# Sensor solutions for the packaging industry

## Industry guide for fillers and dispensers

Baumer
Passion for Sensors


# We deliver innovation and guarantee quality for the packaging industry.

The Baumer Group is an internationally leading manufacturer of sensors, encoders and measuring instruments as well as automated image-processing components. As an owner-managed family business, we employ about 2600 staff worldwide in 38 subsidiaries and 19 countries. Our customers include small, highly specialized plant and machine construction companies, large industrial enterprises as well as affiliated groups operating on a global level.

This industry guide mainly focuses on manufacturers and operators of components, packaging machines and systems for beverages and liquid food. As a leading specialist in sensor technology, we support our customers not only in classic process technology, drive systems, position detection and quality assurance but also in aseptic filling in the food industry.

The Baumer Group has long been a reliable partner to the packaging industry. This commitment is underscored by Baumer hhs GmbH with more than 30 years of expertise in glue application, quality assurance and camera monitoring systems. With its software know-how for track & trace solutions, quality assurance, process automation and sorting applications, also QualiVision AG with over 10 years experience has firmly established itself in the packaging industry.

# Contents.

# Your benefits at a glance.

With our innovative process sensors, we facilitate reliable manufacturing and cleaning processes in the production of food and drinks. Intelligent process sensors allow machines to switch automatically to different types of packaging. With specifically selected technologies and additional information we reduce maintenance times and operating costs. Image-processing quality assurance enables individual production monitoring over the entire production and packaging process.

## Reduced operating costs

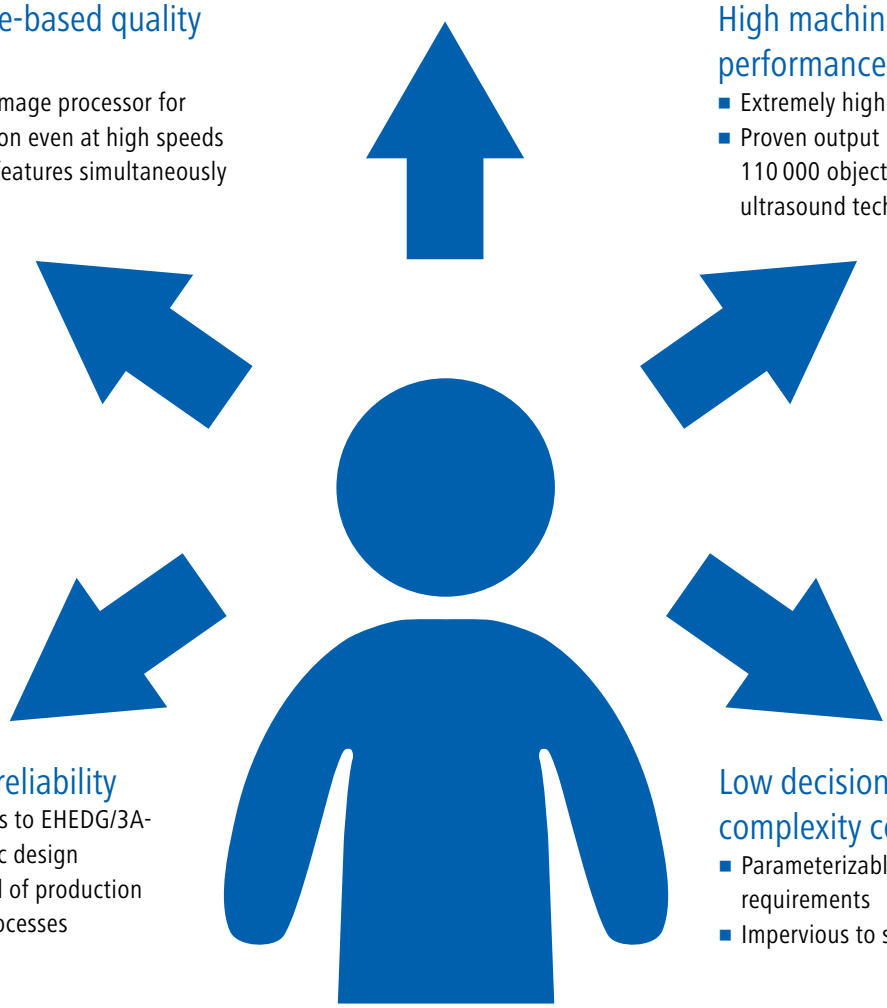
- Increased fault immunity for reduced maintenance and downtimes
- Specifically selected technologies, materials and protection classes

## Reliable image-based quality control

- Patented *FEX*® image processor for reliable evaluation even at high speeds
- Check up to 32 features simultaneously

## High machine flexibility and performance

- Extremely high object variance
- Proven output rates of up to 110 000 objects/hour with ultrasound technology



## High process reliability

- Food-safe thanks to EHEDG/3A-certified hygienic design
- Precision control of production and cleaning processes

## Low decision-making and complexity costs

- Parameterizable for different requirements
- Impervious to shock and vibration

# Approvals and certifications.

**ATEX (ATmosphères EXplosibles)**
ATEX is a directive of the European Union governing explosion protection. It includes the ATEX Product Directive 2014/34/EU and the ATEX Operating Directive 1999/92/EC.

**FDA (U.S. Food & Drug Administration)**
The US supervisory authority for food and drugs grants approvals for products and materials used in the food and pharmaceuticals industry.

**3-A SSI (3-A Sanitary Standard, Inc.)**
Is an independent, not-for-profit corporation in the USA. An inspector assesses compliance of a test sample based on design drawings and visual inspection.

**EHEDG (European Hygienic Engineering & Design Group)**
European not-for-profit consortium of users, suppliers and health authorities, which assesses the cleanability of hygiene components based on laboratory tests.

**UL (Underwriters Laboratories)**
UL tests products in accordance with applicable US safety standards.

**Ecolab**
Ecolab encompasses a material resistance test with cleaning agents and disinfectants.

**WHG (Wasserhaushaltsgesetz)**
The Water Resources Law (Wasserhaushaltsgesetz) regulates environmental protection and operational safety with the focus on substances hazardous to water.

**IP 69K**
The test criteria of protection class IP 69K in accordance with DIN 40050-9:1993 stipulate the prevention of water ingress in connection with the use of high-pressure and steam jet cleaning systems.

**EAC (Eurasian Conformity)**
Eurasian Conformity certifies a product in accordance with safety standards valid in Russia, Belarus and Kazakhstan.

**CIP (Cleaning-in-Place)**
Procedure for cleaning inner system components with liquid media with defined concentration, time and temperature without the need for disassembly.

**SIP (Sterilization-in-Place)**
Sterilization of inner system components without the need for disassembly, e.g. with steam pressure to remove micro organisms.

**Baumer *SmartReflect*® – light barrier with no reflector**
An optical light barrier based on the *SmartReflect*® principle detects objects irrespective of their shape, color and surface properties. With a detection range of up to 1000 mm transparent objects are also detected without a reflector.

**Baumer *qTeach*® – wear-free adjustment**
The sensors can be taught-in just by touching them with any ferromagnetic tool. A blue LED provides clear visual feedback. To prevent user errors, *qTeach*® locks automatically 5 minutes after energization.

**Baumer *qTarget*® – reduced setup and maintenance costs**
The Baumer design ensures the light beam of the sensor is aligned with the mounting holes. This eliminates individual part tolerances, allowing the light beam to be aligned with consistent accuracy across the entire sensor range.

**Baumer *OneBox Design* – flexibility in planning**
The *OneBox Design* stands for a new Baumer enclosure design. The Baumer *NextGen* sensors within the series feature the same dimensions, through-holes and controls for all sensor principles and technologies.

**Baumer *proTect+* – sealing concept for enhanced operational reliability**
The added reliability is the result of a special design and the use of high-grade materials such as V4A stainless steel, liquid silicon rubber and polyamide. The sensors undergo a comprehensive test procedure involving high-pressure cleaning, immersion tests over 168 hours as well as temperature shock tests in water and air.

# Product range from process through to packaging.

## Hygiene, cleaning and rinsing applications

### Temperature measurement

### Pressure measurement

### Level measurement

### Flow measurement

### Conductivity measurement

### Inductive sensors

### Ultrasonic sensors

### Optical sensors

### Vision sensors / Industrial cameras

### Rotary encoders / angle sensors

### Force / strain sensors

# Wet and dry applications

## Object detection

## Distance measurement

## 2D / 3D sensors

## Image processing / identification

## Rotary encoders / angle sensors

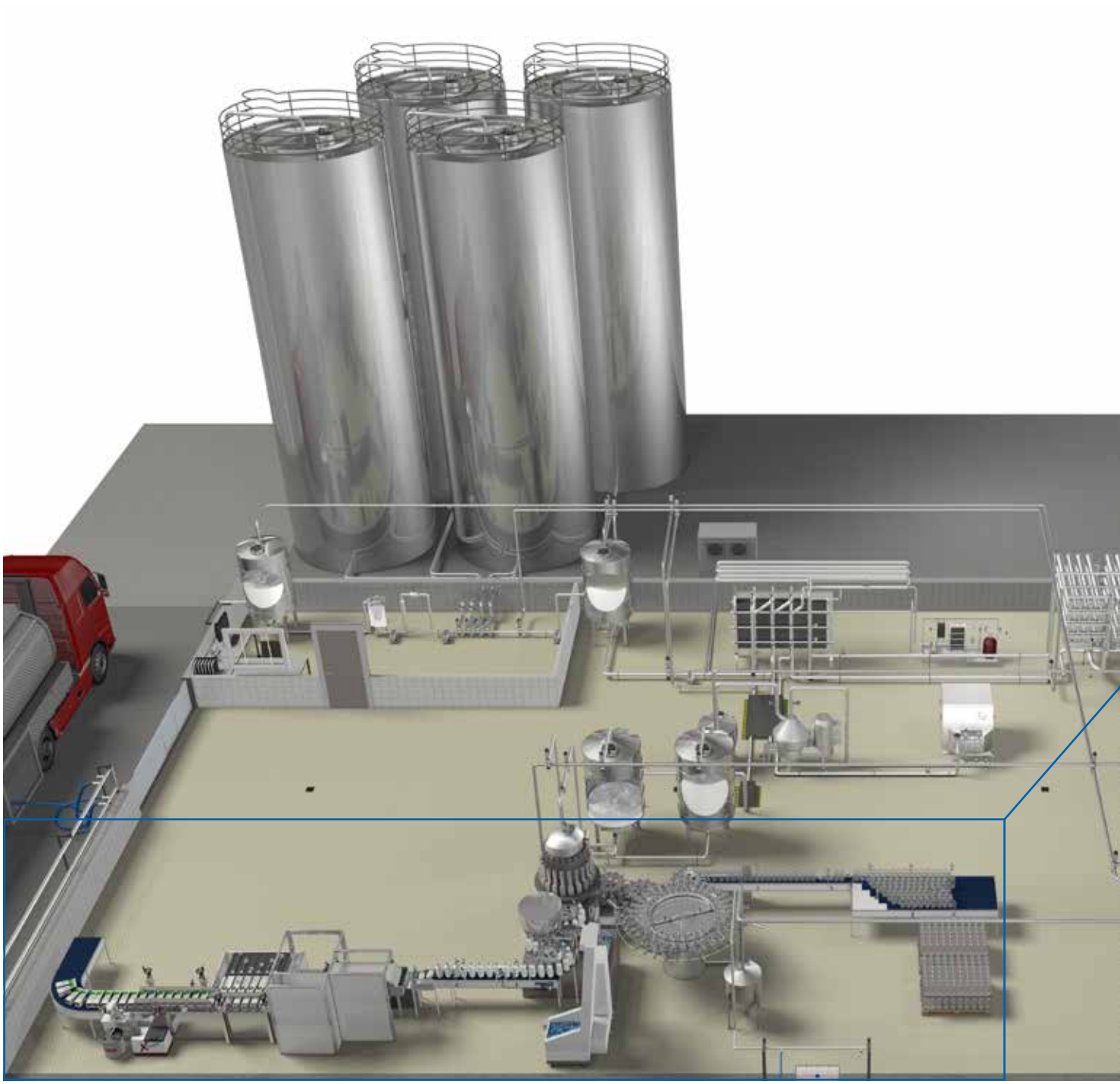
## Process sensors

## Format adjustment

## Accessories

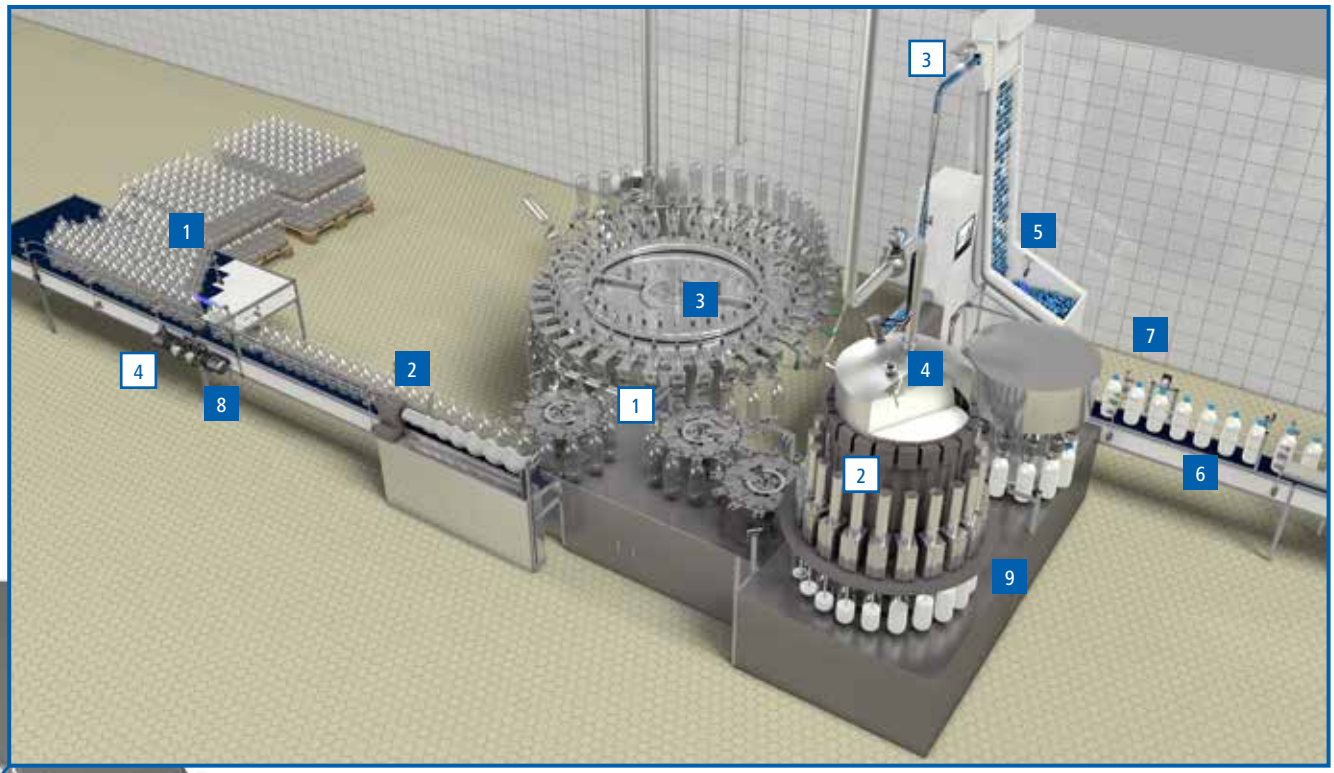
# Sensor solutions for the entire production and packaging process.

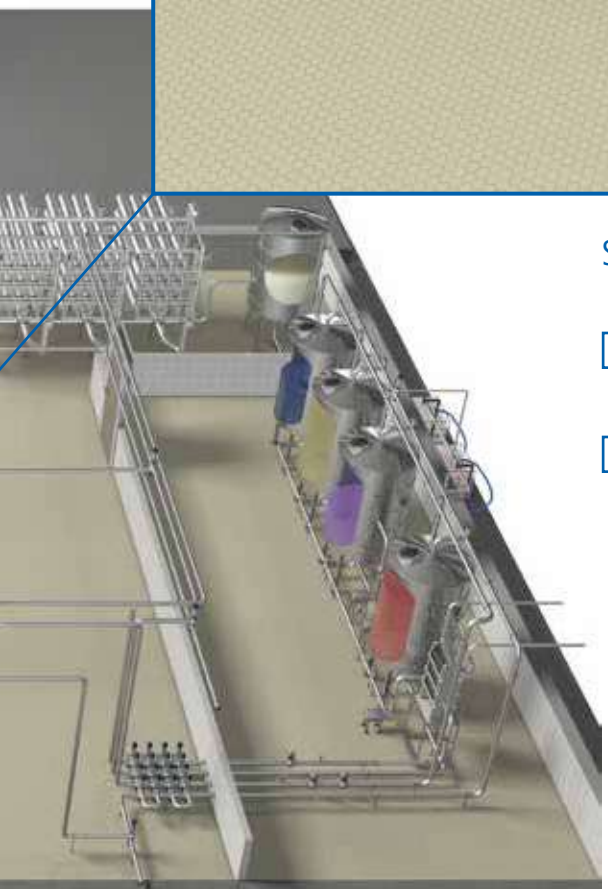
The Baumer Group meets the specific requirements in the production and packaging process with a positive impact on food safety. The packaging process also needs to satisfy the demands for increased machine flexibility and performance. Machine manufacturers preferably implement our solutions with the aim of reducing complexity. In terms of industrial and customer requirements, the configuration of individual machine modules ensures that the part systems link up to create an optimum overall system.



## Sensor solutions in the packaging process



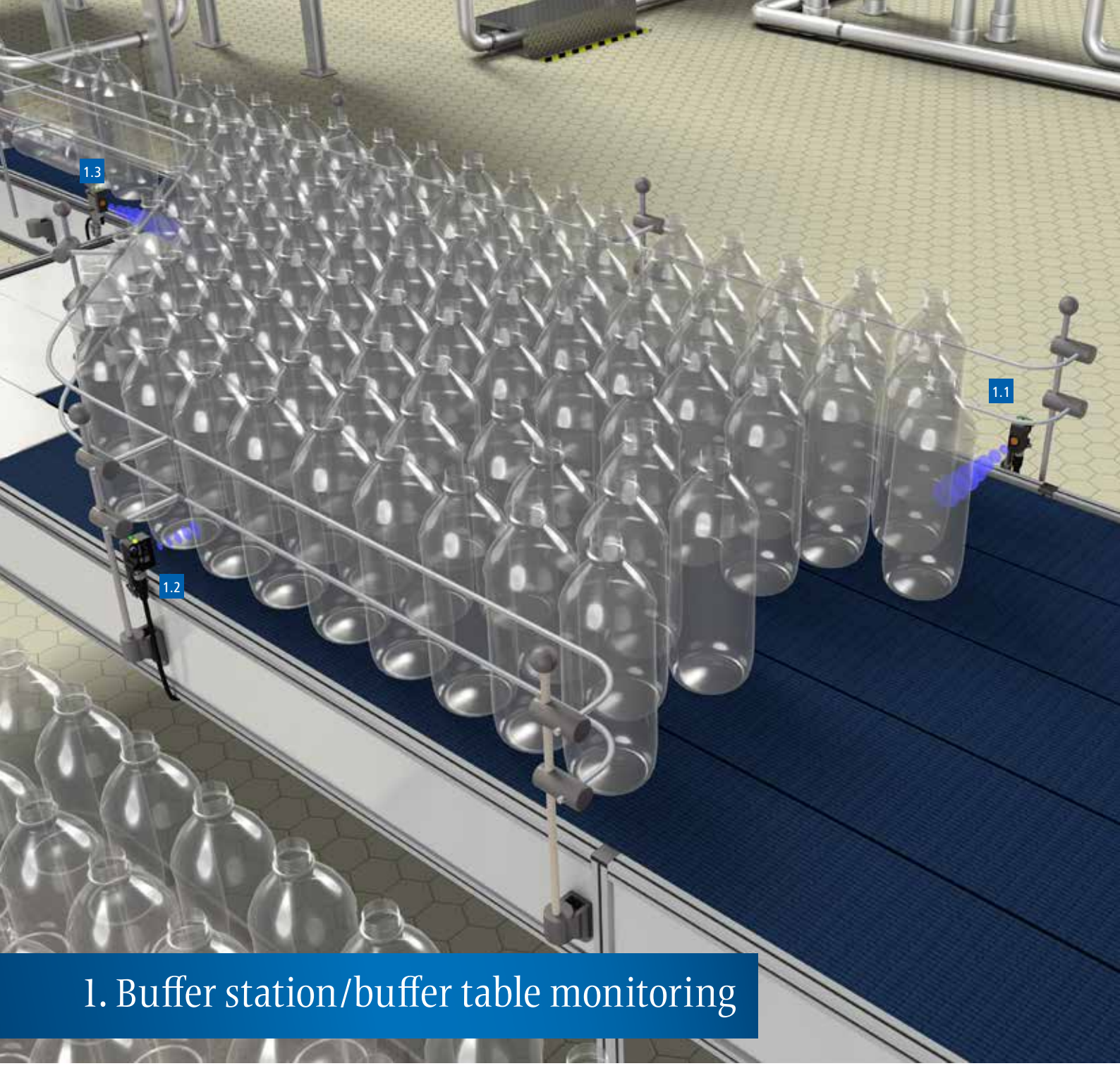


## Solution portfolio

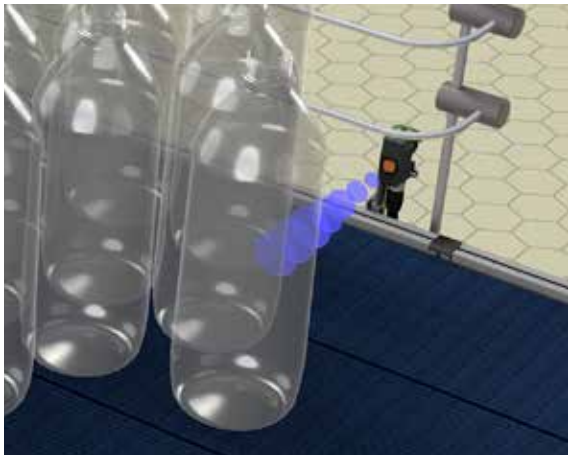


You will find more information on the production process of dairy products in the industry guide "Sensors for the Dairy Industry", everything about gluing systems under **www.baumerhhs.com** as well as information on software for automated quality assurance and track & trace solutions under **www.qualivision.ch**.

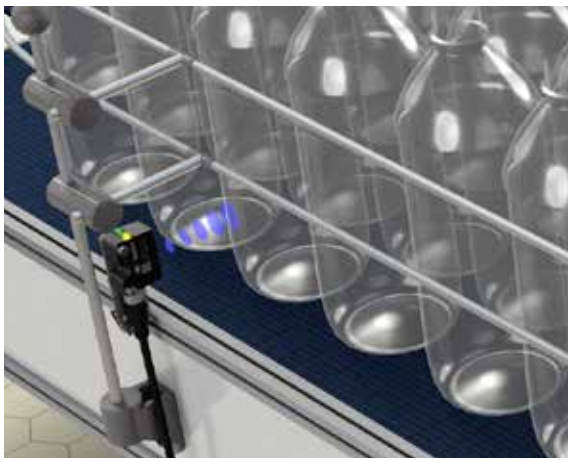



# 1. Buffer station/buffer table monitoring

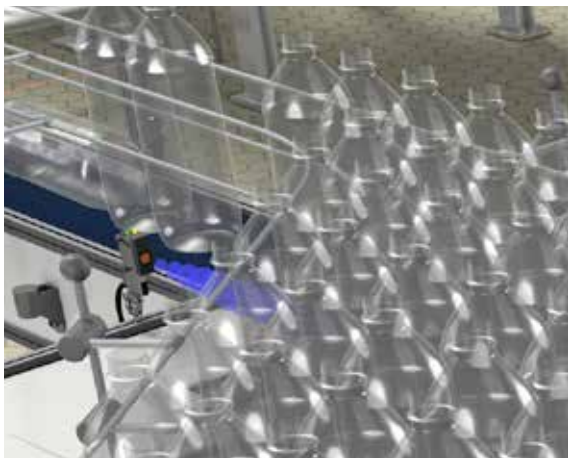
Buffer tables are monitored by sensors in order for modern filling and packaging machines to achieve the greatest possible efficiency. Irrespective of the buffer capacity and container variance, Baumer sensors monitor the no-pressure backup of large quantities over the smallest possible area. This ensures system downtimes are reduced to a minimum.



