-161

Ordering information

DT500-Axx1

- **Resolution:** 12 bit
- **Connection type:** Connector M12, 5-pin
- **Interface:** Q_A
- **CAN address:** –
- **Data rate:** –

D

Measuring range	Output rate	Ambient temperature	Power consumption	Model name	Part no.
0.2 m ... 30 m [1] 0.2 m ... 18 m [2]	250 ms	Operation: –10 °C ... +50 °C Storage: –25 °C ... +75 °C	Typ. 3 W	DT500-A111	1026515
		Operation with heating: –40 °C ... +50 °C Storage: –25 °C ... +75 °C	Typ. 22 W	DT500-A211	1026516
0.2 m ... 7 m [3] [4]	150 ms	Operation: –10 °C ... +50 °C Storage: –25 °C ... +75 °C	Typ. 3 W	DT500-A311	1040475
		Operation with heating: –40 °C ... +50 °C Storage: –25 °C ... +75 °C	Typ. 22 W	DT500-A411	1040465
0.2 m ... 70 m [1] 0.2 m ... 18 m [2]	0.15 s ... 6 s	Operation: –10 °C ... +50 °C Storage: –25 °C ... +75 °C	Typ. 3 W	DT500-A511	1040466
0.2 m ... 70 m [1] 0.2 m ... 30 m [2]	0.15 s ... 6 s	Operation with heating: –40 °C ... +50 °C Storage: –25 °C ... +75 °C	Typ. 22 W	DT500-A611	1040467

[1] 90 % remission.

[2] 6 % remission.

[3] 6 % ... 90 % remission.

[4] Unique up to 7 m.

DT500-Axx2

- **Resolution:** 1 mm
- **Connection type:** Connector M12, 5-pin
- **Interface:** RS-422
- **CAN address:** –
- **Data rate:** ≤ 19.2 kbit/s

Measuring range	Output rate	Ambient temperature	Power consumption	Model name	Part no.
0.2 m ... 30 m [1] 0.2 m ... 18 m [2]	250 ms	Operation: –10 °C ... +50 °C Storage: –25 °C ... +75 °C	Typ. 3 W	DT500-A112	1026517
		Operation with heating: –40 °C ... +50 °C Storage: –25 °C ... +75 °C	Typ. 22 W	DT500-A212	1026518

[1] 90 % remission.

[2] 6 % remission.

DT500-Axx3

- **Resolution:** 0.1 mm
- **Connection type:** Connector M12, 8-pin
- **Interface:** CAN (Layer 2)
- **CAN address:** 11 bit, setup via display
- **Data rate:** 20 kbit/s ... 1,000 kbit/s

Measuring range	Output rate	Ambient temperature	Power consumption	Model name	Part no.
0.2 m ... 30 m [1] 0.2 m ... 18 m [2]	250 ms	Operation: –10 °C ... +50 °C Storage: –25 °C ... +75 °C	Typ. 3 W	DT500-A123	1040468
		Operation with heating: –40 °C ... +50 °C Storage: –25 °C ... +75 °C	Typ. 22 W	DT500-A223	1040469
0.2 m ... 7 m [3] [4]	150 ms	Operation: –10 °C ... +50 °C Storage: –25 °C ... +75 °C	Typ. 3 W	DT500-A323	1040470
		Operation with heating: –40 °C ... +50 °C Storage: –25 °C ... +75 °C	Typ. 22 W	DT500-A423	1040471
0.2 m ... 70 m [1] 0.2 m ... 30 m [2]	0.15 s ... 6 s	Operation: –10 °C ... +50 °C Storage: –25 °C ... +75 °C	Typ. 3 W	DT500-A523	1040472
		Operation with heating: –40 °C ... +50 °C Storage: –25 °C ... +75 °C	Typ. 22 W	DT500-A623	1040473

[1] 90 % remission.

[2] 6 % remission.

[3] 6 % ... 90 % remission.

[4] Unique up to 7 m.

Dimensional drawing
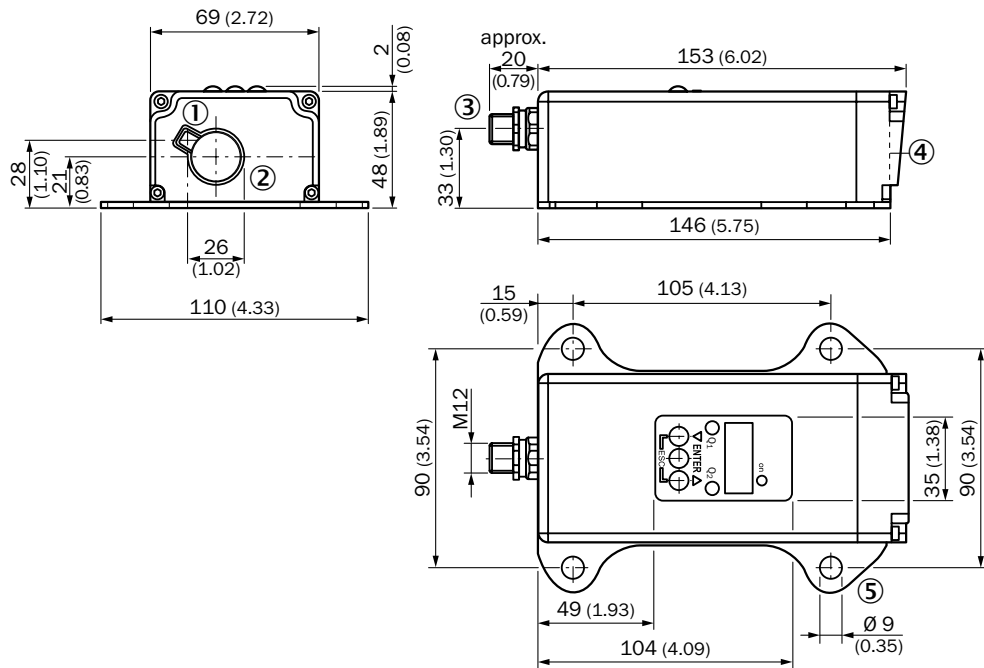
69 (2.72)

2 (0.08)

approx. 20 (0.79)

153 (6.02)

28 (1.10)
21 (0.83)

48 (1.89)

33 (1.30)

146 (5.75)

26 (1.02)

110 (4.33)

15 (0.59)

105 (4.13)

M12

90 (3.54)

35 (1.38)

90 (3.54)

49 (1.93)

104 (4.09)

Ø 9 (0.35)

All dimensions in mm (inch)

① Optical axis, sender
② Optical axis, receiver
③ Connector M12, 5-pin
④ Zero level
⑤ Mounting hole

Adjustments

on ◯ ⑥

⑦

▽ ENTER △
ESC

⑧
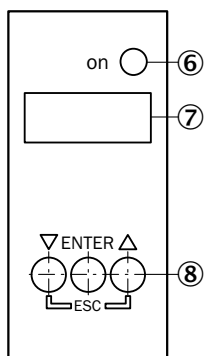
⑥ Operating indicator
⑦ Indicator panel, 7-segment display
⑧ Control panel

Connection type and diagram

Please note: Since wire color on 8-pin connection cables are not normed, always check for a correct pin to wire color assignment when using connection cables others than specified here.

DT500-Axx1 analog
Connector
M12, 5-pin

brn	1	L+
wht	2	Q$_A$
blu	3	M
blk	4	MQ$_A$
gra	5	MF ①
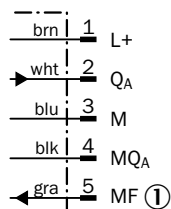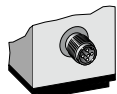
① Multifunctional input

DT500-xx2 RS-422
Connector
M12, 5-pin

brn	1	L+
wht	2	TX+
blu	3	M
blk	4	TX–
gra	5	nc ①
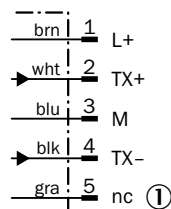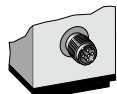
① Not connected

DT500-Axx3 CAN (Layer 2)
Connector
M12, 8-pin

wht	1	MF ①
brn	2	L+
grn	3	CAN Low out
yel	4	CAN High out
gra	5	CAN Low in
pnk	6	CAN High in
blu	7	M
red	8	nc ②

① Multifunctional input
② Not connected

Recommended accessories

Plug connectors and cables

		Model name	Part no.
Illustration may differ	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899
	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544
	Female connector, M12, 8-pin, straight, 2 m, PUR halogen free, shielded, twisted in pairs for DME HIPERFACE	DOL-1208-G02MAH1	6032448
	Female connector, M12, 8-pin, straight, 5 m, PUR halogen free, shielded, twisted in pairs for DME HIPERFACE	DOL-1208-G05MAH1	6032449
	Female connector, M12, 8-pin, straight, 10 m, PUR halogen free, shielded, twisted in pairs for DME HIPERFACE	DOL-1208-G10MAH1	6032450

Terminal and alignment brackets

	Brief description	Model name	Part no.
	Alignment unit for DS/DT500, stainless steel (1.4541), incl. mounting material	BEF-DSDT	2031377

For additional accessories including dimensional drawings, please see page J-301.

Function MF input

Teach in	0 mA	60 ms < MF < 150 ms
Teach in	4 mA	150 ms < MF < 250 ms
Teach in	20 mA	250 ms < MF < 350 ms
Laser off	–	450 ms < MF < ∞

D

D

Time Of Flight

Laser class 2

0 1

Most precise switching without a reflector

Product description

The DS500 is a state-of-the art long range distance sensor. The sensor has two digital outputs and offers a range of up to 70 m on white targets and 30 m on black targets. It is easy to set up via the built-in display and keypad in addition to PC/PLC programming.

At a glance

- Measurement range 0.2 m ... 70 m
- Two switching outputs
- Highest measurement resolution, repeatability and accuracy without a reflector
- Simple adjustment using red laser light
- Metal housing with integrated heating option for cold store applications
- Weather protection housing optional
- Alignment bracket optional

Your benefits

- High-precision switching reliably indicates product position for exact machine control, reducing scrap and increasing throughput
- Red laser light as well as adjustable mounting brackets (optional accessory) enable fast and easy alignment, ensuring on-time and cost-effective installation
- A tough metal housing with internal heating ensures reliability in rough ambient conditions, such as cold store warehouses
- User-friendly display with easy-to-use menu along with external PC/PLC programming offers fast and cost-efficient setup
- Two individual programmable switching outputs offer flexible integration into application
- Wide measurement range of 0.2 m to 70 m enables automated measurement on natural targets where reflectors can't be used

CE

➜ www.mysick.com/en/DS500

Detailed technical data

Performance

Resolution	1 mm
Accuracy	± 3 mm
Light source [1]	Laser, red
Laser protection class	2 (EN 60825/21 CFR 1.040)
Typ. light spot size (distance)	10 mm (at 7 m) 45 mm (at 30 m) 100 mm (at 70 m)

[1] Average service life of 50,000 h at T_A = +25 °C.

Interfaces

Multifunctional input [1] [2]	< 2 V > 12 V < U_V
Hysteresis	± 6 %

[1] Refer to function MF input.

[2] NPN: < 2 V; PNP: > 2 V < V_S.

Mechanics/electronics

Supply voltage V_S	DC 10 V ... 30 V, reverse polarity protected U_s ≥ DC 24 V for devices with heating
Ripple [1]	5 V_{pp}
Initialization time	500 ms
Connection type	Connector M12, 5-pin
Weight	1,000 g

[1] May not fall short of or exceed V_S tolerances.

Ambient data

Enclosure rating	IP 65
Protection class [1]	II
EMC	EN 61000-6-2, EN 55011, EN 60947-5-7: 2003-9
Temperature drift	Typ. 0.05 mm/K
Mechanical load	Shock: EN 600 68-2-27 / -2-29 Sine: EN 600 68-2-6 Noise: EN 600 68-2-64

[1] Reference voltage DC 32 V.

D

Ordering information

Switching output [1]	Measuring range	Response time	Ambient temperature	Power consumption	Model name	Part no.
NPN (< 100 mA)	0.2 m ... 30 m [2] 0.2 m ... 18 m [3]	250 ms	Operation: −10 °C ... +50 °C Storage: −25 °C ... +75 °C	Typ. 3 W	DS500-N111	1026521
			Operation with heating: −40 °C ... +50 °C Storage: −25 °C ... +75 °C	Typ. 22 W	DS500-N211	1026522
PNP (< 100 mA)	0.2 m ... 30 m [2] 0.2 m ... 18 m [3]	250 ms	Operation: −10 °C ... +50 °C Storage: −25 °C ... +75 °C	Typ. 3 W	DS500-P111	1026519
			Operation with heating: −40 °C ... +50 °C Storage: −25 °C ... +75 °C	Typ. 22 W	DS500-P211	1026520
NPN (< 100 mA)	0.2 m ... 7 m [4] [5]	150 ms	Operation: −10 °C ... +50 °C Storage: −25 °C ... +75 °C	Typ. 3 W	DS500-N311	1040481
			Operation with heating: −40 °C ... +50 °C Storage: −25 °C ... +75 °C	Typ. 22 W	DS500-N411	1040482
PNP (< 100 mA)	0.2 m ... 7 m [4] [5]	150 ms	Operation: −10 °C ... +50 °C Storage: −25 °C ... +75 °C	Typ. 3 W	DS500-P311	1040477
			Operation with heating: −40 °C ... +50 °C Storage: −25 °C ... +75 °C	Typ. 22 W	DS500-P411	1040478
NPN (< 100 mA)	0.2 m ... 70 m [2] 0.2 m ... 30 m [3]	0.15 s ... 6 s	Operation: −10 °C ... +50 °C Storage: −25 °C ... +75 °C	Typ. 3 W	DS500-N511	1040483
			Operation with heating: −40 °C ... +50 °C Storage: −25 °C ... +75 °C	Typ. 22 W	DS500-N611	1040484
PNP (< 100 mA)	0.2 m ... 70 m [2] 0.2 m ... 30 m [3]	0.15 s ... 6 s	Operation: −10 °C ... +50 °C Storage: −25 °C ... +75 °C	Typ. 3 W	DS500-P511	1040479
			Operation with heating: −40 °C ... +50 °C Storage: −25 °C ... +75 °C	Typ. 22 W	DS500-P611	1040480

[1] PNP: HIGH = V_S − (< 2.5 V) / LOW < 2.5 V; NPN: HIGH = < 2.5 V / LOW = V_S.

[2] 90 % remission.

[3] 6 % remission.

[4] 6 % ... 90 % remission.

[5] Unique up to 7 m.

Dimensional drawing
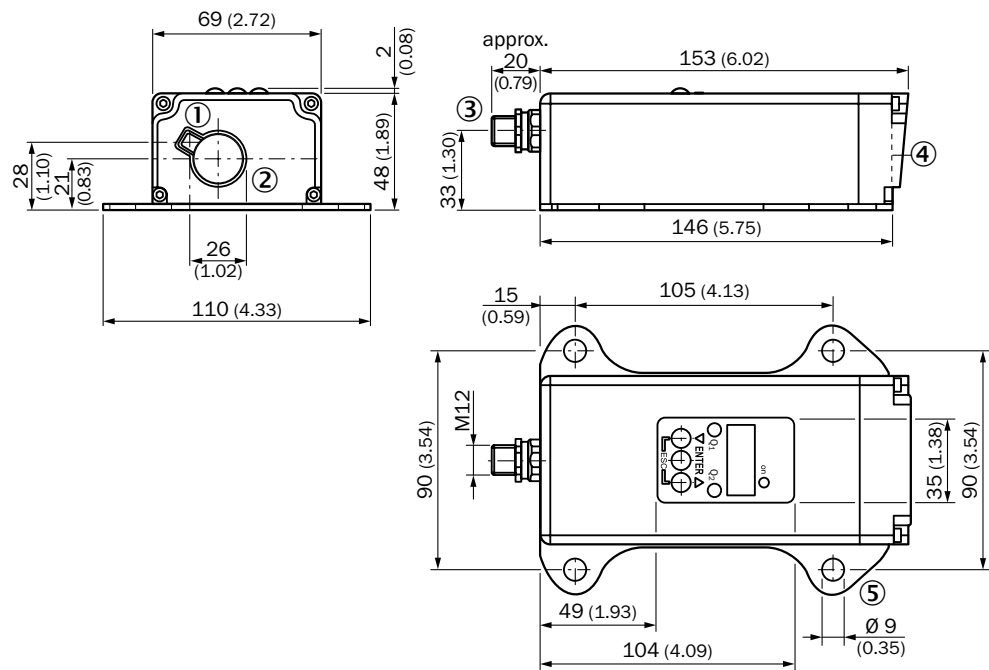
All dimensions in mm (inch)

① Optical axis, sender
② Optical axis, receiver
③ Connector M12, 5-pin
④ Zero level
⑤ Mounting hole

Adjustments
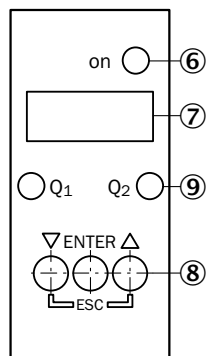
⑥ Operating indicator
⑦ Indicator panel, 7-segment display
⑧ Control panel
⑨ Switching output indicator

Connection type and diagram
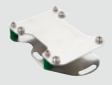
Connector M12, 5-pin

brn	1	L+
wht	2	Q₂
blu	3	M
blk	4	Q₁
gra	5	MF ①

① Multifunctional input

Recommended accessories

Plug connectors and cables

		Model name	Part no.
Illustration may differ	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899
	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544

Terminal and alignment brackets

	Brief description	Model name	Part no.
	Alignment unit for DS/DT500, stainless steel (1.4541), incl. mounting material	BEF-DSDT	2031377

For additional accessories including dimensional drawings, please see page J-301.

D Function MF input

Teach in	Q_1	60 ms < MF < 150 ms
Teach in	$\overline{Q}_1$	150 ms < MF < 250 ms
Teach in	Q_2	250 ms < MF < 350 ms
Teach in	$\overline{Q}_2$	350 ms < MF < 450 ms
Laser off	–	450 ms < MF < ∞

The longest measurement range without a reflector for challenging applications

Time Of Flight | Analog (mA) 4 20 | Laser class 1 | 0 1

Product description

DMT10-2 distance sensors are designed to perform in the toughest environments, such as fog, rain, steel mills, wood processing, etc. They offer a wide measure-ment range from 0.5 m up to 155 m. The DMT's variety of adjustable software tools allow users to cope with challeng-ing environments.

At a glance

- Measurement range from 0.5 m up to 155 m on natural targets
- Excellent accuracy thanks to time-of-flight measurement
- Easy alignment thanks to pilot laser
- Freely programmable parameters
- RS-422, RS-232, PROFIBUS, analog and two switching outputs
- Near field blanking parameter for op-eration through a protection window
- Models with filter for measurement of glowing, hot metal (up to 1,400 °C)

Your benefits

- Extremely wide measurement range of up to 155 m on natural targets offers high flexibility in applications where range is key
- Supplementary visible alignment laser allows fast and easy alignment – even over long distances, offering fast and cost-effective installation
- Tough metal housing design for trouble-free operation in the roughest environmental conditions
- Non-visible, Class 1 IR laser for safe measurement and detection
- User-friendly software with an easy-to-follow interface ensures fast and cost-optimized setup
- Serial and analog interfaces as well as two digital switching outputs allow flexible use for varied applications
- Integrated filter option allows for direct measurement of 1,400 °C glowing, hot targets

CE III **RS-232** **RS-422** PROFIBUS PROCESS FIELD BUS

Additional information

➜ www.mysick.com/en/DMT10_2

Detailed technical data

Performance

Resolution	1 mm
Repeatability	7 mm [1] [2] 10 mm [2] [3]
Accuracy [4] [5]	± 10 mm
Cycle time	1,024 per sec.
Average depth	1/16/64/256/1,024
Output rate [6]	1 ms / 4,000 ms
Light source	Laser, infrared
Laser protection class	1 (EN 60825-1:Nov.2001, IEC 60825-1:ÄM2:2001)
Typ. light spot size (distance)	Typ. 20 mm (+ 5 x distance in m)

[1] Dependant on distance and remission, 7 mm, at 6 % ... 90 % remission from 0.5 m ... 65 m, at 6 % ... 18 % remission from 0.5 m ... 40 m, at 6 % remission from 0.5 m ... 15 m.

[2] Environmental conditions constant, minimum warm-up time 30 min, average depth 1,024, statistical error 1 σ.

[3] Dependant on distance and remission, 10 mm, at 6 % ... 90 % remission from 60 m ... 155 m, at 6 % ... 18 % remission from 40 m ... 65 m, at 6 % remission from 15 m ... 40 m.

[4] 23 °C air temperature, 977 hPa, minimum. warm-up time 30 min.

[5] When operating in ambient temperatures between +40 °C ... +55 °C the accuracy can decrease by factor 2.5.

[6] Dependant on average setting, average depth, timeout, baud rate, data output and output format.

Interfaces

Analog output	4 mA ... 20 mA, scalable
Switching output [1]	Q_1, Q_2
Data transmission rate	≤ 12 MBaud (for Profibus DP)
Interface for parametrization	RS-232

[1] Output Q short-circuit protected.

Mechanics/electronics

Supply voltage V_S	DC 18 V ... 30 V, limit values
Ripple [1]	< 5 V_{pp}
Power consumption [2]	≤ 6 W
Initialization time	6 s
Connection type	1 x cable gland, 1 x Sub-D, 9-pin
Weight	Approx. 1,200 g
Output current I_a	≤ 100 mA

[1] May not fall short of or exceed V_S tolerances.

[2] Without load.

D

Ambient data

Enclosure rating	IP 65
Protection class [1]	III
EMC	EN 55011:1998 Kl. B, Gr. 1, EN 61000-6-2
Ambient temperature	Operation: –10 °C ... +55 °C Storage: –25 °C ... +70 °C
Temperature drift	Typ. 0.6 mm/K [2] Typ. 0.3 mm/K [3]
Mechanical load	Shock: IEC 60068-2-27, -2-29 Sine: IEC 60068-2-6

[1] Reference voltage DC 50 V PELV-voltage (EN 50178).

[2] –10° C ... 0° C, +40 °C ... +55 °C.

[3] 0 °C ... +40 °C.

Ordering information

Special characteristic	Measuring range	Response time [4]	Aperture delay time	Interface	Model name	Part no.
Mechanical aperture	0.5 m ... 155 m [1] 0.5 m ... 65 m [2] 0.5 m ... 40 m [3]	1 ms ... 4,000 ms	1 s [6]	RS-422, RS-232 [5]	DMT10-2-1111	1027603
			1 s [6]	RS-422, RS-232 [5]	DMT10-2-1211	1027604
	0.5 m ... 20 m [7]	1 ms ... 4,000 ms	1 s [6]	RS-422, RS-232 [5]	DMT10-2-1113	1027605
				PROFIBUS DP	DMT10-2-1213	1027606
Electronic aperture	0.5 m ... 155 m [1] 0.5 m ... 65 m [2] 0.5 m ... 40 m [3]	1 ms ... 3,000 ms	1 ms [6]	RS-422, RS-232 [5]	DMT10-2-2111	1028540
				PROFIBUS DP	DMT10-2-2211	1028541

[1] 90 % remission.

[2] 18 % remission.

[3] 6 % remission.

[4] Dependant on average setting, average depth, timeout, baud rate, data output, output format and effective dead time of aperture.

[5] Switchable.

[6] Dependant on average setting, average depth, timeout, baud rate, data output and output format.

[7] Max. object temperature 1,400 °C.

Dimensional drawings

DMT10-2-x1xx

All dimensions in mm (inch)

① Dust protection tube
② Laser pointer pilot light
③ Alignment sight
④ Function indicator
⑤ Zero level
⑥ Mounting hole M6 threaded – 6 mm deep
⑦ Connector cover
⑧ PG9
⑨ Sub-D, 9-pin

D

DMT10-2-x2xx

All dimensions in mm (inch)

① Dust protection tube
② Laser pointer pilot light
③ Alignment sight
④ Function indicator
⑤ Zero level
⑥ Mounting hole M6 threaded – 6 mm deep
⑦ Connector cover
⑧ PG9
⑨ Sub-D, 9-pin
⑩ Sub-D, 9-pin

Adjustments

⑩ Q_2 function indicator
⑪ Q_1 function indicator
⑫ Operating indicator, green
⑬ Plausibility (measurement error), red

Connection type and diagram

DMxxx-2 RS-232/RS-422
PG9


```
1  L+
2  M
3  Q₁
4  Q₂
5  L+/Q, Q_A
6  M/Q, Q_A
7  Q_A
8  nc  ⑫
```

① Pin 1
② Pin 2
③ Pin 3
④ Pin 4
⑤ Pin 5
⑥ Pin 6
⑦ Pin 7
⑧ Pin 8
⑨ Terminals
⑩ DIP switches RS-232/RS-422 switching
⑪ Shield
⑫ Not connected

DMxxx-2 RS-232/RS-422
Connector
Sub-D, 9-pin

RS-232

```
1  RESET
2  RxD
3  TxD
5  GND
```

RS-422

```
1  RESET
5  GND
6  Tx+
7  Tx−
8  Rx+
9  Rx−
```

① Pin 1
⑤ Pin 5
⑥ Pin 6
⑨ Pin 9

D

DMxxx-2 RS-232/PROFIBUS
PG9

1 L+
2 M

① Pin 1
② Pin 2

DMxxx-2 RS-232/PROFIBUS
Socket
Sub-D, 9-pin

3 B
4 RTS
5 GND
6 +5 V
8 A

① Pin 1
⑤ Pin 5
⑥ Pin 6
⑨ Pin 9

D

Recommended accessories

Plug connectors and cables

	Brief description	Model name	Part no.
	Serial RS-232 cable, 3 m, 9-pin, D-sub, socket/open cable end	Connecting cable (socket-open end)	2020319

Terminal and alignment brackets

	Brief description	Model name	Part no.
	Alignment unit for DMT/DML, steel, zinc coated, incl. mounting material	BEF-GH-DMT	5309130

For additional accessories including dimensional drawings, please see page J-301.

D

Master challenges precisely with a range of up to 1,200 m on a reflector

D

Product description

DML distance sensors are designed to perform in the toughest environments, such as fog, rain, steel mills, wood processing, etc. They offer a wide measurement range – up to 1,200 m, solving applications that require very long distances. The DML's variety of adjustable software tools allow users to cope with challenging environments.

At a glance

- Measurement range from 0.5 m up to 1,200 m with a reflector
- Time-of-flight measurement
- Easy alignment thanks to pilot laser
- Freely programmable parameters
- RS-422, RS-232, PROFIBUS, analog and two switching outputs
- Near field blanking parameter for operation through a protection window

Your benefits

- Extremely long measurement ranges of up to 1,200 m on natural targets offer high flexibility in applications where range is key
- Special visible alignment laser allows fast and easy alignment – even over long distances, offering fast and cost-effective installation
- Tough, metal housing design for trouble-free operation in rough environmental conditions
- Class 1 IR laser for discrete and safe measurement and detection
- User-friendly software with an easy-to-follow interface ensures fast and cost-optimized setup
- Serial and analog interfaces as well as two digital switching outputs offer local over/under limit and service signals

CE ⟨III⟩ **RS-232**
RS-422 *PROFIBUS*

Additional information

Detailed technical data

Performance

Measuring range	0.5 m ... 600 m [1] 0.5 m ... 800 m [2] 0.5 m ... 1,200 m [3]
Resolution	1 mm
Repeatability [4] [5]	6 mm
Accuracy [6] [7]	± 10 mm
Response time [8]	1 ms ... 600 ms
Cycle time	5,120 per sec.
Average depth	1/16/64/256/1,024
Output rate [8]	1 ms / 600 ms
Light source	Laser, infrared
Laser protection class	1 (EN 60825-1:Nov.2001, IEC 60825-1:ÄM2:2001) 2 (for DML40-2-1111S01)
Typ. light spot size (distance)	Typ. 20 mm (+ 5 x distance in m)

[1] On Diamond Grade.

[2] On reflector PL880FS01.

[3] On reflector OP60.

[4] 6 % ... 90 % remission.

[5] Environmental conditions constant, minimum warm-up time 30 min, average depth 1,024, statistical error 1 σ.

[6] 23 °C air temperature, 977 hPa, minimum warm-up time 30 min.

[7] When operating in ambient temperatures between +40 °C ... +55 °C the accuracy can decrease by factor 2.5.

[8] Dependant on average setting, average depth, timeout, baud rate, data output and output format.

Interfaces

Analog output [1]	4 mA ... 20 mA, scalable
Switching output	Q_1, Q_2 [1]
Data transmission rate	≤ 12 MBaud
Interface for parametrization	RS-232

[1] Output Q short-circuit protected.

Mechanics/electronics

Supply voltage V_S	DC 18 V ... 30 V, limit values
Ripple [1]	5 V_{pp}
Power consumption [2]	≤ 6 W
Initialization time	6 s
Connection type	1 x cable gland, 1 x Sub-D, 9-pin
Weight	Approx. 1,200 g
Output current I_a	≤ 100 mA

[1] May not fall short of or exceed V_S tolerances.

[2] Without load.

D

Ambient data

Enclosure rating	IP 65
Protection class [1]	III
EMC	EN 55011:1998 Kl. B, Gr. 1, EN 6100-6-2:1999
Ambient temperature	Operation: –10 °C ... +55 °C Storage: –25 °C ... +70 °C
Temperature drift	Typ. 0.6 mm/K [2] Typ. 0.3 mm/K [3]
Mechanical load	Shock: (IEC 60068-2-27, -2-29) Sine: (IEC 60068-2-6)

[1] Reference voltage DC 50 V PELV-voltage (EN 50178).

[2] –10° C ... 0° C, +40 °C ... +55 °C.

[3] 0 °C ... +40 °C.

Ordering information

D

Interface	Special characteristic	Model name	Part no.
RS-422, RS-232 [1]	–	DML40-2-1111	1027607
	Alignment laser always on	DML40-2-1111S01	1044053
PROFIBUS DP	–	DML40-2-1211	1027608

[1] Switchable.

Dimensional drawings

DML40-2-x1xx

All dimensions in mm (inch)

① Dust protection tube
② Laser pointer pilot light
③ Alignment sight
④ Function indicator
⑤ Zero level
⑥ Mounting hole M6 threaded – 6 mm deep
⑦ Connector cover
⑧ PG9
⑨ Sub-D, 9-pin

D

DML40-2-x2xx

All dimensions in mm (inch)

① Dust protection tube
② Laser pointer pilot light
③ Alignment sight
④ Function indicator
⑤ Zero level
⑥ Mounting hole M6 threaded – 6 mm deep
⑦ Connector cover
⑧ PG9
⑨ Sub-D, 9-pin
⑩ Sub-D, 9-pin

Adjustments

⑩ Q_2 function indicator
⑪ Q_1 function indicator
⑫ Operating indicator, green
⑬ Plausibility (measurement error), red

Connection type and diagram

DMxxx-2 RS-232/RS-422
PG9

1	L+
2	M
3	Q₁
4	Q₂
5	L+/Q, Q_A
6	M/Q, Q_A
7	Q_A
8	nc ⑫

① Pin 1
② Pin 2
③ Pin 3
④ Pin 4
⑤ Pin 5
⑥ Pin 6
⑦ Pin 7
⑧ Pin 8
⑨ Terminals
⑩ DIP switches RS-232/RS-422 switching
⑪ Shield
⑫ Not connected

DMxxx-2 RS-232/RS-422
Connector
Sub-D, 9-pin

RS-232

1	$\overline{\text{RESET}}$
2	RxD
3	TxD
5	GND

RS-422

1	$\overline{\text{RESET}}$
5	GND
6	Tx+
7	Tx−
8	Rx+
9	Rx−

① Pin 1
⑤ Pin 5
⑥ Pin 6
⑨ Pin 9

D

**DMxxx-2 RS-232/PROFIBUS
PG9**

1
2

1 L+
2 M

① Pin 1
② Pin 2

**DMxxx-2 RS-232/PROFIBUS
Socket
Sub-D, 9-pin**

⑤
①
⑨
⑥

3 B
4 RTS
5 GND
6 +5 V
8 A

① Pin 1
⑤ Pin 5
⑥ Pin 6
⑨ Pin 9

D

Recommended accessories

Reflectors

	Brief description	Model name	Part no.
	Reflector plate, DG tape 665 mm x 665 mm, material: base plate aluminum, screw connection	PL560DG	1016806

Plug connectors and cables

	Brief description	Model name	Part no.
	Serial RS-232 cable, 3 m, 9-pin, D-sub, socket/open cable end	Connecting cable (socket-open end)	2020319

Terminal and alignment brackets

	Brief description	Model name	Part no.
	Alignment unit for DMT/DML, steel, zinc coated, incl. mounting material	BEF-GH-DMT	5309130

D

New paths in distance measurement

The OLM linear measurement sensor determines its current position using a bar code tape mounted along the length of travel – up to 10 km. The bar code tape can be placed along a curve, free-roaming path, incline/decline or straight line. The OLM measures the right positions every time with an excellent repeatability of up to 0.15 mm – even if multiple vehicles are on the same track.

Your benefits

- High resistance to shock and vibration, thus increasing uptime
- Fast installation and commissioning reduce startup time and costs
- Faster and more precise positioning increase speed and reliability of the entire process
- The OLM is a non-contact solution that ensures more reliable measurement and increased throughput. There is no wheel slippage, wear or recalibration, common with traditional solutions.
- Positioning along a straight line, curve and incline provide more flexible measurement options

E

Linear measurement sensors

New paths in distance measurement – the OLM linear measurement sensor measures linear and curved paths

The OLM identifies the position along a path up to a total length of 10 km with millimeter precision. The high velocity, high repeatability and fast output rates make the OLM *the* sensor for the widest range of applications.

E

Source: Dürr AG

A bar code tape along the path, e.g. of an overhead conveyor, serves as a reference scale for the OLM linear measurement sensor to optically determine the position in the application.

Limitless

Measure paths up to 10 km in length
- Easy definition of short or very long paths using customized bar code tape lengths
- Moving sensor and fixed bar code tape or vice versa:
  Both are possible.
- ➔ Results in large number of useful applications
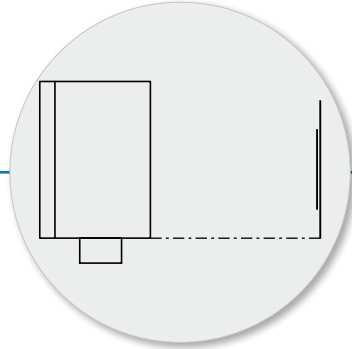
Flexible

For linear or curved paths
- Whatever path it takes, the position of the moving object is always determined, thanks to corresponding mounting of the flexible bar code tape
- Very compact, rugged and easy-to-mount sensor with no moving parts
- ➔ Results in higher system uptime
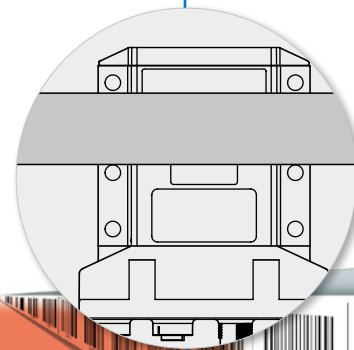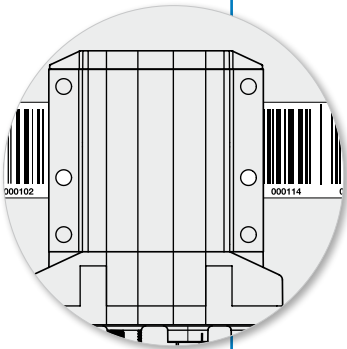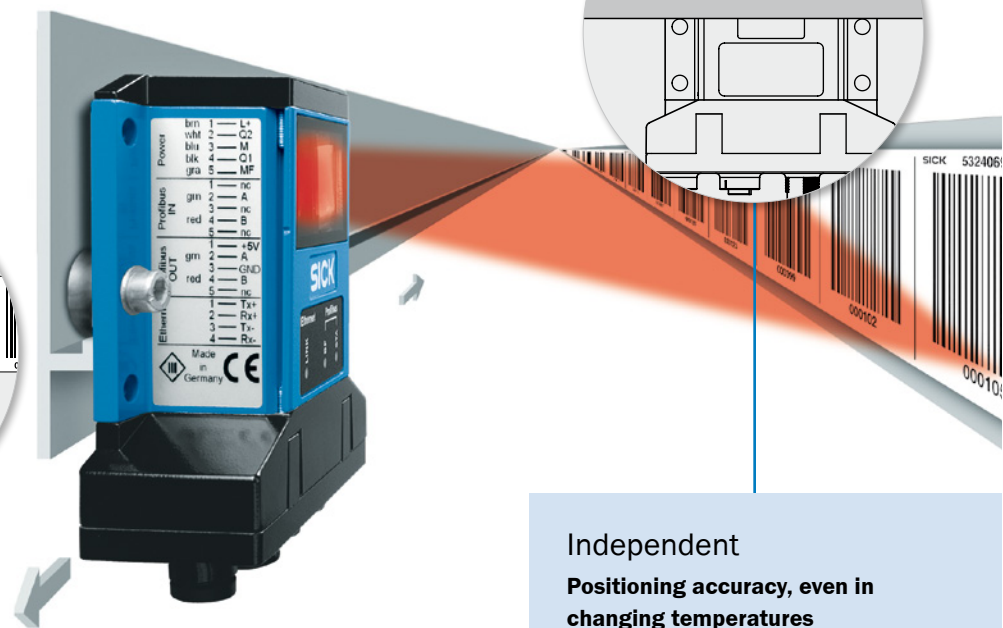
Reliable

High movement speeds and high repeatability
- Industry-proven, durable and rugged LED-based sensors
- Simple mounting and alignment
- Various serial and fieldbus-based interfaces
- ➔ Results in high productivity and less downtime
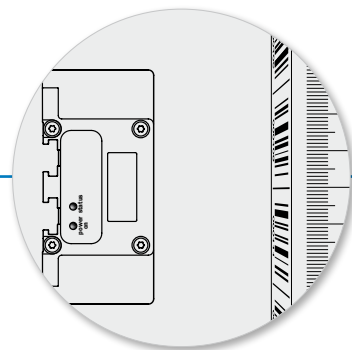
Independent

Positioning accuracy, even in changing temperatures
- The determined position is approached with millimeter precision in all ambient temperatures
- The flexible bar code tape expands together with the rack or rail and contracts as it cools down
- ➔ Results in reliable operation, regardless of temperature fluctuations

E

The OLM has special features, such as its ability to measure an extremely long path and the option to place the bar code tape (virtually) anywhere. These features make it ideal for an unusually large number of applications.

Overhead conveyors

The core tasks performed by overhead conveyors include transporting, sorting, storing, buffering and providing goods and products. The OLM ensures that each individual conveyor is positioned repeatably with high precision.
➜ Maximum availability and optimal, efficient material flows

Source: Dematic GmbH

Rotating rings and tables

Rotating rings and tables guarantee very precise positioning and the greatest possible flexibility for each specific application. The OLM determines the path, from which the control system calculates the angle of rotation.
➜ High efficiency and the ability to adapt quickly and flexibly to changes
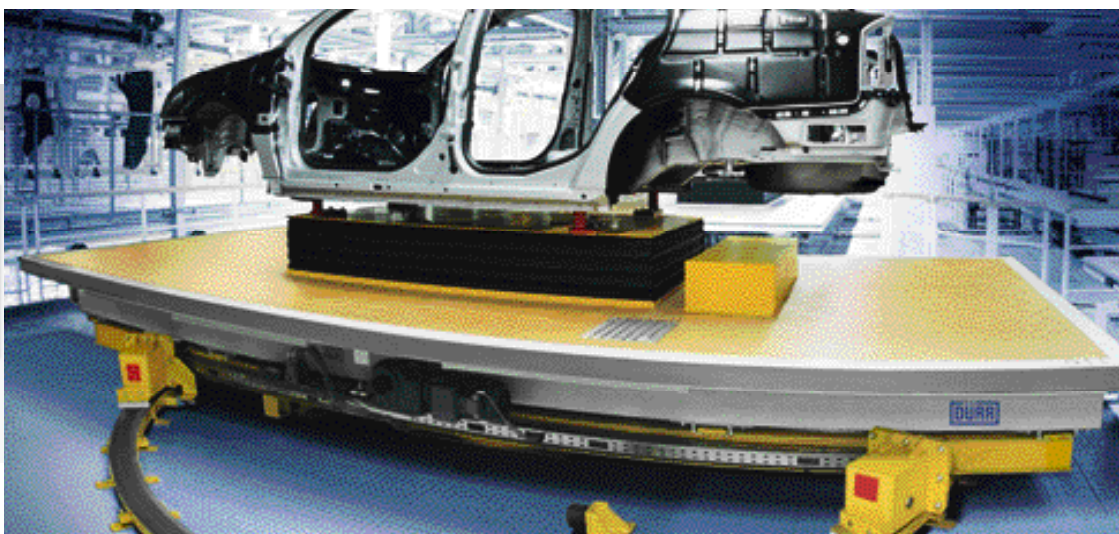
Source: Dürr AG

Shuttles

Shuttles are the interfaces between the buffer stock and commissioning. The shuttles provide fast and flexible storage and retrieval of goods. Depending on the current demands, more or fewer shuttles can be moving around the warehouse at the same time. The OLM allows any number of vehicles to be positioned on a rail system, independently, and without influencing each other.

➜ Very high throughput and a cost-effective solution for small and large logistics centers

Source: Dematic GmbH

Around corners

The OLM is also able to determine the path along curves or at switches, thanks to the flexible bar code tape. This allows goods to be stored and commissioned freely.

➜ Maximum flexibility and reliable operation

E
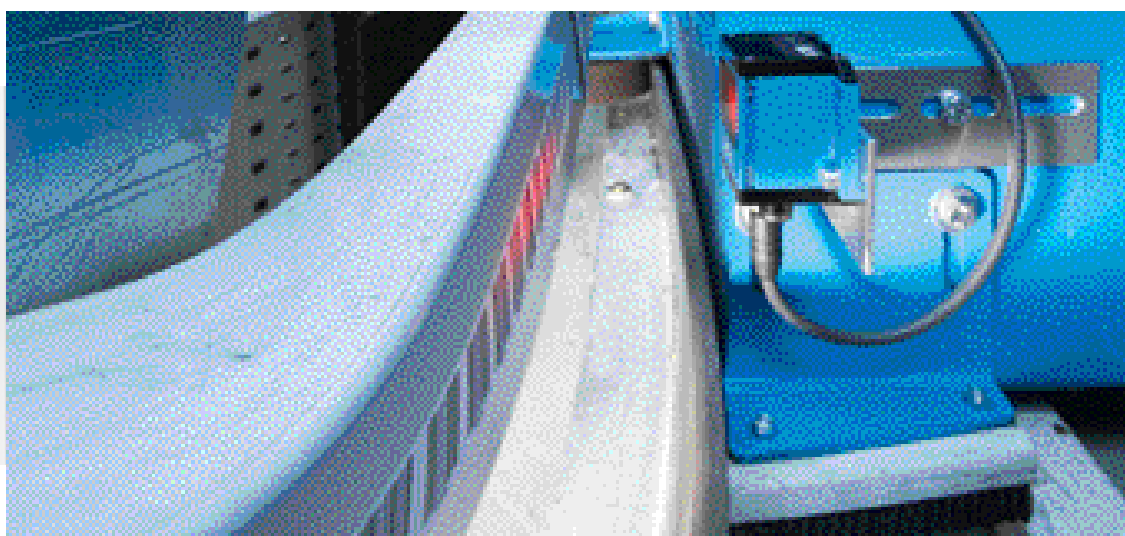
Product family overview

	OLM100	
	Great flexibility in a small housing	
Technical data overview		
Measurement range	0 m ... 10,000 m	
Sensing distance	100 mm ± 20 mm (to bar code tape, 30 mm bar code width)	
	130 mm ± 20 mm (to bar code tape, 40 mm bar code width)	
Repeatability	1 mm	
Max. movement speed	4 m/s	
Interfaces overview	RS-485	
	RS-422	
	SSI	
	CANopen	
Ambient temperature	Operation: –30 °C ... +60 °C	
	Storage: –40 °C ... +75 °C	
Output rate	5 ms	
	1 ms	
Light source	LED, red	
At a glance		

E
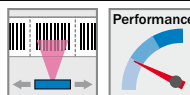
RS-485 RS-422 SSI CANopen®

- Control marks for special functions and sensor configuration
- Measurement range up to 10 km
- High repeatability of 1 mm
- Adjustable resolution as low as 0.1 mm
- Multiple interfaces: SSI, RS-422, RS-485 and CANopen
- Self-adjusting quadruple redundant red LED lighting
- Integrated skew and bank angle for fast parallel mounting, therefore alignment only in one axis is necessary
- Large temperature range from –30 °C to +60 °C

| **Detailed information** | | |

	OLM100 Hi	OLM200
	High performance in a small housing	Advanced positioning with fieldbus interfaces
	0 m ... 10,000 m	0 m ... 10,000 m
	100 mm ± 20 mm (to bar code tape, 30 mm bar code width)	100 mm ± 20 mm (to bar code tape, 30 mm bar code width)
		130 mm ± 20 mm (to bar code tape, 40 mm bar code width)
	0.15 mm	0.15 mm
	10 m/s	10 m/s
	RS-422	PROFIBUS DP-V0
	SSI	
	Operation: –30 °C ... +60 °C	Operation: –30 °C ... +60 °C
	Storage: –40 °C ... +75 °C	Storage: –40 °C ... +75 °C
	5 ms	2.5 ms
	1 ms	
	LED, red	LED, red

RS-422 *SSI*

- Control marks for special functions and sensor configuration
- Measurement range up to 10 km
- High repeatability of 0.15 mm
- Adjustable resolution as low as 0.1 mm
- Travel speed up to 10 m/s
- Self-adjusting quadruple redundant red LED lighting
- Integrated skew and bank angle for fast parallel mounting, therefore alignment only in one axis is necessary
- Large temperature range from –30 °C to +60 °C

- Control marks for special functions and sensor configuration
- Measurement range up to 10 km
- Adjustable resolution as low as 0.1 mm
- Maximum speed of 10 m/s
- Output of position and speed data, as well as service diagnostics via PROFIBUS
- Compatible to SPEEDCON™ connectors and standard M12 connectors
- Large temperature range from –30 °C to +60 °C

E

Great flexibility in a small housing

E

CE ◇III◇ RoHS 2002/95/EC

RS-485 RS-422

CANopen®

SSI

Additional information

Product description

Reach specific positions faster with millimeter accuracy. The OLM enables quick ramp-up and ramp-down times, optimizing work processes. Fast travel speeds, high repeatability, and fast output rates make the OLM ideal for many applications, such as overhead conveyors and turntables.

At a glance

- Control marks for special functions and sensor configuration
- Measurement range up to 10 km
- High repeatability of 1 mm
- Adjustable resolution as low as 0.1 mm
- Multiple interfaces: SSI, RS-422, RS-485 and CANopen
- Self-adjusting quadruple redundant red LED lighting
- Integrated skew and bank angle for fast parallel mounting, therefore alignment only in one axis is necessary
- Large temperature range from –30 °C to +60 °C

Your benefits

- Precise positioning with speeds of up to 4 m/s significantly increases throughput
- Camera-based system with no moving parts in combination with tough metal housing ensure increased lifetime, thus reducing replacement costs
- High ambient light safety due to self-adjusting LED illumination ensures reliable operation, thus increasing machine availability
- Large temperature range from –30 °C to +60 °C offers flexible and reliable use in many applications
- Various interfaces (RS-422, RS-485, SSI and CANopen) offer highest flexibility and easiest system integration, hence saving costs for interface converters and protocol adaption
- Smallest available housing for common industrial serial interfaces offers easy integration in confined spaces, therefore allowing the customer to save room on his machine design

➜ www.mysick.com/en/OLM100

Detailed technical data

Performance

Repeatability [1]	1 mm
Light source	LED, red
Measurement range [2]	0 m ... 10,000 m
Service life [3]	100,000 h
MTTFd	> 100 years
Max. movement speed	4 m/s

[1] Statistical error 3 σ.

[2] Dependant on the set resolution and transfer protocol.

[3] LED typ. MTTF at 25 °C.

Mechanics/electronics

Supply voltage V_S [1]	DC 10 V ... 30 V
Ripple [2]	≤ 5 V_{PP}
Power consumption	< 3 W
Initialization time	< 3 s
Housing material	Aluminum, zinc
Weight	Approx. 260 g

[1] Limit values, reverse polarity protected.

[2] May not fall short of or exceed V_S tolerances.

Ambient data

Enclosure rating	IP 65 (EN 60 529)
Protection class	III
EMC	EN 61000-6-2, EN 61000-6-4
Ambient temperature [1] [2]	Operation: –30 °C ... +60 °C Storage: –40 °C ... +75 °C
Typ. ambient light safety [3]	≤ 30,000 lx
Vibration resistance	DIN/EN 60068-2-6, DIN/EN 60068-2-64
Shock resistance	DIN/EN 60068-2-27

[1] Temperatures < –20 °C with 5 min warm-up time.

[2] Max. 95 % humidity, non-condensing.

[3] Typ. value at +25 °C ambient temperature.

Ordering information

Sensing distance	Bar code width [1]	Output rate	Resolution	Data interface	Model name	Part no.
100 mm ± 20 mm (to bar code tape, 30 mm bar code width)	30 mm	1 ms	0.1 mm, 1 mm	SSI	OLM100-1001	1047411
		5 ms	0.1 mm, 1 mm	RS-422	OLM100-1003	1047412
				RS-485	OLM100-1005	1046580
				CANopen	OLM100-1006	1047413
			1 mm	RS-485 binary	OLM100-1005S01	1050976
130 mm ± 20 mm (to bar code tape, 40 mm bar code width)	40 mm	1 ms	0.1 mm, 1 mm	SSI	OLM100-1051	1050136
		5 ms	0.1 mm, 1 mm	RS-422	OLM100-1053	1050137
				RS-485	OLM100-1055	1050135
				CANopen	OLM100-1056	1050138

[1] The bar code tape available from SICK always has a width of 30 mm. The bar code tape is available in two heights: 30 mm or 40 mm.

E

Dimensional drawing

All dimensions in mm (inch)

① Adjustment aid (slot)
② Connector M12, 5-pin
③ Reference axis position measurement
④ Connector socket Ethernet M12, 4-pin
⑤ Mounting holes, Ø 5.5 mm

E

Connection type and diagram

Please note: Since wire color on 8-pin connection cables are not normed, always check for a correct pin to wire color assignment when using connection cables others than specified here.
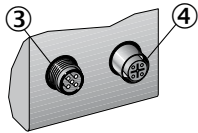
OLM100-10x1
OLM100-10x3
1 x socket M12, 4-pin
1 x connector M12, 8-pin

② ④

②
wht	1	nc ⑤
brn	2	L+ (10 … 30 V)
grn	3	Rx–/Clk–
yel	4	Rx+/Clk+
gra	5	Tx–/Data–
pnk	6	Tx+/Data+
blu	7	M (0 V)
red	8	nc ⑤

FE (shield)

④
wht/ora	1	Tx+
wht/grn	2	Rx+
ora	3	Tx–
grn	4	Rx–
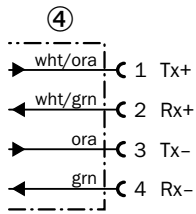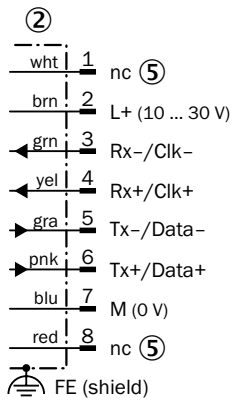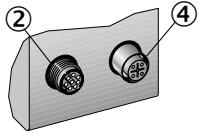
M12 (D-coded)

M12 (A-coded)
② RS-422, SSI
④ Ethernet
⑤ Not connected

OLM100-10x5
1 x socket M12, 4-pin
1 x connector M12, 5-pin

① ④

①
brn	1	L+ (+10 … 30 V DC)
wht	2	Data + ②
blu	3	M (0 V)
blk	4	Data – ②
gra	5	FE (shield)

M12 (A-coded)

④
wht/ora	1	Tx+
wht/grn	2	Rx+
ora	3	Tx–
grn	4	Rx–
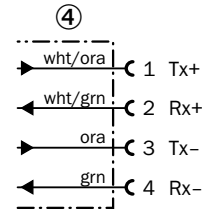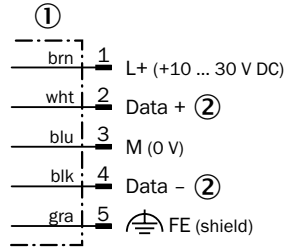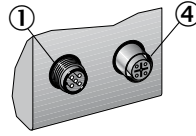
M12 (D-coded)

① RS-485
② Termination resistors integrated in sensor
④ Ethernet

OLM100-10x6
1 x socket M12, 4-pin
1 x connector M12, 5-pin

③ ④

③
	1	FE (shield)
red	2	L+ (10 … 30 V)
blk	3	M (0 V)
wht	4	CAN_H
blu	5	CAN_L

M12 (A-coded)

④
wht/ora	1	Tx+
wht/grn	2	Rx+
ora	3	Tx–
grn	4	Rx–

M12 (D-coded)

③ CANopen
④ Ethernet

E

Recommended accessories

Codes

	Bar code width	Bar code height	Sensing range from	Sensing range to	Model name	Part no.
	30 mm	30 mm	0 m	20 m	Bar code tape	5324069
			20 m	40 m	Bar code tape	5324070
			40 m	60 m	Bar code tape	5324071
			60 m	80 m	Bar code tape	5324072
			80 m	100 m	Bar code tape	5324073

Other mounting accessories

	Brief description	Model name	Part no.
	Set of sliding nuts, M5, 4 pcs	Sliding nuts	2017550

Plug connectors and cables

	Brief description	Model name	Part no.
	Female connector, M12, 5-pin, straight, 5 m, CAN/CANopen, shielded on pin 1	CAN cable 5 m (socket-open end)	6021166
	Female connector, M12, 5-pin, straight, 10 m, CAN/CANopen, shielded on pin 1	DOL-1205-G10M_Can	6021175
	Female connector, M12, 5-pin, straight, 5 m, PUR halogen free, shielded	DOL-1205-G05MAC	6036384
	Female connector, M12, 5-pin, straight, 10 m, PUR halogen free, shielded	DOL-1205-G10MAC	6036385
	Female connector, M12, 5-pin, straight, 20 m, PUR halogen free, shielded	DOL-1205-G20MAC	6036386
	Female connector, M12, 8-pin, straight, 5 m, PUR halogen free, shielded, twisted in pairs for SSI and DME HIPERFACE	DOL-1208-G05MAH1	6032449
	Female connector, M12, 8-pin, straight, 10 m, PUR halogen free, shielded, twisted in pairs for SSI and DME HIPERFACE	DOL-1208-G10MAH1	6032450
	Female connector, M12, 8-pin, straight, 20 m, PUR halogen free, shielded, twisted in pairs for SSI and DME HIPERFACE	DOL-1208-G20MAH1	6032451
	T-junction, M12, 5-pin, CANopen	DSC-1205T000025KM0	6030664
	Connection cable, Ethernet patch cable, 2 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G02ME	6034414
	Connection cable, Ethernet patch cable, 5 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G05ME	6035389
	Connection cable, Ethernet patch cable, 10 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G10ME	6030928
	Male connector, M12, 5-pin, straight, terminal resistor, DeviceNet and CANopen	STE-1205-GKEND	6037193

For additional accessories including dimensional drawings, please see page J-301.

E

E

E

High performance in a small housing

SICK

C E ◇ III ◇ RoHS 2002/95/EC

RS-422 SSI

Product description

The OLM100 Hi is a high performance version of the well known OLM100. Very fast travel speeds, highly precise repeatability as well as a SSI interface for direct feedback into the drive emphasize the strengths of the OLM100 Hi.

At a glance

- Control marks for special functions and sensor configuration
- Measurement range up to 10 km
- High repeatability of 0.15 mm
- Adjustable resolution as low as 0.1 mm
- Travel speed up to 10 m/s
- Self-adjusting quadruple redundant red LED lighting
- Integrated skew and bank angle for fast parallel mounting, therefore alignment only in one axis is necessary
- Large temperature range from −30 °C to +60 °C

Your benefits

- Precise positioning with speeds of up to 10 m/s significantly increases throughput
- Camera-based system with no moving parts in combination with tough metal housing ensure increased lifetime, thus reducing replacement costs
- High ambient light safety due to self-adjusting LED illumination ensures reliable operation, thus increasing machine availability
- Large temperature range from −30 °C to +60 °C offers flexible and reliable use in many applications
- Very fast SSI interface for direct feedback into drive enables sharply set control loops, hence allowing a more efficient positioning
- Smallest available housing for common industrial serial interfaces offers easy integration in confined spaces, therefore allowing the customer to save room on his machine design

→ www.mysick.com/en/OLM100_Hi

Detailed technical data

Performance

Repeatability [1]	0.15 mm
Light source	LED, red
Measurement range [2]	0 m ... 10,000 m
Service life [3]	100,000 h
MTTFd	> 100 years
Maximum speed	10 m/s

[1] Statistical error 3 σ.

[2] Dependant on the set resolution and transfer protocol.

[3] LED typ. MTTF at 25 °C.

Mechanics/electronics

Supply voltage V_S [1]	DC 18 V ... 30 V
Ripple [2]	≤ 5 V_{PP}
Power consumption	< 3 W
Housing material	Aluminum, zinc
Weight	Approx. 260 g

[1] Limit values, reverse polarity protected.

[2] May not exceed or fall short of V_S tolerances.

Ambient data

Enclosure rating	IP 65 (EN 60 529)
Protection class	III
EMC	EN 61000-6-2, EN 61000-6-4
Ambient temperature [1] [2]	Operation: –30 °C ... +60 °C Storage: –40 °C ... +75 °C
Typ. ambient light safety [3]	≤ 30,000 lx
Vibration resistance	DIN/EN 60068-2-6, DIN/EN 60068-2-64
Shock resistance	DIN/EN 60068-2-27

[1] Temperatures < –20 °C with 5 min warm-up time.

[2] Max. 95 % humidity, non-condensing.

[3] Typ. value at +25 °C ambient temperature.

Ordering information

Sensing distance	Bar code width [1]	Output rate	Resolution	Data interface	Model name	Part no.
100 mm ± 20 mm (to bar code tape, 30 mm bar code width)	30 mm	1 ms	0.1 mm, 1 mm	SSI	OLM100-1201	1053074
		5 ms	0.1 mm, 1 mm	RS-422	OLM100-1203	1054170

[1] The bar code tape available from SICK always has a width of 30 mm. The bar code tape is available in two heights: 30 mm or 40 mm.

E

Dimensional drawing

All dimensions in mm (inch)

① Adjustment aid (slot)
② Connector M12, 5-pin
③ Reference axis position measurement
④ Connector socket Ethernet M12, 4-pin
⑤ Mounting holes, Ø 5.5 mm

E
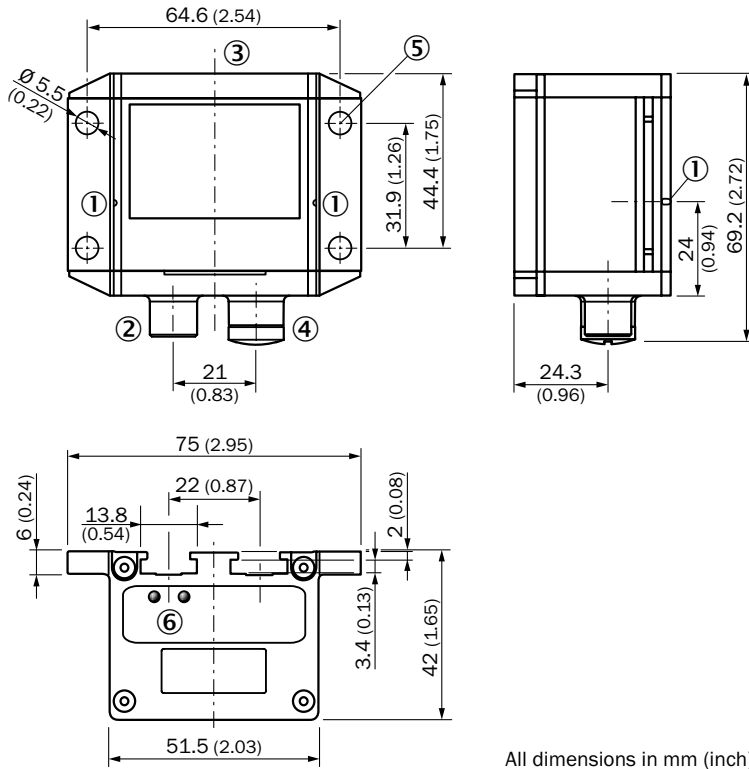
Connection type and diagram

Please note: Since wire color on 8-pin connection cables are not normed, always check for a correct pin to wire color assignment when using connection cables others than specified here.

Socket 1 x M12, 4-pin
Connector 1 x M12, 8-pin

② ④

② ④

wht	1	nc ⑤
brn	2	L+ (10 ... 30 V)
grn	3	Rx–/Clk–
yel	4	Rx+/Clk+
gra	5	Tx–/Data–
pnk	6	Tx+/Data+
blu	7	M (0 V)
red	8	nc ⑤
		FE (shield)

wht/ora	1	Tx+
wht/grn	2	Rx+
ora	3	Tx–
grn	4	Rx–

M12 (D-coded)

M12 (A-coded)
② RS-422, SSI
④ Ethernet
⑤ Not connected

Recommended accessories

Codes

	Bar code width	Bar code height	Sensing range from	Sensing range to	Model name	Part no.
	30 mm	30 mm	0 m	20 m	Bar code tape	5324069
			20 m	40 m	Bar code tape	5324070
			40 m	60 m	Bar code tape	5324071
			60 m	80 m	Bar code tape	5324072
			80 m	100 m	Bar code tape	5324073

Other mounting accessories

	Brief description	Model name	Part no.
	Set of sliding nuts, M5, 4 pcs	Sliding nuts	2017550

Plug connectors and cables

	Brief description	Model name	Part no.
	Female connector, M12, 8-pin, straight, 2 m, PUR halogen free, shielded, twisted in pairs for SSI and DME HIPERFACE	DOL-1208-G02MAH1	6032448
	Female connector, M12, 8-pin, straight, 5 m, PUR halogen free, shielded, twisted in pairs for SSI and DME HIPERFACE	DOL-1208-G05MAH1	6032449
	Female connector, M12, 8-pin, straight, 10 m, PUR halogen free, shielded, twisted in pairs for SSI and DME HIPERFACE	DOL-1208-G10MAH1	6032450
	Connection cable, Ethernet patch cable, 2 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G02ME	6034414
	Connection cable, Ethernet patch cable, 5 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G05ME	6035389
	Connection cable, Ethernet patch cable, 10 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G10ME	6030928

For additional accessories including dimensional drawings, please see page J-301.

E

E

Advanced positioning with fieldbus interfaces

Product description

Linear measurement sensors from SICK can determine a position over a total length of up to 10 km along a curve, free-roaming path, incline/decline or straight line. The OLM200 combines highest precision and fastest moving speeds with a PROFIBUS interface. Along with other additional smart details, this sensor is setting new standards for linear positioning on bar code tape. The output of position data – precise within 0.15 mm – along with a speed output

and diagnosis data, guarantee an efficient and reliable machine operation. The intelligent sensor design in a tough metal housing integrates all required skew and bank angles, thus significantly simplifying the installation – an alignment is merely necessary in one axis. Furthermore, the complete elimination of moving parts, and the use of a redundant LED lighting offer highest sensor lifetimes and durability – even in challenging ambient conditions.

At a glance

- Control marks for special functions and sensor configuration
- Measurement range up to 10 km
- Adjustable resolution as low as 0.1 mm
- Maximum speed of 10 m/s

- Output of position and speed data, as well as service diagnostics via PROFIBUS
- Compatible to SPEEDCON™ connectors and standard M12 connectors
- Large temperature range from –30 °C to +60 °C

Your benefits

- Precise positioning with speeds of up to 10 m/s significantly increases throughput
- Camera-based system with no moving parts in combination with tough metal housing ensure increased lifetime and availability
- High ambient light safety due to self-adjusting LED illumination ensures reliable operation, thus increasing machine availability

- Large temperature range from –30 °C to +60 °C offers flexible and reliable use in many applications
- Status bit for pre-failure and preventive maintenance information eliminates unpredicted machine downtimes
- Single direction alignment, red lighting and compatibility to SPEEDCON™ connectors enable fast mounting, thus saving installation time and costs

➜ www.mysick.com/en/OLM200

Additional information

E

Detailed technical data

Performance

Repeatability [1]	0.15 mm
Response time [2]	10 ms
Light source	LED, red
Measurement range [3]	0 m ... 10,000 m
Service life [4]	100,000 h
MTTFd	> 100 years
Accuracy of speed output	± 5 mm/s
Maximum speed	10 m/s

[1] Statistical error 3 σ, no warm-up time required.

[2] Response time of switching output.

[3] Dependant on the set resolution and transfer protocol.

[4] LED typ. MTTF at 25 °C.

Interfaces

Maximum baudrate	12 MBaud
Switching output [1]	MF1: PNP, MF2: NPN

[1] Functions of switching output MF1/MF2: position, speed, control mark Q00 (off) / Q01 (on), illumination on/off, service [prefailure (dirt/LED lifetime), no bar code tape, over/under temperature, out of range 0 km > position > 10 km, internal error].

Mechanics/electronics

Supply voltage V_S [1]	DC 18 V ... 30 V
Ripple [2]	≤ 5 V_{pp}
Power consumption	< 5.5 W
Initialization time	3 s
Housing material	Aluminum, zinc
Weight	Approx. 510 g

[1] Limit values, reverse-polarity protected.

[2] May not exceed or fall short of V_S tolerances.

Ambient data

Enclosure rating	IP 65 (EN 60 529)
Protection class	III
EMC	EN 61000-6-2, EN 61000-6-4
Ambient temperature [1] [2]	Operation: –30 °C ... +60 °C Storage: –40 °C ... +75 °C
Typ. ambient light safety [3]	≤ 30,000 lx
Vibration resistance	DIN/EN 60068-2-6, DIN/EN 60068-2-64
Shock resistance	DIN/EN 60068-2-27

[1] Temperatures < –20 °C with 5 min warm-up time.

[2] Max. 95 % humidity, non-condensing.

[3] Typ. value at +25 °C ambient temperature.

E

Ordering information

Sensing distance	Bar code width [1]	Output rate	Resolution	Data interface	Model name	Part no.
100 mm ± 20 mm (to bar code tape, 30 mm bar code width)	30 mm	2.5 ms	0.1 mm, 1 mm, 10 mm, 100 mm	PROFIBUS DP-V0	OLM200-1002	1051658
130 mm ± 20 mm (to bar code tape, 30 mm bar code width)	40 mm	2.5 ms	0.1 mm, 1 mm, 10 mm, 100 mm	PROFIBUS DP-V0	OLM200-1052	1051659

[1] The bar code tape available from SICK always has a width of 30 mm. The bar code tape is available in two heights: 30 mm or 40 mm.

