

BALLUFF

sensors worldwide

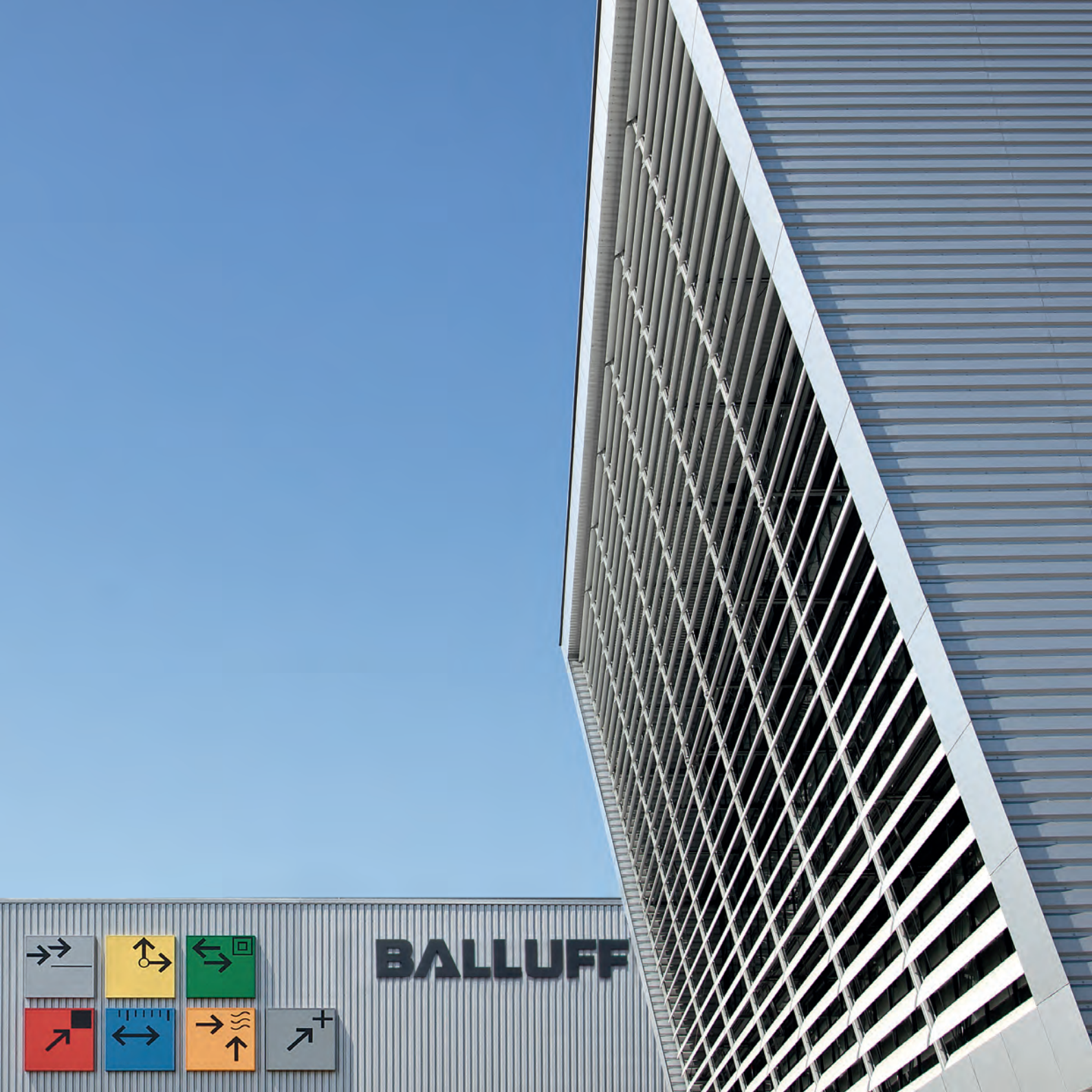


Products + News

Best Quality for Efficient Automation

+++ Systems and Service +++ Industrial Networking and Connectivity +++ Industrial Identification +++
Object Detection +++ Linear Position Sensing and Measurement +++ Condition Monitoring and Fluid Sensors +++ Accessories





BALLUFF

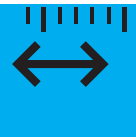
As the leading sensor specialist and system provider with more than 90 years of company tradition, Balluff GmbH has been a recognized partner in factory automation for decades. The global player has a strong presence with 61 sales branches and representative offices as well as nine production sites on all continents. The corporate headquarters in Neuhausen a.d.F. is located near Stuttgart.