1.1 Buffer table full, filling no longer possible



1.2 Buffer table ready for filling



1.3 Buffer table emptying

1.1 1.2 1.3

Ultrasonic proximity switch for reliable detection

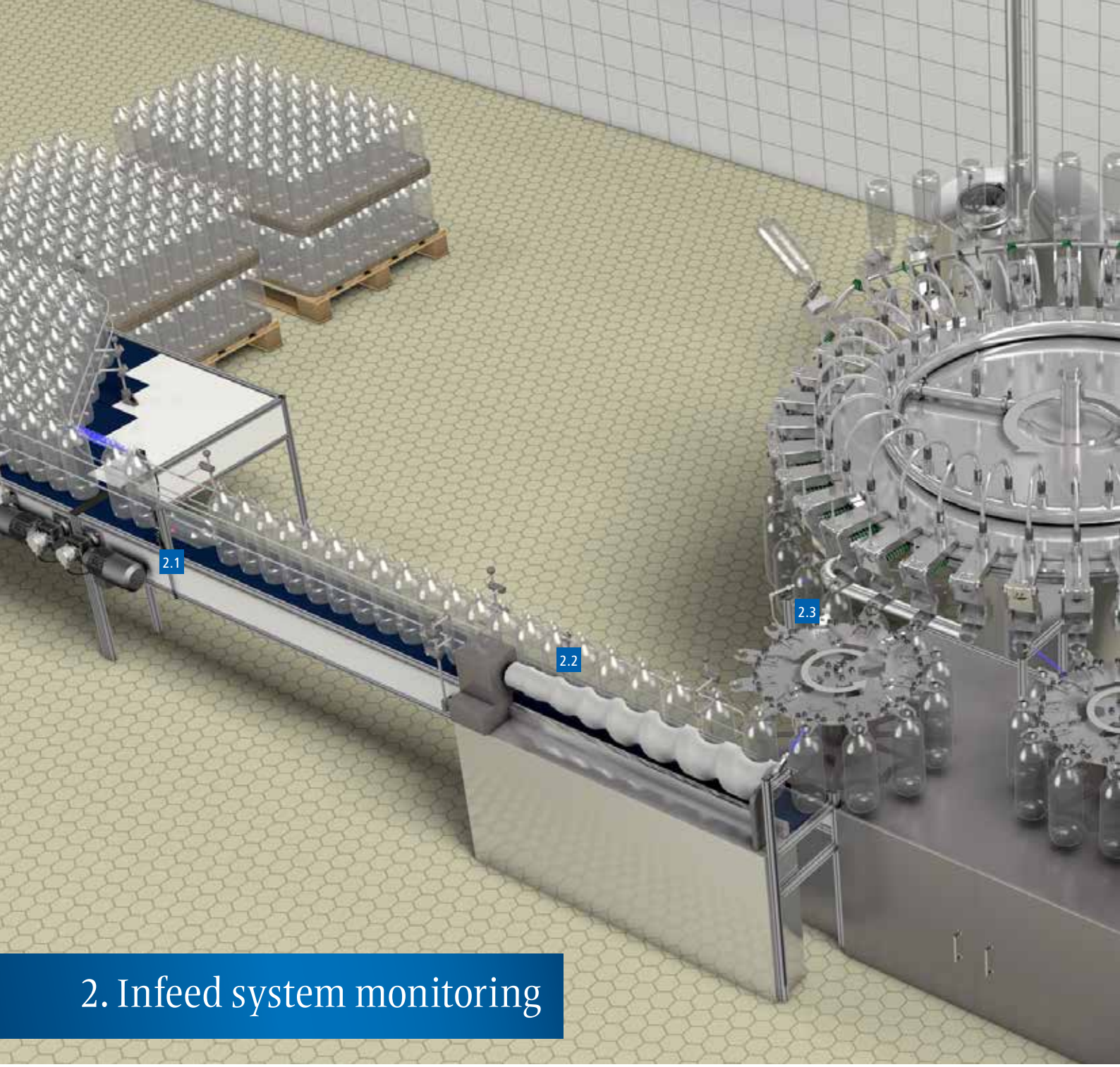
**Ease of selection and planning – reducing costs**

- Ultrasonic proximity switch for high packaging variance
- Detection range from 70 mm to 1000 mm

**Reduced setup and maintenance times**

- Fast adaptation to different applications by setting the sound beam width (e.g. narrow sound beam for individual objects and broad sound beam for groups of objects)
- Adjustable filter functions for an optimum between response time and repeatability
- Flexible adjustment of switching point with *qTeach*® or IO-Link
- Direct detection of packaging


UR18.PA0, p. 57
U500.PA0, p. 53




# 2. Infeed system monitoring

As soon as the mass flow from the buffer table forms an orderly line, the sensors monitor the position of the containers. A production output rate of more than 110 000 bottles or cans per hour is possible.

## 2.1 Container position monitoring

*SmartReflect*® – light barrier with no reflector for detecting transparent containers

**Reduced production time and costs**
- Visible light spot for quick sensor alignment
- No reflector necessary

**High operational reliability**
- Reliable barrier principle between sensor and machine part
- Suitable for objects of different color, surface finish or transparency
- High output rate thanks to fast response times and very small light spot
- Impervious to soiling thanks to plastic, stainless steel or hygiene design

**Ease of selection and planning – reducing costs**
- No need to clean or replace reflectors
- Extended detection range from 30 mm to 1000 mm for increased application options in the machine

IO-Link

O500.SP.T, p. 43

Diffuse sensors with background suppression

**High operational reliability**
- Stable detection process due to immunity to background reflections
- High output rate thanks to fast response times and very small light spot
- Reliable light sensor principle

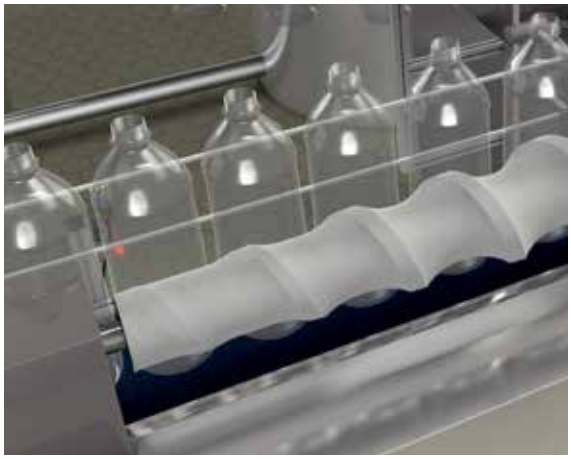
FHDK 10, p. 40

Inductive proximity switch – rugged solution for metal containers

**High operational reliability**
- Unaffected by background reflections
- High positioning accuracy with a repeat accuracy of approx. 10 µm
- High machine output rates of up to 50 metal containers per second

**Low maintenance and complexity costs**
- Robust and wear-free "low cost"-solution
- Factor 1 – one sensor variant for different metal containers

IR12.P04F, p. 64



## 2.2 Monitoring container transfer to screw conveyor

*SmartReflect*® – light barrier with no reflector for detecting transparent containers

### Shorter production and start-up times

- Visible light spot for fast sensor alignment
- No readjustment required thanks to optically aligned axis (*qTarget*)
- No reflector necessary

### High operational reliability

- Barrier principle between sensor and machine part for maximum reliability
- High productivity and output rates thanks to small light spot for narrow packaging gaps
- Impervious to soiling thanks to plastic, stainless steel or hygiene design

IO-Link

O300.SP.T, p. 42

## 2.3 Monitoring container transfer from screw conveyor to capper

Ultrasonic retroreflective barrier with extremely short response time

### High degree of reliability

- Extremely high packaging variance thanks to ultrasonic retroreflective barrier principle
- High machine availability with function reserves
- Impervious to aggressive liquids

### High machine performance

- High machine productivity with proven output rates of up to 110 000 bottles / hour
- High positioning accuracy with a response time of 6 ms

### Low costs

- No additional reflector necessary
- Low decision-making costs due to minimum gap between objects

UNAR 12, p. 54

Protection class IP 69K optically measuring sensors in hygienic design align rotation-asymmetric containers in the cleaning and rinsing area

### High operational reliability

- Hygiene design for reliable detection in the hygiene zone
- High machine productivity with a response time of less than 3 ms

### Low maintenance cost and high machine availability

- Resistant to cleaning agents (Ecolab tested)
- Intelligent functions such as localization of measuring range and averaging, maintenance status message and switching window adjustment

FADH 14, p. 49
FHDH 14, p. 45

Referencing:
Referencing machine's mechanical systems

After being switched on, the majority of packaging machines do not receive feedback on the absolute position of their mechanical systems. Referencing is therefore necessary in order to adjust the axes of the measuring systems and the positions of the mechanical systems. Referencing is concluded when the reference switch is tripped by the mechanical system. Due to the fact that the positioning accuracy of the machine also depends on the referencing, in this case we recommend the use of inductive sensors.

### High positioning accuracy

- Sensor sampling rate up to 2 kHz
- Repeat accuracy of ±10 µm

### High degree of flexibility in design and installation

- Enclosure length 30 mm
- Function irrespective of surface finish, soiling and liquid

### Reference signal from inductive proximity switches

- IR12.P04F, p. 64
- IR30.D24L, p. 64


# 3. Food safety: Disinfection in rinsing process

In terms of reusable packaging such as bottles, ensuring high cleaning quality is a first step towards food safety. Measuring the flow rate and temperature in the rinsing process ensures reliable cleaning performance.

## 3.1 Disinfection in rinsing process

A calorimetric measuring principle is used to monitor flow rate and temperature

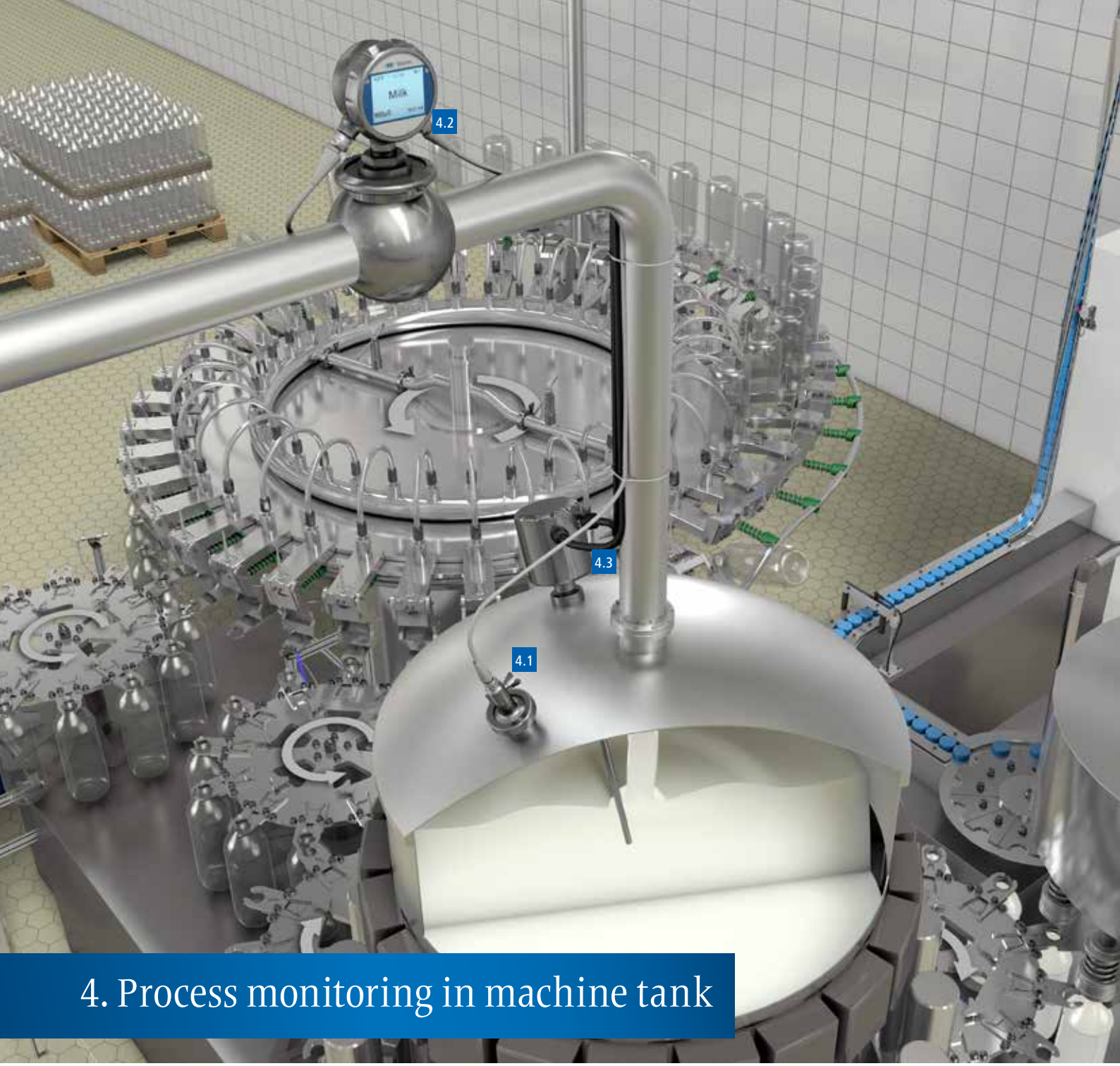
### High process reliability

- Maintaining the defined flow rate and temperature for sterilization
- SIP-capable up to 150 °C, no time limit
- Flow measurement at media temperatures of up to 125 °C

### Reduced complexity and installation time

- Parallel measurement of flow rate and temperature
- BHC process connection for all process variables
- Linearized and calibrated output signals

*FlexFlow* PF20H, p. 77




# 4. Process monitoring in machine tank

Food safety has top priority also when it comes to process monitoring in the machine tank. With hygienic flush process connections we guarantee outstanding cleanability while at the same time reducing the cleaning time.

## 4.1 Monitoring pressure in machine tank

Piezoresistive pressure measurement for absolute pressure, relative pressure and vacuum

### Reliable design

- Precision and longterm stability for efficient process
- Suitable for demanding processes with frequent temperature fluctuations
- Sturdy sensor element secures machine availability even at peak pressures

## 4.2 Soiling monitoring

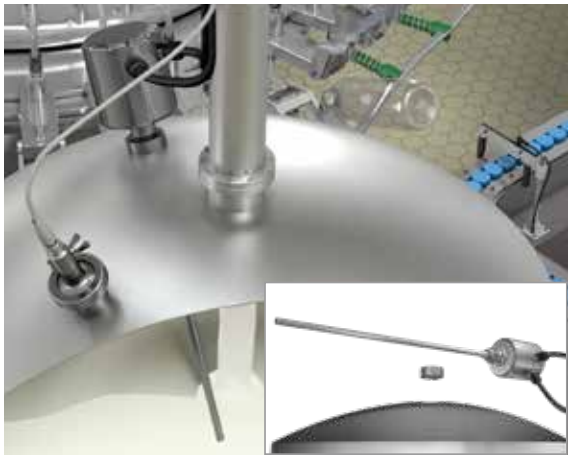
Inductive conductivity measurement for monitoring purity

### High food safety

- Detection of minimal quantities of residual chemicals for high product quality
- Rapid temperature compensation
- EHEDG and 3-A certified hygiene design

PBMH, p. 76


*CombiLyz*® AFI4, p. 80



## 4.3 Level monitoring in machine tank

Continuous level measurement for liquid and viscous media with potentiometric measuring principle

### High operational reliability
- Extremely short response time for fast level control
- Reliable filling even with small buffer tank

LSP, p. 78

Point level detection for liquid and free-flowing media with frequency sweep technology

### High operational reliability
- Foam detection or suppression
- No false signaling for adhesions
- Short response time of 100 ms
- Bright blue LED status indicator

### Long service life
- Sturdy sensor tip made from PEEK
- Acid and alkaline resistant materials
- Resistant to temperature shock
- Enclosure protection class IP 69K

### Easy installation and initial startup
- Comprehensive selection of process connections
- Retrofitable in existing process connections
- Remote setup and clone function

### Certified design
- EHEDG and 3-A certified hygiene design
- ATEX approved
- WHG approved

*CleverLevel*® LBFH, p. 79

Point level monitoring with capacitive technology

### High degree of flexibility

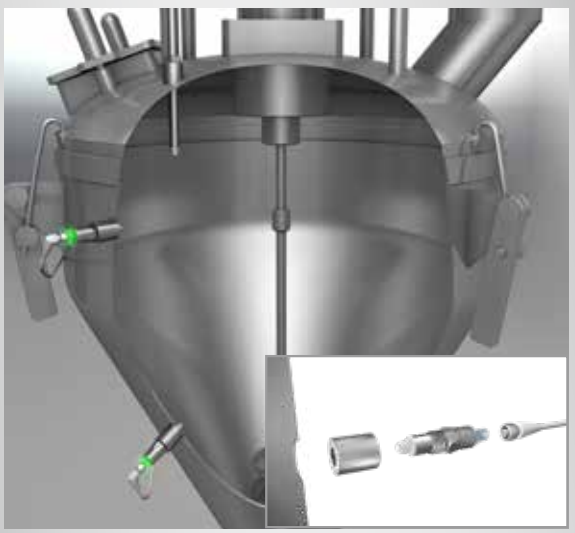
- Also suitable for installation in plastic containers
- Media detection with direct contact or non-contact through container wall
- For conductive or non-conductive liquids
- For free-flowing products

CFAM 12, p. 71
CFAK 12, p. 70

### Easy startup

- Fixed or adjustable sensing distance
- Simple measurement method

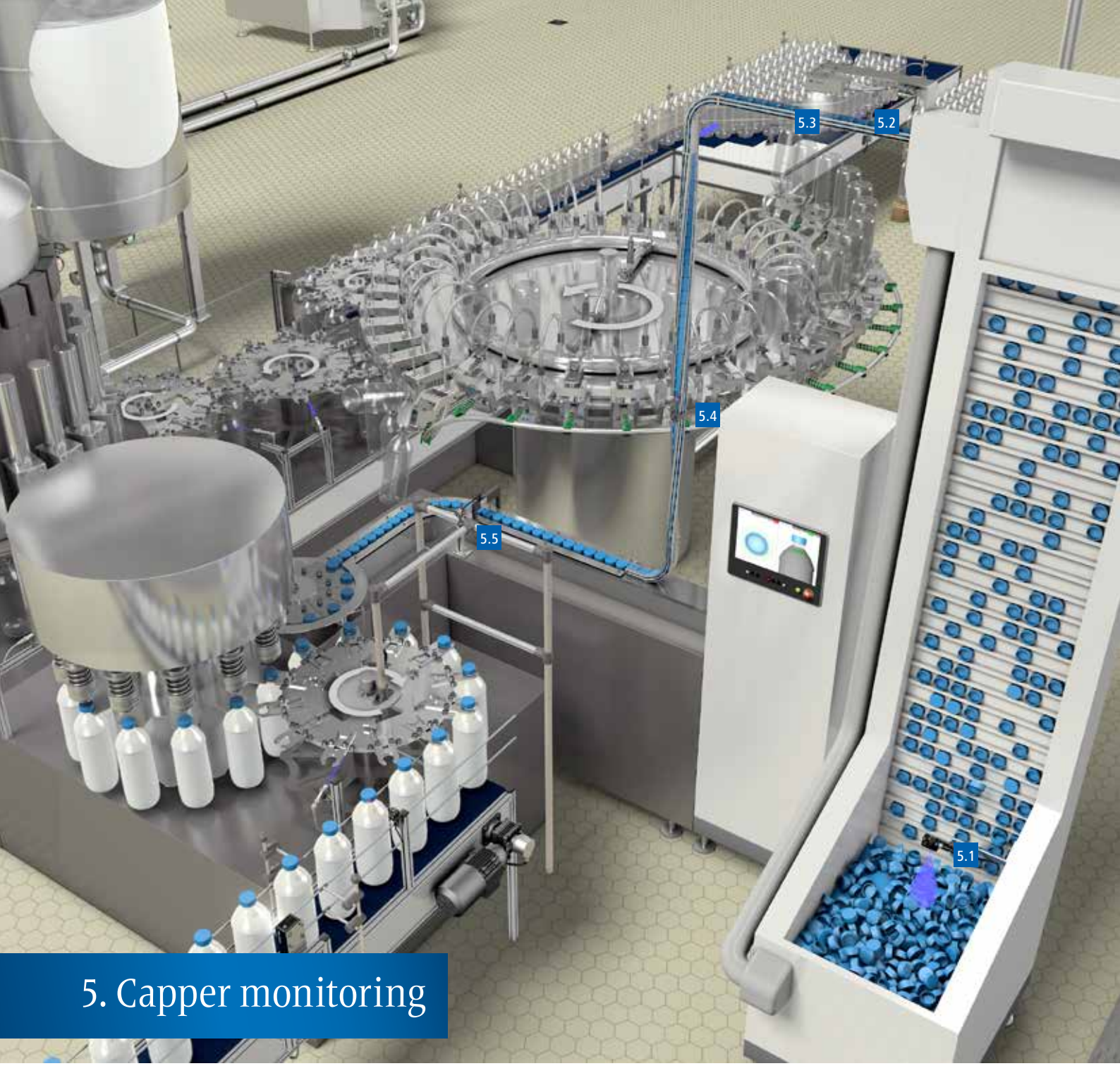
CFDK 25, p. 71



Point level monitoring for free-flowing products in metal tanks with frequency sweep technology and in plastic tanks with capacitive technology

### Solution portfolio:

- *CleverLevel*® LBFH, p. 79
- CFAM 12, p. 71
- CFAK 12, p. 70
- CFDK 25, p. 71




# 5. Capper monitoring

The demands placed on capping machines in terms of performance and flexibility are ever increasing. We  support all types of closures for the most diverse requirements in the pharmaceuticals and cosmetics as well as the food and drink industries. This ensures hygienic standards are achieved, thus allowing these machines to also be used as aseptic cappers.

## 5.1 Cap level monitoring in the bin

Ultrasonic distance sensor with broad sound beam

**High reliability and flexibility**

- Reliable detection irrespective of the object properties thanks to ultrasonic retroreflective barriers
- Ultrasound technology enables the detection of different types of closures
- Extended detection range from 30 mm to 2000 mm
- No-wear teach function (*qTeach*®) ensures easy switching point setting
- Flexible adaptation to given conditions on site, sound beam width adjustment and averaging with IO-Link

IO-Link

U500.DA0, p. 53
UNDK 30, p. 53

Optical distance sensor with IO-Link

**High reliability and flexibility**

- Continuous distance measured values in IO-Link mode
- Transfer rate 230.4 kBaud (COM3), minimum cycle time 1.1 ms
- Extended detection range from 60 mm to 550 mm
- Matching light source (infrared LED, Baumer *PinPoint* LED or laser diode) for reliable level monitoring of different types of closures

IO-Link

O300.DL, p. 46
O500.DI, p. 43

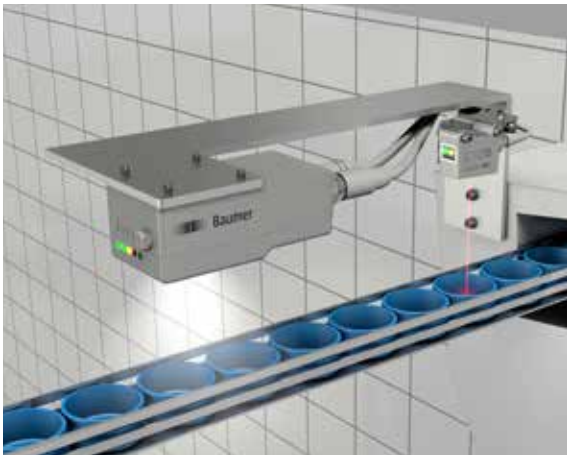
## 5.2 Trigger sensor in wet and cleaning zone for vision sensor / industrial camera

*SmartReflect*® – light barrier with no reflector for detecting caps

**Reduced production costs and times**
- Visible light spot for easy sensor alignment
- No reflector necessary

**High operational reliability**
- High machine flexibility as different colors and shapes are reliably detected
- Immunity to background reflections ensures a stable detection process

**Low service costs**
- Enclosure protection class IP 68/IP 69K and *proTect+*
- Ecolab certified



## 5.3 Quality control of screw caps with seal

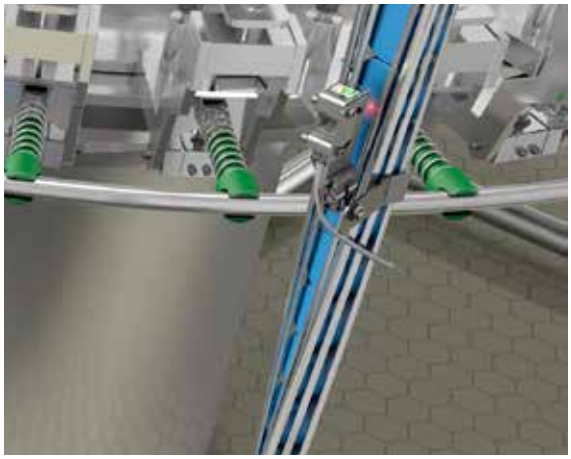
Robust vision sensors and cameras in IP 69K design

**High production reliability with *VeriSens*® vision sensors**
- Patented *FEX*® contour detection down to 1/4 pixel accuracy
- Up to 6000 checks / minute
- Stainless steel enclosure of washdown design and protection class IP 69K (tested at 80 °C and 100 bar pressure)
- User-friendly sensor configuration in four simple steps

**Reduced integration time and system cost with CX.I cameras**
- Operating temperature range from –40 °C to +70 °C
- Four power outputs with up to 120 W (max. 48 V / 2.5 A) for direct lighting control
- IP 69K stainless steel housing in hygienic design


O300W.SP, p. 42
O300H.SP, p. 42

*VeriSens*®, p. 82
CX.I cameras, p. 83



## 5.4 Cap infeed buffer full

Diffuse sensors with background suppression

**Reduced production times and costs**
- Visible light spot for easy sensor alignment
- No reflector necessary

**High machine availability**
- Reliable detection of different colors and shapes
- Unaffected by background reflections and extraneous light

## 5.5 Preparing caps for takeup

Laser fork light barrier

**Reduced installation and decision-making costs**
- No alignment of transceiver necessary
- Fork width from 20 mm to 120 mm

**High machine availability**
- Through beam principle for secure detection process
- Unaffected by extraneous light < 100 kLux


FHDK 07, p. 40
O200.GP, p. 40
O300.GP, p. 42

FHDK 04, p. 40
OGUM, p. 47


# 6. Outfeed station monitoring

With Baumer sensors in the outfeed station you have a wide range of options for checking production quality and display the results online during operation. A large number of features are checked simultaneously. Various customized recipes can of course be stored and called up as required.

## 6.1 Container exiting filling machine

*SmartReflect*® – light barrier with no reflector for detecting transparent containers

**Reduced production time and costs**
- Visible light spot for quick sensor alignment
- No reflector necessary

**High operational reliability**
- Barrier principle between sensor and machine part for maximum reliability
- High productivity and output rates thanks to small light spot for narrow packaging gaps
- Impervious to soiling thanks to plastic, stainless steel or hygiene design

**Ease of selection and planning – reducing costs**
- No need to clean or replace reflectors
- Extended detection range from 30 mm to 1000 mm for increased application options in the machine

IO-Link

O300.SP.T, p. 42

Diffuse sensors with background suppression

**High operational reliability**
- Stable packaging process due to immunity to background reflections
- High output rate thanks to fast response times and very small light spot
- Reliable light sensor principle

FHDK 10, p. 40

Inductive proximity switch – rugged solution for metal containers

**High operational reliability**
- Unaffected by soiling
- High positioning accuracy with a repeat accuracy of ± 10 µm
- High machine output rates of up to 50 containers per second

**Low maintenance and complexity costs**
- Robust and wear-free low cost solution
- Factor 1 – One sensor variant for different metal containers

IR12.P04F, p. 64

## Supplying secondary packaging

A position detection facility is required when the primary packaging is subsequently packed in crates. We recommend the use of an optical laser line sensor to reliably detect the large number of different types of crate.

O300.GP, p. 42


# 7. Quality control in production

High quality products also with maximum food safety in different packaging – these consumer requirements greatly influence the production processes and quality control. These factors in turn are used as the requirement profiles for our sensors. With our corresponding technologies we support the required flexibility in the most diverse machine applications.

