Baumer
Passion for Sensors

Photoelectric sensors. Fiber optics and fiber optic sensors.

Precise, measurably better. Edition 2013

Photoelectric sensors by Baumer combine tried and tested technology and sophisticated innovations.

Visibly better: Baumer sensors.

The Baumer Group is leading at international level in the development and production of sensors, shaft encoders, measuring instruments as well as components for automatic image processing. As an owner-managed family business, we employ about 2500 workers worldwide in 36 subsidiaries and 18 countries. With marked customer orientation, consistently high quality and vast innovation potential worldwide, Baumer develops specific solutions for many industries and applications.

Our standards – your benefits.

- Passion coupled with expertise – both have made us a sensor pioneer and technology leader
- Our range of services is hard to beat – we have the right product, developed by our own team, for every task
- Inspiring through innovation – a challenge Baumer employees take on every day
- Reliability, precision and quality – our customers› requirements are what drives us
- Partnership from the start – together with our customers we develop suitable solutions
- Always a step ahead – thanks to our production depth, our flexibility and our delivery reliability
- Available worldwide – Baumer is Baumer everywhere

Photoelectric sensors detect objects, measure distances, recognize colors, count components and monitor filling levels. Manufacturing newspapers, chocolate, cars, computers and cell phones would be inconceivable without sensors. Delivering letters and packages would be extremely time-consuming and processing food would be cumbersome.

State of technology:

- Today's technology makes it possible to produce compact photoelectric sensors that are able to precisely detect objects with high repeat accuracy even in harsh, industrial environments.
- User-friendly Smart Vision sensors enable objects to be checked in a two-dimensional plane.

Photoelectric sensors from Baumer:

- Baumer offers a wide range of photoelectric sensors for countless applications.
- Complete line of sensors for the food and beverage industry in a washdown or hygienic design
- SmartReflect light barriers offer the most reliable and most convenient type of object detection
- Light barriers and diffuse sensors, also with background suppression if needed, are available in the smallest designs
- Laser technology is also available in nearly every type of sensor
- Broad range of fiber optic sensors and plastic and glass fiber optics
- Distance-measuring laser sensors with high resolution of up to 2 µm and measuring distances of up to 13 m provide precise, absolute distance information
- Line sensors with integrated processing electronics check edge position of textile webs, detect objects in a two-dimensional plane, or provide absolute and precise position information
- Compact vision sensors for position, completeness and placement monitoring. Sensors for specific applications such as the laser *SCATEC* copy counter
- Customer-oriented solutions for specific requirements

Baumer is the right partner for you when it comes to efficient and competitive photoelectric sensor solutions.

Ask us!

Learn more.
Downloadable data sheets as well as further information about our products is available at:
www.baumer.com/photoelectric

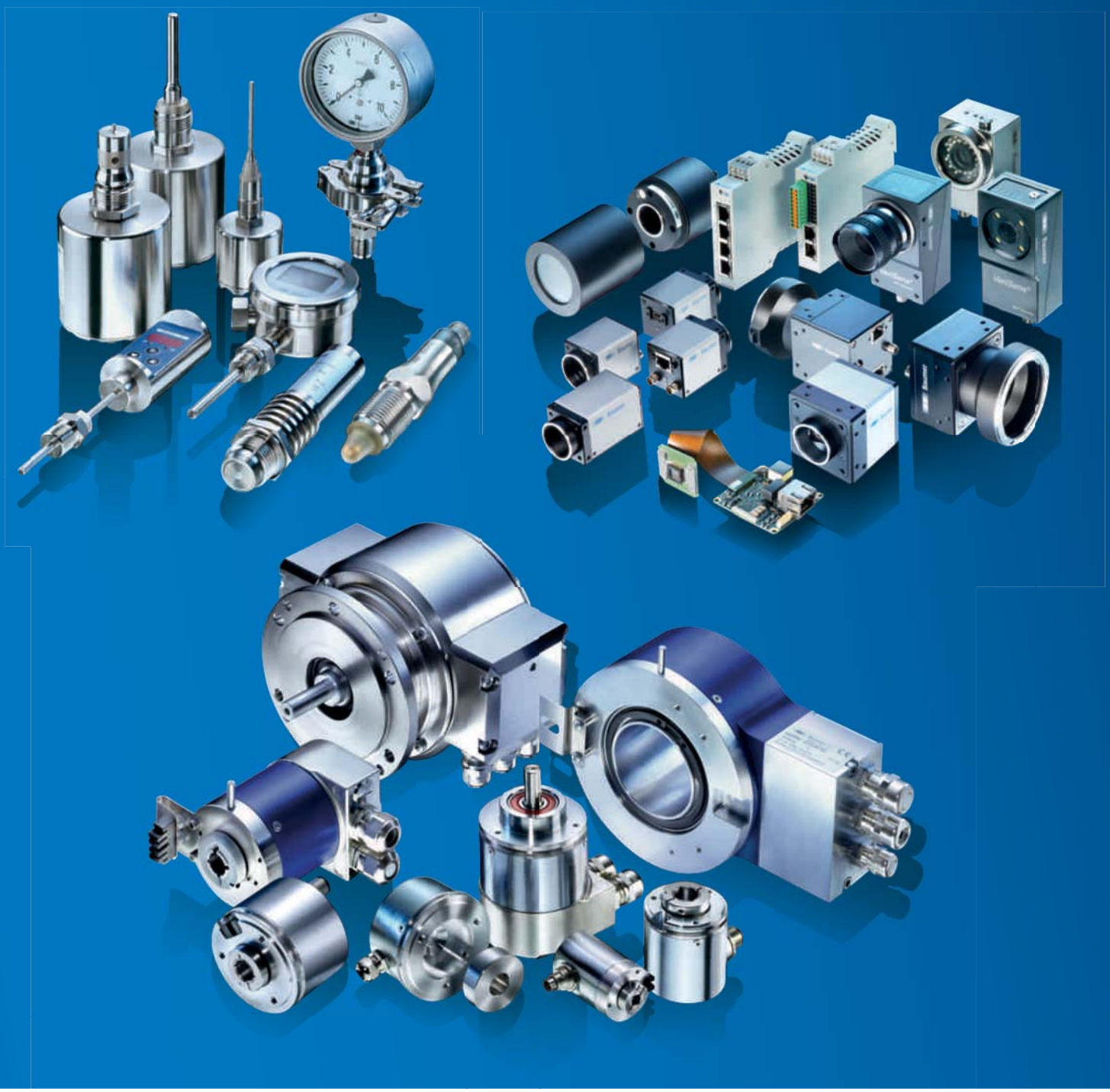
Contents.

Baumer – setting standards with innovations.

The success story of the Baumer Group is characterized by innovations. By hardware and software engineers, designers or process engineers who work day in and day out to make our products and systems even better.

We pay particular attention to the increased miniaturization, precision as well as the measuring speed and robustness of the sensors. These features characterize our products even today. And that is something we are proud of.

The Baumer development teams are organized in an international network and are in close contact with well-known universities, recognized research institutes and highly specialized international engineering companies. As the technological leader, Baumer always endeavors to maintain its lead over the long term and protect its numerous innovations through patents.



Comprehensive product range

- Actuators and positioning drives
- Capacitive proximity sensors
- Conductivity sensors
- Counters
- Digital cameras
- Encoders
- Force and strain sensors
- Inductive sensors
- Level measurement
- Magnetic sensors
- Network Components
- OCR and code reader systems
- Optical inspection systems
- Photoelectric sensors
- Precision switches My-Com
- Pressure measurement
- Process analysis
- Process displays
- Resolvers
- Speed switches
- Spindle positioning systems
- Tachogenerators
- Temperature sensors
- Ultrasonic sensors
- Vision sensors

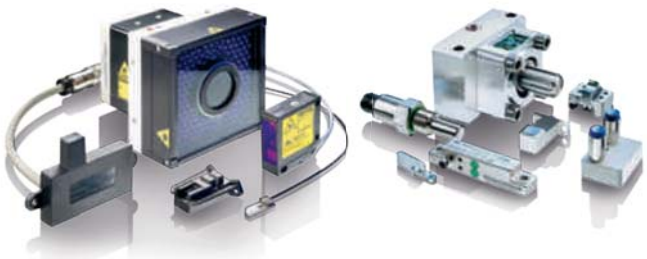
- Inductive sensors
- Capacitive sensors
- Photoelectric sensors
- Vision sensors
- Ultrasonic sensors
- Magnetic sensors
- Precision switches
  My-Com

Passion for sensors.

Whether for object or position recognition, measuring, a miniaturized or exceptionally robust design – Baumer has the right sensor for every application. Different sensor functions in standard housings ease assembly for the user and limit the setup time to a minimum. Baumer can supply a wide range from inductive to vision sensors and advise you comprehensively.

Customized solutions.

Our broad range of products enables us to provide the optimum solution for a large number of applications. But customers might have needs completely outside these application areas that cannot be entirely satisfied by the products currently on the market.



And this is precisely why our development engineers work closely with our customers. In searching for optimum solutions to meet these special needs, we are able to create customized solutions. Our customized solutions range from special mechanical designs to completely new sensor systems.

An innovative sensor solution can also help you gain a significant competitive advantage.

We would be happy to advise you!

Photoelectric sensors in miniature housings

- FHDK 04: smallest sensor on the market with real background suppression (4 x 6 x 45 mm)
- Smallest line of sensors with an adjustable switching distance (*MINOS*)
- Smallest laser sensors with background suppression and adjustable sensing distance (OHDK 10)
- Series 10 miniatures: widest range of products with the best performance

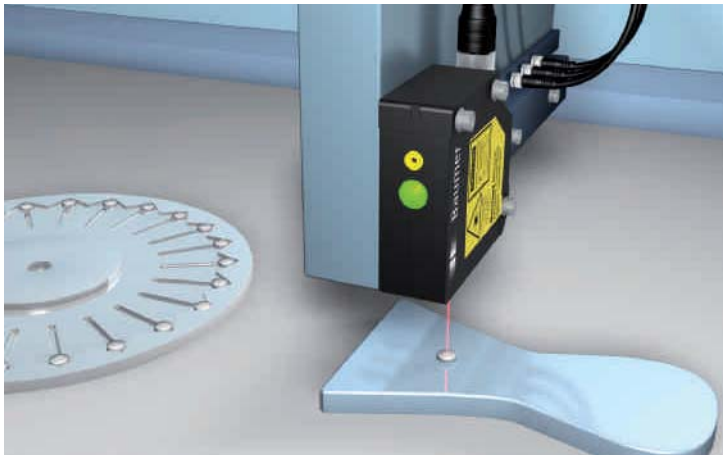
- Whether through teach-in keys or potentiometers: all sensors (even the smallest) can be easily and precisely configured according to the application

- Sensors with beam diameters of up to 0.1 mm can identify the smallest objects or detect parts with the utmost precision regardless of color or objects in the background.

- Large selection of different plastic and glass fiber optics for solving even the most difficult applications
- Custom designed fiber optic heads
- Different fiber optic amplifiers: device ranging from easily adjustable to powerful with multiple modes

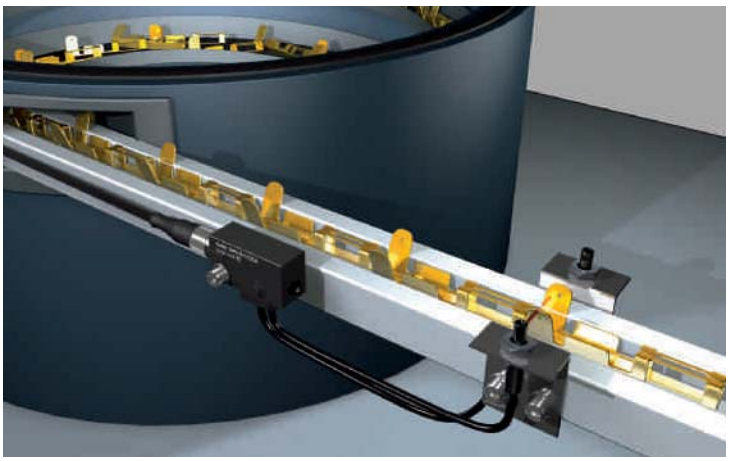
Applications

- Installation/handling
- Semiconductor manufacturing
- Packaging machines
- Measuring/testing technology
- Graphic machines



Laser distance sensor

- Measuring tablet thickness.



Small fiber optic head

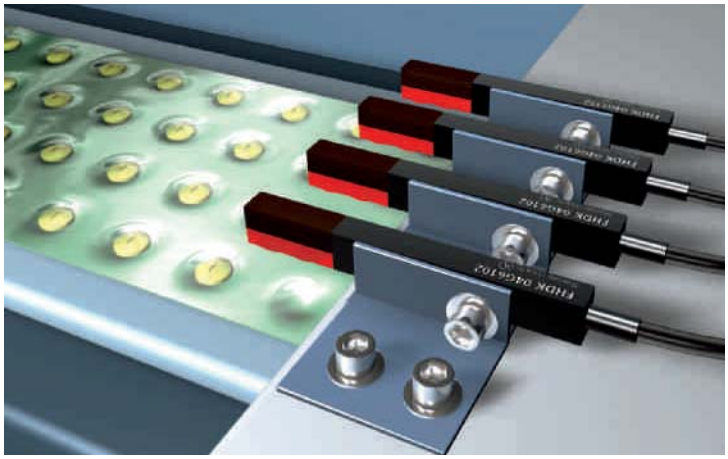
- Detecting small parts on a handling machine.

SmartReflect™ Light barriers

- Positioning the lipstick tube before the filling.