Balluff offers a wide array of products with varied operating principles taking advantage of the broad spectrum of technology available, including high-quality sensors and systems for position measurement and identification, as well as sensors for detecting objects and measuring fluids. The full-range assortment includes optimal network and connection technology and a comprehensive line of accessory products.

We offer innovative, first-class products tested in our own accredited laboratory and maintain certified quality management in accordance with DIN EN 9001:2008. Our technology speaks for itself in international applications since it also meets regional standards.

Balluff stands for application-specific customer solutions, comprehensive services, individual consultation and prompt service. Our staff of more than 2750 employees is committed to providing outstanding service worldwide.

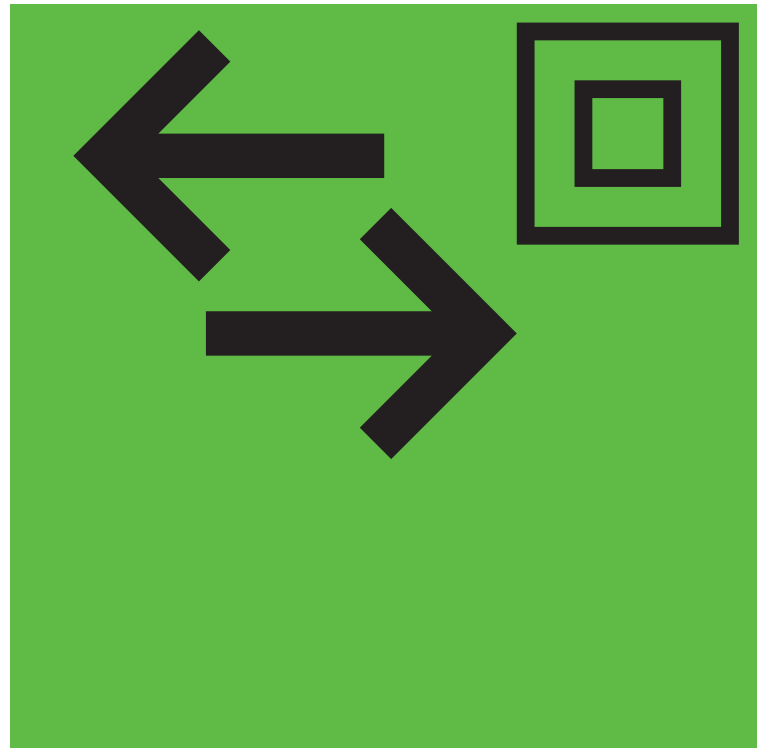
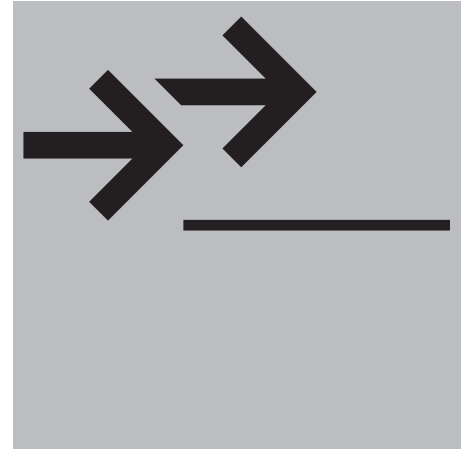
Benefit from comprehensive sensor expertise from a single source. Achieve solutions suited to your requirements.