## 7.1 Level monitoring in packaging

Ultrasonic distance sensor with extremely narrow sound beam

### High quality assurance
- Linearized measuring range with 0.5 mm repeat accuracy
- Reliable ultrasonic retroreflective barrier principle

### Reduced decision-making costs
- Up to 150 mm detection range for a diverse range of media
- Response times of less than 7 ms (measuring)
- Response times of 1.3 ms (switching)

UNDK 09, p. 52
UNAM 12, p. 56

## 7.2 Trigger sensor for vision sensor / camera

Diffuse sensors with background suppression

### Reduced production costs and times
- Visible light spot for easy sensor alignment
- No reflector necessary

### High operational reliability
- High machine flexibility as different colors and shapes are reliably detected
- Immunity to background reflections and extraneous light ensures a stable detection process

IO-Link

O200.GP, p. 40
O300.GP, p. 42
FHDK 07, p. 40

## 7.3 Speed-independent triggering

Direct connection of incremental rotary encoder to the vision sensor / industrial camera for speed-independent quality control

### High quality control reliability

- Virtually jitter-free rotary encoder signals allow precision camera triggering over the entire speed range
- Monolithic opto-ASIC with high integration density facilitates stable signals even under shock and vibration conditions in continuous operation
- Robust sealing concept for guaranteed high protection class IP 67

### High degree of flexibility

- Flexible parameterization from 1 to 65536 pluses / revolution
- Selectable TTL or HTL output signal level

EIL580P, p. 84

## 7.4 Quality control of filled containers

Image processing and identification with vision sensor

### High operational reliability

- Contour-based evaluation by *FEX*® image processor for stable quality control also with fluctuating surface properties
- Easy and reliable setup of color checks with *ColorFEX*® 3D color assistant
- Robust thanks to industrial design in rugged metal enclosure of protection class IP 67

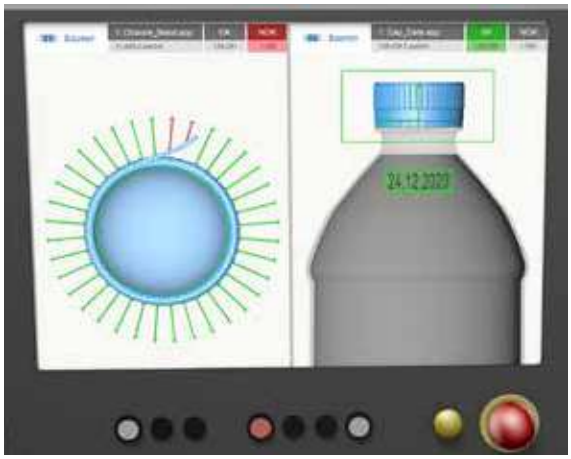
### High degree of flexibility

- No mechanical object alignment necessary thanks to automatic *FEXLoc*® 360 ° position tracking
- 22 different check tools are able to check up to 32 features per job
- Up to 255 jobs can be stored in the sensor with backup option via FTP server
- High-speed mode with up to 100 checks / minute
- XC series with interchangeable lenses, including patented modular IP 67 lens protection


EtherNet/IP

PROFINET®

*VeriSens*®, p. 82



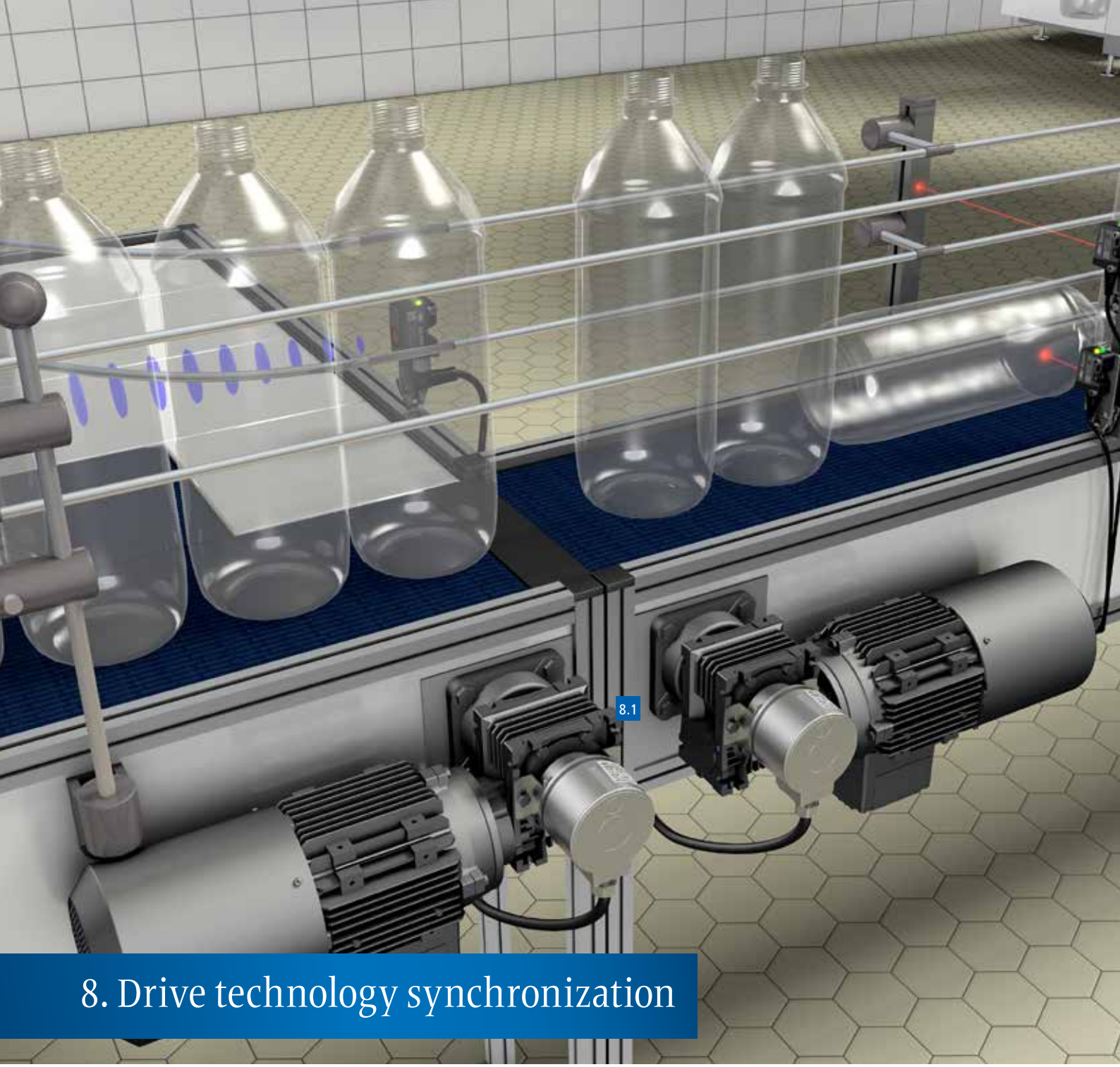
## 7.5 Live image quality assurance

Web interface with *MultiViewer* to display up to 16 *VeriSens*® on one screen

**Reduced implementation time and costs**

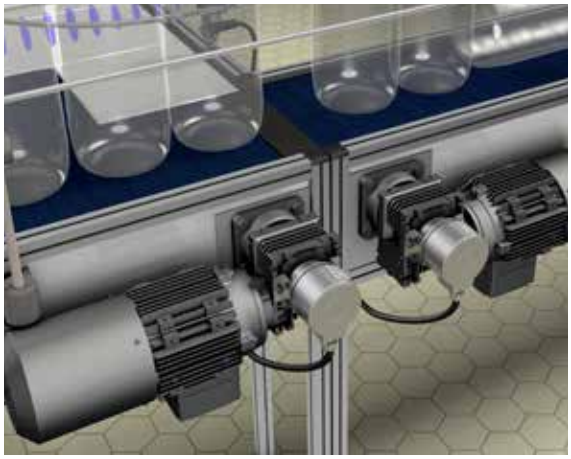
- Configurable web interface for application-specific operation and monitoring in only a few minutes
- No additional software costs
- Integrated *VeriFlash*® flash controller for reduced programming and integration expenditure
- Error image memory in sensor
- Integrated FTP client allows error images to be stored on a FTP server


*VeriSens*® Application Suite
Allows you to perform a test free of charge with product simulators.
Download: www.baumer.com/verisens/appsuite




# 8. Drive technology synchronization

The drive technology uses stable signals from rotary encoders to ensure the containers run at a low noise level through the machine. This not only has a positive effect on machine performance but also reduces conveyor belt wear.



## 8.1 Buffer table and infeed conveyor synchronization

Incremental industrial rotary encoders with precise optical scanning

### Reduced storage and startup costs

- Differing requirements parameterizable with only one rotary encoder variant from 1 to 65536 pulses / revolution
- Shorter startup times by simple reparameterization of the encoders on site with handheld programming tool
- All commonly used mechanical interfaces available

### High operational reliability

- Immune to shock and vibration thanks to high integration density
- New optical sensor technology offers high signal and control performance

EIL580P, p. 84

## 8.2 Master rotary filler axis

High control performance provided by absolute industrial rotary encoders

### High system performance

- Synchronization of various machine modules with only rotary encoder and up to 5 precision incremental outputs of varying resolution
- High precision position and trigger signals with integrated error compensation and filtering of machine vibration
- Adjustable signal resolution for flexible adaptation to machine configuration
- Functionally reliable incremental signal for efficient setup
- Synchronous position output with ultra low jitter in ± 0.6 µs range with Powerlink
- Freely selectable position resolution without conversion in the PLC and Powerlink cross-traffic for ultra-precise synchronization of various axes

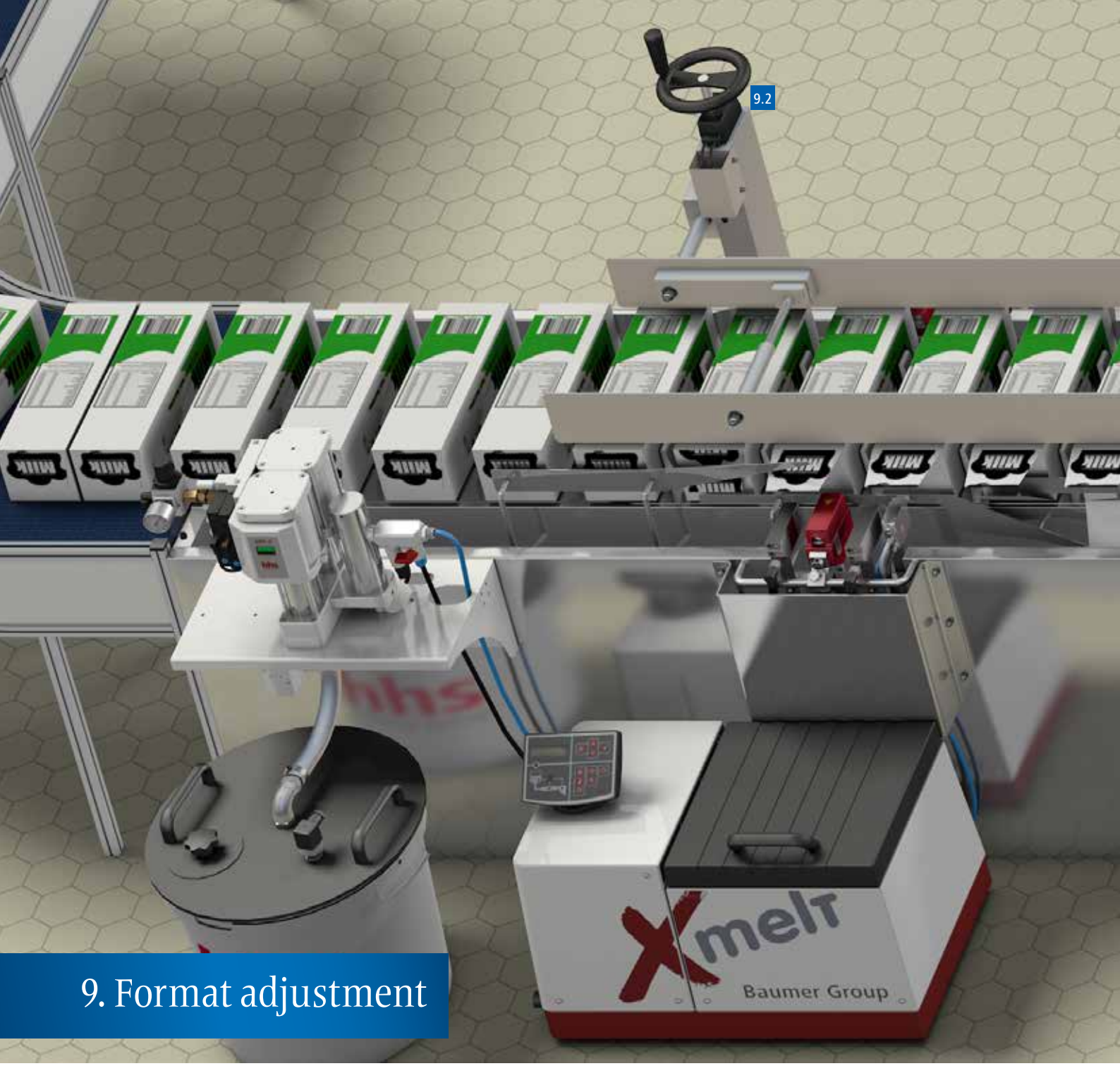
### High operational reliability

- Safety first – Safe incremental rotary encoders with SIL2
- Reliable speed with standard square-wave signals simply integrated in existing architectures
- Simpler verification of safety functions thanks to certified conformity (IEC 61508)
- Long service life of rotary encoders ensured by statistical process checks and automated final inspections
- Absolute rotary encoder with 18 bit resolution and a repeat accuracy of ± 0.1 °

EtherCAT

PROFINET

EAL580, p. 87




# 9. Format adjustment

Container sizes differ according to customer requirements. These mechanical adaptations are adjusted automatically in order to reduce the retooling times of the packaging machine. A format adjustment drive specifically developed for this purpose is able to position the mechanical systems accordingly. Convenient solutions are also available for manual adjustment.

## 9.1 Automatic adjustment of filler head referred to container height

Intelligent compact drive with BLDC motor, absolute multiturn rotary encoder and worm gear

**Maximum availability and process reliability of the machine after format adjustment**

- Automated adaptation to different container sizes
- No referencing necessary after starting up the machine

**Easy to integrate in particularly compact machines**

- Modular design with various gearboxes and connection variants
- Bevel gears with hollow shaft and torque support ensure easy replacement of handwheels
- The self-locking worm gear renders an additional stop brake unnecessary

**Reduced integration and complexity costs**

- PROFINET, PROFIBUS or CANopen® interface enable direct connection to the machine controller
- Manufacturer-independent application profiles, e.g. PROFIdrive, CiA402
- The drive directly provides diagnostic data relating to axis status

MSIA 68 bevel gear transmission
W3 PROFIBUS, p. 94

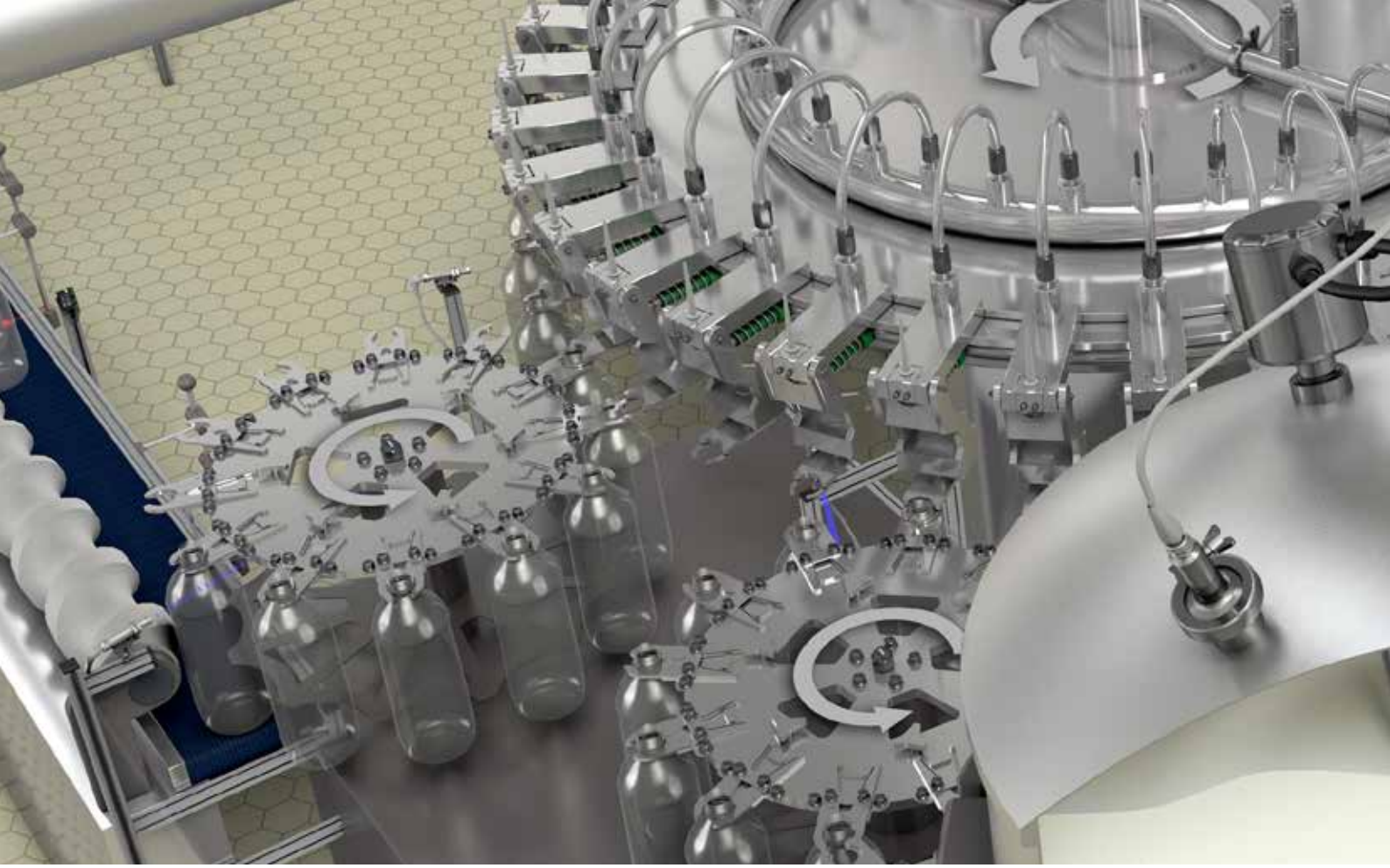
## 9.2 Manual adjustment of container guides

Spindle position display

**Fast and error-free retooling**

- Manual format adjustment with absolute multiturn rotary encoder with operator guidance
- Display of actual position and setpoint for fast, error-free retooling
- Communication with machine controller via RS485, PROFIBUS
- Memory controller N242 for recipe management


N150, p. 94
N242, p. 94



# Contents – solution portfolio.

# Machine modules – optical sensors

| Product name | Buffer station/buffer table monitoring | | | Infeed system monitoring | | | Food safety: Disinfection in rinsing process | Process monitoring in machine tank | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Buffer table full, filling no longer possible | Buffer table ready for filling | Buffer table emptying | Container position monitoring | Monitoring container transfer to screw conveyor | Monitoring container transfer from screw conveyor to capper | Disinfection in rinsing process [1] | Monitoring pressure in machine tank [2] | Soiling monitoring [3] | Level monitoring in machine tank [4] |
| **Light barriers and light sensors** | | | | | | | | | | |
| O300H.GP | | | | ■ | ■ | ■ | | | | |
| O300W.GP | | | | ■ | ■ | ■ | | | | |
| O300H.SP | | | | ■ | ■ | ■ | | | | |
| O300.SP.T | | | | ■ | ■ | ■ | | | | |
| O300W.SP | | | | ■ | ■ | ■ | | | | |
| O300.RP | ■ | ■ | ■ | ■ | ■ | | | | | |
| O300.RP.T | ■ | ■ | ■ | ■ | ■ | | | | | |
| O300.ZR | ■ | ■ | ■ | ■ | ■ | | | | | |
| O200.GP | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| FADH 14 | | | | | | ■ | | | | |
| FHDK 07 | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| FHDK 04 | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| FHDK 10 | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| **Fork / angle light barriers** | | | | | | | | | | |
| OGUM | | | | ■ | ■ | ■ | | | | |
| FGUM | | | | ■ | ■ | ■ | | | | |
| **Optical sensors with laser line** | | | | | | | | | | |
| O300.SL | | | | ■ | | | | | | |
| O300.SP | | | | ■ | | | | | | |
| O300.GL | | | | ■ | | | | | | |
| O300.GP | | | | ■ | | | | | | |
| O300.GR | | | | ■ | | | | | | |

[1] see PF20S, p. 77 [2] see PBMH, p. 76 [3] see *CombiLyz*®, p. 80 [4] see LSP, p. 78 and LBFH, p. 79 and CFAK, p. 70 and CFAM, p. 71 [5] see *VeriSens*®, p. 82

| Capper monitoring | | | | | Outfeed station monitoring | Quality control in production | | | | | Drive technology synchronization | | Format adjustment | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cap level monitoring in the bin | Trigger sensor in wet and cleaning zone for vision sensor / camera | Quality control of screw caps with seal [5] | Cap infeed buffer full | Preparing caps for takeup | Container exiting filling machine | Level monitoring in packaging | Trigger sensor for vision sensor / camera | Speed-independent triggering [6] | Quality control of filled containers [7] | Live image quality assurance [7] | Buffer table and infeed conveyor synchronization [8] | Master rotary filler axis [9] | Automatic adjustment of filler head referred to container height [10] | Manual adjustment of container guides [11] |
| | | | | | | | | | | | | | | |
| | ■ | | ■ | | ■ | | ■ | | | | | | | |
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[6] see EIL580P, p. 84 [7] see *VeriSens*®, p. 82 [8] see EIL580P, p. 84 [9] see EAL580, p. 87 [10] see MSIA 68, p. 94 [11] see N150, p. 94

# Light barriers and light sensors

## Subminiature and miniature sensors

Unique reliable object detection and positioning with optical sensors

- Smart & Small – top performance in smallest designs
- Find the optimum solution quickly through large portfolio
- Easy to set up with clever teach-in function
- Laser sensors for detection tasks in the 0.01 mm range
- Extended functions and setting options via IO-Link

IO-Link

| x = function principle<br>y = light source | FHDK 04 | FxDK 07<br>FxCK 07 | FxDK 10<br>OxDK 10 (Laser) | O200.xy |
|---|---|---|---|---|
| **features** | ■ Mounting in rails<br>■ Fix sensing distance | ■ World's smallest adjustable sensor family | ■ Different beam cones optimized for the application | ■ V-optics and high-power mode for transparent / glossy objects |
| dimensions (B × H × T) | 4 × 44.8 × 6.2 mm | 8 × 16.2 × 10.8 mm | 10.4 × 27 × 14 mm | 8 × 21 × 14,1 mm |
| **function principle (x) / ranges** | | | | |
| diffuse sensors with background suppression | **30 mm / 50 mm**<br>(FHDK 14) | **10 ... 60 mm**<br>(FHDK 07 / FHCK 07) | **10 ... 130 mm**<br>(FHDK 10 / OHDK 10) | **8 ... 120 mm**<br>(O200.Gy) |
| diffuse sensor with background suppression | | **20 ... 150 mm**<br>(FZDK 07 / FZCK 07) | **3 ... 200 mm**<br>(FZDK 10 / OZDK 10) | |
| *SmartReflect*® light barriers without reflector | | **17 ... 45 mm**<br>(FNCK 07) | | **25 ... 180 mm**<br>(O200.SP) |
| *SmartReflect*® transparent | | | | |
| retro-reflective sensors | | **800 mm**<br>(FPDK 07 / FPCK 07) | **4 m**<br>(FPDK 10) | **4 m**<br>(O200.Ry) |
| transparent detection without reflector | | | | |
| through beam sensors | | **2.5 m**<br>(FSDK 07 / FSCK 07)<br>(FEDK 07 / FECK 07) | **10 m**<br>(FSDK 10 / FEDK 10)<br>(OSDK 10 / OEDK 10) | **6 m**<br>(O200.TR / O200.ER) |
| **light source (y)** | | | | |
| standard LED (R) | ■ | ■ | ■ | ■ |
| pinPoint LED (P) | | | | ■ |
| infrarot (I) | | | | |
| laser (L) | | | ■ | |
| response time | < 0.5 ms | < 0.5 ms | < 0.5 ms<br>< 0.05 ms (laser) | < 0,25 ms |
| output | push-pull | PNP<br>NPN | push-pull<br>PNP<br>NPN | push-pull<br>PNP<br>NPN |
| connection types | cable 2 m<br>flylead connector M8 | cable 2 m<br>flylead connector M8 | cable 2 m<br>connector M8<br>flylead connector M8 | cable 2 m<br>flylead connector M8 |
| housing material | plastic | plastic | plastic | plastic |
| operating temperature | –10 ... +50 °C | –20 ... +50 °C | –25 ... +65 °C<br>–10 ... +50 °C (laser) | –25 ... +50 °C |
| protection class | IP 65 | IP 65 | IP 65 / IP 67 | IP 67 |

# Standard sensors – rectangular and cylindrical

Unique reliable object detection and positioning with optical sensors

- Find the optimum solution quickly through large portfolio
- Easy to set up with clever teach-in function
- Laser sensors for detection tasks in the 0.01 mm range