Dimensional drawing
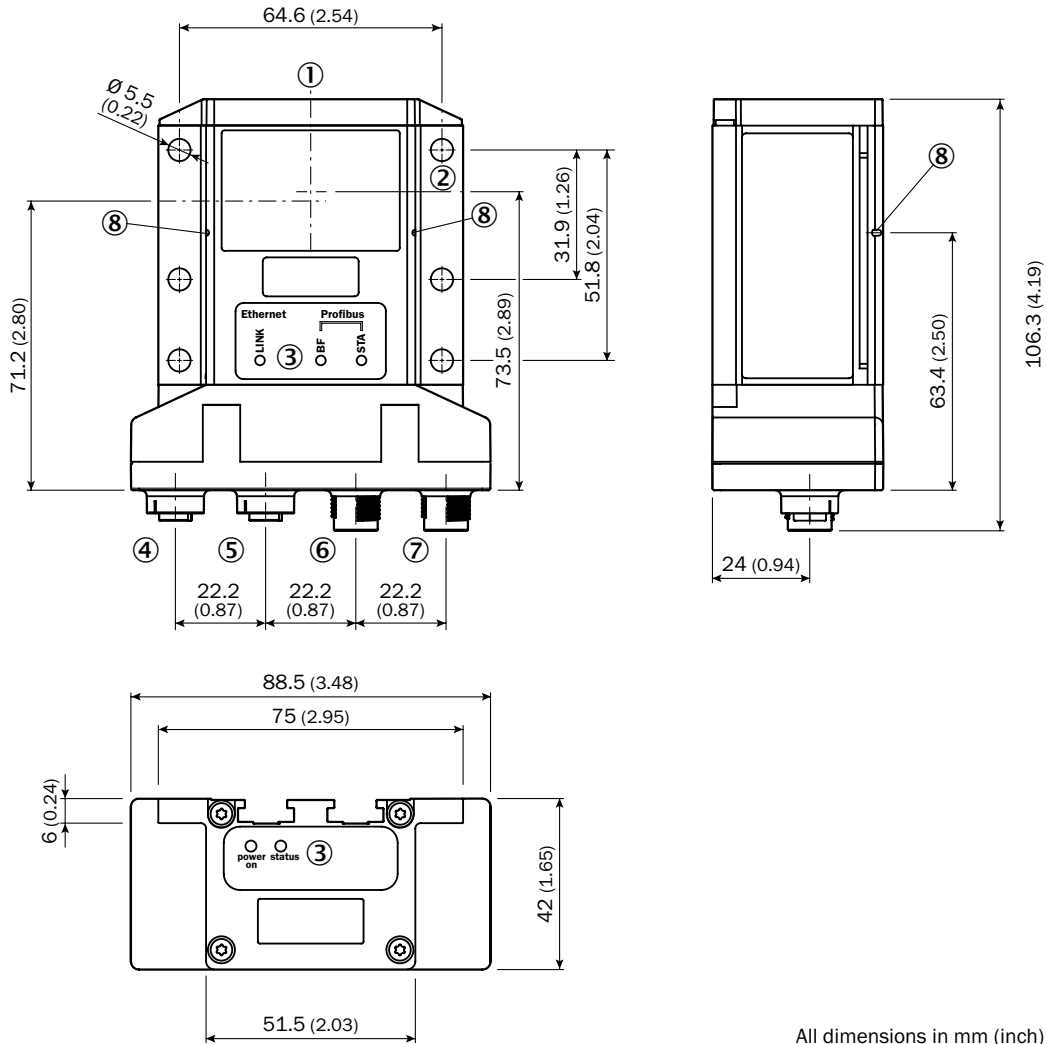
All dimensions in mm (inch)

① Reference axis position measurement
② Mounting hole, Ø 5.5 mm
③ Status LED [status]
④ Ethernet connection M12, 4-pin
⑤ Fieldbus connection M12, 5-pin (e. g. PROFIBUS out)
⑥ Fieldbus connection M12, 5-pin (e. g. PROFIBUS in)
⑦ Connector M12, 5-pin
⑧ Adjustment aid (slot)

Connection type and diagram

Connector
1 x socket M12, 4-pin
1 x socket M12, 5-pin
2 x connector M12, 5-pin

①	②	③	④

①
- wht/ora — 1 Tx+
- wht/grn — 2 Rx+
- ora — 3 Tx–
- grn — 4 Rx–

M12 (D-coded)

②
- 1 5 V
- grn — 2 A
- 3 GND
- red — 4 B
- 5 nc ⑤

M12 (B-coded)

③
- 1 nc ⑤
- grn — 2 A
- 3 nc ⑤
- red — 4 B
- 5 nc ⑤

M12 (B-coded)

④
- brn — 1 L+ (18 ... 30 V)
- wht — 2 MF1$_{NPN}$
- blu — 3 M (0 V)
- blk — 4 MF1$_{PNP}$
- gra — 5 MF2

M12 (A-coded)
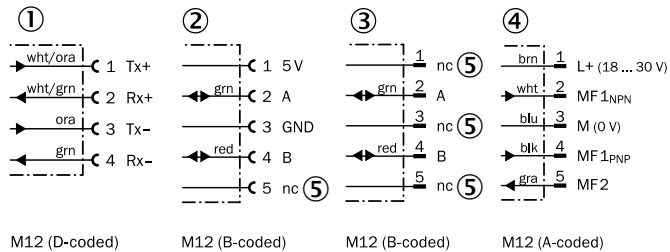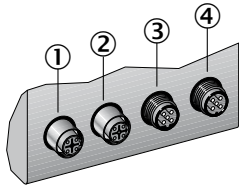
① Ethernet connection M12, 4-pin
② Fieldbus connection M12, 5-pin (e. g. PROFIBUS out)
③ Fieldbus connection M12, 5-pin (e. g. PROFIBUS in)
④ Connector M12, 5-pin
⑤ Not connected

E

Recommended accessories

Codes

	Bar code width	Bar code height	Sensing range from	Sensing range to	Model name	Part no.
	30 mm	30 mm	0 m	20 m	Bar code tape	5324069
			20 m	40 m	Bar code tape	5324070
			40 m	60 m	Bar code tape	5324071
			60 m	80 m	Bar code tape	5324072
			80 m	100 m	Bar code tape	5324073

Other mounting accessories

	Brief description	Model name	Part no.
	Set of sliding nuts, M5, 4 pcs	Sliding nuts	2017550

Plug connectors and cables

	Brief description	Model name	Part no.
Illustration may differ	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899
	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544
	Female connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	DOL-1205-G05MQ	6026006
	Female connector, M12, 5-pin, straight, 10 m, PROFIBUS, shielded	DOL-1205-G10MQ	6026008
	Female connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	DOL-1205-G15MQ	6032637
	Male connector, M12, 4-pin, straight, PROFIBUS, terminal resistor	PR-STE-END	6021156
	Connection cable, Ethernet patch cable, 2 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G02ME	6034414
	Connection cable, Ethernet patch cable, 5 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G05ME	6035389
	Connection cable, Ethernet patch cable, 10 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G10ME	6030928
	Male connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	STL-1205-G05MQ	6026005
	Male connector, M12, 5-pin, straight, 10 m, PROFIBUS, shielded	STL-1205-G10MQ	6026007
	Male connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	STL-1205-G15MQ	6036898

For additional accessories including dimensional drawings, please see page J-301.

E

Ultimate ultrasonic sensor solutions from SICK

Sound is a natural phenomenon which helps us to recognize our environment without physical contact over widely varying distances. SICK's ultrasonic sensors use sound to accurately detect objects and measure distances. These sensors provide outstanding background suppression to reliably detect objects, regardless of the object's appearance. The output used – switching, analog or both – is determined based on your application requirements.

Your benefits

- Intelligent measurement filters assure reliable measurement results for highest process stability
- Synchronization or multiplexing allows simultaneous use of up to 10 sensors, which improves application flexibility and process stability
- Best process quality thanks to high measurement accuracy based on continuous temperature compensation
- Various housing types, different measurement ranges, and several setup options fit a wide range of applications
- Tough sensor designs ensure long lifetime and low service costs
- Compatible housings allow easy interchange of optical and ultrasonic sensors in challenging applications
- Reliable operation in optically challenging applications

F

Ultrasonic sensors

Independent of color, surface shine and transparency ...

F
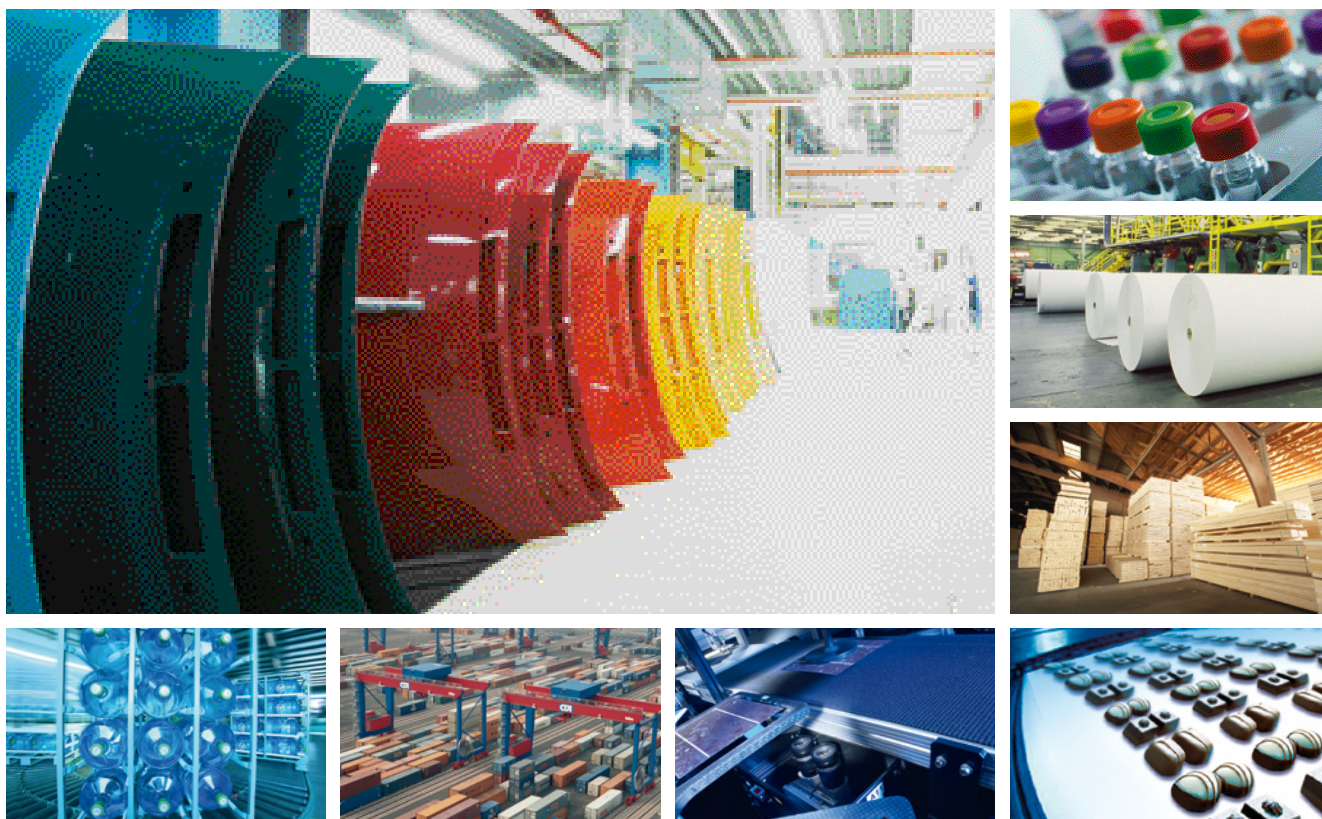
Ultrasonic sensors from SICK measure and detect in very colored, glossy, or transparent surfaces, in many different applications which are demanding and difficult for optical sensors. Even adverse environmental conditions such as dust, dirt, or fog do hardly affect the measuring result. Additionally, the sensors' wide detection range also allows a larger area to be monitored with only one sensor.

For very high reliability ...

- **Intelligent and advanced measurement evaluation** ensures secure detection
- **Temperature compensation** directly on the **active sensor surface** for more precise measurement results
- **Simple synchronization** and **multiplexing** for maximum reliability, even when using multiple sensors
- Simple and reliable solution for many different applications by using the "**Distance to Object,**" "**Window**" or "**Object between the sensor and the background**" switching modes
- A solution for complex applications thanks to the availability of **filter settings** that can be **individually** adapted to the application

... for virtually unlimited application possibilities

(Ultrasonic) time-of-flight measurement
The sensor emits an ultrasonic pulse that is reflected by the object to be detected. The time it takes for the pulse to go from the sensor to the object and back is measured, evaluated and converted into a distance value (see below).

$$\text{Distance} = \text{sound velocity} \times \frac{\text{time-of-flight}}{2}$$

Ultrasonic pulse sent to target

Ultrasonic pulse reflected back to sensor

Limiting range
Aligned plate is detected
Working range

Pipe is detected
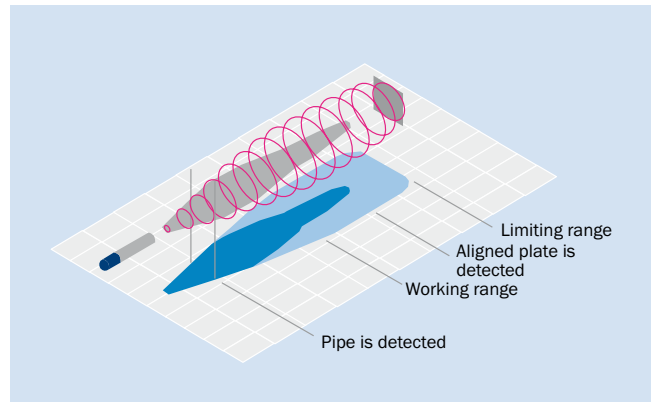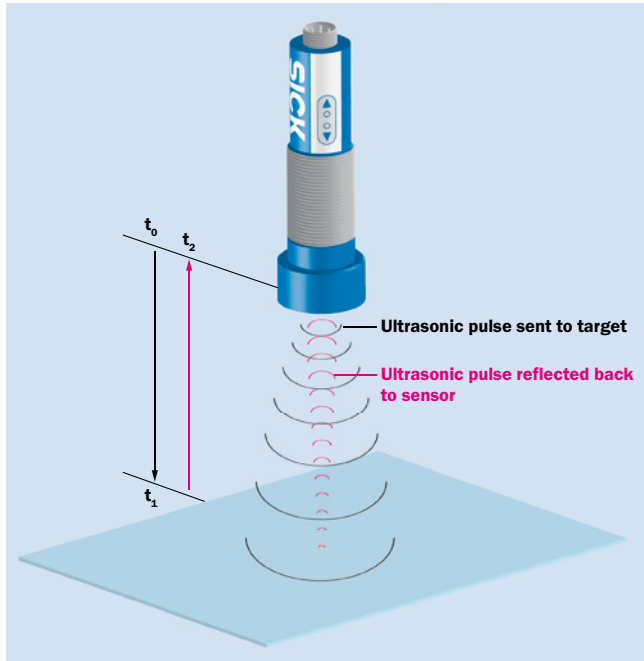
Range of ultrasonic sensors
In general for ultrasonic sensors, the less sound the measurement target absorbs, the greater the possible range. The working range specifies the distance up to which measurement on common objects is possible with sufficient functional reserves. Under ideal conditions, the sensor can even be used up to its limiting range.

Diagrams of the detection are provided for ideal assessment of the application capability. The dark blue area found in these diagrams shows the typical working range of the sensor. The light blue area shows the maximum detection area of the sensor, which can be considered for detection of ideal objects in favorable ambient conditions. Additionally, the area between the sensor and the measurement target should be kept free to avoid unintentional detection of objects.

F

... on demanding surfaces

Hard foam	Glass	Metal	Paint/lacquer
Wood	Liquid/water	Plastic	Bulk materials/rock
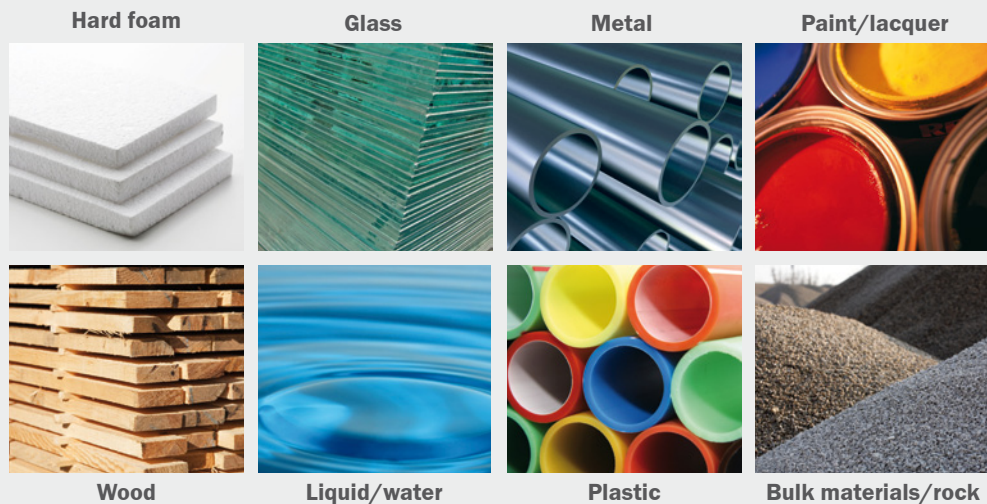
For tricky applications ...

Detection or loop control of perforated or woven materials
such as fabrics

Level monitoring
of liquid and solid materials, for example in silos

Animal detection
for optimizing feeding

Robot positioning
for regulation of the gripping process of packages
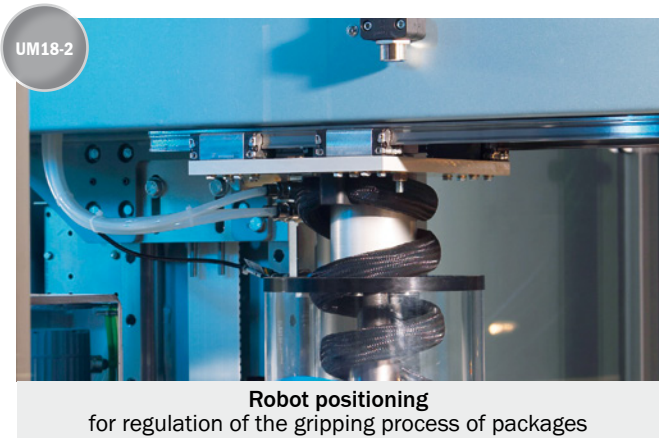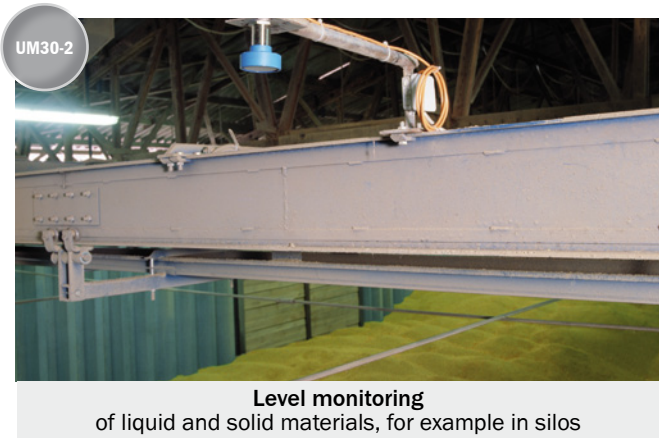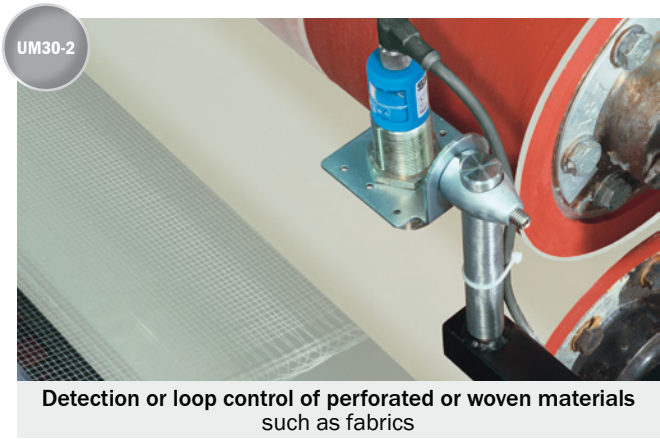
Powerful at great distances

UM30-2
➜ see page F-222

Measurements up to 8,000 mm given out via analog and/or switching output
Compact, universal, powerful and reliable

UM18-2 Hi
➜ see page F-232

Measurements up to 1,300 mm being output via analog, switching or IO-Link signal
Small, rugged, communicative, versatile, and reliable

... the right SICK ultrasonic sensor

UC12

Detection of glass panes
or materials with shiny coatings

UC4

Detection of silicon blocks or ingots
or wafers

UC12

Dimension measurement of packages
e.g., before automatic storage

UC4

Detection of printed circuit boards
independent of shiny surfaces
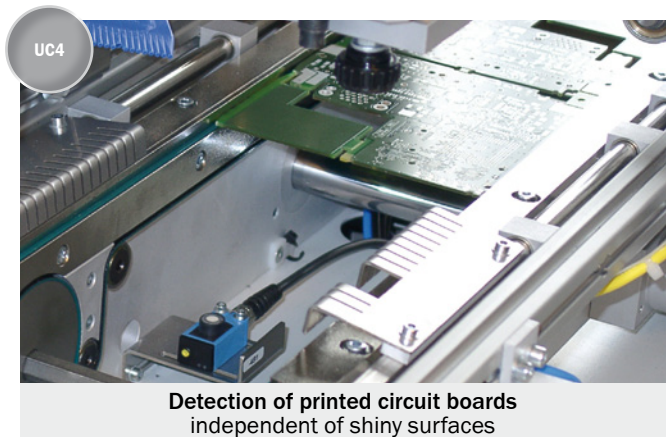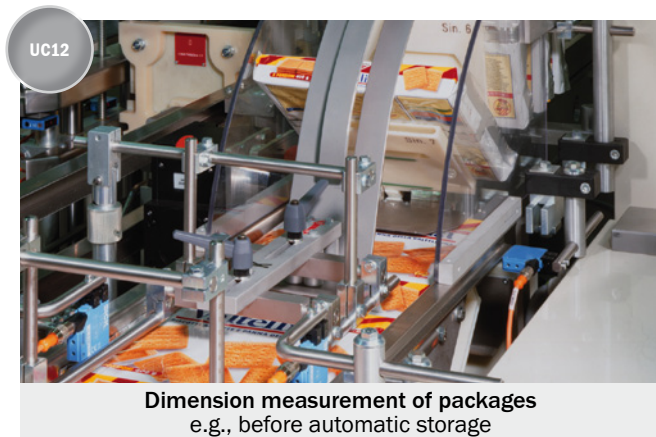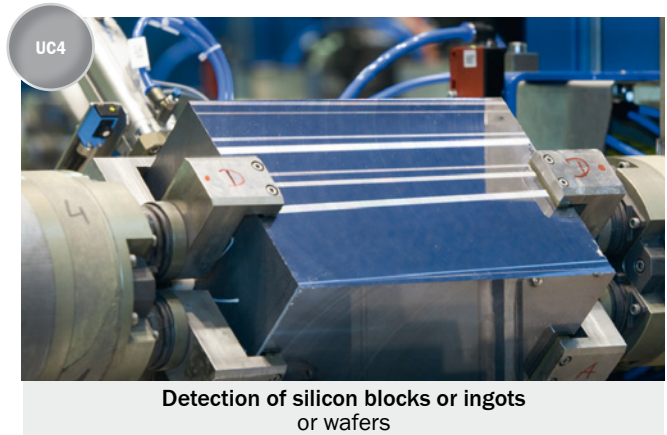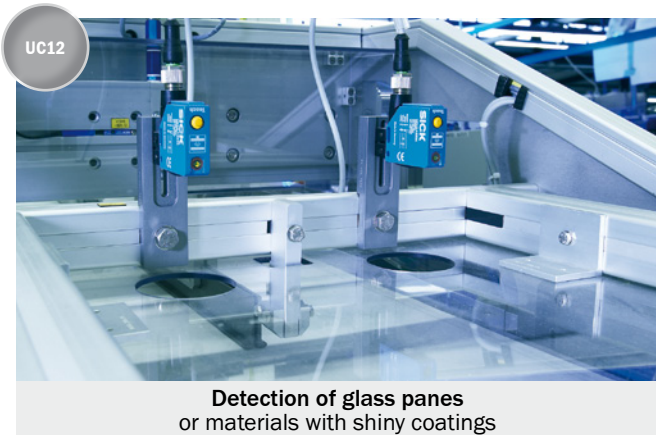
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Small, compact, and always close to the action

UC12

The switching sensor for up to 350 mm
Widely used sensor design; small, rugged, and reliable

UC4

The switching sensor for up to 250 mm
Small, light, and reliable

Interfaces

Working range, limiting range
Repeatability (referring to current measurement value)
Response time

| 10 mm | | | | | | | | | | 100 mm |

UM30-2
Performance

Analog (mA/V)

| 0 1 | Window 1 0 0 | OBSB 1 0 0 |

30 mm ... 250 mm, 350 mm
± 0.15 %
50 ms

UM18-2 Hi
Performance

Analog (V) 0 10 | Analog (mA) 4 20

| 0 1 | Window 1 0 0 | OBSB 1 0 0 |

IO-Link

20 mm ... 150 mm, 250 mm
± 0.15 %
40 ms

30 mm ... 250 mm, 350 mm
± 0.15 %
40 ms

UC12
Performance

| 0 1 | Window 1 0 0 | OBSB 1 0 0 |

20 mm ... 150 mm, 250 mm
± 0.15 %
30 ms

UC4
Performance

| 0 1 | Window 1 0 0 | OBSB 1 0 0 |

13 mm ... 100 mm, 150 mm
± 0.15 %
30 ms

13 mm ... 150 mm, 250 mm
± 0.15 %
30 ms

| 10 mm | | | | | | | | | | 100 mm |

1,000 mm

10,000 mm

350 mm ... 3,400 mm, 5,000 mm
± 0.15 %
180 ms

65 mm ... 350 mm, 600 mm
± 0.15 %
70 ms

600 mm ... 6,000 mm, 8,000 mm
± 0.15 %
240 ms

200 mm ... 1,300 mm, 2,000 mm
± 0.15 %
110 ms

65 mm ... 350 mm, 600 mm
± 0.15 %
80 ms

120 mm ... 1,000 mm, 1,300 mm
± 0.15 %
100 ms

55 mm ... 250 mm, 350 mm
± 0.15 %
30 ms

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1,000 mm

10,000 mm

Product family overview

	UM30-2	UM18-2 Hi	
	The universal application solver	Small size, more functionality – versatile ultrasonic sensor up to 1.3 m	
Technical data overview			
Working range, limiting range	30 mm ... 250 mm, 350 mm 65 mm ... 350 mm, 600 mm 200 mm ... 1,300 mm, 2,000 mm 350 mm ... 3,400 mm, 5,000 mm 600 mm ... 6,000 mm, 8,000 mm	20 mm ... 150 mm, 250 mm 30 mm ... 250 mm, 350 mm 65 mm ... 350 mm, 600 mm 120 mm ... 1,000 mm, 1,300 mm	
Resolution	0.18 mm	0.069 mm	
Repeatability	± 0.15 %	± 0.15 %	
Response time/output rate	50 ms / 8 ms 70 ms / 16 ms 110 ms / 23 ms 180 ms / 43 ms 240 ms / 60 ms	40 ms / 8 ms 40 ms / 8 ms 80 ms / 16 ms 100 ms / 20 ms	
Interfaces overview	1 x switching output and 1 x multifunctional input, 2 x switching output and 1 x multifunctional input, 1 x 4 mA ... 20 mA / 0 V ... 10 V and 1 x multifunctional input, 1 x 4 mA ... 20 mA / 0 V ... 10 V, 1 x switching output and 1 x multifunctional input	1 x switching output, IO-Link and 1 x multifunctional input, 1 x 4 mA ... 20 mA and 1 x multifunctional input, 1 x 0 V ... 10 V and 1 x multifunctional input	
Sensing axis	Straight	Straight, angled	
At a glance			
	• Integrated time-of-flight technology detects objects such as glass, liquids and transparent foils, independent of color • Range up to 8,000 mm • Display enables fast and flexible sensor adjustment • Immune to dust, dirt and fog • Available with combined analog and digital outputs • Synchronization and multiplexing • Adjustable sensitivity • Three operation modes: Distance to Object (DtO), Window (Wnd) or Object between sensor and background (OBSB)	• Reliable measurement independent of material color, transparency, gloss and ambient light • Four ranges up to 1,300 mm • Short M18 metal housing with a length of 41 mm • Straight or right-angle versions • Analog voltage, analog current or push-pull (PNP/NPN in one) switching output with IO-Link available • Set-up via IO-Link and/or teach-in via multi-function input • High immunity to dirt, dust, humidity and fog	
Detailed information	➜ F-222	➜ F-232	

	UC12	UC4
	Ultrasonic technology housed in an industry-proven design	Small, precise, ultrasonic
	20 mm ... 150 mm, 250 mm 55 mm ... 250 mm, 350 mm	13 mm ... 100 mm, 150 mm 13 mm ... 150 mm, 250 mm
	0.1 mm	0.1 mm
	± 0.15 %	± 0.15 %
	30 ms / 8 ms	30 ms / 8 ms
	2 x switching output	1 x switching output
	Straight	Straight
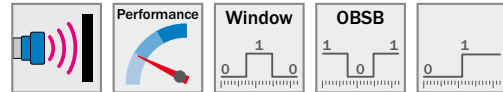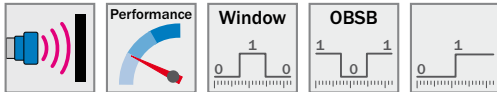
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- Object detection independent of material color and ambient light – even transparent foils, glass, liquids and bottles are reliably detected
- Fast and easy teach-in with single push-button
- Immune to dirt, dust and fog
- Two ambivalent switching outputs (Q, $\overline{Q}$)
- Excellent background suppression
- Three operation modes: Distance to Object (DtO), Window (Wnd) or Object between sensor and background (OBSB)

- Integrated time-of-flight technology detects objects such as glass, liquids and transparent foils, independent of color
- Three operation modes: Distance to Object (DtO), Window (Wnd) or Object between sensor and background (OBSB) Immunity to dirt, dust and fog
- One PNP/NPN switching output
- Excellent background suppression

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The universal application solver
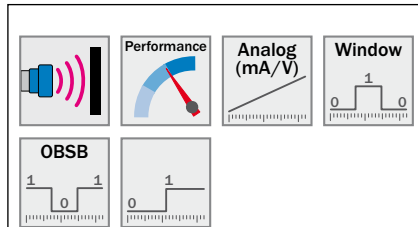
Product description

The UM30 product family provides a variety of flexible options. Sensing ranges up to 8 m, as well as various setup options, enable these sensors to solve nearly any application. Its high measurement accuracy – due to internal temperature compensation – along with the color-independent detection of objects, immunity to dirt and dust, and a high operational temperature range up to 70 °C, enable reliable operation – even under the most challenging conditions.

At a glance

- Integrated time-of-flight technology detects objects such as glass, liquids and transparent foils, independent of color
- Range up to 8,000 mm
- Display enables fast and flexible sensor adjustment
- Immune to dust, dirt and fog
- Available with combined analog and digital outputs
- Synchronization and multiplexing
- Adjustable sensitivity
- Three operation modes: Distance to Object (DtO), Window (Wnd) or Object between sensor and background (OBSB)

Your benefits

- Easy machine integration due to compact size
- Various setup options ensure flexible adaptation to applications
- Multiplex mode eliminates cross-talk interference for consistent and reliable detection and high measurement reliability
- Synchronization mode allows multiple sensors to work as one large sensor, providing a low-cost solution for area detection
- Display enables setup prior to installation, reducing on-site installation time
- Integrated temperature compensation and time-of-flight technology ensure high measurement accuracy
- OBSB-mode enables detection of any object between the sensor and a taught background

→ www.mysick.com/en/UM30-2

Detailed technical data

Performance

Resolution	0.18 mm
Repeatability [1]	± 0.15 %
Accuracy [1] [2]	± 1 %
Detection area (typical)	See diagrams
Additional feature [3]	Set switching mode: Distance to object (DtO) / Window (Wnd) / Object between sensor and background (OBSB) Teach-in of switching output Set levels of switching output Switching output invertible Set on-delay switching output Teach-in of analog output Scaling of analog output Invertable analog output Automatic selection of analog current or voltage output Temperature compensation Multifunctional input: synchronization/multiplexing Synchronization of up to 10 sensors Multiplexing: no cross talk of up to 10 sensors Set measurement filters: value filter, filter strength, adjustable sensitivity, foreground suppression and limiting range Switch off display Reset to factory default

[1] Referring to current measurement value.

[2] Temperature compensation can be switched off, without temperature compensation: 0.17 % / ° K

[3] Functions may vary depending on sensor type.

Interfaces

Multifunctional input	1 x MF

Mechanics/electronics

Supply voltage V$_s$ [1] [2]	DC 9 V ... 30 V
Power consumption [3]	≤ 2.4 W
Initialization time	< 300 ms
Housing material [4]	Nickel-plated brass, PBT, TPU
Connection type	Connector M12, 5-pin
Indication	LED display, 2 x LED

[1] Limit values, reverse-polarity protected, operation in short-circuit protected network, max. 8 A.

[2] 15 V ... 30 V when using analog voltage output.

[3] Without load.

[4] Ultrasonic transducer: polyurethane foam, glass epoxy resin.

Ambient data

Enclosure rating	IP 67
Protection class	III
Ambient temperature	Operation: –25 °C ... +70 °C Storage: –40 °C ... +85 °C
Temperature compensation	✔

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Specific data

Working range, limiting range	Output rate	Ultrasonic frequency (typical)	Sensing axis	Weight	Model name	Ordering information
30 mm … 250 mm, 350 mm	8 ms	320 kHz	Straight	150 g	UM30-211	F-224
65 mm … 350 mm, 600 mm	16 ms	400 kHz	Straight	150 g	UM30-212	F-225
200 mm … 1,300 mm, 2,000 mm	23 ms	200 kHz	Straight	150 g	UM30-213	F-225
350 mm … 3,400 mm, 5,000 mm	43 ms	120 kHz	Straight	210 g	UM30-214	F-226
600 mm … 6,000 mm, 8,000 mm	60 ms	80 kHz	Straight	270 g	UM30-215	F-226

Ordering information

UM30-211

- **Working range, limiting range:** 30 mm … 250 mm, 350 mm
- **Output rate:** 8 ms
- **Ultrasonic frequency (typical):** 320 kHz
- **Sensing axis:** straight
- **Weight:** 150 g

Response time	Switching frequency	Hysteresis	Switching output [1]	Analog output [3] [4] [6]	Resolution analog output	Model name	Part no.
50 ms	11 Hz	3 mm	–	–	–	UM30-211111	6037660
			1 x PNP (200 mA)[2]	1x 0 V … 10 V (≥ 100 kΩ) / 1x 4 mA … 20 mA (≤ 500 Ω)	12 bit	UM30-211118	6036921
			2 x PNP (200 mA)[2]	–	–	UM30-211112	6037664
			1 x NPN (200 mA)[5]	–	–	UM30-211115	6037669
			2 x NPN (200 mA)[5]	–	–	UM30-211114	6037674
	–	–	–	1x 0 V … 10 V (≥ 100 kΩ) / 1x 4 mA … 20 mA (≤ 500 Ω)	12 bit	UM30-211113	6036916

[1] Output Q short-circuit protected.

[2] PNP: HIGH = V_s – (< 2 V), LOW = 0 V.

[3] For V_s ≤ 20 V max. load ≤ 100 Ω.

[4] Automatic selection of analog current or voltage output dependent on load.

[5] NPN: HIGH ≤ 2 V, LOW = V_s.

[6] Subsequent smoothing of the analog output, depending on the application, may increase the response time by up to 200 %.

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UM30-212

- **Working range, limiting range:** 65 mm ... 350 mm, 600 mm
- **Output rate:** 16 ms
- **Ultrasonic frequency (typical):** 400 kHz
- **Sensing axis:** straight
- **Weight:** 150 g

Response time	Switching frequency	Hysteresis	Switching output [1]	Analog output [3] [4] [6]	Resolution analog output	Model name	Part no.
70 ms	8 Hz	5 mm	1 x PNP (200 mA)[2]	–	–	UM30-212111	6037661
				1x 0 V ... 10 V (≥ 100 kΩ) / 1x 4 mA ... 20 mA (≤ 500 Ω)	12 bit	UM30-212118	6036922
			2 x PNP (200 mA)[2]	–	–	UM30-212112	6037665
			1 x NPN (200 mA)[5]	–	–	UM30-212115	6037670
			2 x NPN (200 mA)[5]	–	–	UM30-212114	6037675
	–	–	–	1x 0 V ... 10 V (≥ 100 kΩ) / 1x 4 mA ... 20 mA (≤ 500 Ω)	12 bit	UM30-212113	6036917

[1] Output Q short-circuit protected.

[2] PNP: HIGH = V_s – (< 2 V), LOW = 0 V.

[3] For V_s ≤ 20 V max. load ≤ 100 Ω.

[4] Automatic selection of analog current or voltage output dependent on load.

[5] NPN: HIGH ≤ 2 V, LOW = V_s.

[6] Subsequent smoothing of the analog output, depending on the application, may increase the response time by up to 200 %.

UM30-213

- **Working range, limiting range:** 200 mm ... 1,300 mm, 2,000 mm
- **Output rate:** 23 ms
- **Ultrasonic frequency (typical):** 200 kHz
- **Sensing axis:** straight
- **Weight:** 150 g

Response time	Switching frequency	Hysteresis	Switching output [1]	Analog output [3] [4] [6]	Resolution analog output	Model name	Part no.
110 ms	6 Hz	20 mm	1 x PNP (200 mA)[2]	–	–	UM30-213111	6037537
				1x 0 V ... 10 V (≥ 100 kΩ) / 1x 4 mA ... 20 mA (≤ 500 Ω)	12 bit	UM30-213118	6036923
			2 x PNP (200 mA)[2]	–	–	UM30-213112	6037666
			1 x NPN (200 mA)[5]	–	–	UM30-213115	6037671
			2 x NPN (200 mA)[5]	–	–	UM30-213114	6037676
	–	–	–	1x 0 V ... 10 V (≥ 100 kΩ) / 1x 4 mA ... 20 mA (≤ 500 Ω)	12 bit	UM30-213113	6036918

[1] Output Q short-circuit protected.

[2] PNP: HIGH = V_s – (< 2 V), LOW = 0 V.

[3] For V_s ≤ 20 V max. load ≤ 100 Ω.

[4] Automatic selection of analog current or voltage output dependent on load.

[5] NPN: HIGH ≤ 2 V, LOW = V_s.

[6] Subsequent smoothing of the analog output, depending on the application, may increase the response time by up to 200 %.

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UM30-214

- **Working range, limiting range:** 350 mm ... 3,400 mm, 5,000 mm
- **Output rate:** 43 ms
- **Ultrasonic frequency (typical):** 120 kHz
- **Sensing axis:** straight
- **Weight:** 210 g

Response time	Switching frequency	Hysteresis	Switching output [1]	Analog output [3] [4] [6]	Resolution analog output	Model name	Part no.
180 ms	3 Hz	50 mm	1 x PNP (200 mA)[2]	–	–	UM30-214111	6037662
				1x 0 V ... 10 V (≥ 100 kΩ) / 1x 4 mA ... 20 mA (≤ 500 Ω)	12 bit	UM30-214118	6036924
			2 x PNP (200 mA)[2]	–	–	UM30-214112	6037667
			1 x NPN (200 mA)[5]	–	–	UM30-214115	6037672
			2 x NPN (200 mA)[5]	–	–	UM30-214114	6037677
	–	–	–	1x 0 V ... 10 V (≥ 100 kΩ) / 1x 4 mA ... 20 mA (≤ 500 Ω)	12 bit	UM30-214113	6036919

[1] Output Q short-circuit protected.
[2] PNP: HIGH = V_s – (< 2 V), LOW = 0 V.
[3] For V_s ≤ 20 V max. load ≤ 100 Ω.
[4] Automatic selection of analog current or voltage output dependent on load.
[5] NPN: HIGH ≤ 2 V, LOW = V_s.
[6] Subsequent smoothing of the analog output, depending on the application, may increase the response time by up to 200 %.

UM30-215

- **Working range, limiting range:** 600 mm ... 6,000 mm, 8,000 mm
- **Output rate:** 60 ms
- **Ultrasonic frequency (typical):** 80 kHz
- **Sensing axis:** straight
- **Weight:** 270 g

Response time	Switching frequency	Hysteresis	Switching output [1]	Analog output [3] [4] [6]	Resolution analog output	Model name	Part no.
240 ms	2 Hz	100 mm	1 x PNP (200 mA)[2]	–	–	UM30-215111	6037663
				1x 0 V ... 10 V (≥ 100 kΩ) / 1x 4 mA ... 20 mA (≤ 500 Ω)	12 bit	UM30-215118	6036925
			2 x PNP (200 mA)[2]	–	–	UM30-215112	6037668
			1 x NPN (200 mA)[5]	–	–	UM30-215115	6037673
			2 x NPN (200 mA)[5]	–	–	UM30-215114	6037678
	–	–	–	1x 0 V ... 10 V (≥ 100 kΩ) / 1x 4 mA ... 20 mA (≤ 500 Ω)	12 bit	UM30-215113	6036920

[1] Output Q short-circuit protected.
[2] PNP: HIGH = V_s – (< 2 V), LOW = 0 V.
[3] For V_s ≤ 20 V max. load ≤ 100 Ω.
[4] Automatic selection of analog current or voltage output dependent on load.
[5] NPN: HIGH ≤ 2 V, LOW = V_s.
[6] Subsequent smoothing of the analog output, depending on the application, may increase the response time by up to 200 %.

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Dimensional drawings

UM30-211, UM30-212, UM30-213
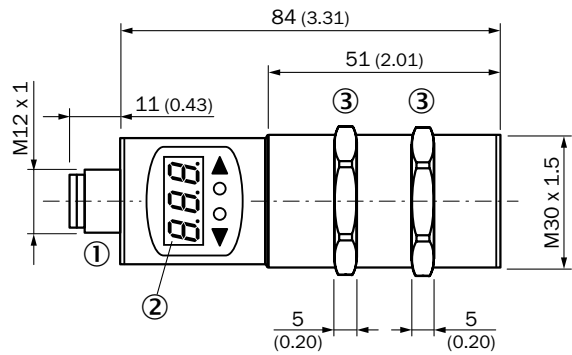
84 (3.31)
51 (2.01)
M12 x 1
11 (0.43)
③ ③
M30 x 1.5
①
②
5 (0.20)
5 (0.20)

All dimensions in mm (inch)

① Connection
② Display
③ Mounting nuts, SW 36 mm

UM30-214

102 (4.02)
69 (2.72)
33 (1.30)
19.5 (0.77)
M12 x 1
11 (0.43)
③ ③
Ø 47.5 (1.87)
①
②
5 (0.20)
5 (0.20)
M30 x 1.5

All dimensions in mm (inch)

① Connection
② Display
③ Mounting nuts, SW 36 mm

UM30-215

105 (4.13)
72 (2.83)
36 (1.42)
22.5 (0.89)
M12 x 1
11 (0.43)
③ ③
Ø 65 (2.56)
①
②
5 (0.20)
5 (0.20)
M30 x 1.5
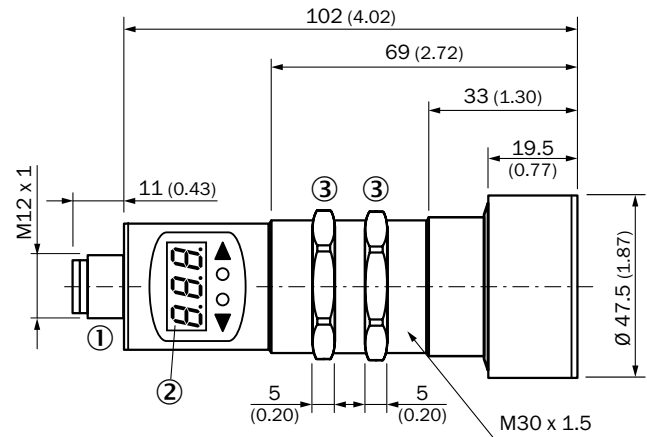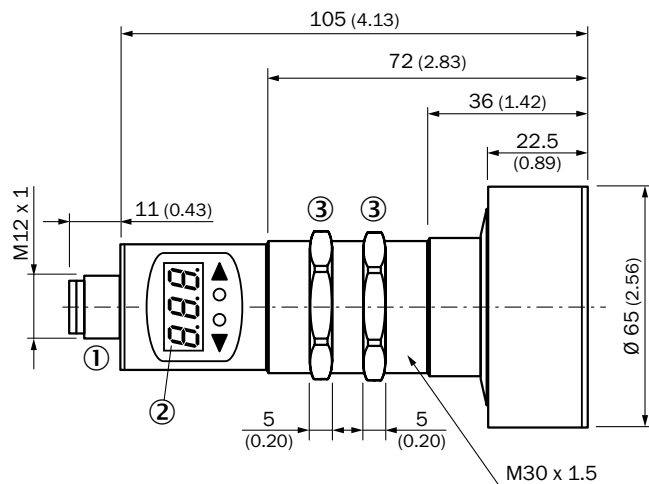
All dimensions in mm (inch)

① Connection
② Display
③ Mounting nuts, SW 36 mm

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Adjustments
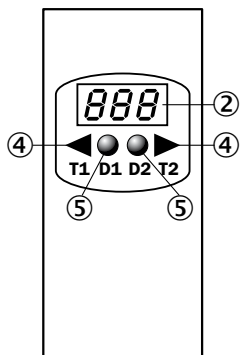
② Display
④ Control elements
⑤ Status indicators

Connection type and diagram

UM30-21x111
UM30-21x114
Connector
M12, 5-pin

brn	1	L+
blk	4	Q/$\overline{Q}$
blu	3	M
wht	2	nc ①
gra	5	Sync/Com
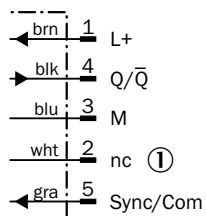
① Not connected

UM30-21x112
UM30-21x115
Connector
M12, 5-pin

brn	1	L+
blk	4	$Q_2/\overline{Q}_2$
blu	3	M
wht	2	$Q_1/\overline{Q}_1$
gra	5	Sync/Com
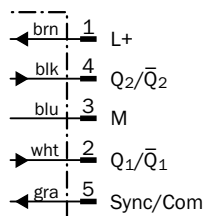
UM30-21x113
Connector
M12, 5-pin

brn	1	L+
blk	4	nc ①
blu	3	M
wht	2	Q_A
gra	5	Sync/Com
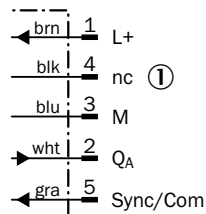
① Not connected

UM30-21x118
Connector
M12, 5-pin

brn	1	L+
blk	4	Q/$\overline{Q}$
blu	3	M
wht	2	Q_A
gra	5	Sync/Com

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Detection areas

UM30-211

Detection area in mm (inch)

(graph axes)
400 (15.75)
350 (13.78)
300 (11.81)
250 (9.84)
200 (7.87)
150 (5.91)
100 (3.94)
50 (1.97)
0

150 (5.91) 100 (3.94) 50 (1.97) 0 50 (1.97) 100 (3.94) 150 (5.91)

Detection area in mm (inch)

① Limiting range
② Aligned plate 500 mm x 500 mm
③ Working range
④ Pipe diameter 10 mm

UM30-212

Detection area in mm (inch)

(graph axes)
700 (27.56)
600 (23.62)
500 (19.69)
400 (15.75)
300 (11.81)
200 (7.87)
100 (3.94)
0

300 (11.81) 200 (7.87) 100 (3.94) 0 100 (3.94) 200 (7.87) 300 (11.81)

Detection area in mm (inch)

① Limiting range
② Aligned plate 500 mm x 500 mm
③ Working range
④ Pipe diameter 27 mm

UM30-213

Detection area in mm (inch)

(graph axes)
2,400 (94.49)
2,000 (78.74)
1,600 (63.00)
1,200 (47.24)
800 (31.50)
400 (15.75)
0

1,200 (47.24) 800 (31.50) 400 (15.75) 0 400 (15.75) 800 (31.50) 1,200 (47.24)

Detection area in mm (inch)

① Limiting range
② Aligned plate 500 mm x 500 mm
③ Working range
④ Pipe diameter 27 mm

UM30-214

Detection area in mm (inch)

(graph axes)
5,600 (220.47)
4,800 (188.98)
4,000 (157.48)
3,200 (125.98)
2,400 (94.49)
1,600 (63.00)
800 (31.50)
0

2,400 (94.49) 1,600 (63.00) 800 (31.50) 0 800 (31.50) 1,600 (63.00) 2,400 (94.49)

Detection area in mm (inch)

① Limiting range
② Aligned plate 500 mm x 500 mm
③ Working range
④ Pipe diameter 27 mm

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UM30-215
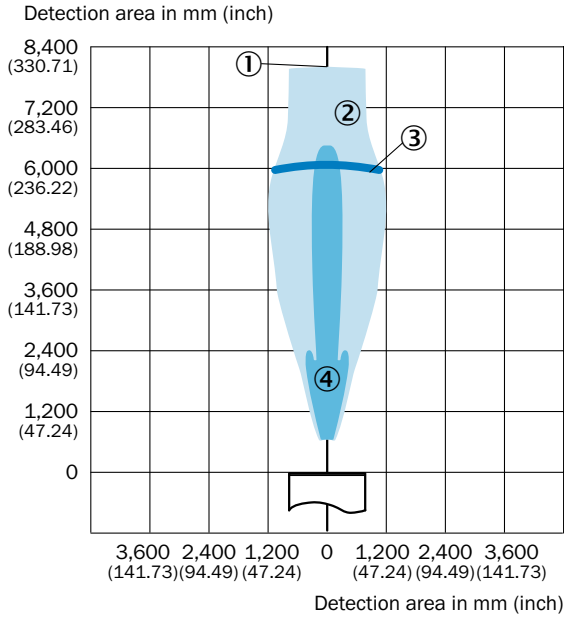
Detection area in mm (inch)

① Limiting range
② Aligned plate 500 mm x 500 mm
③ Working range
④ Pipe diameter 27 mm

Recommended accessories

Mounting brackets/plates

	Brief description	Model name	Part no.
	Mounting plate for M30 sensors, steel, zinc coated, without mounting material	BEF-WG-M30	5321871
	Mounting bracket, M30 thread, steel, zinc coated, without mounting material	BEF-WN-M30	5308445

Plug connectors and cables

	Brief description	Model name	Part no.
Illustration may differ	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899
	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544
Illustration may differ	Female connector, M12, 5-pin, angled, 2 m, PVC	DOL-1205-W02M	6008900
	Female connector, M12, 5-pin, angled, 5 m, PVC	DOL-1205-W05M	6009869
	Female connector, M12, 5-pin, angled, 10 m, PVC	DOL-1205-W10M	6010542

Terminal and alignment brackets

	Brief description	Model name	Part no.
	Mounting bracket, axial adjustable, with tapering thread M6, without mounting material	BEF-HA-M30A	5311527

For additional accessories including dimensional drawings, please see page J-301.

F

Small size, more functionality – versatile ultrasonic sensor up to 1.3 m

F
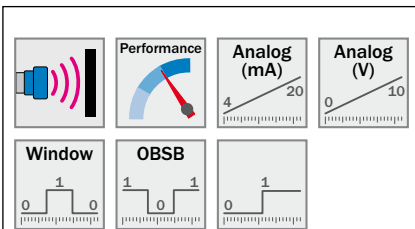
Product description

The UM18-2 Hi sub product family offers a short housing in combination with a high level of functionality. With four measuring ranges up to 1,300 mm the sensor can be used with extreme flexibility. For easy machine integration, the ultrasonic sensor offers straight or right-angle versions as well as three industrial interfaces. Besides devices with an analog current or voltage output, versions with a push-pull output and IO-Link are available.

At a glance

- Reliable measurement independent of material color, transparency, gloss and ambient light
- Four ranges up to 1,300 mm
- Short M18 metal housing with a length of 41 mm
- Straight or right-angle versions
- Analog voltage, analog current or push-pull (PNP/NPN in one) switching output with IO-Link available
- Set-up via IO-Link and/or teach-in via multifunction input
- High immunity to dirt, dust, humidity and fog

Your benefits

- Ranges up to 1,300 mm offer plenty of options for flexible use
- Easy machine integration due to short M18 housing available in straight or right-angle versions
- Intelligent measurement filters ensure reliable measurement results for highest process stability
- Integrated temperature compensation ensures high measurement accuracy at any time for best process quality
- Solid, one-piece metal housing secures highest machine availability
- Synchronization or multiplexing allow simultaneous use of up to 10 sensors, which improves application flexibility and process stability
- Unintentional adjustments to sensor settings are eliminated since teach-in process is done with an external wire
- Devices with switching output and IO-Link allow highest machine flexibility while offering easy machine operation

➜ www.mysick.com/en/UM18-2_Hi

Detailed technical data

Performance

Resolution	0.069 mm
Repeatability [1]	± 0.15 %
Accuracy [1] [2]	± 1 %
Detection area (typical)	See diagrams
Additional feature [3]	Set switching mode: Distance to object (DtO) / Window (Wnd) / Object between sensor and background (OBSB) Teach-in of switching output Inverted switching output IO-Link Teach-in of analog output Invertible analog output Temperature compensation Multifunctional input: external teach/synchronization/multiplexing Synchronization of up to 10 sensors Multiplexing: no cross talk of up to 10 sensors Reset to factory default

[1] Referring to current measurement value.

[2] Temperature compensation can be switched off, without temperature compensation: 0.17 % / ° K.

[3] Functions may vary depending on sensor type.

Interfaces

Multifunctional input	1 x MF

Mechanics/electronics

Supply voltage V_s [1] [2]	DC 10 V ... 30 V
Power consumption [3]	≤ 1.2 W
Initialization time	< 300 ms
Housing material [4]	Brass nickel-plated
Connection type	Connector M12, 5-pin
Indication	2 x LED

[1] Limit values, reverse-polarity protected, operation in short-circuit protected network, max. 8 A.

[2] 15 V ... 30 V when using analog voltage output.

[2] Without load.

[3] Ultrasonic transducer: polyurethane foam, glass epoxy resin.

Ambient data

Enclosure rating	IP 67
Protection class	III
Ambient temperature	Operation: –25 °C ... +70 °C Storage: –40 °C ... +85 °C
Temperature compensation	✔

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Specific data

Working range, limiting range	Output rate	Ultrasonic frequency (typical)	Sensing axis	Weight	Model name	Ordering information
20 mm ... 150 mm, 250 mm	8 ms	380 kHz	Straight	25 g	UM18-217xxxx11	F-234
			Angled	30 g	UM18-217xxxx12	F-234
30 mm ... 250 mm, 350 mm	8 ms	320 kHz	Straight	25 g	UM18-211xxxx11	F-235
			Angled	30 g	UM18-211xxxx12	F-235
65 mm ... 350 mm, 600 mm	16 ms	400 kHz	Straight	25 g	UM18-212xxxx11	F-235
			Angled	30 g	UM18-212xxxx12	F-236
120 mm ... 1,000 mm, 1,300 mm	20 ms	200 kHz	Straight	25 g	UM18-218xxxx11	F-236
			Angled	30 g	UM18-218xxxx12	F-236

Ordering information

UM18-217xxxx11

- **Working range, limiting range:** 20 mm ... 150 mm, 250 mm
- **Output rate:** 8 ms
- **Ultrasonic frequency (typical):** 380 kHz
- **Sensing axis:** straight
- **Weight:** 25 g

Response time	Switching frequency	Hysteresis	Switching output [1] [2]	Analog output [3]	Resolution analog output	Model name	Part no.
40 ms	25 Hz	2 mm	1 x Push-pull: PNP/NPN (100 mA); IO-Link	–	–	UM18-21712A211	6048384
	–	–	–	1 x 4 mA ... 20 mA (≤ 500 Ω) [4]	12 bit	UM18-217126111	6048386
				1 x 0 V ... 10 V (≥ 100 kΩ)	12 bit	UM18-217127111	6048388

[1] Output Q short-circuit protected.
[2] Push-Pull: PNP/NPN HIGH = U_V - (< 4 V), LOW < 2 V.
[3] Subsequent smoothing of the analog output, depending on the application, may increase the response time by up to 200 %.
[4] For V_s ≤ 20 V max. load ≤ 100 Ω.

UM18-217xxxx12

- **Working range, limiting range:** 20 mm ... 150 mm, 250 mm
- **Output rate:** 8 ms
- **Ultrasonic frequency (typical):** 380 kHz
- **Sensing axis:** angled
- **Weight:** 30 g

Response time	Switching frequency	Hysteresis	Switching output [1] [2]	Analog output [3]	Resolution analog output	Model name	Part no.
40 ms	25 Hz	2 mm	1 x Push-pull: PNP/NPN (100 mA); IO-Link	–	–	UM18-21712A212	6048385
	–	–	–	1 x 4 mA ... 20 mA (≤ 500 Ω) [4]	12 bit	UM18-217126112	6048387
				1 x 0 V ... 10 V (≥ 100 kΩ)	12 bit	UM18-217127112	6048389

[1] Output Q short-circuit protected.
[2] Push-Pull: PNP/NPN HIGH = U_V - (< 4 V), LOW < 2 V.
[3] Subsequent smoothing of the analog output, depending on the application, may increase the response time by up to 200 %.
[4] For V_s ≤ 20 V max. load ≤ 100 Ω.

F

UM18-211xxxx11

- **Working range, limiting range:** 30 mm ... 250 mm, 350 mm
- **Output rate:** 8 ms
- **Ultrasonic frequency (typical):** 320 kHz
- **Sensing axis:** straight
- **Weight:** 25 g

Response time	Switching frequency	Hysteresis	Switching output [1] [2]	Analog output [3]	Resolution analog output	Model name	Part no.
40 ms	25 Hz	3 mm	1 x Push-pull: PNP/NPN (100 mA); IO-Link	–	–	UM18-21112A211	6048390
	–	–	–	1 x 4 mA ... 20 mA (≤ 500 Ω) [4]	12 bit	UM18-211126111	6048392
				1 x 0 V ... 10 V (≥ 100 kΩ)	12 bit	UM18-211127111	6048394

[1] Output Q short-circuit protected.

[2] Push-Pull: PNP/NPN HIGH = U_V - (< 4 V), LOW < 2 V.

[3] Subsequent smoothing of the analog output, depending on the application, may increase the response time by up to 200 %.

[4] For V_s ≤ 20 V max. load ≤ 100 Ω.

UM18-211xxxx12

- **Working range, limiting range:** 30 mm ... 250 mm, 350 mm
- **Output rate:** 8 ms
- **Ultrasonic frequency (typical):** 320 kHz
- **Sensing axis:** angled
- **Weight:** 30 g

Response time	Switching frequency	Hysteresis	Switching output [1] [2]	Analog output [3]	Resolution analog output	Model name	Part no.
40 ms	25 Hz	3 mm	1 x Push-pull: PNP/NPN (100 mA); IO-Link	–	–	UM18-21112A212	6048391
	–	–	–	1 x 4 mA ... 20 mA (≤ 500 Ω) [4]	12 bit	UM18-211126112	6048393
				1 x 0 V ... 10 V (≥ 100 kΩ)	12 bit	UM18-211127112	6048395

[1] Output Q short-circuit protected.

[2] Push-Pull: PNP/NPN HIGH = U_V - (< 4 V), LOW < 2 V.

[3] Subsequent smoothing of the analog output, depending on the application, may increase the response time by up to 200 %.

[4] For V_s ≤ 20 V max. load ≤ 100 Ω.

UM18-212xxxx11

- **Working range, limiting range:** 65 mm ... 350 mm, 600 mm
- **Output rate:** 16 ms
- **Ultrasonic frequency (typical):** 400 kHz
- **Sensing axis:** straight
- **Weight:** 25 g

Response time	Switching frequency	Hysteresis	Switching output [1] [2]	Analog output [3]	Resolution analog output	Model name	Part no.
80 ms	12 Hz	5 mm	1 x Push-pull: PNP/NPN (100 mA); IO-Link	–	–	UM18-21212A211	6048396
	–	–	–	1 x 4 mA ... 20 mA (≤ 500 Ω) [4]	12 bit	UM18-212126111	6048398
				1 x 0 V ... 10 V (≥ 100 kΩ)	12 bit	UM18-212127111	6048400

[1] Output Q short-circuit protected.

[2] Push-Pull: PNP/NPN HIGH = U_V - (< 4 V), LOW < 2 V.

[3] Subsequent smoothing of the analog output, depending on the application, may increase the response time by up to 200 %.

[4] For V_s ≤ 20 V max. load ≤ 100 Ω.

F

UM18-212xxxx12

- **Working range, limiting range:** 65 mm ... 350 mm, 600 mm
- **Output rate:** 16 ms
- **Ultrasonic frequency (typical):** 400 kHz
- **Sensing axis:** angled
- **Weight:** 30 g

Response time	Switching frequency	Hysteresis	Switching output [1] [2]	Analog output [3]	Resolution analog output	Model name	Part no.
80 ms	12 Hz	5 mm	1 x Push-pull: PNP/NPN (100 mA); IO-Link	–	–	UM18-21212A212	6048397
	–	–	–	1 x 4 mA ... 20 mA (≤ 500 Ω) [4]	12 bit	UM18-212126112	6048399
				1 x 0 V ... 10 V (≥ 100 kΩ)	12 bit	UM18-212127112	6048401

[1] Output Q short-circuit protected.

[2] Push-Pull: PNP/NPN HIGH = U_V - (< 4 V), LOW < 2 V.

[3] Subsequent smoothing of the analog output, depending on the application, may increase the response time by up to 200 %.

[4] For V_s ≤ 20 V max. load ≤ 100 Ω.

UM18-218xxxx11

- **Working range, limiting range:** 120 mm ... 1,000 mm, 1,300 mm
- **Output rate:** 20 ms
- **Ultrasonic frequency (typical):** 200 kHz
- **Sensing axis:** straight
- **Weight:** 25 g

Response time	Switching frequency	Hysteresis	Switching output [1] [2]	Analog output [3]	Resolution analog output	Model name	Part no.
100 ms	10 Hz	20 mm	1 x Push-pull: PNP/NPN (100 mA); IO-Link	–	–	UM18-21812A211	6048402
	–	–	–	1 x 4 mA ... 20 mA (≤ 500 Ω) [4]	12 bit	UM18-218126111	6048404
				1 x 0 V ... 10 V (≥ 100 kΩ)	12 bit	UM18-218127111	6048406

[1] Output Q short-circuit protected.

[2] Push-Pull: PNP/NPN HIGH = U_V - (< 4 V), LOW < 2 V.

[3] Subsequent smoothing of the analog output, depending on the application, may increase the response time by up to 200 %.

[4] For V_s ≤ 20 V max. load ≤ 100 Ω.

UM18-218xxxx12

- **Working range, limiting range:** 120 mm ... 1,000 mm, 1,300 mm
- **Output rate:** 20 ms
- **Ultrasonic frequency (typical):** 200 kHz
- **Sensing axis:** angled
- **Weight:** 30 g

Response time	Switching frequency	Hysteresis	Switching output [1] [2]	Analog output [3]	Resolution analog output	Model name	Part no.
100 ms	10 Hz	20 mm	1 x Push-pull: PNP/NPN (100 mA); IO-Link	–	–	UM18-21812A212	6048403
	–	–	–	1 x 4 mA ... 20 mA (≤ 500 Ω) [4]	12 bit	UM18-218126112	6048405
				1 x 0 V ... 10 V (≥ 100 kΩ)	12 bit	UM18-218127112	6048407

[1] Output Q short-circuit protected.

[2] Push-Pull: PNP/NPN HIGH = U_V - (< 4 V), LOW < 2 V.

[3] Subsequent smoothing of the analog output, depending on the application, may increase the response time by up to 200 %.

[4] For V_s ≤ 20 V max. load ≤ 100 Ω.

F

Dimensional drawings

UM18-2xxxxxx1
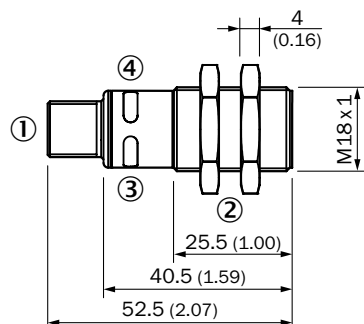
4
(0.16)

④

①

③

②

M18 x 1

25.5 (1.00)

40.5 (1.59)

52.5 (2.07)

All dimensions in mm (inch)

① Connection
② Mounting nuts, SW 24 mm
③ Status indicator power on (green)
④ Status indicator switching/analog output (orange)

UM18-2xxxxxx2
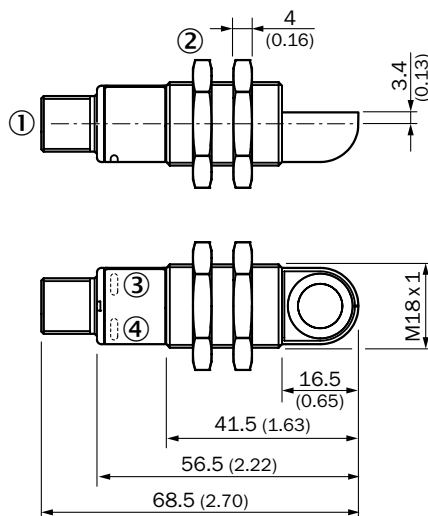
4
(0.16)

②

①

3.4
(0.13)

③
④

M18 x 1

16.5
(0.65)

41.5 (1.63)

56.5 (2.22)

68.5 (2.70)

All dimensions in mm (inch)

① Connection
② Mounting nuts, SW 24 mm
③ Status indicator power on (green)
④ Status indicator switching/analog output (orange)

Connection type and diagram

UM18-21xxxAxxx
Connector
M12, 5-pin

brn	1	L+
blk	4	Q/$\overline{Q}$
blu	3	M
wht	2	nc ①
gra	5	Sync/Com
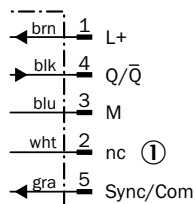
① Not connected

UM18-21xxx6xxx
UM18-21xxx7xxx
Connector
M12, 5-pin

brn	1	L+
blk	4	nc ①
blu	3	M
wht	2	Q_A
gra	5	MF ②
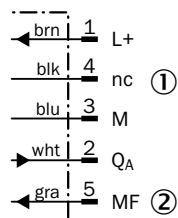
① Not connected
② Multifunctional input

F

Detection areas

UM18-217

Detection area in mm (inch)

Detection area in mm (inch)

① Limiting range
② Aligned plate 500 mm x 500 mm
③ Working range
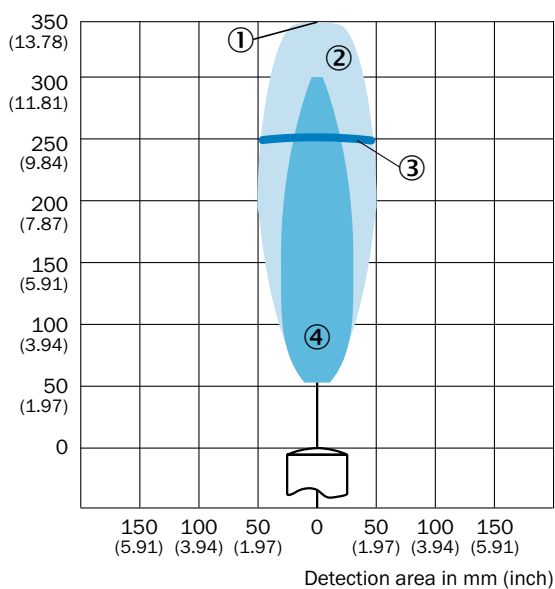④ Pipe diameter 10 mm

UM18-211

Detection area in mm (inch)

Detection area in mm (inch)

① Limiting range
② Aligned plate 500 mm x 500 mm
③ Working range
④ Pipe diameter 10 mm

UM18-212

Detection area in mm (inch)

Detection area in mm (inch)

① Limiting range
② Aligned plate 500 mm x 500 mm
③ Working range
④ Pipe diameter 27 mm

UM18-218

Detection area in mm (inch)

Detection area in mm (inch)

① Limiting range
② Aligned plate 500 mm x 500 mm
③ Working range
④ Pipe diameter 27 mm

Recommended accessories

Mounting brackets/plates

	Brief description	Model name	Part no.
	Mounting plate for M18 sensors, steel, zinc coated, without mounting material	BEF-WG-M18	5321870
	Mounting bracket, M18 thread, steel, zinc coated, without mounting material	BEF-WN-M18	5308446

Plug connectors and cables

	Brief description	Model name	Part no.
Illustration may differ	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899
	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544
Illustration may differ	Female connector, M12, 5-pin, angled, 2 m, PVC	DOL-1205-W02M	6008900
	Female connector, M12, 5-pin, angled, 5 m, PVC	DOL-1205-W05M	6009869
	Female connector, M12, 5-pin, angled, 10 m, PVC	DOL-1205-W10M	6010542

Terminal and alignment brackets

	Brief description	Model name	Part no.
	Mounting clamp for cylindrical sensors M18 with positive stop, plastic (PA12), glass-fiber reinforced, incl. mounting material	BEF-KHF-M18	2051482
	Plate H for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-H01	2022465
	Alignment bracket with ball joint, plastic (ABS), incl. mounting material	BEF-WN-M18-ST02	5312973

F

Ultrasonic technology housed in an industry-proven design

F

Product description

Ultrasonic technology provides reliable results where optical sensors reach their limits. The UC12 shares the same housing as common photoelectric sensors. In addition a single teach-in button enables easy setup. Dark or transparent objects are easily detected.