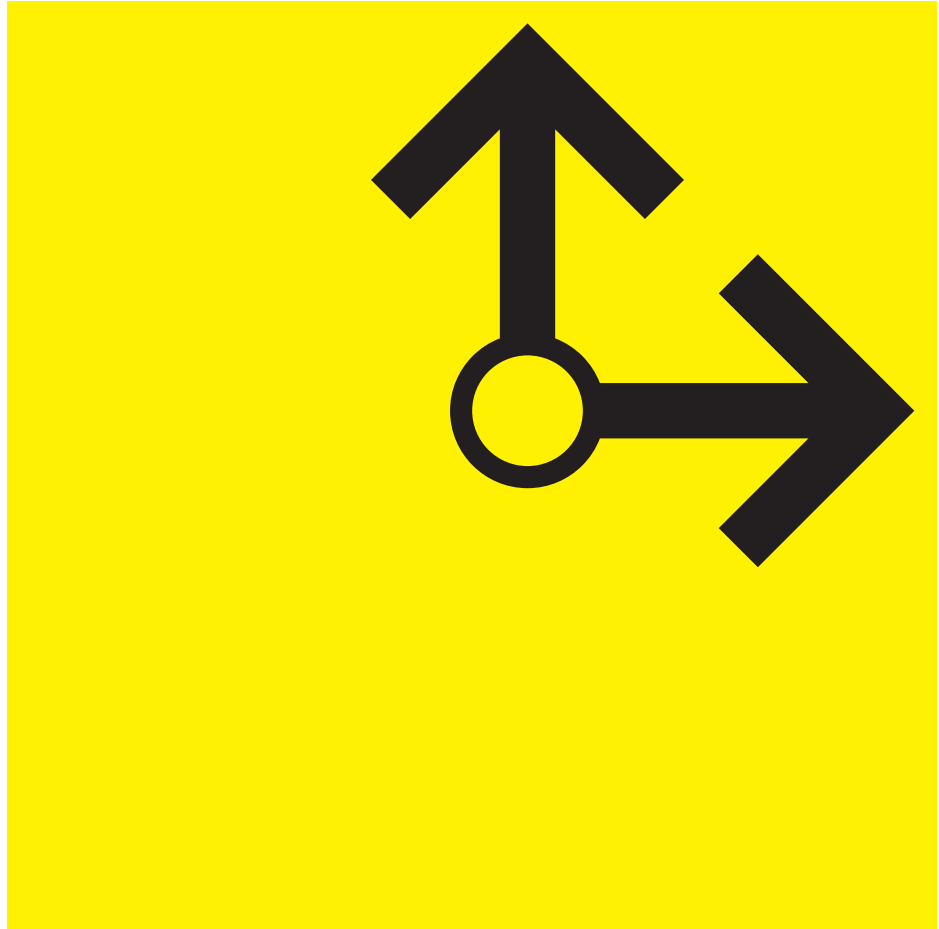
Systems and Service

Service

Mold ID on page 10
Tool ID Upgrade on page 12



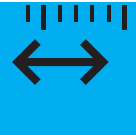
Industrial Identification



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Network Technology for Reliable Data Transfer
on page 16

Profinet
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Industrial Networking and Connectivity

Object Detection

Photoelectric Sensors

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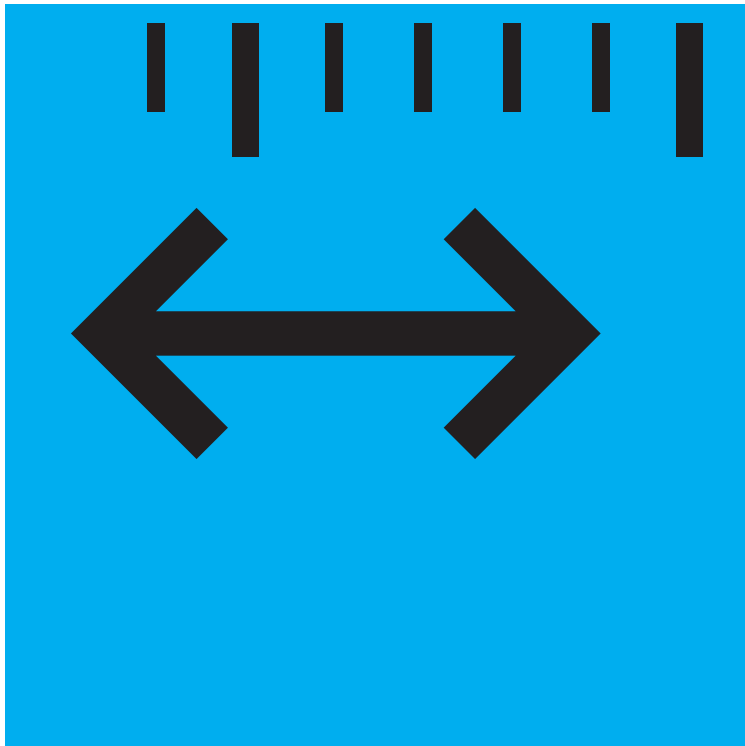
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Accessories