Learn more:
www.baumer.com/opto


| x = function principle<br>y = light source | FxDK 14<br>OxDK 14 (laser) | FxDM 16<br>OxDM 16 (laser) | OR18.xy | FxAM 18 |
|---|---|---|---|---|
| **features** | ■ Sensors for transparent objects | ■ Laser sensors for wafer detection | ■ Setting via potentiometer, teach-in or *qTeach* | ■ Compatible with glass fibre optics |
| dimensions (B × H × T) | 14.8 × 43 × 31 mm | 15.4 × 50 × 50 mm | M18 | M18 |
| **function principle (x) / ranges** | | | | |
| diffuse sensors with background suppression | **20 ... 500 mm**<br>(FHDK 14 / OHDK 14) | **20 ... 600 mm**<br>(FHDM 16 / OHDM 16) | **40 ... 200 mm**<br>(OR18.Gy) | |
| diffuse sensors with intensity difference | **5 ... 600 mm**<br>(FZDK 14 / OZDK 14) | **0 ... 400 mm**<br>(FZDM 16 / OZDM 16) | **0 ... 800 mm**<br>(OR18.ZI) | **60 ... 430 mm**<br>(FZAM 18) |
| *SmartReflect*® light barriers without reflector | **50 ... 800 mm**<br>(FNDK 14) | | **55 ... 300 mm**<br>(OR18.SP) | |
| *SmartReflect*® transparent | | | | |
| retro-reflective sensors | **11 m**<br>(FRDK / FPDK / OPDK 14) | **12 m**<br>(FPDM 16 / OPDM 16) | **16 m**<br>(OR18.RR) | **4 m**<br>(FPAM 18) |
| transparent detection without reflector | | | **800 mm**<br>(OR18.RR.T) | |
| through beam sensors | **15 m**<br>(FSDK 14 / FEDK 14)<br>(OSDK 14 / OEDK 14) | | **60 m**<br>(OR18.TI / OR18.EI) | |
| **light source (y)** | | | | |
| standard LED (R) | ■ | ■ | ■ | ■ |
| pinPoint LED (P) | | | ■ | |
| infrarot (I) | | | ■ | ■ |
| laser (L) | ■ | ■ | ■ | |
| response time | < 0.5 ms<br>< 0.25 ms (laser) | < 1 ms<br>< 0.05 ms (laser) | < 0.5 ms<br>< 0.1 ms (laser) | < 1 ms |
| output | push-pull<br>PNP<br>NPN | PNP<br>NPN<br>4 ... 20 mA | PNP<br>NPN | PNP<br>NPN |
| connection types | cable 2 m<br>connector M8<br>flylead connector M12 | cable 2 m<br>connector M12 | cable 2 m<br>connector M12<br>flylead connector M12 | cable 2 m<br>connector M12 |
| housing material | plastic | die-cast zinc | plastic<br>brass nickel plated | brass nickel plated |
| operating temperature | –25 ... +65 °C<br>–10 ... +50 °C (laser) | –25 ... +65 °C<br>–10 ... +50 °C (laser) | –25 ... +55 °C<br>–10 ... +55 °C (laser) | –25 ... +55 °C |
| protection class | IP 67 | IP 67 | IP 67 | IP 67 |

# Light barriers and light sensors

## Standard with extra power – O300/O500

Unique portfolio with extra performance for your application

- Enhanced processor performance for reliable detection
- 2500 variants with seven sensor principles and four light sources
- Easy implementation and operation
- IO-Link – Industry 4.0 and IIoT-ready

IO-Link

IO-Link

IO-Link

| O300.xy<br>x = function principle<br>y = light source | O300.xy | O300W.xy | O300H.xy |
|---|---|---|---|
| **features** | ■ Setting via wear-free *qTeach*® or IO-Link | ■ Setting via wear-free *qTeach*® or IO-Link | ■ Setting via wear-free magnetic *qTeach*® or IO-Link |
| dimensions (B × H × T) | 12.9 × 32.3 × 23 mm | 16.5 × 34.7 × 28.2 mm | 16.5 × 34.6 × 28.7 mm |
| **function principle (x) / ranges** | | | |
| diffuse sensors background suppression (G) | **30 ... 300 mm** (O300.Gy) | **30 ... 250 mm** (O300W.Gy) | **30 ... 250 mm** (O300H.Gy) |
| diffuse sensors with intensity difference (Z) | **10 ... 400 mm** (O300.Zy) | | |
| *SmartReflect*® light barriers without a reflector (S) | **30 ... 300 mm** (O300.Sy) | **30 ... 300 mm** (O300W.Sy) | **30 ... 300 mm** (O300H.Sy) |
| *SmartReflect*® transparent (Sy.T) | **30 ... 300 mm** (O300.SP.T) | **30 ... 300 mm** (O300W.SP.T) | **30 ... 300 mm** (O300H.SP.T) |
| diffuse sensors (R) | **6 m** (O300.Ry) | **6 m** (O300W.Ry) | **6 m** (O300H.Ry) |
| retro-reflective sensors (Ry. T) | **4 m** (O300.RP.T) | **4 m** (O300W.RP.T) | **4 m** (O300H.Ry.T) |
| through beam sensors (T / E) | **15 m** (O300.Ty / O300.Ey) | **15 m** (O300W.Ty / O300W.Ey) | **15 m** (O300H.Ty / O300H.Ey) |
| **light source (y)** | | | |
| standard LED (R) | ■ | ■ | ■ |
| pinPoint LED (P) | ■ | ■ | ■ |
| infrarot (I) | ■ | | |
| laser (L) | ■ | ■ | ■ |
| response time | < 0.25 ms<br>< 0.1 ms (laser) | < 0.25 ms<br>< 0.1 ms (laser) | < 0.25 ms<br>< 0.1 ms (laser) |
| output | push-pull<br>PNP<br>NPN | push-pull | push-pull |
| connection types | cable 2 m<br>connector M8<br>flylead connector M8 | connector M8 | connector 2 m<br>flylead connector M8 |
| housing material | plastic | stainless steel, Ecolab-certified, FDA-compliant | stainless steel, Ecolab-certified, EHEDG-compliant, FDA-compliant |
| operating temperature | –25 ... +60 °C<br>–10 ... +60 °C (laser) | –25 ... +60 °C<br>–10 ... +60 °C (laser) | –25 ... +60 °C<br>–10 ... +60 °C (laser) |
| protection class | IP 67 | IP 68 / IP 69K<br>*proTect+* | IP 68 / IP 69K<br>*proTect+* |

Learn more:
www.baumer.com/opto




| O500.xy<br>x = function principle<br>y = light source | O500.xy | O500W.xy | O500H.xy |
|---|---|---|---|
| **features** | ■ Setting via wear-free *qTeach*®<br>or IO-Link | ■ Setting via wear-free *qTeach*®<br>or IO-Link | ■ Setting via wear-free magnetic<br>*qTeach*® or IO-Link |
| dimensions (B × H × T) | 18 × 45 × 32 mm | 20.2 × 47.2 × 37.2 mm | 20.2 × 47.7 × 36.4 mm |
| **function principle (x) / ranges** | | | |
| diffuse sensors<br>background suppression (G) | **60 ... 550 mm**<br>(O500.Gy) | **60 ... 400 mm**<br>(O500W.Gy) | **60 ... 400 mm**<br>(O500H.Gy) |
| diffuse sensors with intensity difference (Z) | **20 ... 600 mm**<br>(O500.Zy) | | |
| *SmartReflect*® light barriers without a reflector (S) | **60 ... 600 mm**<br>(O500.SP) | **60 ... 600 mm**<br>(O500W.SP) | **60 ... 600 mm**<br>(O500H.SP) |
| *SmartReflect*® transparent (Sy.T) | **60 ... 1000 mm**<br>(O500.SP.T) | **60 ... 1000 mm**<br>(O500W.SP.T) | **60 ... 1000 mm**<br>(O500H.SP.T) |
| diffuse sensors (R) | **8 m**<br>(O500.Ry) | **8 m**<br>(O500W.Ry) | **8 m**<br>(O500H.Ry) |
| retro-reflective sensors (Ry. T) | **6 m**<br>(O500.RP.T) | **6 m**<br>(O500W.RP.T) | **6 m**<br>(O500H.RP.T) |
| through beam sensors (T / E) | **40 m**<br>(O500.TR / O500.ER) | **40 m**<br>(O500W.TR / O500W.ER) | **40 m**<br>(O500H.TR / O500H.ER) |
| **light source (y)** | | | |
| standard LED (R) | ■ | ■ | ■ |
| pinPoint LED (P) | ■ | ■ | ■ |
| infrarot (I) | ■ | | |
| laser (L) | | | |
| response time | < 0.25 ms | < 0.25 ms | < 0.25 ms |
| output | push-pull<br>PNP<br>NPN | push-pull | push-pull |
| connection types | cable 2 m<br>connector M12 | connector M12 | cable 2 m<br>connector M12 |
| housing material | plastic | stainless steel, Ecolab-certified, FDA-compliant | stainless steel, Ecolab-certified, EHEDG-compliant, FDA-compliant |
| operating temperature | –25 ... +60 °C | –25 ... +60 °C | –25 ... +60 °C |
| protection class | IP 67 | IP 68 / IP 69K<br>*proTect+* | IP 68 / IP 69K<br>*proTect+* |

# Light barriers and light sensors

## Washdown design

- Robust stainless steel housing
- Long-term sealing thanks to *proTect+*
- IP 69K and Ecolab tested
- Different sizes and sensor principles
- Benefits by *SmartReflect*® light barrier without reflector

| x = function principle<br>y = light source | IO-Link<br>FxDR 14 | IO-Link<br>O300W.xy | IO-Link<br>O500W.xy | IO-Link<br>OR18W.xy |
|---|---|---|---|---|
| dimensions (B × H × T) | 19.6 × 62.4 × 34.3 mm | 16.5 × 34.7 × 28.2 mm | 20.2 × 47.2 × 37.7 mm | M18 |
| **function principle (x) / ranges** | | | | |
| diffuse sensors with background suppression | **50 ... 400 mm**<br>(FHDR 14) | **30 ... 250 mm**<br>(O300W.GP / O300W.GL) | **60 ... 400 mm**<br>(O500W.GP) | **40 ... 120 mm**<br>(OR18W.GR) |
| diffuse sensors with intensity difference | | | | **0 ... 800 mm**<br>(OR18W.ZI) |
| *SmartReflect*® light barriers without reflector | **50 ... 800 mm**<br>(FNDR 14) | **30 ... 300 mm**<br>(O300W.SP / O300W.SL) | **60 ... 600 mm**<br>(O500W.SP) | |
| *SmartReflect*® transparent | **200 ... 800 mm**<br>(FNDR 14) | **30 ... 300 mm**<br>(O300W.SP.T) | **60 ... 1000 mm**<br>(O500W.SP.T) | |
| retro-reflective sensors | **3 m**<br>(FPDR 14) | **6 m**<br>(O300W.RP / O300W.RL) | **8 m**<br>(O500W.RP) | **4.5 m**<br>(OR18W.RR) |
| transparent detection without reflector | | **4 m**<br>(O300W.RP.T) | **6 m**<br>(O500W.RP.T) | **800 mm**<br>(OR18W.RR.T) |
| through beam sensors | | **15 m**<br>(O300W.TR / .TL)<br>(O300W.ER / .EL) | **40 m**<br>(O500W.TR / .TL)<br>(O500W.ER / .EL) | **20 m**<br>(OR18W.TI)<br>(OR18W.EI) |
| contrast sensor | **12.5 mm ± 2 mm**<br>(FKDR 14) | | | |
| **light source (y)** | | | | |
| standard LED (R) | ■ | ■ | ■ | ■ |
| pinPoint LED (P) | ■ | ■ | ■ | |
| infrarot (I) | | | | ■ |
| laser (L) | | ■ | | |
| response time | < 1 ms<br>< 0.05 ms (contrast) | < 0.25 ms<br>< 0.1 ms (laser) | < 0.25 ms | < 1 ms |
| output | push-pull | push-pull | push-pull | PNP<br>NPN |
| connection types | connector M12 | connector M8 | connector M12 | connector M12 |
| housing material | stainless steel, Ecolab-certified, FDA-compliant | stainless steel, Ecolab-certified, FDA-compliant | stainless steel, Ecolab-certified, FDA-compliant | stainless steel, Ecolab-certified, FDA-compliant |
| operating temperature | –25 ... +60 °C | –25 ... +60 °C | –25 ... +60 °C | –25 ... +55 °C |
| protection class | IP 68 / IP 69K<br>*proTect+* | IP 68 / IP 69K<br>*proTect+* | IP 68 / IP 69K<br>*proTect+* | IP 67 / IP 69K |

## Hygiene Design

- EHEDG certified, FDA-compliant, Ecolab tested
- Long-term sealing thanks to *proTect+*
- Different sizes and sensor principles
- Benefits through *SmartReflect*® light barrier without reflector

Learn more:
www.baumer.com/opto

IO-Link

IO-Link

IO-Link

| x = function principle<br>y = light source | FxDH 14 | O300H.xy | O500H.xy |
|---|---|---|---|
| dimensions (B × H × T) | 19.6 × 52.2 × 34.3 mm | 16.5 × 34.6 × 28.7 mm | 20.2 × 47.7 × 36.4 mm |
| **function principle (x) / ranges** | | | |
| diffuse sensors with background suppression | **50 ... 400 mm**<br>(FHDH 14) | **30 ... 250 mm**<br>(O300H.Gy) | **60 ... 400 mm**<br>(O500H.Gy) |
| diffuse sensors with intensity difference | | | |
| *SmartReflect*® light barriers without reflector | **50 ... 800 mm**<br>(FNDH 14) | **30 ... 300 mm**<br>(O300H.Sy) | **60 ... 600 mm**<br>(O500H.Sy) |
| *SmartReflect*® transparent | **200 ... 800 mm**<br>(FNDH 14) | **30 ... 300 mm**<br>(O300H.SPT) | **60 ... 1000 mm**<br>(O500H.SPT) |
| retro-reflective sensors | **3.5 m**<br>(FPDH 14) | **6 m**<br>(O300H.Ry) | **8 m**<br>(O500H.Ry) |
| transparent detection without reflector | | **4 m**<br>(O300H.RPT) | **6 m**<br>(O500H.RPT) |
| through beam sensors | | **15 m**<br>(O300H.Ty)<br>(O300H.Ey) | **40 m**<br>(O500H.Ty)<br>(O500H.Ey) |
| contrast sensor | **12.5 m ± 2 mm**<br>(FKDH 14) | | |
| **light source (y)** | | | |
| standard LED (R) | ■ | ■ | ■ |
| pinPoint LED (P) | ■ | ■ | ■ |
| infrarot (I) | | | |
| laser (L) | | ■ | |
| response time | < 1 ms<br>< 0.05 ms (contrast) | < 0.25 ms<br>< 0.1 ms (laser) | < 0.25 ms |
| output | push-pull | push-pull | push-pull |
| connection types | connector 2 m<br>flylead connector M12 | connector 2 m<br>flylead connector M8 | connector 2 m<br>flylead connector M12 |
| housing material | stainless steel, Ecolab-certified, EHEDG-compliant, FDA-compliant | stainless steel, Ecolab-certified, EHEDG-compliant, FDA-compliant | stainless steel, Ecolab-certified, EHEDG-compliant, FDA-compliant |
| operating temperature | –30 ... +60 °C | –25 ... +60 °C<br>–10 ... +60 °C (Laser) | –25 ... +60 °C |
| protection class | IP 68 / IP 69K<br>*proTect+* | IP 68 / IP 69K<br>*proTect+* | IP 68 / IP 69K<br>*proTect+* |

# Light barriers and light sensors

## Laser sensors

Precise control of fast processes and detection of very small objects

- Very precise object positioning to within 0.01 mm
- Detection of very small objects thanks to focused 0.1 mm laser spot
- Detection of fast objects thanks to short response times of < 0.1 ms
- The right shapes, sizes and sensor principles for your application

Learn more:
www.baumer.com/laser

IO-Link

IO-Link

IO-Link

| x = function principle | OxDK 14 | O300.xL | O300W.xL | O300H.xL |
|---|---|---|---|---|
| **features** | ■ Mechanical sensing distance adjustment | ■ Setting via wear-free magnetic *qTeach*® or IO-Link | ■ Setting via wear-free *qTeach*® or IO-Link | ■ Setting via wear-free magnetic *qTeach*® or IO-Link |
| dimensions (B × H × T) | 14.8 × 43 × 31 mm | 12.9 × 32.3 × 23 mm | 16.5 × 34.7 × 28.2 mm | 16.5 × 34.6 × 28.7 mm |
| **function principle (x) / ranges** | | | | |
| diffuse sensors background suppression | **20 ... 350 mm** (OHDK 14) | **30 ... 300 mm** (O300.GL) | **30 ... 250 mm** (O300W.GL) | **30 ... 250 mm** (O300H.GL) |
| diffuse sensors with intensity difference | | **10 ... 400 mm** (O300.ZL) | | |
| *SmartReflect*® light barriers without a reflector | | **30 ... 300 mm** (O300.SL) | **30 ... 300 mm** (O300W.SL) | **30 ... 300 mm** (O300H.SL) |
| retro-reflective sensors | **11 m** (OPDK 14) | **6 m** (O300.RL) | **6 m** (O300W.RL) | **6 m** (O300H.RL) |
| retro-reflective sensors for transparent detection | **5.2 m** (OPDK 14) | | | |
| through beam sensors | | **75 m** (O300.TL / O300.EL) | **75 m** (O300W.TL / O300W.EL) | **75 m** (O300H.TL / O300H.EL) |
| differential sensors | | | | |
| laser class | 2 | 1 | 1 | 1 |
| response time up | < 0.15 ms | < 0.1 ms | < 0.1 ms | < 0.1 ms |
| output | PNP<br>NPN | PNP<br>NPN<br>push-pull | push-pull | push-pull |
| housing material | plastic | plastic | stainless steel | stainless steel |
| operating temperature | –10 ... +50 °C | –25 ... +60 °C | –25 ... +60 °C | –25 ... +60 °C |
| protection class | IP 67 | IP 67<br>IP 68 / IP 69K<br>*proTect+* | IP 67<br>IP 68 / IP 69K<br>*proTect+* | IP 67<br>IP 68 / IP 69K<br>*proTect+* |

## Fork and angle sensors

- Quick response times up to 0.125 ms
- High repeat accuracy
- Robust metal housing
- Narrow parallel light beam
- Smallest detectable object 0.05 mm
- Different gap widths 20 ... 158 mm
- Output PNP/NPN

Learn more:
www.baumer.com/fork-angle




| | FGUM<br>with | OGUM<br>basic | OGUM | FGLM |
|---|---|---|---|---|
| category | Pulsed red LED<br>Fork sensors | Laser<br>Fork sensors | Laser<br>Fork sensors | Angle sensors<br>L profile |
| features | ■ Potentiometer or Teach-in version<br>■ Narrow, virtually parallel light beam<br>■ Sensors can be mounted side-by-side | ■ High resolution<br>■ Short response time<br>■ Sensors can be mounted side-by-side | ■ Very high resolution<br>■ Extremely narrow laser light beam<br>■ Sensors can be mounted side-by-side<br>■ High repeat accuracy | ■ Special L-type<br>■ Narrow, virtually parallel light beam<br>■ Sensors can be mounted side-by-side |
| type | U profile | U profile | U profile | L profile |
| fork widths | 20 mm<br>30 mm<br>50 mm<br>80 mm<br>120 mm<br>170 mm | 30 mm<br>50 mm<br>80 mm<br>120 mm | 30 mm<br>50 mm<br>80 mm<br>120 mm | 60 mm<br>100 mm<br>158 mm |
| object size | > 0.4 mm | > 0.1 mm | > 0.05 mm | > 0.5 mm |
| repeat accuracy | < 0.02 mm | < 0.02 mm | < 0.01 mm | < 0.06 mm |
| response / release time | < 0.125 ms | < 0.166 ms | < 0.166 ms | < 0.125 ms |
| connection types | connector M8 | connector M12 | connector M8 | connector M8 |
| housing material | die-cast zinc | aluminum | aluminum | die-cast zinc |
| operating temperature | –10 ... +60 °C | +5 ... +45 °C | +5 ... +45 °C | –10 ... +60 °C |
| protection class | IP 67 | IP 67 | IP 67 | IP 67 |
| specific features | | ■ laser class 1 | ■ laser class 1 | |

## Optical sensors with analogue output

- Resolution up to 0.1 mm
- Measuring range up to 1000 mm
- Red LED or laser class 1
- Washdown and hygienic design
- IO-Link

IO-Link

| | FADK 14<br>LED distance sensor |
|---|---|
| category | |
| features | ■ Compact housing<br>■ Measuring distance 50 ... 400 mm<br>■ Resolution up to 0.1 mm |
| dimensions | 14.8 × 43 × 31 mm |
| measuring distance | 50 ... 400 mm |
| resolution | 0,1 ... 1 mm |
| response time | < 3 ms |
| output signal | 4 ... 20 mA<br>0 ... 10 V |
| connection types | cable 2 m<br>connector M12 |
| housing material | plastic (ASA, MABS) |
| operating temperature | 0 ... +50 °C |
| protection class | IP 67 |
| specific features | ■ cost-effective solution for simpler measuring tasks |

# Robust stainless steel distance sensors

Sensors in Hygiene and Washdown design

- Stainless steel housing V4A
- *proTect+*® sealing concept
- Ecolab-tested and -certified
- EHEDG-compliant
- FDA-compliant materials

Learn more:
www.baumer.com/opto-distance

IO-Link

IO-Link

| | FADR 14 | FADH 14 | OADR 20 |
|---|---|---|---|
| features | ■ Washdown design<br>■ Adjustable measuring range<br>■ Point source LED | ■ Hygienic design<br>■ Adjustable measuring range<br>■ Point source LED | ■ Washdown design<br>■ Adjustable measuring range<br>■ Laser beam<br>■ Laser point / Laser line |
| dimensions | 19.6 × 62.4 × 33.8 mm | 19.6 × 99.5 × 33.6 mm | 20.3 × 65 × 50 mm |
| measuring distance | 50 ... 400 mm | 50 ... 400 mm | 30 ... 600 mm |
| resolution | 0.1 mm | 0.1 mm | 5 µm |
| response time | < 3 ms | < 3 ms | < 0.9 ms |
| output signal | 4 ... 20 mA<br>0 ... 10 V | 4 ... 20 mA<br>0 ... 10 V | 4 ... 20 mA<br>0 ... 10 V |
| connection types | connector M12 | cable 2 m<br>flylead connector M12 | connector M12 |
| housing material | stainless steel 1.4404 (V4A) | stainless steel 1.4404 (V4A) | stainless steel 1.4404 (V4A) |
| operating temperature | 0 ... +50 °C | 0 ... +50 °C | 0 ... +50 °C |
| protection class | IP 68 / IP 69K &<br>*proTect+* | IP 68 / IP 69K &<br>*proTect+* | IP 68 / IP 69K &<br>*proTect+* |
| specific features | ■ alarm output to signalize any incorrect measuring operation or out-of-range object<br>■ service status indicator when soiled | ■ alarm output to signalize any incorrect measuring operation or out-of-range object<br>■ service status indicator when soiled | ■ alarm output to signalize any incorrect measuring operation or out-of-range object<br>■ input for synchronizing measurements<br>■ laser diode can be switched on/off |

# Machine modules – ultrasonic sensors

| Product name | Buffer station/buffer table monitoring | | | Infeed system monitoring | | | Food safety: Disinfection in rinsing process | Process monitoring in machine tank | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Buffer table full, filling no longer possible | Buffer table ready for filling | Buffer table emptying | Container position monitoring | Monitoring container transfer to screw conveyor | Monitoring container transfer from screw conveyor to capper | Disinfection in rinsing process [1] | Monitoring pressure in machine tank [2] | Soiling monitoring [3] | Level monitoring in machine tank [4] |
| **Ultrasonic sensors** | | | | | | | | | | |
| UNDK 09 | | | | | | | | | | |
| UNCK 09 | | | | | | | | | | |
| UNAM 12 | | | | | | | | | | |
| UNAR 12 | | | | | | ■ | | | | |
| UNAR 18 | ■ | ■ | ■ | | | | | | | ■ |
| URAR 18 | | | | ■ | ■ | ■ | | | | |
| U500.DA0 | ■ | ■ | ■ | | | | | | | ■ |
| U500.PA0 | ■ | ■ | ■ | | | | | | | |
| U500.RA0 | ■ | ■ | ■ | | | | | | | |
| U500.EA0 | ■ | ■ | ■ | | | | | | | |
| U500.TA0 | ■ | ■ | ■ | | | | | | | |
| UR18.DA0 | ■ | ■ | ■ | | | | | | | ■ |
| UR18.PA0 | ■ | ■ | ■ | | | | | | | |
| UR18.RA0 | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| UNDK 30 | ■ | ■ | ■ | | | | | | | |
| UZDK 30 | ■ | ■ | ■ | | | | | | | |

[1] see PF20S, p. 77 [2] see PBMH, p. 76 [3] see *CombiLyz*®, p. 80 [4] see LSP, p. 78 and LBFH, p. 79 and CFAK, p. 70 and CFAM, p. 71 [5] see *VeriSens*®, p. 82

| Capper monitoring | | | | | Outfeed station monitoring | Quality control in production | | | | | Drive technology synchronization | | Format adjustment | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cap level monitoring in the bin | Trigger sensor in wet and cleaning zone for vision sensor / camera | Quality control of screw caps with seal [5] | Cap infeed buffer full | Preparing caps for takeup | Container exiting filling machine | Level monitoring in packaging | Trigger sensor for vision sensor / camera | Speed-independent triggering [6] | Quality control of filled containers [7] | Live image quality assurance [7] | Buffer table and infeed conveyor synchronization [8] | Master rotary filler axis [9] | Automatic adjustment of filler head referred to container height [10] | Manual adjustment of container guides [11] |
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[6] see EIL580P, p. 84 [7] see *VeriSens*®, p. 82 [8] see EIL580P, p. 84 [9] see EAL580, p. 87 [10] see MSIA 68, p. 94 [11] see N150, p. 94

# Ultrasonic sensors

## Rectangular standard sensors

Undisturbed by difficult environmental conditions and varying object properties

- Sensing distances up to 2000 mm
- Reliable detection of high-reflective and transparent objects
- Tolerant of dust and dirt
- Versions with two separate switching outputs
- Adjustable response times ton/toff for throughbeam barriers

| | UNCK / UNDK 09<br>URCK / URDK 09 | UNDK 10 / URDK 10 | UNDK 20<br>URDK 20<br>UEDK 20 |
|---|---|---|---|
| **features** | ■ High resolution<br>■ Minimal blind region<br>■ RS 232<br>■ Various mounting options<br>■ Flat housing<br>■ Narrow sonic beam angle for detection in openings of up to 3 mm | ■ Smallest ultrasonic sensor<br>■ Internal and external Teach-in<br>■ Very low weight: 4 g<br>■ Narrow sonic beam angle<br>■ Cable and flylead connector versions | ■ Flat type<br>■ Internal and external Teach-in<br>■ Narrow and wide sonic beam angles<br>■ M8 connector |
| dimensions | 8.6 × 82 × 24.5 mm | 10.4 × 27 × 14 mm | 20 × 42 × 15 mm |
| **sensing range Sd / sensor principle** | | | |
| proximity switch (UNxx / xx.PAO) | 3 ... 200 mm | 10 ... 200 mm | 10 ... 1000 mm |
| 2 point proximity switch (UZxx) | | | |
| retro-reflective sensors (URxx / xx.RAO) | 0 ... 200 mm | 0 ... 200 mm | 0 ... 1000 mm |
| through beam sensors (UExx) | | | 0 ... 1000 mm |
| response time | < 0.5 mm | < 0.5 mm | < 0.5 mm |
| output | push-pull<br>RS 232 | NPN<br>PNP | NPN<br>PNP |
| connection types | cable 2 m<br>connector M8 | cable 2 m<br>connector M8<br>flylead connector M8 | connector M8 |
| housing material | plastic | plastic | plastic |
| operating temperature | 0 ... +60 °C | –10 ... +60 °C | –10 ... +60 °C |
| protection class | IP 67 | IP 67 | IP 67 |