At a glance

- Object detection independent of material color and ambient light – even transparent foils, glass, liquids and bottles are reliably detected
- Fast and easy teach-in with single push-button
- Immune to dirt, dust and fog

- Two ambivalent switching outputs $(Q, \bar{Q})$
- Excellent background suppression
- Three operation modes: Distance to Object (DtO), Window (Wnd) or Object between sensor and background (OBSB)

Your benefits

- Fast commissioning due to single-button teach-in
- Full mechanical compatibility to photoelectric sensors increase application flexibility without machine modification

- Standard proximity, window and reflection modes provide application flexibility, which increases reliability and productivity
- Integrated temperature compensation ensures high measurement accuracy
- Complementary switching outputs immediately signal broken wiring, reducing faulty production results

Additional information

➜ www.mysick.com/en/UC12

Detailed technical data

Performance

Resolution	0.1 mm
Repeatability [1]	± 0.15 %
Output rate	8 ms
Switching frequency	25 Hz
Detection area (typical)	See diagrams
Additional feature [2]	Set switching mode: Distance to object (DtO) / Window (Wnd) / Object between sensor and background (OBSB) Teach-in of switching output Temperature compensation Reset to factory default Lock user interface

[1] Referring to current measurement value.

[2] Functions may vary depending on sensor type.

Interfaces

Hysteresis	2 mm

Mechanics/electronics

Supply voltage V_s [1]	DC 10 V ... 30 V
Power consumption [2]	≤ 1.2 W
Initialization time	< 300 ms
Housing material [3]	Die-cast zinc
Connection type	Connector M12, 4-pin
Indication	Dual LED
Weight	75 g

[1] Limit values, reverse-polarity protected, operation in short-circuit protected network, max. 8 A.

[2] Without load.

[3] Ultrasonic transducer: polyurethane foam, glass epoxy resin.

Ambient data

Enclosure rating	IP 67
Protection class	III
Ambient temperature	Operation: –25 °C ... +70 °C Storage: –40 °C ... +85 °C

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Ordering information

Response time	Accuracy [1]	Temperature compensation	Ultrasonic frequency (typical)	Working range, limiting range	Switching output [2] [3]	Model name	Part no.
30 ms	± 1 %	✔	380 kHz	20 mm … 150 mm, 250 mm	2 x PNP (500 mA) [4]	UC12-11231	6029831
					2 x NPN (500 mA) [5]	UC12-11235	6029833
			500 kHz	55 mm … 250 mm, 350 mm	2 x PNP (500 mA) [4]	UC12-12231	6029832
					2 x NPN (500 mA) [5]	UC12-12235	6029834

[1] Referring to current measurement value.

[2] Output Q short-circuit protected.

[3] Complementary switching outputs (Q, $\overline{Q}$).

[4] PNP: HIGH = V_s – (< 2 V), LOW = 0 V.

[5] NPN: HIGH ≤ 2 V, LOW = V_s.

Dimensional drawing
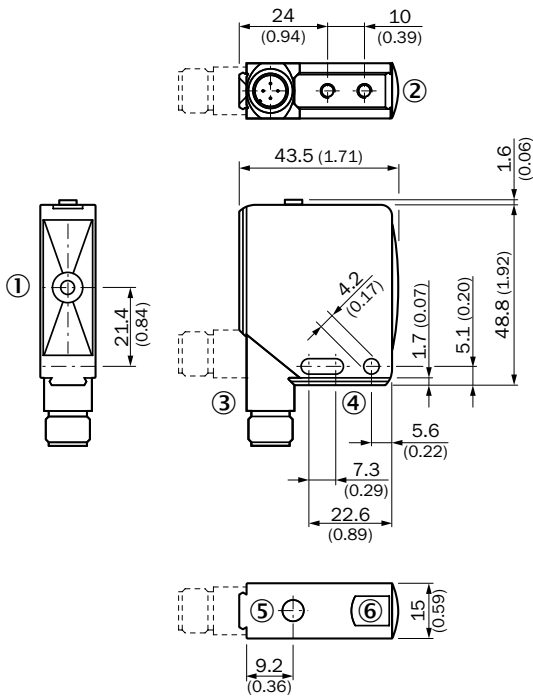
All dimensions in mm (inch)

① Transmission and reception axis
② M4 threaded mounting hole, 4 mm deep
③ Connection
④ Mounting hole
⑤ Control elements
⑥ Status indicator switching output (orange)

Adjustments
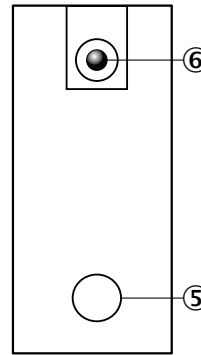
⑤ Control elements
⑥ Status indicator switching output (orange) and power on (green)

Connection type and diagram

**Connector
M12, 4-pin**

brn	1	L+
blk	4	Q
blu	3	M
wht	2	Q̄
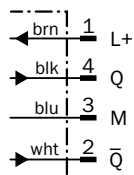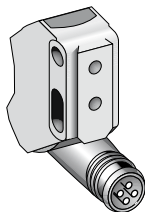
Detection areas

UC12-11

Detection area in mm (inch)

350 (13.78)	
300 (11.81)	
250 (9.84)	
200 (7.87)	
150 (5.91)	
100 (3.94)	
50 (1.97)	
0	

150 (5.91) 100 (3.94) 50 (1.97) 0 50 (1.97) 100 (3.94) 150 (5.91)

Detection area in mm (inch)
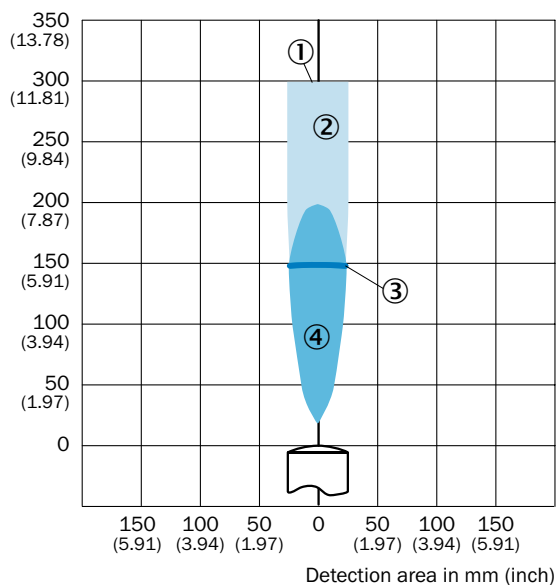
① Limiting range
② Aligned plate 10 mm x 10 mm
③ Working range
④ Pipe diameter 10 mm

UC12-12

Detection area in mm (inch)

150 (5.91) 100 (3.94) 50 (1.97) 0 50 (1.97) 100 (3.94) 150 (5.91)

Detection area in mm (inch)

① Limiting range
② Aligned plate 10 mm x 10 mm
③ Working range
④ Pipe diameter 10 mm

F

Recommended accessories

Mounting brackets/plates

	Brief description	Model name	Part no.
	Mounting bracket, big, stainless steel (1.4404), incl. mounting material	BEF-WG-W12	2013942
	Mounting bracket, small, stainless steel (1.4404), incl. mounting material	BEF-WK-W12	2012938

Plug connectors and cables

	Brief description	Model name	Part no.
Illustration may differ	Female connector, M12, 4-pin, straight, 2 m, PVC	DOL-1204-G02M	6009382
	Female connector, M12, 4-pin, straight, 5 m, PVC	DOL-1204-G05M	6009866
	Female connector, M12, 4-pin, straight, 10 m, PVC	DOL-1204-G10M	6010543
Illustration may differ	Female connector, M12, 4-pin, angled, 2 m, PVC	DOL-1204-W02M	6009383
	Female connector, M12, 4-pin, angled, 5 m, PVC	DOL-1204-W05M	6009867
	Female connector, M12, 4-pin, angled, 10 m, PVC	DOL-1204-W10M	6010541

Terminal and alignment brackets

		Model name	Part no.
	Plate D for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-D01	2022461
	Plate L for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-L01	2023057
	Plate N02 for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-N02	2051608

For additional accessories including dimensional drawings, please see page J-301.

F

Small, precise, ultrasonic

F

CE △III RoHS 2002/95/EC

Additional information

Product description

The UC4 ultrasonic sensor family combines state-of-the-art ultrasonic technology in a miniature housing. This compact, lightweight sensor not only detects transparent objects, but it also provides excellent background suppression, making it ideal for use in challenging conditions. The UC4 product line is the perfect solution for tough applications in confined spaces.

At a glance

- Integrated time-of-flight technology detects objects such as glass, liquids and transparent foils, independent of color
- Three operation modes: Distance to Object (DtO), Window (Wnd) or Object between sensor and background (OBSB)
- Immunity to dirt, dust and fog
- One PNP/NPN switching output
- Excellent background suppression

Your benefits

- Mini housing allows for quick and easy integration, even in the most confined spaces
- Immunity to dirt and dust ensures reliable object detection, even in challenging environmental conditions
- Integrated temperature compensation ensures high measurement accuracy
- Various switching outputs provide application flexibility, which increases reliability and productivity
- Full mechanical compatibility to photoelectric sensors increase application flexibility without machine modification
- Economical version available for simple, cost-sensitive applications
- Fast machine setup due to easy-to-use teach-in button

➜ www.mysick.com/en/UC4

Detailed technical data

Performance

Resolution	0.1 mm
Repeatability [1]	± 0.15 %
Response time	30 ms
Output rate	8 ms
Switching frequency	20 Hz
Detection area (typical)	See diagrams
Additional feature [2]	Set switching mode: Distance to object (DtO) / Window (Wnd) / Object between sensor and background (OBSB) Teach-in of switching output Switching output invertible Temperature compensation Reset to factory default Lock user interface

[1] Referring to current measurement value.

[2] Functions may vary depending on sensor type.

Interfaces

Hysteresis	2 mm

Mechanics/electronics

Supply voltage V_S [1]	DC 20 V ... 30 V
Power consumption [2]	≤ 0.75 W
Initialization time	< 300 ms
Housing material [3]	ABS-plastic
Connection type	Connector M8, 3-pin
Indication	2 x LED
Weight	10 g

[1] Limit values, reverse-polarity protected, operation in short-circuit protected network, max. 8 A.

[2] Without load.

[3] Ultrasonic transducer: polyurethane foam, glass epoxy resin.

Ambient data

Enclosure rating	IP 67
Protection class	III
Ambient temperature	Operation: –25 °C ... +70 °C Storage: –40 °C ... +85 °C

F

Ordering information

Response time	Accuracy [1]	Temperature compensation	Ultrasonic frequency (typical)	Working range, limiting range [2]	Switching output [3]	Model name	Part no.
30 ms	0.17 % / K	–	380 kHz	13 mm … 100 mm, 150 mm	1 x PNP (200 mA)[4]	UC4-11341	6034667
					1 x NPN (200 mA)[5]	UC4-11345	6034668
	± 1 %	✔	380 kHz	13 mm … 150 mm, 250 mm	1 x PNP (200 mA)[4]	UC4-13341	6034669
					1 x NPN (200 mA)[5]	UC4-13345	6034670

[1] Referring to current measurement value.

[2] Teach-in from 21 mm.

[3] Output Q short-circuit protected.

[4] PNP: HIGH = V_s – (< 2 V), LOW = 0 V.

[5] NPN: HIGH ≤ 2 V, LOW = V_s.

Dimensional drawing
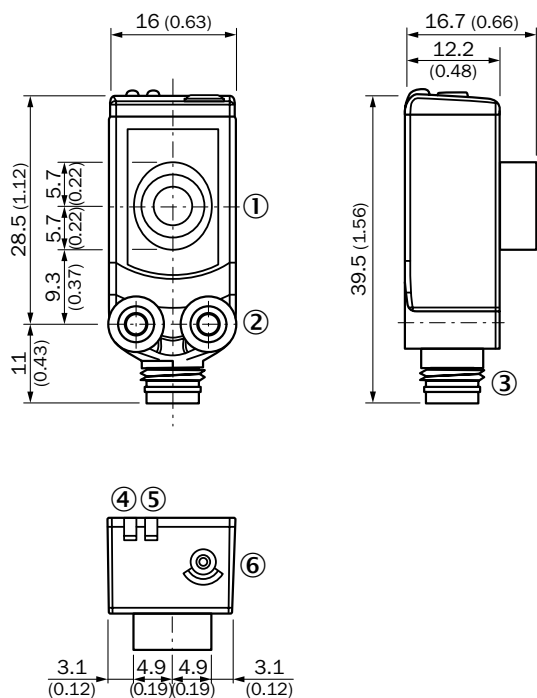
All dimensions in mm (inch)

① Transmission and reception axis
② Threaded mounting hole M3
③ Connection
④ Status indicator switching output (orange)
⑤ Status indicator power on (green)
⑥ Control elements

Adjustments

④ Status indicator switching output (orange)
⑤ Status indicator power on (green)
⑥ Control elements

F
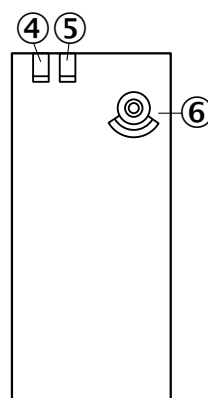
Connection type and diagram

Connector
M8, 3-pin

brn	1	L+
blu	3	M
blk	4	Q

Detection areas

UC4-11

Detection area in mm (inch)

① Limiting range
② Aligned plate 100 mm x 100 mm
③ Working range
④ Pipe diameter 10 mm

UC4-13

Detection area in mm (inch)

① Limiting range
② Aligned plate 100 mm x 100 mm
③ Working range
④ Pipe diameter 10 mm

F
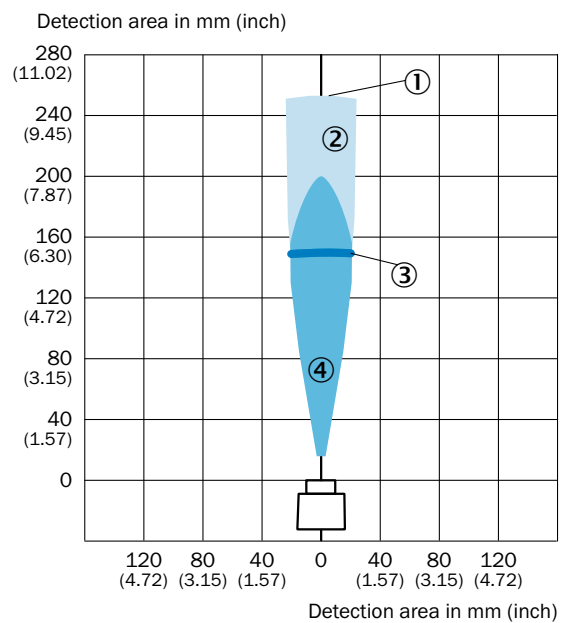
Recommended accessories

Mounting brackets/plates

	Brief description	Model name	Part no.
	Mounting bracket for wall mounting, stainless steel (1.4571), incl. mounting material	BEF-W4-A	2051628

Plug connectors and cables

	Brief description	Model name	Part no.
Illustration may differ	Female connector, M8, 3-pin, straight, 2 m, PVC	DOL-0803-G02M	6010785
	Female connector, M8, 3-pin, straight, 5 m, PVC	DOL-0803-G05M	6022009
	Female connector, M8, 3-pin, straight, 10 m, PVC	DOL-0803-G10M	6022011
Illustration may differ	Female connector, M8, 3-pin, angled, 2 m, PVC	DOL-0803-W02M	6008489
	Female connector, M8, 3-pin, angled, 5 m, PVC	DOL-0803-W05M	6022010
	Female connector, M8, 3-pin, angled, 10 m, PVC	DOL-0803-W10M	6022012

Terminal and alignment brackets

	Brief description	Model name	Part no.
	Ball joint bracket with additional mounting hole 2.5 mm, plastic (ABS), incl. mounting material	BEF-GH-MINI02	2027128
	Plate H for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-H01	2022465

For additional accessories including dimensional drawings, please see page J-301.

F

F

Reliable ultrasonic double sheet detection

SICK's ultrasonic double sheet detectors are used to identify the presence/absence of a single sheet, no sheet or a double sheet in printing applications. Double sheet detection with ultrasonic sensors offers various advantages, including color-independent detection and plug and play operation.

Your benefits

- Increased quality and productivity through reliable double sheet detection
- Fast commissioning since sensor does not require any configuration or teaching
- Reliable detection of transparent foils, various paper types and thin metal sheets provides application flexibility
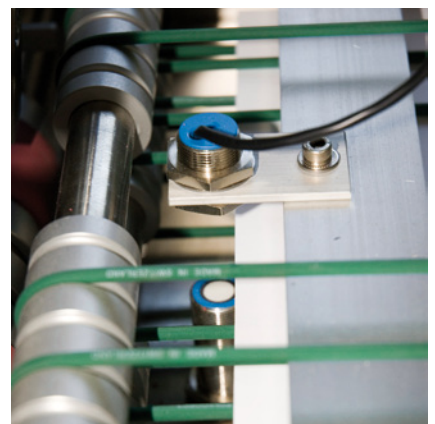
Double sheet detector

G

Double sheet detection using ultrasonic technology

Double sheet detection sensors are specially designed to monitor thin and planar stacked layers. Using ultrasonic technology, they function completely independent of color and can even detect materials such as very thin sheets or transparent films.
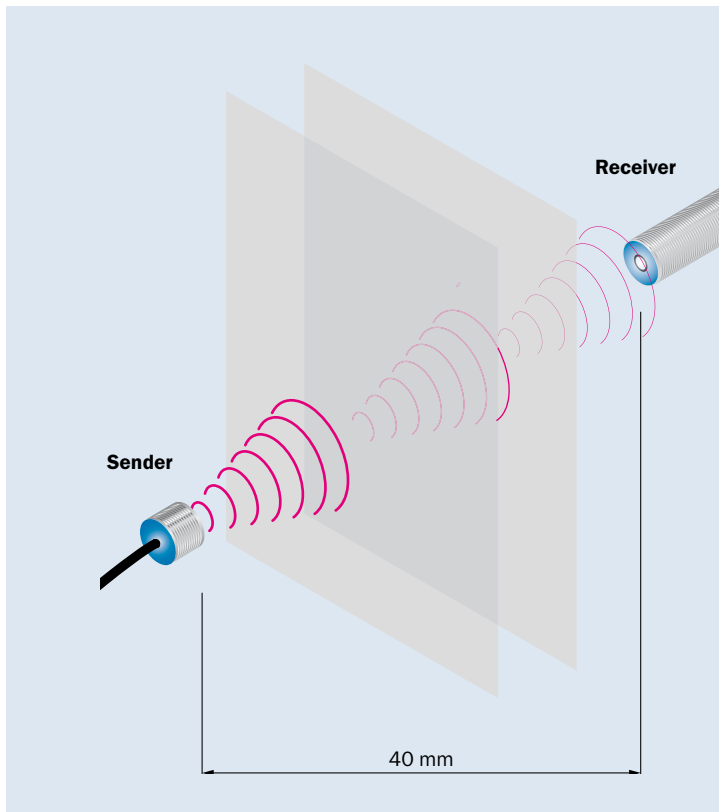
UM18 sensor for double sheet detection

- Simple mounting of the sender and receiver facing each other
- Extremely simple commissioning as no programming is needed
- A short mounting distance of only 40 mm enables installation in limited spaces
- Easily distinguishes between:
  - **no sheets,**
  - **one sheet,**
  - **several sheets.**

G
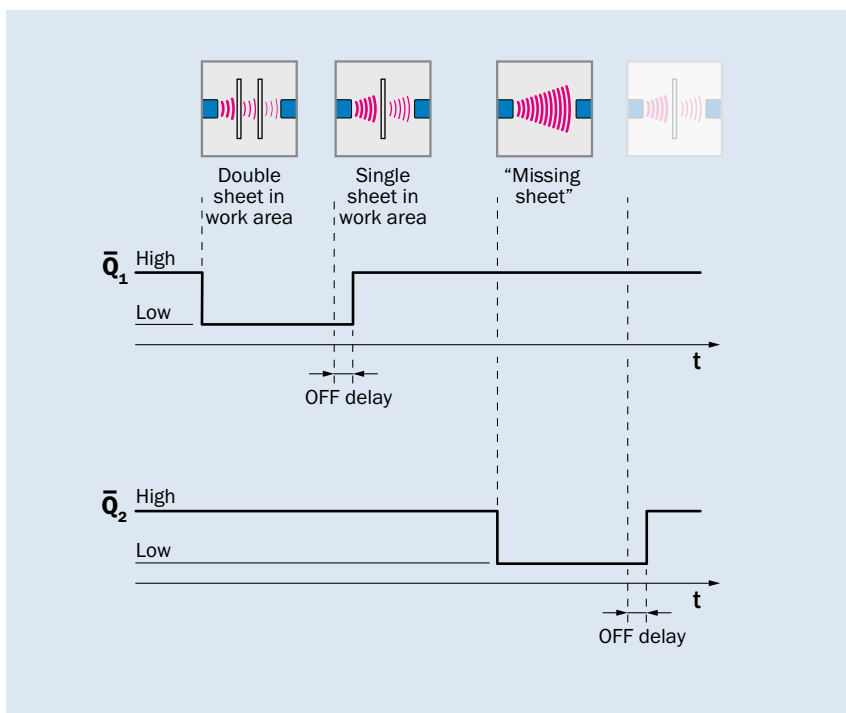
Switching behavior

The sender constantly emits ultrasonic waves in the direction of the receiver. If there is no material in the work area ("missing sheet"), the opposite side receives the full signal. If there are one or more sheets in the work area, the ultra-sonic waves cause these sheets to vibrate, resulting in the signal being weakened and evaluated by the receiver.

The two switching outputs are allocated with "double sheet ($\overline{Q}_1$)" and "missing sheet ($\overline{Q}_2$)" so that all of the process statuses can be recognized.

Typical materials
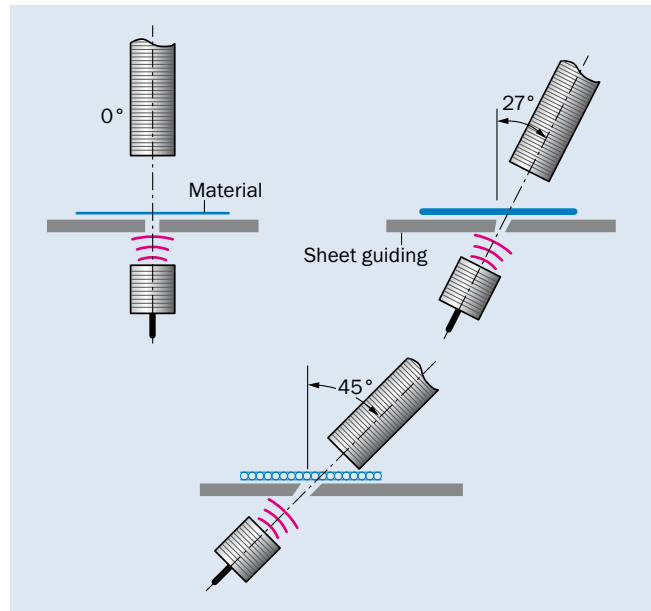
The UM18 sensor for double sheet detection does not have to be set up for different sheet materials. The following materials can be reliably detected:

Depending on the quality and thickness of the material, the best detection results are generally achieved with the following mounting angles:

Material	Maximum thickness	Recommended mounting angle
Papers	1,200 g/m²	0°
Thin films	0.2 mm	0°
Thicker films	0.4 mm	27°
Sheets	0.3 mm	27°
Chip cards, wafers	0.3 mm	27°
Corrugated board	Single wall F, N and G flutes [1]	45°

[1] Approximate values: should be qualified in the application.

Typical fields of application
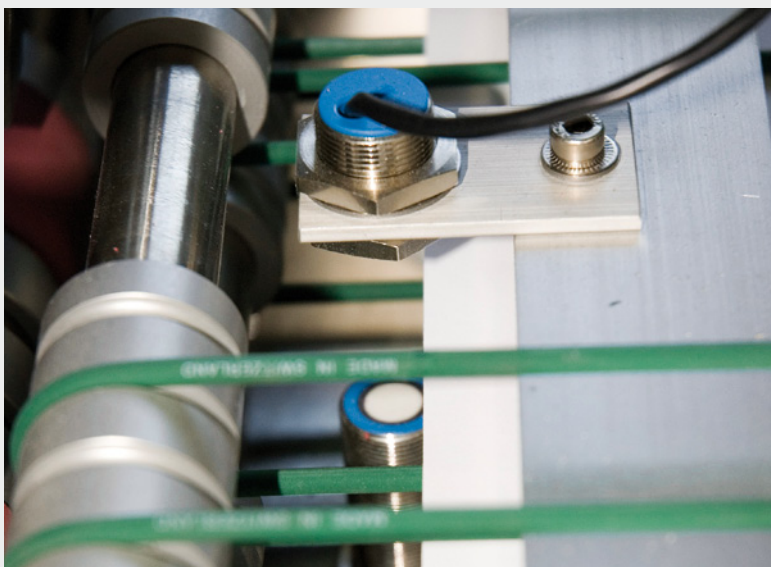
Print & paper

- Sheet-fed printing presses
- Paper processing machines
  - Collating machines
  - Folding machines

Packaging

- Double layer detection of packaging materials

Electronics & solar

- Production of printed circuit boards
- Production of solar cells and silicon wafers

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G

Product family overview

	UM18
	Highly efficient double sheet detection for your print job
Technical data overview	
Detectable material	Paper grams per square meter: 20 g/m² ... 1,200 g/m²
	Metal-laminated sheets and films: ≤ 0.4 mm
	Self-adhesive films, metal sheets: ≤ 0.3 mm
	Corrugated cardboard: single wall F, N and G flute sizes
Installation distance	37 mm ... 43 mm
Resolution	Double sheets not completely glued together
Response time	2.5 ms / 6.5 ms
Interfaces overview	2 x switching output
	1 x control input
At a glance	
	• Double-sheet detection of foils, metal sheets and corrugated cardboard with F, N and G flutes
	• Installation distance 37 mm ... 43 mm
	• Automatic adjustment, plug and play operation
	• Color-independent detection
	• Two switching outputs for double and miss-fed sheets
Detailed information	➜ G-258
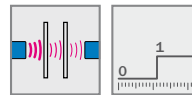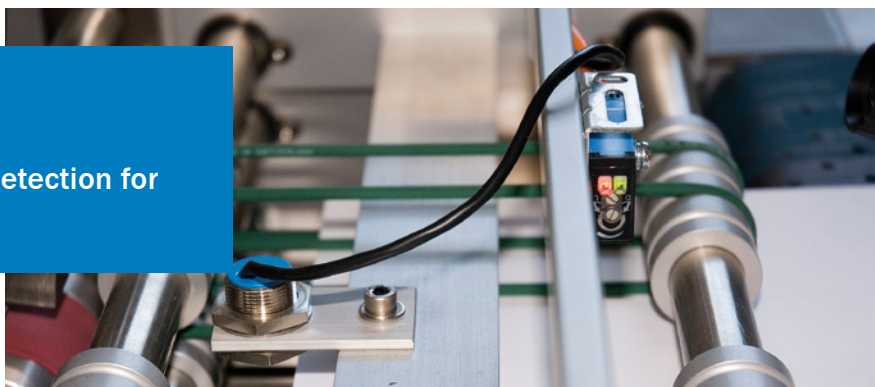
G
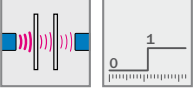
Highly efficient double sheet detection for your print job

Product description

The UM18 double sheet detector identifies the presence/absence of a single sheet or a double sheet in printing applications. Double sheet detection with ultrasonic sensors offers various advantages, including color-independent detection and plug and play operation.

At a glance

- Double sheet detection of foils, metal sheets and corrugated cardboard with F, N and G flute sizes
- Installation distance 37 mm ... 43 mm
- Automatic adjustment, plug and play operation
- Color-independent detection
- Two switching outputs for double and miss-fed sheets

Your benefits

- Increased quality and productivity through reliable double sheet detection
- Fast commissioning since sensor does not require calibration or teaching
- Reliable detection of transparent foils, various paper types and thin metal sheets provide application flexibility

Additional information

G

→ www.mysick.com/en/UM18

Detailed technical data

Performance

Installation distance	37 mm ... 43 mm
Resolution	Double sheets not completely glued together
Typ. ultrasonic frequency	400 kHz
Response time [1]	2.5 ms / 6.5 ms
Blind zone	7 mm from sender and receiver
Permissible angle deviation	± 45° perpendicular to sheet
Detectable material [2]	Paper grams per square meter: 20 g/m² ... 1,200 g/m² Metal-laminated sheets and films: ≤ 0.4 mm Self-adhesive films, metal sheets: ≤ 0.3 mm Corrugated cardboard: single wall F, N and G flute sizes

[1] Dependent on signal at control input: V_s < DC 5 V = 2.5 ms / V_s > DC 9 V = 6.5 ms.

[2] Approximate values: should be qualified in the application.

Interfaces

Off delay	10 ms

Mechanics/electronics

Supply voltage V_s [1]	DC 20 V ... 30 V
Power consumption [2]	≤ 1.35 W
Initialization time	< 300 ms
Housing material [3]	Brass nickel-plated
Connection type	Connection cable: 5-pin, 2 m, PVC Sender: cable with connector, 2-pin, 1 m, PVC Receiver: cable with connector, 2-pin, 1.2 m, PVC
Indication	1 x Dual-LED
Weight [4]	280 g

[1] Limit values. Reverse-polarity protected, operation in short circuit protected network max. 8 A.

[2] Without load.

[3] Ultrasonic transducer: polyurethan foam, glass epoxy resin.

[4] Incl. cable.

Ambient data

Enclosure rating [1]	IP 65
Ambient temperature	Operation: +5 °C ... +60 °C Storage: –40 °C ... +85 °C

[1] Connector of connection cable between sender and receiver complies with IP 20.

Ordering information

Control input	Switching output (max. output current) [1] [2]	Model name	Part no.
1 x	2 x PNP (500 mA) [3]	UM18-20012	6025670
	2 x NPN (500 mA) [4]	UM18-20014	6037880

[1] Output Q short-circuit protected.

[2] Q_1: switching output double sheet, Q_2: switching output mis-fed sheet, normally closed.

[3] PNP: HIGH = V_s - (< 2 V), LOW = 0 V.

[4] NPN: HIGH = < 2 V, LOW = V_s.
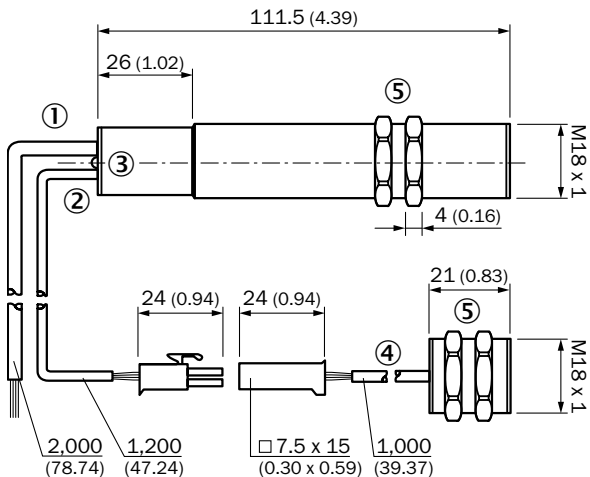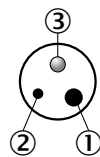
G

Dimensional drawing

111.5 (4.39)

26 (1.02)

⑤

①

③

②

M18 x 1

4 (0.16)

24 (0.94) 24 (0.94)

21 (0.83)

⑤

④

M18 x 1

2,000 (78.74) 1,200 (47.24) □ 7.5 x 15 (0.30 x 0.59) 1,000 (39.37)

All dimensions in mm (inch)

① Connection cable: 5-pin, 2 m, PVC
② Receiver: cable with connector, 2-pin, 1.2 m, PVC
③ Status indicator of the switching outputs
④ Sender: cable with connector, 2-pin, 1 m, PVC
⑤ Mounting nuts, SW 24 mm

Adjustments

③

② ①

① Connection cable: 5-pin, 2 m, PVC
② Receiver: cable with connector, 2-pin, 1.2 m, PVC
③ Status indicator of the switching outputs

Connection type and diagram

Sender
Cable, 2-pin

Receiver
Cable, 5-pin
and 2-pin
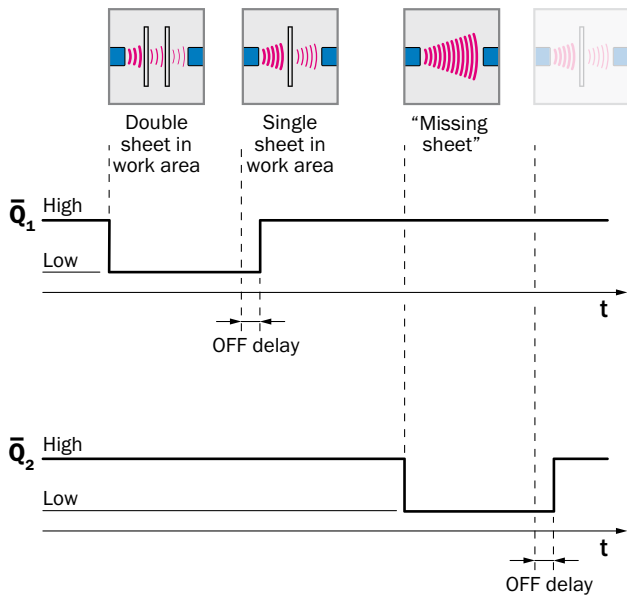
brn	L+
blk	$\bar{Q}_1$
blu	M
wht	$\bar{Q}_2$
gra	E

G

Characteristic curve

| Double sheet in work area | Single sheet in work area | "Missing sheet" | |

$\overline{Q}_1$ — High / Low

OFF delay

$\overline{Q}_2$ — High / Low

OFF delay

Recommended accessories

Mounting brackets/plates

	Brief description	Model name	Part no.
	Mounting plate for M18 sensors, steel, zinc coated, without mounting material	BEF-WG-M18	5321870
	Mounting bracket, M18 thread, steel, zinc coated, without mounting material	BEF-WN-M18	5308446

Terminal and alignment brackets

	Brief description	Model name	Part no.
	Mounting clamp for cylindrical sensors M18 with positive stop, plastic (PA12), glass-fiber reinforced, incl. mounting material	BEF-KHF-M18	2051482
	Plate H for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-H01	2022465
	Alignment bracket with ball joint, plastic (ABS), incl. mounting material	BEF-WN-M18-ST02	5312973

For additional accessories including dimensional drawings, please see page J-301.

G

Optical data transmission – wireless communication made easy

The ISD infrared data transmission system enables wireless communication. Typical uses are on stacker cranes in storage and conveyer systems for wireless communication from the vehicle to the control unit. The system consists of an optically aligned pair of sender and receiver which can communicate bidirectional over long distances. This is a wear-free, cost-effective and highly reliable alternative to trailing cables.

Your benefits

- Non-contact system eliminates wear and tear thus guaranteeing high machine uptime and significantly reduced maintenance costs
- Very long sensing range ensures high gain reserve even in challenging environmental conditions
- Reduced installation costs by eliminating cables
- Excellent ambient light safety and electromagnetic compatibility (EMC) ensure accurate and reliable data transmission
- Increased system speed with fast data transmission

Optical data transmission

H

Wireless communication made easy

The ISD infrared data transmission system allows wireless data transmission via a light path. This system offers a wear-free alternative to the trailing cables used with storage and retrieval systems. A data transmission path consists of two optically aligned devices. The point-to-point light path is monitored during transmission. The ISD counts and stores the number of times the light path is interrupted. This information can be analyzed on a display, allowing users to optimize the process and to increase operational reliability.

H

Two devices are required for optical data transmission. One device serves as a fix-mounted base station and the other as a portable communication partner in storage and retrieval systems, automated guided vehicles or cranes. They allow wireless, and therefore wear-free, data transmission over long transmission lengths. The quick data transmission rate guarantees high system performance.

ISD300

- Carrier frequency is defined for each device
- Range of interfaces: PROFIBUS, Ethernet, CANopen/DeviceNet, Modbus
- Transmission range up to 300 m
- Electronic alignment aid via the display
- Optical aid for approximate alignment
- Baud rate can be configured up to 2 Mbit/s
- Integrated 3-point bracket
- Connection for fiber-optics

Wear-free system
➜ Reduced maintenance costs, enhanced uptime

Long transmission range of up to 300 m
➜ Maximum flexibility

Elimination of cables
➜ Low installation costs

Excellent ambient light safety and electromagnetic compatibility
➜ High operating reserve

Integrated 3-point bracket
➜ Quick mounting reduces installation costs

ISD400

- Adjustable carrier frequency F1/F2
- PROFIBUS/Ethernet interface
- Transmission range up to 180 m
- Simple commissioning thanks to optical and electronic alignment aids
- Connection and operation possible without opening the device
- Optical transmission rates of up to 3 Mbit/s
- Integrated PROFIBUS-repeater
- 10/100 Mbit Ethernet

Electronically adjustable carrier frequency
➜ Reduced storage costs

Integrated optical and electronic alignment aids
➜ Quick, cost-effective commissioning

Wide operating temperature range
➜ High system availability – even in deep freeze storage areas

Large number of fieldbus interfaces
➜ Flexible and cost-effective operation

H

H

Product family overview

	ISD300	ISD400
	Optical data transmission for long transmission ranges	Wireless communication – fast and easy
Technical data overview		
Transmission range	0.2 m ... 120 m 0.2 m ... 200 m 0.2 m ... 300 m	0.2 m ... 180 m
Interfaces overview	RS-485/PROFIBUS DP Ethernet RS-422/Interbus Interbus fiber-optic DH+/RIO DeviceNet/CANopen	RS-485/PROFIBUS DP Ethernet
Enclosure rating	IP 65	IP 65
Ambient temperature	Operating: −30 °C ... +50 °C	Operating: −40 °C ... +50 °C
Data transmission rate	2 Mbit/s 1.5 Mbit/s 1 Mbit/s 0.5 Mbit/s 230.4 kbit/s	3 Mbit/s
Light source	LED, infrared	LED, infrared
At a glance		
	CANopen DeviceNet Ethernet PROFIBUS INTERBUS RS-422 RS-485	Ethernet PROFIBUS RS-485
	• Transmission range up to 300 m • Baud rate up to 2 Mbit/s • Bargraph display for fine alignment • Optical aid for rough alignment • Variety of interfaces: PROFIBUS, Ethernet, DeviceNet, Modbus	• Up to 3 Mbit/s optical transfer rate • Push button displays opposing device's reception level for simple one man alignment • PROFIBUS/Ethernet interface • Adjustable carrier frequency F1/F2 • Integrated repeater • 10/100 Mbit Ethernet • Connection and setup without opening device
Detailed information	➜ H-268	➜ H-278

H

Optical data transmission for long transmission ranges

Product description

The ISD300 infrared data transmission system enables wireless communication between vehicles and fixed stations, thus providing a wear-free and flexible solution. The system consists of an optically aligned pair of sender and receiver which can communicate bidirectional over long distances.

At a glance

- Transmission range up to 300 m
- Baud rate up to 2 Mbit/s
- Bargraph display for fine alignment
- Optical aid for rough alignment
- Variety of interfaces: PROFIBUS, Ethernet, DeviceNet, Modbus

Your benefits

- Non-contact system eliminates wear and tear thus guaranteeing high machine uptime and significantly reduced maintenance costs
- Reduced installation times due to wireless data transmission
- Long transmission range and high gain reserve guarantee flexibility and reliability
- Reduced installation costs by eliminating cables
- Excellent ambient light safety and electromagnetic compatibility (EMC) ensure accurate and reliable data transmission
- Increased system speed with fast data transmission
- Fast and easy assembly with integrated 3-point mounting bracket

Data Transmission
10011
10101

CE CANopen
DeviceNet CONFORMANCE TESTED
Ethernet
PROFI PROCESS FIELD BUS BUS
INTERBUS

RS-422 RS-485

Additional information

➜ www.mysick.com/en/ISD300

H

Detailed technical data

Performance

Light source	LED, infrared (880 nm)
Light spot size	Approx. 1.75 m (at 100 m)
Field of view	Approx. ± 0.5 °

Interfaces

Data transmission rate	2 Mbit/s 1.5 Mbit/s 1 Mbit/s 0.5 Mbit/s 230.4 kbit/s
Switching output	0 V … 2 V: interference-free operation, V_S -2 V: reduced system reserve
Switching input	0 V … 2 V: sender deactivated
Signal delay	≤ 1.5 µs + 1 Tbit ≤ 1.5 µs ≤ 2.5 µs

Mechanics/electronics

Supply voltage V_S	DC 18 V … 30 V
Housing material	Metal
Connection type	Terminals Fiber-optic (LWL)
Weight	Approx. 1.2 kg

Ambient data

Enclosure rating	IP 65
Protection class	I
EMC	EN 61000-6-2, EN 61000-6-4
Ambient temperature	Storage: –30 °C … +70 °C
Max. rel. humidity (not condensing)	90 %, non-condensing

Ordering information

Data interface [1]	Transmission range	Ambient temperature operation	Power consumption	Frequency [2]	Model name	Part no.
RS-485, PROFIBUS DP	0.2 m … 120 m	–5 °C … +50 °C	≤ 0.2 mA	1	ISD300-1111	6024761
				2	ISD300-1112	6024837
		–30 °C … +50 °C	≤ 0.8 mA	1	ISD300-1121	6024840
				2	ISD300-1122	6024841
	0.2 m … 200 m	–5 °C … +50 °C	≤ 0.2 mA	1	ISD300-1211	6024759
				2	ISD300-1212	6024760
		–30 °C … +50 °C	≤ 0.8 mA	1	ISD300-1221	6024838
				2	ISD300-1222	6024839
	0.2 m … 300 m	–5 °C … +50 °C	≤ 0.2 mA	1	ISD300-1311	6028213
				2	ISD300-1312	6028214
		–30 °C … +50 °C	≤ 0.8 mA	1	ISD300-1321	6030889
				2	ISD300-1322	6030890

[1] RS-485 on request.

[2] A pair of devices with numbers ending in 1 and 2 are required to create a data transfer section.

H

Data interface [1]	Transmission range	Ambient tempera-ture operation	Power consumption	Frequency [2]	Model name	Part no.
RS-422/Interbus	0.2 m ... 120 m	–5 °C ... +50 °C	≤ 0.2 mA	1	ISD300-2111	6024844
				2	ISD300-2112	6024845
		–30 °C ... +50 °C	≤ 0.8 mA	1	ISD300-2121	6024848
				2	ISD300-2122	6024849
	0.2 m ... 200 m	–5 °C ... +50 °C	≤ 0.2 mA	1	ISD300-2211	6024842
				2	ISD300-2212	6024843
		–30 °C ... +50 °C	≤ 0.8 mA	1	ISD300-2221	6024846
				2	ISD300-2222	6024847
Interbus fiber-optic	0.2 m ... 200 m	–5 °C ... +50 °C	≤ 0.2 mA	1	ISD300-3211	6024850
				2	ISD300-3212	6024851
		–30 °C ... +50 °C	≤ 0.8 mA	1	ISD300-3221	6024852
				2	ISD300-3222	6024853
DH+/RIO	0.2 m ... 200 m	–5 °C ... +50 °C	≤ 0.2 mA	1	ISD300-4211	6024854
				2	ISD300-4212	6024855
		–30 °C ... +50 °C	≤ 0.8 mA	1	ISD300-4221	6024856
				2	ISD300-4222	6024857
DeviceNet/CANopen	0.2 m ... 200 m	–5 °C ... +50 °C	≤ 0.2 mA	1	ISD300-5211	6027231
				2	ISD300-5212	6027232
Ethernet	0.2 m ... 200 m	–5 °C ... +50 °C	≤ 0.2 mA	1	ISD300-6211	6028692
				2	ISD300-6212	6028693
		–30 °C ... +50 °C	≤ 0.8 mA	1	ISD300-6221	6030557
				2	ISD300-6222	6030558
	0.2 m ... 300 m	–5 °C ... +50 °C	≤ 0.2 mA	1	ISD300-6311	6032711
				2	ISD300-6312	6032712

[1] RS-485 on request.

[2] A pair of devices with numbers ending in 1 and 2 are required to create a data transfer section.

H

Dimensional drawings

**ISD300 RS-485/PROFIBUS,
ISD300 RS-422/Interbus,
ISD300 DH+/RIO,
ISD300 DeviceNet/CANopen**
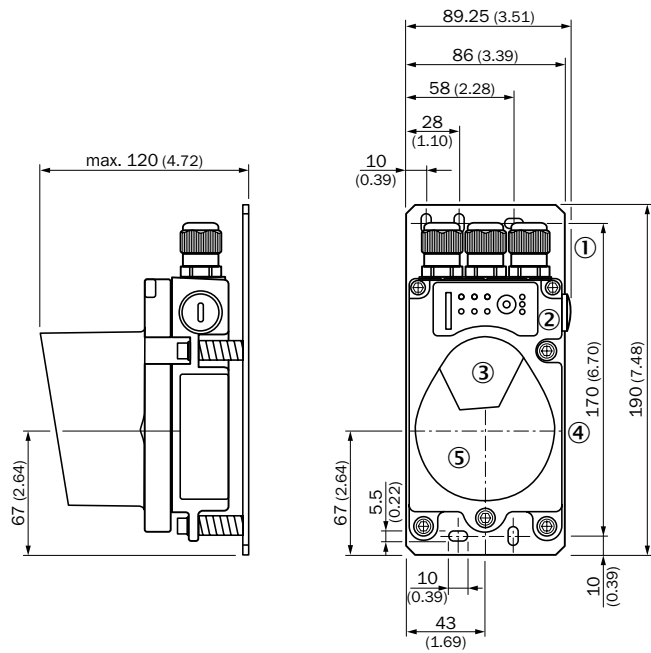
ISD300 Interbus fiber-optic

All dimensions in mm (inch)

① M16 gland
② Control panel
③ Sender lens
④ Center of optical axis
⑤ Receiver lens

All dimensions in mm (inch)
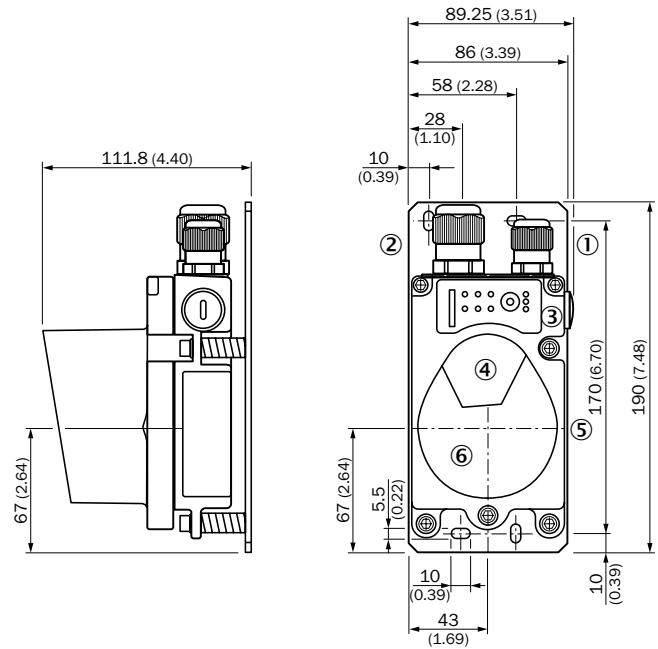
① M16 gland
② M20 gland
③ Control panel
④ Sender lens
⑤ Center of optical axis
⑥ Receiver lens

ISD300 Ethernet
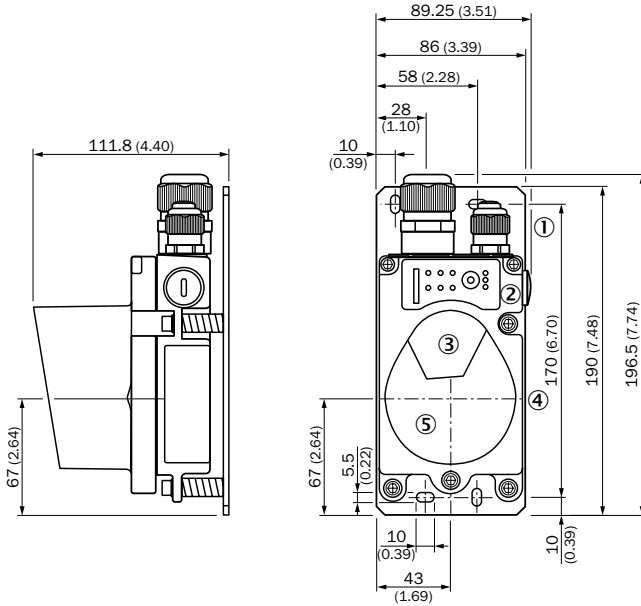
All dimensions in mm (inch)

① M16 gland
② Control panel
③ Sender lens
④ Center of optical axis
⑤ Receiver lens

Adjustments

**ISD300 RS-485/PROFIBUS,
ISD300 RS-422/Interbus,
ISD300 DH+/RIO,
ISD300 DeviceNet/CANopen**
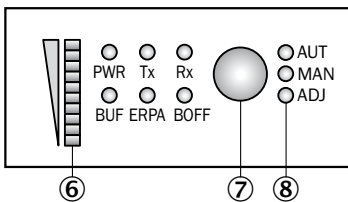
⑥ Display for signal level
⑦ Function button
⑧ LED operating indicator

ISD300 Interbus fiber-optic
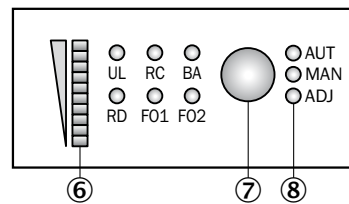
⑥ Display for signal level
⑦ Function button
⑧ LED operating indicator

ISD300 Ethernet
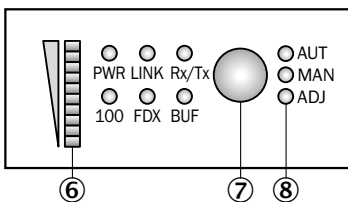
⑥ Display for signal level
⑦ Function button
⑧ LED operating indicator

Connection type and diagram

ISD300 RS-485/PROFIBUS
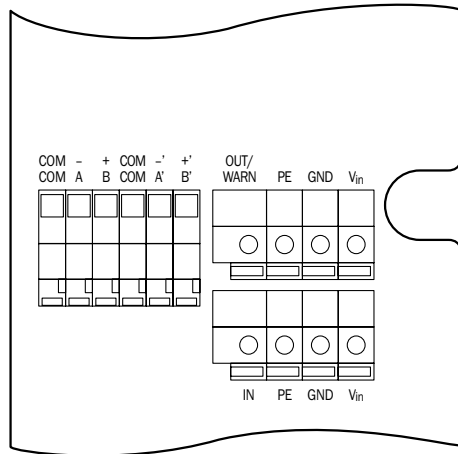
Terminals, general

V_{in}	L+
GND	M
PE	Shield
OUT/WARN	Q
IN	Switch. input

Terminals, PROFIBUS

A, –	A wire
B, +	B wire
COM	Pot. balance
A', –'	A wire
B', +'	B wire

ISD300 RS-422/Interbus
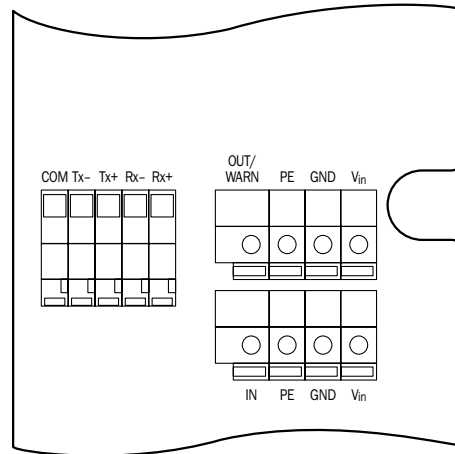
Terminals, general

V_{in}	L+
GND	M
PE	Shield
OUT/WARN	Q
IN	Switch. input

Terminals, RS-422/Interbus

DO1/DI2, Rx+	Receiver wire
$\overline{DO1/DI2, Rx-}$	Receiver wire
DI1/DO2, Tx+	Send wire
$\overline{DI1/DO2, Tx-}$	Send wire
COM	Pot. balance

ISD300 Interbus fiber-optic
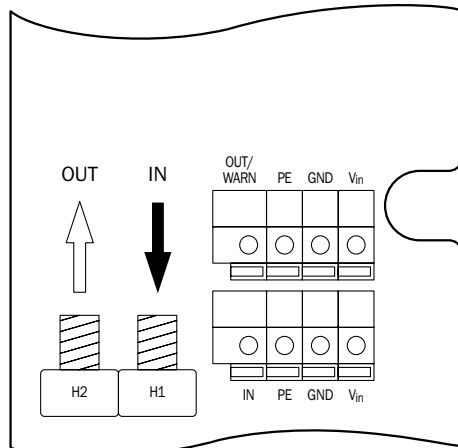
Terminals, general

V_{in}	L+
GND	M
PE	Shield
OUT/WARN	Q
IN	Switch. input

Fiber-optic socket, Interbus

H1	Receiver
H2	Sender

ISD300 DH+/RIO
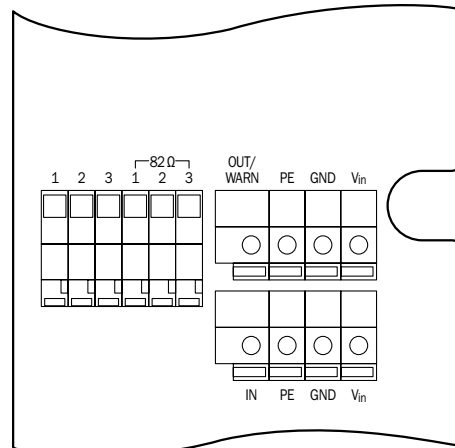
Terminals, general

V_{in}	L+
GND	M
PE	Shield
OUT/WARN	Q
IN	Switch. input

Terminals, DH+/RIO

1	Clear/blue
2	Shield/shield
3	Blue/clear

H

ISD300 DeviceNet/CANopen
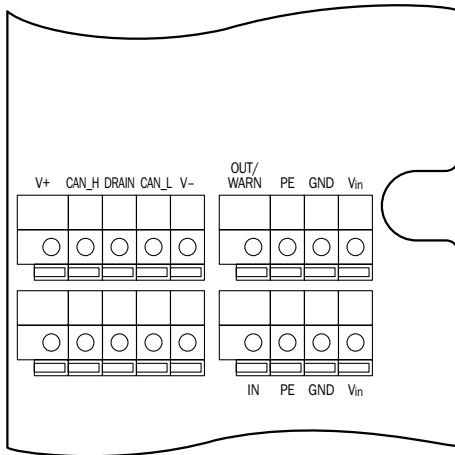
Terminals, general

V_{in}	L+
GND	M
PE	Shield
OUT/WARN	Q
IN	Switch. input

Terminals, CANopen/DeviceNet

V–	Neg. supply (CAN reference ground)
CAN_L	Bus signal (LOW)
DRAIN	Shield
CAN_H	Bus signal (HIGH)
V+	Pos. supply

H

ISD300 Ethernet
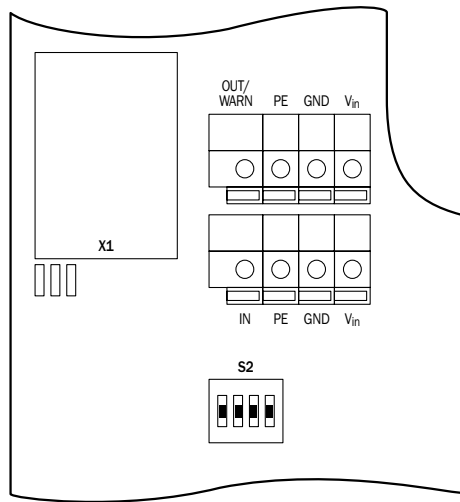
Terminals, general

V$_{in}$	L+
GND	M
PE	Shield
OUT/WARN	Q
IN	Switch. input

Socket	**Function**	
X1	RJ-45 socket for 10Base-T or 100Base-TX	

Switch	**Position**	**Function**
S2.1	ON	Autospace negotiation active (default)
	OFF	Autospace negotiation deactivated
S2.2	ON	100 Mbit
	OFF	10 Mbit (default)
S2.3	ON	Full duplex
	OFF	Half duplex (default)
S2.4	ON	Reserved
	OFF	Reserved (default)

H

Recommended accessories

Plug connectors and cables

	Brief description	Model name	Part no.
	Female connector, M12, 5-pin, straight, shielded	DOS-1205-GA	6027534
	Cable, by the meter, PROFIBUS, shielded	LTG-2102-MW	6021355
	Cable, by the meter, DeviceNet/CANopen, 2 x 0.34 mm² + 2 x 0.25 mm², twisted pair	LTG-2804-MW	6028328
	Female connector, M12, 5-pin, straight, PROFIBUS, shielded	PR-DOS-1205-G	6021353
	Male connector, M12, 5-pin, straight, PROFIBUS, shielded	STE-1205-GQ	6021354
	Male connector, M12, 5-pin, straight, shielded	STE-1205-GA	6027533
	Male connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	STL-1205-G05MQ	6026005

For additional accessories including dimensional drawings, please see page J-301.

H

H

Wireless communication – fast and easy

Data Transmission
10011
10101

Product description

The ISD400 generation of optical data transmission offers several benefits that will reduce overall costs and allow a fast, easy and flexible integration of a wireless communication system into highly automated production and logistic facilities.

At a glance

- Up to 3 Mbit/s optical transfer rate
- Push button displays opposing device's reception level for simple one man alignment
- PROFIBUS/Ethernet interface
- Adjustable carrier frequency F1/F2
- Integrated repeater
- 10/100 Mbit Ethernet
- Connection and setup without opening device

Your benefits

- An integrated optical and electronic alignment aid supports fast and cost-effective installation
- The electronically adjustable carrier frequency allows each ISD400 to be used as either sender or receiver unit, thus reducing stock-keeping costs
- Large operating temperature range guarantees highest machine uptimes – even in cold stores
- Flexible and cost-effective system integration due to various fieldbus interfaces
- Increased system speed with fast data transmission

Ethernet

CE ⟨III⟩

PROFI ® **RS-485**
PROCESS FIELD BUS
BUS

Additional information

➜ www.mysick.com/en/ISD400

H

Detailed technical data

Performance

Light source	LED, infrared (880 nm)
Light spot size	Approx. 1.75 m (at 100 m)
Field of view	Approx. ± 0.5°

Interfaces

Data transmission rate	3 Mbit/s
Switching output	24 V DC (V_S – 2.25 V DC … V_S)
Switching input	V_S: sender deactivated
Signal delay [1]	≤ 1 µs + 2 Tbit ≤ 350 µs, + no. of Bytes x 8 / 3 Mbit/s

[1] 1 µs + 2 Tbit only for PROFIBUS.

Mechanics/electronics

Supply voltage V_S	DC 18 V … 30 V
Housing material	Metal
Connection type	Connector, M12, 4-pin
Weight	Approx. 0.9 kg

Ambient data

Enclosure rating	IP 65
Protection class	III
EMC [1]	EN 61000-6-2, EN 61000-6-4
Ambient temperature	Storage: –40 °C … +75 °C
Max. rel. humidity (not condensing)	90 %, non-condensing

[1] This is a Class A device. This device can cause radio interference in living quarters.

Ordering information

Transmission range	Ambient temperature operation	Power consumption	Data interface	Model name	Part no.
0.2 m … 180 m	–25 °C … +55 °C	≤ 0.4 A	PROFIBUS [1]	ISD400-1111	1042286
	–40 °C … +55 °C		Ethernet [2]	ISD400-6111	1046119
	–25 °C … +55 °C	≤ 0.8 A	PROFIBUS [1]	ISD400-1121	1043511
	–40 °C … +55 °C		Ethernet [2]	ISD400-6121	1046120

[1] RS-485 on request.

[2] Internal buffer 8 kB.

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Dimensional drawing

① Optical axis, sender
② View finder lens
③ Function indicator/level warning
④ Optical axis, receiver
⑤ Threaded mounting hole M6
⑥ Liquid crystal display with funktion keys
⑦ Optical adjustment aid
⑧ Alignment sight
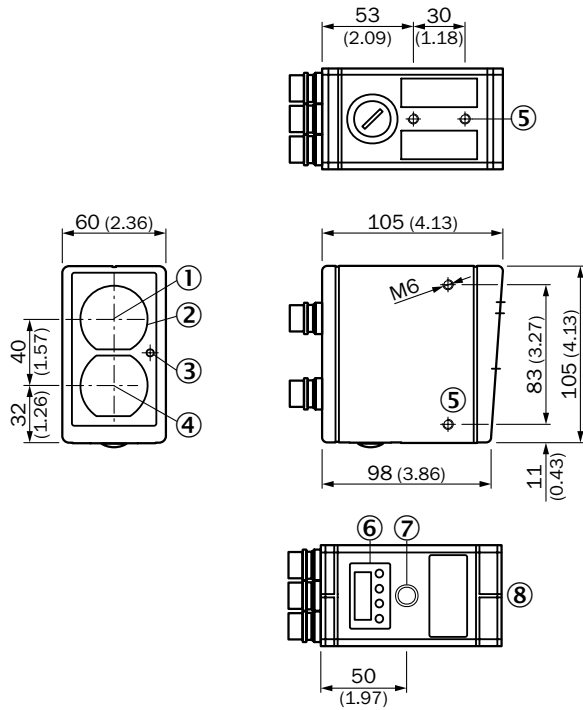
Adjustments

⑥ Liquid crystal display with funktion keys

Connection type and diagram

ISD400 PROFIBUS

①		②		③	
1	NC ⑥	1	+5 V	brn 1	L+ (DC 18 … 30 V)
grn 2	A	grn 2	A	wht 2	Q
3	NC ⑥	3	GND	blu 3	M (0 V)
red 4	B	red 4	B	blk 4	MF ⑦
5	NC ⑥	5	NC ⑥		
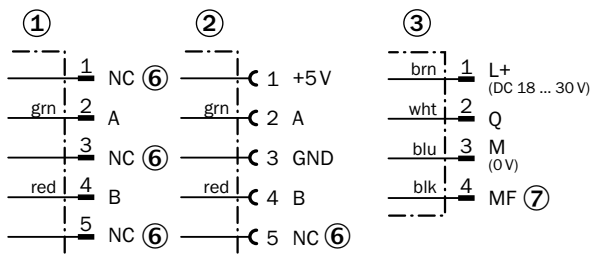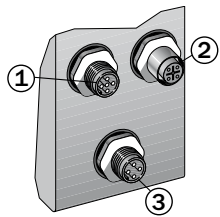
⑥ NC = Normally closed
⑦ Multifunctional input

ISD400 Ethernet

④		⑤	
brn 1	TD+	brn 1	L+ (DC 18 … 30 V)
wht 2	RD+	wht 2	Q
blu 3	TD–	blu 3	M (0 V)
blk 4	RD–	blk 4	MF ⑦
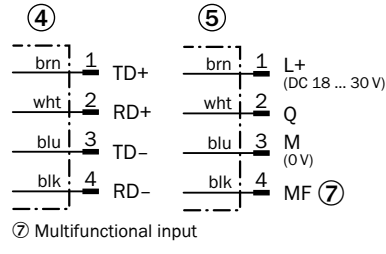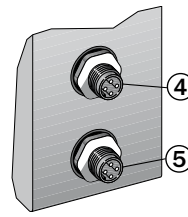
⑦ Multifunctional input

H

Recommended accessories

Plug connectors and cables

	Brief description	Model name	Part no.
Illustration may differ	Female connector, M12, 4-pin, straight, 2 m, PVC	DOL-1204-G02M	6009382
	Female connector, M12, 4-pin, straight, 5 m, PVC	DOL-1204-G05M	6009866
	Female connector, M12, 4-pin, straight, 10 m, PVC	DOL-1204-G10M	6010543
	Female connector, M12, 5-pin, straight, 12 m, PROFIBUS, shielded	DOL-1205-G12MQ	6032636
	Female connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	DOL-1205-G15MQ	6032637
	Female connector, M12, 5-pin, straight, 20 m, PROFIBUS, shielded	DOL-1205-G20MQ	6032638
	Connection cable, Ethernet patch cable, 2 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G02ME	6034414
	Connection cable, Ethernet patch cable, 5 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G05ME	6035389
	Connection cable, Ethernet patch cable, 10 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G10ME	6030928

Terminal and alignment brackets

	Brief description	Model name	Part no.
	Alignment unit for DME4000/ISD400, aluminum, anodized	BEF-ISD/DME	2046052

H

Reliable and accurate fine positioning

The DMP position finders are opto-electronic sensors that are used for precise, relative non-contact positioning of an ASRS handling or transfer unit in the x- and y-axis. DMP sensors compensate for temperature and load variations to provide reliable, fast and precise positioning in automated storage and retrieval applications. The relative positioning in the x- and y-axis is done at ranges from 200 mm up to 2,000 mm – depending on the sensor type.

Your benefits

- Increased productivity due to automation of storage and retrieval processes
- Highest reliability in storage and retrieval applications due to relative positioning, which automatically compensates for mechanical rack deviations
- Increased positioning accuracy eliminates temperature- and load-dependent deviations
- Improved process quality and positioning accuracy – sensor compensates for travel inconsistencies in storage and retrieval units
- Fast commissioning and setup due to easy teach-in procedure
- Flexible use – integrated heating versions can be used in environments with temperatures as low as –40 °C

Position finders

Fine positioning with millimeter precision with the DMP – even in harsh conditions

Changing geometries occur at transfer and docking stations, influenced by temperature, weight and the steel racking. These factors have made reliable positioning virtually impossible up to now. The DMP position finders solve this problem.