Condition Monitoring and Fluid Sensors



**Magnetically Coded Position
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Photoelectric Distance Sensors
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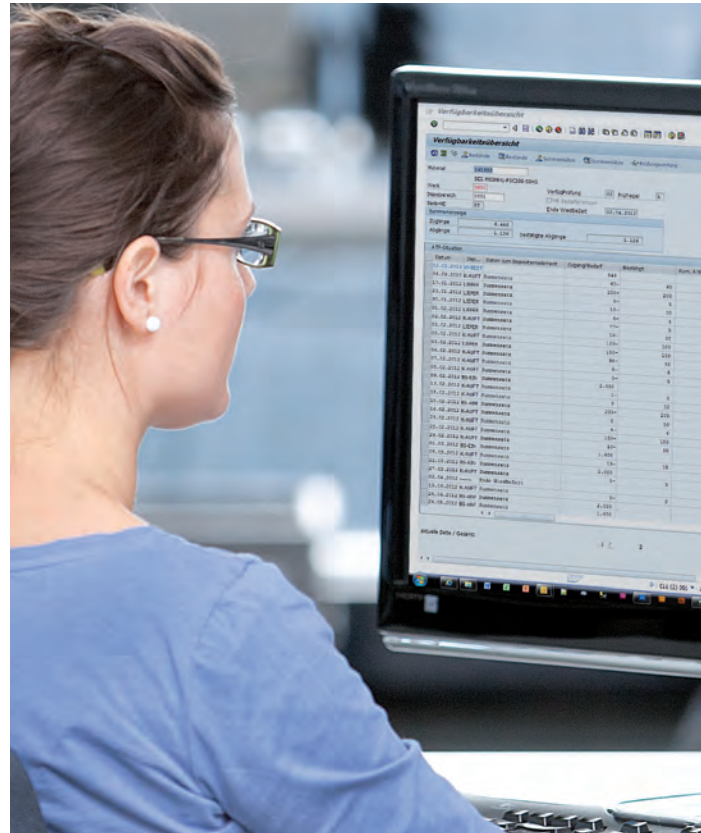
Linear Position Sensing and Measurement



Systems and Service



Mold ID
Mold ID Upgrade



Mold ID – Transparency in Mold Handling

Optimize utilization of your injection molding tools

Monitoring repair and maintenance

Mold ID makes the use of injection molds traceable and ensures their optimal utilization. Each mold has to be clearly identified, because all relevant data—such as drawing number, last maintenance or service life—is saved to the mold and can be retrieved at any time. This makes incorrect assignments and missing forms a thing of the past. Production cycles are also counted. This enables condition-based maintenance of the tools. This extends the runtime and supports reliable operation. It increases the productivity of the systems and improves the efficiency. Ensure transparency with Mold ID.

Mold ID is backed by an autonomous system. All machines can be upgraded individually, without the manufacturer and regardless of the location.

Another plus: You can access the Mold ID system from anywhere in the world using a standard web browser, smartphone or tablet PC. An app with functions protected by configurable passwords enables access to the data directly on the mold by using Near Field Communication (NFC).



Software interface of the Mold-ID system. Access is via a normal web browser.



Mold ID – components

Data carriers

- For each mold
- Variant depends on the ambient conditions

Shot counter

Via inductive sensor for communication with the data carrier

RFID unit

For communication with the data carrier

Mobile end devices

- Read data
- For initializing data carriers
- For setting limit values
- For password protection

Mold ID unit

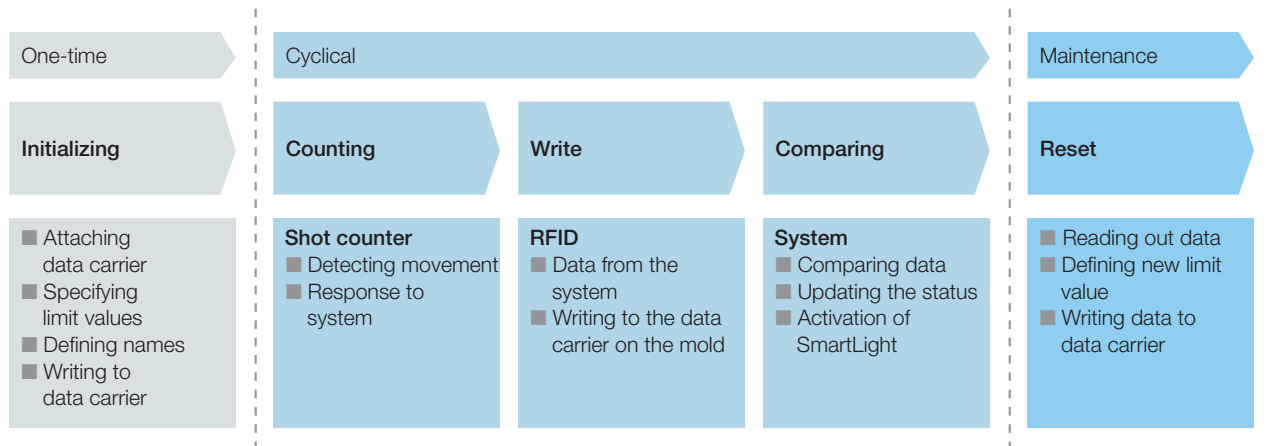
- Industrial PC
- Software
- Gateway to the company network
- Visualization with the SmartLight signal light