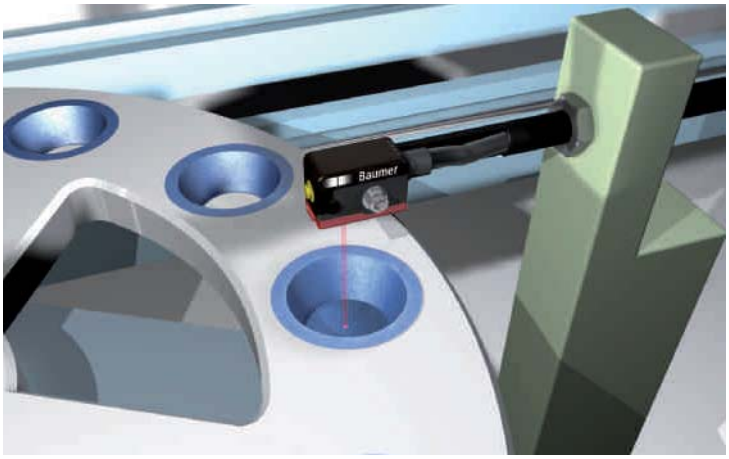
Miniaturization is an unstoppable trend. Faster processes, better quality and increasingly more integrated machines require more precise and compact sensors. Our uniquely small sensors are the perfect fit for applications where detecting objects in this position and at this location has previously seemed to be impossible.

No place is too cramped and no application is too difficult for Baumer's miniature sensors to handle.



Diffuse sensors with background suppression

- Presence check of tablets.

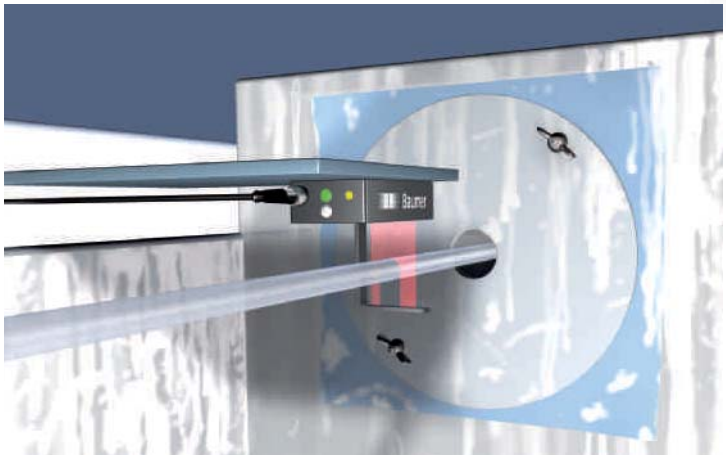


Diffuse sensors with intensity difference

- Presence check of filters in the coffee capsules.

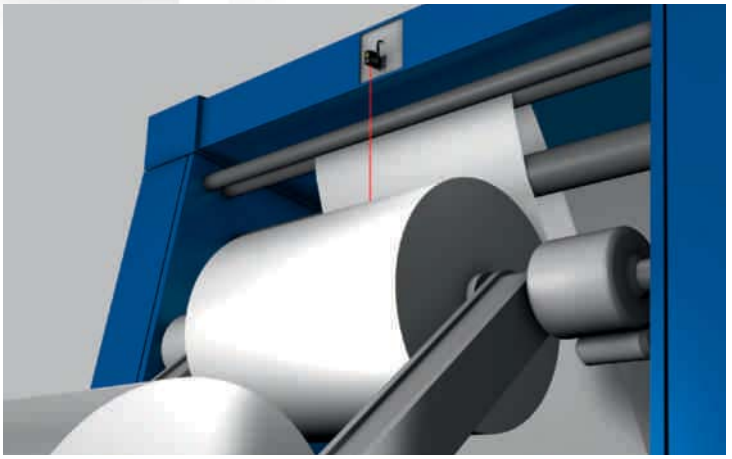
Photoelectric distance-measuring sensors

Many applications need a lot more information than just whether an object is present. Our sensors can provide precise measurements at high cycle times even with difficult surfaces. So distances, widths, heights, positions and diameters of objects can be measured with the utmost precision and high resolution.



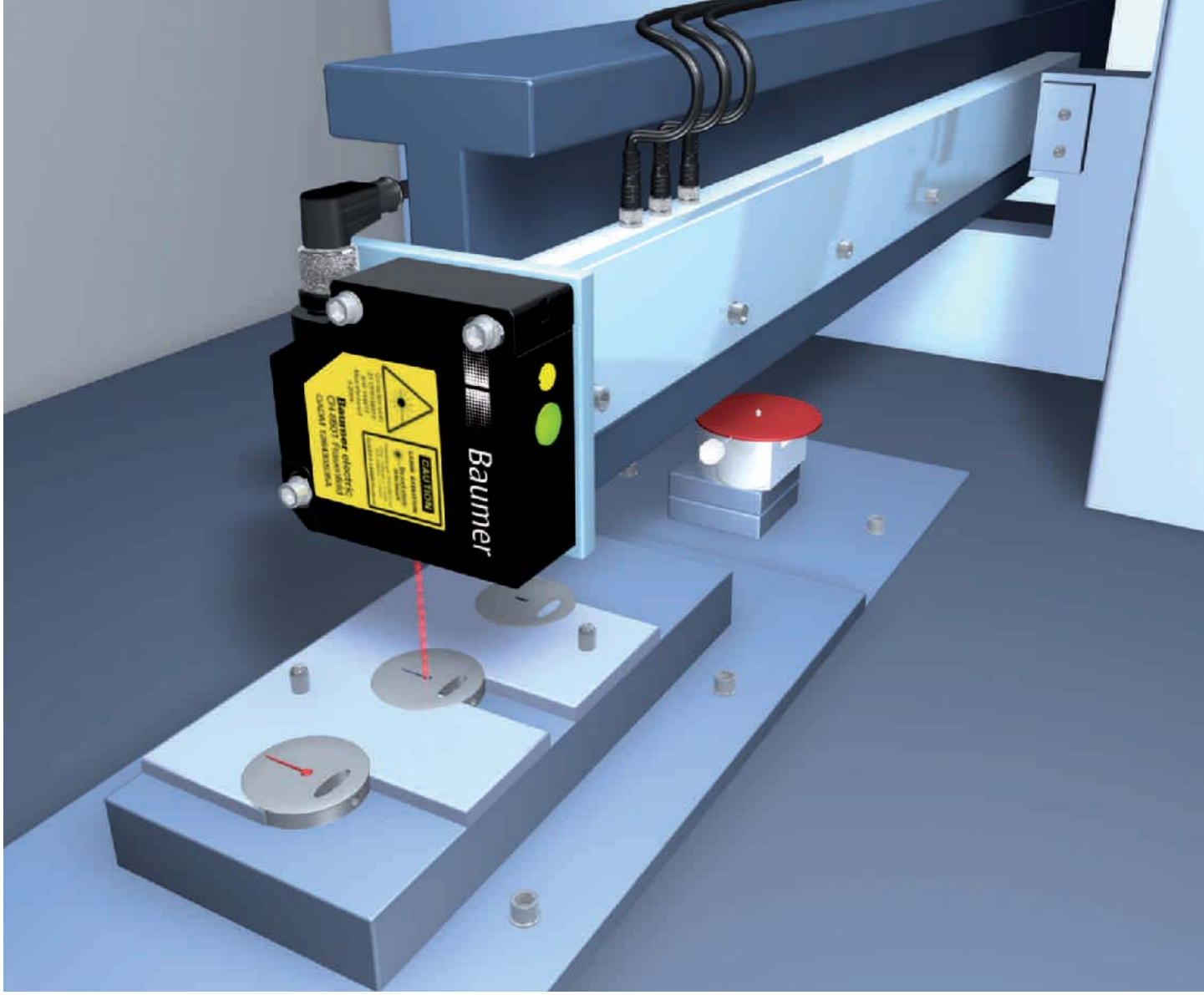
ParCon line sensor

- Diameter monitoring during plastic rod extrusion process.



Laser distance sensor

- Diameter monitoring with a narrow paper roll.



Laser distance sensor

- Distance measuring on dial plate to determine the precise press-in depth for the indicator.

Applications

- Machine tool building
- Installation/handling
- Semiconductor manufacturing
- Packaging machines
- Measuring/testing technology
- Textile machines
- Graphic machines
- Commercial vehicles

CCD line sensor with integrated processing electronics in compact metal housing

- *ParCon* measures web edges or object widths in the 24 mm range
- *PosCon* measures web edges or object widths in the 30–350 mm range
- High resolution (of up to 0.03 mm)

Distance-measuring sensor with integrated processing electronics in highly compact metal housing

- Distance measurement from 0.02 m to 1 m
- Maximum resolution of 0.002 mm
- Incredibly short response time of 0.9 ms.
- Possible to optimize the resolution by limiting the measuring range
- Precise distance measurement regardless of object's color or surface

Photoelectric laser sensors

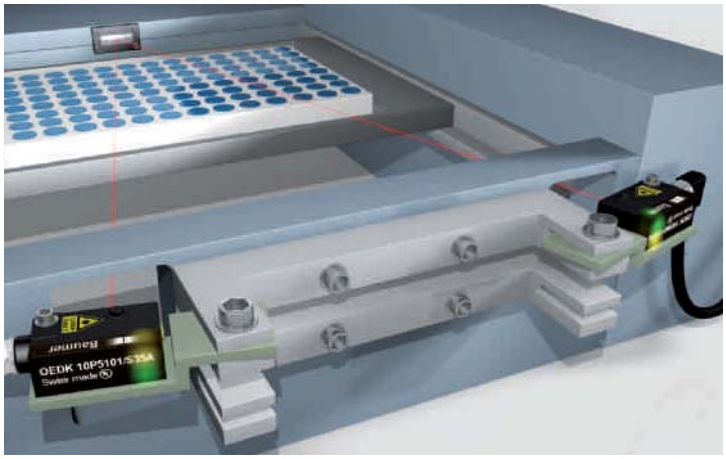
Applications
- Machine tool building
- Installation/handling
- Semiconductor manufacturing
- Packaging machines
- Measuring/testing technology
- Textile machines
- Graphic machines
- Plastics machines

- Small, clearly visible light spot
- Laser class 1 or 2
- Laser diode service life of up to 100,000 hours

- Fast and precise object detection
- High repeat accuracy in sensing and measuring
- Best laser sensor in its class with background suppression (OHDM 12)

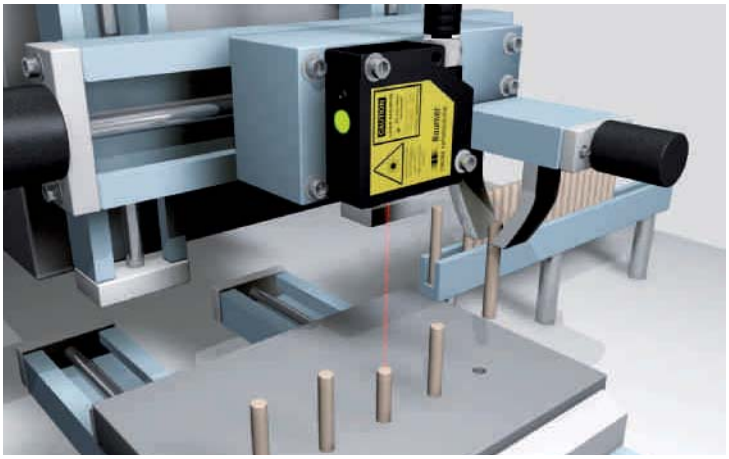
- Laser copy counters (*SCATEC*): counting up to 3 million copies of newspapers per hour
- Counting individual sheets up to 0.1 mm thick
- Individual package detection with seamless product conveyance

- Smallest laser sensor with background suppression and adjustable sensing distance (OHDK 10)
- Retro-reflective sensor with single lens optics
- Smallest laser distance sensor with integrated processing electronics (OADM 12)
- Wide range of laser distance sensors in various housing sizes



Through beam laser sensor

- Monitoring the top edge of a rack for small parts.



Laser differential sensor

- Detecting when height differences of pressed-in pins are too large.

Diffuse laser sensor

- Reliable edge detection of a printed circuit board via line optics.

It is able to detect the smallest parts. Objects can also be identified through very narrow slits. All because laser sensors are able to detect the smallest objects at incredible distances thanks to their acute, intensive light beam.
They are also able to do so regardless of whether the scanner works with background suppression, retro-reflective sensor with single lens optics or through beam sensor.