UNxx / xx.PAO = proximity switch
URxx / xx.RAO = retro-reflective sensors
UZxx = 2 point proximity switch
UExx = through beam sensors

Learn more:
www.baumer.com/ultrasonic

IO-Link

| UNDK 30 / URDK 30<br>UZDK 30 / UEDK 30 | U500.PA0 / U500.RA0 |
|---|---|
| ■ Compact type<br>■ Large sensing range<br>■ Teach-in on the sensor<br>■ Potentiometer version<br>■ Narrow and wide sonic beam angles | ■ IO-Link<br>■ Robust sensing element<br>■ 2 switching outputs (dual channel) |
| 30 × 65 × 31 mm | 18 × 45.1 × 32.2 mm |
| 30 ... 1000 mm | 70 ... 1000 mm |
| 30 ... 2000 mm | 70 ... 1000 mm |
| 0 ... 2000 mm | 0 ... 1000 mm |
| 0 ... 700 mm | 0 ... 2000 mm |
| < 0.5 mm | < 0.5 mm |
| NPN<br>PNP | push-pull<br>2 × push-pull |
| cable 2 m<br>connector M12 | connector M12 |
| plastic / die-cast zinc | plastic |
| –10 ... +60 °C | –25 ... +65 °C |
| IP 67 | IP 67 |

# Ultrasonic sensors

## Application-specific ultrasonic sensors – high-speed / robust

- High-speed sensors
- Robust stainless steel sensors

| | UNAM 12<br>High-speed | URAM 12<br>High-speed | UxAR 12 mit<br>Parylene coating | UNAR 18<br>URAR 18 |
|---|---|---|---|---|
| **category** | **High-speed sensors** | | **Robust stainless steel sensors, high chemical resistance** | |
| **features** | ■ Fastest ultrasonic sensor<br>■ External Teach-in | ■ Fastest ultrasonic sensor<br>■ External Teach-in<br>■ Sensors with sonic nozzle for small openings | ■ Miniature sensor for narrow designs<br>■ Patented all-round protection<br>■ FDA-compliant materials<br>■ Very short response time | ■ M18 standard housing<br>■ FDA-compliant materials<br>■ Internal and external Teach-in |
| dimensions | M12 | M12 | M12 | M18 |
| **sensing range Sd / sensor principle** | | | | |
| proximity switch (UNxx / xx.PAO) | 0 ... 40 mm<br>10 ... 70 mm | | 30 ... 200 mm | 60 ... 1000 mm |
| 2 point proximity switch (UZxx) | | | | |
| retro-reflective sensors (URxx / xx.RAO) | | 0 ... 40 mm<br>0 ... 70 mm | 0 ... 200 mm | 0 ... 400 mm |
| repeat accuracy | < 0.5 mm | < 1.5 mm | < 0.5 mm | < 0.5 mm |
| output | NPN<br>PNP | NPN<br>PNP | NPN<br>PNP | NPN<br>PNP |
| connection types | connector M12 | connector M12 | connector M12 | connector M12 |
| housing material | brass nickel plated | brass nickel plated | stainless steel | brass nickel plated<br>stainless steel |
| operating temperature | –10 ... +60 °C | –10 ... +60 °C | 0 ... +60 °C | –10 ... +60 °C |
| protection class | IP 67 | IP 67 | IP 67 | IP 67 |

UNxx / xx.PAO = proximity switch
URxx / xx.RAO = retro-reflective sensors
UZxx = 2 point proximity switch
UExx = through beam sensors

# Application-specific ultrasonic sensors – sonic nozzles / sensing distances

- Sensors with sonic nozzles
- Sensors with large sensing distances

Learn more:
www.baumer.com/ultrasonic

| | UNDK 09 | UNAM / URAM 12 |
|---|---|---|
| **category** | **with sonic nozzles** | |
| **features** | ■ High resolution<br>■ Minimal blind region<br>■ RS 232<br>■ Various mounting options<br>■ Flat housing<br>■ Narrow sonic beam angle for detection in openings of up to 3 mm | ■ Sonic nozzle for very narrow sonic beams<br>■ External Teach-in<br>■ Connector M12 |
| dimensions | 8.6 × 82 × 24.5 mm | M12 |
| **sensing range Sd / sensor principle** | | |
| proximity switch (UNxx / xx.PAO) | 3 ... 200 mm | 5 ... 400 mm |
| 2 point proximity switch (UZxx) | | |
| retro-reflective sensors (URxx / xx.RAO) | 0 ... 200 mm | 0 ... 70 mm |
| response time | < 0.5 mm | < 0.5 mm |
| output | push-pull<br>RS 232 | NPN<br>PNP |
| connection types | cable 2 m<br>flylead connector M8 | connector M12 |
| housing material | plastic | brass nickel plated |
| operating temperature | 0 ... +60 °C | –10 ... +60 °C |
| protection class | IP 67 | IP 67 |

# Ultrasonic sensors

## Precise ultrasonic distance sensors – cylindrical

Accurate distance measurement regardless of material, surface, color or transparency

- Small and light miniature sensors, e.g. for robotics
- Measurements in very small containers or openings
- Large measuring ranges up to 6000 mm
- Sturdy sensors also for demanding environments

| | UNAM 12<br>UNAR 12 | UNAM 12<br>with sonic nozzles | UNAM 18<br>UNAR 18 |
|---|---|---|---|
| **category** | miniature | miniature | standard |
| features | ■ Narrow and wide sonic beam angles<br>■ External Teach-in<br>■ M12 connector | ■ External Teach-in<br>■ M12 connector<br>■ Beam columnator for very narrow sonic cone profile | ■ Stainless steel housing V4A<br>■ Chemically resistant sensor front<br>■ FDA-compliant materials<br>■ Internal and external Teach-in<br>■ M12 connector |
| dimensions | M12 | M12 | M18 |
| measuring distance | 20 ... 400 mm | 2 ... 82 mm | 60 ... 1000 mm |
| response time | < 10 ms | < 1.3 ms | < 50 ms |
| resolution | < 0.5 mm | < 0.3 mm | < 0.3 mm |
| repeat accuracy | < 0.5 mm | < 0.5 mm | < 0.5 mm |
| output | 0 ... 10 mA / 10 ... 0 mA<br>0 ... 10 V / 10 ... 0 V | 0 ... 10 mA / 10 ... 0 mA<br>0 ... 10 V / 10 ... 0 V | 4 ... 20 mA / 20 ... 4 mA<br>0 ... 10 V / 10 ... 0 V |
| connection types | connector M12 | connector M12 | connector M12 |
| housing material | brass nickel plated | brass nickel plated | brass nickel plated<br>stainless steel |
| operating temperature | –10 ... +60 °C | –10 ... +60 °C | –10 ... +60 °C |
| protection class | IP 67 | IP 67 | IP 67 |
| specific features | ■ with or w/o sonic nozzles | | ■ optional sonic deflection bracket mounting |

Learn more:
www.baumer.com/ultrasonic-distance

| UR18 |
| --- |
| standard |
| ■ IO-Link<br>■ Robust sensing element<br>■ Analog outputs with IO-Link |
| M18 |
| 70 ... 1000 mm |
| < 40 ms |
| < 0.3 mm |
| < 0.5 mm |
| 4 ... 20 mA / 20 ... 4 m + push-pull<br>0 ... 10 V / 10 ... 0 V + push-pull |
| connector M12 |
| stainless steel |
| –25 ... +70 °C<br>(+60 °C in current mode) |
| IP 67 |

# Ultrasonic sensors

## Precise ultrasonic distance sensors – rectangular

Accurate distance measurement regardless of material, surface, color or transparency

- Small and light miniature sensors, e.g. for robotics
- Measurements in very small containers or openings

IO-Link

| | UNxK 09<br>URDK 09 | UNDK 10 | UNDK 20 | UNDK 30 |
|---|---|---|---|---|
| category | miniature | miniature | standard | standard |
| features | ■ High resolution<br>■ Minimal blind region<br>■ RS 232<br>■ Various mounting options<br>■ Flat housing<br>■ Narrow sonic beam angle for detection in openings of up to 3 mm | ■ Smallest ultrasonic sensor<br>■ Internal and external Teach-in<br>■ Very low weight: 4 g<br>■ Narrow sonic beam angle<br>■ Cable and flylead connector versions | ■ Flat type<br>■ Internal and external Teach-in<br>■ Narrow and wide sonic beam angles<br>■ M8 connector | ■ Compact type<br>■ Large sensing range<br>■ Teach-in on the sensor<br>■ Potentiometer version<br>■ Narrow and wide sonic beam angles<br>■ Cable and connector versions |
| dimensions | 8.6 × 48.8 × 57.5 mm | 10.4 × 27 × 14 mm | 20 × 42 × 15 mm | 30 × 65 × 31 mm |
| measuring distance | 3 ... 200 mm | 20 ... 200 mm | 20 ... 1000 mm | 30 ... 2000 mm |
| response time | < 7 ms | < 15 ms | < 10 ms | < 10 ms |
| resolution | < 0.1 mm | < 0.3 mm | < 0.3 mm | < 0.3 mm |
| repeat accuracy | < 0.5 mm | < 0.5 mm | < 0.5 mm | < 0.5 mm<br>< 1 mm |
| output | 0 ... 10 V / 10 ... 0 V<br>RS 232 | 0 ... 10 V / 10 ... 0 V | 4 ... 20 mA / 20 ... 4 mA<br>0 ... 10 V / 10 ... 0 V | 4 ... 20 mA / 20 ... 4 mA<br>0 ... 10 V / 10 ... 0 V |
| connection types | cable 2 m<br>flylead connector M8 | cable 2 m<br>connector M8<br>flylead connector M8 | connector M8 | cable 2 m<br>connector M12 |
| housing material | plastic | plastic | plastic | polyester / die-cast zinc |
| operating temperature | 0 ... +60 °C | –10 ... +60 °C | –10 ... +60 °C | –10 ... +60 °C |
| protection class | IP 67 | IP 67 | IP 67 | IP 67 |
| specific features | ■ with or w/o sonic nozzles<br>■ cascadable in 9 mm grid | ■ wide range of accessories and installation options | ■ optional sonic deflection bracket | |

Learn more:
www.baumer.com/ultrasonic-distance

IO-Link

| U500 |
|---|
| standard |
| ■ IO-Link<br>■ Robust sensing element<br>■ Analog outputs with IO-Link |
| 18 × 45.1 × 32.2 mm |
| 70 ... 1000 mm |
| < 40 ms |
| < 0.3 mm |
| < 0.5 mm |
| 4 ... 20 mA / 20 ... 4 mA + push-pull<br>0 ... 10 V / 10 ... 0 V + push-pull |
| connector M12 |
| plastic |
| –25 ... +65 °C<br>(+60 °C in current mode) |
| IP 67 |
| ■ wide range of accessories and installation options |

# Machine modules – inductive sensors

| Product name | Buffer station/ buffer table monitoring with mechanical guides | | | Infeed system monitoring with metal containers | | | | Food safety: Disinfection in rinsing process | Process monitoring in machine tank | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Buffer table full, filling no longer possible | Buffer table ready for filling | Buffer table emptying | Container position monitoring | Monitoring container transfer to screw conveyor | Monitoring container transfer from screw conveyor to capper | Referencing machine's mechanical systems | Disinfection in rinsing process [1] | Monitoring pressure in machine tank [2] | Soiling monitoring [3] | Level monitoring in machine tank [4] |
| **Inductive sensors** | | | | | | | | | | | |
| IFRM 12 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| IFRM 18 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| IR30.P18S | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| IR30.P24S | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| IR12.D06L | ■ | ■ | ■ | | | ■ | ■ | | | | |
| IR18.D08L | ■ | ■ | ■ | | | ■ | ■ | | | | |
| IR30.D24L | ■ | ■ | ■ | | | ■ | ■ | | | | |
| IR12.P04F | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| IR18.P08F | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| IFBR 11 | | | | ■ | ■ | ■ | ■ | | | | |
| IFBR 17 | | | | ■ | ■ | ■ | ■ | | | | |
| IFRR 12 | | | | ■ | ■ | ■ | ■ | | | | |
| IFRR 18 | | | | ■ | ■ | ■ | ■ | | | | |

[1] see PF20S, p. 77 [2] see PBMH, p. 76 [3] see *CombiLyz*®, p. 80 [4] see LSP, p. 78 and LBFH, p. 79 and CFAK, p. 70 and CFAM, p. 71 [5] see *VeriSens*®, p. 82

| Capper monitoring with metal lids (e.g. cans) | | | | | Outfeed station monitoring | Quality control in production with metal containers | | | | | Drive technology synchronization | | Format adjustment | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cap level monitoring in the bin | Trigger sensor in wet and cleaning zone for vision sensor / camera | Quality control of screw caps with seal [5] | Cap infeed buffer full | Preparing caps for takeup | Container exiting filling machine | Level monitoring in packaging | Trigger sensor for vision sensor / camera | Speed-independent triggering [6] | Quality control of filled containers [7] | Live image quality assurance [7] | Buffer table and infeed conveyor synchronization [8] | Master rotary filler axis [9] | Automatic adjustment of filler head referred to container height [10] | Manual adjustment of container guides [11] |
| | | | ■ | ■ | ■ | | ■ | | | | | | | |
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| | ■ | | ■ | ■ | ■ | | ■ | | | | | | | |

[6] see EIL580P, p. 84 [7] see *VeriSens*®, p. 82 [8] see EIL580P, p. 84 [9] see EAL580, p. 87 [10] see MSIA 68, p. 94 [11] see N150, p. 94

# Inductive proximity switches

## Cylindrical inductive proximity switches for factory automation

The proven solution for safe, non-contact detection of metal objects

- Very small sensors with all integrated evaluation electronics and large sensing distance
- Sturdy, maintenance-free and durable
- Always the right sensor thanks to a wide variety of variants
- Millions of them in use - highest precision and guaranteed reliability thanks to over 40 years of experience

| | IFRM 12<br>IR12.PxxS | IFRM 18<br>IR18.PxxS | IFRM 30<br>IR30.PxxS |
|---|---|---|---|
| **category** | **Compact** | **Compact** | **Compact** |
| dimensions | M12 | M18 | M30 |
| housing length | from 30 mm | from 35 mm | from 35 mm |
| nominal sensing distance Sn | 4 ... 10 mm | 8 ... 15 mm | 10 ... 24 mm |
| switching frequency | to 2 kHz | to 500 Hz | to 500 Hz |
| output signal | PNP<br>NPN | PNP<br>NPN | PNP<br>NPN |
| connection types | connector M8<br>connector M12<br>cable 2 m | connector M8<br>connector M12<br>cable 2 m | connector M12<br>cable 2 m |
| housing material | brass nickel plated | brass nickel plated | brass nickel plated |
| operating temperature | –25 ... +75 °C | –25 ... +75 °C<br>0 ... +65 °C | –25 ... +75 °C |
| protection class | IP 67 | IP 67 | IP 67 |
| specific features | ■ variants with antivalent output (NO & NC) | ■ variants with antivalent output (NO & NC) | ■ variants with antivalent output (NO & NC) |

# Application-specific inductive sensors – outdoor / high temperature

- Rugged Outdoor and Washdown sensors
- High shock and vibration resistance
- Sensors with extended temperature range up to 180 °C

Learn more:
www.baumer.com/inductive

| **Outdoor / Washdown** | **IFRM 12 / 18**<br>**Outdoor** | **IFRR 08 / 12 / 18**<br>**Washdown** |
|---|---|---|
| features | ■ Rugged stainless steel (V4A) or all-metal housing<br>■ IP 69K long-term seal – *proTect+*<br>■ High signal quality in an extended temperature range | |
| dimensions | M12 / M18 | M8 / M12 / M18 |
| nominal sensing distance Sn | 6 ... 12 mm | 3 ... 12 mm |
| switching frequency | 0.4 ... 2 kHz | 0.5 ... 3 kHz |
| housing material | brass nickel plated | stainless steel 1.4404 (V4A) |
| operating temperature | –40 ... +80 °C | –40 ... +80 °C |
| protection class | IP 67 | IP 68 / IP 69K & *proTect+* |
| specific features | | ■ Ecolab-tested<br>■ FDA-compliant<br>■ Vibration resistance EN 61373: 2010 (category 3)<br>■ Shock resistance EN 61373: 2010 (category 3) |

| **High temperature up to +180 °C** | **IFRM 06 / 08 / 12**<br>**High temperature up to +100 °C** | **IFRD 06 / 08 / 12 / 18**<br>**High temperature up to +100 °C**<br>**Full metal housing (*DuroProx*)** | **IFRH 06 / 08 / 12**<br>**High temperature up to +180 °C**<br>**with separated electronics** |
|---|---|---|---|
| features | ■ Sensors with extended temperature range up to 180 °C<br>■ Versions with integrated and separate evaluation electronics<br>■ High switching frequencies | | |
| dimensions | ø 6.5 mm / M8 / M12 | ø 6.5 mm / M8 / M12 / M18 | M8 / M12 / M18 |
| nominal sensing distance Sn | 2 ... 4 mm | 2 ... 6 mm | 1.5 ... 5 mm |
| switching frequency | 2 ... 5 KHz | 100 ... 150 Hz | 1 ... 4 kHz |
| housing material | stainless steel<br>brass nickel plated | stainless steel 1.4404 (V4A) | stainless steel<br>brass nickel plated |
| operating temperature | –25 ... +100 °C | –25 ... +100 °C | –25 ... +180 °C |
| protection class | IP 67 | IP 68 / IP 69K | IP 67 |

# Inductive proximity switches

## Application-specific inductive sensors - Large sensing distance / Factor 1

- Sensors with extended switching distance up to 24 mm
- Factor 1 sensors with the same switching distance on all metals

| **Large sensing distance** | **IR12.P06S**<br>**IR12.P10S** | **IR18.P12S**<br>**IR18.P15S** | **IR30.P18S**<br>**IR30.P24S** |
|---|---|---|---|
| **category** | **Compact** | **Compact** | **Compact** |
| features | ■ Large installation tolerances<br>■ Enhanced protection against mechanical damage<br>■ Cylindrical designs from Ø6.5 mm to M30<br>■ Flush and non-flush variants | | |
| dimensions | M12 | M18 | M30 |
| nominal sensing distance Sn | 6 / 10 mm | 15 / 18 mm | 18 / 24 mm |
| switching frequency | 1 kHz | 400 Hz | 500 Hz |
| housing material | brass nickel plated | brass nickel plated | brass nickel plated |
| operating temperature | –25 ... +75 °C | –25 ... +75 °C<br>0 ... +65 °C | –25 ... +75 °C |
| protection class | IP 67 | IP 67 | IP 67 |

| **Factor 1** | **IR12.P04F** | **IR18.P06F**<br>**IR18.P08F** |
|---|---|---|
| **category** | **Compact** | **Compact** |
| features | ■ Detection of stainless steel, aluminum and non-ferrous metals with the same sensing distance<br>■ High switching frequencies up to 3 kHz | |
| dimensions | M12 | M18 |
| nominal sensing distance Sn | 40 / 50 mm | 50 / 60 mm |
| switching frequency | 4 mm | 6 / 8 mm |
| housing material | 2 kHz | 500 Hz |
| operating temperature | brass nickel plated | brass nickel plated |
| protection class | –25 ... +75 °C | –25 ... +75 °C |
| protection class | IP 67 | IP 67 |

# Application-specific inductive sensors - ATEX / Hygienic

- Sensors for the Ex-area (ATEX-certified)
- Stainless steel sensors in hygienic design, EHEDG-certified

Learn more:
www.baumer.com/inductive



| **ATEX** | IFRM 06X<br>IFRM 08X | IFRM 12 | IFRM 12X<br>IFRM 18X |
|---|---|---|---|
| category | Miniatur | Compact | Compact |
| features | ■ For environments with flammable gas or dust<br>■ ATEX certified<br>■ High repeat accuracy < 0.01 mm<br>■ Compact design | | |
| dimensions | ø 6.5 mm / M8 | M12 | M12 / M18 |
| nominal sensing distance Sn | 1.5 mm | 4 mm | 2 ... 8 mm |
| switching frequency | 5 kHz | 2 kHz | to 2 kHz |
| output circuit | NAMUR | PNP / NPN | NAMUR |
| operating temperature | –20 ... +60 °C | –25 ... +65 °C | –20 ... +60 °C |
| protection class | IP 67 | IP 67 | IP 67 |
| approvals/certificates | ATEX 1G | ATEX 3D | ATEX 1G |



| **Hygienic design** | IFBR 06 | IFBR 11 | IFBR 17 |
|---|---|---|---|
| category | Miniature | Compact | Compact |
| features | ■ FDA compliant materials – EHEDG certified<br>■ High chemical resistance – Ecolab tested and LCP front cap<br>■ IP 68K long-term seal – *proTect+*<br>■ Flush and non-flush housings | | |
| dimensions | ø 6.5 mm | ø 11 mm | ø 17 mm |
| nominal sensing distance Sn | 3 mm | 4 mm (flush)<br>6 mm (non-flush) | 8 mm (flush)<br>12 mm (non-flush) |
| switching frequency | 3 kHz | 1 kHz | 500 Hz |
| housing material | stainless steel 1.4404 (V4A) | stainless steel 1.4404 (V4A) | stainless steel 1.4404 (V4A) |
| operating temperature | –40 ... +80 °C,<br>cleaning temperature to +100 °C | –40 ... +80 °C,<br>cleaning temperature to +100 °C | –40 ... +80 °C,<br>cleaning temperature to +100 °C |
| protection class | IP 68 / IP 69K & *proTect+* | IP 68 / IP 69K & *proTect+* | IP 68 / IP 69K & *proTect+* |

# Inductive distance sensors – *AlphaProx*®

## Linearized characteristic curve and reduction factor 1

- Internal temperature compensation
- Easy integration into the controller
- Variants with an additional digital output
- Two to four times larger measuring range for aluminum
- Particularly suitable for measurements on non-ferromagnetic metals
- Adjustable measuring range limits (teach)

| | IR12.DxxL | IR18.DxxL | IR18.DxxF |
|---|---|---|---|
| **category** | **compact** | **compact** | **compact** |
| **features** | ■ Linearized characteristic curve<br>■ Adjustable measuring range<br>■ Linearized output calibration curves<br>■ External Teach-in | ■ Linearized characteristic curve<br>■ Adjustable measuring range<br>■ Linearized output calibration curves<br>■ External Teach-in | ■ Factor 1<br>■ Same distance on all metals<br>■ Very high measurement sensitivity<br>■ Linearized output calibration curves<br>■ External Teach-in |
| dimensions | M12 | M18 | M18 |
| housing length | 60 mm | 60 mm | 60 mm |
| measuring distance Sd | 0 ... 6 mm | 0 ... 8 mm | 0 ... 8 mm |
| resolution | 3 µm | 8 µm | 20 µm |
| repeat accuracy | 10 µm | 15 µm | 30 µm |
| response time | 1 ms | 1 ms | 15 ms |
| output signal | 4 ... 20 mA<br>0 ... 10 V | 4 ... 20 mA<br>0 ... 10 V | 0 ... 10 V |
| connection types | connector M12 | connector M12 | connector M12 |
| housing material | brass nickel plated | brass nickel plated | brass nickel plated |
| operating temperature | –25 ... +75 °C | –25 ... +75 °C | –25 ... +75 °C |
| protection class | IP 67 | IP 67 | IP 67 |

## Sturdy sensors / ATEX

Rugged stainless steel housing

- Rugged stainless steel sensors
- Outdoor and Washdown design
- Sensors for potentially explosive areas

Learn more:
www.baumer.com/inductive-distance

| | IWRR 18 | IWRM 12 |
|---|---|---|
| **category** | **Outdoor design<br>Washdown design** | **ATEX** |
| dimensions | M18 | M12 |
| housing length | 60 mm | 50 mm |
| measuring distance Sd | 0 ... 7 mm | 0 ... 4 mm |
| resolution | 5 µm | 1 µm |
| repeat accuracy | 15 µm | 10 µm |
| response time | 2 ms | 2 ms |
| output signal | 4 ... 20 mA | 4 ... 20 mA |
| connection types | connector M12 | connector M12 |
| housing material | stainless steel 1.4404 (V4A) | brass nickel plated |
| operating temperature | –40 ... +70 °C | –10 ... +50 °C |
| protection class | IP 68 / IP 69K & *proTect+* | IP 67 |
| specific features | Ecolab-tested<br>FDA-compliant | ATEX 2D |

# Machine modules – capacitive sensors

| Product name | Buffer station/buffer table monitoring | | | Infeed system monitoring | | | Food safety: Disinfection in rinsing process | Process monitoring in machine tank | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Buffer table full, filling no longer possible | Buffer table ready for filling | Buffer table emptying | Container position monitoring | Monitoring container transfer to screw conveyor | Monitoring container transfer from screw conveyor to capper | Disinfection in rinsing process [1] | Monitoring pressure in machine tank [2] | Soiling monitoring [3] | Level monitoring in machine tank [4] |
| **Capacitive sensors** | | | | | | | | | | |
| CFAK 12 | | | | | | | | | | ■ |
| CFAM 12 | | | | | | | | | | ■ |
| CFAK 18 | | | | | | | | | | ■ |
| CFAM 18 | | | | | | | | | | ■ |
| CFDK 25 | | | | | | | | | | ■ |

[1] see PF20S, p. 77 [2] see PBMH, p. 76 [3] see *CombiLyz*®, p. 80 [4] see LSP, p. 78 and LBFH, p. 79 and CFAK, p. 70 and CFAM, p. 71 [5] see *VeriSens*®, p. 82

| Capper monitoring | | | | | Outfeed station monitoring | Quality control in production | | | | | Drive technology synchronization | | Format adjustment | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cap level monitoring in the bin | Trigger sensor in wet and cleaning zone for vision sensor / camera | Quality control of screw caps with seal [5] | Cap infeed buffer full | Preparing caps for takeup | Container exiting filling machine | Level monitoring in packaging | Trigger sensor for vision sensor / camera | Speed-independent triggering [6] | Quality control of filled containers [7] | Live image quality assurance [7] | Buffer table and infeed conveyor synchronization [8] | Master rotary filler axis [9] | Automatic adjustment of filler head referred to container height [10] | Manual adjustment of container guides [11] |
| | | | | | | | | | | | | | | |
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[6] see EIL580P, p. 84 [7] see *VeriSens*®, p. 82 [8] see EIL580P, p. 84 [9] see EAL580, p. 87 [10] see MSIA 68, p. 94 [11] see N150, p. 94