Molds are subject to wear and tear and must be regularly maintained as a result. The regularity of inspection often depends on the experience values of individual employees or handwritten notes that are not available to everyone.

In many cases, therefore, maintenance and inspection are frequently carried out only if the produced parts no longer meet the required quality standards or if the mold malfunctions.

Benefits

- Fewer unplanned downtimes as the result of
 - continuous **counting** of the shots
 - automatic **documentation** on the mold
 - **visualizing** the mold status
 - **notice** for the operator about the next scheduled maintenance
- Transparency through the level of use of identically designed molds
- Overview of all molds currently running on the machines, through access to the systems over the company network via TCP/IP.
- Mobile reading out of the documented mold data via smartphone or RFID handheld, for example, during an audit or when selecting the correct mold.



Tool ID Upgrade – Upgrading from a Single Source

For optimum tool usage

For all common technologies

Tool ID Upgrade is a complete solution for upgrading the tool ID on existing machines. This all-around package with an industrial RFID system provides the optimal interface between the setting device and the machine control system. It is ideal for all common technologies.*

Each solution is tailored to your individual requirements.

*The system can be implemented in most controllers, such as those from Siemens, Heidenhain, Fanuc or Mazak. If you work with a different manufacturer, please contact us.

Features for optimizing your processes

- Safe transmission of the tool parameters
- Correct machine assignments by scanning on the tool magazine
- Visual depiction of tool data on the monitor
- Faster set-up times through automation
- Optimal utilization of the tools



RFID-based tool identification optimizes setup times.



System description

Hardware – control unit

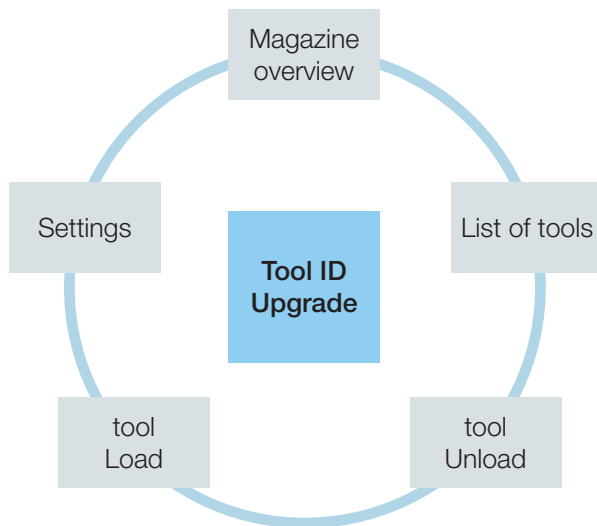
- Panel PC with touch screen
- RFID reader with BIS C series interface
- 24 V power supply for reader and panel PC
- Holder for the installation

Hardware – tool holder, e.g. for HSK, ISO

- Mechanical holder for the tools
- Holder for the read/write head
- BIS C series read/write head
- Holder for the installation
- Cabling

Software

- Pre-installed with the option for the relevant controller



Functional range of the software

Commissioning

- Installing tool holders and the control units on each machine
- Configuring the readers
- Connecting to the relevant controller
- Starting up individual machines
- Tests and validating function
- Collective acceptance of the installation

Training

- Creating specific documents
- Your authorized personnel will be instructed in operation.