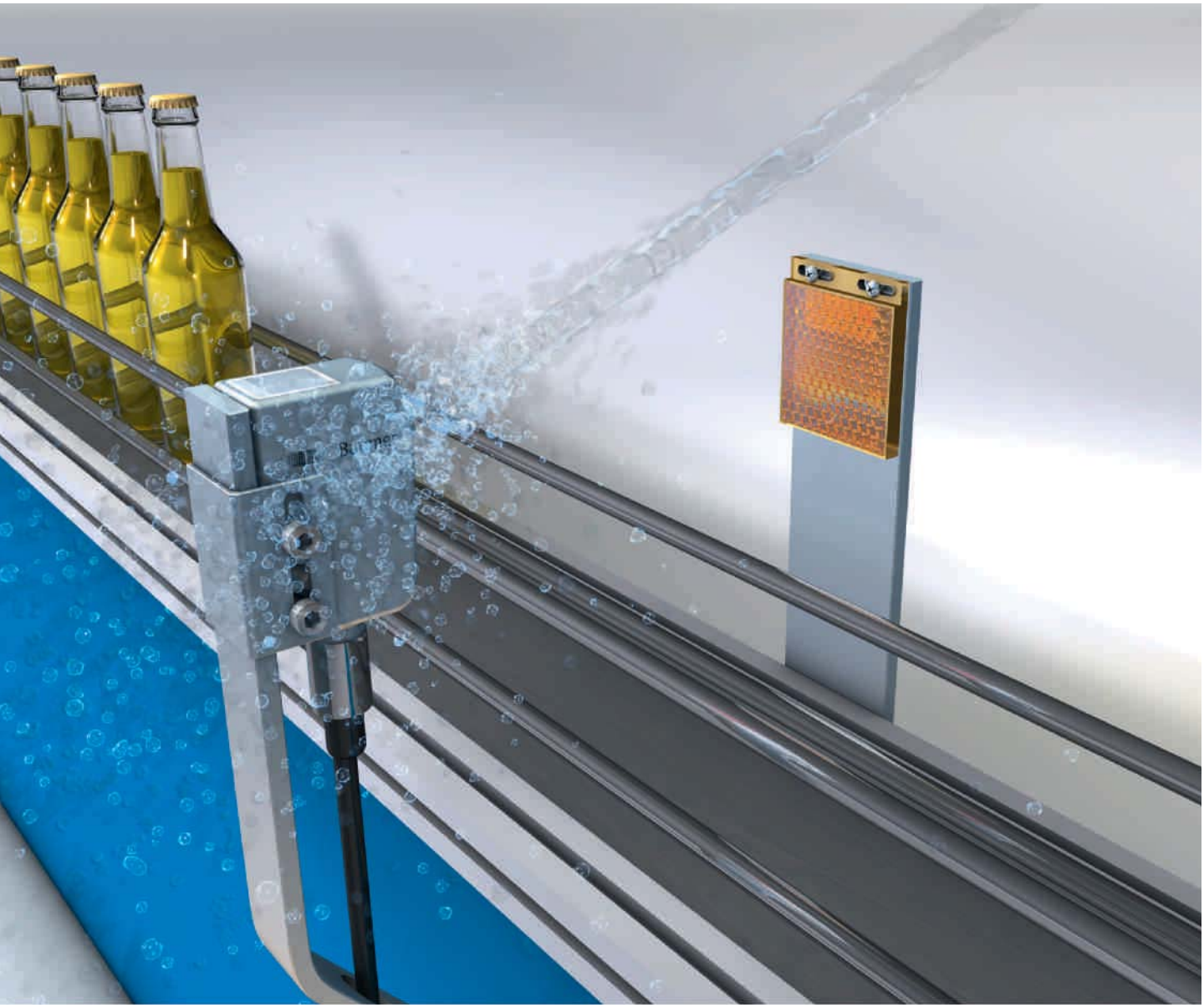
SCATEC copy counter / edge detector

- Precise triggering with seamless product conveyance
- Counting of individual packages / copies

Laser distance sensor

- Capturing information on shelf contents within an automated warehouse.

Photoelectric sensors for the food and beverage industry.



Photoelectric sensors for the food and beverage industry meet strict standards and regulations. We only use FDA-compliant materials, and we make sure they are chemically resistant to cleaning agents. The housings are made of V4A stainless steel with a roughness factor of ≤0.8 µm so that no microbial residue can accumulate.
The sensors are available in two different housing designs for the two different areas in which the machines are used.

Hygienic design for the food area
EHEDG-certified design any residue that might start to accumulate is reliably removed when the hygienic design is cleaned.

Washdown design for the splash zone
Sensors for the splash zone meet the same strict criteria as sensors for the food area. However, no hygienic design is required since no residue is able to find its way back into the flow of production.

***SmartReflect* – Light barriers without reflectors**
These light barriers work by reflecting off a machine part.
In other words, the sensor provides the reliable object detection of a light barrier but does not need a reflector. Machine downtimes caused by a damaged reflector can thus be completely avoided.

Production areas

- Food processing
- Food storage
- Food packaging
- Filling
- Quality control

Unique proTect+ impermeability concept guarantees
impermeability even after significant temperature cycles; high reliability and a long service life

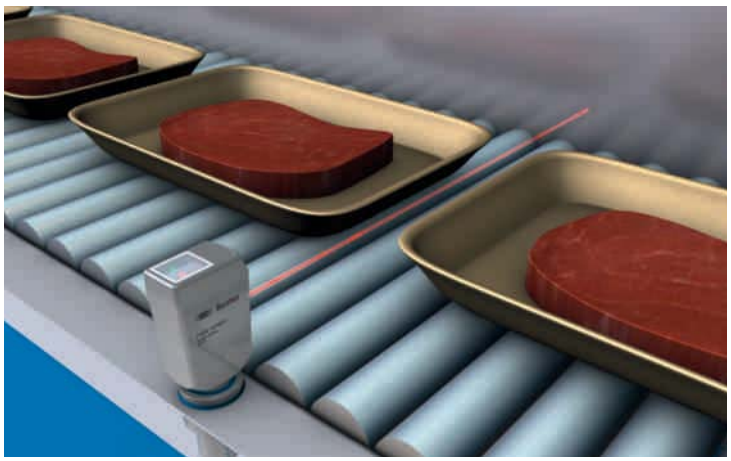
Ecolab-tested and FDA-compliant
for reliable chemical resistance to cleaning agents and consistent use of materials that conform to food standards and regulations

Operating temperature range up to 60 °C
facilitates versatile use and results in long service life even with high temperatures.

Stainless steel housing V4A with protection class IP 69K
for incredible robustness and a long service life

Integral hygienic design
of sensors and fitting accessories meets design guidelines for hygienic applications, enables them to be used in immediate proximity to food, and simplifies the certification process for machines

Laser inscription
ensures that the sensor can always be clearly identified



SmartReflect™ sensor

- The *SmartReflect*™ detects the meat trays on the conveyor belt and uses a machine part as a reflection reference.

Diffuse sensors with background suppression

- Background suppression is used to detect the feed of objects into a packaging machine.

VeriSens® – the vision sensor for factory automation!

Baumer's image-processing *VeriSens* vision sensor bridges the gap between traditional photoelectric sensors and complex vision systems.
The high-resolution image sensor enables objects to be checked in a two-dimensional plane. For this purpose, the *VeriSens* vision sensor offers various functions, which support a large number of inspection and object detection tasks in an automated process.

- Completeness monitoring
- Object presence monitoring
- Object placement monitoring
- Object position monitoring

Discover the difference!

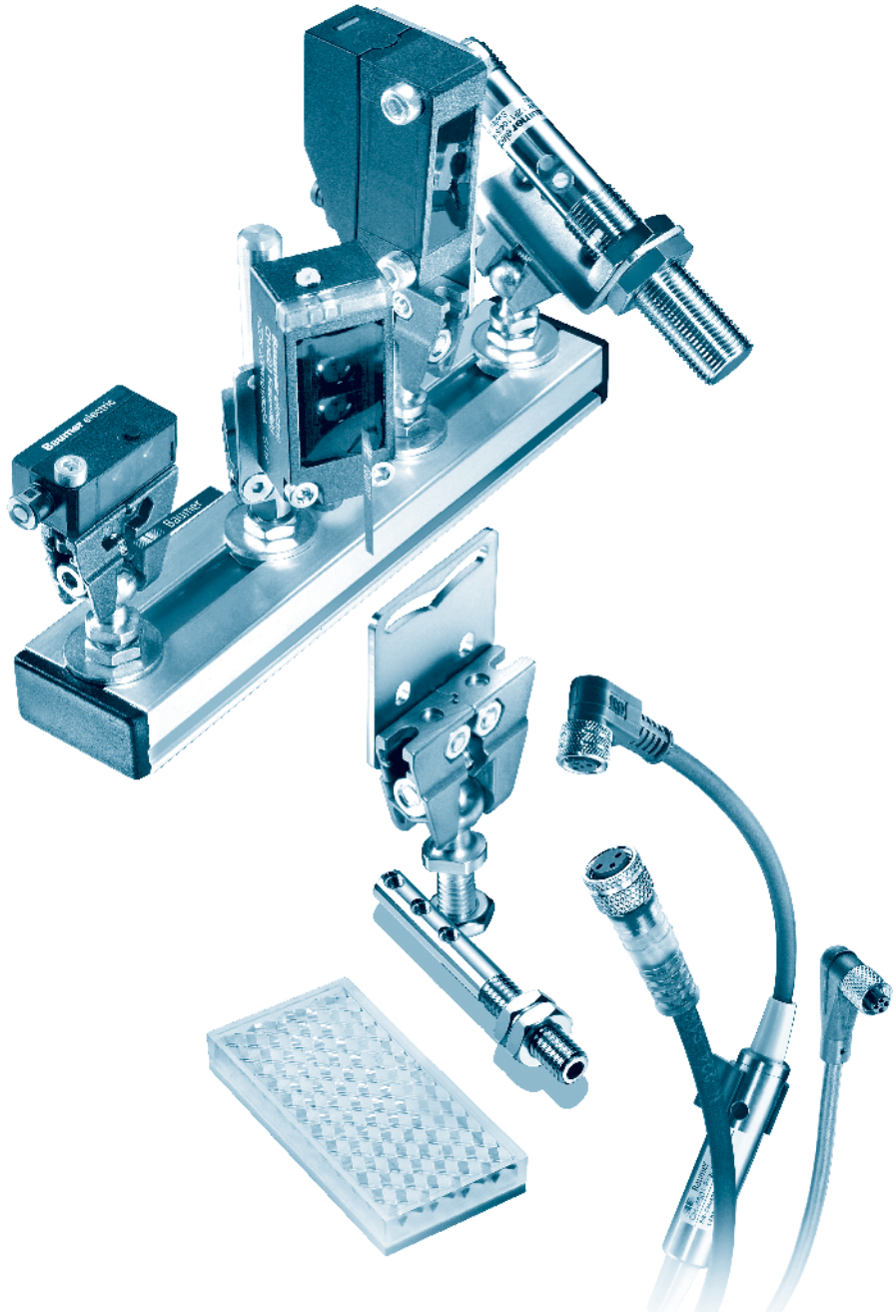
Custom designed photoelectric sensors

No product portfolio can ever be large enough to provide an optimum solution for every application. Needs always arise that cannot be handled with standard sensors. In such situations, our development engineers work closely with our customers to come up with a custom designed sensor that is the perfect solution.

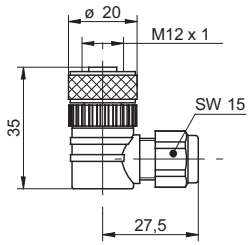
The solutions range from a special housing to a completely new sensor or optical system. An innovative, customized sensor solution can help you become a market leader.

We would be happy to help you with your application!

Accessories



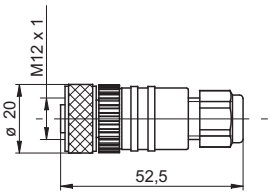
ES 14 - Cable socket M12 angular, not pre-assembled



order reference	
ES 14 PG7	Connector M12, 4 pin, angular
ES 14C PG7	Connector M12, 5 pin, angular

- Connector unshielded
- Connector only, no cable supplied
- 4 and 5 pin versions

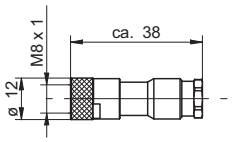
ES 18 - Cable socket M12 straight, not pre-assembled



order reference	
ES 18 PG7	Connector M12, 4 pin, straight
ES 18C PG7	Connector M12, 5 pin, straight

- Connector unshielded
- Connector only, no cable supplied
- 4 and 5 pin versions

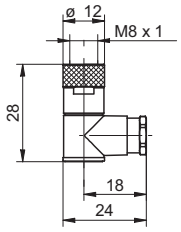
ES 21 - Cable socket M8 straight, not pre-assembled



order reference	
ES 21	Connector M8, 3 pin, straight
ES 21A	Connector M8, 4 pin, straight

- Connector unshielded
- Connector only, no cable supplied
- 3 and 4 pin version

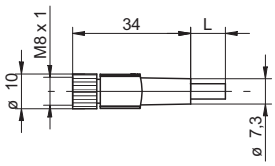
ES 22 - Cable socket M8 angular, not pre-assembled



order reference	
ES 22	Connector M8, 3 pin, angular
ES 22A	Connector M8, 4 pin, angular

- Connector unshielded
- Connector only, no cable supplied
- 3 and 4 pin versions

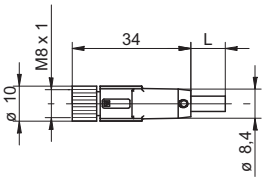
ESG 32 - Connector M8 straight



order reference	
ESG 32AH0200	Connector M8, 4 pin, straight, 2 m
ESG 32AH0500	Connector M8, 4 pin, straight, 5 m
ESG 32AH1000	Connector M8, 4 pin, straight, 10 m
ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESG 32SH0500	Connector M8, 3 pin, straight, 5 m
ESG 32SH1000	Connector M8, 3 pin, straight, 10 m

- Connector unshielded
- 3 and 4 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

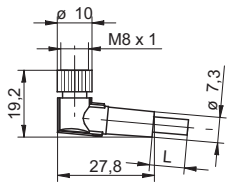
ESG 32G - Connector M8 straight, shielded



order reference	
ESG 32AH0200G	Connector M8, 4 pin, straight, 2 m, shielded
ESG 32AH0500G	Connector M8, 4 pin, straight, 5 m, shielded
ESG 32AH1000G	Connector M8, 4 pin, straight, 10 m, shielded
ESG 32SH0500G	Connector M8, 3 pin, straight, 5 m, shielded
ESG 32SH1000G	Connector M8, 3 pin, straight, 10 m, shielded

- Connector shielded, screen connected with cap nut
- 3 and 4 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

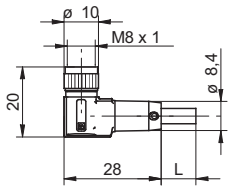
ESW 31 - Connector M8 angular



order reference	
ESW 31AH0200	Connector M8, 4 pin, angular, 2 m
ESW 31AH0500	Connector M8, 4 pin, angular, 5 m
ESW 31AH1000	Connector M8, 4 pin, angular, 10 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
ESW 31SH0500	Connector M8, 3 pin, angular, 5 m
ESW 31SH1000	Connector M8, 3 pin, angular, 10 m

- Connector unshielded
- 3 and 4 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

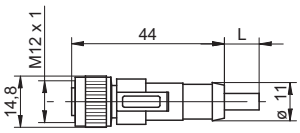
ESW 31G - Connector M8 angular, shielded



order reference	
ESW 31AH0200G	Connector M8, 4 pin, angular, 2 m, shielded
ESW 31AH0500G	Connector M8, 4 pin, angular, 5 m, shielded
ESW 31AH1000G	Connector M8, 4 pin, angular, 10 m, shielded
ESW 31SH0200G	Connector M8, 3 pin, angular, 2 m, shielded
ESW 31SH0500G	Connector M8, 3 pin, angular, 5 m, shielded