# Capacitive sensors

## Capacitive proximity sensors in plastic housings

Proximity switch for non-contact detection of liquid as well as solid objects and bulk solids

- High switching distance up to 30 mm even through non-metallic walls
- Absolutely reliable even when interfered by ambient conditions, e.g. ambient light or dirt
- Absolutely reliable detection of objects such as wafers, PCBs, paper stacks or hot adhesives up to 200 °C

| | CFAK 12 with cap | CFAK 12 | CFAK 18 | CFAK 22 Oil Level Switch |
|---|---|---|---|---|
| category | cylindrical | cylindrical | cylindrical | cylindrical |
| function | | | | |
| detection of non-conductive media | | | ■ | ■ |
| fill level detection through container | | | ■ | |
| Liquids in direct contact | ■ | ■ | ■ | ■ |
| object detection / buld goods | | | ■ | |
| dimensions | M12 | M12 | M18 | M22 |
| housing length | 39.5 mm | 39 mm | 63.5 mm | 87 mm |
| nominal sensing distance Sn | 0.1 mm | 0.5 mm | 2 ... 15 mm | |
| switching frequency | 15 Hz | 15 Hz | 50 Hz | |
| output signal | PNP<br>NPN | PNP<br>NPN | PNP<br>NPN | voltage output |
| connection types | cable 2 m<br>connector M8 | cable 2 m | cable 2 m | connector<br>AMPSEAL 16 3-Pol |
| housing material | POM<br>EPDM50 | PBT | PBT | PA 10T/X |
| operating temperature | 0 ... +50 °C | 0 ... +70 °C | –25 ... +75 °C | –40 ... +85 °C |
| protection class | IP 67 | IP 67 | IP 67 / IP 65 | IP 69K |
| specific features | ■ liquid level sensor for wastewater | | ■ potentiometer | ■ liquid level sensor for oil<br>■ media temperature +100 °C max. |

Learn more:
www.baumer.com/capacitive





| CFAK 30 | CFDK 25 | CFDK 30 | CFAM 12 | CFAM 18 |
|---|---|---|---|---|
| cylindrical | rectangular<br>extremely flat | rectangular | cylindrical | cylindrical |
| ■ | | ■ | ■ | ■ |
| ■ | ■ | ■ | ■ | ■ |
| ■ | | | | |
| ■ | | ■ | ■ | ■ |
| M30 | 25 × 52.4 × 6 mm | 30 × 65 × 18.5 mm | M12 | M18 |
| 72 mm | | | 60 mm without connector<br>76 mm with connector M12 | 64 mm without connector<br>78.5 mm with connector M12 |
| 5 ... 30 mm | 2 ... 15 mm | 4 ... 15 mm | 0.5 ... 4 mm | 2 ... 8 mm |
| 50 Hz | 35 Hz | 50 Hz | 50 Hz | 50 Hz |
| PNP<br>NPN | push-pull | PNP<br>NPN | PNP<br>NPN | PNP<br>NPN |
| cable 2 m | cable 2 m<br>flylead connector M8 | cable 2 m<br>connector M12 | cable 2 m<br>connector M12 | cable 2 m<br>connector M12 |
| PBT | PA 12 | PBT | brass nickel plated | brass nickel plated |
| –25 ... +75 °C | –25 ... +75 °C | –25 ... +75 °C | –25 ... +75 °C | –25 ... +75 °C |
| IP 67 / IP 65 | IP 65 | IP 65 | IP 65 | IP 65 |
| ■ versions with fixed switching point<br>■ potentiometer | ■ fixed sensing distance<br>■ flexible mounting options thanks to innovative mounting frame | ■ potentiometer | ■ potentiometer<br>■ flush mountable | ■ potentiometer<br>■ flush mountable |




| Cables & adapters | Cable socket unassembled | Cable socket | Male connector | Connecting cables |
|---|---|---|---|---|
| characteristics | ■ M8 and M12<br>■ Straight or angled<br>■ 3-, 4- and 5-pole versions | ■ M5, M8, M9, M12 or 8 mm snap-in<br>■ 3- or 12-pole versions<br>■ Straight or angled<br>■ Screened or unscreened<br>■ Various sheath materials<br>■ Various lengths available up to 25 m | ■ M8<br>■ 3-pole versions<br>■ Straight<br>■ PUR sheath<br>■ Various lengths available up to 3 m | ■ M8 or M12<br>■ 3- or 4-pole versions<br>■ Straight or angled<br>■ PUR sheath<br>■ Various lengths available up to 10 m |




| Mounting accessories | Mounting kits | Mounting bracket | Mounting bracket | Bracket for profiles |
|---|---|---|---|---|
| characteristics | ■ Sensofix Mounting sets<br>■ Robust metal version<br>■ Mounting sets for various sensor types<br>■ Easy, flexible alignment | ■ Matching mounting brackets available for various sensor types<br>■ High quality metal<br>■ Compatible with flexible Sensofix | ■ Easy, fast mounting of smooth and cylindrical sensors<br>■ Available from ø 6.5 mm to ø 20 mm | ■ Mounting adapter for diverse sensor types<br>■ e.g. for mounting in profiles, slots, cylinders, etc. |

Learn more:
www.baumer.com/accessories

IO-Link

| Testing and parameterization | Sensor test equipment | Teach-in Adapter | USB-IO-Link Master |
|---|---|---|---|
| characteristics | ■ Display (V or mA) or. LED (PNP/ NPN) reading<br>■ Sensor programming using integrated teach key<br>■ Connection option for plug-in power supply (available as accessory) | ■ Sensor programming with teach-in pin<br>■ Teach-in using key<br>■ For sensors with M12 connection | ■ Teach-in, parameterization and operation of IO-Link capable sensors |

| Reflectors<br>Lenses<br>Apertures<br>Glass | Reflectors | Reflective tapes | Apertures | Glass covers<br>Filter<br>Lens |
|---|---|---|---|---|
| characteristics | ■ Self-adhesive or screw-mount reflectors<br>■ Circular or rectangular<br>■ All-metal reflectors<br>■ Ecolab certified types, resistant to cleaning agents | ■ Self-adhesive tapes<br>■ Various widths and lengths | ■ Apertures for various sensor types | ■ For various sensor types |

Learn more:
www.baumer.com/accessories

| Beam columnators and deflector (Ultrasonic) | Beam columnators | Beam deflectors |
|---|---|---|
| characteristics | ■ Replacement nozzles for sensors with sonic nozzles | ■ Ideal for cramped spaces<br>■ Bends the sound 90° |

# Electronic pressure

Customization is our passion!
One of our strengths is customizing products to your individual needs.

| | PBMN flush | PP20H | PBMH hygienic | *CombiPress*® PFMH |
|---|---|---|---|---|
| Product highlights | ■ Cavity-free process connection<br>■ Compact installation from G 1/2 A<br>■ Excellent temperature stability<br>■ CIP capability | ■ All market typical hygienic connections<br>■ EHEDG & 3-A certified versions available<br>■ Condensate-proof measuring cell<br>■ IO-Link available<br>■ Space-saving installations from DN 25 on | ■ Certified hygienic design<br>■ SIP / CIP capability<br>■ Excellent temperature stability | ■ Certified hygienic design<br>■ SIP / CIP capability<br>■ High-precision and temperature stable<br>■ Touch display with tank illustration |
| Application examples | Vapor phase control, continuous level measurement, density measurement, pasty or crystallizing media | Process pressure in Food & Beverage, Continuous level monitoring, CIP cleaning processes (Clean In Place) | Controlling of CIP procedure, vapor phase control, continuous level measurement | Controlling of CIP procedure, filter monitoring, continuous level measurement |
| Measuring ranges | –1 … 0 bar to<br>0 … 400 bar | –1 … 40 bar | –1 … 0 bar to<br>0 … 40 bar | –1 … 0 bar to<br>0 … 60 bar |
| Process conditions | –40 … +125 °C<br>–40 … +200 °C<br>(with cooling neck) | –20 ... 125 °C | –40 … +125 °C<br>–40 … +200 °C<br>(with cooling neck) | –40 … +125 °C<br>–40 … +200 °C<br>(with cooling neck) |
| Technology | Piezoresistive silicon | Piezoresistive silicon | Piezoresistive silicon | Piezoresistive silicon |
| Wetted parts material | AISI 316L (1.4404)<br>AISI 316L (1.4435) | AISI 316L (1.4404)<br>AISI 316L (1.4435) | AISI 316L (1.4404)<br>AISI 316L (1.4435) | AISI 316L (1.4404)<br>AISI 316L (1.4435) |
| Accuracy<br>(max. measuring error) | ≤ 0.1 % FS (NP ≥ 400 mbar)<br>≤ 0.25 % FS<br>≤ 0.5 % FS | ± 0.5 % FS<br>± 1.0 % FS (0 … 0.4 bar) | ≤ 0.1 % FS (NP ≥ 400 mbar)<br>≤ 0.25 % FS | ≤ 0.1 % FS (NP ≥ 400 mbar)<br>≤ 0.25 % FS |
| Output signal | 4 … 20 mA<br>0 … 10 V | 4 … 20 mA, Programmable switch, IO-Link 1.1 | 4 … 20 mA<br>0 … 10 V | 4 … 20 mA + HART®<br>2 × PNP switch |
| Proof pressure | 3 × NP, max. 690 bar | > 3 × NP, max. 270 bar | > 3 × NP | > 3 × NP |
| Versatile options for process connection | G 1/2 A hygienic<br>G1 A hygienic<br>G 1/2 A ISO 228-1 with cone<br>G 1/2 A DIN 3852-E with O-ring at the front<br>G 1 A DIN 3852-E with O-ring at the front<br>G 1/2 A DIN 3852-E<br>1/2-14 NPT | G 1/2 A DIN 3852-E<br>G1 A hygienic<br>G 1/2 A hygienic<br>Tri-Clamp ø 50.5<br>Tri-Clamp ø 64<br>VARIVENT® DN 25<br>VARIVENT® DN 32<br>DIN 11851, DN 40, DN 50<br>DIN 11864-1-A, DN 40, DN50 | BHC 3A DN 38<br>BHC 3A DN 76<br>Tri-Clamp ø 24.9<br>Tri-Clamp ø 34.0<br>Tri-Clamp ø 50.5<br>Tri-Clamp ø 64.0<br>DIN 11864-3-A (Aseptic Clamp), DN25, ø 50.5<br>VARIVENT® DN 25;<br>1" (Type F), ø 50<br>VARIVENT® DN 32 … 125;<br>1 1/2" … 6" (Type N), ø 68 | BHC 3A DN 38<br>BHC 3A DN 76<br>Tri-Clamp ø 50.5<br>Tri-Clamp ø 64.0<br>VARIVENT® DN 32 … 125;<br>1 1/2" … 6" (Type N), ø 68 |
| Electrical connection | M12, 4 pins<br>DIN 43650<br>Shielded cable | M12, 4 pins<br>M12, 5 pins | M12, 4 pins<br>DIN 43650<br>Shielded cable | M12, 5 pins<br>M12, 8 pins<br>Cable gland, M16 |
| Degree of protection | IP 65 , IP 67 | IP 67, IP 69K | IP 65, IP 67 | IP 67, IP 69K |
| Compliance and approvals | ATEX | 3-A, EHEDG | ATEX, 3-A, EHEDG | ATEX, 3-A, EHEDG |
| Additional information | ■ External programming of zero point and span with FlexProgram | ■ External programming via IO-Link | ■ External programming of zero point and span with FlexProgram | ■ Internal setting of zero point<br>■ External programming with FlexProgram |

## Efficient and flexible.



| | *FlexFlow* PF20H | *FlexFlow* PF20S |
|---|---|---|
| Product highlights | ■ Hygienic design<br>■ SIP / CIP capability<br>■ Flow and temperature measurement in a single sensor<br>■ Compact and robust<br>■ Two analogue outputs or IO-Link plus programmable output<br>■ No moving parts | ■ Industrial process connections<br>■ Flow and temperature measurement in a single sensor<br>■ Compact and robust<br>■ Two analogue outputs or IO-Link plus programmable output<br>■ No moving parts |
| Application examples | Flow control, controlling of CIP procedure | Flow control, controlling of CIP procedure |
| Applicable media | Water<br>Beverages<br>Cleaning agents | Water<br>Water-glycol mixture<br>(max. 30 % glycol) |
| Process conditions | –25 … +150 °C<br>40 bar max. | –25 … +150 °C<br>100 bar max. |
| Measuring ranges | 10 … 400 cm/s<br>–25 … +125 °C | 10 … 400 cm/s<br>–25 … +125 °C |
| Versatile options for process connection | G 1/2 A hygienic<br>BHC 3A DN 38<br>Tri-Clamp ø 34.0<br>Tri-Clamp ø 50.5<br>Tri-Clamp ø 64.0<br>DIN 11851 (dairy pipe connection), DN 25<br>DIN 11851 (dairy pipe connection), DN 40<br>DIN 11851 (dairy pipe connection), DN 50<br>VARIVENT® DN 25;<br>1" (Type F), ø 50<br>VARIVENT® DN 32 … 125;<br>1 1/2" … 6" (Type N), ø 68 | G 1/2 A ISO 228-1 with cone<br>Sealing cone M18 × 1.5<br>Compression fitting ø 6 mm |
| Wetted parts material | AISI 316L (1.4404) | AISI 316L (1.4404) |
| Output signal | Programmable switch<br>IO-Link 1.1<br>4 … 20 mA<br>0 … 10 V | Programmable switch<br>IO-Link 1.1<br>4 … 20 mA<br>0 … 10 V |
| Accuracy (max. measuring error) | ≤ 2 % (FS) | ≤ 2 % (FS) |
| Degree of protection | IP 67, IP 68, IP 69K | IP 67, IP 68, IP 69K |
| Compliance and approvals | cULus<br>FDA | cULus |

# Level measurement

## Robust and reliable.

| | LSP051.X | LSP056.X | LSKx2x | LSKx5x |
|---|---|---|---|---|
| Product highlights | ■ Fast response time < 10 ms<br>■ Insensitive to foam, bubbles and sticky media<br>■ Top-, bottom- or side mounting | ■ Fast response time < 10 ms<br>■ Insensitive to foam, bubbles and sticky media<br>■ Remote sensor with cable up to 5 m | ■ Top- or side mounted<br>■ Adjustable rod length<br>■ PTFE coating for foamy media<br>■ Robust stainless steel connection head | ■ Multipoint level detection<br>■ Adjustable rod length<br>■ PTFE coating for foamy media<br>■ Robust stainless steel connection head |
| Application examples | Controlling of filling machines, level regulation in deaerator tanks | Controlling of filling machines, level regulation in deaerator tanks | Point level detection in tanks, overfill protection | Multi point level detection in tanks, overfill protection |
| Process conditions | –20 … +140 °C<br>Media conductivity > 50 µS | –20 … +140 °C<br>Media conductivity > 50 µS | –20 … +140 °C | –20 … +140 °C |
| Measuring ranges | 0 … 200 mm to<br>0 … 3000 mm | 0 … 200 mm to<br>0 … 3000 mm | 20 … 2000 mm | 20 … 2000 mm |
| Versatile options for process connection | G1 A hygienic | G1 A hygienic | G 1/2 A hygienic | G1 A hygienic |
| Technology | Potentiometric | Potentiometric | | |
| Wetted parts material | PEEK<br>AISI 316L (1.4404) | PEEK<br>AISI 316L (1.4404) | PEEK<br>PTFE (with coating)<br>AISI 316L (1.4404) | PEEK<br>PTFE (with coating)<br>AISI 316L (1.4404) |
| Accuracy (max. measuring error) | ≤ 0.5 % FS | ≤ 0.5 % FS | | |
| Output signal | 4 … 20 mA (galvanically isolated) | 4 … 20 mA (galvanically isolated) | Electrode terminal<br>PNP switch (with LKP100) | 2 × … 4 × electrode terminal |
| Degree of protection | IP 67 | IP 67 | IP 67 | IP 67 |
| Compliance and approvals | 3-A | 3-A | 3-A | 3-A |
| Additional information | ■ Adaptors for other hygienic connections available | ■ Adaptors for other hygienic connections available | ■ Adaptors for other hygienic connections available | ■ Adaptors for other hygienic connections available<br>■ Evaluation unit DNGA-230.100 available as accessory |

Another Baumer INNOVATION

*CleverLevel Switch*
The clever alternative to vibrating forks.

IO-Link

IO-Link

| | *CleverLevel*® LBFS | *CleverLevel*® LFFS | *CleverLevel*® LBFI | *CleverLevel*® LBFH |
|---|---|---|---|---|
| Product highlights | ■ Certified hygienic design<br>■ SIP / CIP capability<br>■ Minimal insertion length<br>■ Detects all kinds of media (solid, liquid, viscous, pasty)<br>■ Compact and light weight<br>■ LED display | ■ Certified hygienic design<br>■ SIP / CIP capability<br>■ Detects all kinds of media (solid, liquid, viscous, pasty)<br>■ Bright, blue light on top when triggered<br>■ Visible from long distance | ■ Compact and robust stainless steel housing<br>■ On-site setting with *qTeach*<br>■ Two adjustable switching outputs<br>■ Multicolor LED display of switching statuses | ■ Certified hygienic design<br>■ SIP / CIP capability<br>■ Foam detection or suppression<br>■ Problem solver for adhesions<br>■ Two adjustable switching outputs<br>■ 360° visible multicolor LED |
| Application examples | Point level detection in tanks, empty pipe monitoring, overfill protection, leakage detection, high temperature applications up to 200 °C | Point level detection in tanks, empty pipe monitoring, overfill protection, leakage detection | Point level detection in tanks, empty pipe monitoring, max. / min. level control, separation layer detection | Controlling of CIP procedure, point level detection in tanks, empty pipe monitoring, separation layer detection |
| Process conditions | –40 … +115 °C<br>–40 … +200 °C<br>(sliding connection) | –40 … +115 °C<br>–40 … +200 °C<br>(sliding connection) | –40 … +115 °C | –40 … +115 °C<br>+135 °C max. (t < 1 h) |
| Versatile options for process connection | G 1/2 A hygienic<br>G 1/2 A ISO 228-1 BSC<br>G 3/4 A ISO 228-1<br>G 1 A ISO 228-1<br>G 1/2 A DIN 3852-E<br>M18×1 ISO 261 / ISO 965<br>1/2-14 NPT<br>3/4-14 NPT<br>G 1/2 A ISO 228-1 for reverse assembly (in-shell thread) | G 1/2 A hygienic<br>BHC 3A DN 38 | G 1/2 A hygienic<br>G 1/2 A ISO 228-1 BSC<br>1/2-14 NPT | G 1/2 A hygienic |
| Output signal | PNP switch<br>NPN switch | PNP switch<br>NPN switch | 2 × programmable switch<br>IO-Link 1.1 | 2 × programmable switch<br>IO-Link 1.1 |
| Wetted parts material | PEEK<br>AISI 316L (1.4404)<br>AISI 304 (1.4301) (optional) | PEEK | PEEK<br>AISI 316L (1.4404) | PEEK |
| Degree of protection | IP 67, IP 69K | IP 67 | IP 67, IP 69K | IP 67, IP 69K |
| Compliance and approvals | ATEX<br>3-A<br>EHEDG<br>WHG<br>EN50155 (railway)<br>DNV-GL<br>Lloyd's register<br>CCS | ATEX<br>3-A<br>EHEDG<br>WHG<br>EN50155 (railway)<br>DNV-GL | ATEX<br>cULus<br>FDA | ATEX<br>cULus<br>3-A<br>EHEDG |
| Additional information | ■ M18 × 1 replaces a capacitive sensor directly<br>■ Available with sliding connection 250 mm<br>■ Hanging version for silos | ■ Available with sliding connection 100 mm and 250 mm | | |

# Conductivity measurement

## Innovative and compact.

| | *CombiLyz*® AFI4 | *CombiLyz*® AFI5 |
|---|---|---|
| Product highlights | ■ Conductivity or concentration output<br>■ Fast internal temperature compensation<br>■ Fast response time<br>■ High accuracy ≤ 1 %<br>■ Programmable via touch screen or FlexProgram | ■ Remote sensor with cable up to 10 m<br>■ Conductivity or concentration output<br>■ Fast internal temperature compensation<br>■ Fast response time<br>■ High accuracy ≤ 1 %<br>■ Programmable via touch screen or FlexProgram |
| Application examples | Concentration measurement, ingredients monitoring, phase separation | Concentration measurement, ingredients monitoring, phase separation |
| Process conditions | –20 … +140 °C<br>+150 °C max. (t < 1 h) | –20 … +140 °C<br>+150 °C max. (t < 1 h) |
| Measuring range | 0 … 500 µS/cm to<br>0 … 1000 mS/cm | 0 … 500 µS/cm to<br>0 … 1000 mS/cm |
| Versatile options for process connection | G1 A hygienic | G1 A hygienic |
| Wetted parts material | PEEK | PEEK |
| Output signal | 4 … 20 mA + HART®<br>(galvanically isolated) | 4 … 20 mA + HART®<br>(galvanically isolated) |
| Accuracy | ≤ 1 % of selected range | ≤ 1 % of selected range |
| Degree of protection | IP 67, IP 69K | IP 67, IP 69K |
| Compliance and approvals | 3-A<br>EHEDG | 3-A<br>EHEDG |
| Additional information | ■ Adaptors for other hygienic connections available | ■ Adaptors for other hygienic connections available |

## Your individual alarm system.

Red = take action

Green = ok

| | *CombiView*® DFON | FlexProgrammer 9701 | USB IO-Link Master |
|---|---|---|---|
| Product highlights | ■ Large digits and illustration visible from long distance<br>■ Configurable via touch screen or FlexProgram<br>■ Backlight color change according to alarm settings<br>■ 3 configurable backlight colors | ■ Easy configuring with menu control function<br>■ Data transfer from PC to device via USB<br>■ Configuration of a device on the spot without a PC<br>■ Robust plastic case with digital display and buttons<br>■ Rechargeable battery (USB)<br>■ Free FlexProgram updates from Baumer web site | ■ Compatible with IO-Link Device Tool<br>■ Including power supply and USB cable |
| Application examples | Remote monitoring, value visualization, alerting | Sensor parameterization, setup duplication, data monitoring and logging | Integration of IO-Link sensors via USB |
| Supply voltage | Loop-powered | From USB-port | Wall power supply |
| Accuracy | 0.1 % ± 1 digit | | |
| Output signal | 2 × PNP switch | Sensor interface | IO-Link 1.1 |
| Ambient conditions | –30 … +80 °C | 0 … +50 °C, rel. humidity < 90 % | |
| Degree of protection | IP 67 | IP 42 | |
| Software | | FlexProgram<br>FDT / DTM based | FlexProgram<br>IO-Link Device Tool |
| Compliance and approvals | ATEX | | |

# Image processing / identification

## *VeriSens*® vision sensors

- Intuitive configuration in just four steps
- Patented *FEX*® image processor for higher process stability
- *FEXLoc*® 360 ° part location saves object alignment effort
- *ColorFEX*® – reliable color differentiation made easy to everyone
- Easy-to-configure web interface

PROFINET®
EtherNet/IP™

*VeriSens*® CS100

*VeriSens*® ID100

*VeriSens*® ID510


*VeriSens*® XF700 / 800, also color

| | | | | |
|---|---|---|---|---|
| Feature checks | ■ Presence and completeness check<br>■ Part recognition and part sorting<br>■ Checking part geometries<br>■ *FEXLoc*® 360° part location | ■ Multi-code reader for 1D and 2D codes<br>■ Code quality identification according to ISO / AIM | ■ Multi reader for text and 1D / 2D codes (incl. GS1)<br>■ Reading of different fonts without training<br>■ Text verification (OCR / OCV), code quality control | ■ Presence and completeness check<br>■ Part position and alignment check<br>■ Identification (XF800 only)<br>■ *FEXLoc*® 360° part location<br>■ Special color functions |
| Dimensions | 53 × 99.5 × 38 mm | 53 × 99.5 × 38 mm | 53 × 99.5 × 38 mm | 53 × 99.5 × 38 mm |
| Protection class | IP 67 | IP 67 | IP 67 | IP 67 |
| Resolution | 752 × 480 px | 752 × 480 px | 752 × 480 px | 752 × 480 px |
| Lens | 10 mm / 16 mm | 10 mm / 16 mm | 12 mm | 12 mm / 16 mm |
| Illumination | white / infrared | white | white / infrared | white / infrared |
| Speed | max. 50 inspections / s | max. 50 inspections / s | max. 50 inspections / s | max. 100 inspections / s |
| Communication:<br>Digital inputs<br>Digital outputs<br>Setup<br>Process interface | <br>5<br>5<br>Ethernet | <br>5<br>3<br>Ethernet<br>TCP/UDP (Ethernet), RS485, PROFINET / EtherNet/IP™ (via gateway) | <br>5<br>5<br>Ethernet<br>TCP/UDP (Ethernet), PROFINET / EtherNet/IP™ | <br>5<br>5<br>Ethernet<br>TCP/UDP (Ethernet), PROFINET / EtherNet/IP™ |
| Special features | ■ Configurable web interface | ■ Password protection<br>■ Configurable web interface | ■ Password protection<br>■ Configurable web interface | ■ Coordinate conversion<br>■ Password protection<br>■ Configurable web interface |

## CX.I cameras in IP 65 / 67 or IP 69K design

- Precise inspection with resolutions up to 12 megapixel
- Fast image acquisition with high-sensitivity global shutter CMOS cameras
- Industrial camera design for reliable image evaluation with long-term stability