Tolerance fluctuations caused by weight
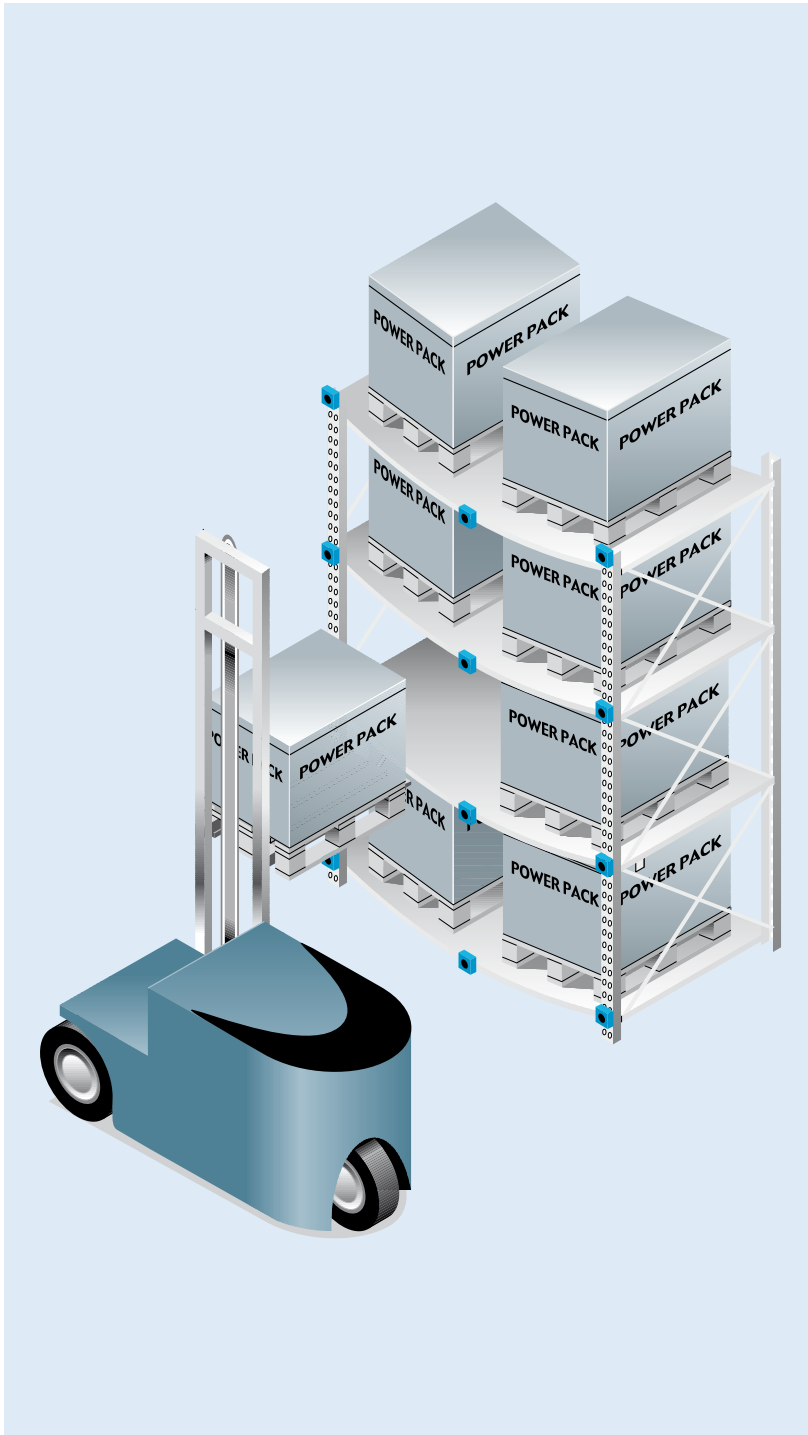
Tolerance changes caused by temperature
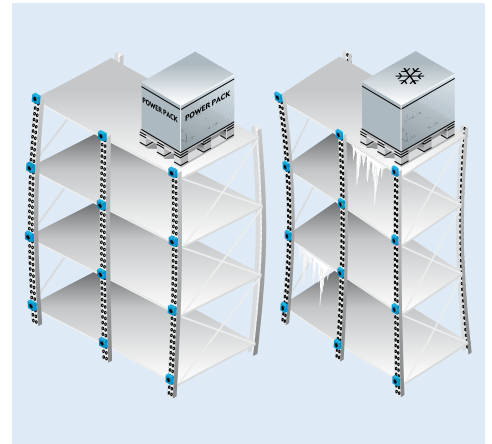
Tolerances in steel racking
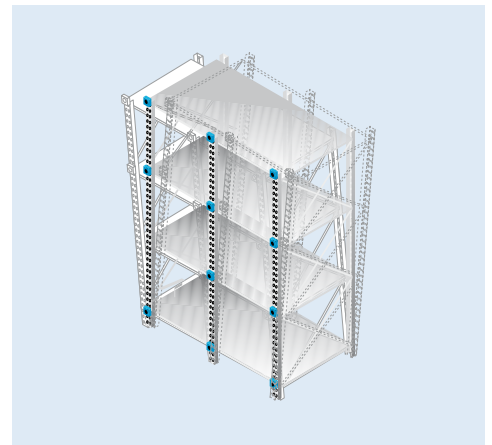
Unsteady mast

The DMP3 and DMP2 position finders use autocollimated light. The light emitted by the sensor is reflected from the edge of the hole, by a sticker or by a reflector and imaged on the sensor's array. The position is determined with millimeter precision from this image – once approximate positioning has taken place.
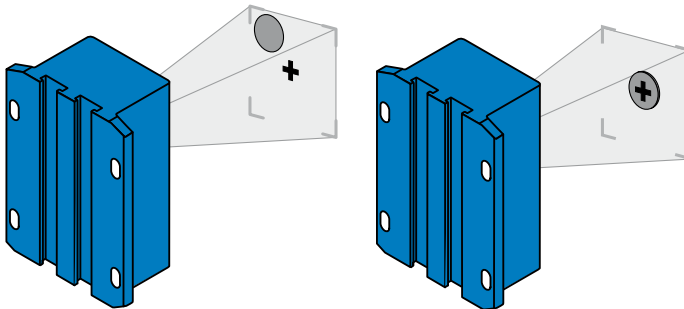
The handling or positioning unit then centers the reflected light in the middle of the receiver array. This process results in the desired fine positioning.

DMP3

Precise fine positioning without a reflector

200–350 mm
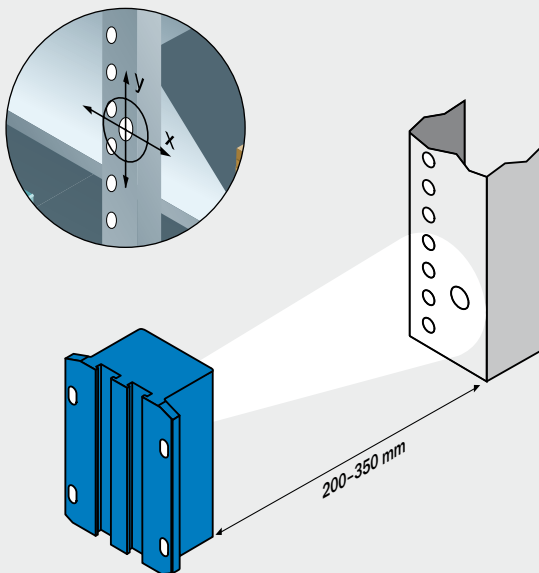
The DMP3 performs high-precision relative fine positioning on a programmed hole. Its excellent 0.15 mm repeatability, as well as a heated version that can be used in ambient temperatures as low as –40 °C, mean that the DMP3 is also suitable for fine positioning in deep-freeze storage.

DMP2

Precise fine positioning with a reflector

10

PL22
PL50A
PL80A

200 mm ... 500 mm
500 mm ... 1,200 mm
500 mm ... 2,000 mm
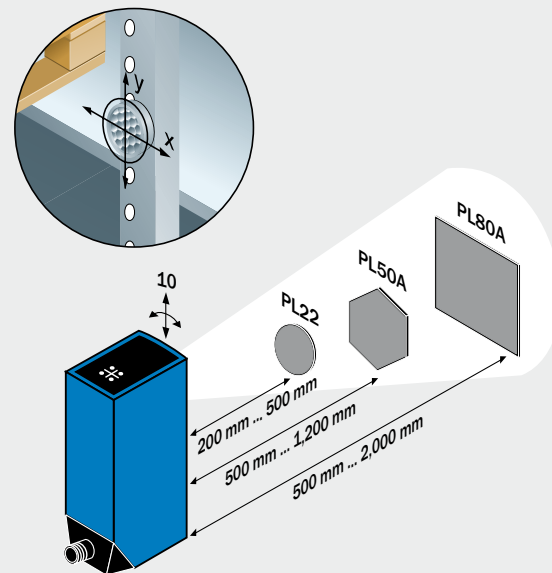
The DMP2 performs high-precision relative fine positioning on a reflector. This makes operating ranges of up to 2000 mm possible. Excellent repeatability of 0.15 mm makes the DMP2 product family ideal for fine positioning in high-bay warehouses.

Product family overview

	DMP3	DMP2
	Precise positioning without a reflector	Efficient and reliable fine positioning on a reflector
Technical data overview		
Sensing distance	200 mm ... 350 mm	200 mm ... 500 mm (PL22)
		500 mm ... 1,200 mm (PL50A)
		500 mm ... 2,000 mm (PL80A)
Target	Hole	Reflector
Repeatability	0.15 mm	0.15 mm
Switching frequency	20 Hz	250 Hz
Interfaces overview	4 x PNP	2 x 4 mA ... 20 mA (700 Ω)
		2 x PNP / 2 x NPN
		5 x PNP / 5 x NPN
Ambient temperature	Operation: –40 °C ... +50 °C	Operation: –25 °C ... +55 °C
	Storage: –40 °C ... +70 °C	Storage: –25 °C ... +75 °C
Light source	LED, infrared	LED, red
At a glance		
	• Distances between 200 mm and 350 mm	• Distances between 200 mm and 2,000 mm
	• 0.15 mm repeatability	• 0.15 mm repeatability
	• Four switching outputs	• Analog output 4 mA ... 20 mA
	• Operating temperatures as low as –40 °C	• Relative positioning on a reflector
	• Two different teach-in positions	• Switching and analog outputs available
	• Field of view ± 10° in each direction	• 90° rotatable connector
	• Easy alignment	• Field of view ± 10° in each direction
		• Easy alignment
Detailed information	➜ I-288	➜ I-294

Precise positioning without a reflector

Product description

The DMP3 is a camera-based sensor for high-precision applications that require relative positioning on a previously taught-in hole. Excellent repeatability (0.15 mm) and an optional heated version, which can be used in environments with temperatures as low as –40 °C, make the DMP3 the ideal sensor for fine positioning in storage and retrieval applications – even in cold storage warehouses.

At a glance

- Distances between 200 mm and 350 mm
- 0.15 mm repeatability
- Four switching outputs
- Operating temperatures as low as –40 °C
- Two different teach-in positions
- Field of view ± 10° in each direction
- Easy alignment

Your benefits

- Increased productivity due to automated storage and retrieval processes
- Highest reliability in storage and retrieval applications due to relative positioning, which automatically compensates for mechanical rack deviations
- Increased positioning accuracy eliminates temperature-dependent deviations
- Improved process quality and positioning accuracy – sensor compensates for travel inconsistencies in storage and retrieval units
- Fast commissioning and setup due to easy teach-in procedure
- Flexible use – integrated heating version can be used in environments with temperatures as low as –40 °C

Additional information

→ www.mysick.com/en/DMP3

Detailed technical data

Performance

Target	Hole
Sensing distance [1]	200 mm ... 350 mm
Repeatability [2]	0.15 mm
Switching frequency	20 Hz
Scanning angle [3]	± 10°
Operating mode	Continuous

[1] Hole diameter 10 mm ... 20 mm.
[2] At 300 mm sensing distance.
[3] In all axis perpendicular to the hole.

Interfaces

Output current I$_A$	≤ 100 mA
Bank select input	Bank 1: 0 V ... < 2 V or free running Bank 2: >7 V ... V$_S$ max
Teach-in input	Active: >7 V ... V$_S$ max Inactive: 0 V ... < 2 V or free running

Mechanics/electronics

Supply voltage V$_S$ [1]	DC 18 V ... 30 V
Ripple [2]	< 5 V$_{PP}$
Connection type	Connector M12, 8-pin
Weight [3]	450 g

[1] Limit values, reverse-polarity protected.
[2] May not fall short of or exceed V$_S$ tolerances.
[3] Incl. cable.

Ambient data

Enclosure rating	IP 54
Protection class [1]	III
Vibration resistance	According to IEC 68

[1] Reference voltage DC 50 V.

Ordering information

Light source	Switching output [1]	Ambient temperature	Power consumption [2]	Model name	Part no.
LED, infrared	4 x PNP	Operation: 0 °C ... +50 °C Storage: –40 °C ... +70 °C	< 250 mA	DMP3-B1111	1042918
		Operation: –40 °C ... +50 °C Storage: –40 °C ... +70 °C	< 1,300 mA	DMP3-B1211	1042919

[1] PNP: HIGH = V$_S$ – ≤ 2 V / LOW = ≤ 2 V.
[2] Without load.

Dimensional drawing
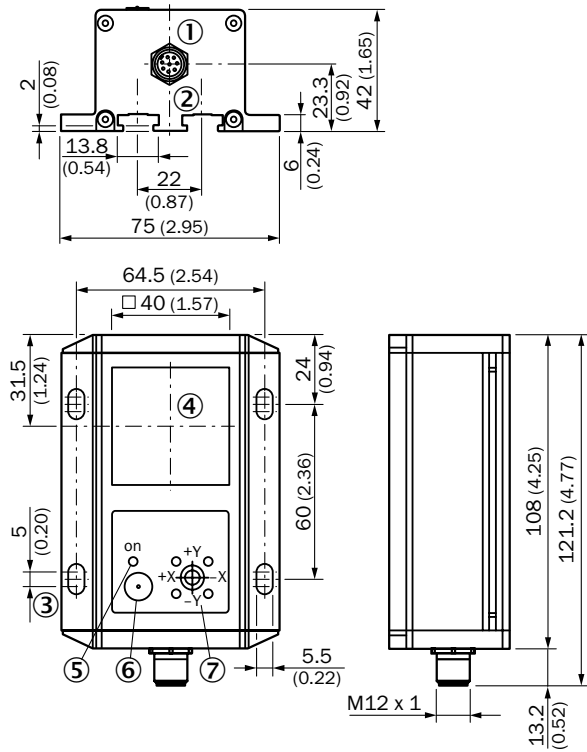
All dimensions in mm (inch)
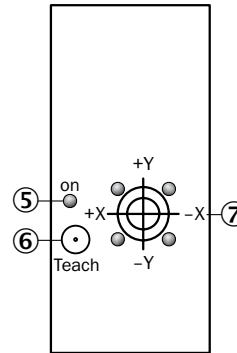
① Connector M12, 8-pin
② T-bar to mount
③ Mounting hole
④ Optical axis
⑤ LED monitoring area
⑥ Teach-in button
⑦ Four LEDs, position indicator

⑤ LED green monitoring area
⑥ Teach-in button
⑦ Four LEDs, position indicator

Adjustments

Connection type and diagram

Please note: Since wire color on 8-pin connection cables are not normed, always check for a correct pin to wire color assignment when using connection cables others than specified here.

**Connector
M12, 8-pin**

wht	1	Bank select input
brn	2	L+ (+18 ... 30 V)
grn	3	Q−X
yel	4	Q+X
gra	5	Q−Y
pnk	6	Q+Y
blu	7	M (0 V)
red	8	Teach-in input

Field of view

120 mm x 120 mm

100 mm x 100 mm

70 mm x 70 mm

a = 200 mm

a = 300 mm

a = 350 mm
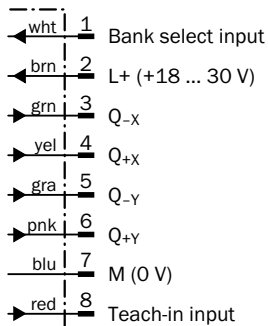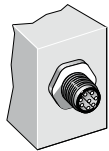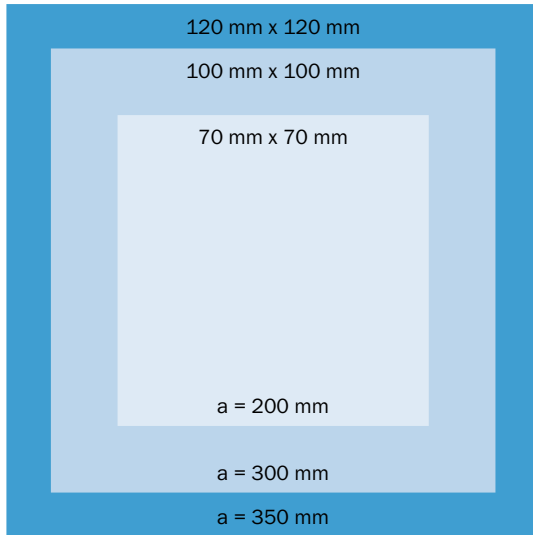
a = sensing distance

Principle of operation

$Q_{-x} = 1$
$Q_{+x} = 0$
$Q_{-y} = 0$
$Q_{+y} = 1$

$Q_{-x} = 1$
$Q_{+x} = 1$
$Q_{-y} = 0$
$Q_{+y} = 1$

$Q_{-x} = 0$
$Q_{+x} = 1$
$Q_{-y} = 0$
$Q_{+y} = 1$

$Q_{-x} = 1$
$Q_{+x} = 0$
$Q_{-y} = 1$
$Q_{+y} = 1$

$Q_{-x} = 1$
$Q_{+x} = 1$
$Q_{-y} = 1$
$Q_{+y} = 1$

$Q_{-x} = 0$
$Q_{+x} = 1$
$Q_{-y} = 1$
$Q_{+y} = 1$

$Q_{-x} = 1$
$Q_{+x} = 0$
$Q_{-y} = 1$
$Q_{+y} = 0$

$Q_{-x} = 1$
$Q_{+x} = 1$
$Q_{-y} = 1$
$Q_{+y} = 0$

$Q_{-x} = 0$
$Q_{+x} = 1$
$Q_{-y} = 1$
$Q_{+y} = 0$

Tolerance

Tolerance

Recommended accessories

Other mounting accessories

	Brief description	Model name	Part no.
	Set of sliding nuts, M5, 4 pcs	Sliding nuts	2017550

Plug connectors and cables

	Brief description	Model name	Part no.
	Female connector, M12, 8-pin, straight, 2 m, PVC, shielded	DOL-1208-G02MA	6020633
Illustration may differ	Female connector, M12, 8-pin, straight, 5 m, PVC, shielded	DOL-1208-G05MA	6020993
	Female connector, M12, 8-pin, straight, 10 m, PVC, shielded	DOL-1208-G10MA	6022152

For additional accessories including dimensional drawings, please see page J-301.

Efficient and reliable fine positioning on a reflector
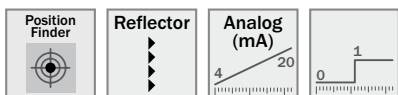
Product description

The DMP2 is a sensor for high-precision relative positioning using a reflector. With operating distances of up to 2,000 mm and excellent repeatability (0.15 mm), the DMP2 is the ideal sensor for fine positioning in storage and retrieval applications in high bay warehouses.

At a glance

- Distances between 200 mm and 2,000 mm
- 0.15 mm repeatability
- Analog output 4 mA ... 20 mA
- Relative positioning on a reflector
- Switching and analog outputs available
- 90° rotatable connector
- Field of view ± 10° in each direction
- Easy alignment

Your benefits

- Increased productivity due to automated storage and retrieval processes
- Highest reliability in storage and retrieval applications due to relative positioning, which automatically compensates for mechanical rack deviations
- Increased positioning accuracy – relative positioning eliminates temperature-dependent deviations
- Improved process quality and positioning accuracy – sensor compensates for travel inconsistencies in storage and retrieval units
- Fast commissioning and setup due to easy teach-in procedure

Additional information

➜ www.mysick.com/en/DMP2

Detailed technical data

Performance

Target	Reflector
Sensing distance	200 mm ... 500 mm (PL22) 500 mm ... 1,200 mm (PL50A) 500 mm ... 2,000 mm (PL80A)
Repeatability [1]	0.15 mm
Response time	3 ms
Switching frequency	250 Hz
Scanning angle [2]	± 10°
Operating mode	Choice of continuous or triggered

[1] At 300 mm sensing distance.

[2] In all axis perpendicular to the reflector (PL22, PL50A, PL80A).

Interfaces

Analog output [1]	2 x 4 mA ... 20 mA (700 Ω)
Output current I_A	≤ 100 mA
Blanking input AT	Blanked (triggered): PNP: > 18 V ... > V_S max. Free running: PNP: < 2 V or free running Blanked (triggered): NPN: 0 V ... V_S – (≥ 18 V) Free running: NPN: V_S – (≤ 2 V) or free running

[1] Within detection area 4 mA ... 20 mA, outside detection area 3 mA.

Mechanics/electronics

Supply voltage V_S [1]	DC 18 V ... 30 V
Ripple [2]	< 5 V_{PP}
Power consumption [3]	< 250 mA
Connection type	Connector M12, 8-pin
Weight [4]	990 g

[1] Limit values, reverse-polarity protected.

[2] May not fall short of or exceed V_S tolerances.

[3] Without load.

[4] Incl. cable.

Ambient data

Enclosure rating	IP 67
Protection class [1]	II
Ambient temperature	Operation: –25 °C ... +55 °C Storage: –25 °C ... +75 °C
Vibration resistance	According to IEC 68

[1] Reference voltage DC 50 V.

Ordering information

Light source	Detection area	Analog output	Switching output	Model name	Part no.
LED, red	Standard	2 x Q_A	2 x PNP [1]	DMP2-P11111	1016235
			2 x NPN [2]	DMP2-N11111	1016236
		–	5 x PNP [1]	DMP2-P21111	1016237
			5 x NPN [2]	DMP2-N21111	1016238
	Double detection area	–	5 x PNP [1]	DMP2-P21111S01	1024288
			5 x NPN [2]	DMP2-N21111S01	1026606

[1] PNP: HIGH = V_S – ≤ 2 V / LOW = ≤ 2 V.

[2] NPN: HIGH = ≤ 2 V / LOW = V_S.

Dimensional drawing
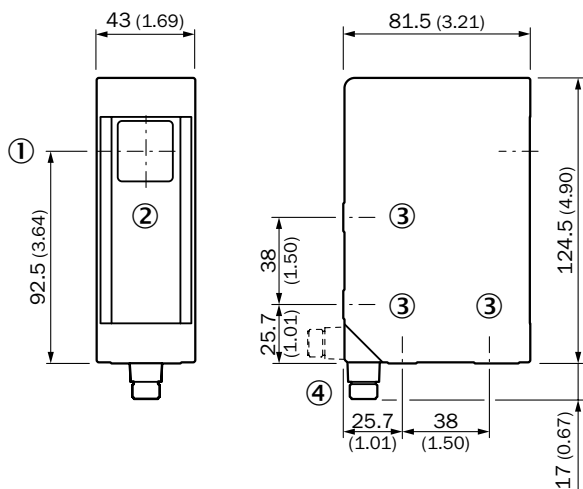
All dimensions in mm (inch)

① Center of optical axis
② Receiver
③ Thread borehole M6, 8 mm deep
④ Connector M12, 8-pin (rotatable up to 90°)

Adjustments
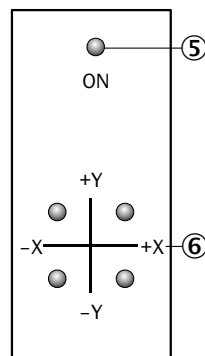
⑤ Operating indicator
⑥ Adjustment aid

Connection type and diagram

Please note: Since wire color on 8-pin connection cables are not normed, always check for a correct pin to wire color assignment when using connection cables others than specified here.

DMP2-x1
Connector
M12, 8-pin

DMP2-x2
Connector
M12, 8-pin

		DMP2-x1			DMP2-x2
wht	1	AT	wht	1	AT
brn	2	L+	brn	2	L+
grn	3	Q_{AX}	grn	3	Q_{-X}
yel	4	Q_{AY}	yel	4	Q_{+X}
gra	5	nc ①	gra	5	Q_{-Y}
pnk	6	Q	pnk	6	Q_{+Y}
blu	7	M	blu	7	M
red	8	Q_R	red	8	Q_R
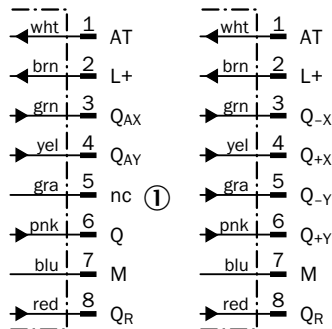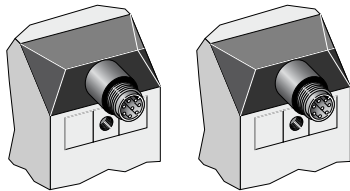
① Not connected

Field of view

Detection area

Detection area in mm (inch)

y-axis:
1,000 x 1,000 (39.37 x 39.37)
900 x 900 (35.43 x 35.43)
800 x 800 (31.50 x 31.50)
700 x 700 (27.56 x 27.56)
600 x 600 (23.62 x 23.62)
500 x 500 (19.69 x 19.69)
400 x 400 (15.75 x 15.75)
300 x 300 (11.81 x 11.81)
200 x 200 (7.87 x 7.87)
100 x 100 (3.94 x 3.94)
0

x-axis: Sensing distance in mm (inch)
0   400 (15.75)   800 (31.50)   1,200 (47.24)   1,600 (62.99)   2,000 (78.75)

Target area

Target area in mm (inch)

y-axis:
20 (0.79)
18 (0.71)
16 (0.63)
14 (0.55)
12 (0.47)
10 (0.39)
8 (0.31)
6 (0.24)
4 (0.16)
2 (0.08)
0

x-axis: Sensing distance in mm (inch)
0   400 (15.75)   800 (31.50)   1,200 (47.24)   1,600 (62.99)   2,000 (78.75)

Principle of operation

● ○ / ○ ○ $Q_{-x} = 1$ $Q_{+x} = 0$ $Q_{-y} = 0$ $Q_{+y} = 1$	● ● / ○ ○ $Q_{-x} = 1$ $Q_{+x} = 1$ $Q_{-y} = 0$ $Q_{+y} = 1$	○ ● / ○ ○ $Q_{-x} = 0$ $Q_{+x} = 1$ $Q_{-y} = 0$ $Q_{+y} = 1$
● ○ / ● ○ $Q_{-x} = 1$ $Q_{+x} = 0$ $Q_{-y} = 1$ $Q_{+y} = 1$	● ● / ● ● $Q_{-x} = 1$ $Q_{+x} = 1$ $Q_{-y} = 1$ $Q_{+y} = 1$	○ ● / ○ ● $Q_{-x} = 0$ $Q_{+x} = 1$ $Q_{-y} = 1$ $Q_{+y} = 1$
○ ○ / ● ○ $Q_{-x} = 1$ $Q_{+x} = 0$ $Q_{-y} = 1$ $Q_{+y} = 0$	○ ○ / ● ● $Q_{-x} = 1$ $Q_{+x} = 1$ $Q_{-y} = 1$ $Q_{+y} = 0$	○ ○ / ○ ● $Q_{-x} = 0$ $Q_{+x} = 1$ $Q_{-y} = 1$ $Q_{+y} = 0$

Tolerance (vertical axis) • Tolerance (horizontal axis)

Recommended accessories

Mounting brackets/plates

	Brief description	Model name	Part no.
	Alignment unit for DMP2, steel, zinc coated, incl. mounting material	BEF-GH-DMH2	2020796

Reflectors

	Brief description	Model name	Part no.
	Reflector, round, Ø 25.5 mm, material: PMMA/ABS, self-adhesive	PL22-2	1003621
	Reflector, 78 mm x 60 mm, material: PMMA/ABS, 2-hole mounting, screw connection	PL50A	1000132
	Reflector, 80 mm x 80 mm, material: PMMA/ABS, 2-hole mounting, screw connection	PL80A	1003865

Plug connectors and cables

	Brief description	Model name	Part no.
Illustration may differ	Female connector, M12, 8-pin, straight, 2 m, PVC, shielded	DOL-1208-G02MA	6020633
	Female connector, M12, 8-pin, straight, 5 m, PVC, shielded	DOL-1208-G05MA	6020993
	Female connector, M12, 8-pin, straight, 10 m, PVC, shielded	DOL-1208-G10MA	6022152

A winning combination: sensors and accessories from SICK

In order to ensure optimal integration of sensors into your systems, it is essential that your accessories are perfectly tuned to each other. This applies not only to the connection and mounting systems, but also to reflectors, alignment aids and further special accessories.

Reliable signal transmission guarantees productivity – high-quality connectivity components with long service life reduce costs. That is why SICK offers the right connection systems for any application or sector, whether for the material handling, packaging, automotive or food and beverage industry. The extensive range of plug connectors and distributors makes it possible to achieve the right cabling for every application, even under the harshest and most difficult conditions.

The requirements of mounting systems for sensors are just as diverse as their areas of application. With its clever mounting concepts, SICK offers the right solutions for mounting, alignment and protection of industrial SICK sensor systems. Efficient and functional.

Produkt Finder

www.mysick.com/products
Further accessories can be found online: enter the part no. of the product, and make your selection in "Related content: Accessories".
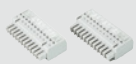
Accessories

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Short range distance sensors (displacement)

Adapters/distributors

	Brief description	Model name	Part no.	OD Value	OD Hi	OD Max	OD Precision	DT20 Hi
	External in- and output terminal, 50-pin, and cable, PVC, 3 m, open ends	IO-EXP-AOD5	6035990	–	–	–	●	–
	Terminal block for AOD (1x R-coded and 1x L-coded)	TERM.-AOD/AODG	6033129	–	–	●	–	–
	Terminal block for AOD5-P1/AOD5-N1 (OD Precision)	TERM.-AOD5	6035989	–	–	–	●	–

For dimensional drawings, please see page J-336.

Device protection (mechanical)

	Brief description	Model name	Part no.	OD Value	OD Hi	OD Max	OD Precision	DT20 Hi
	Cooling plate	BEF-KP-Dx50/DT20	2055755	–	–	–	–	●

For dimensional drawings, please see page J-340.

Mounting brackets/plates

	Brief description	Model name	Part no.	OD Value	OD Hi	OD Max	OD Precision	DT20 Hi
	Mounting bracket, stainless steel (1.4404), without mounting material, for DT20 Hi	BEF-WN-DT20	4043524	–	–	–	–	●

For dimensional drawings, please see page J-344.

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Plug connectors and cables

	Brief description	Model name	Part no.	OD Value	OD Hi	OD Max	OD Precision	DT20 Hi
Illustration may differ	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899	–	–	–	–	●
	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868	–	–	–	–	●
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544	–	–	–	–	●
	Female connector, M12, 5-pin, straight, 2 m, PUR halogen free	DOL-1205-G02MC	6025906	–	–	–	–	●
	Female connector, M12, 5-pin, straight, 5 m, PUR halogen free	DOL-1205-G05MC	6025907	–	–	–	–	●
	Female connector, M12, 5-pin, straight, 10 m, PUR halogen free	DOL-1205-G10MC	6025908	–	–	–	–	●
	Female connector, M12, 5-pin, straight, 5 m, PUR halogen free, shielded	DOL-1205-G05MAC	6036384	–	–	–	–	●
	Female connector, M12, 5-pin, straight, 10 m, PUR halogen free, shielded	DOL-1205-G10MAC	6036385	–	–	–	–	●
	Female connector, M12, 5-pin, straight, 20 m, PUR halogen free, shielded	DOL-1205-G20MAC	6036386	–	–	–	–	●
Illustration may differ	Female connector, M12, 5-pin, angled, 2 m, PVC	DOL-1205-W02M	6008900	–	–	–	–	●
	Female connector, M12, 5-pin, angled, 5 m, PVC	DOL-1205-W05M	6009869	–	–	–	–	●
	Female connector, M12, 5-pin, angled, 10 m, PVC	DOL-1205-W10M	6010542	–	–	–	–	●
	Female connector, M12, 5-pin, angled, 2 m, PUR halogen free	DOL-1205-W02MC	6025909	–	–	–	–	●
	Female connector, M12, 5-pin, angled, 5 m, PUR halogen free	DOL-1205-W05MC	6025910	–	–	–	–	●
	Female connector, M12, 5-pin, angled, 10 m, PUR halogen free	DOL-1205-W10MC	6025911	–	–	–	–	●
Illustration may differ	Female connector, M12, 8-pin, straight, 2 m, PVC, shielded, special color code	DOL-1208-G02MF	6020663	●	●	–	–	–
	Female connector, M12, 8-pin, straight, 5 m, PVC, shielded, special color code	DOL-1208-G05MF	6020664	●	●	–	–	–
	Female connector, M12, 8-pin, straight, 10 m, PVC, shielded, special color code	DOL-1208-G10MF	6048434	●	●	–	–	–
	Female connector, M12, 12-pin, straight, 5 m, PVC, shielded, for stand-alone use	DOL-1212-G05M	6035988	–	–	–	●	–
	Female connector, M12, 12-pin, straight, 10 m, PVC, shielded, for stand-alone use	DOL-1212-G10M	6045214	–	–	–	●	–
	Female connector, M12, 12-pin, straight, 20 m, PVC, shielded, for stand-alone use	DOL-1212-G20M	6045215	–	–	–	●	–
	Female connector, M12, 5-pin, straight	DOS-1205-G	6009719	–	–	–	–	●
	Female connector, M12, 5-pin, angled	DOS-1205-W	6009720	–	–	–	–	●
	Female connector, M12, 8-pin, straight	DOS-1208-G	6028422	●	●	–	–	–
	Female connector, M12, 8-pin, straight, shielded	DOS-1208-GA	6028369	●	●	–	–	–
	Connection cable, M12, 10-pin, connector straight/socket straight, 2 m	DSL-1210-G02M	6028943	–	–	●	–	–
	Connection cable, M12, 10-pin, connector straight/socket straight, 5 m	DSL-1210-G05M	6028944	–	–	●	–	–
	Connection cable, M12, 10-pin, connector straight/socket straight, 10 m	DSL-1210-G10M	6033614	–	–	●	–	–

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	Brief description	Model name	Part no.	OD Value	OD Hi	OD Max	OD Precision	DT20 Hi
	Connection cable, M12, 12-pin, connector straight/socket straight, 2 m	DSL-1212-G02M	6035986	–	–	–	●	–
	Connection cable, M12, 12-pin, connector straight/socket straight, 5 m	DSL-1212-G05M	6035987	–	–	–	●	–
	Connection cable, M12, 12-pin, connector straight/socket straight, 10 m	DSL-1212-G10M	6045158	–	–	–	●	–
	Connection cable, M12, 12-pin, connector straight/socket straight, 20 m	DSL-1212-G20M	6045159	–	–	–	●	–
	Male connector, M12, 5-pin, straight	STE-1205-G	6022083	–	–	–	–	●
	Male connector, M12, 5-pin, angled	STE-1205-W	6022082	–	–	–	–	●

For dimensional drawings, please see page J-351.

Terminal and alignment brackets

	Brief description	Model name	Part no.	OD Value	OD Hi	OD Max	OD Precision	DT20 Hi
	Dx50 alignment bracket, steel, zinc coated	BEF-AH-DX50	2048397	–	–	–	–	●
	Universal bar clamp, steel, die-cast zinc	BEF-KHS-KH1	2022726	–	–	–	–	●
	Mounting rod, straight, 200 mm, steel, zinc coated, without mounting material	BEF-MS12G-A	4056054	–	–	–	–	●
	Mounting rod, straight, 300 mm, steel, zinc coated, without mounting material	BEF-MS12G-B	4056055	–	–	–	–	●
	Mounting rod, L-shaped, 150 mm x 150 mm, steel, zinc coated, without mounting material	BEF-MS12L-A	4056052	–	–	–	–	●
	Mounting rod, L-shaped, 250 mm x 250 mm, steel, zinc coated, without mounting material	BEF-MS12L-B	4056053	–	–	–	–	●
	Mounting rod, L-shaped, 150 mm x 70 mm x 150 mm, steel, zinc coated, without mounting material	BEF-MS12Z-A	4056056	–	–	–	–	●
	Mounting rod, L-shaped, 150 mm x 70 mm x 250 mm, steel, zinc coated, without mounting material	BEF-MS12Z-B	4056057	–	–	–	–	●
	Rod bar clamp for rod diameter of 12 mm, aluminum, 2 screws M6 x 30, 2 spring discs	BEF-RMC-D12	5321878	–	–	–	–	●

For dimensional drawings, please see page J-364.

Mid range distance sensors

Device protection (mechanical)

	Brief description	Model name	Part no.	DT50	DT50 Hi	DS50	DL50	DL50 Hi
	Cooling plate	BEF-KP-Dx50/DT20	2055755	●	●	●	●	●
	Display protection cover	Control panel cover	2058007	●	●	●	●	●
	Lens protection cover, transparent	LPC-DX50	2049269	●	●	●	●	●
	Heat protection lens with NIR-Filter for use with 2x cooling plate BEF-KP-Dx50/DT20	Front heat protection cover	2057137	●	●	●	●	●
	Weather protection hood for Dx50	OBW-KHS-M02	2050205	●	●	●	●	●

For dimensional drawings, please see page J-340.

Mounting brackets/plates

	Brief description	Model name	Part no.	DT50	DT50 Hi	DS50	DL50	DL50 Hi
	Dx50 alignment bracket, steel, zinc coated	BEF-AH-DX50	2048397	●	●	●	●	●
	Mounting bracket, steel, zinc coated, incl. mounting material, for Dx50	BEF-WN-DX50	2048370	●	●	●	●	●
	Mounting bracket for weather protection hood OBW-KHS, steel, zinc coated, incl. mounting material	BEF-WN-OBW	2023251	●	●	●	●	●

For dimensional drawings, please see page J-344.

Plug connectors and cables

	Brief description	Model name	Part no.	DT50	DT50 Hi	DS50	DL50	DL50 Hi
	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899	●	●	●	●	–
Illustration may differ	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868	●	●	●	●	–
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544	●	●	●	●	–
	Female connector, M12, 5-pin, straight, 15 m, PVC	DOL-1205-G15M	6029215	●	●	●	●	–
	Female connector, M12, 5-pin, straight, 2 m, PUR halogen free	DOL-1205-G02MC	6025906	●	●	●	●	–
	Female connector, M12, 5-pin, straight, 5 m, PUR halogen free	DOL-1205-G05MC	6025907	●	●	●	●	–
	Female connector, M12, 5-pin, straight, 9 m, PUR halogen free	DOL-1205-G09MC	6037154	●	●	●	●	–
	Female connector, M12, 5-pin, straight, 10 m, PUR halogen free	DOL-1205-G10MC	6025908	●	●	●	●	–
	Female connector, M12, 5-pin, straight, 5 m, PUR halogen free, shielded	DOL-1205-G05MAC	6036384	●	●	–	●	–
	Female connector, M12, 5-pin, straight, 10 m, PUR halogen free, shielded	DOL-1205-G10MAC	6036385	●	●	–	●	–
	Female connector, M12, 5-pin, straight, 20 m, PUR halogen free, shielded	DOL-1205-G20MAC	6036386	●	●	–	●	–

Brief description	Model name	Part no.	DT50	DT50 Hi	DS50	DL50	DL50 Hi
Female connector, M12, 5-pin, angled, 2 m, PVC	DOL-1205-W02M	6008900	●	●	●	●	–
Female connector, M12, 5-pin, angled, 5 m, PVC	DOL-1205-W05M	6009869	●	●	●	●	–
Female connector, M12, 5-pin, angled, 10 m, PVC	DOL-1205-W10M	6010542	●	●	●	●	–
Female connector, M12, 5-pin, angled, 2 m, PUR halogen free	DOL-1205-W02MC	6025909	●	●	●	●	–
Female connector, M12, 5-pin, angled, 5 m, PUR halogen free	DOL-1205-W05MC	6025910	●	●	●	●	–
Female connector, M12, 5-pin, angled, 10 m, PUR halogen free	DOL-1205-W10MC	6025911	●	●	●	●	–
Female connector, M12, 5-pin, angled, 5 m, PUR halogen free, shielded	DOL-1205-W05MAC	6041751	●	●	–	●	–
Female connector, M12, 5-pin, angled, 10 m, PUR halogen free, shielded	DOL-1205-W10MAC	6041752	●	●	–	●	–
Female connector, M12, 8-pin, straight, 2 m, PUR halogen free, shielded, twisted in pairs for SSI and HIPERFACE	DOL-1208-G02MAH1	6032448	–	–	–	–	●
Female connector, M12, 8-pin, straight, 5 m, PUR halogen free, shielded, twisted in pairs for SSI and HIPERFACE	DOL-1208-G05MAH1	6032449	–	–	–	–	●
Female connector, M12, 8-pin, straight, 10 m, PUR halogen free, shielded, twisted in pairs for SSI and DME HIPERFACE	DOL-1208-G10MAH1	6032450	–	–	–	–	●
Female connector, M12, 8-pin, straight, 20 m, PUR halogen free, shielded, twisted in pairs for SSI and DME HIPERFACE	DOL-1208-G20MAH1	6032451	–	–	–	–	●
Female connector, M12, 5-pin, straight	DOS-1205-G	6009719	●	●	●	●	–
Female connector, M12, 5-pin, straight, shielded	DOS-1205-GA	6027534	●	●	–	●	–
Female connector, M12, 5-pin, angled	DOS-1205-W	6009720	●	●	●	●	–
Female connector, M12, 8-pin, straight, shielded	DOS-1208-GA	6028369	–	–	–	–	●
Female connector, M12, 8-pin, angled, shielded	DOS-1208-WA	6043358	–	–	–	–	●
Male connector, M12, 5-pin, straight	STE-1205-G	6022083	●	●	●	●	–
Male connector, M12, 5-pin, straight, shielded	STE-1205-GA	6027533	●	●	–	●	–
Male connector, M12, 5-pin, angled	STE-1205-W	6022082	●	●	●	●	–
Male connector, M12, 8-pin, straight, shielded	STE-1208-GA	6028370	–	–	–	–	●

Illustration may differ

For dimensional drawings, please see page J-351.

Reflectors

	Brief description	Model name	Part no.	DT50	DT50 Hi	DS50	DL50	DL50 Hi
	Reflector plate, DG tape 330 mm x 330 mm, material: base plate aluminum, screw connection	PL240DG	1017910	–	–	–	●	●
	Reflector plate, DG tape 330 mm x 330 mm, material: base plate aluminum, screw connection, heated	PL240DG-H	1022926	–	–	–	●	●
	Reflector plate, DG tape 665 mm x 665 mm, material: base plate aluminum, screw connection	PL560DG	1016806	–	–	–	●	●
	Reflector plate, DG tape 665 mm x 665 mm, material: base plate aluminum, screw connection, heated	PL560DG-H	1023888	–	–	–	●	●
	Reflector plate, DG tape 1,000 mm x 1,000 mm, material: base plate aluminum, screw connection	PL880DG	1018975	–	–	–	●	●
	Diamond Grade reflective tape, sheet, 749 mm x 914 mm, self-adhesive	REF-DG	5320565	–	–	–	●	●
	Diamond Grade reflective tape, customizable by sheet, self-adhesive	REF-DG-K	4019634	–	–	–	●	●

For dimensional drawings, please see page J-361.

Terminal and alignment brackets

	Brief description	Model name	Part no.	DT50	DT50 Hi	DS50	DL50	DL50 Hi
	Plate K for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-K01	2022718	●	●	●	●	●
	Universal bar clamp, steel, die-cast zinc	BEF-KHS-KH1	2022726	●	●	●	●	●
	Universal bar clamp for mounting bars (Ø 12 mm), die-cast zinc, without mounting plate and screws	BEF-KHS-KH3	5322626	●	●	●	●	●
	Plate N04 for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-N04	2051610	●	●	●	●	●
	Plate N04 for universal bar clamp, stainless steel, incl. universal bar clamp and mounting material	BEF-KHS-N04N	2051620	●	●	●	●	●
	Mounting rod, straight, 200 mm, steel, zinc coated, without mounting material	BEF-MS12G-A	4056054	●	●	●	●	●
	Mounting rod, straight, 300 mm, steel, zinc coated, without mounting material	BEF-MS12G-B	4056055	●	●	●	●	●
	Mounting rod, straight, 200 mm, stainless steel, without mounting material	BEF-MS12G-NA	4058914	●	●	●	●	●
	Mounting rod, straight, 300 mm, stainless steel, without mounting material	BEF-MS12G-NB	4058915	●	●	●	●	●
	Mounting rod, L-shaped, 150 mm x 150 mm, steel, zinc coated, without mounting material	BEF-MS12L-A	4056052	●	●	●	●	●
	Mounting rod, L-shaped, 250 mm x 250 mm, steel, zinc coated, without mounting material	BEF-MS12L-B	4056053	●	●	●	●	●
	Mounting rod, L-shaped, 150 mm x 150 mm, stainless steel, without mounting material	BEF-MS12L-NA	4058912	●	●	●	●	●
	Mounting rod, L-shaped, 250 mm x 250 mm, stainless steel, without mounting material	BEF-MS12L-NB	4058913	●	●	●	●	●
	Mounting rod, U-shaped, 130 mm x 52 mm x 130 mm, steel, zinc coated, without mounting material	BEF-MS12U	4065437	●	●	●	●	●

	Brief description	Model name	Part no.	DT50	DT50 Hi	DS50	DL50	DL50 Hi
	Mounting rod, Z-shaped, 150 mm x 70 mm x 150 mm, steel, zinc coated, without mounting material	BEF-MS12Z-A	4056056	●	●	●	●	●
	Mounting rod, Z-shaped, 150 mm x 70 mm x 250 mm, steel, zinc coated, without mounting material	BEF-MS12Z-B	4056057	●	●	●	●	●
	Mounting rod, Z-shaped, 100 mm x 150 mm x 200 mm, steel, zinc coated, without mounting material	BEF-MS12Z-C	4064563	●	●	●	●	●
	Mounting rod, Z-shaped, 150 mm x 70 mm x 150 mm, stainless steel, without mounting material	BEF-MS12Z-NA	4058916	●	●	●	●	●
	Mounting rod, Z-shaped, 150 mm x 70 mm x 250 mm, stainless steel, without mounting material	BEF-MS12Z-NB	4058917	●	●	●	●	●
	Rod bar clamp for rod diameter of 12 mm, aluminum, 2 screws M6 x 30, 2 spring discs	BEF-RMC-D12	5321878	●	●	●	●	●

For dimensional drawings, please see page J-364.

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Long range distance sensors

Adapters/distributors

	Brief description	Model name	Part no.	DME4000	DME5000	DL100 Hi	DT500	DS500	DMT10-2	DML40-2
	Adapter for DME4000/5000, M16, 8-pin, to M12, 4-pin, for PROFIBUS variants	Adapter DME4000/5000	6034800	●	●	–	–	–	–	–
	Signal converter from SSI to analog signal (0 mA … 20 mA / 4 mA … 20 mA / 0 V … 10 V)	HN.SK20.2	6021449	●	●	●	–	–	–	–

For dimensional drawings, please see page J-336.

Deflector mirrors

	Brief description	Model name	Part no.	DME4000	DME5000	DL100 Hi	DT500	DS500	DMT10-2	DML40-2
	Corner mirror, deflection of light emission upward, material: stainless steel, additional base plate mounting kit required	USP-DME5	2027710	●	●	–	–	–	–	–

For dimensional drawings, please see page J-338.

Device protection (mechanical)

	Brief description	Model name	Part no.	DME4000	DME5000	DL100 Hi	DT500	DS500	DMT10-2	DML40-2
	Peltier cooling unit, incl. lid for DME4000/5000	BEF-KE-DME4000/5000	2040184	●	●	–	–	–	–	–
	Thermo protection cooling case DME4000/5000, peltier cooling unit, fiber glass housing	Cooling Case DME4000/DME5000	6036180	●	●	–	–	–	–	–
	Thermo protection cooling case DMTx/DMLx, peltier cooling unit, fiber glass housing	Cooling Case DML/DMT	6036183	–	–	–	–	–	●	●
	Thermo protection cooling case DS/DT500, peltier cooling unit, fiber glass housing	Cooling Case DS500/DT500	6036182	–	–	–	●	●	–	–
	Weather protection hood for DME4000/5000	WSG-DME5	2027800	●	●	–	–	–	–	–
	Weather protection hood for DS/DT500 incl. protection tube against sunlight	WSG-DSDT	2049298	–	–	–	●	●	–	–

For dimensional drawings, please see page J-340.

Lens and accessories

	Brief description	Model name	Part no.	DME4000	DME5000	DL100 Hi	DT500	DS500	DMT10-2	DML40-2
	Lens tube for DMT, with filter and gasket	Tubus DMT	2031331	–	–	–	–	–	●	●
	Lens tube for DMT, short version 17 mm	Tubus DMT (short)	2034838	–	–	–	–	–	●	●

For dimensional drawings, please see page J-344.

Mounting brackets/plates

	Brief description	Model name	Part no.	DME4000	DME5000	DL100 Hi	DT500	DS500	DMT10-2	DML40-2
	Mounting kit for base plate, aluminum, nickel-plated, for DME4000, with mounting material, required for mounting on alignment bracket DME5000	BEF-DME4000	2040738	●	–	–	–	–	–	–
	Mounting kit for base plate, aluminum, nickel-plated, for DME5000, without mounting material	BEF-DME5000	4038063	–	●	–	–	–	–	–
	Mounting bracket, aluminum alloy, without mounting material	BEF-WINK-DME/ISD	2046444	●	●	–	–	–	–	–

For dimensional drawings, please see page J-344.
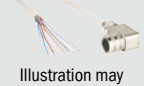
Plug connectors and cables

	Brief description	Model name	Part no.	DME4000	DME5000	DL100 Hi	DT500	DS500	DMT10-2	DML40-2
	Female connector, M12, 5-pin, straight, 5 m, CAN/CANopen, shielded on pin 1	CAN cable 5 m (socket-open end)	6021166	●	●	–	–	–	–	–
	Serial RS-232 connecting cable, 3 m, 9-pin, D-sub, socket/open cable end	Connecting cable (socket-open end)	2020319	–	–	–	–	–	●	●
	D-sub plug connection inlay, 9-pin, multipoint socket connector	D-sub, 9-pin socket connector	6007336	–	–	–	–	–	●	●
	D-sub plug housing (metal) for 9-pin/15-pin HD insert	D-sub, metal plug housing	6009438	–	–	–	–	–	●	●
	Female connector, M12, 4-pin, straight, 2 m, PVC	DOL-1204-G02M	6009382	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, straight, 5 m, PVC	DOL-1204-G05M	6009866	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, straight, 10 m, PVC	DOL-1204-G10M	6010543	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, straight, 15 m, PVC	DOL-1204-G15M	6010753	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, straight, 20 m, PVC	DOL-1204-G20M	6034401	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, straight, 5 m, PVC, shielded	DOL-1204-G05MA	6042100	●	●	●	–	–	–	–
	Female connector, M12, 4-pin, straight, 2 m, PUR halogen free	DOL-1204-G02MC	6025900	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, straight, 5 m, PUR halogen free	DOL-1204-G05MC	6025901	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, straight, 10 m, PUR halogen free	DOL-1204-G10MC	6025902	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, straight, 15 m, PUR halogen free	DOL-1204-G15MC	6034749	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, straight, 20 m, PUR halogen free	DOL-1204-G20MC	6034750	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, straight, 25 m, PUR halogen free	DOL-1204-G25MC	6034751	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, straight, 5 m, PUR halogen free, shielded	DOL-1204-G05MAC	6038621	●	●	●	–	–	–	–
	Female connector, M12, 4-pin, straight, 10 m, PUR halogen free, shielded	DOL-1204-G10MA	6041797	●	●	●	–	–	–	–

Illustration may differ

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	Brief description	Model name	Part no.	DME4000	DME5000	DL100 Hi	DT500	DS500	DMT10-2	DML40-2
	Female connector, M12, 4-pin, angled, 2 m, PVC	DOL-1204-W02M	6009383	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, angled, 5 m, PVC	DOL-1204-W05M	6009867	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, angled, 10 m, PVC	DOL-1204-W10M	6010541	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, angled, 15 m, PVC	DOL-1204-W15M	6036474	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, angled, 20 m, PVC	DOL-1204-W20M	6033559	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, angled, 5 m, PVC, shielded	DOL-1204-W05MA	6042098	●	●	●	–	–	–	–
	Female connector, M12, 4-pin, angled, 2 m, PUR halogen free	DOL-1204-W02MC	6025903	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, angled, 5 m, PUR halogen free	DOL-1204-W05MC	6025904	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, angled, 10 m, PUR halogen free	DOL-1204-W10MC	6025905	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, angled, 15 m, PUR halogen free	DOL-1204-W15MC	6034752	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, angled, 25 m, PUR halogen free	DOL-1204-W25MC	6034754	–	–	●	–	–	–	–
	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, straight, 15 m, PVC	DOL-1205-G15M	6029215	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, straight, 2 m, PUR halogen free	DOL-1205-G02MC	6025906	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, straight, 5 m, PUR halogen free	DOL-1205-G05MC	6025907	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, straight, 10 m, PUR halogen free	DOL-1205-G10MC	6025908	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, straight, 5 m, PUR halogen free, shielded	DOL-1205-G05MAC	6036384	●	●	–	●	●	–	–
	Female connector, M12, 5-pin, straight, 10 m, PUR halogen free, shielded	DOL-1205-G10MAC	6036385	●	●	–	●	●	–	–
	Female connector, M12, 5-pin, straight, 20 m, PUR halogen free, shielded	DOL-1205-G20MAC	6036386	●	●	–	●	●	–	–
	Female connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	DOL-1205-G05MQ	6026006	●	●	●	–	–	–	–
	Female connector, M12, 5-pin, straight, 10 m, PROFIBUS, shielded	DOL-1205-G10MQ	6026008	●	●	●	–	–	–	–
	Female connector, M12, 5-pin, straight, 12 m, PROFIBUS, shielded	DOL-1205-G12MQ	6032636	●	●	●	–	–	–	–
	Female connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	DOL-1205-G15MQ	6032637	●	●	●	–	–	–	–
	Female connector, M12, 5-pin, straight, 20 m, PROFIBUS, shielded	DOL-1205-G20MQ	6032638	●	●	●	–	–	–	–
	Female connector, M12, 5-pin, straight, 30 m, PROFIBUS, shielded	DOL-1205-G30MQ	6032639	●	●	●	–	–	–	–
	Female connector, M12, 5-pin, straight, 50 m, PROFIBUS, shielded	DOL-1205-G50MQ	6032861	●	●	●	–	–	–	–
	Female connector, M12, 5-pin, straight, 6 m, DeviceNet/CANopen, dropcable shielded	DOL-1205-G06MK	6028326	●	●	–	–	–	–	–
	Female connector, M12, 5-pin, straight, 10 m, CAN/CANopen, shielded on pin 1	DOL-1205-G10M_Can	6021175	●	●	–	–	–	–	–

Illustration may differ

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	Brief description	Model name	Part no.	DME4000	DME5000	DL100 Hi	DT500	DS500	DMT10-2	DML40-2
Illustration may differ	Female connector, M12, 5-pin, angled, 2 m, PVC	DOL-1205-W02M	6008900	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, angled, 5 m, PVC	DOL-1205-W05M	6009869	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, angled, 10 m, PVC	DOL-1205-W10M	6010542	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, angled, 5 m, PUR halogen free, shielded	DOL-1205-W05MAC	6041751	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, angled, 10 m, PUR halogen free, shielded	DOL-1205-W10MAC	6041752	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, angled, 2 m, PUR halogen free	DOL-1205-W02MC	6025909	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, angled, 5 m, PUR halogen free	DOL-1205-W05MC	6025910	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, angled, 10 m, PUR halogen free	DOL-1205-W10MC	6025911	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, angled, 5 m, PROFIBUS, shielded	DOL-1205-W05MQ	6041423	●	●	●	–	–	–	–
	Female connector, M12, 5-pin, angled, 10 m, PROFIBUS, shielded	DOL-1205-W10MQ	6041425	●	●	●	–	–	–	–
	Female connector, M12, 8-pin, straight, 2 m, PUR halogen free, shielded, twisted in pairs for SSI and HIPERFACE	DOL-1208-G02MAH1	6032448	●	●	●	●	–	–	–
	Female connector, M12, 8-pin, straight, 5 m, PUR halogen free, shielded, twisted in pairs for SSI and HIPERFACE	DOL-1208-G05MAH1	6032449	●	●	●	●	–	–	–
	Female connector, M12, 8-pin, straight, 10 m, PUR halogen free, shielded, twisted in pairs for SSI and DME HIPERFACE	DOL-1208-G10MAH1	6032450	●	●	●	●	–	–	–
	Female connector, M12, 8-pin, straight, 20 m, PUR halogen free, shielded, twisted in pairs for SSI and DME HIPERFACE	DOL-1208-G20MAH1	6032451	●	●	●	●	–	–	–
	Female connector, M12, 8-pin, angled, 2 m, PUR halogen free, SSI, shielded, twisted in pairs	DOL-1208-W02MAS01	6029224	●	●	●	●	–	–	–
Illustration may differ	Female connector, M16, 8-pin, straight, 5 m, PVC, shielded	DOL-1608-G05MA	2026742	●	●	–	–	–	–	–
	Female connector, M16, 8-pin, straight, 10 m, PVC, shielded	DOL-1608-G10MA	2027193	●	●	–	–	–	–	–
	Female connector, M16, 8-pin, straight, 50 m, PVC, shielded	DOL-1608-G50MA	6032903	●	●	–	–	–	–	–
Illustration may differ	Female connector, M16, 8-pin, angled, 5 m, PVC, shielded	DOL-1608-W05MA	2026743	●	●	–	–	–	–	–
	Female connector, M16, 8-pin, angled, 10 m, PVC, shielded	DOL-1608-W10MA	2027194	●	●	–	–	–	–	–
	Female connector, M12, 4-pin, straight	DOS-1204-G	6007302	–	–	●	–	–	–	–
	Female connector, M12, 4-pin, angled	DOS-1204-W	6007303	–	–	●	–	–	–	–
	Female connector, M12, 5-pin, straight	DOS-1205-G	6009719	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, straight, shielded	DOS-1205-GA	6027534	●	●	–	●	●	–	–
	Female connector, M12, 5-pin, straight, PROFIBUS, shielded	DOS-1205-GQ	6021353	●	●	●	–	–	–	–

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	Brief description	Model name	Part no.	DME4000	DME5000	DL100 Hi	DT500	DS500	DMT10-2	DML40-2
	Female connector, M12, 5-pin, angled	DOS-1205-W	6009720	–	–	–	●	●	–	–
	Female connector, M12, 5-pin, angled, PROFIBUS, shielded	DOS-1205-WQ	6041429	●	●	–	–	–	–	–
	Female connector, M12, 8-pin, straight, shielded	DOS-1208-GA	6028369	●	●	●	●	–	–	–
	Female connector, M12, 8-pin, angled, shielded	DOS-1208-WA	6043358	●	●	–	●	–	–	–
	Female connector, M16, 8-pin, straight, shielded	DOS-1608-GA	6025726	●	●	–	–	–	–	–
	Female connector, M16, 8-pin, angled, shielded	DOS-1608-WA	6025727	●	●	–	–	–	–	–
	Female connector, 7/8", 5-pin, straight, DeviceNet	DOS-7805-GK	6028331	●	●	–	–	–	–	–
	Female connector, 7/8", 5-pin, straight, DeviceNet, terminal resistor	DOS-7805-GKEND	6028329	●	●	–	–	–	–	–
	Connection cable, M12, 5-pin, connector straight/socket straight, 1 m, CAN/CANopen, shielded	DSL-1205-G01MK	6021164	●	●	–	–	–	–	–
	Connection cable, M12, 5-pin, connector straight/socket straight, 2 m, CAN/CANopen, shielded	DSL-1205-G02MK	6028903	●	●	–	–	–	–	–
	Connection cable, M12, 5-pin, connector straight/socket straight, 3 m, CAN/CANopen, shielded	DSL-1205-G03MK	6021165	●	●	–	–	–	–	–
	Connection cable, M12, 5-pin, connector straight/socket straight, 4 m, CAN/CANopen, shielded	DSL-1205-G04MK	6030737	●	●	–	–	–	–	–
	Connection cable, M12, 5-pin, connector straight/socket straight, 5 m, CAN/CANopen, shielded	DSL-1205-G05MK	6021168	●	●	–	–	–	–	–
	Connection cable, M12, 5-pin, connector straight/socket straight, 6 m, CAN/CANopen, shielded	DSL-1205-G06MK	6028327	●	●	–	–	–	–	–
	Connection cable, M12, 5-pin, connector straight/socket straight, 10 m, PROFIBUS, shielded	DSL-1205-G10MQ	6032640	●	●	●	–	–	–	–
	Data connection cable to PC, 3 m, 2 x 9-pin, D-sub socket	Data connection cable (RS-232) to PC	2014054	–	–	–	–	–	●	●
	Female connector, straight, 10 m, PVC, for DME5000 with separate wires for SSI and power, SIEMENS-D-sub-connector	LEITUNG,DOSE/STE 10M0	6033752	●	●	–	–	–	–	–
Illustration may differ	Cable, by the meter, PVC, shielded, 3x 0.25 mm², shielded	LTG-1303-MW	6004538	–	–	–	–	–	●	●
	Cable, by the meter, PROFIBUS, shielded	LTG-2102-MW	6021355	●	●	●	–	–	●	●
	Cable, by the meter, SSI, 8 wires, 2 x 0.5 mm² + 6 x 0.25 mm², twisted pair, shielded	LTG-2308-MW	6026292	●	●	–	–	–	–	–

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	Brief description	Model name	Part no.	DME4000	DME5000	DL100 Hi	DT500	DS500	DMT10-2	DML40-2
	Cable, by the meter, DeviceNet/CANopen, 2 x 0.34 mm² + 2 x 0.25 mm², twisted pair	LTG-2804-MW	6028328	●	●	–	–	–	–	–
Illustration may differ	Cable, by the meter, 8-pin, PUR halogen free, shielded, twinned pair	LTG-3108-MW	6032456	●	●	●	●	–	–	–
	Male connector, M12, 5-pin, straight, PROFIBUS, shielded	PR-STE-1205-G	6021354	●	●	●	–	–	–	–
	Male connector, M12, 4-pin, straight, PROFIBUS, terminal resistor	PR-STE-END	6021156	●	●	●	–	–	–	–
	T-junction, M12, 5-pin, DeviceNet, CANopen	SDO-02D78-SF	6028330	●	●	–	–	–	–	–
	Connection cable, Ethernet patch cable, 2 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G02ME	6034414	–	–	●	–	–	–	–
	Connection cable, Ethernet patch cable, 5 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G05ME	6035389	–	–	●	–	–	–	–
	Connection cable, Ethernet patch cable, 10 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G10ME	6030928	–	–	●	–	–	–	–
	Connection cable, Ethernet patch cable, 25 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G25ME	6033555	–	–	●	–	–	–	–
	Male connector, M12, 5-pin, straight, shielded	STE-1205-GA	6027533	●	●	–	–	–	–	–
	Male connector, M12, 5-pin, straight, terminal resistor, DeviceNet and CANopen	STE-1205-GKEND	6037193	●	●	–	–	–	–	–
	Male connector, M12, 5-pin, angled, PROFIBUS, shielded	STE-1205-WQ	6041428	●	●	–	–	–	–	–
	Male connector, M12, 8-pin, straight, shielded	STE-1208-GA	6028370	●	●	–	–	–	–	–
	Male connector, 7/8", 5-pin, straight, DeviceNet	STE-7805-GK	6028332	●	●	–	–	–	–	–
	Male connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	STL-1205-G05MQ	6026005	●	●	●	–	–	–	–
	Male connector, M12, 5-pin, straight, 10 m, PROFIBUS, shielded	STL-1205-G10MQ	6026007	●	●	●	–	–	–	–
	Male connector, M12, 5-pin, straight, 12 m, PROFIBUS, shielded	STL-1205-G12MQ	6032635	●	●	●	–	–	–	–
	Male connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	STL-1205-G15MQ	6036898	●	●	●	–	–	–	–
	Male connector, M12, 5-pin, angled, 5 m, PROFIBUS, shielded	STL-1205-W05MQ	6041426	●	●	●	–	–	–	–
	Male connector, M12, 5-pin, angled, 10 m, PROFIBUS, shielded	STL-1205-W10MQ	6041427	●	●	●	–	–	–	–

For dimensional drawings, please see page J-351.

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Power supply units

	Brief description	Model name	Part no.	DME4000	DME5000	DL100 Hi	DT500	DS500	DMT10-2	DML40-2
	Power supply unit, 24 V DC / 10 A, 110 … 120, 210 … 240 V AC, 24 V DC, 10 A, for cap rail mounting and TPCC supply	Power supply unit	6020875	●	●	●	●	●	●	●

Reflectors

	Brief description	Model name	Part no.	DME4000	DME5000	DL100 Hi	DT500	DS500	DMT10-2	DML40-2
	Self-adhesive foil 252.4 mm x 252.4 mm	OBF-PL880F	4031159	–	–	–	–	–	–	●
	Single-triple glass reflector for very high sensing ranges, Ø 60 mm, focus = infinite, material: aluminum (anodized)/ glass, screw connection	OP60-00	1000141	–	–	–	–	–	–	●
	Reflector plate, DG tape 330 mm x 330 mm, material: base plate aluminum, screw connection	PL240DG	1017910	●	●	●	–	–	–	●
	Reflector plate, DG tape 330 mm x 330 mm, material: base plate aluminum, screw connection, heated	PL240DG-H	1022926	●	●	●	–	–	–	●
	Reflector plate, DG tape 665 mm x 665 mm, material: base plate aluminum, screw connection, heated	PL560DG-H	1023888	●	●	●	–	–	–	●
	Reflector plate, DG tape 1,000 mm x 1,000 mm, material: base plate aluminum, screw connection	PL880DG	1018975	●	●	●	–	–	–	●
	Reflector plate, 11 x 11 PL80A, 928 mm x 928 mm, material: base plate aluminum, screw connection	PL880FS01	1017865	–	–	–	–	–	–	●
	Diamond Grade reflective tape, sheet, 749 mm x 914 mm, self-adhesive	REF-DG	5320565	●	●	–	–	–	–	●
	Diamond Grade reflective tape, customizable by sheet, self-adhesive	REF-DG-K	4019634	●	●	–	–	–	–	●

For dimensional drawings, please see page J-361.

Terminal and alignment brackets

	Brief description	Model name	Part no.	DME4000	DME5000	DL100 Hi	DT500	DS500	DMT10-2	DML40-2
	Alignment unit for DME5000, stainless steel (1.4541), incl. mounting material, additional base plate mounting kit required	BEF-AH-DME5	2027721	–	●	–	–	–	–	–
	Alignment unit for DMT/DML, steel, zinc coated, incl. mounting material	BEF-GH-DMT	5309130	–	–	–	–	–	●	●
	Alignment unit for DME4000/ISD400, aluminum, anodized	BEF-ISD/DME	2046052	●	–	–	–	–	–	–
	Alignment unit for DME4000, stainless steel	BEF-DME	2040695	●	–	–	–	–	–	–
	Alignment unit for Dx100, steel, zinc coated, incl. mounting material	BEF-AH-DX100	2058653	–	–	●	–	–	–	–
	Alignment unit for DS/DT500, stainless steel (1.4541), incl. mounting material	BEF-DSDT	2031377	–	–	–	●	●	–	–

For dimensional drawings, please see page J-364.