Tool ID Upgrade – application description

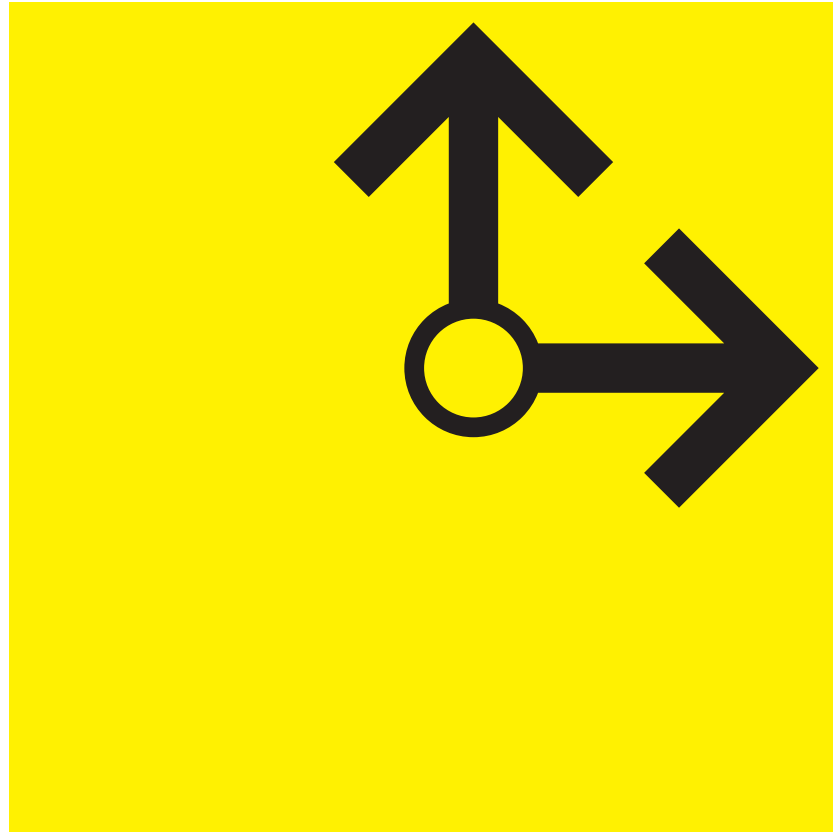
A machine is to be upgraded with a tool ID. First, the components of the system are selected so that they perfectly match the present machine control system.

Then, a separate control unit with integrated RFID technology is installed on each machine outside of the tool room; this control unit communicates with the machine control system.

The control unit and a tool holder with RFID read/write head can be used to take data that is on the data carrier and read it into the controller as well as write it back to the data carrier. The touch screen controls the process of reading or writing to the data carrier. All data and commands are displayed in plain text.

After the tool holder and control unit are installed, the read/write heads are configured and the connection to the machine control system is established. Now the machine can be put into operation. In tests, function is validated and the installation is accepted along with the user.