GiGE VISION
GEN<i>CAM



| *VeriSens*® XC700 / 800, also color* | *VeriSens*® XF105 / 205 | | VCXG-xxx.I / .I.XT (with housing base set IP 65 / 67 and tube) | VCXG-xxx.I / .I.XT (with housing base set IP 69K and tube) |
|---|---|---|---|---|
| ■ Presence and completeness check<br>■ Part position and alignment check<br>■ Identification (XC800 only)<br>■ *FEXLoc*® 360° part location<br>■ Special color functions | ■ Presence and completeness check<br>■ Part position and alignment check<br>■ Identification (XF205 only)<br>■ *FEXLoc*® 360° part location | Features | ■ Extended operating temperature range from –40 °C to +70 °C (.XT models)<br>■ Industrial housing tolerates vibration up to 10 g and shock up to100 g<br>■ 4 opto-decoupled power outputs with an output power of up to 120 W (max. 48 V / 2.5 A)<br>■ Exposure from 1 µs and up to 1000 fps with ROI | |
| 53 × 99.5 × 49.8 mm (without lens / tube) | 53 × 107.5 × 38 mm | Dimensions | Ø 65 × 123 mm | Ø 63 × 208 mm |
| IP 67 | IP 69K | Protection class | IP 65 / 67 | IP 69K |
| 640 × 480 px (1/4")*<br>1280 × 960 px (1/3")*<br>1600 × 1200 px (1/1.8") | 752 × 480 px | Resolution | 1.3 MP: 1280 × 1024 px (1/2")<br>1.5 MP: 1440 × 1080 px (1/2.9")<br>2.3 MP: 1920 × 1200 px (2/3")<br>5 MP: 2448 × 2048 px (2/3")<br>12 MP: 4096 × 3000 px (1.1") | |
| changeable lens (C-mount) | 10 mm / 16 mm | Lens | C-mount | |
| *VeriFlash*® flash controller | white / infrared | Illumination | External (integrated 4-channel lighting controller) | |
| max. 118 inspections / s (VGA) | max. 100 inspections / s | Frame rate | up to 94 fps | |
| 5<br>5<br>Ethernet<br>TCP/UDP (Ethernet), PROFINET / EtherNet/IP™ | 5<br>5<br>Ethernet<br>TCP/UDP (Ethernet) | Communication:<br>Digital inputs<br>Digital outputs<br>Setup | 4<br>4 power outputs with up to 120 W (max. 48 V / 2.5 A)<br>GigE | |
| ■ Integrated *VeriFlash*® flash controller for external illuminaton<br>■ Free choice of lenses due to C-mount and modular tube system<br>■ CCD sensor with resolution of 0.3 MP* / 1.2 MP* / 2 MP<br>■ Configurable web interface | ■ Coordinate conversion<br>■ Password protection<br>■ Configurable web interface | Housing | ■ Hard-anodized IP 65 / 67 housing resistant to aggressive cleaners | ■ IP 69K housing capable of high-pressure cleaning |

# Incremental encoders

Size 58 mm

## Precise optical sensing.
## Max. 5000 pulses per revolution.

- Solid shaft, blind or through hollow shaft
- Robust all-metal housing

*OptoPulse®* – the new benchmark for encoders

*OptoPulse®*

| Features | ■ Solid shaft with clamping flange | ■ Solid shaft with synchro flange | ■ Blind hollow shaft | ■ Through hollow shaft |
|---|---|---|---|---|
| Product family | **EIL580-SC** - *OptoPulse®* | **EIL580-SY** - *OptoPulse®* | **EIL580-B** - *OptoPulse®* | **EIL580-T** - *OptoPulse®* |

| | | | | |
|---|---|---|---|---|
| Sensing method | Optical | | | |
| Size (housing) | ø 58 mm | | | |
| Voltage supply | 5 VDC ± 5 %, 8 ... 30 VDC, 4.75 ... 30 VDC | | | |
| Output stage | | | | |
| - TTL/RS422 | ■ | ■ | ■ | ■ |
| - HTL/push-pull | ■ | ■ | ■ | ■ |
| Output signals | A 90° B, N + inverted | | | |
| Shaft type | | | | |
| - Solid shaft | ø 10 mm | ø 6 mm | – | – |
| - Blind hollow shaft | – | – | ø 8 ... 15 mm | – |
| - Through hollow shaft | – | – | – | ø 8 ... 15 mm |
| Connection | | | | |
| - Flange connector M12, M23 | Radial / axial | | | Radial |
| - Cable | Radial / axial / tangential | | | Radial / tangential |
| Pulses per revolution | 100 ... 5000 | | | |
| Operating temperature | –40 ... +85 °C (option: +100 °C) | | | |
| Protection | IP 65, IP 67 | | | |
| Operating speed | ≤ 12 000 rpm (IP 65)<br>≤ 6000 rpm (IP 67) | | ≤ 8000 rpm (IP 65)<br>≤ 6000 rpm (IP 67) | ≤ 6000 rpm (IP 65)<br>≤ 3000 rpm (IP 67) |
| Max. shaft load | ≤ 40 N axial, ≤ 80 N radial | | – | – |
| Option | Square flange, programmable | | Isolated hollow shaft, hybrid bearings, programmable | |

## *OptoPulse®*

The innovative optical sensing method utilized by *OptoPulse®* incremental encoders ensures ultra-high accuracy and consistently high signal quality throughout the entire temperature range. The heart of this technology is a monolithic OptoASIC with high integration density particularly conceived for high-precision encoders. Thanks to the limited number of discrete components, reliability in the application is decisively improved when it comes to shocks and vibrations.

# V2A.
# Max. 10 000 pulses per revolution.

- Size ø 58 ... 89 mm
- Square wave and sine signals




| | | | | | |
|---|---|---|---|---|---|
| **Features** | ■ Through hollow shaft<br>■ Max. 6000 pulses per revolution | ■ Solid shaft with clamping flange<br>■ Max. 6000 pulses per revolution | ■ Blind hollow shaft<br>■ Max. 6000 pulses per revolution | ■ Blind hollow shaft<br>■ Max. 10 000 pulses per revolution<br>■ Sine waves per revolution 1024 ... 2048 | |
| **Product family** | **GE333** | **GE355** | **ITD21 A4 Y65** | **ITD 40 A4** | **ITD 42 A4 Y141** |
| **Sensing method** | Optical | | | | |
| **Size (housing)** | ø 58 mm | | | ø 89 mm | |
| **Voltage supply** | 5 VDC ± 10 %, 4.75 ... 30 VDC, 10 ... 30 VDC | | 5 VDC ± 5 %, 8 ... 30 VDC | | |
| **Output stage** | | | | | |
| - TTL/RS422 | ■ | ■ | ■ | ■ | – |
| - HTL/push-pull | ■ | ■ | ■ | ■ | – |
| - SinCos 1 Vpp | – | – | – | – | ■ |
| **Output signals** | A 90° B, N + inverted | | | A, B, N + inv. | A, B, N |
| **Shaft type** | | | | | |
| - Solid shaft | – | ø 10 mm | – | – | – |
| - Blind hollow shaft | – | – | – | ø 20 ... 27 mm | – |
| - Through hollow shaft | ø 12 mm | – | ø 10 ... 14 mm | – | ø 20 ... 27 mm |
| **Connection** | | | | | |
| - Cable | Radial | Radial / axial | Radial | Radial | |
| **Pulses per revolution** | 5 ... 6000 | 5 ... 6000 | 200 ... 6000 | 2000 ... 10 000 | – |
| **Sine waves per revolution** | – | – | – | – | 1024 ... 2048 |
| **Operating temperature** | –25 ... +100 °C (5 VDC)<br>–25 ... +85 °C (24 VDC) | –25 ... +85 °C | –20 ... +85 °C | –20 ... +70 °C | –20 ... +85 °C |
| **Protection** | IP 65 | IP 67 | IP 66 | IP 67 | |
| **Operating speed** | ≤ 6000 rpm | ≤ 10 000 rpm | ≤ 3000 rpm | ≤ 2500 rpm | |
| **Max. shaft load** | – | ≤ 20 N axial, ≤ 40 N radial | | – | |
| **Material** | Stainless steel: 1.4305 | Stainless steel: 1.4305 | Stainless steel: 1.4305 | Stainless steel: 1.4305 | Stainless steel |
| **Options** | – | – | Cable with connector | Cable with connector | |

# Absolute encoders

## Robust magnetic precise sensing. Integrated interface.

- Solid shaft and blind hollow shaft
- Compact housing where space is tight
- Shock resistant up to 500 g
- Angular accuracy up to ± 0.15 °

PROFINET® SSI SAE J1939 CANopen

## *MAGRES*





| | | | | |
|---|---|---|---|---|
| **Features** | ■ Solid shaft with clamping or synchro flange | ■ Solid shaft with clamping or synchro flange<br>■ E1 compliant design<br>■ Corrosion protection C5-M | ■ Blind hollow shaft | ■ Blind hollow shaft<br>■ E1 compliant design<br>■ Corrosion protection C5-M |
| **Product family** | **EAM580** - *MAGRES* | **EAM580R** - *MAGRES* | **EAM580** - *MAGRES* | **EAM580R** - *MAGRES* |
| **Interface** | | | | |
| - SSI | ■ | – | ■ | – |
| - Analog | – | ■ | – | ■ |
| - CANopen® / redundant | ■ / – | ■ / ■ | ■ / – | ■ / ■ |
| - CANopen® Lift | ■ | – | ■ | – |
| - SAE J1939 | – | ■ | – | ■ |
| - Profinet | ■ | – | ■ | – |
| **Function principle** | Multiturn \| Singleturn | Multiturn \| Singleturn | Multiturn \| Singleturn | Multiturn \| Singleturn |
| **Sensing method** | Magnetic | | | |
| **Size (housing)** | ø 58 mm | | | |
| **Voltage supply** | 4.5 ... 30 VDC (CANopen, SAE J1939, SSI)<br>8 ... 30 VDC / 14 ... 30 VDC (Analog - depending on type)<br>10 ... 30 VDC (Ethernet) | | | |
| **Shaft type** | | | | |
| - Solid shaft | ø 6 mm, ø 10 mm | | – | |
| - Blind hollow shaft | – | | ø 12 mm, ø 14 mm, ø 15 mm | |
| **Connection** | | | | |
| - Flange connector M12 | Radial | Radial | Radial | Radial |
| - Flange connector M23 | Radial | – | Radial | – |
| - Cable | Radial (0.14 mm²) | Radial (0.5 mm²) | Radial (0.14 mm²) | Radial (0.5 mm²) |
| **Total resolution**[1)] | ≤ 32 bit \| ≤ 14 bit | ≤ 32 bit \| ≤ 14 bit | ≤ 32 bit \| ≤ 14 bit | ≤ 32 bit \| ≤ 14 bit |
| **Steps per turn** | ≤ 16384/14 bit \| ≤ 16384/14 bit | ≤ 16384/14 bit \| ≤ 16384/14 bit | ≤ 16384/14 bit \| ≤ 16384/14 bit | ≤ 16384/14 bit \| ≤ 16384/14 bit |
| **Number of turn** | ≤ 262144/18 bit \| – | ≤ 262144/18 bit \| – | ≤ 262144/18 bit \| – | ≤ 262144/18 bit \| – |
| **Absolute accuracy** | Up to ± 0.25° (+25 °C) | | | |
| **Operating temperature** | –40 ... +85 °C | | | |
| **Protection** | IP 65, IP 67 | IP 67 | IP 65, IP 67 | IP 67 |
| **Operating speed** | ≤ 6000 rpm | | | |
| **Max. shaft load** | ≤ 40 N axial, ≤ 80 N radial | | | |
| **Options** | Additional incremental signals (SSI, CANopen®) | Additional incremental signals (SSI, CANopen®)<br>Cable with Deutsch connector | Additional incremental signals (SSI, CANopen®) | Additional incremental signals (SSI, CANopen®)<br>Cable with Deutsch connector |

# Precise optical sensing.
# Integrated interface.

- Resolution up to 13 bit per turn
- High accuracy up to ± 0.025 °
- Operating temperature down to –40 °C
- Additional incremental signals

ETHERNET POWERLINK · PROFIBUS · EtherCAT · PROFINET · CANopen · EtherNet/IP · DeviceNet



| Features | ■ Solid shaft with clamping flange | | ■ Solid shaft with synchro flange | | ■ Blind hollow shaft | | ■ Through hollow shaft | |
|---|---|---|---|---|---|---|---|---|
| **Interface** | **Product family** | | | | | | | |
| - SSI or (SSI / incremental) | **GM400** | **GA240** | **GM401** | **GA241** | **GXM2S** | **GXA2S** | **G0M2H** | **G0A2H** |
| - CANopen® | **GXP5W** | **GXU5W** | **GXP5W** | **GXU5W** | **GXP5S** | – | **G0P5H** | – |
| - DeviceNet | **GXP8W** | – | **GXP8W** | – | – | – | – | – |
| - Profinet | **EAL580-SC** | | **EAL580-SY** | | **EAL580-B** | | **EAL580-T** | |
| - EtherNet/IP | **EAL580-SC** | | **EAL580-SY** | | **EAL580-B** | | **EAL580-T** | |
| - EtherCAT | **EAL580-SC** | | **EAL580-SY** | | **EAL580-B** | | **EAL580-T** | |
| **Function principle** | Multiturn | Singleturn | Multiturn | Singleturn | Multiturn | Singleturn | Multiturn | Singleturn |
| **Sensing method** | Optical | | | | | | | |
| **Size (housing)** | ø 58 mm | | | | | | | |
| **Voltage supply** | 10 ... 30 VDC | | | | | | | |
| **Shaft type** | | | | | | | | |
| - Solid shaft | ø 10 mm | | ø 6 mm | | – | | – | |
| - Blind hollow shaft | – | | – | | ø 10 ... 15 mm | | – | |
| - Through hollow shaft | – | | – | | – | | ø 10 ... 14 mm | |
| **Connection** | Flange connector M12, M23, M27, D-SUB or cable (depending on product and variant) | | | | | | | |
| **Total resolution**[1)] | ≤ 29 bit | ≤ 13 bit | ≤ 29 bit | ≤ 13 bit | ≤ 29 bit | ≤ 13 bit | ≤ 29 bit | ≤ 13 bit |
| **Steps per turn** | ≤ 8192/13 bit | | | | | | | |
| **Number of turn** | ≤ 65536/16 bit | – | ≤ 65536/16 bit | – | ≤ 65536/16 bit | – | ≤ 65536/16 bit | – |
| **Absolute accuracy** | ± 0.025° | | | | | | | |
| **Protection** | IP 65 | | | | IP 54 | | | |
| **Operating temperature** | –40 ... +85 °C (depending on product and variant) | | | | | | | |
| **Operating speed** | ≤ 6000 rpm | | | | | | | |
| **Max. shaft load** | ≤ 20 N axial, ≤ 40 N radial | | | | – | | | |
| **Options** | Stainless steel, Offshore | | – | | – | | Protection IP 65 | |

# Absolute encoders

## Precise optical sensing. Integrated interface.

- High resolution up to 18 bit per turn
- High accuracy ± 0.01 °
- Operating temperature down to –40 °C
- Additional incremental signals

HighRes – up to 18 bit singleturn resolution



| Features | ■ Solid shaft with clamping flange<br>■ High resolution | | ■ Solid shaft with synchro flange<br>■ High resolution | | ■ Blind hollow shaft<br>■ High resolution | | ■ Through hollow shaft<br>■ High resolution | |
|---|---|---|---|---|---|---|---|---|
| **Interface** | **Product family** | | | | | | | |
| - SSI or (SSI / incremental) | **GBM2W** | **GBA2W** | **GBM2W** | **GBA2W** | **GBM2S** | **GBA2S** | **GBM2H** | **GBA2H** |
| - CANopen® | **GBP5W** | **GBU5W** | **GBP5W** | **GBU5W** | **GBP5S** | – | **GBP5H** | – |
| - Profinet | **EAL580-SC** | | **EAL580-SY** | | **EAL580-B** | | **EAL580-T** | |
| - EtherNet/IP | **EAL580-SC** | | **EAL580-SY** | | **EAL580-B** | | **EAL580-T** | |
| - EtherCAT | **EAL580-SC** | | **EAL580-SY** | | **EAL580-B** | | **EAL580-T** | |
| **Function principle** | Multiturn | Singleturn | Multiturn | Singleturn | Multiturn | Singleturn | Multiturn | Singleturn |
| **Sensing method** | Optical | | | | | | | |
| **Size (housing)** | ø 58 mm | | | | | | | |
| **Voltage supply** | 10 ... 30 VDC | | | | | | | |
| **Shaft type** | | | | | | | | |
| - Solid shaft | ø 10 mm | | ø 6 mm | | – | | – | |
| - Blind hollow shaft | – | | – | | ø 10 ... 15 mm | | – | |
| - Through hollow shaft | – | | – | | – | | ø 10 ... 14 mm | |
| **Connection** | Flange connector M12, M23, D-SUB or cable (depending on product and variant) | | | | | | | |
| **Total resolution**[1)] | ≤ 32 bit | ≤ 18 bit | ≤ 32 bit | ≤ 18 bit | ≤ 32 bit | ≤ 18 bit | ≤ 32 bit | ≤ 18 bit |
| **Steps per turn** | ≤ 262144/18 bit | | | | | | | |
| **Number of turn** | ≤ 16384/14 bit | – | ≤ 16384/14 bit | – | ≤ 16384/14 bit | – | ≤ 16384/14 bit | – |
| **Absolute accuracy** | ± 0.01° | | | | | | | |
| **Protection** | IP 65 | | | | IP 54 (IP 65 optional) | | IP 54 | |
| **Operating temperature** | –40 ... +85 °C (depending on product and variant) | | | | | | | |
| **Operating speed** | ≤ 6000 rpm | | | | | | | |
| **Max. shaft load** | ≤ 20 N axial, ≤ 40 N radial | | | | – | | | |

1) depending on interface
2) on request

## Precise optical sensing.
## Modular bus cover.

- High resolution up to 18 bit per turn
- High accuracy ± 0.01 °
- Operating temperature down to –40 °C
- Additional incremental signals

HighRes – up to 18 bit singleturn resolution




| Features | ■ Solid shaft with clamping flange<br>■ High resolution | | ■ Solid shaft with synchro flange<br>■ High resolution | | ■ Blind hollow shaft<br>■ High resolution | | ■ Through hollow shaft<br>■ High resolution | |
|---|---|---|---|---|---|---|---|---|
| **Product family** | **GBMMW** | **GBAMW** | **GBMMW** | **GBAMW** | **GBMMS** | **GBAMS** | **GBMMH** | **GBAMH** |
| **Interface** | | | | | | | | |
| - CANopen® | ■ | | ■ | | ■ | | ■ | |
| - DeviceNet | ■ | | ■ | | ■ | | ■ | |
| - Profibus-DP | ■ | | ■ | | ■ | | ■ | |
| - Powerlink | ■ | | ■ | | ■ | | – | |
| **Function principle** | Multiturn | Singleturn | Multiturn | Singleturn | Multiturn | Singleturn | Multiturn | Singleturn |
| **Sensing method** | Optical | | | | | | | |
| **Size (housing)** | ø 58 mm | | | | | | | |
| **Voltage supply** | 10 ... 30 VDC | | | | | | | |
| **Shaft type** | | | | | | | | |
| - Solid shaft | ø 10 mm | | ø 6 mm | | – | | – | |
| - Blind hollow shaft | – | | – | | ø 12 ... 14 mm | | – | |
| - Through hollow shaft | – | | – | | – | | ø 12 ... 14 mm | |
| **Connection** | Bus cover with M12 or cable gland (depending on product and variant) | | | | | | | |
| **Total resolution** | ≤ 31 bit | ≤ 18 bit | ≤ 31 bit | ≤ 18 bit | ≤ 31 bit | ≤ 18 bit | ≤ 31 bit | ≤ 18 bit |
| **Steps per turn** | ≤ 262144/18 bit | | ≤ 262144/18 bit | | ≤ 262144/18 bit | | ≤ 262144/18 bit | |
| **Number of turn** | ≤ 8192/13 bit | – | ≤ 8192/13 bit | – | ≤ 8192/13 bit | – | ≤ 8192/13 bit | – |
| **Absolute accuracy** | ± 0.01° | | | | | | | |
| **Protection** | IP 54, IP 65 | | | | | | IP 54 | |
| **Operating speed** | ≤ 6000 rpm | | | | | | | |
| **Operating temperature** | –25 ... +85 °C | | | | | | | |
| **Max. shaft load** | ≤ 20 N axial, ≤ 40 N radial | | | | – | | – | |
| **Options** | Incremental outputs<br>Operating temperature<br>–40 ... +85 °C | | | | | | Protection IP 69K<br>Stainless steel variant<br>Operating temperature<br>–40 ... +85 °C | |

## With SIL2 and SIL3 certification.
## For quick implementation of your system concepts.

- Size ø 58 ... 105 mm
- Square wave and sine signals

PL SIL Functional Safety

| | | |
|---|---|---|
| **Features** | ■ Sine encoders<br>■ Through hollow shaft<br>■ SIL2/SIL3 approval | ■ Incremental encoders<br>■ Solid shaft with clamping or synchro flange<br>■ SIL2 approval |
| **Product family** | **ITD22H00 SIL** | **GI357** |
| **Sensing method** | Optical | |
| **Size (housing)** | ø 58 mm | ø 58 mm |
| **Voltage supply** | 5 VDC ± 10 % | 24 VDC +20/–50 % |
| **Output stage** | | |
| - TTL/RS422 | – | ■ |
| - HTL/push-pull | – | ■ |
| - SinCos 1 Vpp | ■ | – |
| **Output signals** | A, B, N | A 90° B + inverted |
| **Shaft type** | | |
| - Cone shaft 1:10 | – | – |
| - Solid shaft | – | ø 6 mm / ø 10 mm |
| - Blind hollow shaft | – | – |
| - Through hollow shaft | ø 10, ø 12, ø 14 mm | – |
| **Flange** | – | Clamping or synchro flange |
| **Connection** | | |
| - Terminal box | – | – |
| - Flange connector M12, M23 | – | Radial, axial |
| - Cable | Tangential | – |
| **Pulses per revolution** | – | 5 ... 5000 |
| **Sine waves per revolution** | 1024, 2048 | – |
| **Operating temperature** | –30 ... +100 °C | –25 ... +85 °C |
| **Protection** | IP 65 | IP 54 (without shaft seal)<br>IP 65 (with shaft seal) |
| **Operating speed** | ≤ 6000 rpm | ≤ 10 000 rpm |
| **Max. shaft load** | – | ≤ 20 N axial, ≤ 40 N radial |
| **Approval** | SIL2 or SIL3 compliant in redundant use | SIL2 compliant to IEC 61508 |
| **Other** | Suitable to safety speed switches GMM2xxS | |

## V2A and V4A.

- Size 58 mm
- SSI, fieldbus, real time EtherNet

EtherCAT · EtherNet/IP · PROFIBUS · CANopen · DeviceNet · PROFINET · ETHERNET POWERLINK · SSI · SAE J1939

## *MAGRES hermetic*




| Features | ■ Solid shaft with clamping flange<br>■ Integrated interfaces | | ■ Solid shaft with clamping or synchro flange<br>■ Through hollow shaft<br>■ Modular bus cover | | ■ Solid shaft with clamping flange<br>■ Hermetically sealed<br>■ Integrated interfaces | ■ Solid shaft with clamping flange<br>■ Hermetically sealed<br>■ Modular bus cover |
|---|---|---|---|---|---|---|
| **Product family** | **GE244** | **GE404** | **GEMMW** | **GEMMH** | **BMMV 58 -** *MAGRES hermetic* | **BMMV 58 flexible -** *MAGRES hermetic* |
| **Interface** | | | | | | |
| - SSI | ■ | | – | | ■ | – |
| - CANopen® | – | | ■ | | ■ | ■ |
| - DeviceNet | – | | ■ | | – | ■ [1] |
| - Profibus-DP | – | | ■ | | ■ | ■ |
| - SAE J1939 | – | | ■ [1] | | – | ■ |
| - EtherCAT | – | | ■ [1] | | – | ■ [1] |
| - EtherNet/IP | – | | ■ [1] | | – | ■ |
| - Powerlink | – | | ■ [1] | | – | ■ [1] |
| - Profinet | – | | ■ [1] | | – | ■ |
| **Function principle** | Singleturn | Multiturn | Multiturn | | Multiturn | Multiturn |
| **Sensing method** | Optical | | | | Magnetic | |
| **Size (housing)** | ø 58 mm | | | | | |
| **Voltage supply** | 10 ... 30 VDC | | | | | |
| **Shaft type** | | | | | | |
| - Solid shaft | ø 10 mm | | ø 6, ø 10 mm | – | ø 10 mm | |
| - Through hollow shaft | – | | – | ø 12 ... 14 mm | – | – |
| **Connection** | M23 radial | | Bus cover cable gland | | Bus cover M12 | |
| **Total resolution** | 14 bit | 26 bit | 29 bit | | ≤ 29 bit | ≤ 30 bit |
| **Steps per turn** | ≤ 16384/14 bit | ≤ 4096/12 bit | ≤ 8192/13 bit | | ≤ 8192/13 bit | ≤ 4096/12 bit |
| **Number of turn** | – | ≤ 16384/14 bit | ≤ 65 536/16 bit | | ≤ 65 536/16 bit | ≤ 262 144/18 bit |
| **Absolute accuracy** | ± 0.025° | | | | ± 1° | |
| **Operating temperature** | –25 ... 85 °C | | | | –40 ... +85 °C | |
| **Protection** | IP 67 | | | | IP 68, IP 69 K | |
| **Operating speed** | ≤ 6000 rpm | | | | | |
| **Max. shaft load** | ≤ 20 N axial<br>≤ 40 N radial | | ≤ 20 N axial<br>≤ 40 N radial | – | ≤ 120 N axial (combined), ≤ 280 N radial (combined)<br>≤ 270 N axial (single load) | |
| **Material** | Stainless steel: 1.4305 / 1.4404 | | Stainless steel: 1.4305 | | | |

1) on request

# Accessories


## Mounting accessories for hollow shaft encoders

Matching accessories for hollow shaft mount

- Stator couplings for ultra-precise mount with maximum installation flexibility
- Safe and easy anti-torsion spring washers and pins
- Torque supports for industry and HeavyDuty variants

## Mounting accessories for solid shaft encoders

Matching accessories for solid shaft mount

- Shaft couplings to link drive shaft and encoder shaft
- Mounting clamp to secure encoder flange
- Adaptor flange and mounting angle for quick and safe encoder mount
- Flange adaptor, for example to change a clamping flange into a synchro flange

## Small and large measuring wheels

Measuring wheels – for any surface the optimum grip

- Wheel material and surface profile depending on the application
- Circumference 20 or 50 cm
- For shaft diameters from 4 to 12 mm

# Encoders and angular sensors

Several mechanical and electric interface concepts as well as increasingly demanding applications call for appropriate accessories. With Baumer you will always encounter the matching mounting accessories like torque supports, spring washers, connectors and cables.