Linear measurement sensors

Codes

	Bar code width	Bar code height	Sensing range from	Sensing range to	Model name	Part no.	OLM100	OLM100 Hi	OLM200
	30 mm	30 mm	0 m	5 m	Bar code tape	5324252	●	●	●
			0 m	20 m	Bar code tape	5324069	●	●	●
			20 m	40 m	Bar code tape	5324070	●	●	●
			40 m	60 m	Bar code tape	5324071	●	●	●
			60 m	80 m	Bar code tape	5324072	●	●	●
			80 m	100 m	Bar code tape	5324073	●	●	●
			100 m	120 m	Bar code tape	5324074	●	●	●
			120 m	140 m	Bar code tape	5324075	●	●	●
			140 m	160 m	Bar code tape	5324076	●	●	●
			160 m	180 m	Bar code tape	5324077	●	●	●
			180 m	200 m	Bar code tape	5324078	●	●	●
			200 m	220 m	Bar code tape	5324079	●	●	●
			220 m	240 m	Bar code tape	5324080	●	●	●
			240 m	260 m	Bar code tape	5324081	●	●	●
			260 m	280 m	Bar code tape	5324082	●	●	●
			280 m	300 m	Bar code tape	5324083	●	●	●
			300 m	320 m	Bar code tape	5324084	●	●	●
			320 m	340 m	Bar code tape	5324085	●	●	●
			340 m	360 m	Bar code tape	5324086	●	●	●
			360 m	380 m	Bar code tape	5324087	●	●	●
			380 m	400 m	Bar code tape	5324088	●	●	●
			400 m	420 m	Bar code tape	5324205	●	●	●
			420 m	440 m	Bar code tape	5324206	●	●	●
			440 m	460 m	Bar code tape	5324207	●	●	●
			460 m	480 m	Bar code tape	5324208	●	●	●
			480 m	500 m	Bar code tape	5324209	●	●	●
			On demand	On demand	Customized bar code tape	5322556	●	●	●
		40 mm	0 m	5 m	Bar code tape	5324251	●	●	●
			0 m	20 m	Bar code tape	5324090	●	●	●
			20 m	40 m	Bar code tape	5324091	●	●	●
			40 m	60 m	Bar code tape	5324092	●	●	●
			60 m	80 m	Bar code tape	5324093	●	●	●
			80 m	100 m	Bar code tape	5324094	●	●	●
			100 m	120 m	Bar code tape	5324095	●	●	●
			120 m	140 m	Bar code tape	5324096	●	●	●
			140 m	160 m	Bar code tape	5324097	●	●	●
			160 m	180 m	Bar code tape	5324098	●	●	●

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	Bar code width	Bar code height	Sensing range from	Sensing range to	Model name	Part no.	OLM100	OLM100 Hi	OLM200
	30 mm	40 mm	180 m	200 m	Bar code tape	5324099	●	●	●
			200 m	220 m	Bar code tape	5324100	●	●	●
			220 m	240 m	Bar code tape	5324101	●	●	●
			240 m	260 m	Bar code tape	5324102	●	●	●
			260 m	280 m	Bar code tape	5324103	●	●	●
			280 m	300 m	Bar code tape	5324104	●	●	●
			300 m	320 m	Bar code tape	5324105	●	●	●
			320 m	340 m	Bar code tape	5324106	●	●	●
			340 m	360 m	Bar code tape	5324107	●	●	●
			360 m	380 m	Bar code tape	5324108	●	●	●
			380 m	400 m	Bar code tape	5324109	●	●	●
			400 m	420 m	Bar code tape	5324210	●	●	●
			420 m	440 m	Bar code tape	5324211	●	●	●
			440 m	460 m	Bar code tape	5324212	●	●	●
			460 m	480 m	Bar code tape	5324213	●	●	●
			480 m	500 m	Bar code tape	5324214	●	●	●
			On demand	On demand	Customized bar code tape	5323951	●	●	●

For dimensional drawings, please see page J-337.

Other mounting accessories

	Brief description	Model name	Part no.	OLM100	OLM100 Hi	OLM200
	Set of sliding nuts, M5, 4 pcs	Sliding nuts	2017550	●	●	●

Plug connectors and cables

	Brief description	Model name	Part no.	OLM100	OLM100 Hi	OLM200
	Female connector, M12, 5-pin, straight, 5 m, CAN/CANopen, shielded on pin 1	CAN cable 5 m (socket-open end)	6021166	●	–	–
Illustration may differ	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899	–	–	●
	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868	–	–	●
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544	–	–	●
	Female connector, M12, 5-pin, straight, 5 m, PUR halogen free, shielded	DOL-1205-G05MAC	6036384	●	–	●
	Female connector, M12, 5-pin, straight, 10 m, PUR halogen free, shielded	DOL-1205-G10MAC	6036385	●	–	●
	Female connector, M12, 5-pin, straight, 20 m, PUR halogen free, shielded	DOL-1205-G20MAC	6036386	●	–	●
	Female connector, M12, 5-pin, straight, 2 m, PUR halogen free	DOL-1205-G02MC	6025906	–	–	●
	Female connector, M12, 5-pin, straight, 5 m, PUR halogen free	DOL-1205-G05MC	6025907	–	–	●
	Female connector, M12, 5-pin, straight, 10 m, PUR halogen free	DOL-1205-G10MC	6025908	–	–	●

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Brief description	Model name	Part no.	OLM100	OLM100 Hi	OLM200
Female connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	DOL-1205-G05MQ	6026006	–	–	●
Female connector, M12, 5-pin, straight, 10 m, PROFIBUS, shielded	DOL-1205-G10MQ	6026008	–	–	●
Female connector, M12, 5-pin, straight, 12 m, PROFIBUS, shielded	DOL-1205-G12MQ	6032636	–	–	●
Female connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	DOL-1205-G15MQ	6032637	–	–	●
Female connector, M12, 5-pin, straight, 20 m, PROFIBUS, shielded	DOL-1205-G20MQ	6032638	–	–	●
Female connector, M12, 5-pin, straight, 30 m, PROFIBUS, shielded	DOL-1205-G30MQ	6032639	–	–	●
Female connector, M12, 5-pin, straight, 50 m, PROFIBUS, shielded	DOL-1205-G50MQ	6032861	–	–	●
Female connector, M12, 5-pin, straight, 6 m, DeviceNet/CANopen, dropcable shielded	DOL-1205-G06MK	6028326	●	–	–
Female connector, M12, 8-pin, straight, 2 m, PUR halogen free, shielded, twisted in pairs for SSI and HIPERFACE	DOL-1208-G02MAH1	6032448	●	●	–
Female connector, M12, 8-pin, straight, 5 m, PUR halogen free, shielded, twisted in pairs for SSI and HIPERFACE	DOL-1208-G05MAH1	6032449	●	●	–
Female connector, M12, 8-pin, straight, 10 m, PUR halogen free, shielded, twisted in pairs for SSI and DME HIPERFACE	DOL-1208-G10MAH1	6032450	●	●	–
Female connector, M12, 8-pin, straight, 20 m, PUR halogen free, shielded, twisted in pairs for SSI and DME HIPERFACE	DOL-1208-G20MAH1	6032451	●	●	–
Female connector, M12, 5-pin, straight	DOS-1205-G	6009719	–	–	●
Female connector, M12, 5-pin, straight, shielded	DOS-1205-GA	6027534	●	–	–
Female connector, M12, 5-pin, straight, PROFIBUS, shielded	DOS-1205-GQ	6021353	–	–	●
Female connector, M12, 8-pin, straight, shielded	DOS-1208-GA	6028369	●	●	–
Female connector, 7/8", 5-pin, straight, DeviceNet	DOS-7805-GK	6028331	●	–	–
Female connector, 7/8", 5-pin, straight, DeviceNet, terminal resistor	DOS-7805-GKEND	6028329	●	–	–
T-junction, M12, 5-pin, CANopen	DSC-1205T000025KM0	6030664	●	–	–
Connection cable, M12, 5-pin, connector straight/socket straight, 1 m, CAN/CANopen, shielded	DSL-1205-G01MK	6021164	●	–	–
Connection cable, M12, 5-pin, connector straight/socket straight, 2 m, CAN/CANopen, shielded	DSL-1205-G02MK	6028903	●	–	–
Connection cable, M12, 5-pin, connector straight/socket straight, 3 m, CAN/CANopen, shielded	DSL-1205-G03MK	6021165	●	–	–
Connection cable, M12, 5-pin, connector straight/socket straight, 4 m, CAN/CANopen, shielded	DSL-1205-G04MK	6030737	●	–	–
Connection cable, M12, 5-pin, connector straight/socket straight, 5 m, CAN/CANopen, shielded	DSL-1205-G05MK	6021168	●	–	–
Connection cable, M12, 5-pin, connector straight/socket straight, 6 m, CAN/CANopen, shielded	DSL-1205-G06MK	6028327	●	●	–
Cable, by the meter, PROFIBUS, shielded	LTG-2102-MW	6021355	–	–	●

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	Brief description	Model name	Part no.	OLM100	OLM100 Hi	OLM200
	Cable, by the meter, DeviceNet/CANopen, 2x 0.34 mm² + 2x 0.25 mm², twisted pair	LTG-2804-MW	6028328	●	–	–
	Male connector, M12, 5-pin, straight, PROFIBUS, shielded	PR-STE-1205-G	6021354	–	–	●
	Male connector, M12, 4-pin, straight, PROFIBUS, terminal resistor	PR-STE-END	6021156	–	–	●
	T-junction, M12, 5-pin, DeviceNet, CANopen	SDO-02D78-SF	6028330	●	–	–
	Connection cable, Ethernet patch cable, 2 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G02ME	6034414	●	●	●
	Connection cable, Ethernet patch cable, 3 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G03ME	6029630	●	●	●
	Connection cable, Ethernet patch cable, 5 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G05ME	6035389	●	●	●
	Connection cable, Ethernet patch cable, 10 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G10ME	6030928	●	●	●
	Connection cable, Ethernet patch cable, 20 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G20ME	6036158	●	●	●
	Connection cable, Ethernet patch cable, 25 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G25ME	6033555	●	●	●
	Male connector, M12, 5-pin, straight, shielded	STE-1205-GA	6027533	●	●	–
	Male connector, M12, 5-pin, straight, terminal resistor, DeviceNet and CANopen	STE-1205-GKEND	6037193	●	–	–
	Male connector, 7/8", 5-pin, straight, DeviceNet	STE-7805-GK	6028332	●	–	–
	Male connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	STL-1205-G05MQ	6026005	–	–	●
	Male connector, M12, 5-pin, straight, 10 m, PROFIBUS, shielded	STL-1205-G10MQ	6026007	–	–	●
	Male connector, M12, 5-pin, straight, 12 m, PROFIBUS, shielded	STL-1205-G12MQ	6032635	–	–	●
	Male connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	STL-1205-G15MQ	6036898	–	–	●

For dimensional drawings, please see page J-351.

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Ultrasonic sensors

Configuration software

		Model name	Part no.	UM30	UM18	UC12	UC4
	Programming tool, incl. adapter, cable and T-junction to USB (A/B)	CPA connect Plus	6037782	●	●	–	–

Deflector mirrors

	Brief description	Model name	Part no.	UM30	UM18	UC12	UC4
	90° sound deflection plate for UM18-1xxxxx and UM18-2xxxxx, stainless steel, for straight versions	USP-UM18	5323658	–	●	–	–
	90° sound deflection plate for UM30-21xxxx, UM30-22xxxx, UM30-23xxxx, stainless steel	USP-UM30	5312916	●	–	–	–

For dimensional drawings, please see page J-338.

Device protection (mechanical)

	Brief description	Model name	Part no.	UM30	UM18	UC12	UC4
	Protection hood for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-SG-W12-3	2045175	–	–	●	–

Mounting brackets/plates

	Brief description	Model name	Part no.	UM30	UM18	UC12	UC4
	Mounting bracket for wall mounting, stainless steel (1.4571), incl. mounting material	BEF-W4-A	2051628	–	–	–	●
	Mounting bracket for floor mounting, stainless steel (1.4571), incl. mounting material	BEF-W4-B	2051630	–	–	–	●
	Mounting plate for M18 sensors, steel, zinc coated, without mounting material	BEF-WG-M18	5321870	–	●	–	–
	Mounting plate for M18 sensors, stainless steel (1.4404), without mounting material	BEF-WG-M18N	5320948	–	●	–	–
	Mounting plate for M30 sensors, steel, zinc coated, without mounting material	BEF-WG-M30	5321871	●	–	–	–
	Mounting bracket, big, stainless steel (1.4404), incl. mounting material	BEF-WG-W12	2013942	–	–	●	–
	Mounting bracket, small, stainless steel (1.4404), incl. mounting material	BEF-WK-W12	2012938	–	–	●	–
	Mounting bracket, small, stainless steel (1.4404), incl. mounting material, for UC4	BEF-WK-W4	2022026	–	–	–	●
	Mounting bracket, M18 thread, steel, zinc coated, without mounting material	BEF-WN-M18	5308446	–	●	–	–
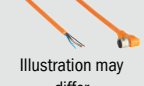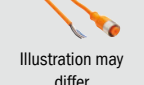
	Brief description	Model name	Part no.	UM30	UM18	UC12	UC4
	Mounting bracket, stainless steel (1.4404), incl. mounting material	BEF-WN-M18N	5320947	–	●	–	–
	Mounting bracket, M30 thread, steel, zinc coated, without mounting material	BEF-WN-M30	5308445	●	–	–	–

For dimensional drawings, please see page J-344.

Nuts and screws

	Brief description	Model name	Part no.	UM30	UM18	UC12	UC4
	Spare nut, M18 x 1, wrench size 24, brass	Fixing nut(s) / replacement nut(s) M18 / SW24	7900436	–	●	–	–
	Spare nut, M30 x 1, wrench size 36, brass	Nut M30	7900438	●	–	–	–

Plug connectors and cables

	Brief description	Model name	Part no.	UM30	UM18	UC12	UC4
	Female connector, M8, 3-pin, straight, 2 m, PVC	DOL-0803-G02M	6010785	–	–	–	●
	Female connector, M8, 3-pin, straight, 5 m, PVC	DOL-0803-G05M	6022009	–	–	–	●
Illustration may differ	Female connector, M8, 3-pin, straight, 10 m, PVC	DOL-0803-G10M	6022011	–	–	–	●
	Female connector, M8, 3-pin, straight, 15 m, PVC	DOL-0803-G15M	6036472	–	–	–	●
	Female connector, M8, 3-pin, straight, 2 m, PUR halogen free	DOL-0803-G02MC	6025888	–	–	–	●
	Female connector, M8, 3-pin, straight, 5 m, PUR halogen free	DOL-0803-G05MC	6025889	–	–	–	●
	Female connector, M8, 3-pin, straight, 10 m, PUR halogen free	DOL-0803-G10MC	6025890	–	–	–	●
	Female connector, M8, 3-pin, straight, 20 m, PUR halogen free	DOL-0803-G20MC	6036456	–	–	–	●
	Female connector, M8, 3-pin, angled, 2 m, PVC	DOL-0803-W02M	6008489	–	–	–	●
	Female connector, M8, 3-pin, angled, 5 m, PVC	DOL-0803-W05M	6008489	–	–	–	●
Illustration may differ	Female connector, M8, 3-pin, angled, 10 m, PVC	DOL-0803-W10M	6022012	–	–	–	●
	Female connector, M8, 3-pin, angled, 15 m, PVC	DOL-0803-W15M	6036473	–	–	–	●
	Female connector, M8, 3-pin, angled, 2 m, PUR halogen free	DOL-0803-W02MC	6025891	–	–	–	●
	Female connector, M8, 3-pin, angled, 3 m, PUR halogen free	DOL-0803-W03MC	6038991	–	–	–	●
	Female connector, M8, 3-pin, angled, 5 m, PUR halogen free	DOL-0803-W05MC	6025892	–	–	–	●
	Female connector, M8, 3-pin, angled, 10 m, PUR halogen free	DOL-0803-W10MC	6025893	–	–	–	●
	Female connector, M12, 4-pin, straight, 2 m, PVC	DOL-1204-G02M	6009382	–	–	●	–
	Female connector, M12, 4-pin, straight, 5 m, PVC	DOL-1204-G05M	6009866	–	–	●	–
Illustration may differ	Female connector, M12, 4-pin, straight, 10 m, PVC	DOL-1204-G10M	6010543	–	–	●	–
	Female connector, M12, 4-pin, straight, 15 m, PVC	DOL-1204-G15M	6010753	–	–	●	–
	Female connector, M12, 4-pin, straight, 20 m, PVC	DOL-1204-G20M	6034401	–	–	●	–

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	Brief description	Model name	Part no.	UM30	UM18	UC12	UC4
	Female connector, M12, 4-pin, straight, 2 m, PUR halogen free	DOL-1204-G02MC	6025900	–	–	●	–
	Female connector, M12, 4-pin, straight, 5 m, PUR halogen free	DOL-1204-G05MC	6025901	–	–	●	–
	Female connector, M12, 4-pin, straight, 10 m, PUR halogen free	DOL-1204-G10MC	6025902	–	–	●	–
	Female connector, M12, 4-pin, straight, 15 m, PUR halogen free	DOL-1204-G15MC	6034749	–	–	●	–
	Female connector, M12, 4-pin, straight, 20 m, PUR halogen free	DOL-1204-G20MC	6034750	–	–	●	–
	Female connector, M12, 4-pin, straight, 25 m, PUR halogen free	DOL-1204-G25MC	6034751	–	–	●	–
Illustration may differ	Female connector, M12, 4-pin, angled, 2 m, PVC	DOL-1204-W02M	6009383	–	–	●	–
	Female connector, M12, 4-pin, angled, 5 m, PVC	DOL-1204-W05M	6009867	–	–	●	–
	Female connector, M12, 4-pin, angled, 10 m, PVC	DOL-1204-W10M	6010541	–	–	●	–
	Female connector, M12, 4-pin, angled, 15 m, PVC	DOL-1204-W15M	6036474	–	–	●	–
	Female connector, M12, 4-pin, angled, 20 m, PVC	DOL-1204-W20M	6033559	–	–	●	–
	Female connector, M12, 4-pin, angled, 2 m, PUR halogen free	DOL-1204-W02MC	6025903	–	–	●	–
	Female connector, M12, 4-pin, angled, 5 m, PUR halogen free	DOL-1204-W05MC	6025904	–	–	●	–
	Female connector, M12, 4-pin, angled, 10 m, PUR halogen free	DOL-1204-W10MC	6025905	–	–	●	–
	Female connector, M12, 4-pin, angled, 15 m, PUR halogen free	DOL-1204-W15MC	6034752	–	–	●	–
	Female connector, M12, 4-pin, angled, 25 m, PUR halogen free	DOL-1204-W25MC	6034754	–	–	●	–
Illustration may differ	Female connector, M12, 5-pin, straight, 2 m, PVC	DOL-1205-G02M	6008899	●	●	–	–
	Female connector, M12, 5-pin, straight, 5 m, PVC	DOL-1205-G05M	6009868	●	●	–	–
	Female connector, M12, 5-pin, straight, 10 m, PVC	DOL-1205-G10M	6010544	●	●	–	–
	Female connector, M12, 5-pin, straight, 15 m, PVC	DOL-1205-G15M	6029215	●	●	–	–
	Female connector, M12, 5-pin, straight, 2 m, PUR halogen free	DOL-1205-G02MC	6025906	●	●	–	–
	Female connector, M12, 5-pin, straight, 5 m, PUR halogen free	DOL-1205-G05MC	6025907	●	●	–	–
	Female connector, M12, 5-pin, straight, 9 m, PUR halogen free	DOL-1205G09MC	6037154	●	●	–	–
	Female connector, M12, 5-pin, straight, 10 m, PUR halogen free	DOL-1205-G10MC	6025908	●	●	–	–
	Female connector, M12, 5-pin, straight, 5 m, PUR halogen free, shielded	DOL-1205-G05MAC	6036384	●	●	–	–
	Female connector, M12, 5-pin, straight, 10 m, PUR halogen free, shielded	DOL-1205-G10MAC	6036385	●	●	–	–
	Female connector, M12, 5-pin, straight, 20 m, PUR halogen free, shielded	DOL-1205-G20MAC	6036386	●	●	–	–
Illustration may differ	Female connector, M12, 5-pin, angled, 2 m, PVC	DOL-1205-W02M	6008900	●	●	–	–
	Female connector, M12, 5-pin, angled, 5 m, PVC	DOL-1205-W05M	6009869	●	●	–	–
	Female connector, M12, 5-pin, angled, 10 m, PVC	DOL-1205-W10M	6010542	●	●	–	–
	Female connector, M12, 5-pin, angled, 2 m, PUR halogen free	DOL-1205-W02MC	6025909	●	●	–	–
	Female connector, M12, 5-pin, angled, 5 m, PUR halogen free	DOL-1205-W05MC	6025910	●	●	–	–
	Female connector, M12, 5-pin, angled, 10 m, PUR halogen free	DOL-1205-W10MC	6025911	●	●	–	–
	Female connector, M12, 5-pin, angled, 5 m, PUR halogen free, shielded	DOL-1205-W05MAC	6041751	●	●	–	–
	Female connector, M12, 5-pin, angled, 10 m, PUR halogen free, shielded	DOL-1205-W10MAC	6041752	●	●	–	–
	Female connector, M8, 3-pin, straight	DOS-0803-G	7902077	–	–	–	●
	Female connector, M8, 3-pin, angled	DOS-0803-W	7902078	–	–	–	●
	Female connector, M12, 4-pin, straight	DOS-1204-G	6007302	–	–	●	–

	Brief description	Model name	Part no.	UM30	UM18	UC12	UC4
	Female connector, M12, 4-pin, angled	DOS-1204-W	6007303	–	–	●	–
	Female connector, M12, 5-pin, straight	DOS-1205-G	6009719	●	●	–	–
	Female connector, M12, 5-pin, angled	DOS-1205-W	6009720	●	●	–	–
	Male connector, M12, 4-pin, straight	STE-1204-G	6009932	–	–	●	–
	Male connector, M12, 4-pin, angled	STE-1204-W	6022084	–	–	●	–
	Male connector, M12, 5-pin, straight	STE-1205-G	6022083	●	●	–	–
	Male connector, M12, 5-pin, angled	STE-1205-W	6022082	●	●	–	–

For dimensional drawings, please see page J-351.

Terminal and alignment brackets

	Brief description	Model name	Part no.	UM30	UM18	UC12	UC4
	Double clamps for dovetail mounting, steel, zinc coated, incl. mounting material	BEF-DKH-W12	2013947	–	–	●	–
	Ball joint bracket, plastic (ABS), incl. mounting material	BEF-GH-MINI01	2023160	–	–	–	●
	Ball joint bracket with additional mounting hole 2.5 mm, plastic (ABS), incl. mounting material	BEF-GH-MINI02	2027128	–	–	–	●
	Mounting bracket, axial adjustable, with tapering thread M6, without mounting material	BEF-HA-M30A	5311527	●	–	–	–
	Mounting bracket, radial adjustable, with fixing holes for M4, without mounting material	BEF-HA-M30R	5311528	●	–	–	–
	Mounting clamp for cylindrical sensors M18 without positive stop, plastic (PA12), glass-fiber reinforced, incl. mounting material	BEF-KH-M18	2051481	–	●	–	–
	Clamb holder for dovetail mounting, steel, zinc coated, incl. mounting material	BEF-KH-W12	2013285	–	–	●	–
	Mounting clamp for cylindrical sensors M18 with positive stop, plastic (PA12), glass-fiber reinforced, incl. mounting material	BEF-KHF-M18	2051482	–	●	–	–
	Plate D for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-D01	2022461	–	–	●	–
	Plate H for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-H01	2022465	–	●	–	●

J

Brief description	Model name	Part no.	UM30	UM18	UC12	UC4
Plate K for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-K01	2022718	–	–	●	●
Universal bar clamp, steel, die-cast zinc	BEF-KHS-KH1	2022726	–	●	●	●
Universal bar clamp for mounting bars (Ø 12 mm), die-cast zinc, without mounting plate and screws	BEF-KHS-KH3	5322626	–	●	●	●
Plate L for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-L01	2023057	–	–	●	–
Plate N02 for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-N02	2051608	–	–	●	–
Plate N02 for universal bar clamp, stainless steel, incl. universal bar clamp and mounting material	BEF-KHS-N02N	2051618	–	–	●	–
Plate N03 for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-N03	2051609	–	–	●	–
Plate N03 for universal bar clamp, stainless steel, incl. universal bar clamp and mounting material	BEF-KHS-N03N	2051619	–	–	●	–
Plate N04 for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-N04	2051610	–	–	●	–
Plate N04 for universal bar clamp, stainless steel, incl. universal bar clamp and mounting material	BEF-KHS-N04N	2051620	–	–	●	–
Plate N05 for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-N05	2051611	–	–	–	●
Plate N05 for universal bar clamp, stainless steel, incl. universal bar clamp and mounting material	BEF-KHS-N05N	2051621	–	–	–	●
Plate N06 for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material, Ø 18 mm	BEF-KHS-N06	2051612	–	●	–	–
Plate N06 for universal bar clamp, stainless steel, incl. universal bar clamp and mounting material, Ø 18 mm	BEF-KHS-N06N	2051622	–	●	–	–
Plate N08 for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-N08	2051607	–	–	–	●
Mounting rod, straight, 200 mm, steel, zinc coated, without mounting material	BEF-MS12G-A	4056054	–	●	●	●
Mounting rod, straight, 300 mm, steel, zinc coated, without mounting material	BEF-MS12G-B	4056055	–	●	●	●
Mounting rod, straight, 200 mm, stainless steel, without mounting material	BEF-MS12G-NA	4058914	–	●	●	●
Mounting rod, straight, 300 mm, stainless steel, without mounting material	BEF-MS12G-NB	4058915	–	●	●	●
Mounting rod, L-shaped, 150 mm x 150 mm, steel, zinc coated, without mounting material	BEF-MS12L-A	4056052	–	●	●	●
Mounting rod, L-shaped, 250 mm x 250 mm, steel, zinc coated, without mounting material	BEF-MS12L-B	4056053	–	●	●	●
Mounting rod, L-shaped, 150 mm x 150 mm, stainless steel, without mounting material	BEF-MS12L-NA	4058912	–	●	●	●
Mounting rod, L-shaped, 250 mm x 250 mm, stainless steel, without mounting material	BEF-MS12L-NB	4058913	–	●	●	●
Mounting rod, U-shaped, 130 mm x 52 mm x 130 mm, steel, zinc coated, without mounting material	BEF-MS12U	4065437	–	●	●	●

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	Brief description	Model name	Part no.	UM30	UM18	UC12	UC4
	Mounting rod, Z-shaped, 150 mm x 70 mm x 150 mm, steel, zinc coated, without mounting material	BEF-MS12Z-A	4056056	–	●	●	●
	Mounting rod, Z-shaped, 150 mm x 70 mm x 250 mm, steel, zinc coated, without mounting material	BEF-MS12Z-B	4056057	–	●	●	●
	Mounting rod, Z-shaped, 100 mm x 150 mm x 200 mm, steel, zinc coated, without mounting material	BEF-MS12Z-C	4064563	–	●	●	●
	Mounting rod, Z-shaped, 150 mm x 70 mm x 150 mm, stainless steel, without mounting material	BEF-MS12Z-NA	4058916	–	●	●	●
	Mounting rod, Z-shaped, 150 mm x 70 mm x 250 mm, stainless steel, without mounting material	BEF-MS12Z-NB	4058917	–	●	●	●
	Rod bar clamp for rod diameter of 12 mm, aluminum, 2 screws M6 x 30, 2 spring discs	BEF-RMC-D12	5321878	–	●	●	●
	Alignment bracket with ball joint, plastic (ABS), incl. mounting material	BEF-WN-M18-ST02	5312973	–	●	–	–
	Mounting ring, stainless steel (1.4404), without mounting material	BEF-WN-MH15-2V	4053358	–	●	–	–

J

Double sheet detector

Mounting brackets/plates

	Brief description	Model name	Part no.	UM18
	Mounting plate for M18 sensors, steel, zinc coated, without mounting material	BEF-WG-M18	5321870	●
	Mounting plate for M18 sensors, stainless steel (1.4404), without mounting material	BEF-WG-M18N	5320948	●
	Mounting bracket, M18 thread, steel, zinc coated, without mounting material	BEF-WN-M18	5308446	●
	Mounting bracket, stainless steel (1.4404), incl. mounting material	BEF-WN-M18N	5320947	●

For dimensional drawings, please see page J-344.

Nuts and screws

	Brief description	Model name	Part no.	UM18
	Spare nut, M18 x 1, wrench size 24, brass	Fixing nut(s) / replacement nut(s) M18 / SW24	7900436	●

Plug connectors and cables

	Brief description	Model name	Part no.	UM18
	Male connector, M12, 4-pin, straight	STE-1204-G	6009932	●
	Male connector, M12, 4-pin, angled	STE-1204-W	6022084	●

For dimensional drawings, please see page J-351.

Terminal and alignment brackets

	Brief description	Model name	Part no.	UM18
	Mounting clamp for cylindrical sensors M18 without positive stop, plastic (PA12), glass-fiber reinforced, incl. mounting material	BEF-KH-M18	2051481	●
	Mounting clamp for cylindrical sensors M18 with positive stop, plastic (PA12), glass fiber reinforced, incl. mounting material	BEF-KHF-M18	2051482	●
	Plate H for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-H01	2022465	●
	Universal bar clamp, steel, die-cast zinc	BEF-KHS-KH1	2022726	●
	Universal bar clamp for mounting bars (Ø 12 mm), die-cast zinc, without mounting plate and screws	BEF-KHS-KH3	5322626	●
	Plate N06 for universal bar clamp, steel, zinc coated, incl. universal bar clamp and mounting material	BEF-KHS-N06	2051612	●
	Plate N06 for universal bar clamp, stainless steel, incl. universal bar clamp and mounting material	BEF-KHS-N06N	2051622	●

	Brief description	Model name	Part no.	UM18
	Mounting rod, straight, 200 mm, steel, zinc coated, without mounting material	BEF-MS12G-A	4056054	●
	Mounting rod, straight, 300 mm, steel, zinc coated, without mounting material	BEF-MS12G-B	4056055	●
	Mounting rod, straight, 200 mm, stainless steel, without mounting material	BEF-MS12G-NA	4058914	●
	Mounting rod, straight, 300 mm, stainless steel, without mounting material	BEF-MS12G-NB	4058915	●
	Mounting rod, L-shaped, 150 mm x 150 mm, steel, zinc coated, without mounting material	BEF-MS12L-A	4056052	●
	Mounting rod, L-shaped, 250 mm x 250 mm, steel, zinc coated, without mounting material	BEF-MS12L-B	4056053	●
	Mounting rod, L-shaped, 150 mm x 150 mm, stainless steel, without mounting material	BEF-MS12L-NA	4058912	●
	Mounting rod, L-shaped, 250 mm x 250 mm, stainless steel, without mounting material	BEF-MS12L-NB	4058913	●
	Mounting rod, U-shaped, 130 mm x 52 mm x 130 mm, steel, zinc coated, without mounting material	BEF-MS12U	4065437	●
	Mounting rod, Z-shaped, 150 mm x 70 mm x 150 mm, steel, zinc coated, without mounting material	BEF-MS12Z-A	4056056	●
	Mounting rod, Z-shaped, 150 mm x 70 mm x 250 mm, steel, zinc coated, without mounting material	BEF-MS12Z-B	4056057	●
	Mounting rod, Z-shaped, 100 mm x 150 mm x 200 mm, steel, zinc coated, without mounting material	BEF-MS12Z-C	4064563	●
	Mounting rod, Z-shaped, 150 mm x 70 mm x 150 mm, stainless steel, without mounting material	BEF-MS12Z-NA	4058916	●
	Mounting rod, Z-shaped, 150 mm x 70 mm x 250 mm, stainless steel, without mounting material	BEF-MS12Z-NB	4058917	●
	Rod bar clamp for rod diameter of 12 mm, aluminum, 2 screws M6 x 30, 2 spring discs	BEF-RMC-D12	5321878	●
	Alignment bracket with ball joint, plastic (ABS), incl. mounting material	BEF-WN-M18-ST02	5312973	●
	Mounting ring, stainless steel (1.4404), without mounting material	BEF-WN-MH15-2V	4053358	●

For dimensional drawings, please see page J-364.

J

Optical data transmission

Device protection (mechanical)

	Brief description	Model name	Part no.	ISD300	ISD400
	Thermo protection cooling case ISD400, peltier cooling unit, fiber glass housing	TPCC cooling housing ISD400 (Peltier element)	6036994	–	●

For dimensional drawings, please see page J-340.

Mounting brackets/plates

	Brief description	Model name	Part no.	ISD300	ISD400
	Mounting bracket, aluminum alloy, without mounting material	BEF-WINK-DME/ISD	2046444	–	●
	Mounting bracket, steel, zinc coated, incl. mounting material	BEF-WN-W45	2011480	–	●

For dimensional drawings, please see page J-344.

Plug connectors and cables

	Brief description	Model name	Part no.	ISD300	ISD400
Illustration may differ	Female connector, M12, 4-pin, straight, 2 m, PVC	DOL-1204-G02M	6009382	–	●
	Female connector, M12, 4-pin, straight, 5 m, PVC	DOL-1204-G05M	6009866	–	●
	Female connector, M12, 4-pin, straight, 10 m, PVC	DOL-1204-G10M	6010543	–	●
	Female connector, M12, 4-pin, straight, 15 m, PVC	DOL-1204-G15M	6010753	–	●
	Female connector, M12, 4-pin, straight, 20 m, PVC	DOL-1204-G20M	6034401	–	●
	Female connector, M12, 4-pin, straight, 2 m, PUR halogen free	DOL-1204-G02MC	6025900	–	●
	Female connector, M12, 4-pin, straight, 5 m, PUR halogen free	DOL-1204-G05MC	6025901	–	●
	Female connector, M12, 4-pin, straight, 10 m, PUR halogen free	DOL-1204-G10MC	6025902	–	●
	Female connector, M12, 4-pin, straight, 15 m, PUR halogen free	DOL-1204-G15MC	6034749	–	●
	Female connector, M12, 4-pin, straight, 20 m, PUR halogen free	DOL-1204-G20MC	6034750	–	●
	Female connector, M12, 4-pin, straight, 25 m, PUR halogen free	DOL-1204-G25MC	6034751	–	●
	Female connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	DOL-1205-G05MQ	6026006	●	●
	Female connector, M12, 5-pin, straight, 10 m, PROFIBUS, shielded	DOL-1205-G10MQ	6026008	●	●
	Female connector, M12, 5-pin, straight, 12 m, PROFIBUS, shielded	DOL-1205-G12MQ	6032636	●	●
	Female connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	DOL-1205-G15MQ	6032637	●	●
	Female connector, M12, 5-pin, straight, 20 m, PROFIBUS, shielded	DOL-1205-G20MQ	6032638	●	●
	Female connector, M12, 5-pin, straight, 30 m, PROFIBUS, shielded	DOL-1205-G30MQ	6032639	●	●
	Female connector, M12, 5-pin, straight, 50 m, PROFIBUS, shielded	DOL-1205-G50MQ	6032861	●	●
	Female connector, M12, 5-pin, straight, 6 m, DeviceNet/CANopen, dropcable shielded	DOL-1205-G06MK	6028326	●	–
	Female connector, M12, 5-pin, angled, 5 m, PROFIBUS, shielded	DOL-1205-W05MQ	6041423	●	–
	Female connector, M12, 5-pin, angled, 10 m, PROFIBUS, shielded	DOL-1205-W10MQ	6041425	●	–
	Female connector, M12, 4-pin, straight	DOS-1204-G	6007302	–	●

Brief description	Model name	Part no.	ISD300	ISD400
Female connector, M12, 5-pin, straight, shielded	DOS-1205-GA	6027534	●	–
Female connector, M12, 5-pin, straight, PROFIBUS, shielded	DOS-1205-GQ	6021353	●	●
Connection cable, M12, 5-pin, connector straight/socket straight, 10 m, PROFIBUS, shielded	DSL-1205-G10MQ	6032640	–	●
Cable, by the meter, PROFIBUS, shielded	LTG-2102-MW	6021355	●	●
Cable, by the meter, DeviceNet/CANopen, 2x 0.34 mm² + 2x 0.25 mm², twisted pair	LTG-2804-MW	6028328	●	–
Male connector, M12, 5-pin, straight, PROFIBUS, shielded	PR-STE-1205-G	6021354	●	●
Male connector, M12, 4-pin, straight, PROFIBUS, terminal resistor	PR-STE-END	6021156	–	●
Connection cable, Ethernet patch cable, 2 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G02ME	6034414	–	●
Connection cable, Ethernet patch cable, 3 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G03ME	6029630	–	●
Connection cable, Ethernet patch cable, 5 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G05ME	6035389	–	●
Connection cable, Ethernet patch cable, 10 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G10ME	6030928	–	●
Connection cable, Ethernet patch cable, 25 m, straight, connector M12, 4-pin to connector RJ-45	SSL-2J04-G25ME	6033555	–	●
Male connector, M12, 5-pin, straight, shielded	STE-1205-GA	6027533	●	–
Male connector, M12, 5-pin, angled, PROFIBUS, shielded	STE-1205-WQ	6041428	–	●
Male connector, M12, 4-pin, straight, 2 m, PUR halogen free	STL-1204-G02MC	6028077	●	–
Male connector, M12, 4-pin, straight, 10 m, PUR halogen free	STL-1204-G10MC	6041750	●	–
Male connector, M12, 4-pin, angled, 5 m, PUR halogen free	STL-1204-W05MC	6037472	●	–
Male connector, M12, 4-pin, angled, 15 m, PUR halogen free	STL-1204-W15MC	6037473	●	–
Male connector, M12, 5-pin, straight, 5 m, PROFIBUS, shielded	STL-1205-G05MQ	6026005	●	●
Male connector, M12, 5-pin, straight, 10 m, PROFIBUS, shielded	STL-1205-G10MQ	6026007	●	●
Male connector, M12, 5-pin, straight, 12 m, PROFIBUS, shielded	STL-1205-G12MQ	6032635	–	●
Male connector, M12, 5-pin, straight, 15 m, PROFIBUS, shielded	STL-1205-G15MQ	6036898	–	●

Power supply units

Brief description	Model name	Part no.	ISD300	ISD400
Power supply unit, 24 V DC / 10 A, 110 ... 120, 210 ... 240 V AC, 24 V DC, 10 A, for cap rail mounting and TPCC supply	Power supply unit	6020875	–	●

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Terminal and alignment brackets

	Brief description	Model name	Part no.	ISD300	ISD400
	Alignment unit for DME4000/ISD400, aluminum, anodized	BEF-ISD/DME	2046052	–	●
	Ball joint bracket, steel, zinc coated, incl. mounting material	BEF-KK-W45	2011436	–	●

For dimensional drawings, please see page J-364.

J

Position finders

Other mounting accessories

	Brief description	Model name	Part no.	DMP2	DMP3
	Set of sliding nuts, M5, 4 pcs	Sliding nuts	2017550	–	●

Plug connectors and cables

	Brief description	Model name	Part no.	DMP2	DMP3
	Female connector, M12, 8-pin, straight, 2 m, PVC, shielded	DOL-1208-G02MA	6020633	●	●
	Female connector, M12, 8-pin, straight, 5 m, PVC, shielded	DOL-1208-G05MA	6020993	●	●
Illustration may differ	Female connector, M12, 8-pin, straight, 10 m, PVC, shielded	DOL-1208-G10MA	6022152	●	●
	Female connector, M12, 8-pin, straight, 15 m, PVC, shielded	DOL-1208-G15MA	6022153	●	●
	Female connector, M12, 8-pin, straight, 30 m, PVC, shielded	DOL-1208-G30MA	6022242	●	●
	Female connector, M12, 8-pin, straight, 2 m, PUR halogen free	DOL-1208-G02MC	6035620	●	●
	Female connector, M12, 8-pin, straight, 5 m, PUR halogen free	DOL-1208-G05MC	6035621	●	●
	Female connector, M12, 8-pin, straight, 10 m, PUR halogen free	DOL-1208-G10MC	6035622	●	●
	Female connector, M12, 8-pin, straight, 15 m, PUR halogen free	DOL-1208-G15MC	6038559	●	●
	Female connector, M12, 8-pin, straight, 20 m, PUR halogen free	DOL-1208-G20MC	6038560	●	●
	Female connector, M12, 8-pin, straight, 10 m, PUR halogen free, shielded	DOL-1208-G10MAC	6038832	●	●
	Female connector, M12, 8-pin, straight, 15 m, PUR halogen free, shielded	DOL-1208-G15MAC	6038833	●	●
	Female connector, M12, 8-pin, straight, 5 m, PUR halogen free, 360° shielded	DOL-1208-G05MACR	6037517	●	●
	Female connector, M12, 8-pin, angled, 2 m, PVC, shielded	DOL-1208-W02MA	6020992	●	●
	Female connector, M12, 8-pin, angled, 5 m, PVC, shielded	DOL-1208-W05MA	6021033	●	●
	Female connector, M12, 8-pin, angled, 2 m, PUR halogen free	DOL-1208-W02MC	6035623	●	●
Illustration may differ	Female connector, M12, 8-pin, angled, 5 m, PUR halogen free	DOL–1208–W05MC	6035624	●	●
	Female connector, M12, 8-pin, angled, 10 m, PUR halogen free	DOL–1208–W10MC	6035625	●	●
	Female connector, M12, 8-pin, straight	DOS-1208-G	6028422	●	●
	Female connector, M12, 8-pin, straight, shielded	DOS-1208-GA	6028369	●	●
	Female connector, M12, 8-pin, angled, shielded	DOS-1208-WA	6043358	●	●
	Male connector, M12, 8-pin, straight, shielded	STE-1208-GA	6028370	●	●

For dimensional drawings, please see page J-351.

J

Reflectors

	Brief description	Model name	Part no.	DMP2	DMP3
	Reflector, round, Ø 25.2 mm, material: PMMA/ABS, screw connection, M4 x 8 threaded bolts	P25	5315172	●	–
	Reflector, round, Ø 25.2 mm, material: PMMA/ABS, pluggable	P25-2	5318969	●	–
	Reflector, round, Ø 25.2 mm, material: PMMA/ABS, pluggable, package with 400 pieces	P25-2-A	5324298	●	–
	Reflector, round, Ø 28 mm, material: PMMA/ABS, pluggable	PL22-1	1003546	●	–
	Reflector, round, Ø 25.5 mm, material: PMMA/ABS, self-adhesive	PL22-2	1003621	●	–
	Reflector, round, Ø 28 mm, material: PMMA/ABS, pluggable for metal plates	PL22-3	1004488	●	–
	Reflector, 78 mm x 60 mm, material: PMMA/ABS, 2-hole mounting, screw connection	PL50A	1000132	●	–
	Reflector, 80 mm x 80 mm, material: PMMA/ABS, 2-hole mounting, screw connection	PL80A	1003865	●	–

For dimensional drawings, please see page J-361.

Terminal and alignment brackets

	Brief description	Model name	Part no.	DMP2	DMP3
	Alignment unit for DMP2, steel, zinc coated, incl. mounting material	BEF-GH-DMH2	2020796	●	–

Adapters/distributors

Adapter DME4000/5000
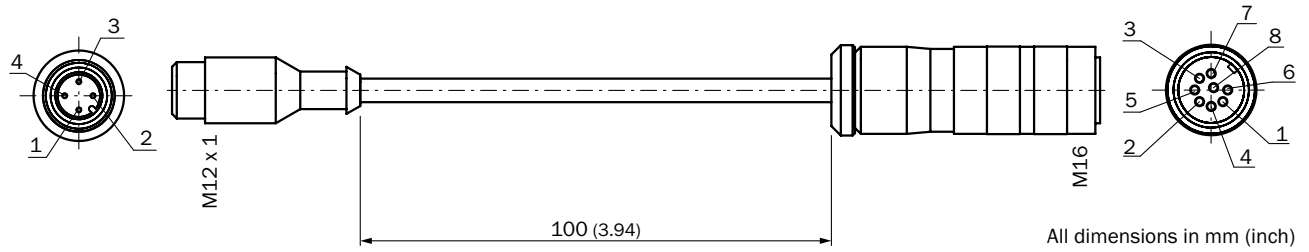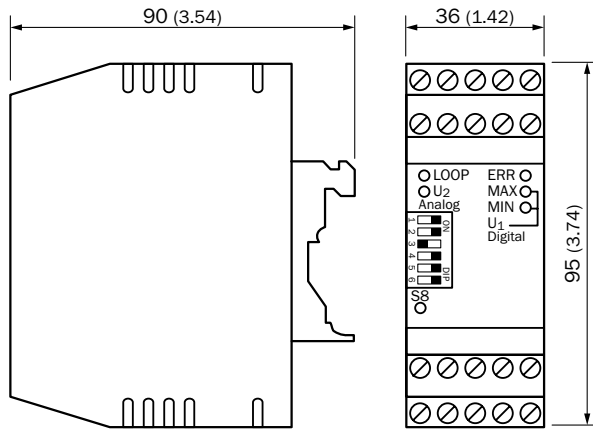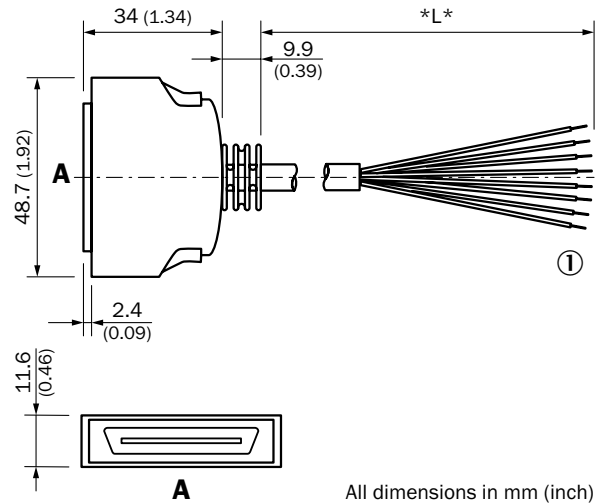
100 (3.94)

M12 x 1

M16

All dimensions in mm (inch)

HN.SK20.2

90 (3.54)

36 (1.42)

95 (3.74)

LOOP   ERR
U2   MAX
Analog   MIN
         U1
         Digital
S8

All dimensions in mm (inch)

IO-EXP-A0D5

34 (1.34)

9.9 (0.39)

L

48.7 (1.92)

A

2.4 (0.09)

11.6 (0.46)

A

①

① 50 pins, refer to manual

All dimensions in mm (inch)

TERM.-A0D/A0DG

14.8 (0.58)

26.7 (1.05)

26.7 (1.05)

46.8 (1.84)

46.8 (1.84)

13.9 (0.55)

L   R

All dimensions in mm (inch)

TERM.-A0D5

14.8 (0.58)

26.7 (1.05)

46.8 (1.84)

13.9 (0.55)

All dimensions in mm (inch)

Codes

Bar code tape 30 mm

All dimensions in mm (inch)

Bar code tape 40 mm

All dimensions in mm (inch)

J

BES-A4-0LM

210 (8.27)

297 (11.69)

DIN A4
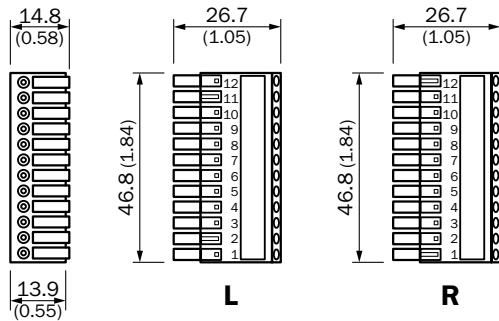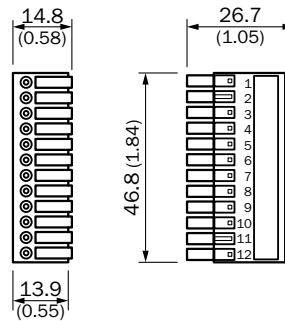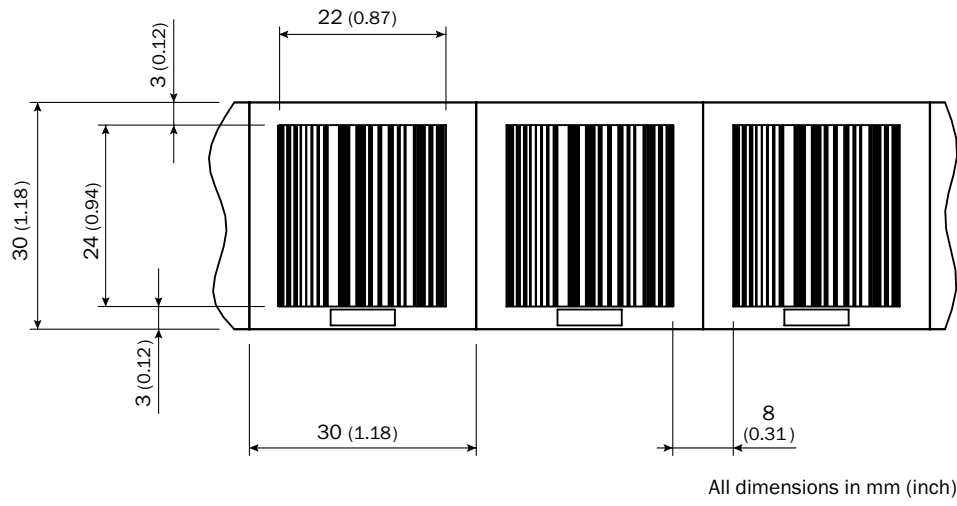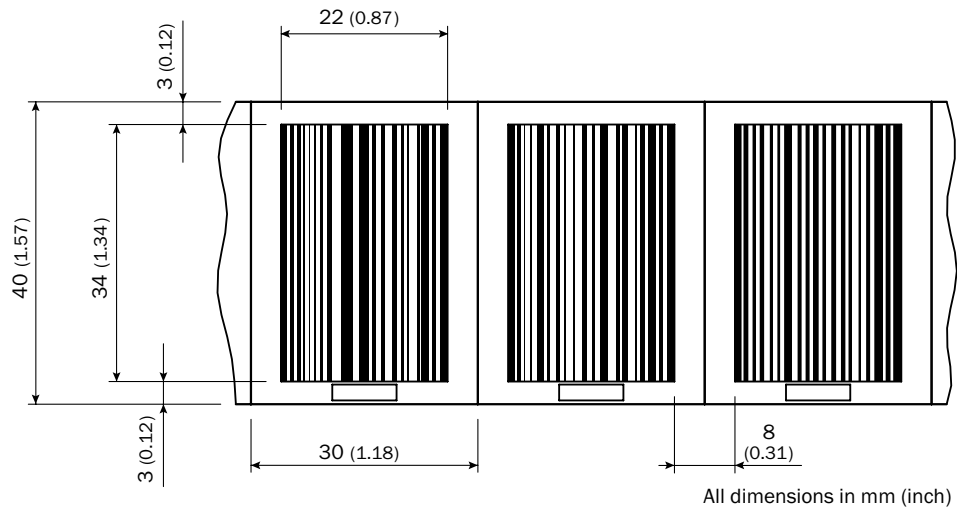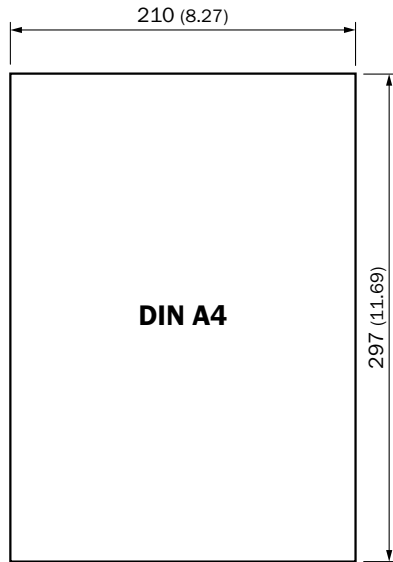
All dimensions in mm (inch)

Deflector mirrors

USP-DME5

101

85

111

60

65

244
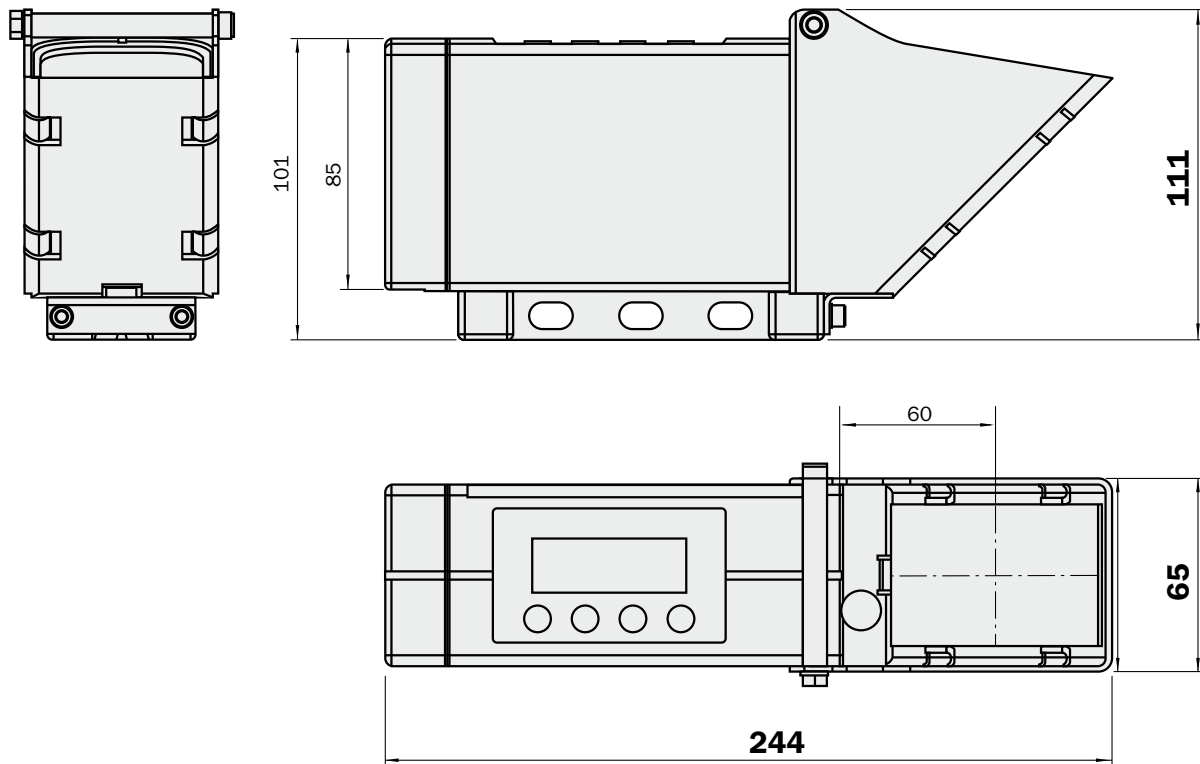
All dimensions in mm

USP-UM18

30 (1.18)

28 (1.10)

Ø 18.3 (0.72)

135°

14 (0.55)

29.4 (1.16)
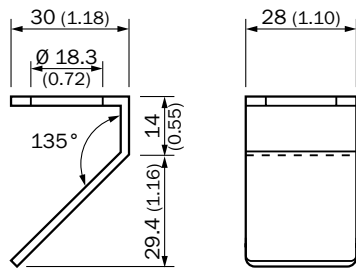
All dimensions in mm (inch)

USP-UM30

45 (1.77)

41 (1.61)

8.8 (0.35)

Ø 30 (1.18)

25.5 (1.00)

135°

25 (0.98)

18.8 (0.74)

44.4 (1.75)

Ø 5.5 (0.22)

All dimensions in mm (inch)

J
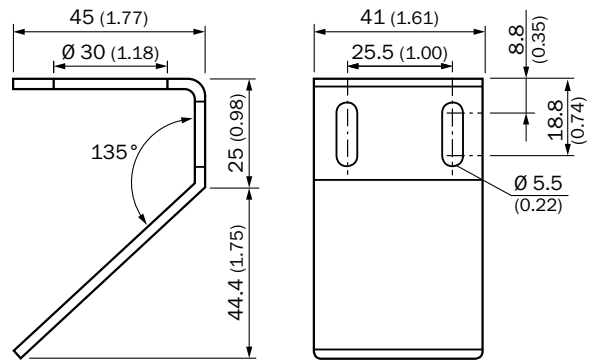
Device protection (mechanical)

BEF-KE-DME4000/5000
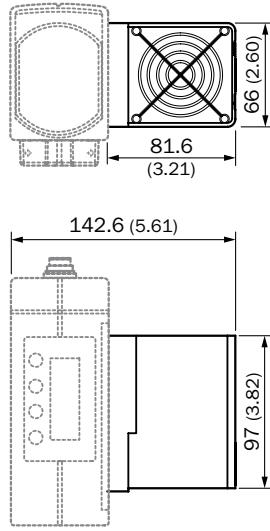
All dimensions in mm (inch)

BEF-KP-Dx50/DT20
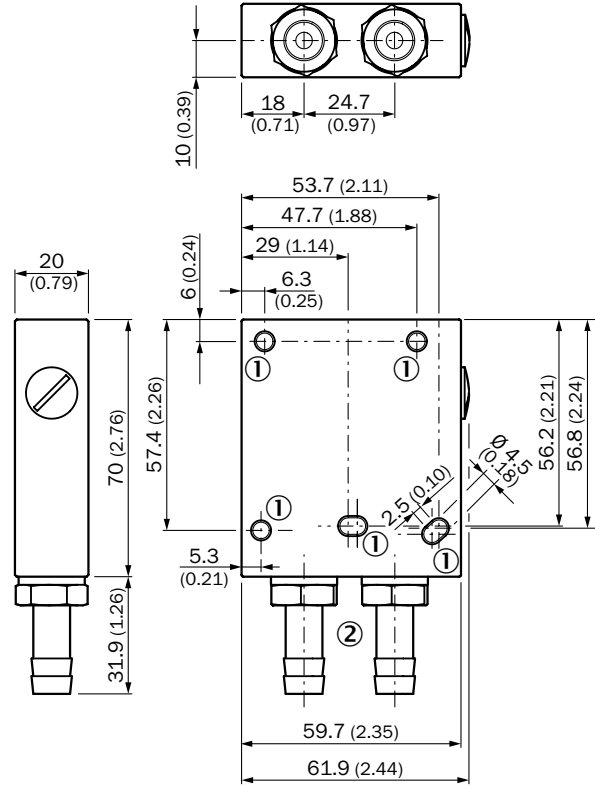
All dimensions in mm (inch)

① Mounting hole sensor
② Hose nozzle R1/4"

Control panel cover
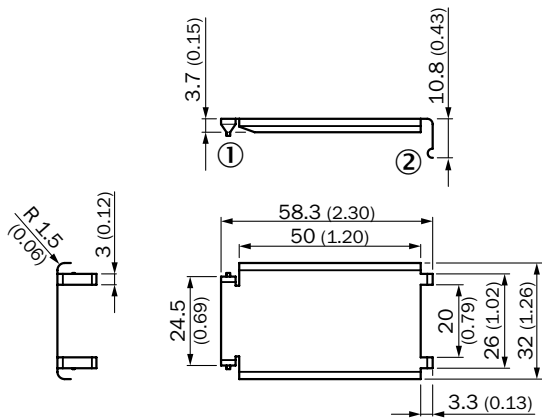
All dimensions in mm (inch)

① Catch display protection cover
② Snap-fit

Cooling Case DME4000/DME5000
Cooling Case DS500/DT500
Cooling Case DML/DMT
TPCC cooling housing ISD400 (Peltier element)
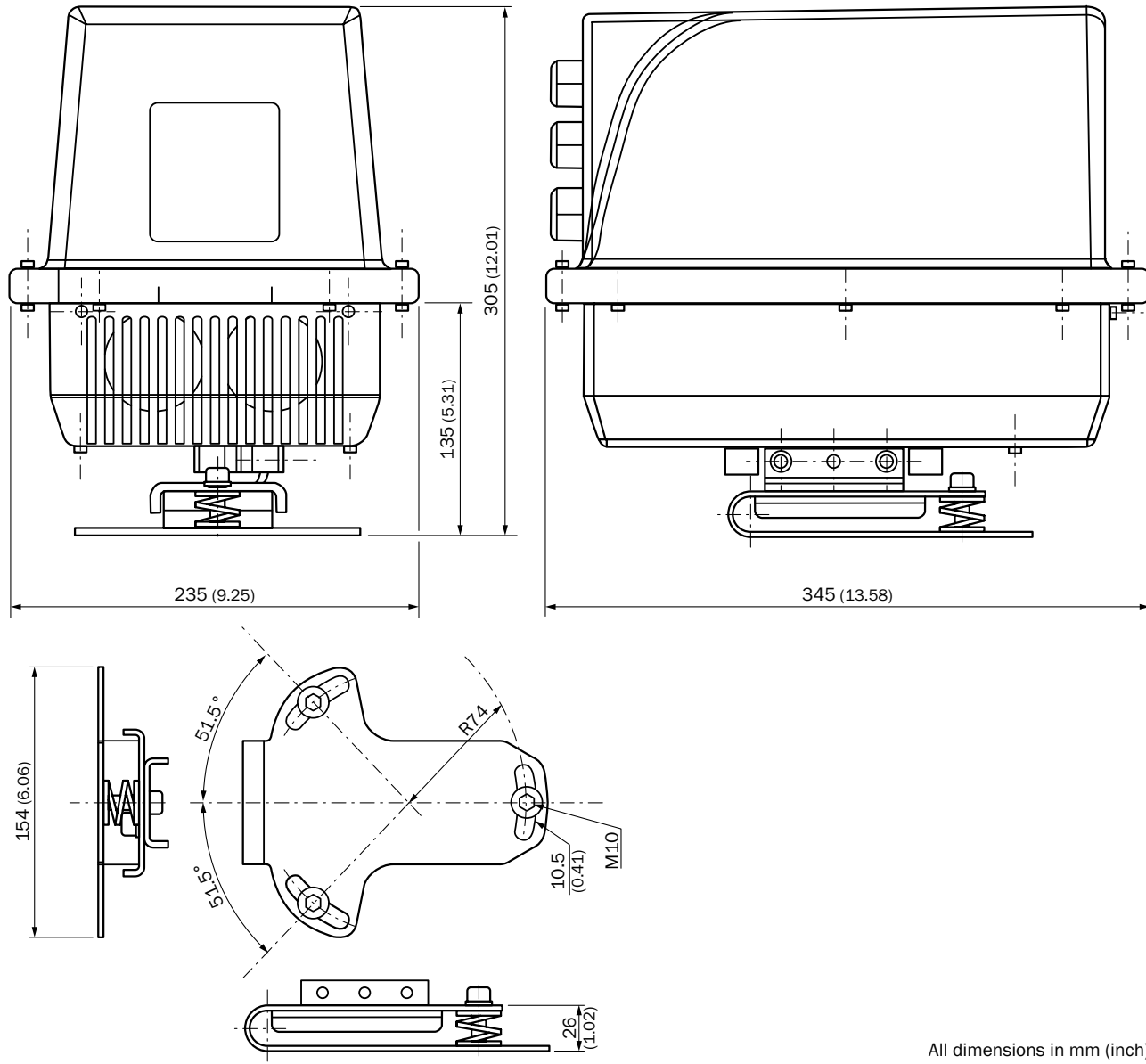
305 (12.01)

135 (5.31)

235 (9.25)

345 (13.58)

154 (6.06)

51.5°

51.5°

R74

M10

10.5 (0.41)

26 (1.02)

All dimensions in mm (inch)

J

Front heat protection cover

67.1 (2.64)
41 (1.61)
13 (0.51)
7.1 (0.28)
69 (2.72)
65.9 (2.60)
35.4 (1.40)
3°
56.1 (2.21)
10.9 (0.43)
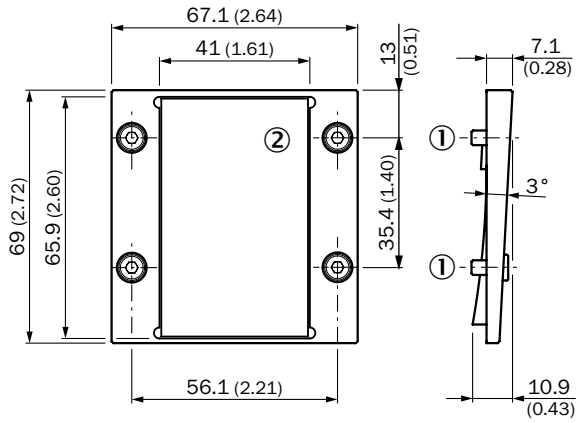
All dimensions in mm (inch)

① Mounting hole front heat protection cover
② Protective glass

LPC-DX50

36 (1.42)
15.8 (0.62)
67.6 (2.66)
3 (0.12)
R 38.2 (1.50)
11.7 (0.46)
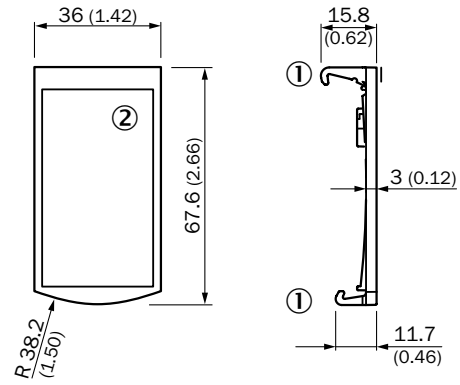
All dimensions in mm (inch)

① Snap-fit
② Protective glass

0BW-KHS-M02

160 (6.30)
50 (1.97)
58 (2.28)
26 (1.02)
47 (1.85)
42 (1.65)
107 (4.21)
50 (1.97)
48 (1.89)
45 (1.77)
Ø 5.2 (0.20)
6 (0.24)
2.5 (0.10)
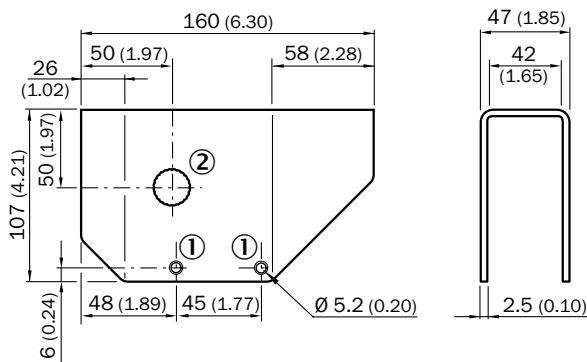
All dimensions in mm (inch)

① Mounting hole sensor (included in scope of supply)
② Universal bar clamp mounting

WSG-DME5

318.15

141.5

92.5

50.71

11.95

129.03

301.37
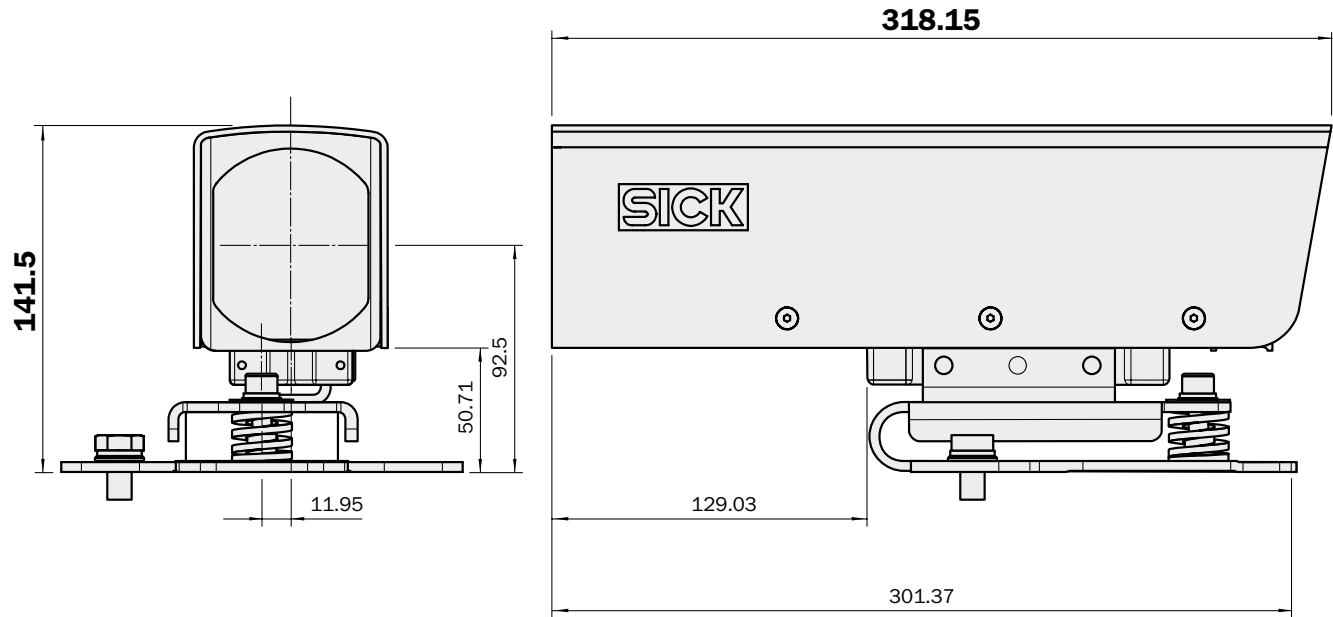
All dimensions in mm (inch)