Industrial Networking and Connectivity



IO-Link
Profinet Master
SmartLight



IO-Link

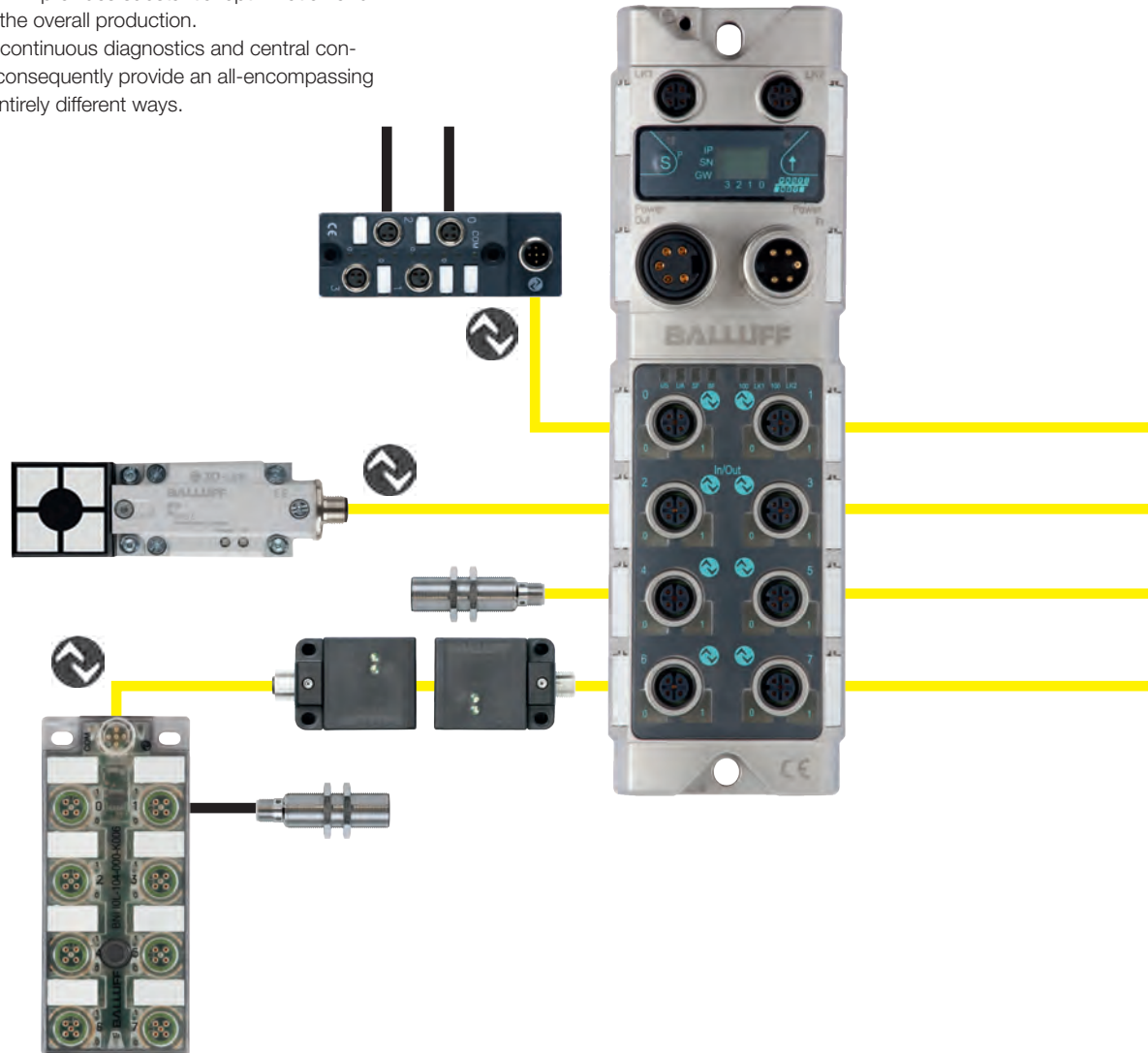
Network technology for reliable data transfer and more efficiency

More efficiency, lower costs

IO-Link saves time and money in overall production

IO-Link is all you need to make automation even more high-performance. This is because IO-Link provides substantial optimization and cost reduction potential for the overall production.

The uniform, simple wiring, continuous diagnostics and central configuration via the controller consequently provide an all-encompassing effect. And they do this in entirely different ways.





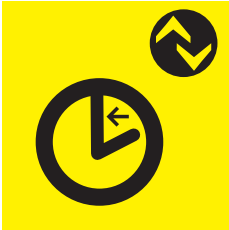
Simplification of installation

- Faster, simpler connection to an unshielded, three-core standard cable
- Standard sensors can also be integrated into the fieldbus level
- 8-fold IO-Link master for eight different IO-Link devices or eight hubs, each with up to 16 binary sensors
- Cost-saving due to fewer mechanical installations
- High security against interference thanks to digital communication



Requirements-based maintenance

- Continuous diagnostics
- Automatic readjustment via the controller
- Predictive error detection
- Longer maintenance intervals



More efficient operation

- Positioning of the sensors right where the action is
- Process monitoring, configuration and error analysis of the IO-Link devices via the controller
- Fast, high-performance data transmission
- Time-optimized machine processes
- High signal quality by means of digital data transmission
- A selection of sensors that is highly suited to the particular application because of the simultaneous use of binary, analog, and IO-Link sensors



Highest machine availability

- Faster, error-free sensor replacement and prompt commissioning
- Automatic configuration of an IO-Link sensor
- Prompt format changes and recipe changes centrally via the controller
- Additional security from clearly identifiable IO-Link devices



First Profinet Master BNI with 16 IO-Link Ports

For maximum flexibility

A Balluff exclusive: 16-fold IO-Link master

The first Profinet IO-Link master with 16 IO-Link ports is on the market. With this module, Balluff has doubled the previous number of available ports and increased the capacity of each individual port. The high bandwidth and fast data transfer rate of this Ethernet-based fieldbus system offer the ideal conditions for this purpose.

More output per port: 32 bytes

Each IO-Link port transmits up to 32 bytes of process data in cyclical form. At the same time, parameter or diagnostic data can be transmitted acyclically at each port. If adding up the output of all ports, the 16-fold IO-Link master provides 1 kByte of process data.

Digital and analog signals

IO-Link succeeds in transmitting both digital and analog signals at each port. In contrast, conventional fieldbuses can do only one or two signals per port.