- Connector shielded, screen connected with cap nut
- 3 and 4 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

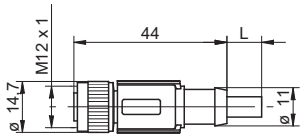
ESG 34 - Connector M12 straight



order reference	
ESG 34AH0200	Connector M12, 4 pin, straight, 2 m
ESG 34AH0500	Connector M12, 4 pin, straight, 5 m
ESG 34AH1000	Connector M12, 4 pin, straight, 10 m
ESG 34CH0200	Connector M12, 5 pin, straight, 2 m
ESG 34CH0500	Connector M12, 5 pin, straight, 5 m
ESG 34SH0200	Connector M12, 3 pin, straight, 2 m
ESG 34SH0500	Connector M12, 3 pin, straight, 5 m
ESG 34SH1000	Connector M12, 3 pin, straight, 10 m

- Connector unshielded
- 3, 4 and 5 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

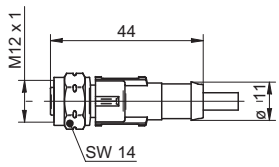
ESG 34G - Connector M12 straight, shielded



order reference	
ESG 34AH0200G	Connector M12, 4 pin, straight, 2 m, shielded
ESG 34AH0500G	Connector M12, 4 pin, straight, 5 m, shielded
ESG 34AH1000G	Connector M12, 4 pin, straight, 10 m, shielded
ESG 34CH0200G	Connector M12, 5 pin, straight, 2 m, shielded
ESG 34CH0500G	Connector M12, 5 pin, straight, 5 m, shielded
ESG 34CH1000G	Connector M12, 5 pin, straight, 10 m, shielded
ESG 34FH0200G	Connector M12, 8 pin, straight, 2 m, shielded
ESG 34FH0500G	Connector M12, 8 pin, straight, 5 m, shielded
ESG 34FH1000G	Connector M12, 8 pin, straight, 10 m, shielded

- Connector shielded, screen connected with cap nut
- 4, 5 and 8 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

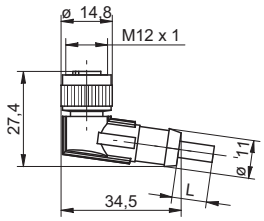
ESG 34F - Connector M12 straight, PVC/V4A



order reference	
ESG 34AF0200	Connector M12, 4 pin, straight, 2 m, V4A-PVC
ESG 34AF0500	Connector M12, 4 pin, straight, 5 m, V4A-PVC
ESG 34AF1000	Connector M12, 4 pin, straight, 10 m, V4A-PVC
ESG 34AF2500	Connector M12, 4 pin, straight, 25 m, V4A-PVC

- Connector unshielded
- 4 pin version
- Cable coating PVC
- Cap nut material in stainless steel V4A
- Ecolab certified and FDA conform
- UL listed, number E315836

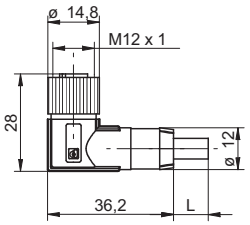
ESW 33 - Connector M12 angular



order reference	
ESW 33AH0200	Connector M12, 4 pin, angular, 2 m
ESW 33AH0500	Connector M12, 4 pin, angular, 5 m
ESW 33AH1000	Connector M12, 4 pin, angular, 10 m
ESW 33CH0200	Connector M12, 5 pin, angular, 2 m
ESW 33CH0500	Connector M12, 5 pin, angular, 5 m
ESW 33SH0200	Connector M12, 3 pin, angular, 2 m
ESW 33SH0500	Connector M12, 3 pin, angular, 5 m
ESW 33SH1000	Connector M12, 3 pin, angular, 10 m

- Connector unshielded
- 3, 4 and 5 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

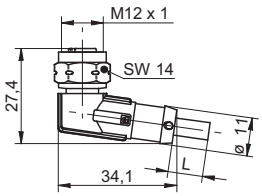
ESW 33G - Connector M12 angular, shielded



order reference	
ESW 33AH0200G	Connector M12, 4 pin, angular, 2 m, shielded
ESW 33AH0500G	Connector M12, 4 pin, angular, 5 m, shielded
ESW 33AH1000G	Connector M12, 4 pin, angular, 10 m, shielded
ESW 33CH0500G	Connector M12, 5 pin, angular, 5 m, shielded
ESW 33FH0200G	Connector M12, 8 pin, angular, 2 m, shielded
ESW 33FH0500G	Connector M12, 8 pin, angular, 5 m, shielded
ESW 33FH1000G	Connector M12, 8 pin, angular, 10 m, shielded

- Connector shielded, screen connected with cap nut
- 4, 5 and 8 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

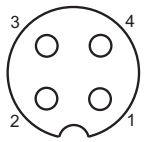
ESW 33F - Connector M12 angular, PVC/V4A



order reference	
ESW 33AF0200	Connector M12, 4 pin, angular, 2 m, V4A-PVC
ESW 33AF0500	Connector M12, 4 pin, angular, 5 m, V4A-PVC
ESW 33AF2500	Connector M12, 4 pin, angular, 25 m, V4A-PVC

- Connector unshielded
- 4 pin version
- Cable coating PVC
- Cap nut material in stainless steel V4A
- Ecolab certified and FDA conform
- UL listed, number E315836

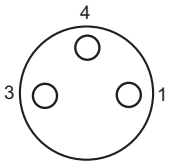
3 pin



1 = BN
2 = n.c.
3 = BU
4 = WH

ESG 34
ESW 33

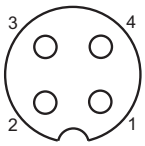
3 pin



1 = BN
3 = BU
4 = BK

ES 21
ES 22
ESG 32
ESG 32G
ESW 31
ESW 31G

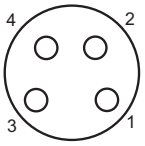
4 pin



1 = BN (+Vs)
2 = WH (output)
3 = BU (0V)
4 = BK (output)

ES 14
ES 18
ESG 34
ESG 34F
ESG 34G
ESW 33
ESW 33F
ESW 33G

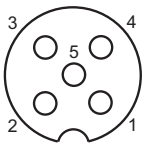
4 pin



1 = BN
2 = WH
3 = BU
4 = BK

ES 21A
ES 22A
ESG 32
ESG 32G
ESW 31
ESW 31G

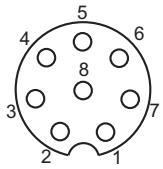
5 pin



1 = BN
2 = WH
3 = BU
4 = BK
5 = GY

ES 14C
ES 18C
ESG 34
ESG 34G
ESW 33
ESW 33G

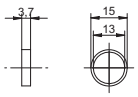
8 pin



1 = WH
2 = BN
3 = GN
4 = YE
5 = GY
6 = PK
7 = BU
8 = RD

ESG 34G
ESW 33G

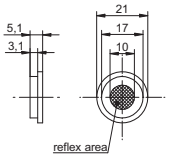
FTAR 013



- Fastening method self-adhesive
- Micro structure
- For Retro-reflective sensors

order reference	
FTAR 013A000	Reflector round Ø 15 mm

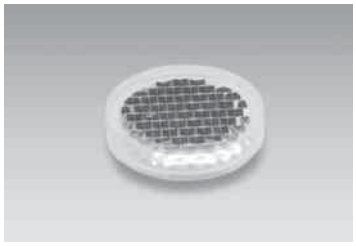
FTAR 014

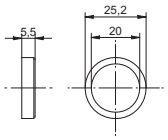


- Fastening method self-adhesive
- For Retro-reflective sensors

order reference	
FTAR 014A000	Reflector round Ø 21 mm

FTAR 020

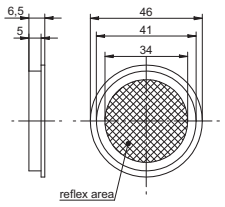




- Fastening method self-adhesive
- Micro structure
- For Retro-reflective sensors

order reference	
FTAR 020A000	Reflector round Ø 25,2 mm

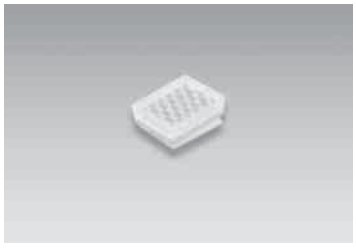
FTAR 038

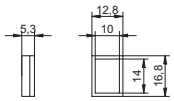


- Fastening method self-adhesive
- For Retro-reflective sensors

order reference	
FTAR 038A000	Reflector round Ø 46 mm

FTDR 010A

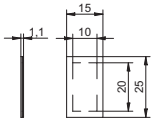




- Fastening method self-adhesive
- For Retro-reflective sensors

order reference	
FTDR010A014	Reflector rectangular 16,8 x 12,8 mm

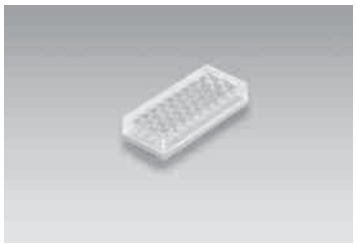
FTDR 010D

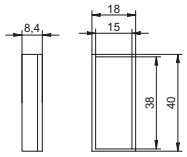


- Fastening method self-adhesive
- For laser light sensors

order reference	
FTDR 010D020	Reflector rectangular 15 x 25 mm

FTDR 015

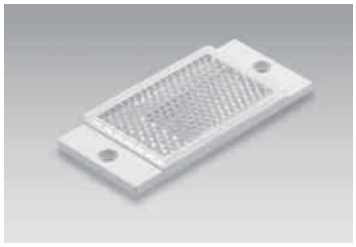


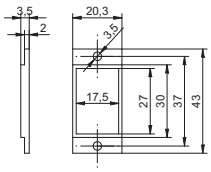


- Fastening method self-adhesive
- For Retro-reflective sensors

order reference	
FTDR 015A038	Reflector rectangular 40 x 18 mm

FTDR 017

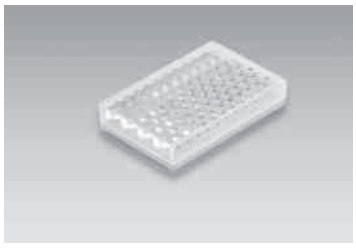


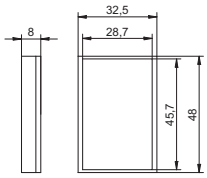


- Fastening method screw mounting
- Micro structure
- For Retro-reflective sensors

order reference	
FTDR 017A027	Reflector rectangular 43 x 20,3 mm

FTDR 029

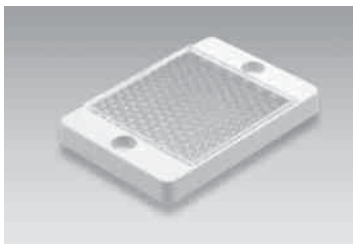


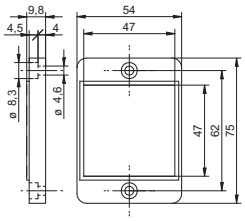


- Fastening method self-adhesive
- For Retro-reflective sensors

order reference	
FTDR 029A046	Reflector rectangular 48 x 32,5 mm

FTDR 047

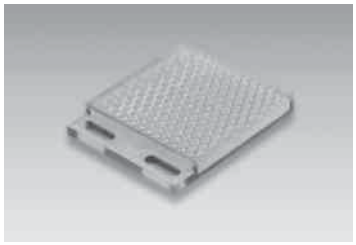


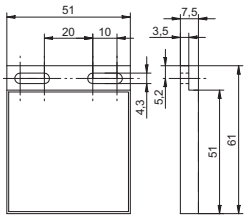


- Fastening method screw mounting
- For Retro-reflective sensors

order reference	
FTDR 047A048	Reflector rectangular 75 x 54 mm

FTDR 051

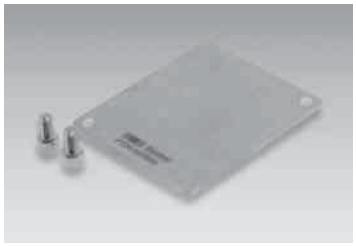


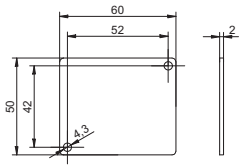


- Detergent resistant reflecteur
- Ecolab approved
- For Retro-reflective sensors

order reference	
FTDR 051E051	Ecolab approved reflecteur

FTDR 050

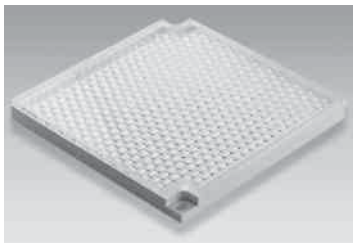


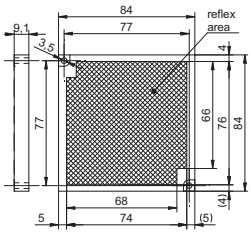


- Stainless steel reflector for SmartReflect in washdown design
- Material: Stainless steel V4A

order reference	
FTDR 050R060	Stainless steel reflector for SmartReflect in washdown design

FTDR 084

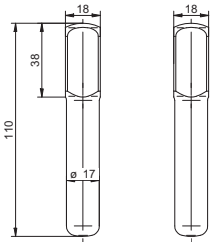




- Fastening method screw mounting
- For Retro-reflective sensors

order reference	
FTDR 084A084	Reflector rectangular 84 x 84 mm

FTDR 017W



- Stainless steel reflector for SmartReflect in hygiene design
- EHEDG-certified

Accessorie: “mounitng for sensors in hygienic design Ø17”, order reference HI17-1H

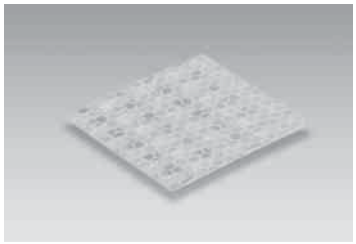
order reference	
FTDR 017W035	Stainless steel reflector for SmartReflect in hygiene design