WSG-DSDT

112 (4.41)   105 (4.13)

90 (3.54)

76.4 (3.01)

Ø 6.5 (0.26)

116.4 (4.59)

28.8 (1.13)

23.8 (0.94)

66 (2.60)

61.5 (2.42)

331.2 (13.04)

Ø 46 (1.81)

800.8 (31.53)

7.7 (0.30)

16.3 (0.64)
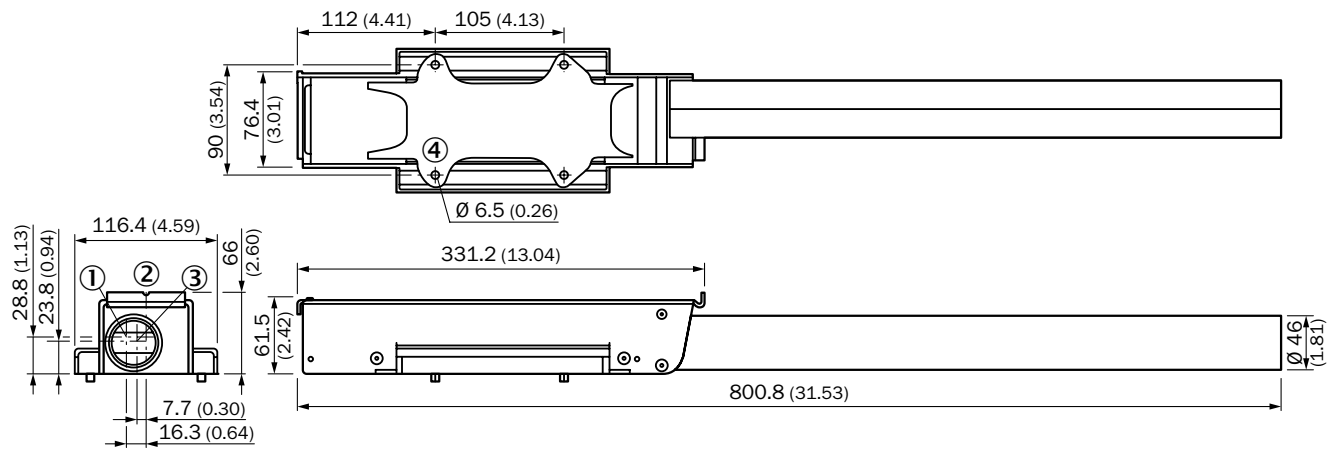
All dimensions in mm (inch)

① Optical axis, sender
② Alignment sight
③ Optical axis, receiver
④ Mounting hole

J

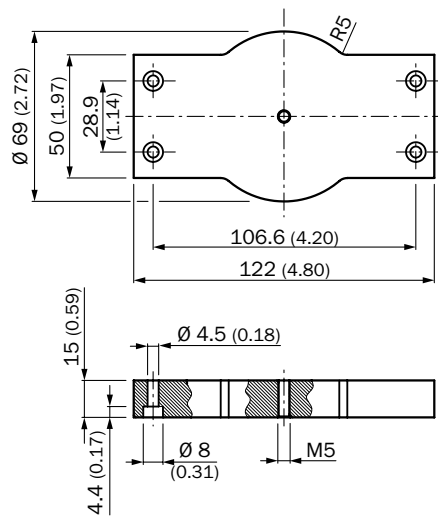## Lens and accessories

Tubus DMT
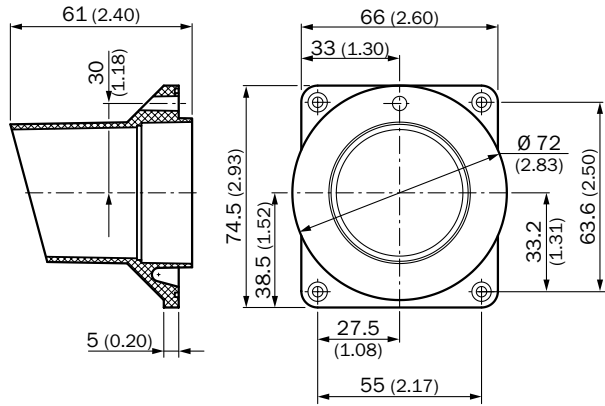
All dimensions in mm (inch)

Tubus DMT (short)
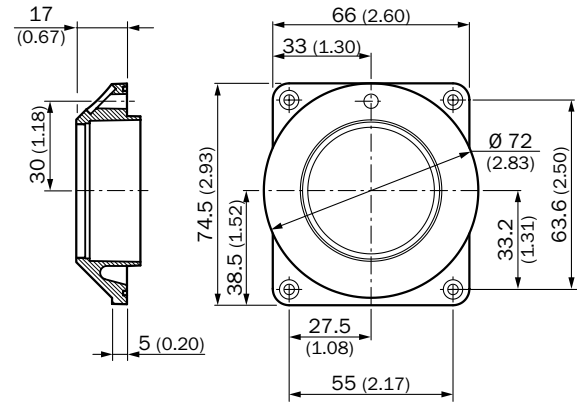
All dimensions in mm (inch)

Mounting brackets/plates

Adapter plate DME/DMD

All dimensions in mm (inch)

BEF-AH-DX50
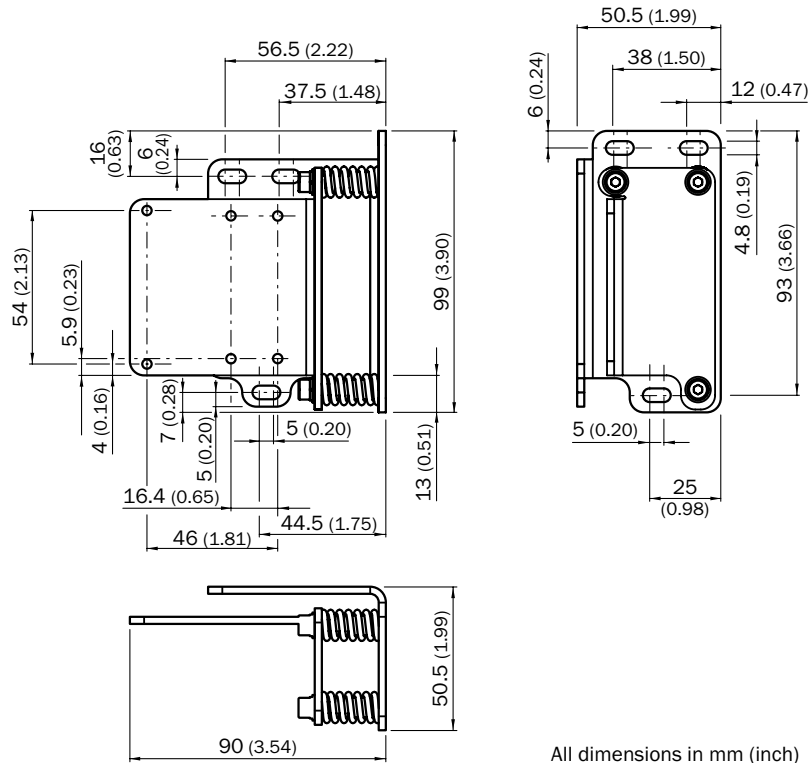
All dimensions in mm (inch)

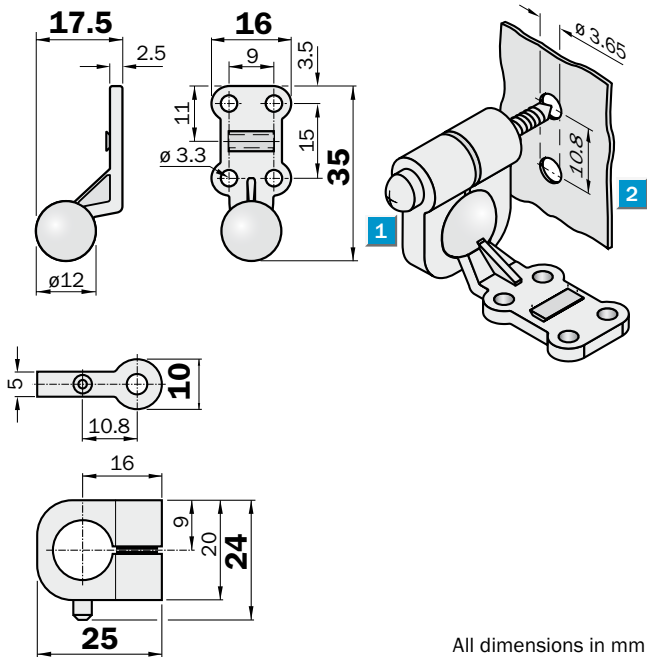**BEF-DME4000**
BEF-DME5000
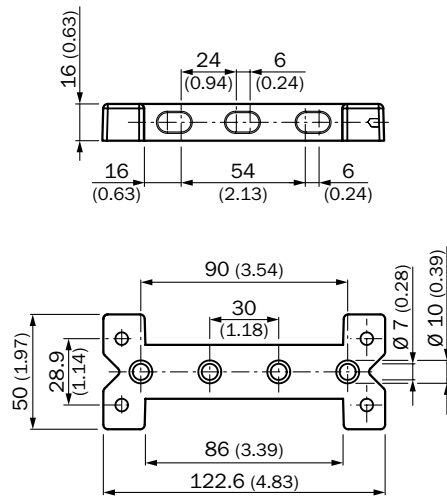
All dimensions in mm (inch)
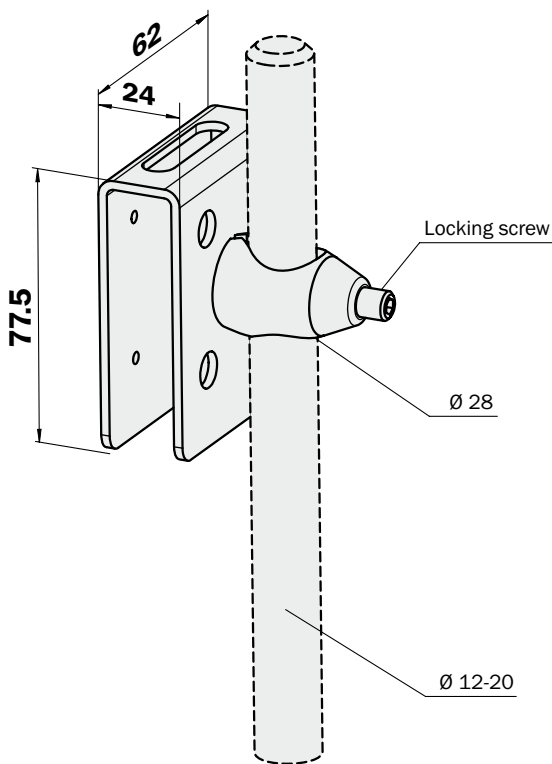
BEF-GH-DMH2

All dimensions in mm (inch)
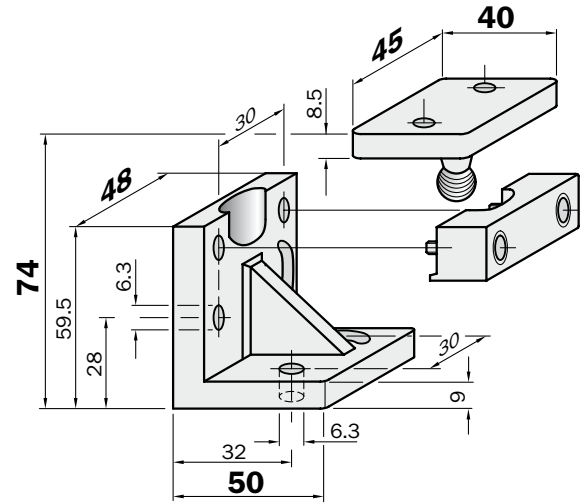
J

BEF-GH-MINI01

All dimensions in mm

① Self tapping screw Ø 4 mm
② Separate part for machine mounting

BEF-KK-W45

All dimensions in mm

BEF-SG-W12-3

Locking screw

Ø 28

Ø 12-20

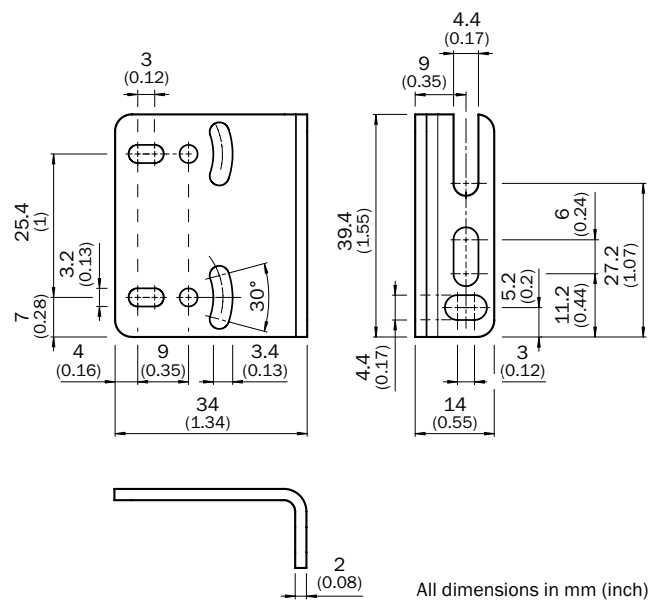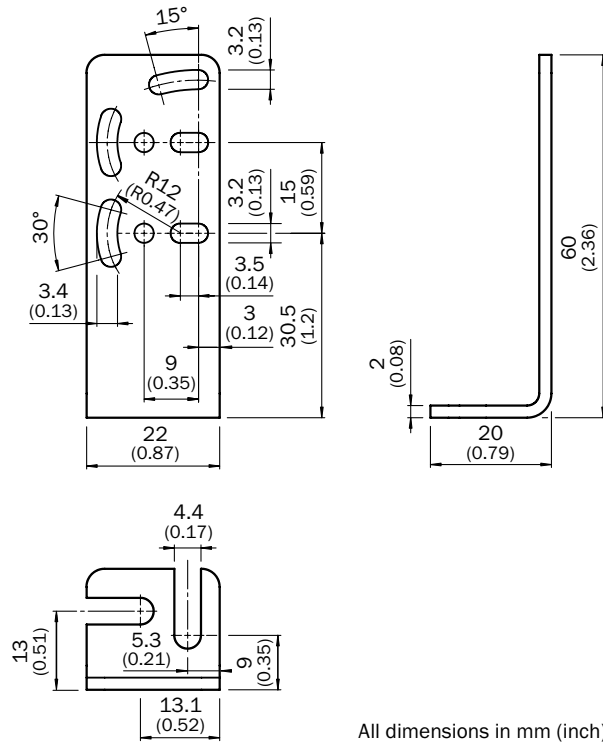All dimensions in mm

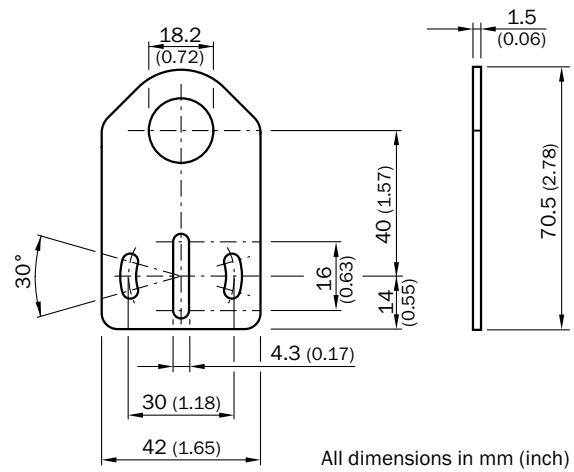## BEF-W4-A

All dimensions in mm (inch)
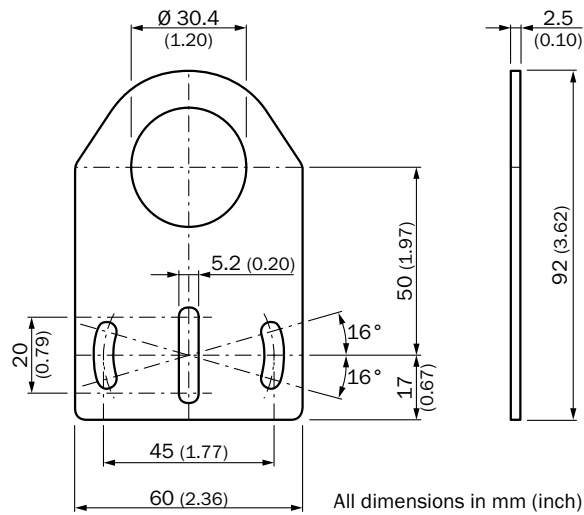
BEF-W4-B

All dimensions in mm (inch)

BEF-WG-M18
BEF-WG-M18N

All dimensions in mm (inch)

BEF-WG-M30

All dimensions in mm (inch)

BEF-WG-W12

All dimensions in mm (inch)

J

BEF-WINK-DME/ISD

100 (3.94)

13 (0.51)

300 (11.81)

300 (11.81)

M10 x 3

60 (2.36)

60 (2.36)

25 (0.98)

16 (0.63)

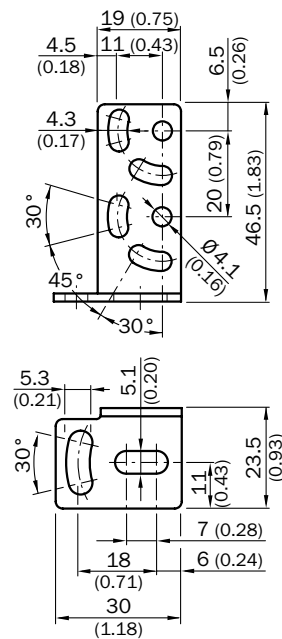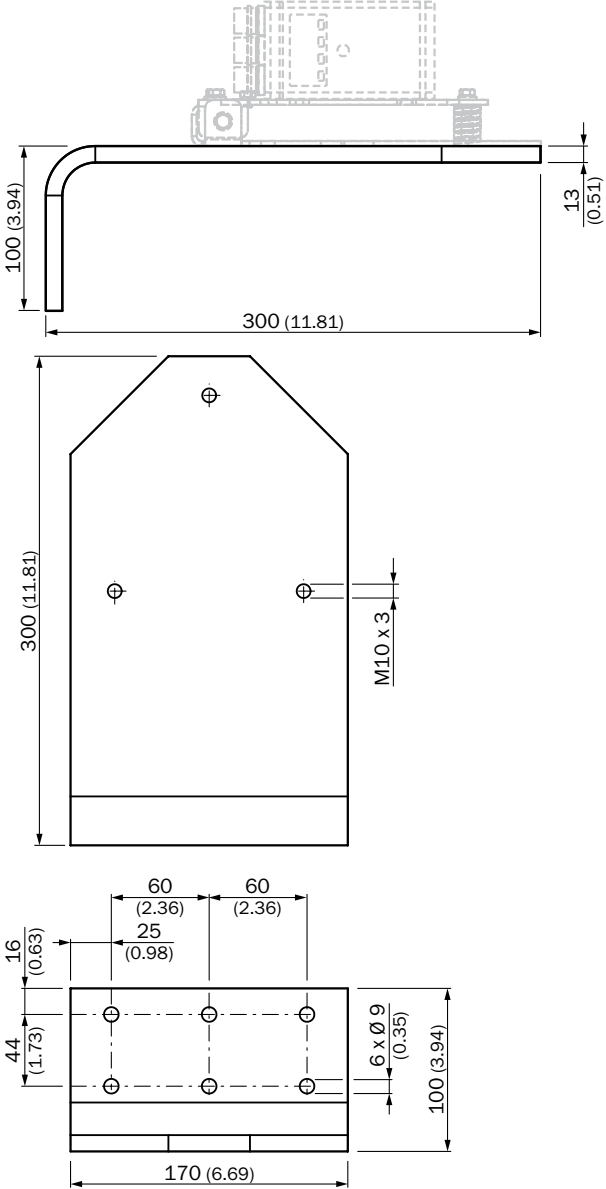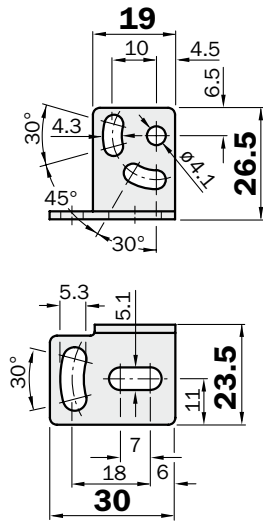44 (1.73)

6 x Ø 9 (0.35)

100 (3.94)

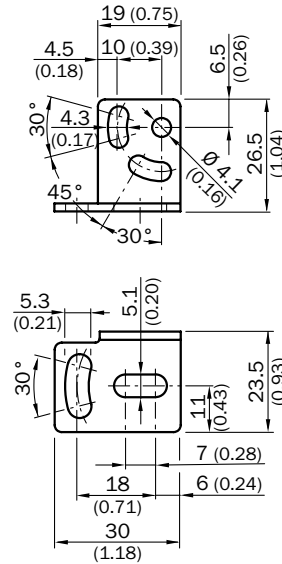170 (6.69)

All dimensions in mm (inch)

J

BEF-WK-W4

All dimensions in mm

BEF-WK-W12

All dimensions in mm (inch)

BEF-WN-DT20
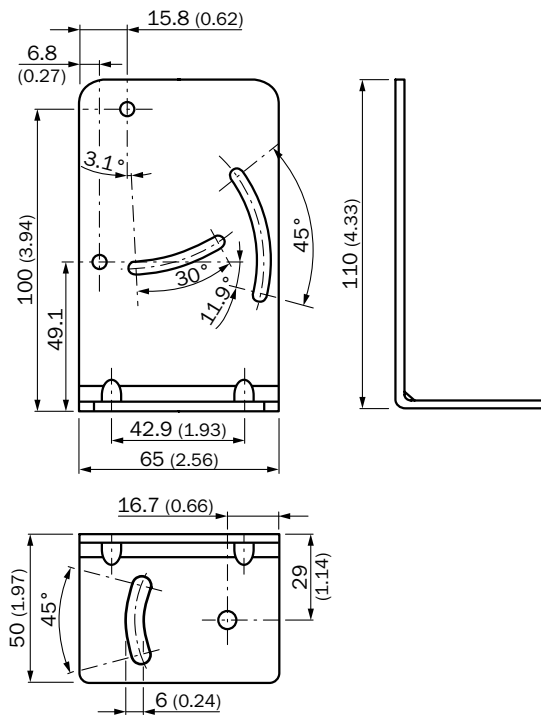
All dimensions in mm (inch)

BEF-WN-DX50
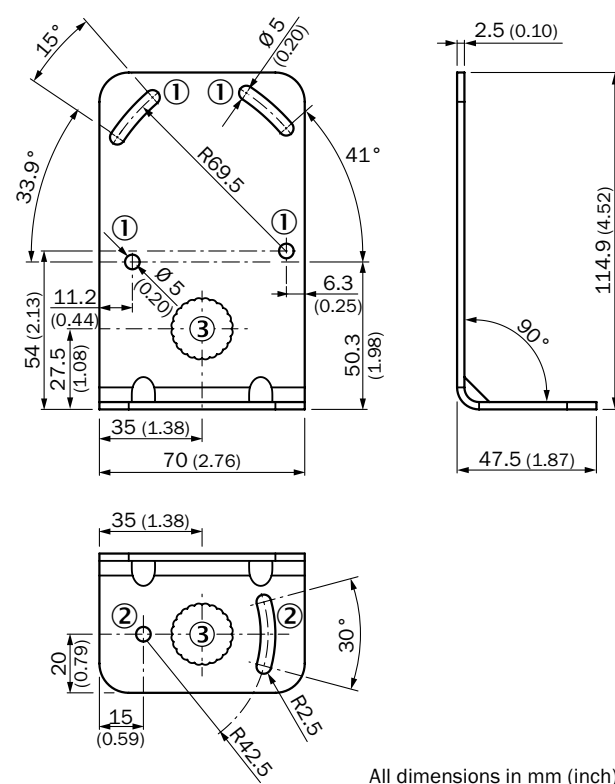
All dimensions in mm (inch)

① Mounting hole sensor
② Mounting hole bracket
③ Universal bar clamp mounting

BEF-WN-M18
BEF-WN-M18N

1.5 (0.06)

18.2 (0.72)

36.5 (1.44)

20 (0.79)

4.3 (0.17)

15° 15°

16 (0.63)

37 (1.46)

6 (0.24)　30 (1.81)

42 (1.65)

14 (0.55)
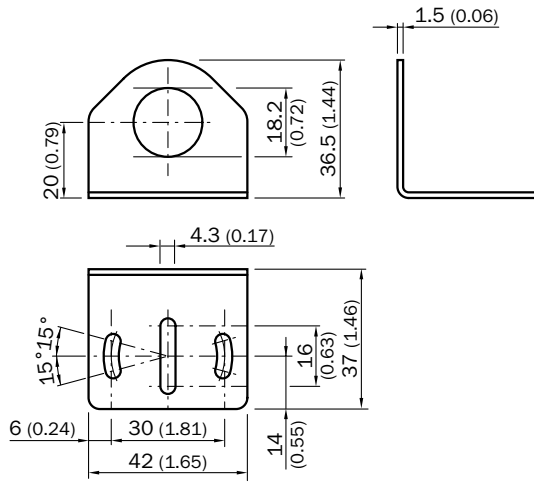
All dimensions in mm (inch)

BEF-WN-M18-ST02
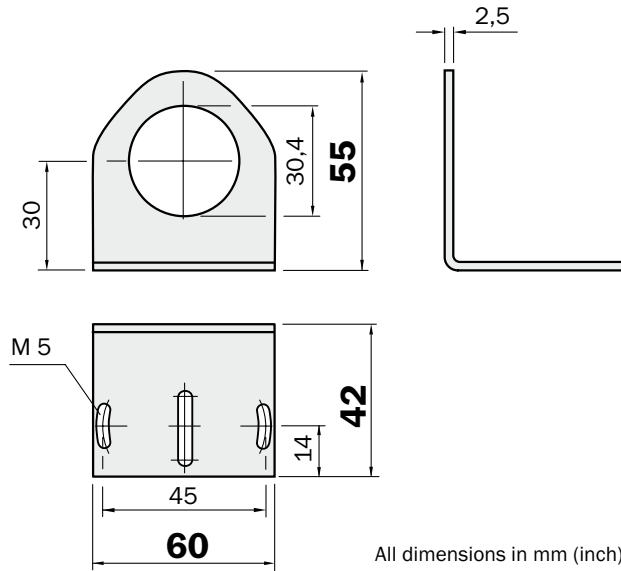
41.5

18.1

36

5.5

18

30°

4.1

5.5　　44　　5.5

55

All dimensions in mm (inch)

BEF-WN-M30

2,5

30,4

55

30

M 5

42

14

45

60

All dimensions in mm (inch)

BEF-WN-MH15-2V

M18x1

4

Ø 30

M18x1

All dimensions in mm (inch)

BEF-WN-0BW
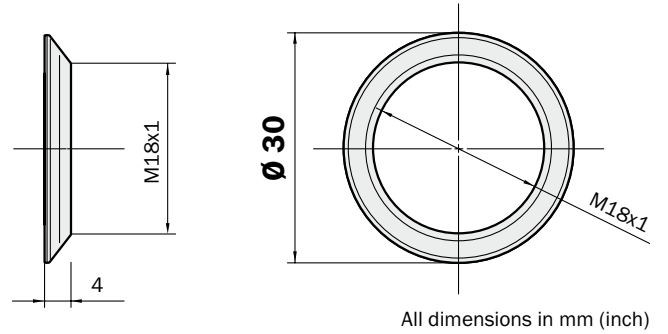
All dimensions in mm (inch)

BEF-WN-W45

All dimensions in mm (inch)
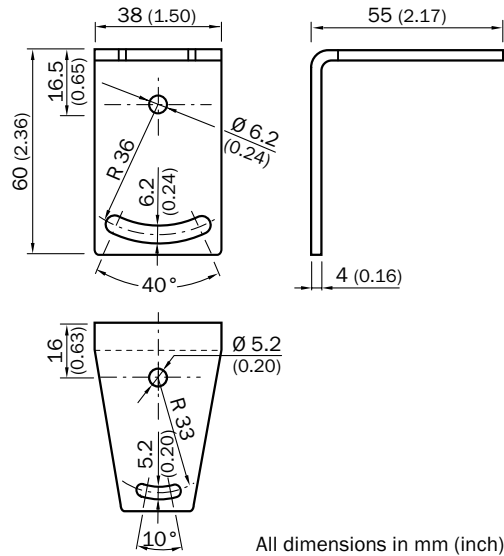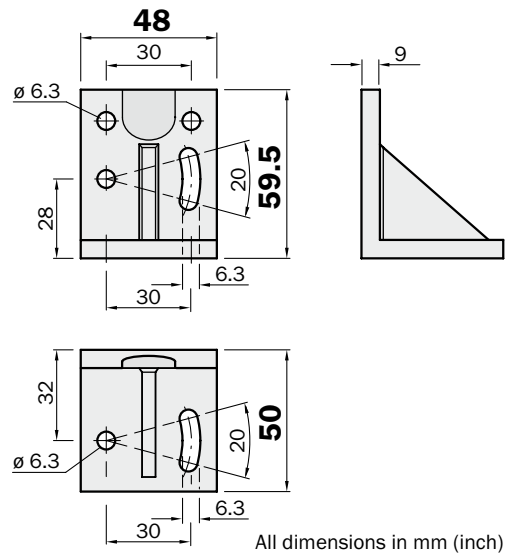
Plug connectors and cables

DOL-0803-G02M
DOL-0803-G05M
DOL-0803-G10M
DOL-0803-G15M

All dimensions in mm (inch)
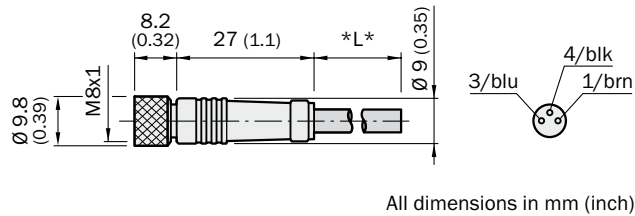
DOL-0803-G02MC
DOL-0803-G05MC
DOL-0803-G10MC
DOL-0803-G20MC

All dimensions in mm (inch)
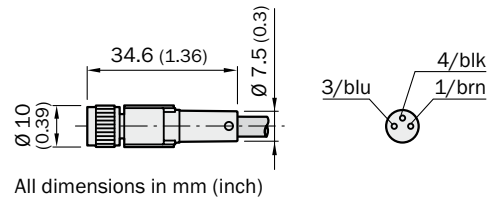
DOL-0803-W02M
DOL-0803-W05M
DOL-0803-W10M
DOL-0803-W15M

All dimensions in mm (inch)
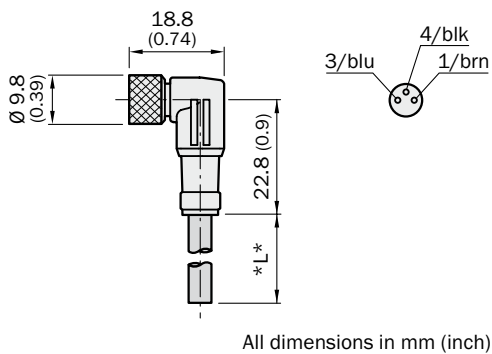
DOL-0803-W02MC
DOL-0803-W03MC
DOL-0803-W05MC
DOL-0803-W10MC

All dimensions in mm (inch)
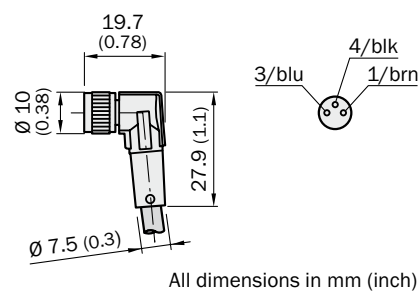
DOL-1204-G02M   DOL-1204-G02MC   DOL-1204-W02M
DOL-1204-G05M   DOL-1204-G05MC   DOL-1204-W05M
DOL-1204-G10M   DOL-1204-G10MC   DOL-1204-W10M
DOL-1204-G15M   DOL-1204-G15MC   DOL-1204-W15M
DOL-1204-G20M   DOL-1204-G20MC   DOL-1204-W20M
DOL-1204-G05MA   DOL-1204-G25MC   DOL-1204-W05MA
DOL-1204-G10MA
DOL-1204-G05MAC
DOL-1204-G10MAC
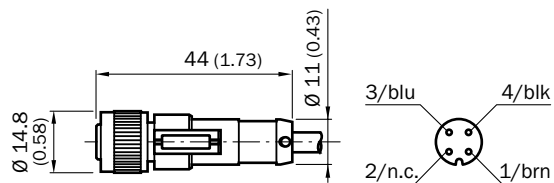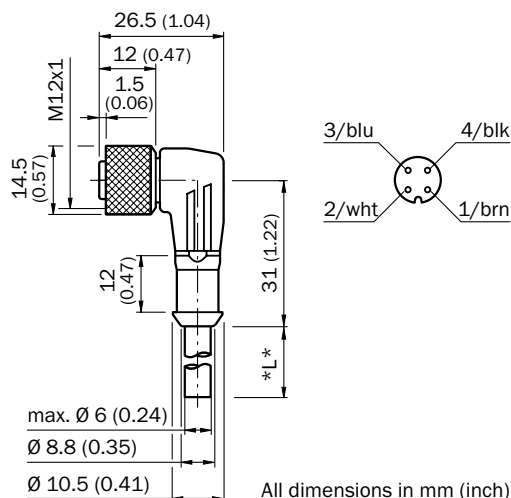
All dimensions in mm (inch)

DOL-1204-W02MC   DOL-1205-G02M
DOL-1204-W05MC   DOL-1205-G05M
DOL-1204-W10MC   DOL-1205-G10M
DOL-1204-W15MC   DOL-1205-G15M
DOL-1204-W25MC

All dimensions in mm (inch)
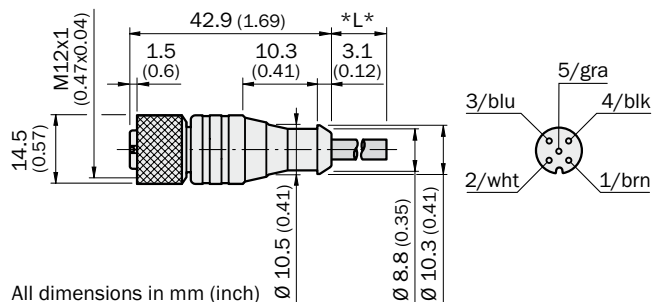
All dimensions in mm (inch)

DOL-1205-G05MAC   DOL-1205-G02MC
DOL-1205-G10MAC   DOL-1205-G05MC
DOL-1205-G20MAC   DOL-1205-G09MC
                         DOL-1205-G10MC

All dimensions in mm (inch)
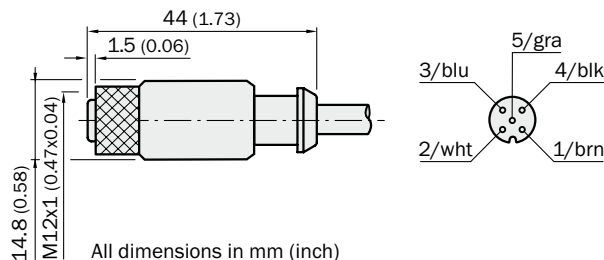
All dimensions in mm (inch)

DOL-1205-G06MK
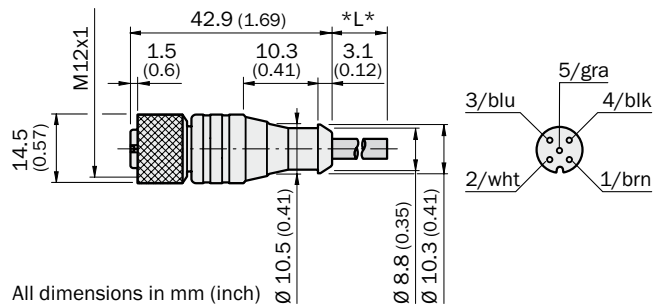
All dimensions in mm (inch)

DOL-1205-G05MQ
DOL-1205-G10MQ
DOL-1205-G12MQ
DOL-1205-G15MQ
DOL-1205-G20MQ
DOL-1205-G30MQ
DOL-1205-G50MQ
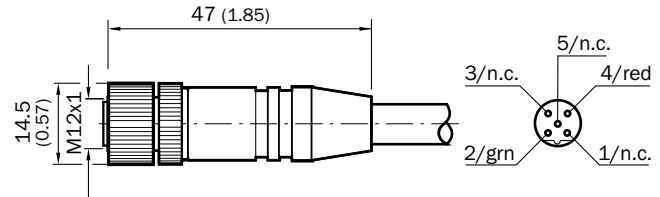
All dimensions in mm (inch)

DOL-1205-W02M
DOL-1205-W05M
DOL-1205-W10M
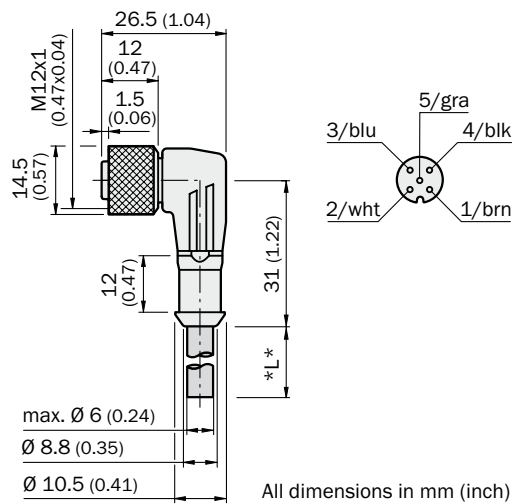
All dimensions in mm (inch)

DOL-1205-W02MC
DOL-1205-W05MC
DOL-1205-W10MC
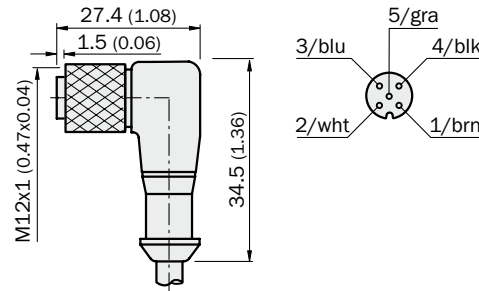
All dimensions in mm (inch)

DOL-1205-W02MAC
DOL-1205-W05MAC
DOL-1205-W10MAC
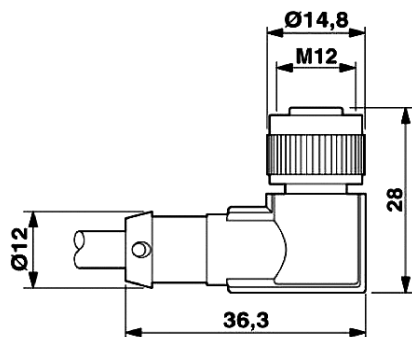
All dimensions in mm

DOL-1205-W05MQ
DOL-1205-W10MQ
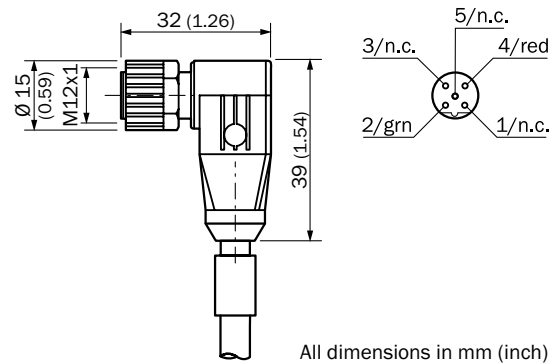
All dimensions in mm (inch)

DOL-1208-G02MA
DOL-1208-G05MA
DOL-1208-G10MA
DOL-1208-G15MA
DOL-1208-G30MA
DOL-1208-G10MAC
DOL-1208-G15MAC

44.5 (1.75)

Ø 14.8 (.58)
M12

5 6 4 7 3 1 2 8
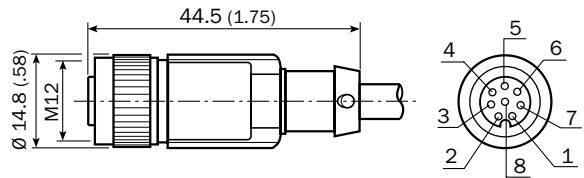
All dimensions in mm (inch)

DOL-1208-G02MAH1
DOL-1208-G05MAH1
DOL-1208-G10MAH1
DOL-1208-G20MAH1

43 (1.69)
1.5 (0.06)

Ø 14.5 (0.57)
M12x1

5/gra
4/yel 6/pnk
3/grn 7/blu
2/brn 1/wht
8/red
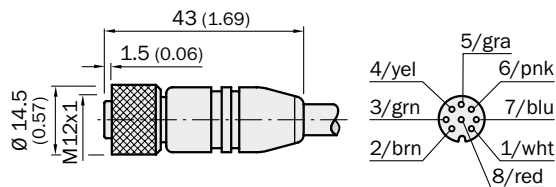
All dimensions in mm (inch)

DOL-1208-G02MC
DOL-1208-G05MC
DOL-1208-G10MC
DOL-1208-G15MC
DOL-1208-G20MC

44 (1.73)
Ø 11 (0.43)
Ø 14.8 (0.58)

5/gra
4/yel 6/pnk
3/grn 7/blu
2/brn 1/wht
8/red

All dimensions in mm (inch)

DOL-1208-G05MACR

43 (1.69)
1.5 (0.06)

14.5 (0.57)
M12x1

5/grey
4/yel 6/pnk
3/grn 7/blu
2/brn 1/wht
8/red
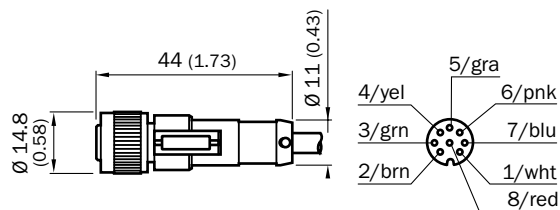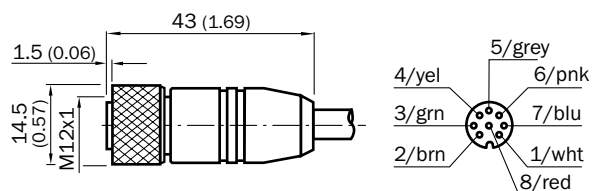
All dimensions in mm (inch)

DOL-1208-G02MF
DOL-1208-G05MF
DOL-1208-G10MF

43
1.5

14.5
M12x1

R_min

5/gra 6/pnk
4/blk 7/vio
3/blu 8/ora
2/wht 1/brn
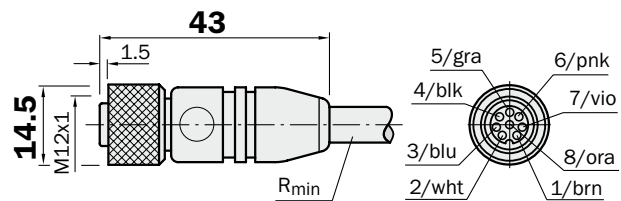
All dimensions in mm

DOL-1208-W02MA
DOL-1208-W02MAS01
DOL-1208-W05MA
DOL-1208-W02MC
DOL-1208-W05MC
DOL-1208-W10MC

27.4 (1.08)
Ø 14.8 (0.58)
34.5 (1.36)
Ø 11 (0.43)

5/gra
4/yel 6/pnk
3/grn 7/blu
2/brn 1/wht
8/red
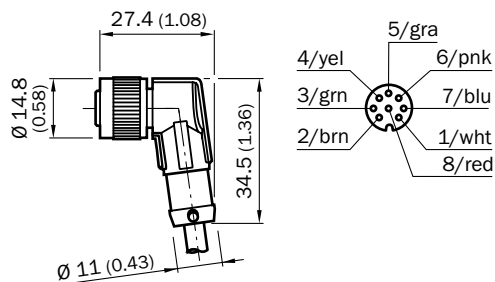
All dimensions in mm (inch)

DOL-1212-G05M
DOL-1212-G10M
DOL-1212-G20M

42.3 (1.67)
L
12.7 (0.50)
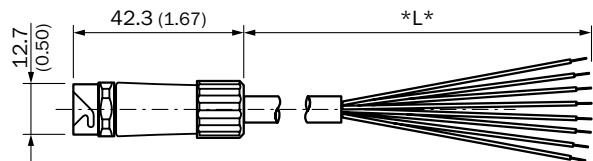
All dimensions in mm (inch)

DOL-1608-G05MA
DOL-1608-G10MA
DOL-1608-G50MA
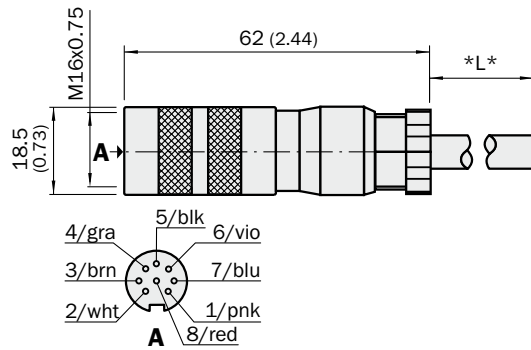
All dimensions in mm (inch)

DOL-1608-W05MA
DOL-1608-W10MA
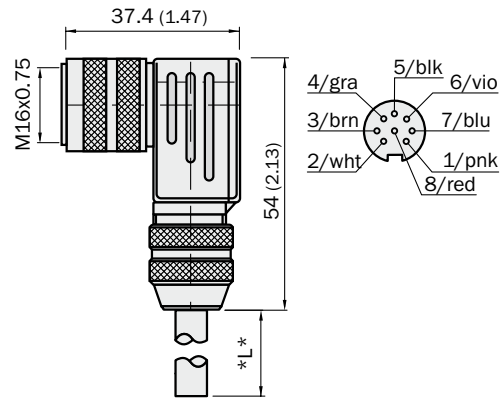
All dimensions in mm (inch)

DOL-1608-10MS
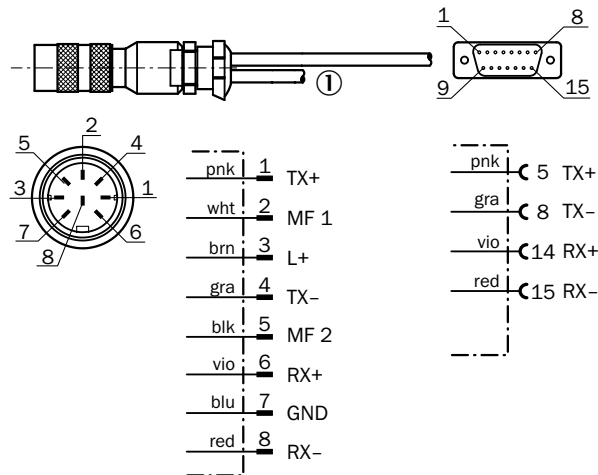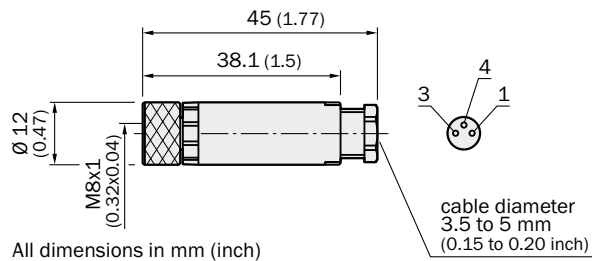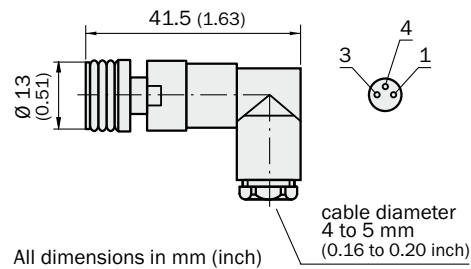
	pin	signal
pnk	1	TX+
wht	2	MF 1
brn	3	L+
gra	4	TX–
blk	5	MF 2
vio	6	RX+
blu	7	GND
red	8	RX–

	pin	signal
pnk	5	TX+
gra	8	TX–
vio	14	RX+
red	15	RX–

① Supply cable

DOS-0803-G

cable diameter
3.5 to 5 mm
(0.15 to 0.20 inch)

All dimensions in mm (inch)

DOS-0803-W

cable diameter
4 to 5 mm
(0.16 to 0.20 inch)

All dimensions in mm (inch)

J

DOS-1204-G

52.5 (2.07)
20 (0.79)
M12x1

3   4
2   1

cable diameter
3 to 6.5 mm
(0.12 to 0.26)

All dimensions in mm (inch)

DOS-1204-W

35 (1.38)
Ø 20 (0.79)
M12x1
27.5 (1.08)
37.5 (1.48)

3   4
2   1

cable diameter
3 to 6.5 mm
(0.12 to 0.26)
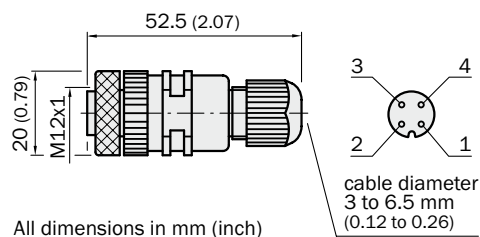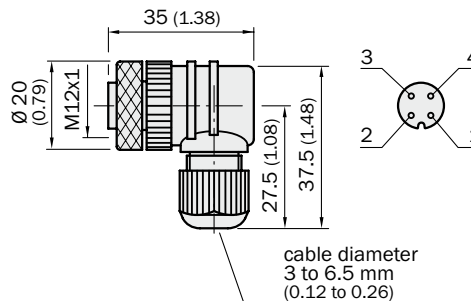
All dimensions in mm (inch)

DOS-1205-G
DOS-1205-GA
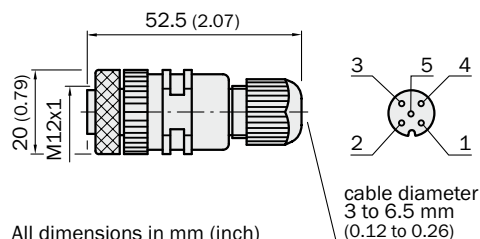
52.5 (2.07)
20 (0.79)
M12x1

3   5   4
2   1

cable diameter
3 to 6.5 mm
(0.12 to 0.26)

All dimensions in mm (inch)

DOS-1205-GQ

60 (2.36)
M12x1
20 (0.79)

3   5   4
2   1

(mating side)

All dimensions in mm (inch)

DOS-1205-W

M12x1 (0.47x0.04)
35 (1.38)
20 (0.79)
27.5 (1.08)
37.5 (1.48)

3   5   4
2   1

cable diameter
3 to 6.5 mm
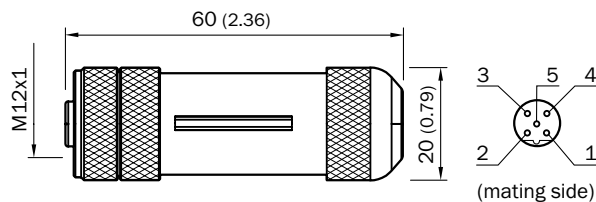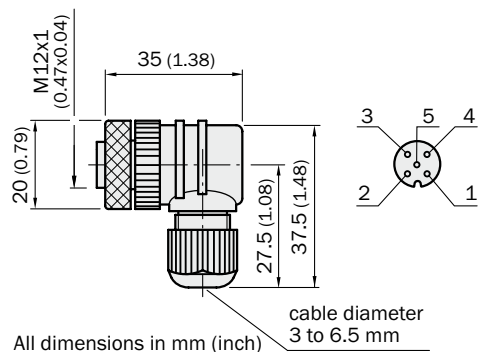
All dimensions in mm (inch)

DOS-1208-G
DOS-1208-GA

54 (2.13)
Ø 20 (0.79)

4   5   6
3   7
2   1
      8

cable diameter
3 to 6.5 mm
(0.12 to 0.26)

All dimensions in mm (inch)

DOS-1208-WA

Ø 19 (0.75)
M12
approx. 48 (1.89)
SW 13
approx. 41 (1.61)

All dimensions in mm (inch)

DOS-1608-GA

62
18.5
M16x0.75

Cable-ø
6 to 8 mm

2/wht   4/gra
5/blk   1/ros
3/brn   8/red
7/blu   6/vio

All dimensions in mm

J

DOS-1608-WA

2/wht   4/gra
5/blk
1/ros
3/brn   8/red
7/blu
6/vio

20

54

37.4

M 16 x 0.75
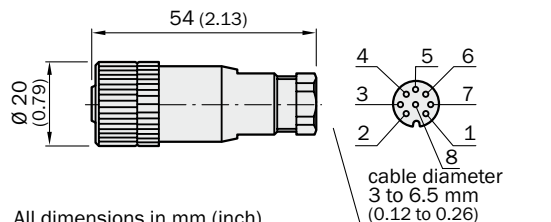
All dimensions in mm
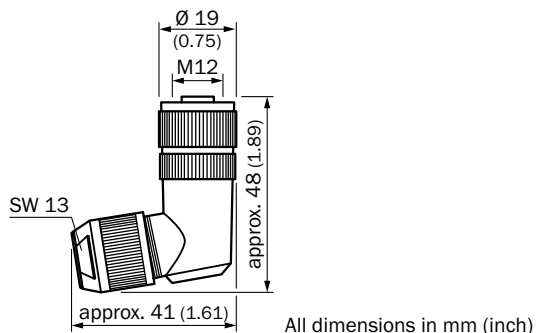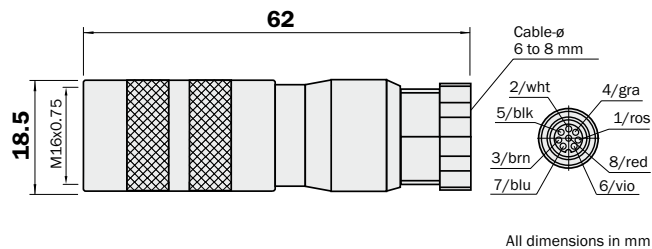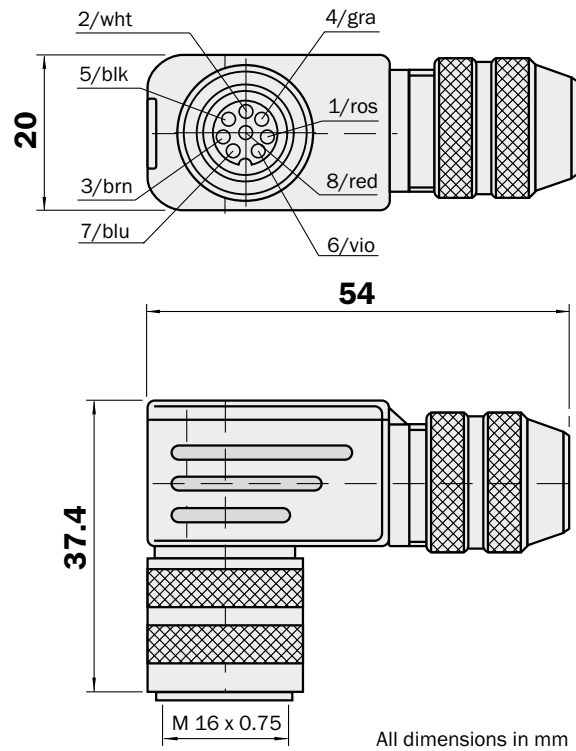
DOS-7805-GK
DOS-7805-GKEND

1 (0.04)   60 (2.36)

Ø 26 (1.02)

All dimensions in mm (inch)

DSC-1608-1208

①   ②

42 (1.65)

58 (2.28)

400 (15.74)

All dimensions in mm (inch)

① Connector M16, 8-pin
② Connector M12, 8-pin

DSC-1612-1208

①   ②

42 (1.65)

58 (2.28)

400 (15.74)

All dimensions in mm (inch)
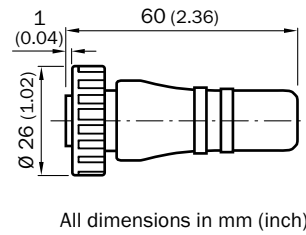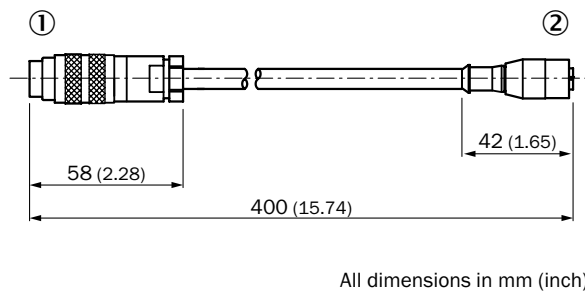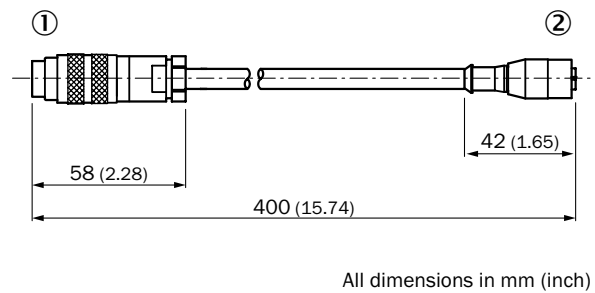
① Connector M16, 12-pin
② Connector M12, 8-pin

DSL-1205-G01MK
DSL-1205-G02MK
DSL-1205-G03MK
DSL-1205-G04MK
DSL-1205-G05MK
DSL-1205-G06MK

1.5 (0.06)   43 (1.69)   *L*   46.5 (1.83)   18.5 (0.73)

14.5 (0.57)

A

M12x1

12 (0.47)   30 (1.18)

14.5 (0.57)

B

M12x1

5/gra
3/blu   4/blk
2/wht   1/brn

A

5/gra
4/blk   3/blu
1/brn   2/wht

B

All dimensions in mm (inch)

DSL-1205-G10MQ

43 (1.69)   *L*   46.5 (1.83)

M12x1

1.5 (0.06)

12 (0.47)   30 (1.18)

Ø 13.5 (0.53)

15.8 (0.62)

Ø 1 (0.04)

14.5 (0.57)

A   **B**

3   5   4
2   1

A

4   5   3
1   2

B

All dimensions in mm (inch)

J
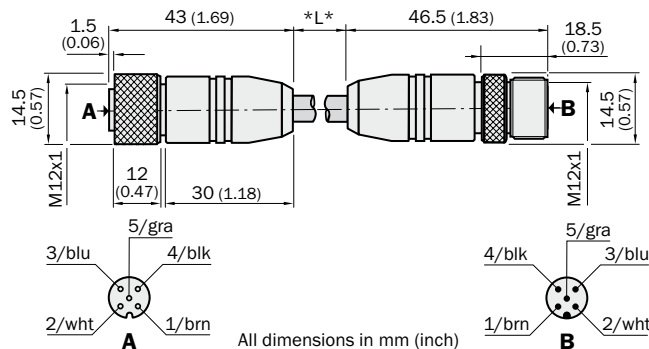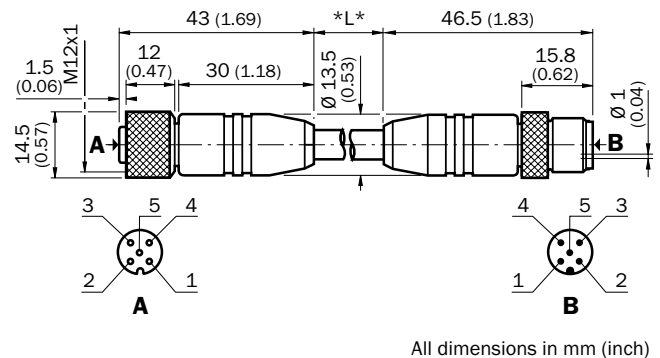
DSL-1212-G02M
DSL-1212-G05M
DSL-1212-G10M
DSL-1212-G20M
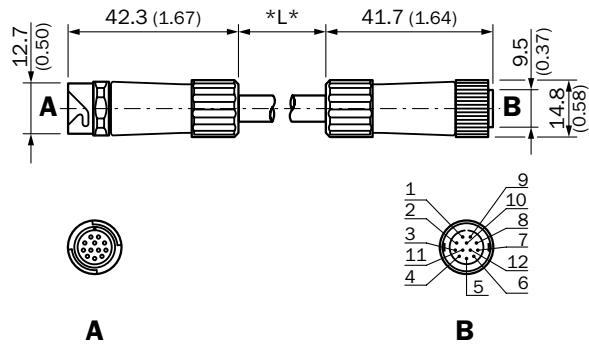
All dimensions in mm (inch)
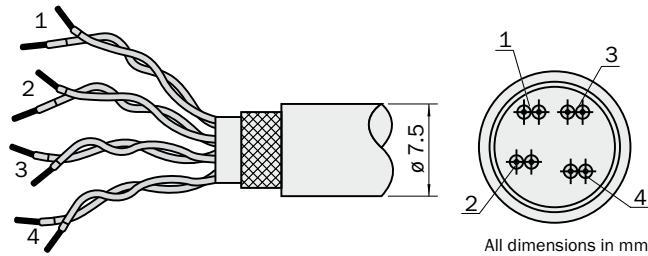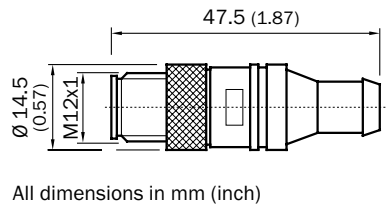
LEITUNG,DOSE/STE 10M0

pnk	1	TX+
wht	2	MF 1
brn	3	L+
gra	4	TX−
blk	5	MF 2
vio	6	RX+
blu	7	GND
red	8	RX−

pnk	5	TX+
gra	8	TX−
vio	14	RX+
red	15	RX−

① Supply cable

LTG-2308-MW

All dimensions in mm

PR-STE-1205-G

65 (5.56)

M12x1
Ø 1 (0.04)
20 (0.79)

(mating side)

All dimensions in mm (inch)

PR-STE-END

47.5 (1.87)

Ø 14.5 (0.57)
M12x1
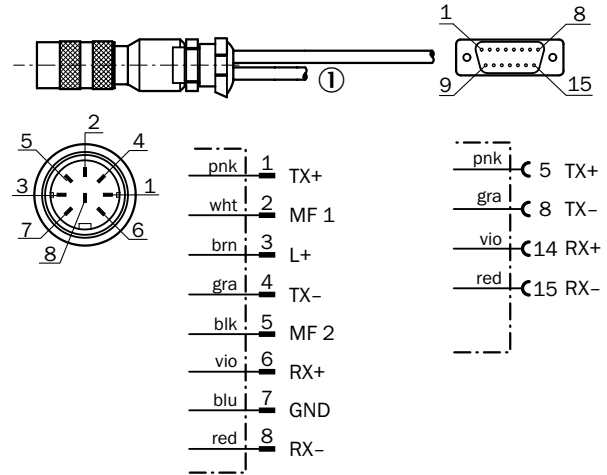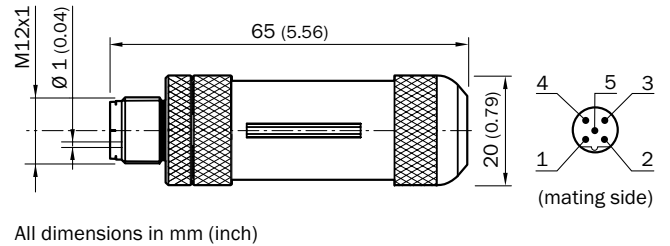
All dimensions in mm (inch)

SDO-02D78-SF

93

67
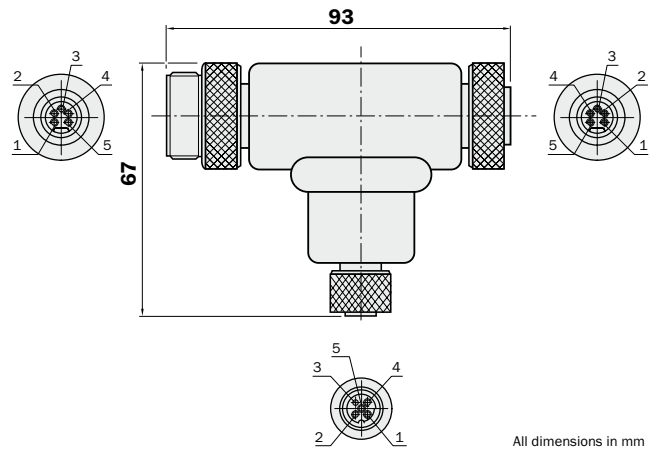
All dimensions in mm

SSL-2J04-G02ME
SSL-2J04-G03ME
SSL-2J04-G05ME
SSL-2J04-G10ME
SSL-2J04-G20ME
SSL-2J04-G25ME
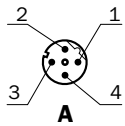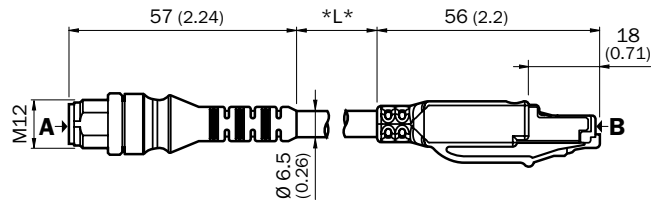
All dimensions in mm (inch)

STE-1204-G

cable diameter 3 to 6.5 mm (0.12 to 0.26)

All dimensions in mm (inch)

STE-1205-W

cable diameter 3 to 6.5 mm

All dimensions in mm (inch)

STE-1205-G

cable diameter 3 to 6.5 mm
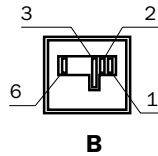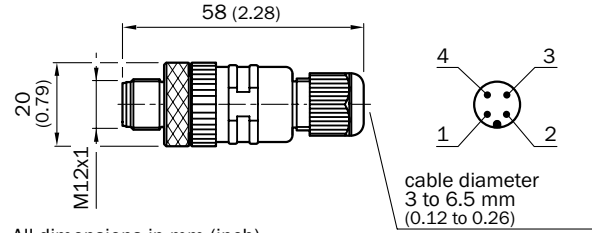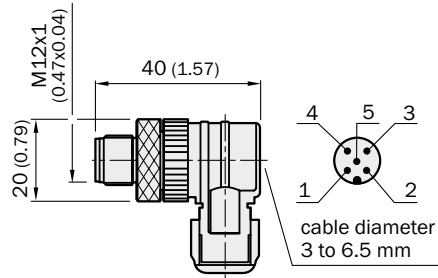
All dimensions in mm (inch)

STE-1205-GA

Cable diameter max. 4.5 to 7 mm
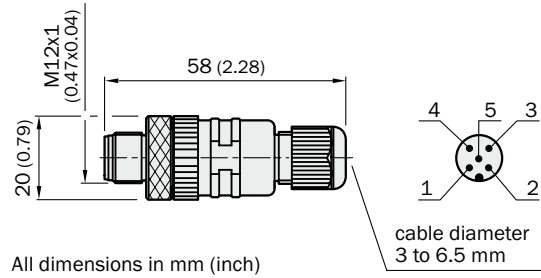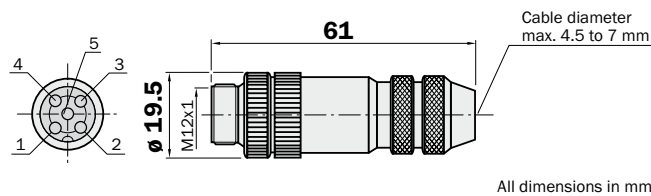
All dimensions in mm

STE-1205-GKEND

All dimensions in mm (inch)

STE-1208-GA

cable diameter 6 to 8 mm (0.24 to 0.31)
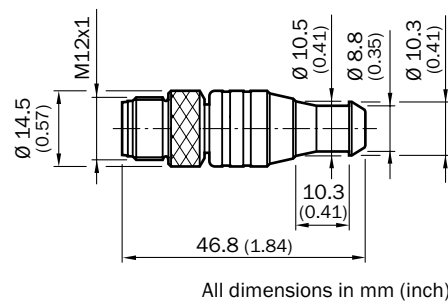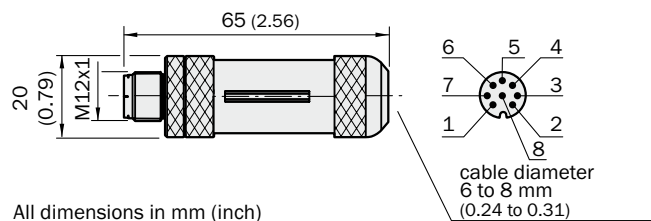
All dimensions in mm (inch)

STE-7805-GK

All dimensions in mm (inch)

J

STL-1204-G02MC
STL-1204-G10MC

46.8 (1.84)

Ø 11 (0.43)

Ø 14.8 (0.58)

4/blk   3/blu

1/brn   2/wht
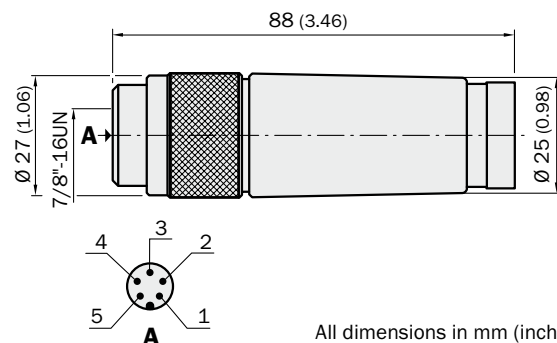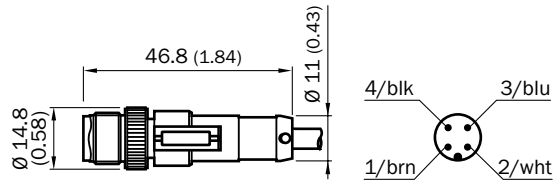
All dimensions in mm (inch)

STL-1204-W05MC
STL-1204-W15MC
STL-1204-W10MD34KM2

27.4 (1.08)

Ø 14.8 (0.55)

34.5 (1.36)

Ø 11 (0.43)

4/blk   3/blu

1/brn   2/wht
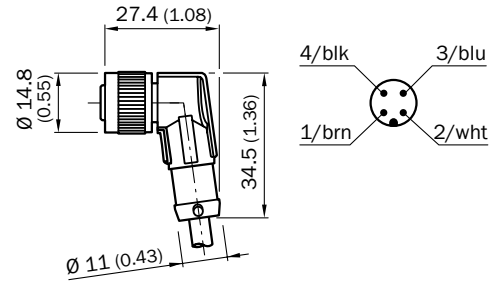
All dimensions in mm (inch)

STL-1205-G05MQ
STL-1205-G10MQ
STL-1205-G12MQ
STL-1205-G15MQ

44 (1.73)

14.5 (0.57)

5/n.c.