Deployed in conjunction with incremental encoders, measuring wheels perform the task of length measurement or speed monitoring. Learn more at: www.baumer.com

## Varied connectors and cables

Matching all encoders and angular sensors

- Mating connector M12, M23, MIL and other standards
- Mating connector pre-assembled or for self-assembly
- Different cables, non-assembled

## Programming and diagnostic tools

For encoder commissioning and configuration

- Signal processing for interpolation, conversion, regenerating and as a switching relay, HTL, TTL, SinCos and fiber-optic
- Programming tools with GSD-/EDS-/XML files as well as instruction manuals, USB adatpor and PC software
- Testing equipment for incremental encoders for consistent monitoring of encoder data
- PC software for display and evaluation

## Programmable resolution and signals

Cutting down on product variety, downtime, maintenance and inventory cost

- 1 ... 65 536 ppr programmable
- Pulse sequence and zero pulse programmable
- Easy programming by handheld tool or PC software
- Convenient programming of several encoders connected in series
- Automatic detection of neighboring devices
- On-screen diagnostics

# Format adjustment

| Designation | Article number | Application profile | Nominal voltage | Rated torque | Nominal speed | Max. torque | Operating temperature range | Protection class | Connector output |
|---|---|---|---|---|---|---|---|---|---|
| **Compact drives for automated format adjustment** | | | | | | | | | |
| MSIA 68 bevel gear transmission W3 CANopen® | 10165384 | CiA 402, CiA 305 | 24 V | 4.0 Nm | 100 rpm | 10 Nm | –15 ... +65 °C (rating at +40 °C) | IP 54 | axial |
| MSIA 68 bevel gear transmission W3 PROFIBUS | 10165308 | PROFIdrive | 24 V | 4.0 Nm | 100 rpm | 10 Nm | –15 ... +65 °C (rating at +40 °C) | IP 54 | axial |

| Designation | Article number | Operating voltage | Measuring principle/function | Measuring range | Step count/ revolutions | Number of revolutions | Spindle pitch | Operating temperature range | Protection class | Type of enclosure | Connection | Dimensions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Spindle position display for manual format adjustment** | | | | | | | | | | | | |
| Manual format adjustment | N150 | 24 V | Absolute multiturn | –99.999 ... +999.99 mm, –9.999 ... +99.999 inch | 1440 | 4096 / 12 bit | ≤ 14 mm | –50 ... +50 °C | IP 50 | Plug-on enclosure with hollow shaft | M8 connector/socket, 4-pin, Cable outlet (30/15 cm) with M8 connector/ socket, 4-pin, RS485 interface | 37 × 75 × 45 mm |
| Memory controller | N242 | 24 V | Programming and memory unit, memory for 100 formats, max. 32 position displays (LCD) | | none | none | none | –10 ... +50 °C | IP 65 | Built-in enclosure with 10 digit and 8 function keys | Screw terminals, RS485 interface | 144 × 144 × 116.5 mm |

# Baumer – the strong partner.

We at Baumer are close to our customers, understand their needs and provide the best solution. Worldwide customer service for Baumer starts with on-the-spot personal discussions and qualified consultation. Our application engineers speak your language and strive from the start, through an interactive problem analysis, to offer comprehensive and user-compatible solutions.

## We are close to you across the globe.

The worldwide Baumer sales organizations guarantee short delivery times and readiness to supply. Many of our customers are directly linked via our electronic order system with the JIT logistics process.

A worldwide network coupled with the most modern communication techniques enable us to deliver information quickly and transparently to decision makers in all Baumer locations.

Closeness to the customer for Baumer means being available for your needs anywhere and at any time.

# Worldwide presence.

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Morocco
Reunion
South Africa

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Colombia
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United States
Venezuela

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China
India
Indonesia
Israel
Japan
Kuwait
Malaysia
Oman
Philippines
Qatar
Saudi Arabia
Singapore
South Korea
Taiwan
Thailand
UAE

**Europe**
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Bulgaria
Croatia
Czech Republic
Denmark
Finland
France
Germany
Greece
Hungary
Italy
Malta
Martinique
Netherlands
Norway
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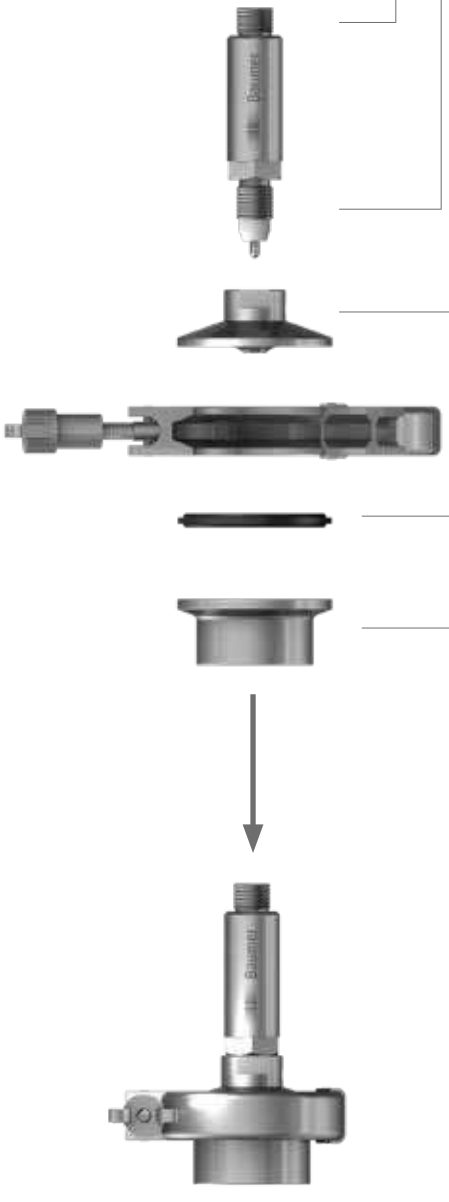
Represented by:

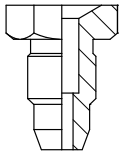

03/19 No. 11213666

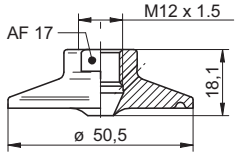
# Baumer Hygienic Connection

## Selection guide



| Sensor | | TE2 |
|---|---|---|
| Instrument connection | Description | M12×1.5 hygienic |
| | BCID | A02 |

| Instrument connection | BCID | A02 |
|---|---|---|
| | |  |
| Process connection | Description | M12×1.5 hygienic |
| | BCID | A02 |

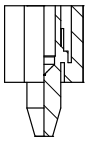
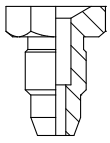
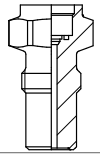
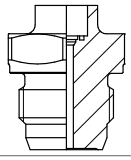
| Hygienic adapters | BCID | A02 |
|---|---|---|
| | Description | M12×1.5 hygienic |
| Ordering key | | ZPH1-2213 |
| | |  |
| Process connection | Description | Tri-Clamp Ø 50.5 |
| | BCID | C04 |

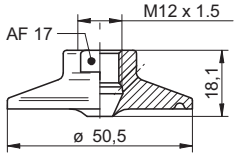
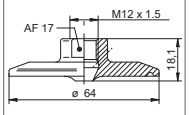
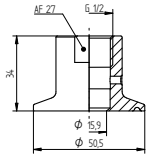
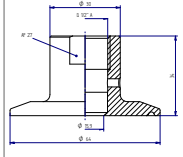
| Mounting aids | BCID | C04 |
|---|---|---|
| | Description | Tri-Clamp Ø 50.5 |
| Ordering key | | ZPX4-310 |
| | |  |
| | BCID | C04 |

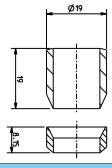
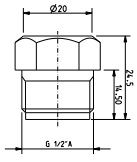
| Gaskets and O-rings | BCID | C04 |
|---|---|---|
| | Description | Tri-Clamp Ø 50.5 |
| Ordering key | | ZPX3-7234 |
| | |  |
| | BCID | C04 |

| Hygienic weld-in sleeves | BCID | C04 |
|---|---|---|
| | Description | Tri-Clamp Ø 50.5 |
| Ordering key | | ZPX4-320 |
| | |  |
| | Description | Universal use |
| | BCID | W_U_use |

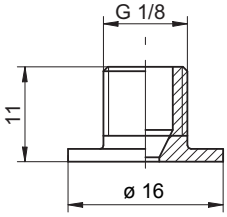
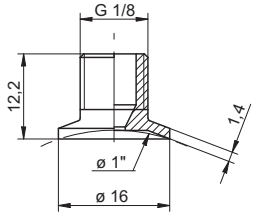
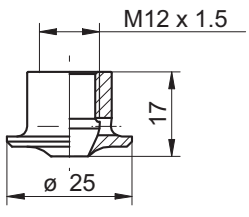
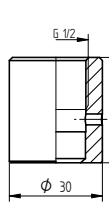
| | | Conductivity | | Level | | | | | PBMN flush | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sensor | | AFI4 | AFI5 | LFFS | | LBFS | LBFI | LBFH | LSP | | | |
| Instrument connection | Description | G1 A hygienic | G1 A hygienic | G 1/2 A hygienic | BHC 3A DN 38 | G 1/2 A hygienic | G 1/2 A hygienic | G 1/2 A hygienic | G1 A hygienic | G 1/2 A hygienic | G1 A hygienic | BHC 3A DN 38 |
| | BCID | A04 | A04 | A03 | B01 | A03 | A03 | A03 | A04 | A03 | A04 | B01 |

| Instrument connection | BCID | A01 | A02 | A03 | A04 |
|---|---|---|---|---|---|
| | |  |  |  |  |
| Process connection | Description | G 1/8 B male thread hygienic | M12×1.5 hygienic | G 1/2 A hygienic | G1 A hygienic |
| | BCID | A01 | A02 | A03 | A04 |

| Hygienic adapters | BCID | A02 | | A02 | A03 | | A03 |
|---|---|---|---|---|---|---|---|
| | Description | M12×1.5 hygienic | | M12×1.5 hygienic | G 1/2 A hygienic | | G 1/2 A hygienic |
| Ordering key | | ZPH1-2213 | | ZPH1-2216 | ZPH3-3213 | | ZPH3-3216 |
| | |  | |  |  | |  |
| Process connection | Description | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 64.0 | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 64.0 |
| | BCID | C03 | C04 | C05 | C03 | C04 | C05 |

| Mounting aids | BCID | A03 | A03 |
|---|---|---|---|
| | Description | G 1/2 A hygienic with sliding connection | G 1/2 A hygienic with sliding connection |
| Ordering key | | ZPX1-006 | ZPX1-008 |
| | |  |  |
| | BCID | A03_Sliding | A03_Sliding |

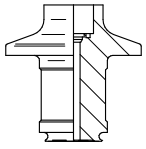
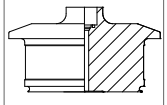
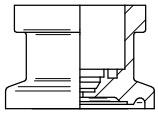
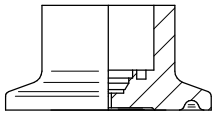
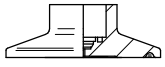
| Gaskets and O-rings | BCID | C04 | C04 |
|---|---|---|---|
| | Description | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 50.5 |
| Ordering key | | ZPX3-7232 | ZPX3-7234 |
| | |  |  |
| | BCID | C04 | C04 |

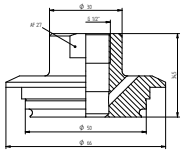
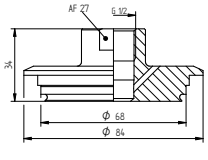
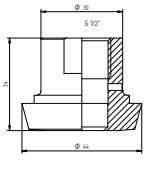
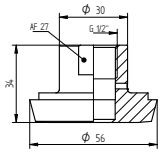
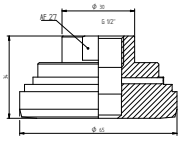
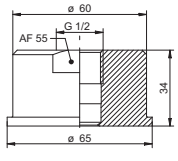
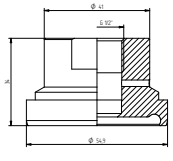
| Hygienic weld-in sleeves | BCID | A01 | A01 | A02 | A03 |
|---|---|---|---|---|---|
| | Description | G 1/8 B male thread hygienic | G 1/8 B male thread hygienic | M12×1.5 hygienic | G 1/2 A hygi |
| Ordering key | | ZPW2-122 | ZPW2-125 | ZPW2-222 | ZPW3-32 |
| | |  |  |  |  |
| | Description | Ø 16 × 12.2 (Thin-walled tanks) | DN 25, Ø 16 (Pipes without collar) | Ø 25 × 17 (Thin-walled tanks) | Ø 30 × 34 (Thick-wa |
| | BCID | W01 | W02 | W05 | W21 |

A01 … A04 B01 … B02 C01 … C05 D01 … D04 H03 … H04 S01 … S02 V01 … V02

Pressure

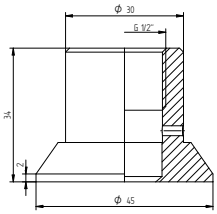
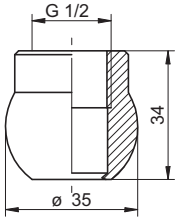
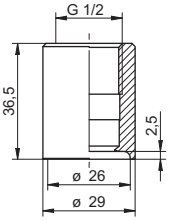
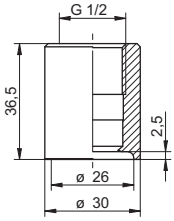
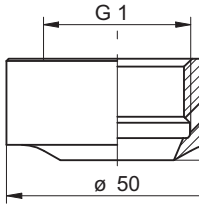
| PBMH | | | | | | | | | PFMH | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BHC 3A DN 76 | Tri-Clamp Ø 24.9 | Tri-Clamp Ø 34.0 | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 64.0 | Varivent® (Type F), Ø 50 | Varivent® (Type N), Ø 68 | DIN 11864-3-A, DN25, Ø 50.5 | BHC 3A DN 38 | BHC 3A DN 76 | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 64.0 | Varivent® (Type N), Ø 68 | G 1/2 A hygienic | G1 A hygienic | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 64.0 |
| B02 | C01 | C02 | C03 | C04 | C05 | V01 | V02 | H41 | B01 | B02 | C04 | C05 | V02 | A03 | A04 | C03 | C05 |

| B01 | B02 | C01 | C02 | C03 | C04 |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| BHC 3A DN 38 | BHC 3A DN 76 | Tri-Clamp Ø 24.9 | Tri-Clamp Ø 34.0 | Tri-Clamp Ø 50.5 | Tri-Clamp Ø |
| B01 | B02 | C01 | C02 | C03 | C04 |

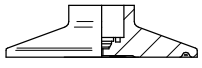
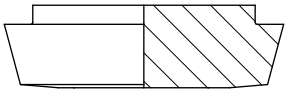
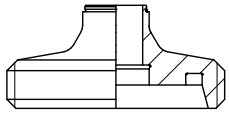
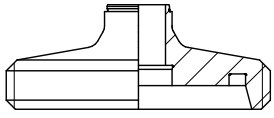
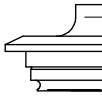
| A03 | A03 | A03 | A03 | A03 | A03 | A03 |
|---|---|---|---|---|---|---|
| G 1/2 A hygienic | G 1/2 A hygienic | G 1/2 A hygienic | G 1/2 A hygienic | G 1/2 A hygienic | G 1/2 A hygienic | G 1/2 A hygienic |
| ZPH3-344F | ZPH3-324E | ZPH3-3221 | ZPH3-3224 | ZPH3-3225 | ZPH1-3236 | ZPH3-3254 |
|  |  |  |  |  |  |  |
| Varivent®, Ø 50 | Varivent®, Ø 68 | DIN 11851, DN 25 | DIN 11851, DN 40 | DIN 11851, DN 50 | SMS 1145, DN 51 | DIN 11864-1-A, DN 40 |
| V01 | V02 | D01 | D03 | D04 | S02 | H03 |

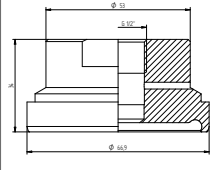
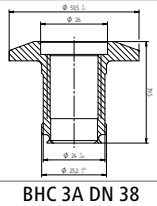
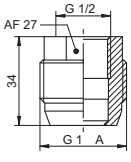
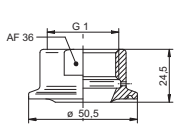
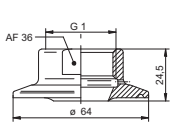
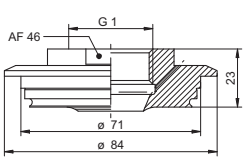
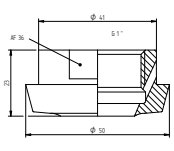
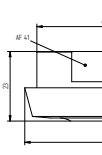
| D03 | D04 | D05 |
|---|---|---|
| DIN 11851 (dairy pipe connection), DN 40 | DIN 11851 (dairy pipe connection), DN 50 | DIN 11851 (dairy pipe connection), DN 65 |
| ZPX4-440 | ZPX4-540 | ZPX4-740 |
|  |  |  |
| D03 | D04 | D05 |

| | C05 | C04 |
|---|---|---|
| | Tri-Clamp Ø 64.0 | Tri-Clamp Ø 50.5 |
| | ZPX3-7262 | ZPX3-7234 |
| |  |  |
| | C05 | C04 |

| | A03 | A03 | A03 | A03 | A04 |
|---|---|---|---|---|---|
| enic | G 1/2 A hygienic | G 1/2 A hygienic | G 1/2 A hygienic | G 1/2 A hygienic | G1 A hygienic |
| 1 | ZPW3-322 | ZPW2-324 | ZPW2-326 | ZPW2-327 | ZPW2-521 |
| |  |  |  |  |  |
| alled tanks) | Ø 45 × 34 (Thin-walled tanks) | Ø 35 × 34 (Inclined mounting) | DN 25 … 50, Ø 29 × 36.5 (Pipes with collar) | DN 65 … 150, Ø 30 × 36.5 (Pipes with collar) | Ø 50 × 23 (Thick-walle |
| | W20 | W30 | W25 | W26 | W45 |

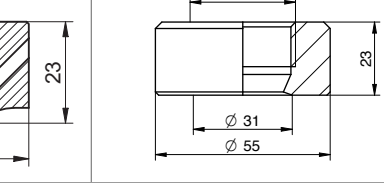
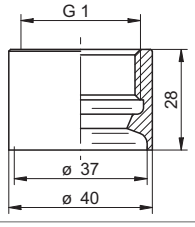
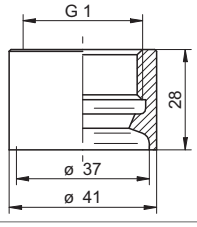
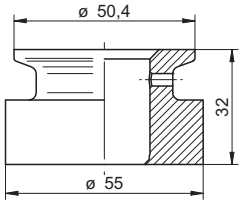
| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | Tempe |
| PP20H | | | | | | | (Y)Ted | | | TFRH | | | | | | TER8 | | | |
| | DIN 11851, DN 40 | DIN 11851, DN 50 | Varivent® (Type F), Ø 50 | Varivent® (Type N), Ø 68 | DIN 11864-1-A, DN 40 | DIN 11864-1-A, DN 50, female thread | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 64.0 | G 1/2 A hygienic | BHC 3A DN 38 | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 64.0 | Varivent® (Type N), Ø 68 | G 1/2 A hygienic | G 1/8 B male thread hygienic | | |
| | D03 | D04 | V01 | V02 | H03 | H14 | C03 | C04 | C05 | A03 | B01 | C03 | C04 | C05 | V02 | A03 | A01 | | |

| | C05 | D01 | D03 | D04 | |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| Ø 50.5 | Tri-Clamp Ø 64.0 | DIN 11851, DN 25 | DIN 11851, DN 40 | DIN 11851, DN 50 | Varive |
| | C05 | D01 | D03 | D04 | |

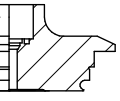
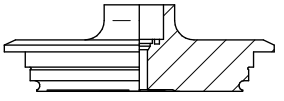
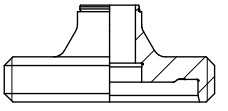
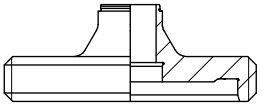
| A03 | A03 | A03 | A04 | A04 | A04 | A04 | A |
|---|---|---|---|---|---|---|---|
| G 1/2 A hygienic | G 1/2 A hygienic | G 1/2 A hygienic | G1 A hygienic | G1 A hygienic | G1 A hygienic | G1 A hygienic | G1 A h |
| ZPH3-3255 | ZPH1-32D3 | ZPH1-32C0 | ZPH1-5213 | ZPH1-5216 | ZPH1-524E | ZPH3-5222 | ZPH3 |
|  |  |  |  |  |  |  |  |
| DIN 11864-1-A, DN 50 | BHC 3A DN 38 | G1 A hygienic | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 64.0 | Varivent® (Type N), Ø 68 | DIN 11851, DN 32 | DIN 1185 |
| H04 | B01 | A04 | C04 | C05 | V02 | D02 | D0 |

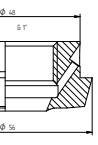
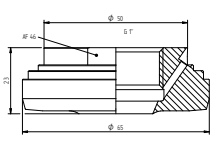
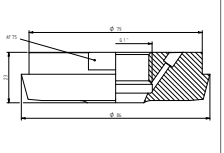
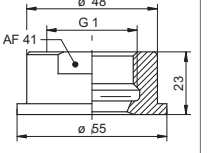
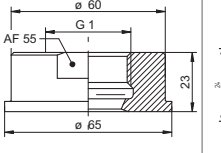
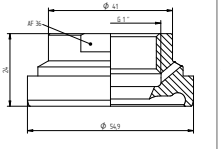
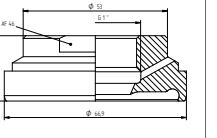
| | D01 | S01 | S02 | |
|---|---|---|---|---|
| | DIN 11851 (dairy pipe connection), DN 25 | SMS 1145, DN 38 | SMS 1145, DN 51 | |
| | ZPX4-140 | ZPX4-330 | ZPX4-630 | |
| |  |  |  | |
| | D01 | S01 | S02 | |

| | B02 | V01 | |
|---|---|---|---|
| | BHC 3A DN 76 | Varivent® DN 25; 1" (Type F), Ø 50 | |
| | ZPX2-223 | ZPX2-823 | |
| |  |  | |
| | B02 | V01 | |

| | A04 | A04 | A04 | B01 | |
|---|---|---|---|---|---|
| | G1 A hygienic | G1 A hygienic | G1 A hygienic | BHC 3A DN 38 | |
| | ZPW2-531 | ZPW2-526 | ZPW2-527 | ZPW2-621 | |
| |  |  |  |  | |
| ed tanks) | Ø 50 × 23 (Thick-walled tanks) | DN 40 … 50, Ø 40 × 28 (Pipes with collar) | DN 65 … 150, Ø 41 × 28 (Pipes with collar) | Ø 55 × 32 (Thick-walled tanks) | DN 38, Ø 38 × 40 (Pipes with collar) |
| | W45 | W40 | W41 | W65 | W60 |

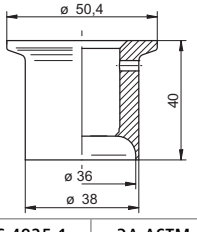
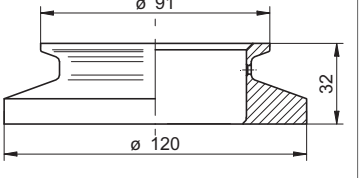
| erature | | | | | | | Flow | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TE2 | | | | | | 8155 Hygienic cable sensor | *FlexFlow* PF20H | | | | | | | | | |
| M12×1.5 hygienic | G 1/2 A hygienic | BHC 3A DN 38 | Tri-Clamp Ø 24.9 | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 50.5 | G 1/8 B male thread hygienic | G 1/2 A hygienic | BHC 3A DN 38 | Tri-Clamp Ø 34.0 | Tri-Clamp Ø 50.5 | Tri-Clamp Ø 64.0 | DIN 11851, DN 25 | DIN 11851, DN 40 | DIN 11851, DN 50 | Varivent® (Type F), Ø 50 | Varivent® (Type N), Ø 68 |
| A02 | A03 | B01 | C01 | C03 | C04 | A01 | A03 | B01 | C02 | C04 | C05 | D01 | D03 | D04 | V01 | V02 |

| V01 | V02 | H03 | H14 | H41 |
|---|---|---|---|---|
|  |  |  |  |  |
| nt®, Ø 50 | Varivent® (Type N), Ø 68 | DIN 11864-1-A, DN 40 | DIN 11864-1-A, DN 50, female thread | DIN 11864-3-A, DN25, Ø 50.5 |
| V01 | V02 | H03 | H14 | H41 |

| 04 | A04 | A04 | A04 | A04 | A04 | A04 |
|---|---|---|---|---|---|---|
| ygienic | G1 A hygienic | G1 A hygienic | G1 A hygienic | G1 A hygienic | G1 A hygienic | G1 A hygienic |
| -5224 | ZPH3-5225 | ZPH3-5227 | ZPH1-5233 | ZPH1-5236 | ZPH3-5254 | ZPH3-5255 |
|  |  |  |   |   |  |  |
| 51, DN 40 | DIN 11851, DN 50 | DIN 11851, DN 65 | SMS 1145, DN 38 | SMS 1145, DN 51 | DIN 11864-1-A, DN 40 | DIN 11864-1-A, DN 40 |
| 03 | D04 | D05 | S01 | S02 | H03 | H03 |

| C05 | B02 | C04 | B01 |
|---|---|---|---|
| Tri-Clamp Ø 64.0 | BHC 3A DN 76 | Tri-Clamp Ø 50.5 | |
| ZPX4-610 | ZPX4-810 | ZPX4-310 | |
|  |  |  | |
| C05 | B02 | C04 | B01 |

| V02 | B01 | C04 |
|---|---|---|
| Varivent® DN 32 … 125; 1 1/2" … 6" (Type N), Ø 68 | BHC 3A DN 38 | Tri-Clamp Ø 50.5 |
| ZPX2-323 | ZPX2-123 | ZPX3-B232 |
|  |  |  |
| V02 | B01 | C04 |

| B01 | | | | | B02 | C04 |
|---|---|---|---|---|---|---|
| BHC 3A DN 38 | | | | | BHC 3A DN 76 | Tri-Clamp Ø 50.5 |
| ZPW2-626 | | | | | ZPW2-721 | ZPX4-320 |
|   | | | | |   |  |
| ISO 2037 | BS 4825-1 | 3A ASTM A270 | SMS 3008 | Dutch Dairy | Ø 120 × 32 (Thick-walled tanks) | Universal use |
| P12 | P21 | P31 | P41 | P46 | W70 | W_U_use |