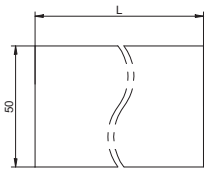
FTDF 020F

- Fastening method self-adhesive
- For laser light sensors

order reference	
FTDF 020F020	Reflective type rectangular 20 x 20 mm

FTDL 050

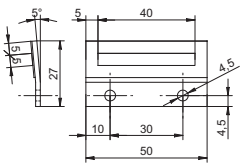




- Fastening method self-adhesive
- For Retro-reflective sensors

order reference	
FTDL 050K000/... m	Reflective type by the meter 50 x … mm

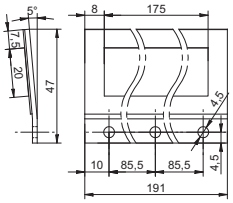
FTDR 005



- Fastening method screw mounting
- For pocket-size line sensor *PosCon*

order reference	
FTDR 005I040	Reflector rectangular 50 x 27 mm

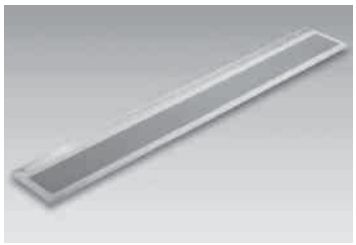
FTDR 020

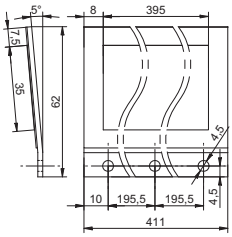


- Fastening method screw mounting
- For pocket-size line sensor *PosCon*

order reference	
FTDR 020I175	Reflector rectangular 191 x 47 mm

FTDR 035

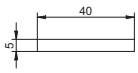




- Fastening method screw mounting
- For pocket-size line sensor *PosCon*

order reference	
FTDR 035I395	Reflector rectangular 411 x 62 mm

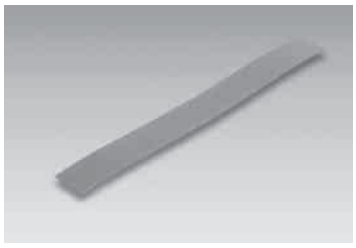
FTDF 005

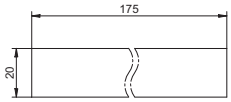


- Fastening method self-adhesive
- For pocket-size line sensor *PosCon*

order reference	
FTDF 005I040	Reflective type rectangular 40 x 5 mm

FTDF 020

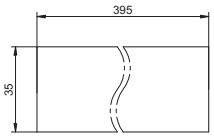




- Fastening method self-adhesive
- For pocket-size line sensor *PosCon*

order reference	
FTDF 020I175	Reflective type rectangular 175 x 20 mm

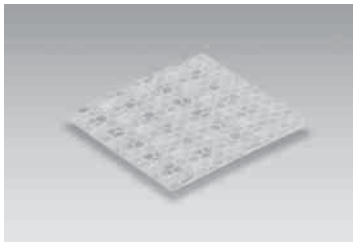
FTDF 035I

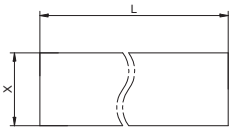


- Fastening method self-adhesive
- For pocket-size line sensor *PosCon*

order reference	
FTDF 035I395	Reflective type rectangular 335 x 35 mm

FTDL

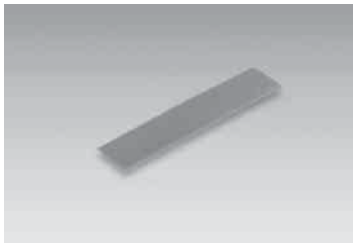


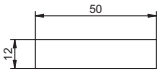


- Fastening method self-adhesive, for pocke-size line sensor *PosCon*

order reference	
FTDL 005I000/... m	Reflective type by the meter 5 mm (x) wide
FTDL 020I000/... m	Reflective type by the meter 20 mm (x) wide
FTDL 035I000/... m	Reflective type by the meter 35 mm (x) wide
FTDL 050I000/... m	Reflective type by the meter 50 mm (x) wide
FTDL 610I000/... m	Reflective type by the meter 50 mm (x) wide

FTDF 012

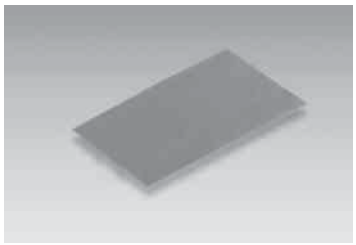


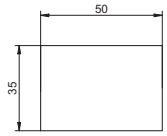


- Fastening method self-adhesive
- For pocket-size line sensor *ParCon*

order reference	
FTDF 012M050	Reflective type rectangular 50 x 12 mm

FTDF 035

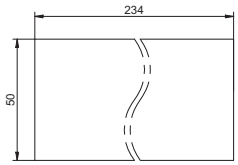




- Fastening method self-adhesive
- For pocket-size line sensor *ParCon*

order reference	
FTDF 035M050	Reflective type rectangular 50 x 34 mm

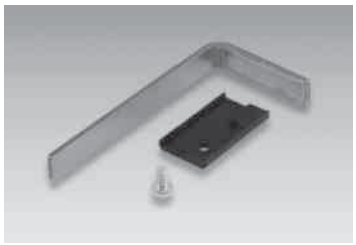
FTDF 050

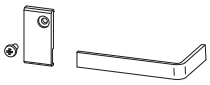


- Fastening method self-adhesive
- For pocket-size line sensor *ParCon*

order reference	
FTDF 050M234	Reflective type rectangular 50 x 234 mm

FTDR 008/01

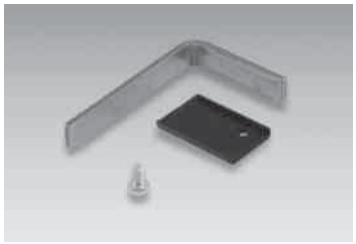




- Bracket with reflector film
- For pocket-size line sensor *ParCon*

order reference	
FTDR 008M030/01	Reflector bracket high

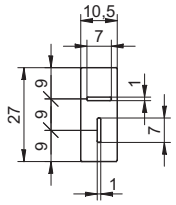
FTDR 008/21



- Bracket with reflector film
- For pocket-size line sensor *ParCon*

order reference	
FTDR 008M030/21	Reflector bracket lateral

Slot aperture stickers series 14

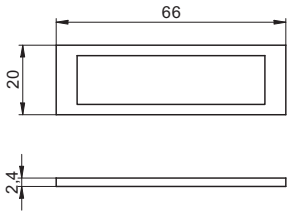


- Material: Polyester foil
- Contents: 2 pieces
- self-adhesive

For use with FSDK 14 / FEDK 14

order reference	
10144075	Slot aperture stickers series 14

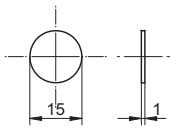
Protector cap for OxDM 20



- Material: PMMA
- Self-adhesive

order reference	
10156878	Protector cap OxDM 20

Glass cover for sensors series 18

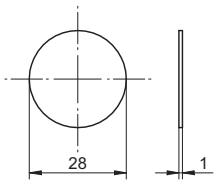


- Material: glass

For use with cap nut series 18

order reference	
10103068	Glass cover series 18

Glass cover for sensors series 30

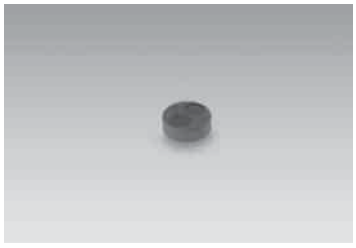


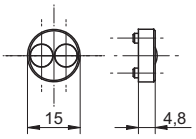
- Material: glass

For use with cap nut series 30

order reference	
10103226	Glass cover series 30

Doubling lens for sensors serie 18



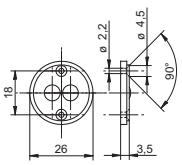


- Material: PBTP / glass
- For double the sensing distance FZAM 18

For use with FZAM 18

order reference	
10107250	Doubling lens series 18 FZAM 18

Doubling lens for sensors serie 30

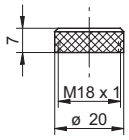


- Material: PC / glass
- For double the sensing distance FZAM 30

For use with FZAM 30

order reference	
10107408	Doubling lens series 30 FZAM 30

Cap nut for photoelectric sensors series 18

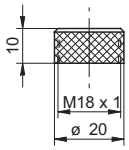


- Material: Nickel-plated brass

For use with FZAM 18 (with glass cover)

order reference	
10103067	Cap nut glass cover for sensors series 18

Cap nut for photoelectric sensors series 18

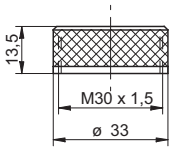


- Material: Nickel-plated brass

For use with FZAM 18 (with doubling lens)

order reference	
10115913	Cap nut glass cover and doubling lens for sensors series 18

Cap nut for photoelectric sensors series 30

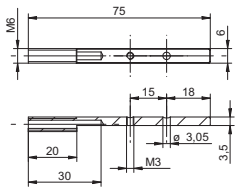


- Material: Nickel-plated brass

For use with FZAM 30 (with glass cover)

order reference	
10102801	Cap nut glass cover for sensors series 30

Mounting brad FHDK 04

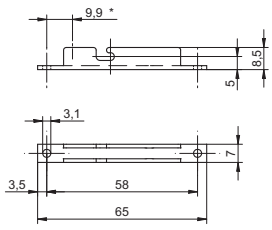


- Material: Nickel-plated steel

For use with FHDK 04

order reference	
10163196	Mounting brad FHDK 04

Bracket for profiles sensor series 04

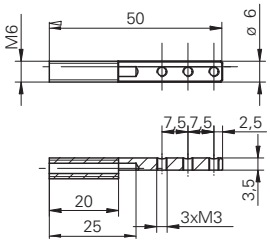


- Material: Aluminum

For use with FHDK 04

order reference	
10163299	Bracket for profiles FHDK 04

Minofix-Mounting kit for MINOS

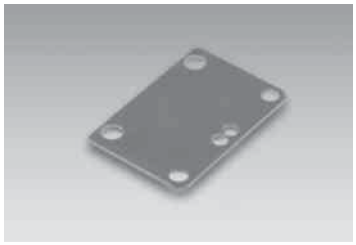


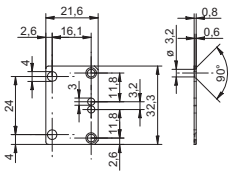
- Material: brass nickel-plated

For use with FxxK 07 (MINOS)

order reference	
10150844	Minofix mounting 07

Mounting panel for sensors series 10

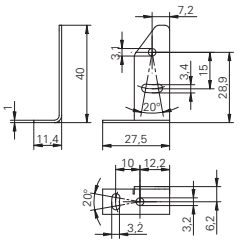




For use with UxDK 10, FxDK 10, OxDK 10

order reference	
10162083	Mounting panel for sensors series 10

Mounting bracket for sensors series 10

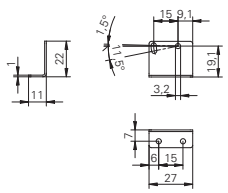


- Material: Steel

For use with UxDK 10, FxDK 10, OxDK 10

order reference	
10118798	Mounting bracket series 10

Mounting bracket for sensors series 10 (L design)

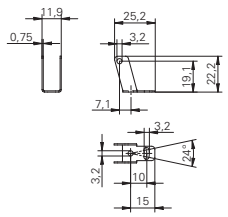


- Material: Steel

For use with UxDK 10, FxDK 10, OxDK 10

order reference	
10133792	Mounting bracket series 10 L design

Mounting bracket for sensors series 10 (U design)

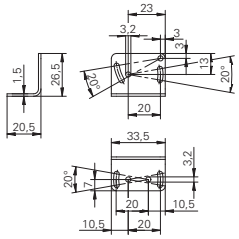


- Material: Steel

For use with UxDK 10, FxDK 10, OxDK 10 (only cabel versions)

order reference	
10114501	Mounting bracket series 10 (U design)

Mounting bracket for sensors series 12

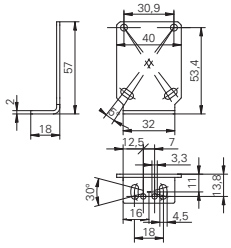


- Material: Steel

For use with FxDM 12, OxDM 12

order reference	
10113873	Mounting bracket series 12 (L design)

Mounting bracket for sensors series 13

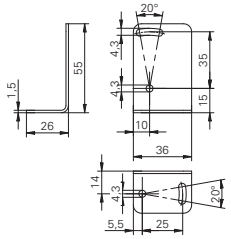


- Material: Steel

For use with OxDM 13

order reference	
10161695	Mounting bracket for sensors series 13 (L design)

Mounting bracket for sensors series 14

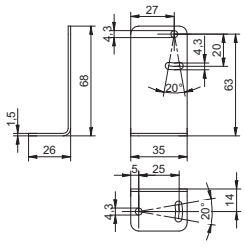


- Material: Steel

For use with FxDK 14, OxDK 14

order reference	
10134964	Mounting bracket series 14 (L design)

Mounting bracket for washdown sensors series 14

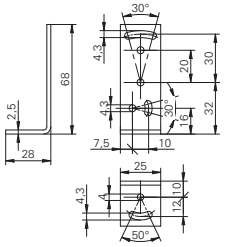


- Material: Stainless Steel

For use with FxDR 14

order reference	
11046278	Mounting bracket series 14 washdown

Mounting bracket for sensors series 15

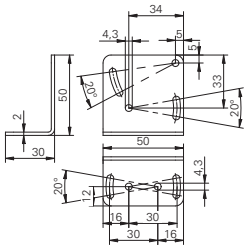


- Material: Steel

For use with FxDM 15

order reference	
10103415	Mounting bracket series 15 (L design)