4/red   3/n.c.

1/n.c.   2/grn
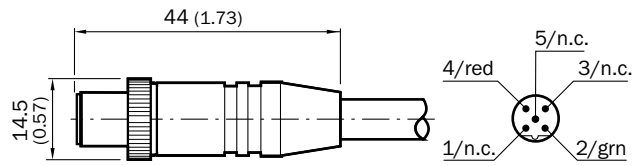
All dimensions in mm (inch)

STL-1205-W05MQ
STL-1205-W10MQ
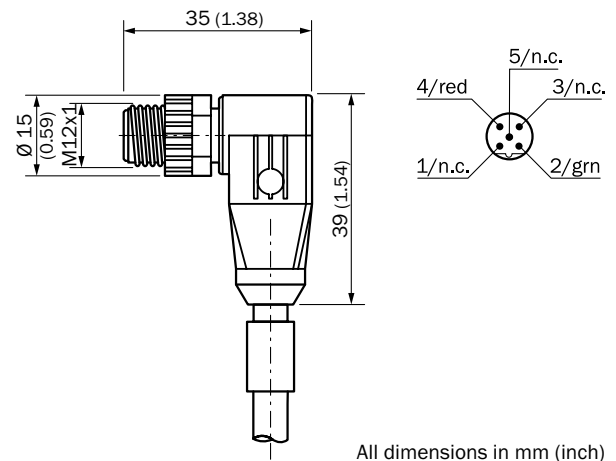
35 (1.38)

Ø 15 (0.59)
M12x1

39 (1.54)

5/n.c.

4/red   3/n.c.

1/n.c.   2/grn

All dimensions in mm (inch)

J

Reflectors

OBF-PL880F

Ø 160 (6.30)

252.4 (9.94)

252.4 (9.94)

All dimensions in mm (inch)

OP60-00

ø 82

M10

ø 77.7

100

ø 60

13

54.5

80

All dimensions in mm

P25

8.4

M4

ø **25.2**

7.5
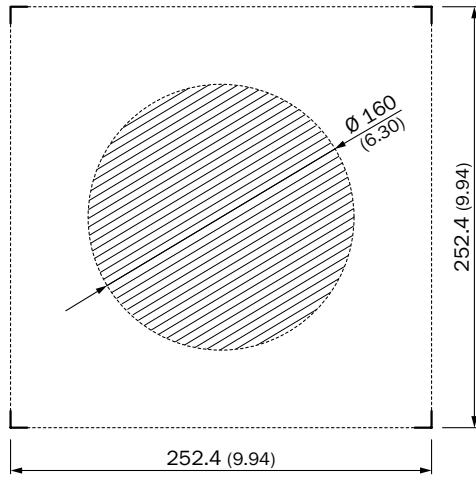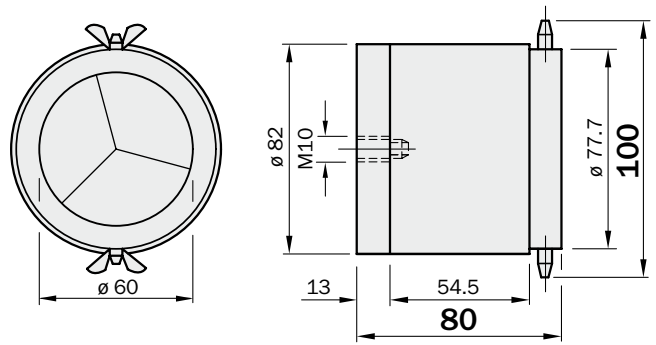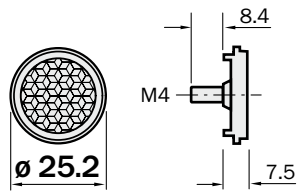
All dimensions in mm

P25-2
P25-2A
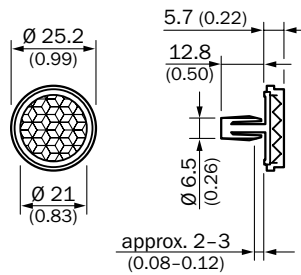
Ø 25.2 (0.99)

Ø 21 (0.83)

5.7 (0.22)

12.8 (0.50)

Ø 6.5 (0.26)

approx. 2–3 (0.08–0.12)

All dimensions in mm (inch)

PL22-1

ø**28**

ø22

15

5.7

ø13

5

Mounting bore

All dimensions in mm

PL22-2

Self-adhesive

ø**25.5**

ø23

7.5

All dimensions in mm

J

PL22-3

Mounting bore
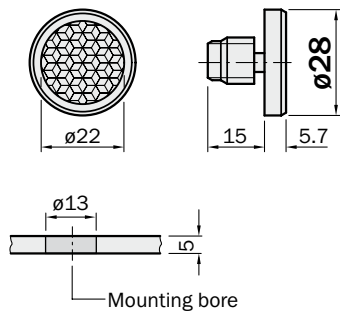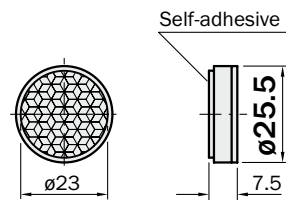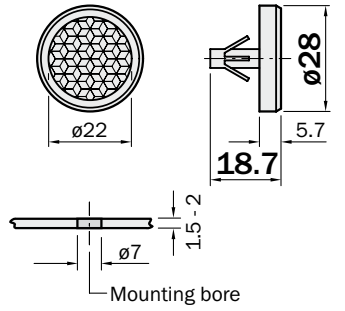
All dimensions in mm

PL240DG

All dimensions in mm (inch)

PL240DG-H

Distance coil

Silicon wire 2 m
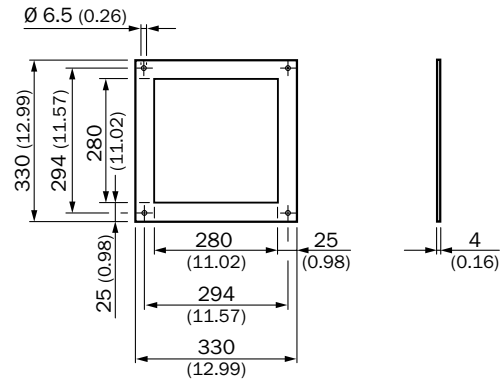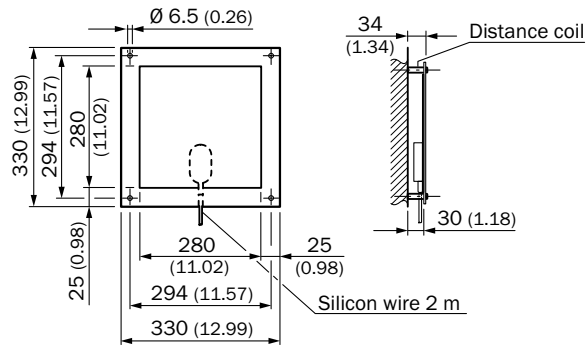
All dimensions in mm (inch)

PL50A
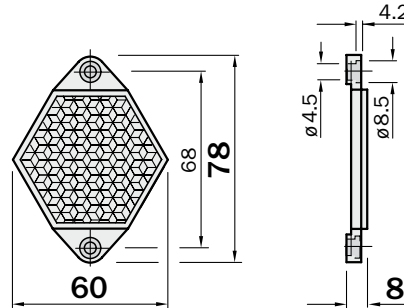
All dimensions in mm

PL560DG

All dimensions in mm (inch)

PL560DG-H

Distance coil

Silicon wire 2 m

All dimensions in mm

J
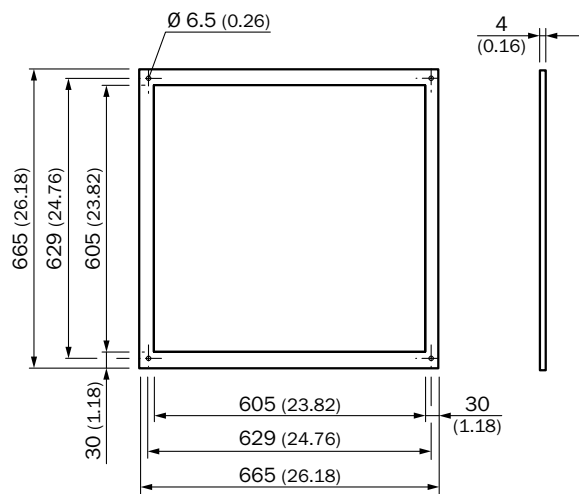
PL880DG
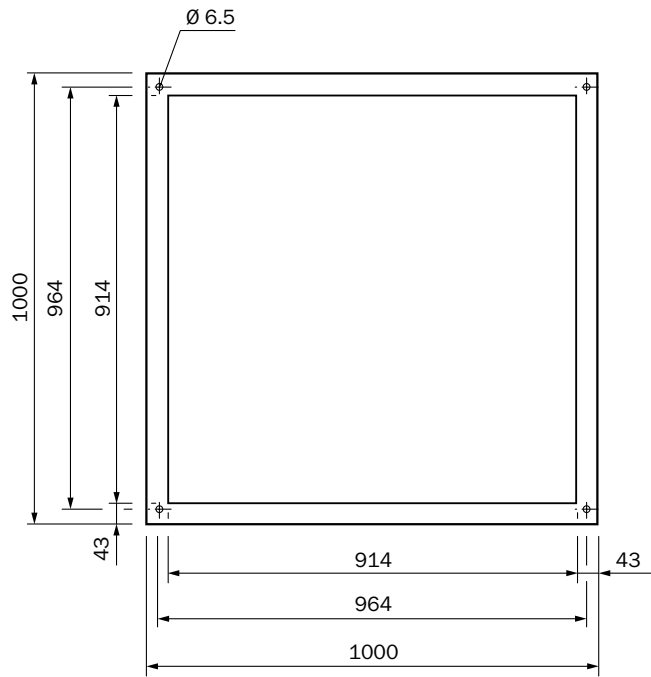
All dimensions in mm

PL80A
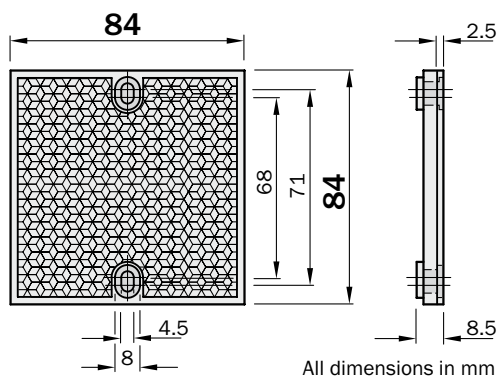
All dimensions in mm

PL880FS01
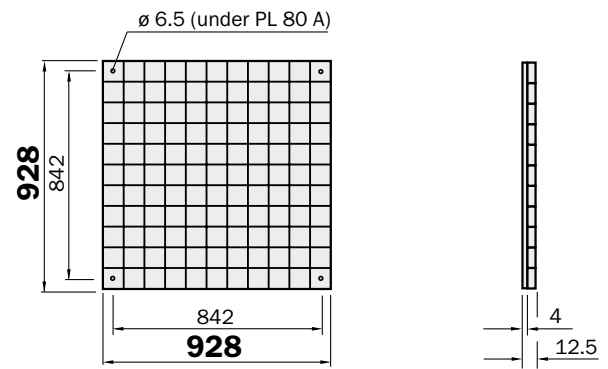
All dimensions in mm

PL1200DG

REF-DG
REF-DG-K

X 1:2

10 (0.39)

Ø 6.5 (0.26)

10 (0.39)

1230 (48.42)

X

1250 (49.21)

1230 (48.42)

1250 (49.21)

4 (0.16)

x

y
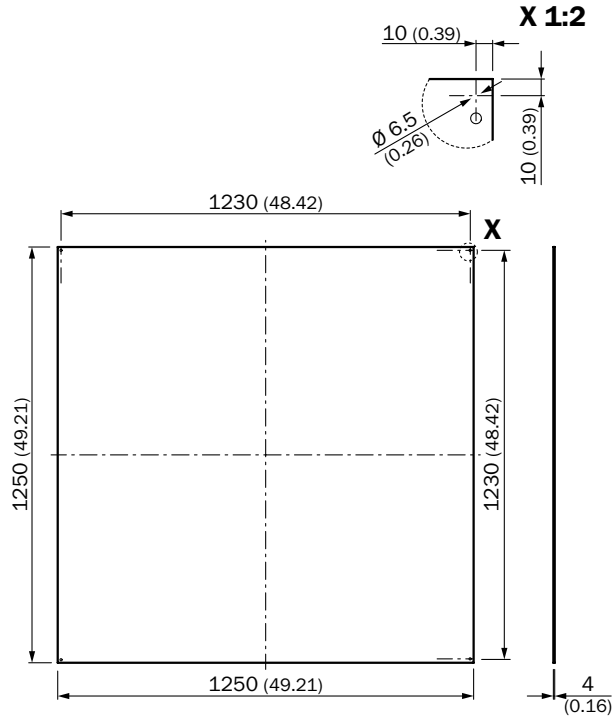
All dimensions in mm (inch)
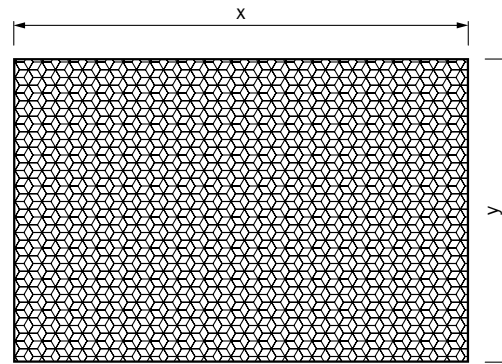
Terminal and alignment brackets

BEF-AH-DME5

163.4 (6.43)

R74

12.5° 12.5°

①

②

26 (1.02)
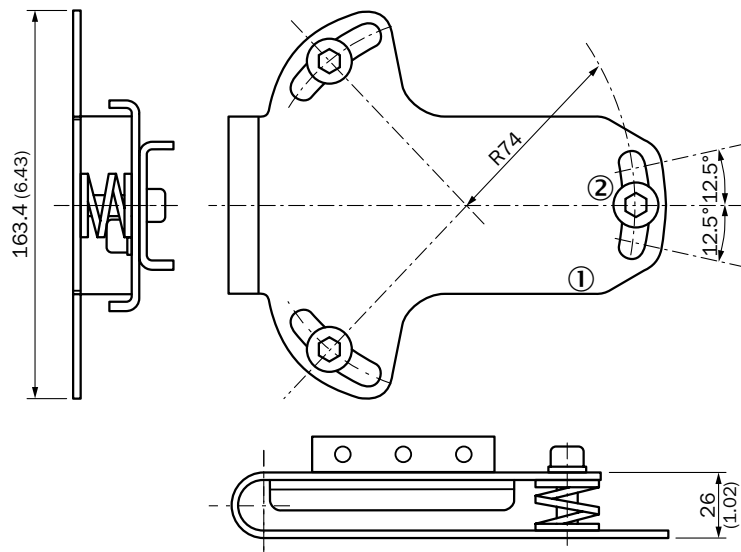
All dimensions in mm (inch)

① Adjustment aid
② Mounting hole

BEF-AH-DX100

130.8 (5.15)

75.7 (2.98)

85.3 (3.36)

126 (4.96)

max. 120.8 (4.76)

Ø 5.4 (0.21)

5 (0.20)

48 (1.89)

5 (0.20)

137 (5.39)

12.7 (0.50)

14.5 (0.57)

5 (0.20)

48 (1.89)

5 (0.20)

126 (4.96)

All dimensions in mm (inch)

BEF-DKH-W12

15 (0.59)

M4

19 (0.75)

10 (0.39)

7.8 (0.31)

14 (0.55)

10 (0.39)

8.6 (0.34)
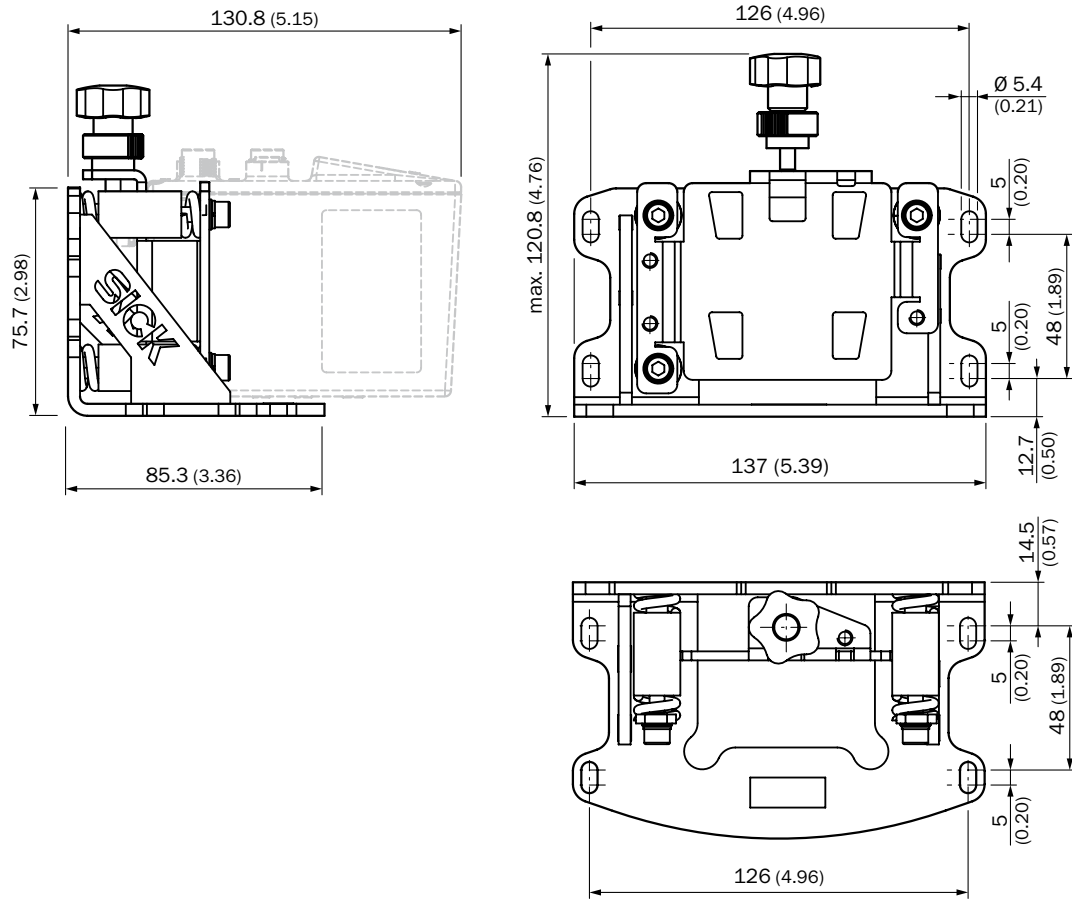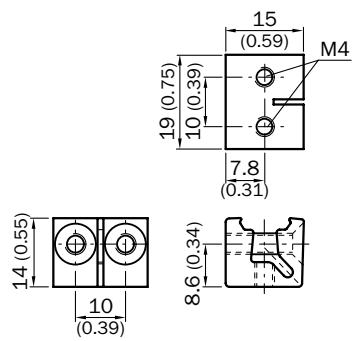
All dimensions in mm (inch)

BEF-DME
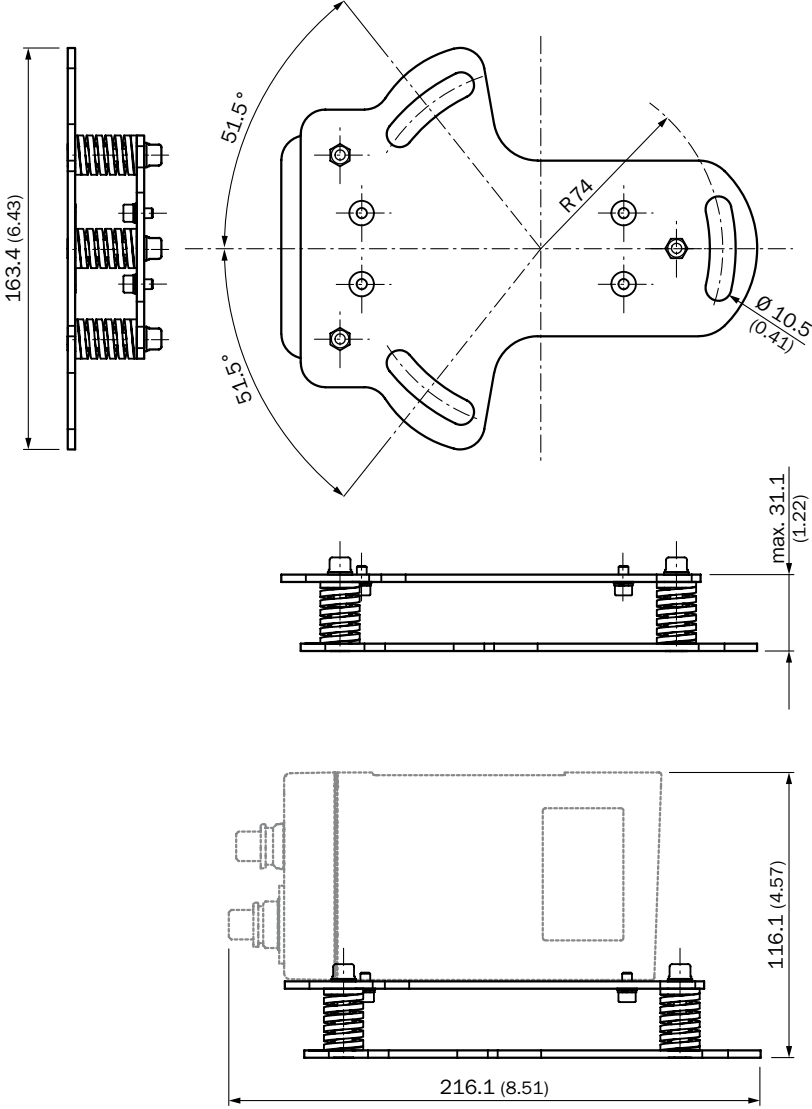
All dimensions in mm (inch)

BEF-DSDT
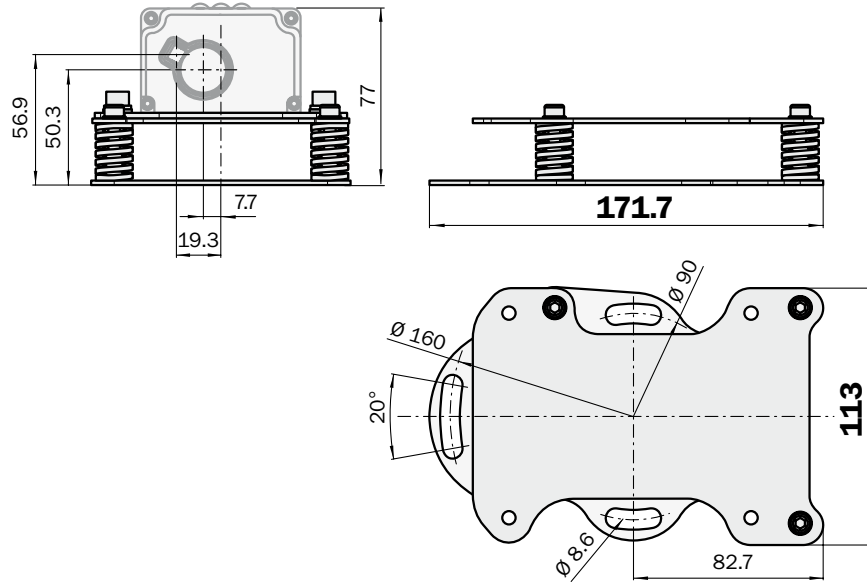
All dimensions in mm

BEF-GH-DMT
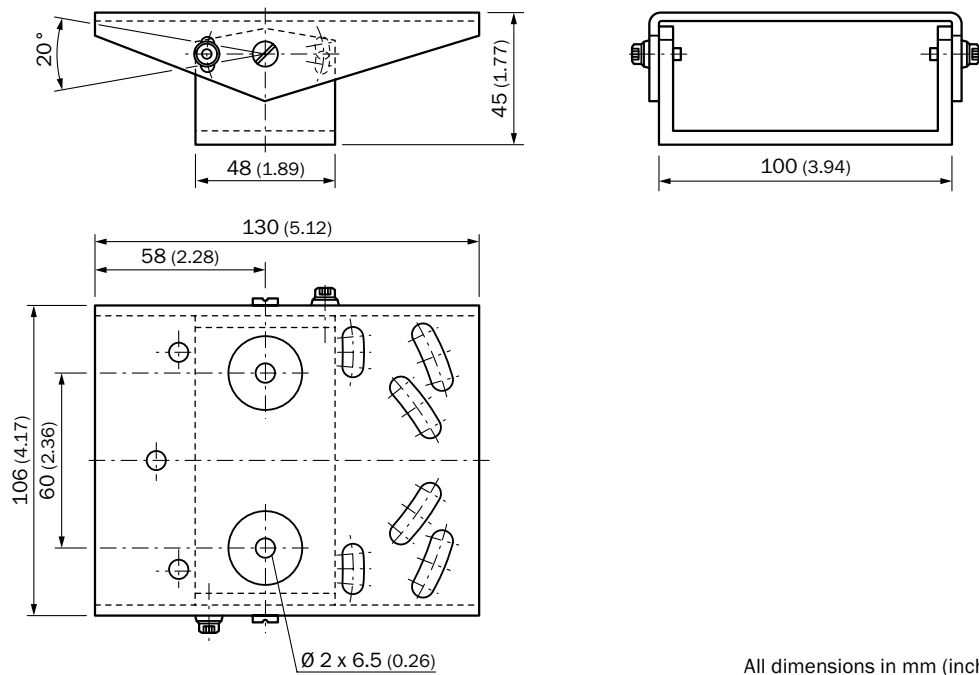
All dimensions in mm (inch)

BEF-ISD/DME

163.72

51.5°
51.5°
R74
ø 10.5

211.7
3

min. 23

max. 30
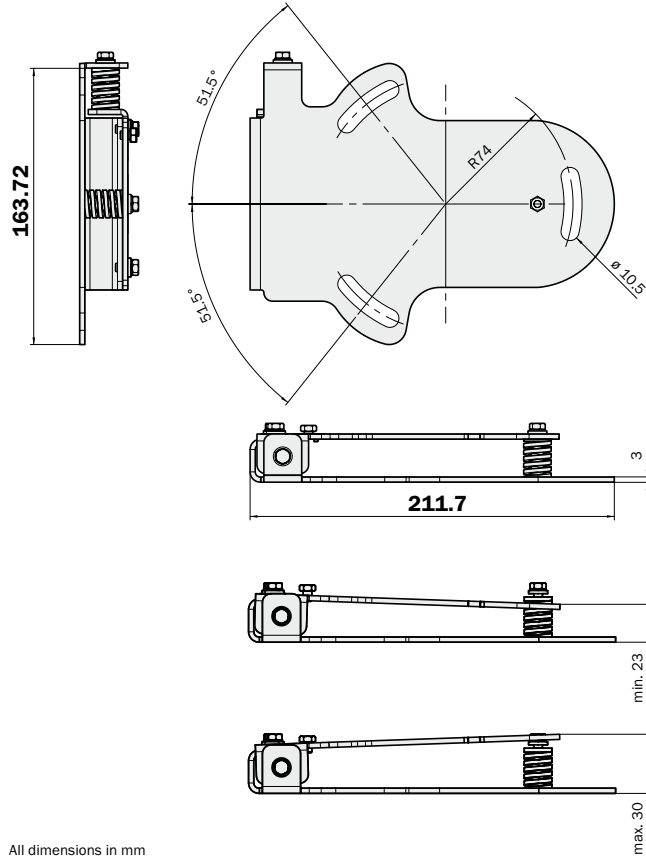
All dimensions in mm

BEF-KH-W12

M4
9 (0.35)
14 (0.55)
15.3 (0.60)

All dimensions in mm (inch)

BEF-KH-M18

All dimensions in mm (inch)

36 (1.42)
14.1 (0.56)
9 (0.35)
6 (0.24)
14 (0.55)
9 (0.35)
5.1 (0.2)
46 (1.81)
Ø 18 (Ø 0.71)
①
6.5 (0.26)
6 (0.24)
24 (0.94)
6 (0.24)
6 (0.24)
R11 (R0.43)
23 (0.91)
23 (0.91)
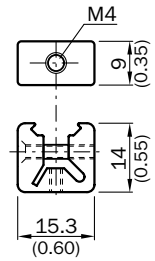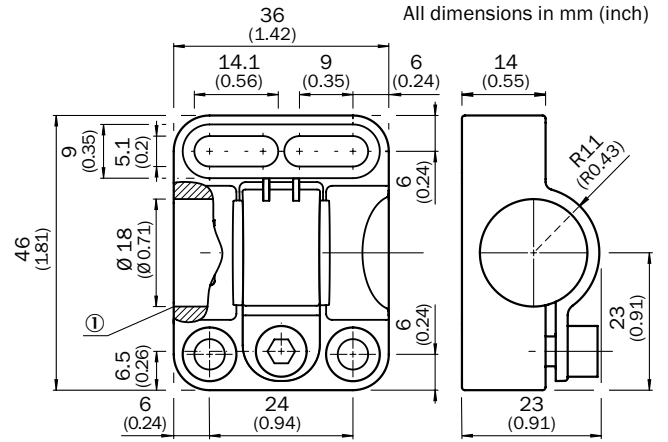
① Without mechanical stop

BEF-KHF-M18

All dimensions in mm (inch)

36 (1.42)
14.1 (0.56)
9 (0.35)
6 (0.24)
14 (0.55)
9 (0.35)
5.1 (0.2)
46 (1.81)
Ø 18 (Ø 0.71)
Ø 16.7 (Ø 0.66)
②
6.5 (0.26)
6 (0.24)
24 (0.94)
6 (0.24)
6 (0.24)
R11 (R0.43)
23 (0.91)
23 (0.91)
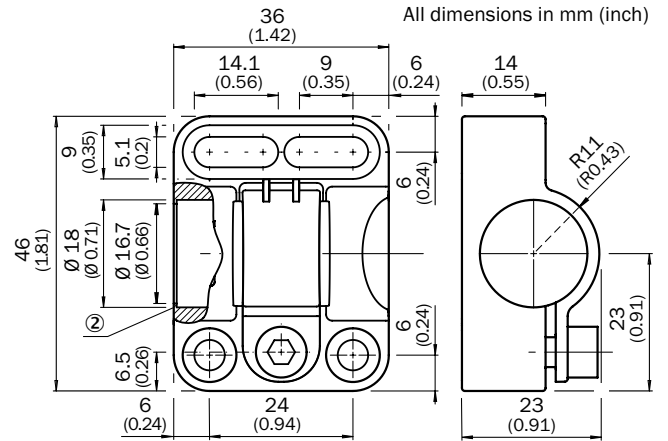
② With mechanical stop

J

BEF-KHS-D01
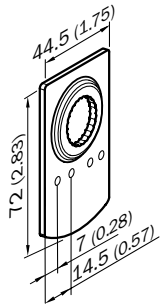
All dimensions in mm (inch)

BEF-KHS-H01

Locking screw
ø28
ø12-20
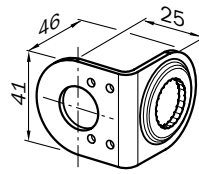
All dimensions in mm
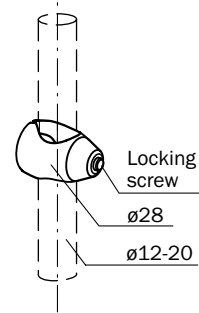
BEF-KHS-K01
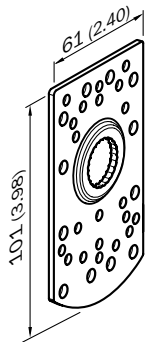
All dimensions in mm (inch)

BEF-KHS-KH1

Locking screw
Ø 28 (1.10)
Ø 12–20 (0.47–0.79)

All dimensions in mm (inch)

BEF-KHS-KH3

37 (1.46)
17 (0.67)
27 (1.06)
20 (0.79)
22 (0.87)
3.3 (0.13)
4.5 (0.18)

29.8 (1.17)
Ø 16 (Ø 0.63)
Ø 12 (Ø 0.47)
10.5 (0.41)
16 (0.63)
5.5 (0.22)
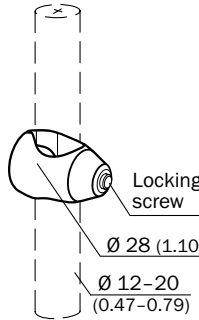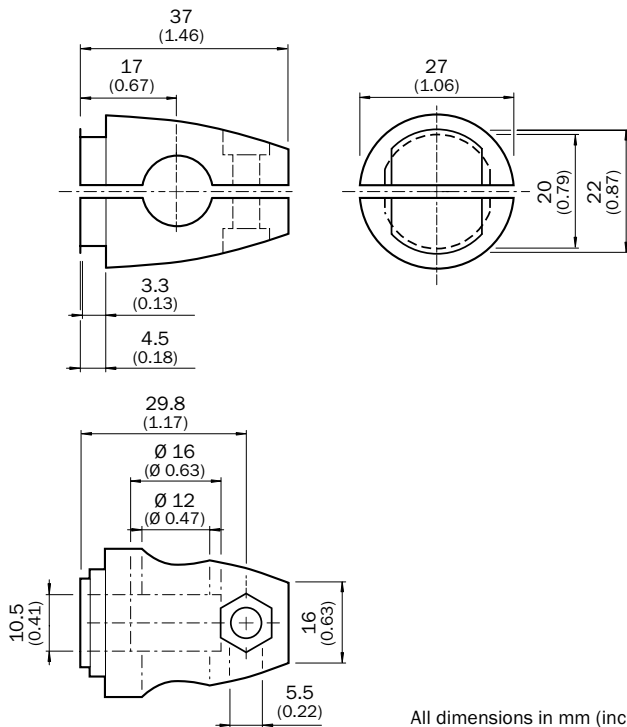
All dimensions in mm (inch)

BEF-KHS-L01

63.5 (2.5)
45 (1.77)

All dimensions in mm (inch)

J

BEF-KHS-N02
BEF-KHS-N02N

43 (1.69) 2.5 (0.10)
24 (0.94)
59.5 (2.34)
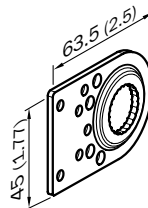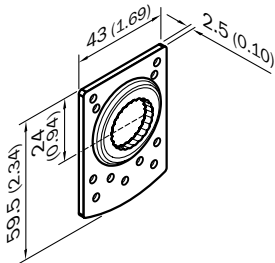
All dimensions in mm (inch)

BEF-KHS-N03
BEF-KHS-N03N

42 (1.65) 2.5 (0.10)
43 (1.69)
90 (3.54)
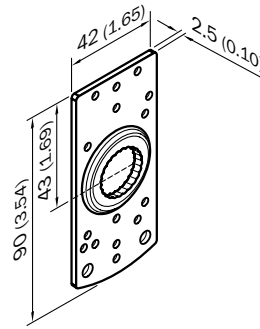
All dimensions in mm (inch)

BEF-KHS-N04
BEF-KHS-N04N

66 (2.60) 2.5 (0.10)
50 (1.97)
110 (4.33)
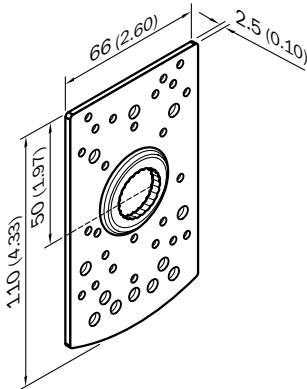
All dimensions in mm (inch)

BEF-KHS-N05
BEF-KHS-N05N

25 (0.98) 2.5 (0.10)
28 (1.10)
39 (1.54) 25.2 (0.99)
39.2 (1.54)
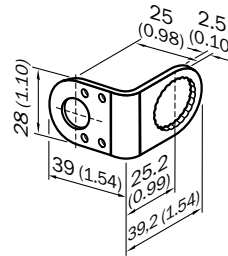
All dimensions in mm (inch)

BEF-KHS-N06
BEF-KHS-N06N

22 (0.87) 2.5 (0.10)
28 (1.10)
36 (1.42) 25.2 (0.99)
39.2 (1.54)

All dimensions in mm (inch)

BEF-KHS-N08

54 (2.13)
33 (1.30)
2.5 (0.10)
42 (1.65)

All dimensions in mm (inch)

J
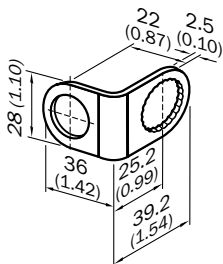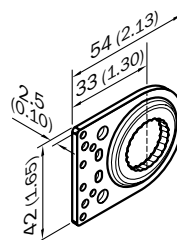
BEF-MS12G-A
BEF-MS12G-B
BEF-MS12G-NA
BEF-MS12G-NB
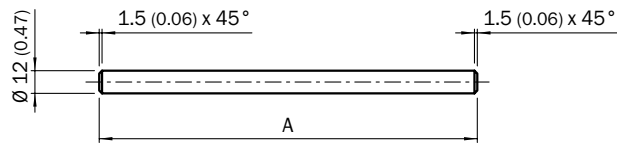
All dimensions in mm (inch)

BEF-MS12L-A
BEF-MS12L-B
BEF-MS12L-NA
BEF-MS12L-NB
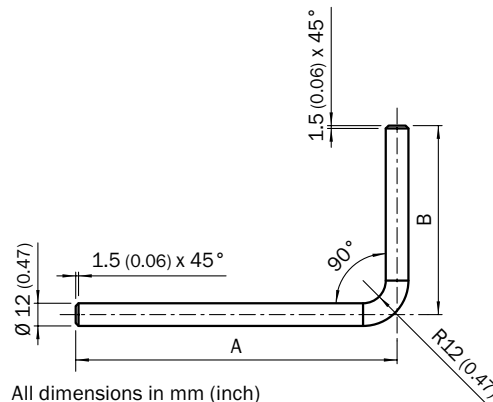
All dimensions in mm (inch)

BEF-MS12Z-A
BEF-MS12Z-B
BEF-MS12Z-C
BEF-MS12Z-NA
BEF-MS12Z-NB
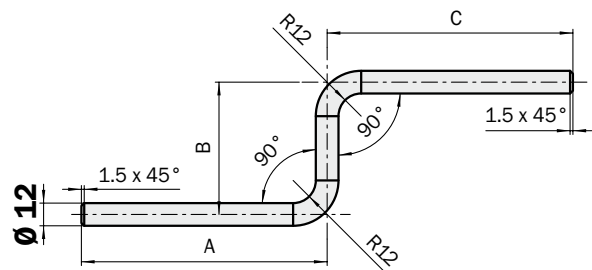
All dimensions in mm

BEF-RMC-D12
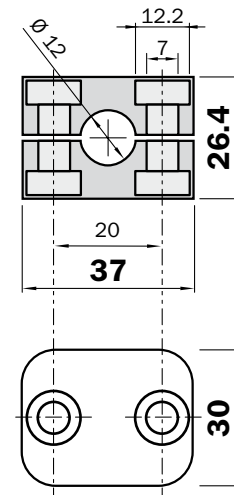
All dimensions in mm

Compact info: important information about sensor solutions from SICK

Glossary

The following pages contain explanations of key terminology in a concise, easy-to-read form, from A for abbreviation to W for Wnd. Definitions of all key terms related to innovations and sensor solutions by SICK can be found here. This glossary also provides valuable information about directives and standards, such as ambient light safety, protection class, laser class, and much more.

Tips & Tricks

Benefit from years of technology and application experience: Find useful tips and tricks for sensor solutions from SICK in this section.
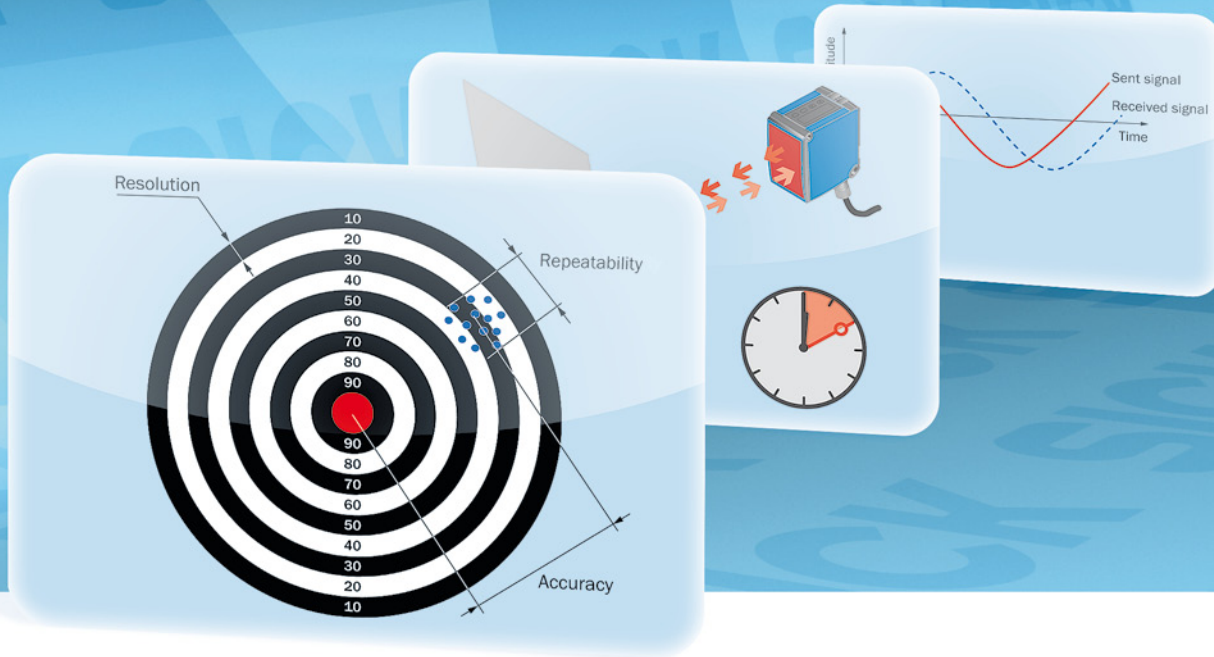
Appendix

A

Abbreviations for distance sensors family

DL – Distance measurement to a reflector; use **D**istance measurement for **L**ong distances as a memory aid

DME – **D**istance **M**easuring **E**quipment

DML – Distance measurement to a reflector; use **D**istance **M**easurement for **L**ong distances as a memory aid

DMP – Position finder (originally **D**imensional **M**easurement of **P**osition)

DMT – **D**istance **M**easurement natural **T**arget

DS – **D**istance sensor **S**witching. The measured values are given out via a switching output.

DT – **D**istance sensor natural **T**arget. Among other methods, the measured value is provided via an analog output.

Dx – Collective term for an entire product family, e. g. including DS, DT and DL devices

Hi – **Hi**gh performance, used to describe a higher performance product within a product family

ISD – Optical data transmission; use **I**nfrared **S**ystem for **D**ata transmission as a memory aid

Max – **Max**imum performance, used to describe an extremely high performance product within a product family

OD – **O**ptical **D**isplacement, describes sensors capable of measuring very small changes in distance at a high level of precision

UC – **U**ltrasonic sensor **C**ube housing

UM – **U**ltrasonic sensor **M**etric thread tubular housing

Accuracy

The measuring accuracy describes the maximum expected measuring error between the measured value and the real distance (compare Fig. Resolution). It includes all deviations from the real distance, such as linearity, offset and gradient errors. With regard to this, it is essential that the measured values are averaged infinitely and that temperature conditions are constant. With optical systems, the reflection properties of the object can affect the measurement. To achieve the best accuracy in every application, optical distance sensors from SICK are generally calibrated and specified on materials with 6 to 90 % remission. Application relevance: reliable measurement on objects with different optical properties. Typical levels of accuracy range from micrometers to a few millimeters. In many applications, such as repeated positioning of an object, accuracy only plays a subordinate role. In these cases, repeatability is more important.

Fig. Accuracy
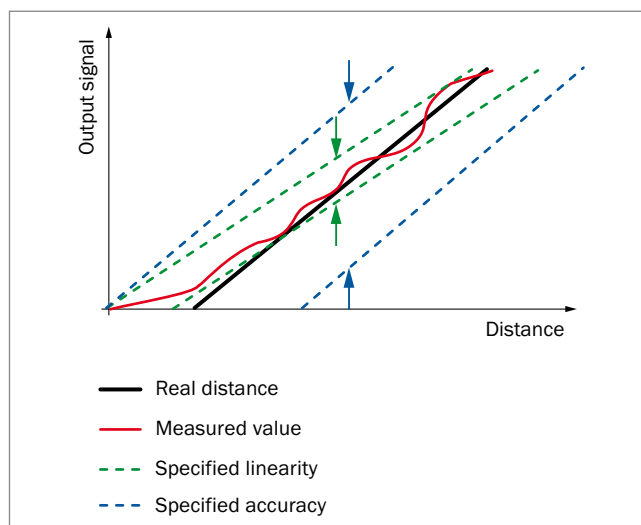
Legend:
— Real distance
— Measured value
--- Specified linearity
--- Specified accuracy

Ambient light safety

Distance sensors evaluate the reflection of their emitted light to determine the distance. Other sources, from the sun to high frequency spotlights, also emit light, which is referred to as ambient light. This light must not affect the function of the opto-electronic devices, otherwise this can result in incorrect switching or measurements. To ensure a high level of process stability and reliability, high degree of ambient light safety, especially in regard to high-frequency or strobe spotlights is a key quality feature of distance sensors from SICK.

Anti-interference mode

Aperture angle

The diameter of the light spot can be calculated based on the aperture angle of the light sender and the distance from the sender lens. The aperture angle of the receiver can be used to calculate the distance-dependent field of vision of a sensor. Among other uses, these values can be used to calculate the minimum distance required between sensors mounted next to each other in order to avoid mutual interference.

Averaging

Many distance sensors feature so-called moving averaging. With this method an average value for the measured distance is formed based on a set amount of measurement values. Moving average means that after every measurement cycle an updated measurement value is given out. The output rate remains constant. In case of a sudden change in distance it has to be considered that averaging has an effect on response time. In case of higher averaging, more time will be required until the output value represents the actual distance.

▶ see "Response time" on page K-383 and see "Output rate" on page K-380

— Real distance
— Measured value without averaging (Avg = off)
— Measured value with averaging (Avg = 32)
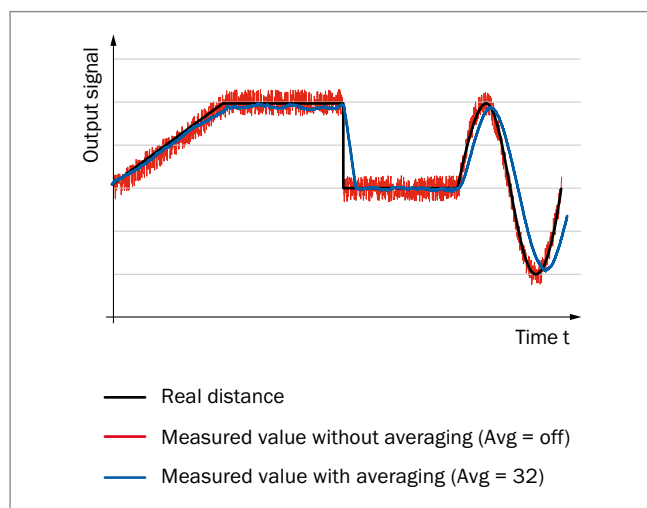
Fig. Averaging

B

Bar code

A bar code is a label consisting of parallel bars and gaps of different widths that can be read by use of optoelectronic devices. In this case the term "code" does not stand for encryption but rather for representing data with binary symbols. The data in a bar code is read using optical reading devices such as bar code readers (scanners) or cameras in combination with software processing. The term bar code is also commonly referred to as a 1D code.

For the product family of OLM linear measurement sensors (see E-187), bar codes are used as a reference scale for position measurement. The position information is represented as a bar code along a self-adhesive strip.

Baud rate

▶ see "Data transmission rate" on page K-376

Blind zone

The blind zone describes the zone directly in front of a sensor where an object or reflector is not detected or not reliably detected. The blind zone begins at the reference edge of the sensor. This is usually the front edge of the sensor housing in the direction of emission of the light or ultrasonic sound.

C

CAN

The CAN (Controller Area Network) is an asynchronous, serial bus system. It connects several devices with equal rights such as sensors and actuators. The data is transferred using identifiers. Due to its high level of resistance to inference, real-time capabilities and low costs, CAN has become an established technology in many safety-relevant areas such as automotive and automation technology. CAN is based on layer 2 according to the OSI model.

CANopen

CANopen®

CANopen is a CAN-based communication protocol. It enhances the CAN bus with a protocol structure. CANopen is based on layer 7 according to the OSI model.

CMOS receiver

The inner structure of a CMOS receiver makes use of the light-sensitivity characteristics of **C**omplementary **M**etal-**O**xide **S**emiconductors. Multiple "light-gathering" pixels and analysis electronics are integrated into a CMOS receiver. The position of the target is determined from the light distribution on the CMOS receiver line. CMOS receivers allow for highly precise and reliable distance measurements. They are typically used in short range distance sensors (displacement) based on a principle of operation known as triangulation.
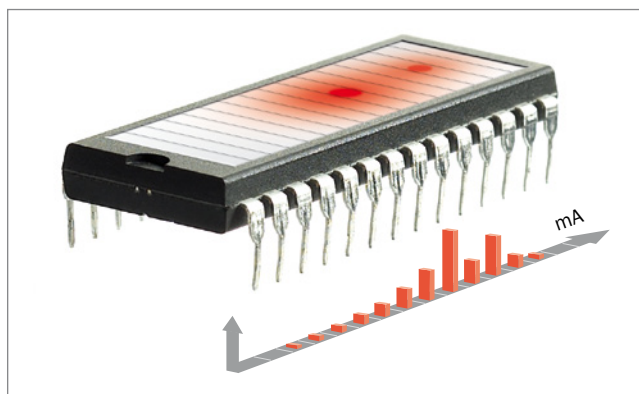
Fig. CMOS receiver row

Conformity

Conformity describes the compliance with all requirements and directives which are required in the respective environment/market.

Essentially there are two binding laws within the EU for distance sensors from SICK:

- EMC Directive 89/336/EEC
- Low Voltage Directive 73/23/EEC

As a manufacturer, SICK declares conformity to these directives by affixing the CE marking to the product.

Within the USA, the national regulations of the OSH Act (Occupational Safety and Health Act) and the NEC (National Electrical Code) apply. Testing is performed by the UL (Underwriters Laboratories).

The conditions of approval must be complied with when the sensor is used. Devices with individual approval and an approval number from Underwriters Laboratories bear the letter "L" for "Listed".

Alternatively, UL offers a combined certification for the USA and Canada.

Connection diagram

Wire colors are abbreviated as follows in the sensor connection diagram:

- blk = black
- blu = blue
- brn = brown
- gra = gray
- grn = green
- ora = orange
- pnk = pink
- red = red
- trq = turquoise
- vio = purple
- wht = white
- yel = yellow

The following abbreviations are used for the assignment:

- L+ = power supply (positive pole of power supply)
- M = ground (negative pole of power supply)
- MF = multifunctional input (in some cases multifunction in- and output)
- nc = not connected
- $Q/\overline{Q}$ = switching output/switching output inverted (may have additional coding or numbers)
- Q_A = analog output
- SH = sample-and-hold input; corresponds to a trigger input
- Sync/Com = synchronization and communication input
- Teach = external teaching input

Controller unit

Short range distance sensors (displacement) are sometimes used in combination with a so-called controller unit. These offer additional functions such as frequency filters or arithmetical calculations. This avoids the need for additional hardware such as computers or logic modules. Multiple sensors can usually be connected to and controlled by only one single.

Cross Talk

▶ see "Mutual interference" on page K-380

Current consumption

The current consumption can be directly derived from the power consumption specified for the sensor. The following formula can be used:

I = P/V or
Current consumption = power consumption/supply voltage

D

Data interface

In addition to serial interfaces, distance sensors from SICK are also available with different fieldbus systems for data transmission:

- SSI
- PROFIBUS
- CANopen
- CAN
- Modbus
- HIPERFACE
- Interbus

These interfaces are collectively referred to as data interfaces.

Data transmission rate

The data transmission rate is the volume of data transmitted over a transmission channel or interface within a specified period of time. The units used for this are baud or bits/s.

Double sheet detection

The SICK double sheet detection sensors allow to differentiate whether one, two or no sheets of a material are present between the sender and receiver. Double sheet detection using ultrasonic technology offers many advantages, especially regarding insensitivity to color and the fact that the sensor requires no teach-in process. The level of damping of the ultrasonic signal is used to distinguish between single or double sheets of paper, plastic, foils, thin metal sheets etc.
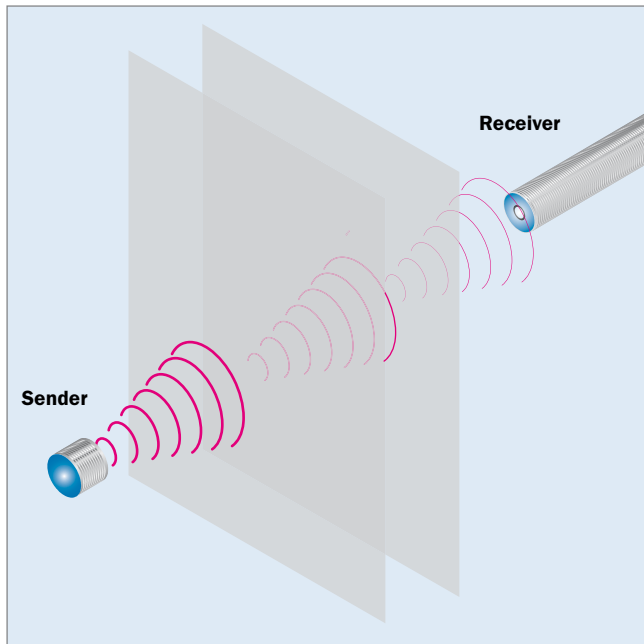
Fig. Double sheet detection

DtO

Distance **t**o **O**bject.

▸ see "Switching modes" on page K-384

E

EMC

The "**E**lectro **M**agnetic **C**ompatibility" (EMC) describes the degree of immunity of devices to interference caused by electromagnetic effects, or their ability to be only affected by extreme conditions. This status is attained on the one hand by restricting sources of interference within the devices and on the other by designing devices to be sufficiently protected from external sources of interference. The EMC designation is regulated by EU Directives and Standards. Sensors from SICK are subject to additional in-house standards that are much stricter than the legal requirements. These are based on many years of application experience and ensure that the sensors are fully functional even under especially critical conditions.

Enclosure rating

The IP or enclosure rating indicates the extent of a device's protection against contact with foreign objects such as dust or water. The code starts with the letters IP and is followed by two numbers. The first digit is an ascending indicator of the degree of protection against ingress of foreign bodies while the second number is an indicator of protection against ingress of water.

▸ see "Fig. Enclosure rating" on page K-388

Ethernet

Ethernet is a bus system developed by RANK XEROX for the interconnection of minicomputers. Since 1985 it has been standardized in the IEEE 802.30 and ISO 8802.3 standards. Coaxial cable or twisted pair cables are used for transmitting the signals. Ethernet technology is widely used in office environments, but also increasingly in automation systems, for connecting computers in a network. Typical transmission speeds range from 10 Mbit/s (Ethernet) to 10 Gbit/s (GigaEthernet).

F

Frequency filter

Frequency filters are circuits with specified frequency-dependent characteristics. They suppress certain frequency ranges of the input signal (suppression range) and/or enhance other frequency ranges (pass-through range). Some of SICK's distance sensors offer these filter functions, which can be used to filter out external interference signals, e.g. vibration. Frequency filters can also be used to perform highly accurate measurements on rotating objects. For example, high-pass filters can be used to suppress shaft vibration and allow only the shaft profile of the object to be measured.
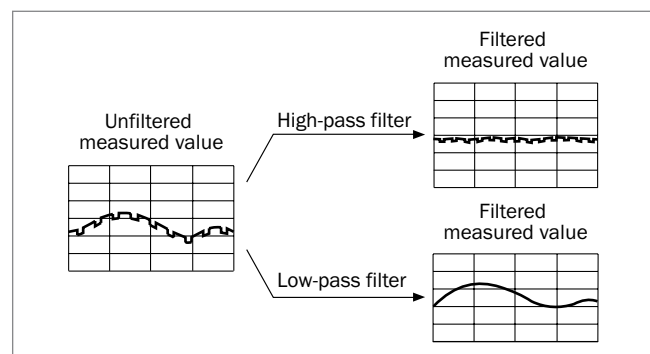
Fig. Frequency filter

H

HDDM

HDDM is a registered trademark describing a technology for highly precise statical pulse time-of-flight measurement (**H**igh **D**efinition **D**istance **M**easurement). It is used in mid-range distance sensors from SICK.

▸ see "Pulse time-of-flight measurement" on page K-381

HIPERFACE

HIPERFACE is a hybrid data interface. It consists of an analog process data channel (sine/cosine signals) and a bidirectional/half-duplex parameter channel (RS-485). This allows simultaneous transmission of position information and other parameter information.

Hold functions

Hold functions allow measurement values from of particular point in time to be held (retained), usually through activation of a special input. Alternatively to the present actual measurement value, minimum or maximum values being measured within a certain period of time can also be held. This function allows a held value to be kept available over a longer period of time for further processing.
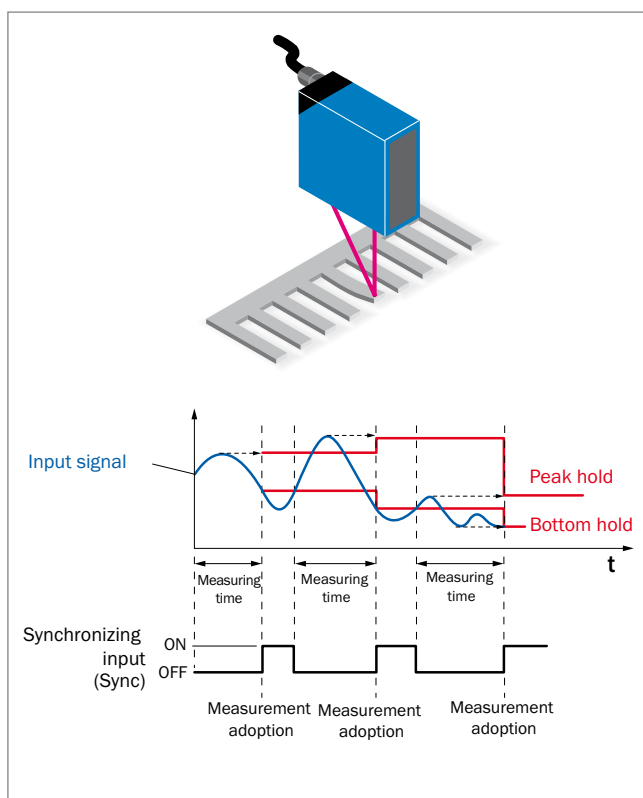
Fig. Hold functions

Hysteresis

Hysteresis is the difference in distance between the switch-on and switch-off points of a switching output. A certain level of hysteresis is necessary for stable switching when the measured distance fluctuates around the switching point that has been set. With most distance sensors the hysteresis, which is defined in millimeters, can be set freely. The free choice allows an ideal compromise between precise switching and stable behavior in each individual application.
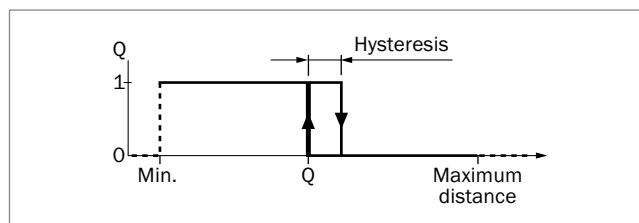
Fig. Hysteresis

▸ see Tips & Tricks "Using hysteresis for level control" on page K-391

I

Initialization time

The initialization time or startup time describes the time required by the distance sensor to become ready for operation after connection to the power supply.

IO-Link

IO-Link is a communication standard used in automation technology. It has been developed through the collaboration of leading automation technology manufacturers. IO-Link is a point-to-point connection between the control system, sensors, and actuators that allows centrally controlled programming and querying of the connected devices.

IO-Link communication technology and its features allow machines and systems to be operated much more effectively:

- Reduction of machine downtimes, setup and changeover times
- Easy setting of parameters
- Improved process quality through continuous monitoring of process parameters

L

Laser

„**L**ight **A**mplification by **S**timulated **E**mission of **R**adiation" – this term describes a light source in the visible red and infrared spectrum frequently used in optical distance sensors. A laser generates bundled, directed, monochrome coherent light. Distance sensors usually use semiconductor lasers or laser diodes to generate the emitted light required for the measurement. A laser can be precisely focused and/or collimated to allow the generation of a precise and small light spot, even over large distances. It can also be pulsed extremely short, which makes them ideal for use in time-of-flight sensors.

Laser classes

Lasers and LEDs are classified into protection and device classes, in increasing order of the danger to human eyes and skin. The following table shows the classification according to the EN 60825-1 standard.

LED

Light **E**mitting **D**iodes (LEDs) are semiconductors that generate light of a certain wavelength as a result of an electric simulation. The wavelength is determined by the chemical composition of the semiconductor. Depending on the application either sensors which emit visible red light or infrared light, invisible to the human eye, can be chosen. Compared to lasers, LEDs have the advantage of being more inexpensive and radiate over a somewhat larger area, creating larger light spots, which allows for averaging to be performed over surface irregularities. Due to the fast pulse rate of the light sender required for time-of-flight measurements, mainly lasers are used in distance sensors from SICK.

Light spot geometry

The light spot geometry describes the shape of the light spot generated by the sender beam of the sensor. The shape is usually approximately circular. Some short range distance sensors (displacement) are available with different light spot geometries or dimensions depending on the measuring task.

Limiting range of an ultrasonic sensor

The limiting range is a term used to describe the maximum achievable range of an ultrasonic distance sensor. Only objects with very good reflection properties for ultrasonic waves in normal ambient conditions can be detected up to this distance. To ensure reliable detection or measurement, we recommend to use ultrasonic sensors only within their specified operating range or qualifying the use at higher distances by a test in the actual application.

Linearity

Linearity is defined as the maximum deviation between the output signal and an ideal, straight-line characteristic curve. Even if the output signal is perfectly linear, offset and slope errors can still be present (see also Fig. Accuracy). Scaling of the output signal by means of a reference measurement is usually recommended.

M

Maximum and minimum load

Depending on the used analog output a maximum or minimum load is permissible. For the analog current output a maximum load is specified, for the analog voltage output a minimum load is specified. To avoid damage to the sensor, this value must not be exceeded.

▸ see "Output current" on page K-380

Measuring frequency

The measuring frequency or sampling rate is the number of measurements completed within a specified time interval, usually in measurements per second (e.g. 10,000/s or 10 kHz). Application relevance: ability to detect and monitor rapid changes in distance.

▸ see "Output rate" on page K-380

Measuring range

The measuring range describes the range of distance in which the sensor operates and measures according to its specifications. Application relevance: Both the smallest object and largest object expected for measurement must be within the measuring range.

Multi-functional input

Distance sensors from SICK have so-called multi-function inputs. The functionality of these inputs can either be permanently defined in the device settings or activated based on the duration of the signal presence at the input. Common functions of multi-function inputs are external teach-in (also known as teach-in by wire), laser off, triggering and synchronization.

Multi-function output

A multi-function output is a digital switching output that can be configured to perform different functions as required. Multi-function outputs are typically used for giving out service information or are used as additional switching outputs.

Multiplexing

Multiplexing describes a method used to prevent mutual interference between sensors. This function is used (e. g.) in SICK's high-end ultrasonic sensors. With multiplexing, the measurements are performed alternately by each sensor rather than simultaneously. In some cases, possible mutual interference can be avoided by synchronization of the sensors as well, which provides a faster response time.