Mounting bracket for sensors series 16

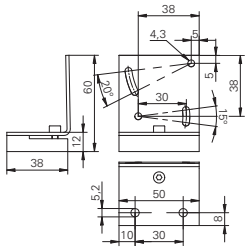


- Material: Steel

For use with FxDM 16, OxDM 16

order reference	
10113917	Mounting bracket series 16 (L design)

Feinjustagebefestigung Serie 16

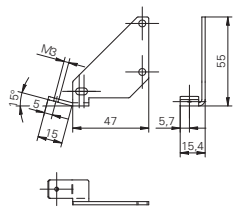


- Material: Steel

Simplifies the alignment of the laser sensors series OSDM 16 / OEDM 16

order reference	
10119373	Mounting bracket for fine adjustment series 16

Lens cleaning air nozzle bracket

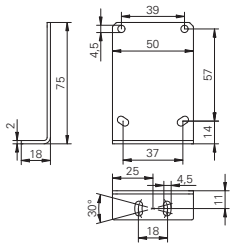


- Material: Steel

For use with FxDM 16, OxDM 16

order reference	
10116407	Lens cleaning air nozzle bracket

Mounting bracket for sensor OxDM 20

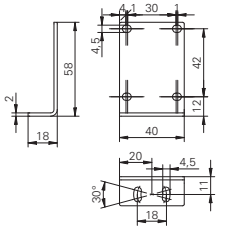


- Material: Steel

For use with OADM 20, OADM 250

order reference	
11010227	Mounting bracket OxDM 20

Mounting bracket for Logipal/PosCon

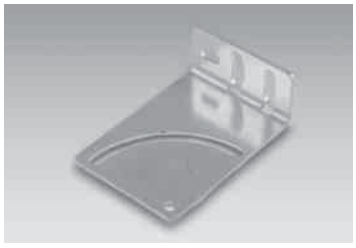


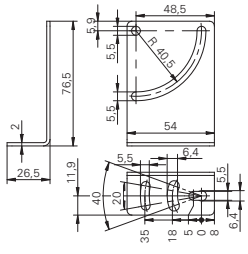
- Material: Steel

For use with ZADM 023, FKDM 22

order reference	
10126220	Mounting bracket series 22 L design

Mounting bracket for sensors series 26



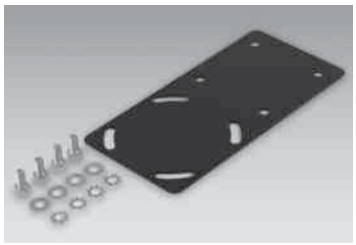


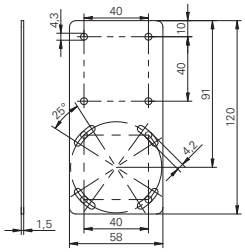
- Material: Steel

For use with FxDK 26

order reference	
10112477	Mounting bracket series 26 (L design)

Mounting bracket for Verisens

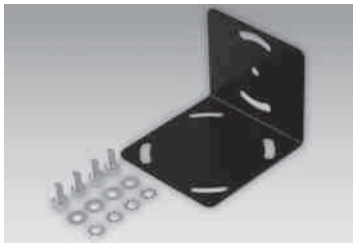


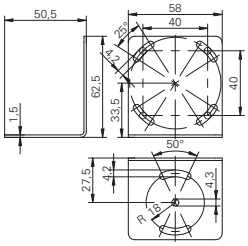


- Material: Steel

order reference	
10159905	Mounting bracket for Verisens

Mounting bracket for Verisens (L)

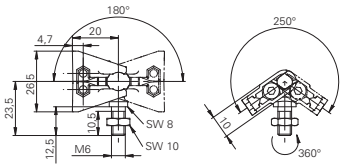




- Material: Steel

order reference	
10159906	Mounting bracket for Verisens L design

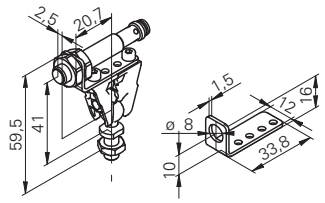
Sensofix-Base module



- Clamps made of stainless steel
- Ball pivots made of galvanized steel

order reference	
10149010	Sensofix-Base module

Sensofix-Mounting kit for sensors series 08 round

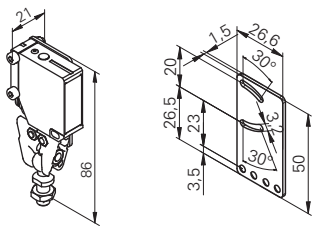


- Clamps made of stainless steel
- Ball pivots made of galvanized steel
- Mounting panel made of stainless steel

For use with all sensors in M8 housing

order reference	
10151719	Sensofix series 08

Sensofix-Mounting kit for sensors series 12

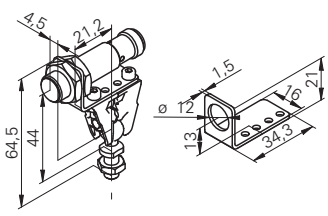


- Clamps made of stainless steel
- Ball pivots made of galvanized steel
- Mounting panel made of stainless steel

For use with FxDM 12, OxDM 12

order reference	
10150328	Sensofix series 12

Sensofix-Mounting kit for sensors series 12 round

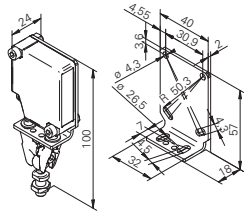


- Clamps made of stainless steel
- Ball pivots made of galvanized steel
- Mounting panel made of stainless steel

For use with all sensors in M12 housing

order reference	
10151720	Sensofix series 12 round

Sensofix-Mounting kit for sensors series 13

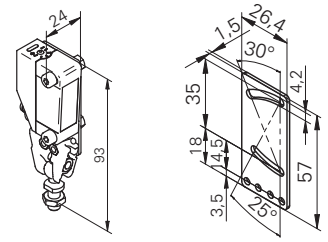


- Clamps made of stainless steel
- Ball pivots made of galvanized steel
- Mounting panel made of stainless steel

For use with OADM 13

order reference	
10161829	Sensofix series 13

Sensofix-Mounting kit for sensors series 14

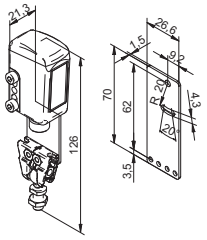


- Clamps made of stainless steel
- Ball pivots made of galvanized steel
- Mounting panel made of stainless steel

For use with FxDK 14, OxDK 14

order reference	
10149011	Sensofix series 14

Sensofix-Mounting kit for washdown sensors series 14

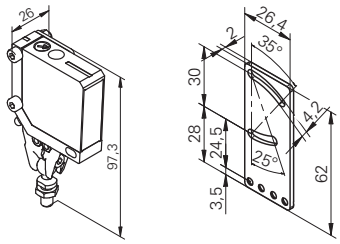


- Clamps made of stainless steel
- Ball pivots made of galvanized steel
- Mounting panel made of stainless steel

For use with FxDR 14

order reference	
11046279	Sensofix series 14 washdown

Sensofix-Mounting kit for sensors series 16

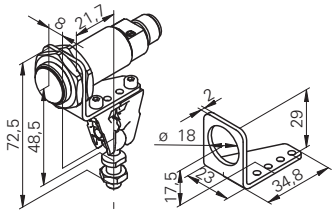


- Mounting panel made of stainless steel
- Clamps made of stainless steel
- Ball pivots made of galvanized steel

For use with FxDM 16, OxDM 16

order reference	
10151721	Sensofix series 16

Sensofix-Mounting kit for sensors series 18 round

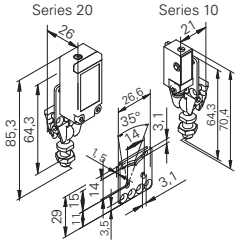


- Clamps made of stainless steel
- Ball pivots made of galvanized steel
- Mounting panel made of stainless steel

For use with all sensors in M18 housing

order reference	
10151658	Sensofix series 18

Sensofix-Mounting kit for sensors series 10/20

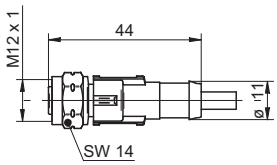


- Clamps made of stainless steel
- Ball pivots made of galvanized steel
- Mounting panel made of stainless steel

For use with photoelectric and ultrasonic sensors series 10, series 20

order reference	
10150326	Sensofix series 10 / series 20

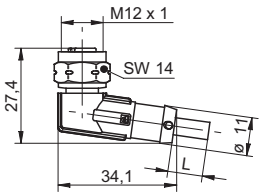
ESG 34F - Connector M12 straight, PVC/V4A



order reference	
ESG 34AF0200	Connector M12, 4 pin, straight, 2 m, V4A-PVC
ESG 34AF0500	Connector M12, 4 pin, straight, 5 m, V4A-PVC
ESG 34AF1000	Connector M12, 4 pin, straight, 10 m, V4A-PVC
ESG 34AF2500	Connector M12, 4 pin, straight, 25 m, V4A-PVC

- Connector unshielded
- 4 pin version
- Cable coating PVC
- Cap nut material in stainless steel V4A
- Ecolab certified and FDA conform
- UL listed, number E315836

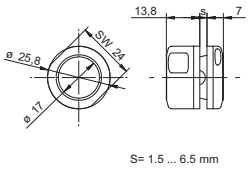
ESW 33F - Connector M12 angular, PVC/V4A



order reference	
ESW 33AF0200	Connector M12, 4 pin, angular, 2 m, V4A-PVC
ESW 33AF0500	Connector M12, 4 pin, angular, 5 m, V4A-PVC
ESW 33AF2500	Connector M12, 4 pin, angular, 25 m, V4A-PVC

- Connector unshielded
- 4 pin version
- Cable coating PVC
- Cap nut material in stainless steel V4A
- Ecolab certified and FDA conform
- UL listed, number E315836

Mounting HI17-1H for sensors in hygienic design Ø 17 mm

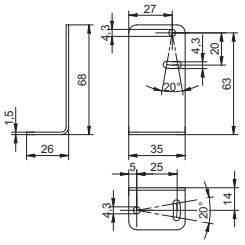


- Material: Stainless steel V4A
- EHEDG-certified

For use with inductive sensors 17 mm and photoelectric sensors in hygienic design

order reference	
HI17-1H	Mounting for sensors in hygienic design Ø 17 mm

Mounting bracket for washdown sensors series 14

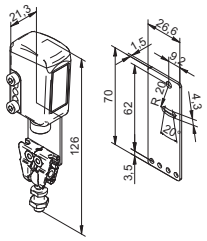


- Material: Stainless Steel

For use with FxDR 14

order reference	
11046278	Mounting bracket series 14 washdown

Sensofix-Mounting kit for washdown sensors series 14

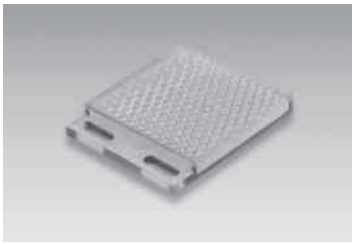


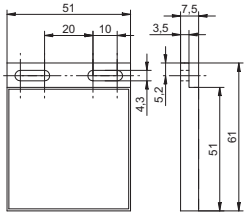
- Clamps made of stainless steel
- Ball pivots made of galvanized steel
- Mounting panel made of stainless steel

For use with FxDR 14

order reference	
11046279	Sensofix series 14 washdown

FTDR 051

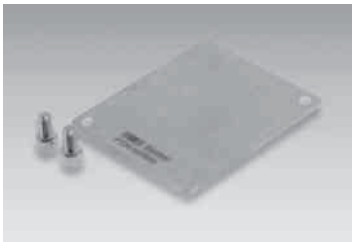


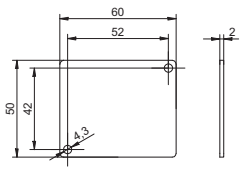


- Detergent resistant reflecteur
- Ecolab approved
- For Retro-reflective sensors

order reference	
FTDR 051E051	Ecolab approved reflecteur

FTDR 050

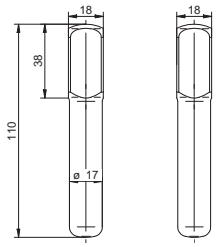




- Stainless steel reflector for SmartReflect in washdown design
- Material: Stainless steel V4A

order reference	
FTDR 050R060	Stainless steel reflector for SmartReflect in washdown design

FTDR 017W

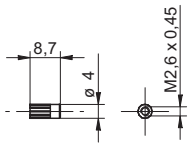


- Stainless steel reflector for SmartReflect in hygiene design
- EHEDG-certified

Accessorie: “mounitng for sensors in hygienic design Ø17”, order reference HI17-1H

order reference	
FTDR 017W035	Stainless steel reflector for SmartReflect in hygiene design

Doubling lens M2,6

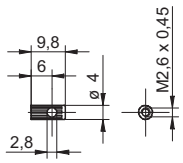


- Increases the actual range Sb by a factor of 6
- Contents: 2 pieces

For fiber optic: FSE 200C1Y00 / FSE 200C2Y00, FSA 200C1Y00, FSG 200C1Y00, FSE 200E1Y00

order reference	
10134541	Doubling lens increases the actual range (paires)

Doubling lens M2,6 (side view version)

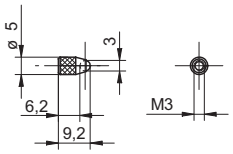


- Side view version
- Increases the actual range Sb by a factor of 6
- Contents: 2 pieces

For fiber optic: FSE 200C1Y00 / FSE 200C2Y00, FSA 200C1Y00, FSG 200C1Y00, FSE 200E1Y00

order reference	
10134540	Doubling lens increases the actual range (paires)

Doubling lens M3

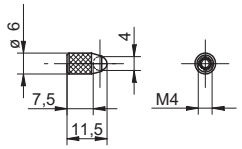


- Material: Ms / glass
- Increases the actual range Sb by a factor of 6
- Contents: 2 pieces

For fiber optic: FSE 200C1004

order reference	
10119910	Doubling lens M3 increases the actual range (paires)

Doubling lens M4

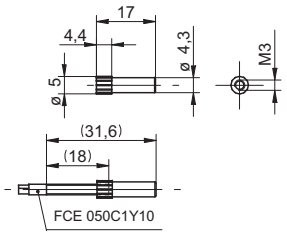


- Material: Ms / glass
- Increases the actual range Sb by a factor of 6
- Contents: 2 pieces

For fiber optic: FSE 200C1004

order reference	
10119909	Doubling lens M4 increases the actual range (paires)

Focusing lens M3 Ø 0,1 mm

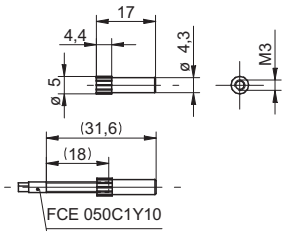


- Light spot Ø 0,1 mm at a distance of 4,6 mm

For fiber optic: FCE 050C1Y10 (empfohlen), FCE 200D1Y00, FCE 200D1Y01, FCE 200E1Y00

order reference	
10134544	Focusing lens M3 Ø 0,1 mm

Focusing lens M3 Ø 0,4 mm

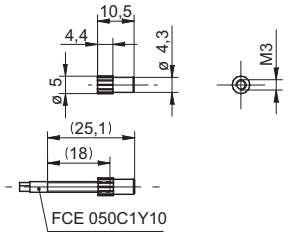


- Light spot Ø 0,4 mm at a distance of 7 mm

For fiber optic: FCE 050C1Y10 (empfohlen), FCE 200D1Y00, FCE 200D1Y01, FCE 200E1Y00

order reference	
10134543	Focusing lens M3 Ø 0,4 mm

Focusing lens M3 Ø 2 mm

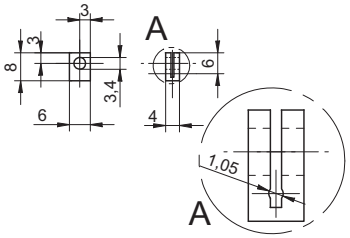


- Light spot Ø 2 mm at a distance of 19 mm

For fiber optic: FCE 050C1Y10 (empfohlen), FCE 200D1Y00, FCE 200D1Y01, FCE 200E1Y00

order reference	
10134542	Focusing lens M3 Ø 2 mm (Paires)

Mounting bracket 1,1 mm

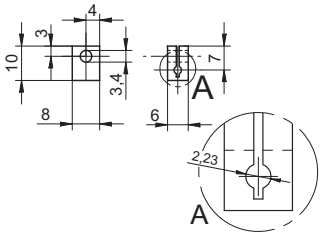


- Material: Aluminum

For fiber optic through beam type with 1,1 mm sheath diameters

order reference	
10119912	Mounting bracket Ø 1,1 mm

Mounting bracket 2,2 mm

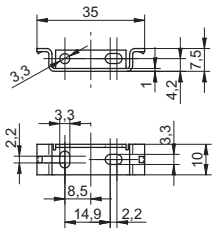


- Material: Aluminum

For fiber optic through beam type with 2,2 mm sheath diameters

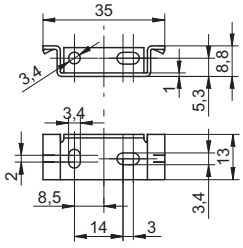
order reference	
10119911	Mounting bracket Ø 2,2 mm

Fiber optic mounting bracket for sensing head M3



order reference	
10134532	Fiber optic mounting bracket for sensing head M3

Mounting bracket for fiber optic sensors series 12

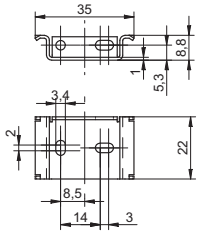


- Material: Steel
- Delivered with every plastic fiber optic sensor series 12

For use with FVDK 12

order reference	
10145702	Mounting bracket for fiber optic sensors series 12

Mounting bracket for fiber optic sensors series 22

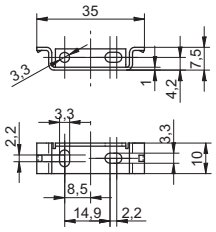


- Material: Steel
- Delivered with every plastic fiber optic sensor series 22

For use with FVDK 22

order reference	
10125534	Mounting bracket for fiber optic sensors series 22

Mounting bracket for fiber optic sensors series 60

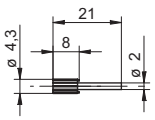


- Material: Steel
- Must be ordered separately for series 66 and series 67sensors

For use with FVDK 66, FVDK 67

order reference	
10159806	Mounting bracket for fiber optic sensors series 60, 67, 69, 80

Reduction tube



- Set of 2
- Delivered with every 1 mm diameter plastic fiber optic

order reference	
10140260	Reduction tube

Fiber optic cable extension

- Reduction in range due to fiber optic exstension: 2 m = approx. 25%
- Reduction in range due to fiber optic exstension: 5 m = approx. 60%

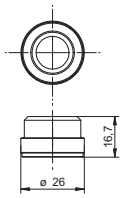
order reference	
10145523	Fiber optic cable extension 5 m hochflexibel
10156738	Fiber optic cable extension 2 m
10158142	Fiber optic cable extension 5 m

Cutting tool

- Delivered with every plastic fiber optic

order reference	
10114652	Cutting tool for plastic fiber optics

Adapter for photoelectric sensors series 30

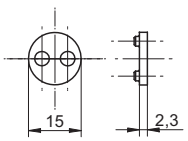


- Material: POM

For use with fiber optic amplifier FZAM 30

order reference	
10102757	Adapter series 30
10106042	Adapter series 30 (abgewinkelte Lichtleiter)

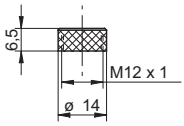
Adjusting plate for glass fiber optic sensors 18 (replace)



- Material: PETP
- For re-orders when lost
- Enclosed with every fiber optic type A

order reference	
10101958	Adjusting plate series 18

Cap nut for glass fiber optic sensors 15 (replace)

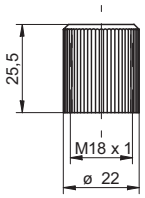


- Material: Nickel-plated brass
- For re-orders when lost
- Enclosed with every glass fiber optic of type B

For use with FVDM 15

order reference	
10103230	Cap nut (Ersatz) for fiber optics series 15

Cap nut for glass fiber optic sensors 18 (replace)



- Material: POM
- For re-orders when lost
- Enclosed with every glass fiber optic of type A

For use with FZAM 18

order reference	
10101480	Cap nut (Ersatz) for fiber optics series 18

Glossary

Glossary

A

Active zone

The zone in which an object can be detected in front of the sensor. With diffuse sensors, this is approximately equivalent to the zone within the maximum sensing distance where the emitted beam and the reception angle intersect. With retro-reflective sensors, this is the zone from the emitted beam exit plane to the reflector and from there back to the receiver entrance plane. With through beam sensors, this is the zone from the emitted beam exit plane to the receiver entrance plane.

Actual range Sb

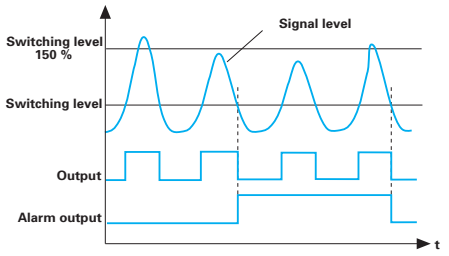
Like the nominal range Sn, but including an excess gain of 50% excess gain, i.e. the maximum distance at which reliable operation of the sensor is possible.

Adjustment aid

See «Output indicator»

Alarm output

Output function which indicates an inadequate signal level. The alarm output usually has a «dynamic» function which indicates whether the excess gain of 150% of the switching threshold was exceeded or not during the last light switching operation. It is also usually available as a «static» function: in this case, the alarm output indicates whether the current value of the signal is within the «critical range» between 100% and 150% of the switching threshold.



Ambient light immunity

Maximum permissible light intensity of the ambient light measured with a non-pulsed light source to IEC60947-5-2 and directed together with the receiver at a white reference paper which clearly covers the received beam. The light intensity is measured on the reference paper. In almost all sensor ranges, direct exposure of the white object to sunlight has no effect on the measurement. However, direct exposure of the received beam to sunlight almost certainly causes measuring errors.

Analog output

In contrast to the binary output with two possible output states, the analog output allows one continuous value such as a voltage or current to be emitted, resulting in a higher resolution of the measured values (see «Resolution»). Usually available as a voltage output 0 … 10 V and current output 0 … 20 mA or 4 ... 20 mA. The analog value can also be transmitted via a digital interface like RS 485.

B

Background suppression

Diffuse sensors usually operate by the triangulation principle. Thanks to this accurate distance measurement, a background may be located close behind the adjusted switching point without interfering with the measurement. The background is «suppressed».

Beam alignment, squint

Due to the addition of the production tolerances of the optical and mechanical components which cannot be compensated by adjustment during manufacture, a squint between the emitter and receiver beams of up to several degrees can occur. From a light distance of more than approx. 40 cm, retro-reflective sensors must usually be aligned. (Exception: OAxx/OBxx range is factory-adjusted.)

Beam-interrupting

Sensor class in which the presence of an object is detected by interruption of the light beam between an emitter (and possibly a reflector) and an associated receiver.

Binary output

Output which can assume two states, i.e. a switching output

Glossary

Black-white (gray-white) offset

For diffuse sensors with foreground and background suppression, there is a reduction in the sensing distance on gray or black reference paper in comparison with white reference paper (foreground suppression: increased sensing distance). This is also known as the black-white and gray-white offset. The sensing distance diagram shows the reduction in the sensing distance to gray or black as a function of the adjusted sensing distance.

Blind region

Because the emitter and receiver axes are usually offset to each other, it is possible at very close distances to the object that no light emitted by the emitted beam is within the detected angle of the receiver. In this situation, the sensor is dark-switched, or «blind».

CE conformity

Designates compliance of the products with European Union directives. The CE marking of the products is conditional on metrological proof of their electromagnetic compatibility (EMC) according to IEC 61000-4-x standards. Please also note the information on the safety concept.

Closing delay

Output function which extends the dark-switched state of a binary sensor by a specific time. This causes a delay in the switching of a light-switching output and the dark-switching output switches later.

Color sensor *LOGIPAL*

A color sensor determines the magnitude of deviation of the color components between a taught-in color and the color reflected by the object. The switching output indicates whether at least one color component is outside the specified tolerance bands.

Color-based

Sensor class which detects a specific composition of the reflected light spectrum, meaning colors or gray scales (=contrasts). The distance and received light intensity are secondary.

Complementary output

Depending on the wiring the output can be used as a light-switching or dark-switching output. Both output versions are available simultaneously.

Correction factor

The material and the surface texture of the object affect the switching distance of a diffuse sensor with intensity difference. To determine the corrected switching distance, the following values must therefore be applied to the relative receiving signal (KFs) and as an approximation to the distance (KFd).

Material	KFs	KFd
Kodak test card	100%	100%
Light, planed wood	80%	90%
Rough wood	20%	45%
Drawn aluminum	25%	50%
Cardboard, matt black	7%	26%

Current consumption

Because photoelectric sensors usually operate with pulsed light, their operating current is not constant, but assumes a saw-tooth shape due to the internal smoothing of the current. An average value and a maximum value can be specified from this. Usually this is the maximum value.

Glossary

D

Degree of remission
The degree of remission designates the diffuse proportion of the reflected light, i.e. without the reflective proportion.

Diffuse sensor
Diffuse sensors detect the presence of an object by illuminating it with emitted light, which is then reflected by the object to the receiver in a diffused form (remitted).

Direction of approach
With triangulation sensors, the approach of an object edge in the direction from the emitter lens to the receiver lens or the reverse can lead to incorrect results. The directions of approach from the front or the side cause no errors.

Distance-based
Sensor class in which the distance to the object is primarily assessed as the measured value. The intensity of the received signal, colors or gray scales are secondary.

ECOLAB approved
The sensors are resistant to many common cleaning agents.

EHEDG (Hygienic Design)
Sensors and mounting accessories meet the design criteria for hygienic applications. These sensors can be used in close proximity to foodstuff and facilitate the certification of the machine.

E

EMC
All sensors undergo type testing with regard to their electromagnetic compatibility (EMC) according to the standards IEC61000-4-2, -3, -4.

Error correction
Photoelectric sensors usually operate by measuring pulsed light reflected by the object to the receiver. Because a measurement of this kind can be interfered with by various effects from the surroundings, e.g. rapid changes in the ambient light (switching fluorescent lighting on and off, welding sparks etc.), not all received light pulses appear in their correct magnitude, which could lead to switching errors. Fault correction evaluates the received pulses and only changes the switching state when a significant majority of pulses received within a time window indicate the need to change the switching state.

Excess gain
Because signal losses can occur in applications with optical sensors due to soiling of the optics and ageing of the light source, an excess gain must be allowed in the design of the application by presuming a shorter distance to the object than that indicated by the switching point. For reliable operation, an excess gain of at least 150% of the switching threshold is required. This distance correction can either be read off from the excess gain diagram or by exploiting the point at which the output indicator stops flashing. There are corresponding correction factors for diffuse sensors with intensity difference.

F

External teach-in input
See «Teach-in»

FDA compliant
Consistent use of food compliant materials only.

Fiber optic sensor
An intensity-based sensor in which the emitter and receiver optics are replaced by an optical fiber connection.

Glossary

Focusing

Particularly for sensors operating by the triangulation principle, it is ideal when the size of the light spot is as small as possible. However, according to the laws of optics, it is only possible to bundle the light rays at one point of the light path, the so-called point of focus. For this reason, light sources are focused at a specific distance. This distance is optimum for the detection of very small objects.

Infrared light

Light in a long-wave range which is invisible to the human eye. In comparison with red light LEDs, IR LEDs can supply a higher radiated power. Unsuitable for use with plastic optical fibers, but suitable for glass optical fibers.