PIN 5

t
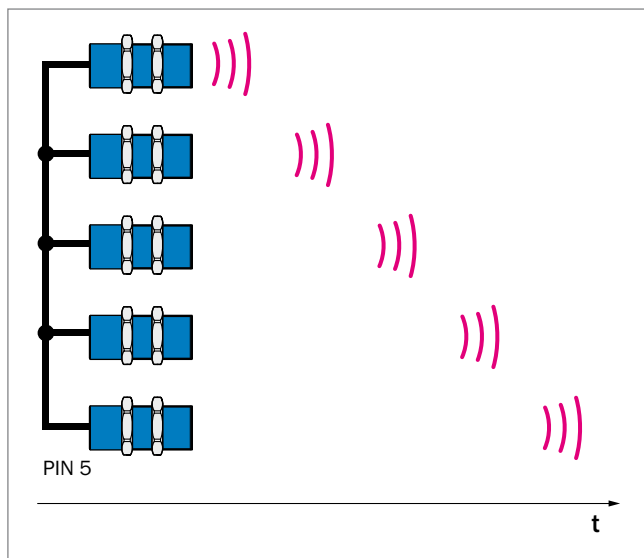
Fig. Multiplexing

Mutual interference

Describes the interference of multiple sensors with another caused by intermixing sending pulses of different sensors.

▸ see Tips & Tricks "Avoiding mutual interference between optical sensors" on page K-395

N

NC/nc

This abbreviation has the following meanings depending on its context:

- In the context of relays: **N**ormally **C**losed
- In the context of connection diagrams: **n**ot **c**onnected.

▸ see "Switching output" on page K-384

Near-field suppression

With some distance sensors, activation of near-field, foreground, or near-area suppression can be used to suppress interfering reflections caused for example by front screens of external protective housings.

NO

Normally **O**pen or switching output (Q).

▸ see "Switching output" on page K-384

NPN output

▸ see Tips & Tricks "Correct wiring and use of NPN outputs" on page K-390

O

OBSB

Object **B**etween **S**ensor and **B**ackground.

▸ see "Switching modes" on page K-384

ON and OFF delay

▸ see "Timing functions" on page K-386

Operating range

The operating range is the distance between sender and receiver, sensor and reflector or ultrasonic sensor and object, within which stable and reliable operation of the sensor is guaranteed.

Limiting scanning range

Aperture angle

Blind zone
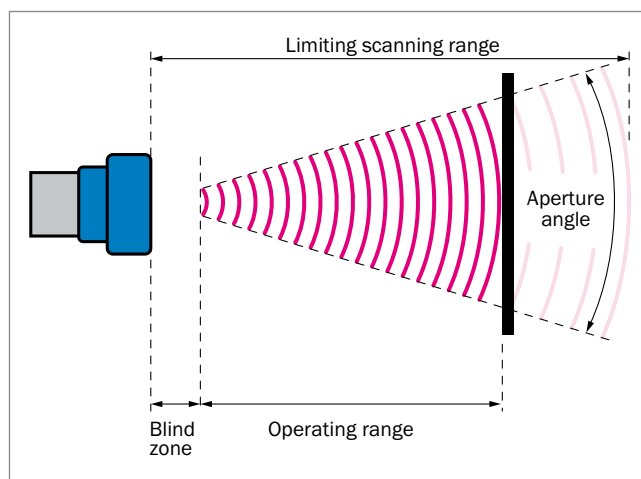
Operating range

Fig. Operating range

Output current

The output current is the maximum permissible current at a switching output.

▸ For analog output see "Maximum and minimum load" on page K-379

Output rate

The output rate is the update rate of the output signal or the time interval at which the output signal is continuously updated. The output rate is constant and independent of the active moving averaging function. With moving averaging the output signal is gradually updated in each output cycle. Most distance sensors from SICK feature this advanced technique of moving averaging.

P

Parity

A so-called parity bit can be appended to measured values sent via serial data transmission in order to detect transmission errors.

The correct number of all bits (including the parity bit) can be checked by the control system using the parity bit. If the number of all bits does not correspond to the parity bit, i.e. odd for odd parity or even for even parity, a transmission error must have occurred. This allows detection and removal of faulty data in the control system.

Possible types that can be selected: even parity (even), odd parity (odd) or no parity (none).

Phase correlation measurement

Phase correlation measurement uses a continuously amplitude-modulated beam of visible or infrared light. The distance between the sensor and the object is calculated by measuring the phase shift between the sent and received signals.

Different frequencies are used for larger ranges to avoid ambiguous results. Up to three frequencies are used, each of which covers different measuring ranges with its wavelengths. The final calculated distance measurement results from all three measurements. Switching between the different frequencies is performed internally by the distance sensor and is optimized for the speed of the object and the dynamics of the measurement.

$$s = \frac{a * \lambda + R * \lambda}{2}$$

a = Number of wavelength periods
λ = wavelength: $\lambda = c_0/f$
   (c_0 = speed of light in a vacuum, f = frequency)
R = fraction of a single wavelength: $R = \Delta\varphi/2\pi$
   ($\Delta\varphi$ = phase shift)
s = distance measurement
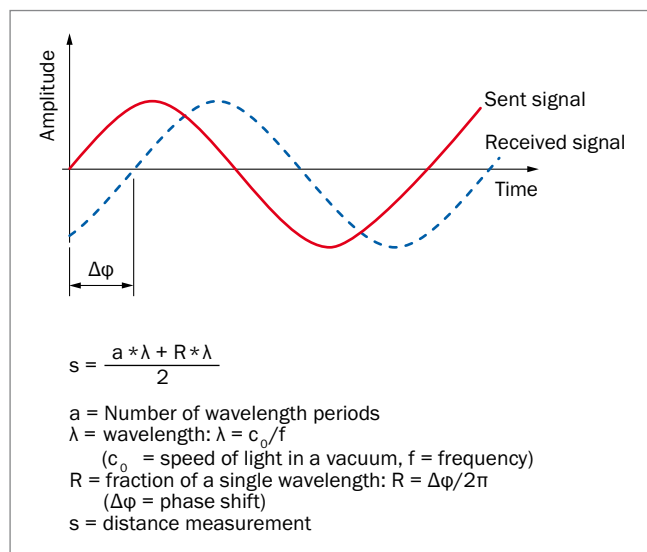
Fig. Phase correlation measurement

PNP output

▸ see Tips & Tricks "Correct wiring and use of PNP outputs" on page K-390

Power consumption

The power consumption describes the amount of electrical energy used by the sensor.

Pre-failure output

A pre-failure output will give out a warning message generated by the sensor. The warning message allows maintenance of the device in time to avoid unexpected machine downtimes.

PROFIBUS

PROFIBUS (**PRO**cess **FI**eld **BUS**) is a standardized universal fieldbus developed by Siemens and the PROFIBUS user organization. PROFIBUS is suitable for fast, time-critical applications and also for complex communication tasks. PROFIBUS PA and PROFIBUS DP versions exist but only the latter is used for distance sensors.

PROFIBUS DP allows controlling of sensors and actuators in automation systems by a decentralized peripheral through a centralized control system. Data transmission rates of up to 12 Mbit/s can be achieved using twisted-pair or fiber-optic cables.

Protection class

Electrical equipment is classified in relation to existing safety measures for prevention of electric shocks. Protection classes are defined in DIN EN 61140. There are four protection classes ranging from "Basic insulation" (Class 0) to "Safety extra-low voltage, double insulation, safety transformer" (Class III). Distance sensors from SICK always have at least protection class II.

Protection class I   Protection class II   Protection class III

Pulse time-of-flight measurement

Pulse time-of-flight measurement is a method for measuring distance. It is implemented in most ultrasonic sensors and is commonly used for optical time-of-flight measurement as well. To perform a measurement, short light or ultrasonic pulses are sent out. Parts of these are reflected by the object to be measured. The time difference between sending and receiving is measured by an internal timer. Based on this the distance between the sensor and the object is calculated. Pulse time-of-flight measurement systems use either deterministic or statistical methods.

With deterministic pulse time-of-flight measurement systems, from one to five pulses are sent. These provide a measured value immediately after the reflected signal is received.

Statistical pulse time-of-flight measurement systems send several 100 pulses and gather the received signals. This information is then statistically analyzed, which makes this process slower than classical pulse time-of-flight measurement systems but much more accurate and less sensitive to interference.

K

R

Range

With double sheet detection sensors or optical data transmission, the range is defined as the maximum permissible distance between the sender and receiver.

Real time

Real time describes the ability of the entire system to provide the required data or measured values within the available or determined time frame. If this is ensured, then this is often referred to as a real-time capable system.

Referencing inputs

Activating a referencing or "zero reset" input sets the current measured value to zero. The previously measured value is stored as an offset in the sensor. The zero point for measurement is now no longer the light emission point on the sensor but rather another point within the physical measuring range of the sensor. This makes it easy to determine the shift of the measured value with respect to a virtual zero point.

Reflector

Reflector systems are the most suitable solution for larger distances, even over 1,000 m in extreme cases. As the name implies, the light signal is not reflected by the object to be measured but rather by a rigid or flexible reflector mounted on the object. The use of a reflector ensures good and stable reflection behavior which allows for measurement of much greater distances than possible with sensors measuring on natural targets.

Remission

Remission is a term used to described the diffuse reflection of light on non shiny or mirror-like reflecting materials. The unit used for measuring remission is known as degree of remission. It represents the ratio of reflected to irradiated energy in percent.

▸ See the inner side of the rear cover of the catalog

Repeated accuracy

▸ see "Repeatability" on page K-382

Repeatability

Repeatability, also known as reproducibility or repeated accuracy, is the deviation between multiple measurements performed in identical conditions (compare Fig. Resolution). Application relevance: Repeated measurement or positioning of identical components. In this case, repeatability oftentimes is more important than accuracy.
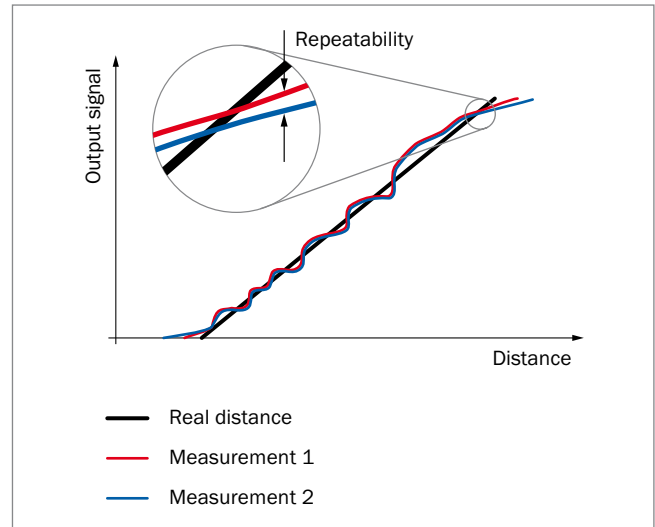
Fig. Repeatability

Residual ripple

Residual ripple is the small AC voltage that remains present on a DC voltage after smoothing and filtering.

Resolution

The resolution is the smallest detectable change in the distance of an object. This can depend on either the level of measurement noise or the step size of the measurement core or the output of the sensor.

Application relevance: Detection of vibration
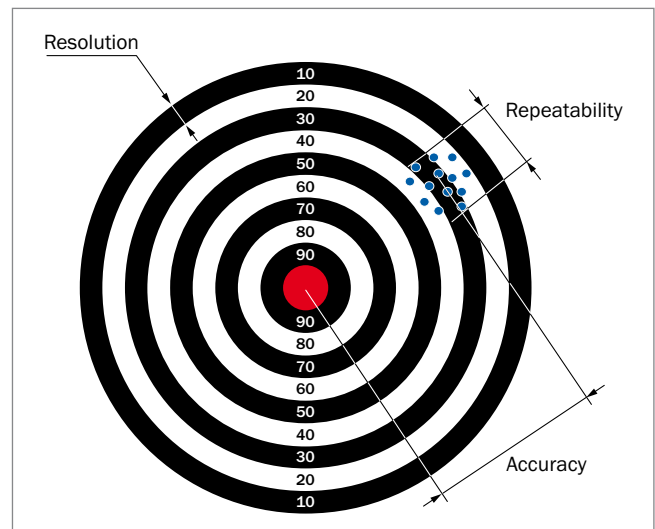
Fig. Resolution

Response time

The response time is the maximum time between a sudden change in distance and the corresponding actuation of a switching output or full updating of an analog output. The response time has a direct relationship to the selected averaging depth, whereby an increased averaging depth will result in a slower response time, but has a positive effect on the repeatability. Typical values range from 0.1 ms to 1000 ms.

Application relevance: measurements of objects subject to sudden changes in distance.
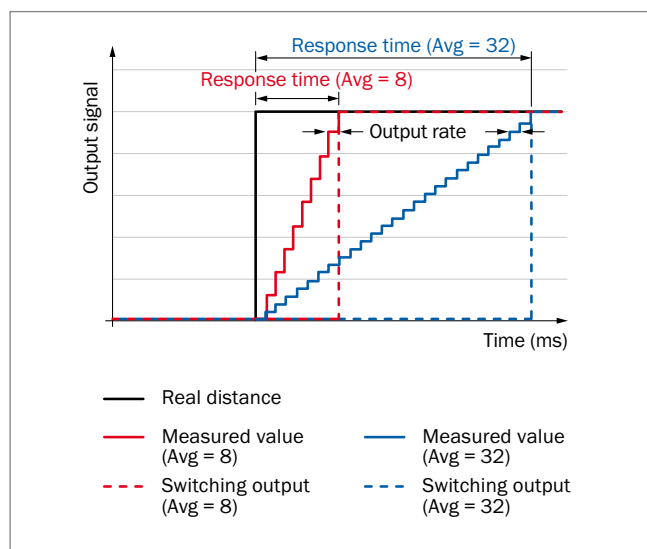
Fig. Response time

S

Shock resistance

Every product family is mechanically tested according to in-house standards including a test regarding shock resistance to ensure reliable operation in an industrial environment. The sensor must remain fully functional after all mechanical tests.

Short-circuit protected

If the permissible output current at a switching output of the sensor is suddenly exceeded, the sensor detects this and activates the current limitation. This function prevents a short-circuit at a sensor output from damaging the sensor. However, not every short-circuit protected sensor is also overload protected. Refer to the max. load. In general, care should be taken to avoid potential causes of short-circuits, e. g. open wires.

Speed monitoring

Speed monitoring is a control function. It determines whether or not a previously defined speed has been exceeded. For example, in the DME5000, exceeding of the previously defined speed can optionally be given out via a switching output.

Storage banks

Some distance sensors allow the storage of different sets of parameter settings in so-called storage banks. These application-specific settings can then be activated depending on the respective application. This functionality avoids the need for storing the configuration settings in a control system. The number of storage banks available depends on the respective sensor.

Switching frequency

The switching frequency is the number of switching operations a sensor can perform within a specified time interval.

▶ see "Response time" on page K-383

Switching hysteresis

▶ see "Hysteresis" on page K-378

Switching modes

SICK distance sensors offer different switching modes:

DtO

Describes the classical distance to object operating mode (**D**istance **t**o **O**bject). In this mode, the output indicating detection of the object is switched as soon as the object is closer to the sensor than the configured switching threshold. With some distance sensors, this mode of operation is also described as "sensor on object" or "simple switching point".

OBSB

Object **B**etween **S**ensor and **B**ackground. With this switching mode, a particular background is programmed as a reference value. The sensor switches whenever an object covers the background or when the distance to the background changes. This switching mode is especially suitable for reliable detection of highly reflective or extremely dark objects. This even allows detection of objects which reflect all the light or away from the sensor. This may for example be painted vehicle parts at large tilting angles. In some cases, this is also referred to as "foreground suppression" or "sensor to background" mode.

Window

When using the **window** mode a near and a far switching threshold is configured for the switching output. A switching signal is output when the measured value lies between the two switching thresholds. With some sensors, this operating mode is also referred to as "2-point teach-in".
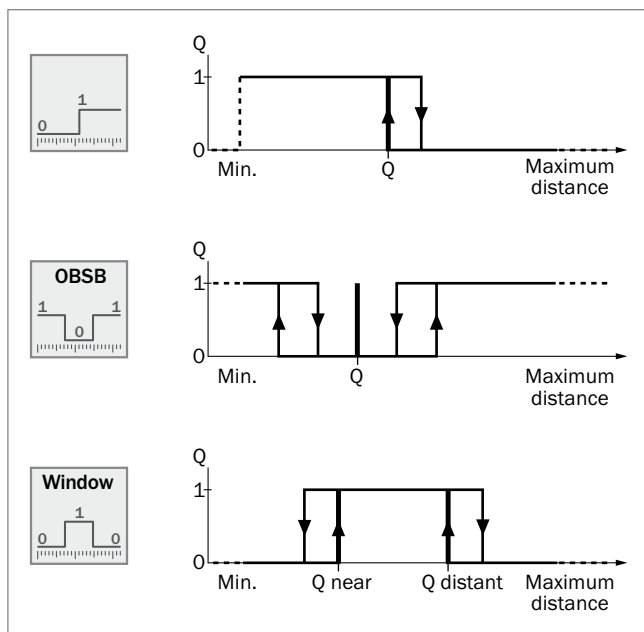
Switching output

A switching output only differentiates between an ON or OFF state. The supply voltage is switched to the output or not, depending on the state of the output.

Switching outputs are distinguished by the state in which the output is active or inactive. Two main terms are commonly used to describe this for distance sensors. "Q" (switching output) or "NO" (normally open) means that the output is switched on and current flows when the configured conditions are fulfilled. This for example is the case when the object is closer to the sensor than the configured switching threshold. Reverse or inverted switching logic uses "Q not ($\overline{Q}$)" (negated switching output) or "NC" (normally closed). In this case, the switching output is activated when the configured conditions are not satisfied, e. g. the object is further away than the configured switching threshold. The switching signal is switched off when the conditions are satisfied.

Synchronization function

The synchronization function ensures that multiple sensors always measure at the same time. This function avoids errors resulting from incorrectly comparing measurements performed at different times. Simultaneous measurement can also reduce the risk of mutual interference between the sensors. Multiplexing can be used to completely eliminate mutual interference between the sensors. Synchronization is used (e. g.) in SICK's high-end ultrasonic sensors.
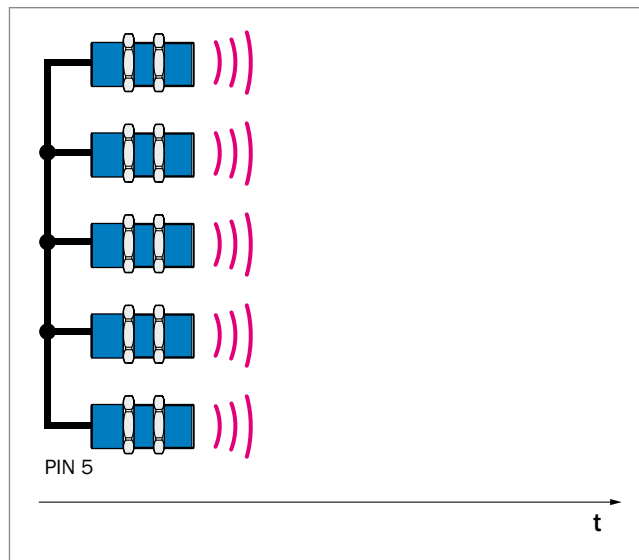
Fig. Synchronization function

Fig. Switching modes

T

Teach-in

In distance measurement, teach-in is the process to define a switching point by means of a reference object. To do this, the target is brought to the desired position within the measuring range. As soon as the object is in front of the sensor the distance is determined automatically. The teach-in process to set the switching threshold to the currently measured distance is started by pressing a button on the device or via teach-in by wire. Different teach-in procedures are available to set up the sensor very easily. This accelerates commissioning and adjustment of the sensor significantly.

Temperature compensation

Temperature compensation is a general term covering all measures taken to counteract or correct undesired temperature influences. Ideally, the temperature compensation eliminates all effects of temperature changes on the distance measurement. This is especially important with ultrasonic sensors because temperature changes can have a significant effect on the ultrasonic time-of-flight and can thus falsify the measured distance. In order to achieve the best possible measuring results, the temperature sensor in ultrasonic sensors from SICK is mounted next to the active surface of the sensor. This enables correction of the measurement based on the temperature conditions of the direct measurement environment.

Time-of-flight measurement

Distance sensors based on the time-of-flight principle measure the time interval between sending a laser pulse or a phase modulated light wave and receiving the same light reflected from the object, which can then be used to calculate the distance between sensor and target. Since light travels at a constant speed, the time-of-flight is directly proportional to the path traveled. An important advantage of time-of-flight measurements is that the measurement is hardly affected by the surface properties of the object. A number of different working principles of time-of-flight are available for measuring the distance: phase correlation, single-pulse measurement or statistical pulse measurement.

▶ see "Phase correlation measurement" on page K-381 and see "Pulse time-of-flight measurement" on page K-381
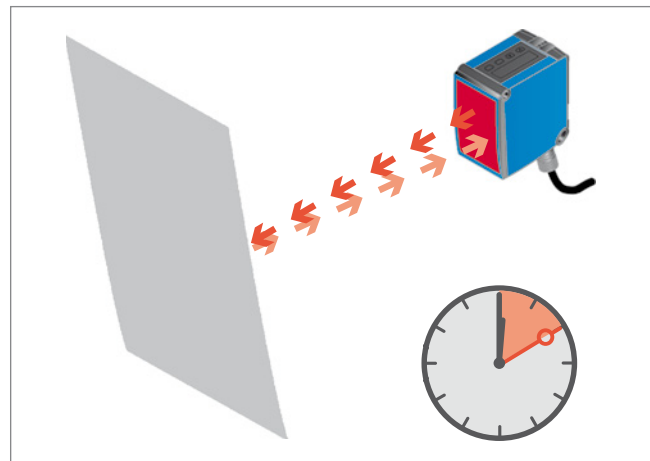
Fig. Time-of-flight measurement

Timing functions

The following timing functions can be useful for passing on the measurement results to other devices.

- ON delay: Short signals (bursts) are suppressed.
- OFF delay: The signal is extended by the configured time to allow for the use of slower control system.
- One shot delay: The signal given out always remains active for the same period of time regardless of the duration of the input signal.
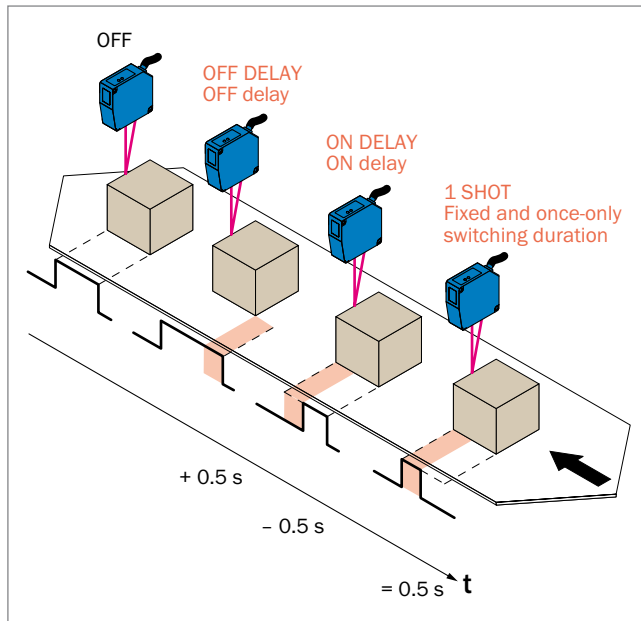
Fig. Timing functions

Transmission

Transmission describes the light transparency properties of a medium. If the light is scattered, then this is described as scattered or diffused transmission. Mixed transmission is a combination of directed and scattered beams.

Triangulation

Triangulation is a measurement method used by SICK's short range distance sensors (displacement). A light spot is projected onto a measurement target (e. g.) by use of a laser diode. The reflection is then focused by the receiver optics onto a photo-sensitive element. The distance to the object is determined based on the position of the light spot on the receiver and the known geometry.
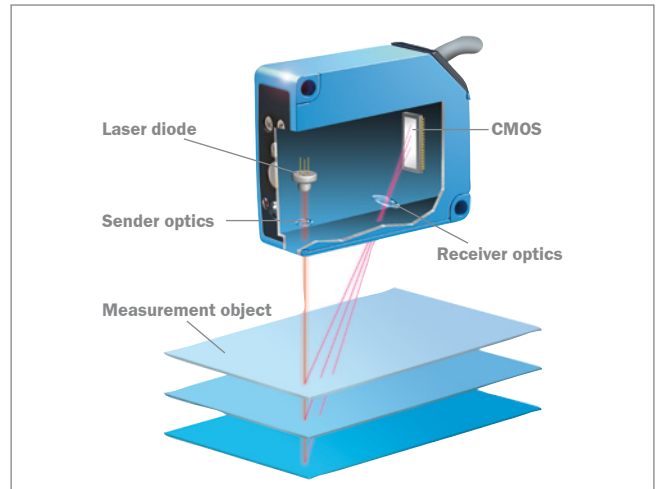
Fig. Triangulation

Trigger

With short range distance sensors, the trigger function allows the measured value to be updated at a specific time via a rising edge at the trigger input. The measured value is usually held (retained) until a new trigger signal arrives. The trigger signal is provided externally, e. g. from a control system or another sensor.

Another functionality which can be activated via a trigger input is known as "sample-and-hold." In this case the last measured value is held when the trigger input is active. Without a signal at the input the measured values are given out continuously.

U

Ultrasonic damping

Ultrasonic double sheet detectors use the principle of ultrasonic damping. With this method, a high-frequency ultrasonic pulse is generated by a sender and analyzed by an opposing receiver. When the transmitted signal hits an object or sheet, it starts to vibrate. This causes emission of a new, but damped ultrasonic pulse on the other side of the object. If another object is in-between sender and receiver, then the signal is damped even further. Based on appropriate analysis of the received signal the sensor then distinguishes between a missing, single, or double sheet.

Ultrasonic time-of-flight

When measuring distances with ultrasonic waves, a short, high-frequency ultrasonic pulse inaudible to the human ear is generated on a cyclic basis. The distance to the object can be measured based on the pulse time-of-flight to the target and back to the sensor again.
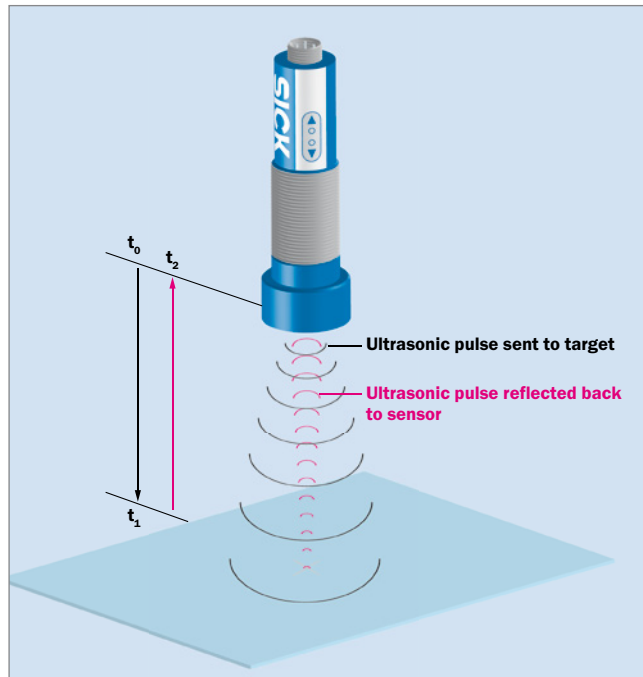
Fig. Ultrasonic time-of-flight

V

Vibration resistance

Every product family is mechanically tested according to in-house standards including vibration resistance test to ensure reliable operation in an industrial environment. The sensor must remain fully functional after all mechanical tests.

W

Warm-up time

The warm-up time is the time from connection of the power supply until the sensor reaches maximum performance capabilities. The warm-up time is necessary to achieve a thermo-mechanical balance in the measuring system and to reach the optimum operating temperature of the electronic components. The optimum operating temperature is usually reached after 5 to 30 minutes.

Wnd

Window mode (**Wind**ow).

		No protection	Drip-water vertical	tilted	Spray water	Splash water	Jet water	Strong jet of water	Temporary immersion	Lasting immersion	100 bar, 16 l/min., 80 °C
2nd digit: Protection against ingress of water											
1st digit: Protection against ingress of foreign bodies	IEC 529 DIN 40050	**IP...0**	**IP...1**	**IP...2**	**IP...3**	**IP...4**	**IP...5**	**IP...6**	**IP...7**	**IP...8**	**IP...9K**
IP 0... No protection		IP 00									
IP 1... Size of foreign body ≥ 50 mm Ø		IP 10	IP 11	IP 12							
IP 2... Size of foreign body ≥ 12 mm Ø		IP 20	IP 21	IP 22	IP 23						
IP 3... Size of foreign body ≥ 2.5 mm Ø		IP 30	IP 31	IP 32	IP 33	IP 34					
IP 4... Size of foreign body ≥ 1 mm Ø		IP 40	IP 41	IP 42	IP 43	IP 44					
IP 5... Dust-protected		IP 50			IP 53	IP 54	IP 55	IP 56			
IP 6... Dust-proof		IP 60					IP 65	IP 66	IP 67		IP 69K

Fig. Enclosure rating

General information

Making better use of the analog output

If the application does not use the full measuring range of the distance sensor, the 4 mA and 20 mA output can be adjusted to suit the application better. This allows a reduction in the resolution requirements of the analog interface card and therefore reduces the costs of the control system. For example, less expensive 12-bit analog input card may suffice instead of a 16-bit module.
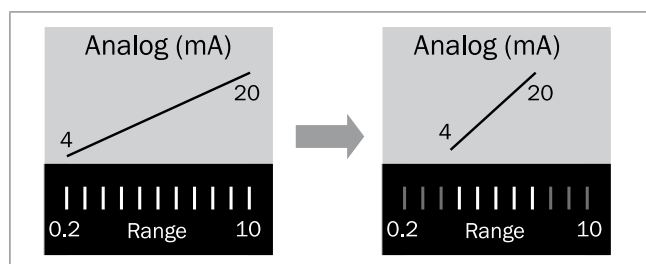
Fig. Scaling of current outputs

If the electrical connection to a 4 to 20-mA interface is lost, e. g. due to a cable breakage, the control system reliably detects the input current of less than 4 mA as an error condition. This ensures that incorrect behavior due to a cable breakage is impossible.

Current to voltage conversion

SICK offers mainly sensors with analog current outputs as these offer a much higher immunity to electromagnetic interference, which is important for the use in industrial environments. The higher immunity is mainly due to the low-resistance characteristics of an analog current output.

The analog 4 to 20 mA interface can be converted to a voltage interface using common electrical resistors from standard electronics suppliers.
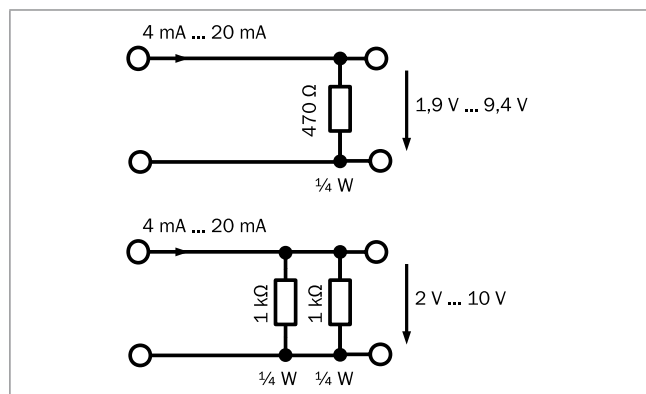
Fig. Transforming a current to a voltage output

In practice, both circuits provide an analog signal ranging from ~2 to 20 volts.

Correct wiring and use of PNP outputs

The PNP output, which is normally used in Europe and America, pulls the Q switching output to the positive supply voltage via a PNP transistor. When switched on, the Q switching output connects to "L+" voltage level, which is usually 24 volts. When the output transistor is not switched on, it effectively corresponds to an open-circuit. This is referred to as a high-impedance output state.
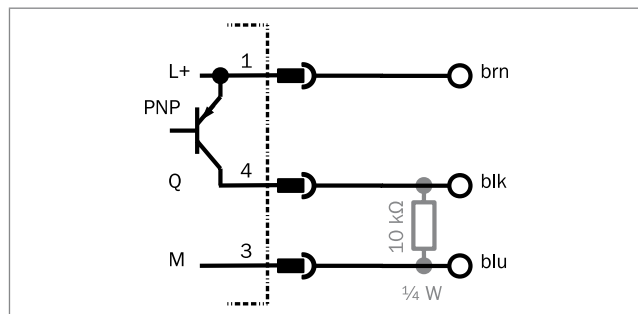
Fig. PNP output

This high-impedance state can be avoided via an external pull-down resistor to Ground (M). With this pull-down resistor, 0 V can be measured at the output when it is switched off. This pull-down resistor is already present in most control systems.

Correct wiring and use of NPN outputs

Control systems with NPN inputs are most commonly used in Asia. In this case the output signal is pulled to ground when the output is switched on. When switched on, the Q switching output connects to Ground or 0 volts. When the output transistor is not switched on, it effectively corresponds to an open-circuit. This is referred to as a high-impedance output state.
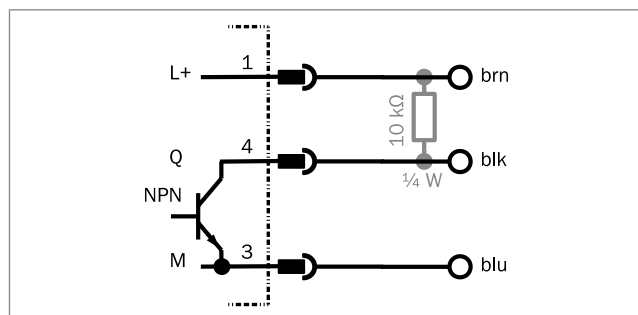
Fig. NPN output

This high-resistance state can be avoided via an external pull-up resistor. With this pull-up resistor, the output provides the "L+" voltage (usually 24 V) when it is switched off. This pull-up resistor is already present in most control systems.

Achieving best measuring and switching accuracy

The warm-up time of sensors should be taken into consideration to achieve the best measuring and switching accuracy. Teach-in of switching and analog outputs should also be performed after the sensors have reached ideal operating temperature.

Calculate the required response time

The response time is the maximum time between a sudden change in distance and the corresponding actuation of a switching output or full updating of an analog output. In dynamic processes, it is important that the response time is short enough to allow reliable measurement of all relevant objects. This means that the maximum permissible response time required for the sensors is directly related to the speed and size of the objects to be measured.
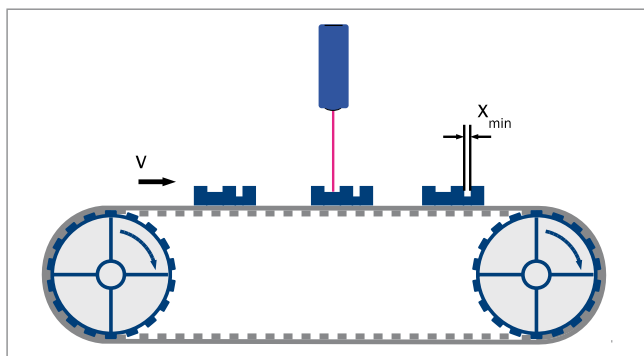
Fig. Calculation of the response time

Example:

$v = 10$ m/min ≈ 0.17 m/s ; object size $x_{min} = 5$ mm

➜ 0.005 m : 0.17 m/s $\approx 30 \times 10^{-3}$ s

The object is visible for 30 ms.

To detect the object with a size $\geq x_{min}$, the sensor must have a response time < 30 ms. The response time is directly dependent on the set averaging. Since this can be configured in some sensors, this must be taken into consideration when selecting the device.

The following table lists the required response time of the sensor in milliseconds depending on conveying speed and object size:

Conveying speed			Max. response time [in ms] depending on object size			
km/h	m/min	m/sec	1 mm	2 mm	5 mm	10 mm
0.06	1	0.02	60	120	300	600
0.12	2	0.03	30	60	150	300
0.30	5	0.08	12	24	60	120
0.60	10	0.17	6	12	30	60
1.2	20	0.33	3	6	15	30
3	50	0.83	1.2	2.4	6	12
6	100	1.67	0.6	1.2	3	6
30	500	8.33	0.12	0.24	0.6	1.2

Tab. Response times depending on conveying speed and object size

Please note:

In case of major changes to the degree of reflectance (e. g. color change), some sensors internally adjust their sensitivity, which can increase the real response time. Information on this is provided in the corresponding product documentation.

Using hysteresis for level control

The classical approach to maintaining a fill level, height, or distance uses two sensors each with one switching output or one distance sensor with two switching outputs. An appropriate control system is then used for logical analysis of the signals. The logical evaluation of the switching signals in the control system can be omitted when the sensor allows configuration of a suitably large hysteresis value. In this case, level control can be implemented using only one switching output. Simply set the switching output to the lower threshold level and then configure the distance to the upper threshold level as hysteresis.
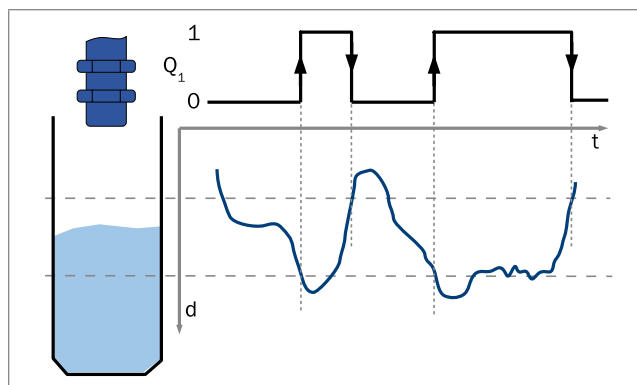
Fig. Level control via hysteresis

Sensors from SICK with configurable hysteresis are, among others, the **UM30-2** ▸ see page F-222 and the **DS50** ▸ see page C-98.

Using connection cables with LEDs
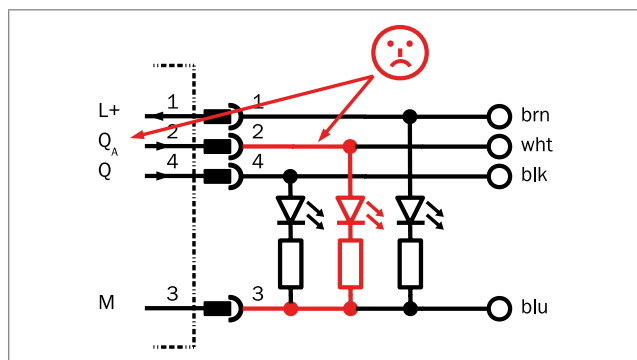
Fig. Connection cable with LED at an analog output

The LED in the cable puts an electrical load on the analog output Q_A. This can lead to unexpected behavior! Connection cables with LEDs are used for indicating the output state of PNP outputs.

An NPN output is bridged by an LED and its load resistor, which will lead to incorrect output switching!
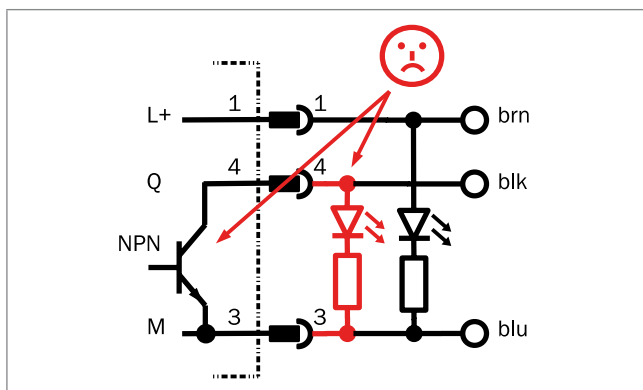
Fig. Connection cable with LED at an NPN output

For this reason always check the circuitry before using LEDs in connection cables!
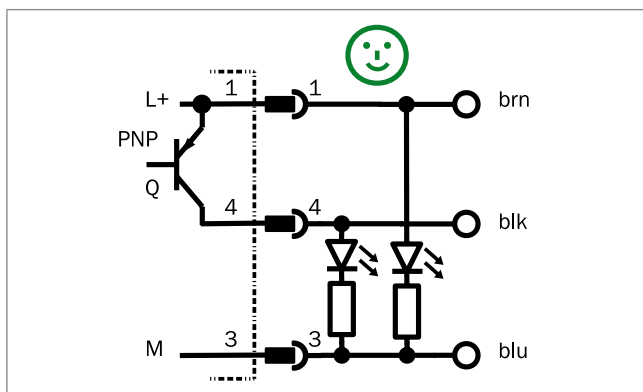
Fig. Connection cable with LED at a PNP output

PVC or PUR cables?

Connection cables with a PVC outer sheath are currently the standard industrial sensor cables. They are suitable for medium levels of mechanical load in packaging machines, assembly and production lines. They offer good resistance to acids and alkaline solutions, a limited resistance to abrasion and conditional resistance to oil and chemicals. For more demanding requirements, e. g. in production lines producing metal chips, cables with a PUR sheath are more suitable due to their good oil and chemical resistance and their high abrasion resistance. PUR cables can also be used for drag chain purposes. In such demanding applications, their higher resistance to abrasion and better bending properties allow 8 x longer service life compared to normal PVC cables.

Enclosure rating and IP class in practice

SICK specifies an IP protection class for its distance sensors. The class is determined and certified using standardized, repeatable laboratory tests. However, especially outdoor applications with natural weather conditions show the limits of such tests. Moisture on a sensor, e. g. a water droplet, can be sucked into the sensor housing through sudden temperature changes and resulting differences in pressure, even when the housing is well sealed. This property is known as the pump effect and can result in damage to the electronics or cause fogging inside the sensor.

When used outdoors, the sensor should always be protected from moisture and direct sunlight by a suitable housing. An appropriately bent metal sheet is often sufficient. This also provides mechanical protection. If installed without a protective housing, at the very least the sensor should be installed at an appropriate inclination so that water cannot accumulate on the device.

Example: **OBW-KHS-M02** outdoor housing ▸ see chapter J.

OBW-KHS-M02 outdoor housing

MTTF$_d$ and PFH$_d$ values

MTTF$_d$ is a statistical value, i. e. an empirically determined or calculated value, which can be seen as an indicator value that has nothing to do with the "guaranteed service life," "failure-free time," or anything similar. The value describes the reliability of the components used and is defined as the "Expected value of the average time until a hazardous failure occurs."

The PFH$_d$ value is the inverse of the MTTF$_d$ value.

Example: MTTF$_d$ = 100 years

➜ PFH$_d$ = 1 / (100 x 365 x 24 h) = 11.4 x 10^{-7} $^1/_h$

The ISO 13849-1 requires conformance to defined PFH$_d$ values in order to achieve a performance level.

Technical data from SICK do not normally specify MTTF$_d$ values for sensors. MTTF$_d$ values for sensors can be provided by the nearest SICK sales office at any time on request.

Optical distance sensors

Infrared or red?

From a technical perspective, the wavelengths of visible red light and near-infrared (NIR) light are very near to each other. The infrared light with its slightly longer wavelength has almost the same dispersion properties as red light. The most important difference is the visibility of red light to humans.

Fig. Light spectrum

With red light, it is easier to align the light spot and assess the size of the light spot. Infrared light offers advantages in daily operation. The light spot is invisible. The operators are less distracted or ir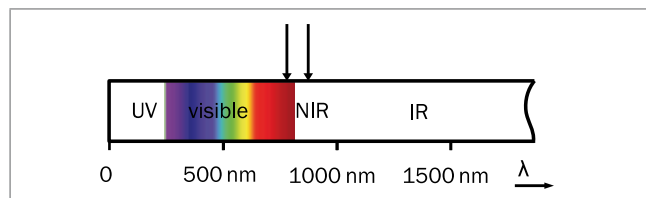ritated by the light spot, especially in dynamic applications. They feel safer at their workplace, even though the absence of the light spot does not by definition mean that the infrared laser is not hazardous. In most cases, distance sensors do not use light sources classified as dangerous.

Distinction between laser class 1 and laser class 2

The classification in accordance with EN 60825-1 stipulates for a class 1 laser a maximum power < 25 µW and a wavelength between 400 nm ... 700 nm. The accessible laser beam is not dangerous.

A class 1M laser has a maximum power < 25 µW and a wavelength between 302.5 nm ... 4,000 nm. The accessible laser power is not dangerous as long as no optical instruments (magnifying glass, binoculars) are used.

A class 2 laser has a maximum power < 1 mW and a wavelength between 400 nm ... 700 nm. According to EN 60825-1, this is not dangerous to the eyes for short periods of exposure (up to 0.25 s).

Note: Generally, the normal blink reflex of the eyes means that one can assume a short period of exposure.

Note the preferred alignment!

Triangulation assumes that both the laser beam and the receiver always reach or monitor the same level. For an edge, this is not the case in all directions! Short range distance sensors, also known as displacement sensors, use the principle of triangulation.

The following preferred alignment should be considered:
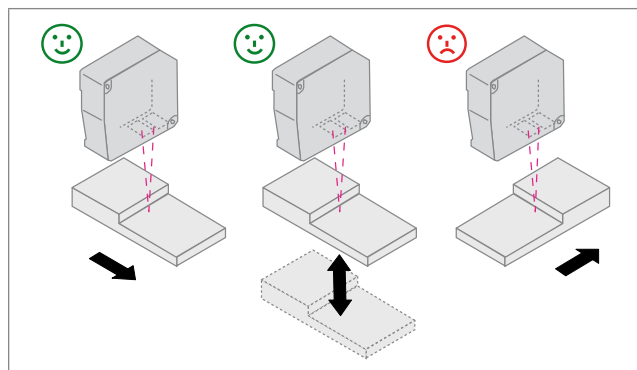
Fig. Preferred direction for triangulation sensors

Measuring on highly reflective surfaces

Highly reflective surfaces can reflect the laser beam away or produce direct reflections that prevent optical distance sensors from providing accurate distance measurements. This problem can often be solved by tilting the sensor or object by approx. 3° to 5° towards or away from the receiver in order to receive valid measured values.

Reliable detection of highly reflective objects

Distance measurements performed on surfaces that reflect the measuring beam away at certain angles do not always provide valid distance values. In the case of an analog sensor, this behavior can be taken into account in the control system until a valid measured value is available again. The correct logic in the control system can thus prevent incorrect behavior.
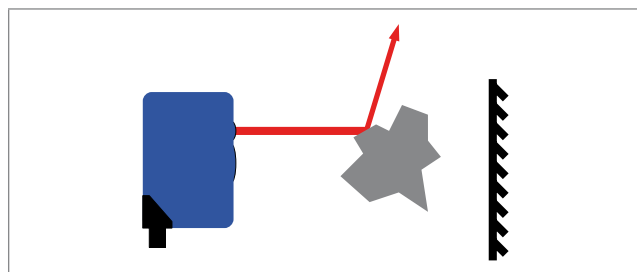
Fig. Reflective objects

In the OBSB mode = "Object Between Sensor and Background," this task is performed by the distance sensor itself. For example, this is present in the **DS50** ▶ see page C-98. The sensor is referenced once on the existing background. Reasoning is, that if a different distance than to the background is measured or (even) if no measurement is possible, an object must be present between sensor and background. This means, that the sensor will give out a stable switching signal in any of the described cases.

Determining the required reflector size

The size of the reflector needed for a distance sensor depends on the maximum distance to be measured and the nature of mechanical installation of the sensor.
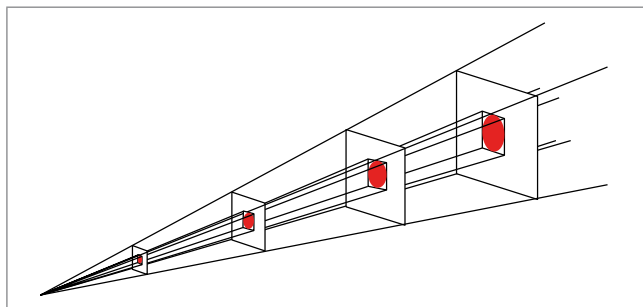
Fig. Reflector sizes

In practice, one can assume a linear horizontal and vertical dispersion of the beam when calculating the size of the light spot. SICK's **DL50 Hi** distance sensor ▸ see page C-110 is examined in this case as an example. With this sensor, the light spot is 15 x 15 mm at a distance of 10 m. The aperture angle ω is calculated as:

$$\omega = 2 \times \arctan((15\text{ mm}/2)/10{,}000\text{ mm}) \approx 0.086°$$

Table calculation: "=2*ARCTAN(DEG(diameter/2/distance))"

This can be used to calculate the size of the light spot at (e.g.) 20 m:

20 m ➜ 20.000 mm x 2 x tan (0,086°/2) = 30 mm

Table calculation:
"=Distance*2*TAN(RADIANS(aperture angle)/2)"

The size of the reflector is determined by the maximum possible alignment tolerance of the distance sensor. Due to this the sensor should ideally be mounted rigidly. If one assumes (e. g.) a possible mechanical deviation of 1° (± 0.5°), then the size of the reflector depending on the size of the light spot can be calculated as follows:

With 1° + 0.086° = 1.086°, this e.g. at 20 m results in:

20 m ➜ 20.000 mm x 2 x tan (1,086°/2) ≈ 380 mm

Table calculation:
"=Distance*2*TAN(RADIANS(alignment tolerance+aperture
  angle)/2)"

At a distance of 20 m, a reflector sized min. 380 mm x 380 mm must therefore be used.

Table for a laser aperture angle of 0.086° and mechanical deviation of ± 0.5°:

Distance	Size of light spot	Required reflector size
10 m	15 mm x 15 mm	190 mm x 190 mm
20 m	30 mm x 30 mm	380 mm x 380 mm
30 m	45 mm x 45 mm	569 mm x 569 mm
40 m	60 mm x 60 mm	758 mm x 758 mm
50 m	70 mm x 70 mm	948 mm x 948 mm

Tab. Reflector and light spot size depending on distance

Moving the reflector instead of the distance sensor

If possible within the requirements of the application, the reflector should always be moved and the distance sensor should remain fixed. In this case, angular deviations, e.g. caused by starting and stopping, have no effect on the alignment and a smaller reflector can be used.

Optical measurements through a transparent material or via a mirror

Assuming the following conditions are present, it is possible to use optical distance sensors to measure an object through a transparent material or via a mirror:

- The transparent material / mirror should be located significantly outside the specified measuring range.
- The transparent material should be coated / non-reflecting and inclined away from the receiver in the light path (approx. 5°… 25°).
- The transparent material should ideally be completely transparent or have a high degree of transmission in the spectral range of the sender.
- A high-quality front or surface mirror should ideally be used for redirecting the beam (without glass cover on top of the reflecting surface).
- The mirror, transparent material etc. in the light path must not restrict the optical sending and receiving path.
- The installed optical surfaces must be kept clean or regularly cleaned.

The accuracy of the sensor can be affected, depending on the quality of the glass/mirror or the thickness of the transparent material, but typically this effect is neglegible.

Reason: Transparent material in the measuring path causes an additional systematic error. The reasons for this include the change of the refractive index for triangulation sensors or the change of the speed of light in glass for time-of-flight light sensors.

The front window of most distance sensors is made of PMMA (Plexiglas®). Black printed areas, known as masks, visible on the optical components, provide artificial damping at near range in order to provide a consistently good measuring result over the entire measuring range (comparable with mechanical shades, e. g. SICK's **DMT** ▸ see page D-170 or **DML** ▸ see page D-178).

Avoiding mutual interference between optical sensors

The following methods can be used to avoid mutual interference between optical distance sensors:

1. Mount sensors in parallel with large enough distance in between
2. Incline the sensors away from each other
3. Use sensors having internal algorithms that prevent mutual interference(e. g. **DS50** ▸ see page C-98, **DL50Hi** ▸ see page C-110)

At near ranges, and depending on the aperture angles of the sender and receiver optics, the sensors can be mounted closer together without causing mutual interference.

Optical density or refractive index

When a laser beam passes from one medium into another, e. g. from air into glass, the light is refracted towards the optically denser material. This must be taken into account when performing triangulation measurements.

Media	Refractive index (n)
Vacuum	1.0000
Air	1.0003
Carbon dioxide	1.0045
Water	1.333
PMMA (Acrylic glass/Plexiglas®)	1.49
Glass	1.45 to 2.14 (depending on type)
Window glass	approx. 1.5 (depending on manufacturer)
Diamond	2.417

Tab. Typical optical refractive indices for various media

Measurement of glass thickness

Based on the reflection at the first and second surface of a transparent material (transition from air into, e. g. glass and back into air) some short range distance sensors (displacement) from SICK can determine the difference between first and second surface using only one sensor head, e. g. **OD Precision** ▸ see page B-56. After referencing the measured transparent material, this corresponds to the thickness of the glass or material.

▸ see also "Optical density or refractive index" on page K-395
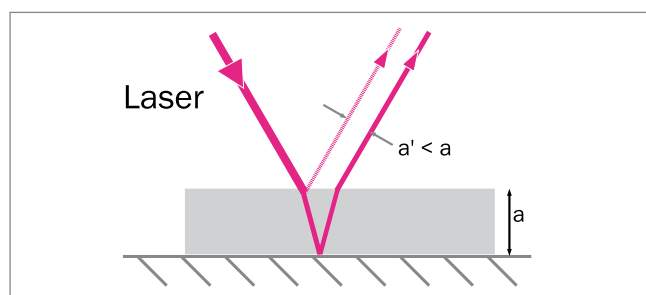
Fig. Glass thickness measurement

Speed of light in different media

The speed of light varies depending on the medium. Ex factory, SICK's distance sensors are calibrated for air. If the measurement is performed in a different environment, this must be taken into account.

Media	Light speed	Correction factor
Vacuum	299,792 km/s	0.99973
Air (close to the ground)	299,711 km/s	1.00000
Water	225,350 km/s	1.32998
Quartz	205,500 km/s	1.45845
Crown glass	197,180 km/s	1.51999
Diamond	121,340 km/s	2.47001

Tab. Typical speed of light in different media

Laser service life depending on temperature

The service life of a laser is physically influenced by the ambient temperature. The service life specified in the data sheets is a statistical value based on an ambient temperature of 25 °C. As a general rule of thumb, the service life halves for each 10 °C increase in ambient temperature. If this is specified with (e. g.) 100,000 hours, the service life will be approx. 12,500 h when being operated at an ambient temperature of 55 °C (e.g. in Dubai). In constant operation, this would result in a service life of about 1.5 years. For this reason, SICK offers a range of cooling systems for numerous product families, which significantly lengthen the service life of the laser.

Example: **BEF-KP-DX50/DT20** cooling plate accessory ▸ see chapter J.
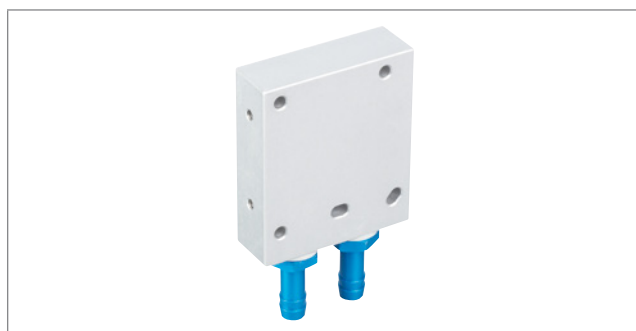
BEF-KP-DX50/DT20 cooling plate accessory

The service life can also be extended by switching off the laser. For example, this is possible via the multi-function input in the Dx50 product family. **Dx50** ▸ see page C-86.

Prevent misting of the optical lens

If an object is suddenly moved from a cold area, e. g. a cold store, into a warmer area, then ambient moisture in the air condenses on the cold object. This is the reason why (e. g.) glasses and sensors fog up when moved from cold to warm areas.

This can be avoided by heating the sensor when in the colder area. Typically heating to a temperature higher than 4 °C is sufficient in most cases. For critical applications, the dew point of water should be considered in more detail.

The problem can generally be solved by using heated device variants, such as (e.g.) the DME5000-322.

Outdoor use of optical sensors

The range of an optical distance sensor using red light is affected by (e. g.) fog, steam, or dust in much the same way as human vision is affected. Infrared light (= IR light) offers advantages in this situation. Up to 50 % longer range can be achieved in comparison to red light.

Ultrasonic sensors

Range of ultrasonic sensors

The working range specifies the distance up to which ultrasonic measurement on common objects is possible with sufficient functional reserves. Under ideal conditions, the sensor can even be used up to its limiting range.
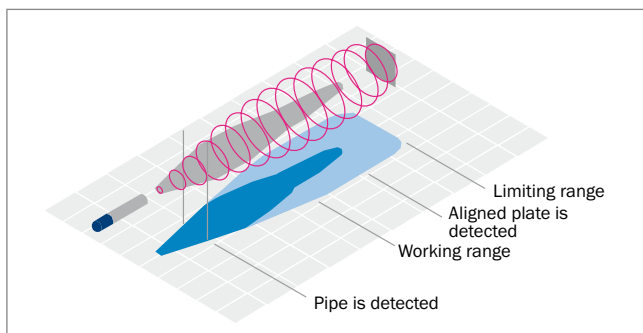

Fig. Detection range

The dark blue area defines the range in which a pipe (Ø 10 mm or Ø 27 mm depending on the ultrasonic sensor) is detected by the sensor. This corresponds to the typical working range of the sensor.

The light blue area defines the range in which a square plate (500 x 500 mm²) at the optimum angle is detected by the sensor. This is the maximum detection range of the sensor, which can be considered for detection of objects with good reflection properties to ultrasonic waves in normal ambient conditions. Additionally, the area between the sensor and the measurement target should be kept free to avoid unintentional detection of objects.

Please note:

The ultrasonic damping, and thus the range of the sensor, depends on the ambient humidity and air pressure. The ambient air temperature also affects the range. Lower temperatures, lower humidity and higher air pressure all increase the range. This should be considered in the application.

Ultrasonic measurements on smooth surfaces

Smooth, acoustically hard surfaces redirect the ultrasonic waves. A maximum inclination of 3° should be maintained in order to ensure detection of smooth surface. A larger angle is applicable with rough surfaces.

Alternatively, most SICK ultrasonic sensors can be programmed to detect objects between sensor and background. With this switching mode, even if the object itself cannot be detected, the sensor will still give out a switching signal if the background cannot be detected. The behavior corresponds to the OBSB mode also used in the Dx50 product family.
Dx50 ▸ see page C-86.
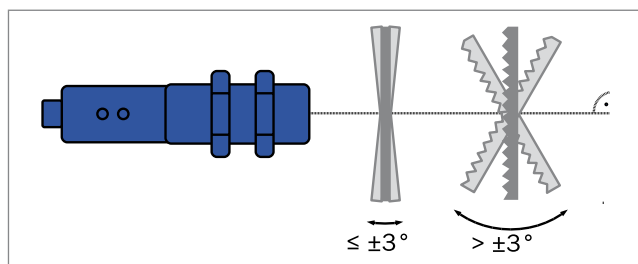
Fig. Reflection of sound on smooth and rough surfaces

On the other hand, this physical property of ultrasonic waves can be used to redirect the wave in a controlled manner, e. g. when space is limited. In this case, an acoustically hard, smooth and sufficiently large surface should be mounted at an angle of 45° in the blind zone in front of the sensor

▸ Fig. Detection range on page K-396.

This property can also be used to check whether the surface is smooth or rough, e. g. to check that a rough object has been covered with a protective foil.

Avoiding mutual interference between ultrasonic sensors

Ultrasonic sensors mounted closely next to each other or directly opposing each other can cause mutual interference. For this reason, sufficient side and axial distances must be maintained between the sensors, depending on their detection range. When using different sensor types it is always the sensor with the largest detection range defines the minimum distance between all sensors.

Fig. Mutual interference

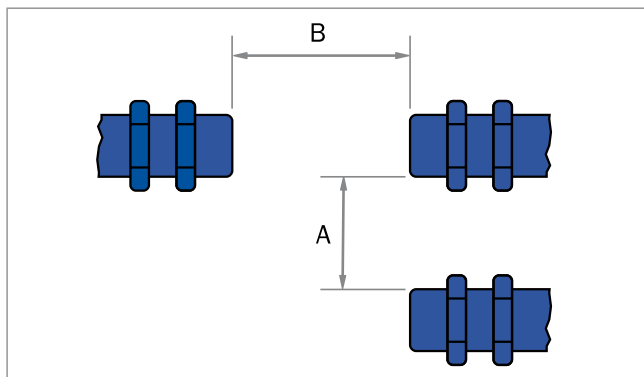| Operating range	Minimum distance A	Minimum distance B
0.07 m	> 0.25 m	> 1.1 m
0.15 m	> 0.25 m	> 1.3 m
0.24	> 0.25 m	> 1.4 m
0.25 m	> 0.35 m	> 2.5 m
0.35 m	> 0.4 m	> 2.5 m
1.0 m	> 0.7 m	> 4 m
1.3 m	> 1.1 m	> 8 m
3.4 m	> 2 m	> 18 m
6 m	> 4 m	> 30 m

Tab. Minimum distances required to prevent mutual interference

If the minimum installation distances specified in the table cannot be adhered to, then the synchronization mode offered by many of SICK's ultrasonic sensors should be used. To do this, pins 5 of all sensors are electrically connected together. Multiplexing can also be used to completely eliminate mutual interference between the sensors. In this case, all connected ultrasonic sensors perform their measurements sequentially, one after another.

▸ see glossary "Multiplexing" on page K-380

▸ see glossary "Synchronization function" on page K-384

Monitoring a large area with multiple ultrasonic sensors

To monitor a large area with multiple ultrasonic sensors, most of SICK's ultrasonic sensors allow synchronization via pin 5.

▸ see glossary "Synchronization function" on page K-384

Acoustic perception of ultrasonic sound

The clicking sound of an ultrasonic sensor which can be heard is a mechanical effect caused by the repeated generation of the ultrasonic pulses used for distance measurement. This is neither a malfunction nor can the human ear hear the actual ultrasonic signal.

Velocity of sound wave depending on air temperature

Velocity of sound wave depends on the air temperature:

Temperature	Velocity of sound wave (c) in air
–20 °C	319.1 m/s
0 °C	331.5 m/s
+20 °C	343.4 m/s
+60 °C	366.1 m/s

Tab. Velocity of sound wave depending on air temperature

This can also be calculated by use of following formula:

$$C_{Air} \approx 331.5 \ \frac{m}{s} \ \sqrt{1 + \frac{\vartheta/°C}{273.15}}$$

Fig. Formula for calculating the velocity of sound wave

Be aware that the temperature unit used for this formula is degrees of Celcius (°C).

Most ultrasonic sensors of SICK feature temperature compensation to achieve highest accuracy even with changing ambient temperatures. Even after the sensors have reached their operating temperature, sudden temperature fluctuations can result in incorrect measured values because the temperature change inside the sensor cannot be physically detected until a short time later.

Please note:
Temperature compensation cannot function correctly if the temperature fluctuation is only present in the measuring area but does not reach the sensor.

Operating ultrasonic sensors in gases

Due to the different velocity of sound wave and damping effects, operating ultrasonic sensors in gases can cause severe measurement errors or even make measurement impossible (e.g. in carbon dioxide). Ultrasonic sensors are designed for use in normal atmospheric air.

Outdoor use of ultrasonic sensors

Tests have shown that wind speeds of up to 160 km/h have no noticeable effect on ultrasonic sensors. Fog, dirt, dust, and light rain have only a negligible effect on ultrasonic sensors. For this reason, there are almost no limits to the use of ultrasonic sensors outdoors. To avoid the accumulation of moisture or other contaminants on the ultrasonic sender, ultrasonic sensors installed outside should ideally be mounted horizontally or inclined slightly downwards.

Distance

	µm	mm	cm	m	km	inch	foot	yard	mile
1 µm ≈	1	1.0×10^{-3}	1.0×10^{-4}	1.0×10^{-6}	1.0×10^{-9}	3.94×10^{-5}	3.28×10^{-6}	1.09×10^{-6}	6.21×10^{-10}
1 mm ≈	1,000	1	0.1	1.0×10^{-3}	1.0×10^{-6}	0.04	3.28×10^{-3}	1.09×10^{-3}	6.21×10^{-7}
1 cm ≈	10,000	10	1	0.01	1.0×10^{-5}	0.39	0.03	0.01	6.21×10^{-6}
1 m ≈	1,000,000	1,000	100	1	1.0×10^{-3}	39.37	32.81	1.09	6.21×10^{-4}
1 km ≈	1,000,000,000	1,000,000	100,000	1,000	1	39,370	3,281	1,094	0.62
1 inch ≈	25,400	25.4	2.54	0.03	2.54×10^{-5}	1	0.08	0.03	1.58×10^{-5}
1 foot ≈	304,800	305	30.5	0.30	3.05×10^{-4}	12	1	0.33	1.89×10^{-4}
1 yard ≈	914,400	914	91.4	0.91	9.14×10^{-4}	36	3	1	5.68×10^{-4}
1 mile ≈	1,609,344,000	1,609,344	160,934	1,609	1.61	63,360	5,280	1,760	1

Area

	mm²	cm²	m²	inch²	foot²
1 mm² ≈	1	0.01	1.0×10^{-6}	1.55×10^{-3}	1.08×10^{-5}
1 cm² ≈	100	1	1.0×10^{-4}	0.16	1.08×10^{-3}
1 m² ≈	1,000,000	10,000	1	1,550	10.8
1 inch² ≈	645	6.45	6.45×10^{-4}	1	6.94×10^{-3}
1 foot² ≈	92,903	929	0.09	144	1
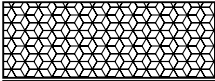
Temperature

$$°F = \frac{°C \times 9}{5} + 32$$

$$°C = \frac{(°F - 32) \times 5}{9}$$

Celcius (°C)	−55	−40	−20	−10	0	+20	+25	+30	+40	+45	+50	+55	+60	+65	+70
Fahrenheit (°F)	−67	−40	−4	+14	+32	+68	+77	+86	+104	+113	+122	+131	+140	+149	+158

Reflectance

|		
	Reflector	> 2,000 %
	White	Approx. 90 %
	Gray	Approx. 18 %
	Black	Approx. 6 %

The information provided here is not suitable for use as a reference.

The degree of reflectance specifies how intensely incident light is reflected from a surface.
As a general rule, the higher the value, the greater the possibility of successful optical sensor measurement.

SICK sensors can perform measurements on very dark as well as very light materials. The measurement range is usually specified as 6 % ... 90 % remission. Some sensors are particularly suited to performing measurements on a reflector. Measuring on a reflector enables longer distances to be measured, or the same distance to be measured with greater accuracy.

SICK at a glance
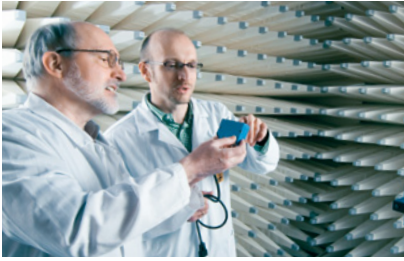
Leading technologies

With a staff of more than 5,000 and over 50 subsidiaries and representations worldwide, SICK is one of the leading and most successful manufacturers of sensor technology. The power of innovation and solution competency have made SICK the global market leader. No matter what the project and industry may be, talking with an expert from SICK will provide you with an ideal basis for your plans – there is no need to settle for anything less than the best.

Unique product range

- Non-contact detecting, counting, classifying, positioning and measuring of any type of object or media
- Accident and operator protection with sensors, safety software and services
- Automatic identification with bar code and RFID readers
- Laser measurement technology for detecting the volume, position and contour of people and objects
- Complete system solutions for analysis and flow measurement of gases and liquids

Comprehensive services

- SICK LifeTime Services – for safety and productivity
- Application centers in Europe, Asia and North America for the development of system solutions under real-world conditions
- E-Business Partner Portal www.mysick.com – price and availability of products, requests for quotation and online orders

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