Intensity-based

Sensor class in which the light intensity impinging on the receiver is processed as a measured value (which is only an indirect measure of the distance to the object). The distance, colors or gray scales (= contrast) are secondary.

Inverted output

Depending on the wiring the output can be used as a light-switching or dark-switching output. Both output variants exist at the same time.

IO-Link

This is a communication standard for point-to-point connections between a master (connecting module) and a slave (sensor/actor). Non-screened standard sensor cables can be used as the transmission medium. Process data (analog/binary) and service data (parameters/diagnostics) can be transmitted by serial communication. IO-Link compatible sensors can be connected to existing I/O modules (without using serial communication). The advantage of IO-Link is the reduction in project planning and installation costs by a uniform interface and convenient parameter adjustment and management.

Laser diode

Light source featuring an exit zone of the light that is very small and can therefore be focused by downstream optics to form a very small measuring point (light spot). Another feature is that the light intensity is regulated by a monitor function and therefore remains practically unchanged during the service life of the laser diode.

Laser protection class

Lasers are subdivided into different protection classes according to their danger to the human eye:

1:	Harmless
1M:	Harmless as long as not further bundled by optical measures
2:	Laser radiation exists only in the visible spectral range (400 … 700 nm). Harmless for short periods of irradiation (max. 0.25s, as normally given by the natural protective reflex of the eyelid)
2M:	Like 2 as long as not further bundled by optical measures

Light/dark operation

Light operation: the output switches when the receiver receives light.
Dark operation: the output switches when the receiver receives no light.

Linearity deviation

Deviation from a proportional linear function (straight line). This is specified as an absolute value in mm or as a relative value as a percentage of the far limit of the measuring rage.

Glossary

Linking capability of outputs

Parallel connection of the outputs (OR function)
Sensors with identical output stages (NPN or PNP) can be connected in parallel if they are connected to the same power supply unit. The number of sensors which can be connected in parallel depends on the respective load current and the currents flowing through the internal pull-up and pull-down resistors (typically 3 mA). The sum of all load currents plus the sum of all internal currents must not exceed the specified maximum switching current of a single sensor.

Series connection of sensors (AND function)
Relay outputs may be connected in series. For sensors with electronic outputs, it is not permissible to switch on the supply of one sensor via the output of a preceding sensor and implement an AND function in this way. Because a sensor represents a high capacitive load, this would activate the short circuit protection.

M

Measuring range

The sensor supplies a valid measurement result within this range. The measuring range and the limits of the measuring range are adjustable in some sensors.

Minimum pulse length

Output function which forces a minimum length, e.g. 4 ms, for the two output states of a binary sensor, so that even a slow controller can detect such a state without difficulty. In contrast to release/response delay, an output state longer than the minimum impulse length is not extended.

Mounting distance

Distance between sensors (in diffuse sensors between the emitted light spots on the object) to prevent optical interference. Sensors with measures to reduce optical interference are not affected by this, but if the number of 3 is exceeded, the specified mounting distance for the next sensor but one is applicable.

Mounting instructions (MAL)

Some sensors are supplied with mounting instructions (MAL) which contain detailed notes on the connection and operation of the sensor

N

Nominal range Sn

The guaranteed maximum switching distance of retro-reflective sensors under ideal conditions (at +25° C, not soiled, sensors adjusted to each other).

NPN output

Binary open collector switching output with NPN transistor switching to 0 V. Consequently the load current flows from the switching output through the load resistance to +Vs. A suppressor diode is integrated and also an internal load resistor of approx. 10 kOhm … 50 kOhm for measurement purposes.

O

Off delay

Output function which extends the light-switched state of a binary sensor by a specific time. As a result, the light-switched output drops out later and the dark-switched output is switched after a delay.

On delay

Output function which extends the dark-switched state of a binary sensor by a specific time. As a result the light-switching output switches after a delay and the dark-switching output will drop out later.

Optical fiber

Cable made of glass or plastic fibers which conveys the light of a photoelectric sensor and enables the detection of an object at a constrained point due to its small size.

Optical interference

Without countermeasures, pulsed light sources which illuminate the same point on an object can overlap, which can cause switching errors. Sensors which are insensitive to optical interference use methods by which the pulses can evade each other and minimize situations in which switching errors are possible. These methods allow operation of up to 3 sensors in the same operating range, i.e. each sensor may «see» 2 interfering neighbors. The method becomes more reliable the better the neighboring sensors can be «seen», enabling the evasion algorithms to be suitably adjusted.

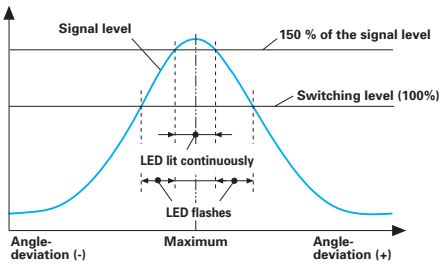
Glossary

Output current

Maximum permissible current load at the outputs. Because the short-circuit protection secures all outputs together in sensors with several outputs and therefore monitors the sum of all output currents, it must be observed that the output current specification refers to this sum.

Output indicator

Visual display on the sensor, usually a yellow LED which indicates the status of the sensor receiver. LED off: receiving signal < switching threshold, LED flashing: receiving signal between 100%…150% of the switching threshold, LED steady on: receiving signal > 150% of the switching threshold.



Overvoltage protection

Protection against brief voltage surges in accordance with the standard IEC 61000-4

P
ParCon/PosCon **line sensor**

The line sensor is able to detect edges, widths and positions of objects without additional illumination. The measured value is issued with high accuracy as an analog value or via a serial interface.

PNP output

Binary open collector switching output with PNP transistor switching to +Vs. Consequently the load current flows from the switching output through the load resistance to 0 V. A suppressor diode is integrated and also an internal load resistor of approx. 10 kOhm … 50 kOhm for measurement purposes.

Point source LED

Form of LED in which, in contrast to conventional LEDs, the light exit is not diffuse and distributed around the entire chip, but exits from the front in a circular and therefore clearly defined shape. A very small light spot can be created in this way (ideal for diffuse sensors with background suppression), similar to a laser, but at the expense of the total light intensity.

Polarization filter

Polarization filters only allow light to pass which is polarized in a specific plane. Retro-reflective sensors with polarization filters have polarization planes at the emitter and receiver twisted towards one another by 90°, so they only detect light which is reflected by a retro-reflector and depolarized in this way. For this reason, the light beam itself is always reliably interrupted by reflective objects (which leave the polarization plane unchanged).

proTect$^{\oplus}$

Unique impermeability concept – it guarantees that the sensors comply with protection class IP 68/IP 69K standards even after many temperature cycles and therefore have a long service life and high reliability.

Protection class (to IEC 60529)

IP 65: Protection against the penetration of dust and full protection against electrical contact. Protection against a water jet from any direction.
IP 67: Protection against the penetration of dust and full protection against electrical contact. Protection against water when the housing is immersed in water under specific pressure and time conditions.

Pulsed light

The sensitivity of a photoelectric sensor to ambient light can substantially be reduced by using pulsed light. On the one hand, the emitter LEDs can emit a higher peak power in pulsed operation, on the other, this makes differential measurement possible during which the difference in the received light with the light source switched on or off can be evaluated and non-pulsed light can be effectively compensated.

Glossary

Push-pull output

Compared to the open collector output variants PNP (= load virtually 0V) and NPN (= load virtually +Vs), the push-pull output enables random switching of the load within the limits of the supply voltage. However, compared to the above named open collector output variants, it is not admissible to connect outputs in parallel.

R

Range sensor

Diffuse sensor with a switching output where two switching points can be set. This makes it possible to detect the presence of an object within a specified distance range.

Red light

Standard light color in the visible range, also suitable for use with plastic optical fibers. Advantage: due to its visibility, this improves the adjustment and monitoring of the application.

Reflection foil

See «(Retro-) reflector»

Relative receiving signal

The relative receiving signal is specified in diffuse sensors operating by the intensity difference principle. This signal represents the signal level received from a white object as a function of the distance. With the aid of this diagram, it is possible to determine the sensing distance for an object which is not white. The correction factor of the respective material is required for this purpose.

Release delay

Output function which extends the light-switched state of a binary sensor by a specific time. The light-switched output thereby opens later and the dark-switched output is switched after a delay.

Release time

The minimum time required for an object to have left the scanning range to cause a change in the output state. This change in state is immediate, unless a signal processing time is also specified by which this change in state is further delayed. Compliance with this release time is conditional on the switching threshold falling by max. 50%. If it is necessary for the sensor to take measures to reduce interference with other sensors, this time may be extended by up to 50 µs.

Reproducibility (Repeat accuracy)

Max. deviation between two measurements under identical conditions (object position, soiling, temperature, duty cycle)

Residual ripple

Maximum proportion of alternating current which may be superimposed on the DC voltage supply with the momentary values remaining within the specified voltage supply range. Specified as a percentage of the mean value of +Vs.

Resolution

The smallest possible change in the measured value to cause a discernible change in the output signal.

Response time

The minimum time required for an object to be within the sensing distance to cause a change in the output state. This change in state is immediate, unless a signal processing time is also specified by which this change in state is further delayed. Compliance with this response time is conditional on an excess gain of at least 50% (the output indicator does not flash). If it is necessary for the sensor to take measures to reduce interference with other sensors, this time may be extended by up to 50 µs.

(Retro-) reflector

Reflector that casts light back in the direction of incidence and as a result, in contrast to a mirror, requires no exact alignment. They are available in the form of a triple reflector or reflective film.

Reverse polarity protection

Protection against reverse polarity is generally ensured between any connections of the sensor unless otherwise specified (e.g. only supply connections).

S

Safety concept
The safety concept defines the technical, instructional and legal measures which ensure the user (machine manufacturer, owner, user) a high degree of safety when handling our components. The safety concept also serves as the basis for the CE marking of our products and can be obtained in German, English or French.

Sensing distance Tb
The sensing distance Tb ranges between the adjusted sensing distance and the blind region. The blind region defines the range immediately in front of the sensor where an object cannot be reliably detected. The sensing distance is therefore the distance where an object (Kodak white) is reliably detected.

Sensing distance Tw
The sensing distance Tw is the maximum achievable distance of a diffuse sensor measured at +25° C on white paper (Kodak Card No. 1 527 795) size 200 x 200 mm. At a maximum sensing distance of under 400 mm, the reference paper size is 100 x 100 mm. The excess gain necessary for reliable operation under ideal conditions (50%) is already included. Sensors with adjusting aids indicate this point by a continuously lit reception indicator.

Sensitivity adjustment
Sensors operating with intensity difference or as retro-reflective sensors may have adjustable sensitivity. The sensitivity can then be adjusted to the application using a potentiometer or by teach-in.

Sensor standard
The sensor standard IEC60947-5-2 forms the basis for all type tests on photoelectric sensors.

Shape-based
Sensor class which detects specific features of shape, e.g. edges, the height of newspaper copies, etc. The distance, received light intensity, colors or gray scales are secondary.

Short circuit protection
In optical sensors, short circuit protection is clocked (switches the output off for approx. 20 ms), self-resetting (attempts to switch the output again after the shut-off time has elapsed) and start-delayed (to handle capacitive loads of up to 50 nF occurring with longer cables).

Signal processing time
Delay between the detection of the future output state and its transmission to the output caused by signal processing. This has no effect on the maximum measurement frequency!

Smallest object
If the optical prerequisites for the detection of small objects are fulfilled, i.e. a sufficient signal difference exists, the following generally applies to the detection of moving objects with diffuse sensors: time in the scanning range > response time.
For retro-reflective sensors: time in the scanning range > release time.
The time in the scanning range te can be calculated by:
te = distance in the scanning range/object speed

SmartReflect light barriers
Light barriers without reflectors. See section on SmartReflect light barriers.

Soiled lens indicator
See «Output indicator»

Start pulse suppression
Start pulse suppression suppresses undefined states during the starting phase by disabling all outputs during the first 20 ms after the voltage supply was switched on.

Glossary

Switching hysteresis

Switching hysteresis is employed to prevent the normal fluctuations of the measured value close to the switching points of binary outputs from producing uncertain switching states (oscillating) at the output. A higher switching threshold to switch on the sensor is adjusted than to switch it off, resulting in a difference between the distances for switching on and off.

T

Teach-in

Electronic teaching of an operating parameter (e.g. sensitivity adjustment) by pressing a button or via an external teach-in input. The «static teach-in» function is available as a standard feature. During teach-in the on position and off position are taught in and the sensor calculates the optimum switching point from this. The on position is always used as a normally open function and the off position always as a normally closed function. There is also a «dynamic teach-in» function, during which the maximum and minimum values of the results measured over a desired time are analyzed and an optimum switching threshold for this situation is automatically adjusted afterwards.

Teach-input external

See «Teach-in».

Temperature drift

In photoelectric sensors, the emitter light sources (apart from laser diodes), receiver elements and amplifiers are subject to certain thermal effects. This dependency of the measured values on the temperature is specified by the designation «temperature drift».

Test input

Some sensors provide a means of switching off the emitter for a function test by activating an input. If the sensor was previously switched to light, the output of the sensor must consequentially change to the dark switching state

Triangulation principle

Measuring principle used in diffuse sensors with background suppression and in distance-measuring sensors. The emitter, the object and the receiver form a triangular arrangement. The receiver is designed to enable measurement of the angle between the beams from the emitter to the object and from the object to the receiver. This angle depends on the distance to the object, which is determined by the position at which the received beam strikes the receiver element.

U

UL test mark

The UL mark on a product indicates that samples of the complete product were tested by UL according to nationally acknowledged safety standards, that they are free from unacceptable, foreseeable risks such as fire, electric shocks and similar hazards and that the product was manufactured under UL supervision. Most products from Baumer electric are UL-listed. The file with the listed products can be viewed at HYPERLINK "http://www.ul.com/database.

V

Voltage supply range

The voltage supply must be within a specified voltage supply range at all times to ensure the correct function of the sensor.