Process up to 272 I/O signals

If sensor/actuator hubs are connected to the IO-Link master, up to 272 I/O signals can be processed. A 3-core standard sensor cable is sufficient. The bottom line: Users now have the ability to make full use of Profinet's capacity, all the way to the intelligent devices in the field.

Additional features: display, integrated switch and webservice

Like all Profinet modules from Balluff, the 16-fold master has an integrated display for information and additional diagnostics. Its integrated switch serves to establish a Profinet line structure. The built-in webservice shows the status of the module with all current information for advanced diagnostics.

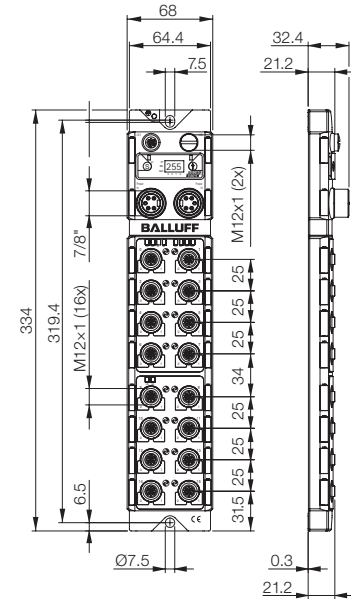




Fieldbus	Profinet
Design	8x IO-Link, 32x I/O
	BNI007M
Supply voltage U_s	18...30 V DC
Function indicator	BUS/RUN
Indicators/input	Display/pushbutton
Module status indicator: Mod LED	Yes
Network status indicator: Net LED	Yes
Port status indicator	Black, red, yellow
Connection: Fieldbus	M12, D-encoded, female
Connection: AUX power	7/8", male, 5-pin
Connection: I/O ports	M12, A-coded, female
No. of I/O ports	16
Number of inputs/outputs	max. 32/max. 32
Configurable inputs/outputs	Yes
Max. load current, sensors/channel	200 mA
Max. output load current	1.6 A/2 A
Port status indicator (signal status)	Yellow LED
Port diagnostic indicator (overload)	Red LED
Total current $U_{Actuator}/U_{Sensor}$	< 9 A
Degree of protection as per IEC 60529	IP 67 (when screwed into place)
Operating temperature T_a	-5...+70 °C
Storage temperature	-25...+70 °C
Mounting	2 mounting holes
Housing material	Nickel-plated die-cast zinc

IO-Link Version 1.1

No. of IO-Link master ports	16x master	
Operating modes (3-wire)	SIO, COM 1, COM 2, COM 3	
Indicators	Communication	Green LED
	Error	Red LED
Max. load current for IO-Link device	1.6 A	



Profinet: Push-Pull Module for Fiber-optic Cables and Copper Cables

For cables in harsh environments

Fiber-optic or copper

Balluff has expanded the Profinet module family by adding push-pull variants. These are available with a fiber-optic cable or copper cable connection. Both versions have the push-pull connection technology for fieldbus and power cables that is specified in the AIDA (Automation Initiative of German Automobile Manufacturers). This makes the wiring extremely simple.

Fiber-optic and copper

Additionally, there is a module that unites both worlds. It provides both a fiber-optic (SCRJ) and a copper (RJ45) push-pull connection. Another plus: This I/O module requires no additional, external module to convert from copper to fiber-optic cables.

About the fiber-optic cable connection

The fiber-optic cable connection is suitable for high-availability and data-intensive applications. Equalizing currents and overvoltages can be effectively prevented through the automatically given potential isolation.

Additional features: display, integrated switch and webserver

Like all Ethernet-based IO-Link masters from Balluff, the push-pull modules also have an integrated display for information and additional diagnostics. The integrated switch serves to establish a Profinet line structure. The built-in webserver shows the status of the module with all current information for advanced diagnostics.

IO-Link 1.1

All functions of IO-Link 1.1 are made available by the 8 IO-Link ports of the push-pull modules.

For suitable connectors, see p. 82

About using fiber-optic cables

Fiber-optic cables have now become established in industrial data communication. This is because potential differences and electro-magnetic influences on the data line are excluded when using fiber-optic cables. Polymer optical fibers (POF) additionally provide a large transmission bandwidth and large ranges.





CE



Fieldbus	Profinet	Profinet
Design	8x IO-Link, 16x I/O	8x IO-Link, 16x I/O
	BNI007K	BNI007J
Supply voltage U_S	18...30 V DC	18...30 V DC
Function indicator	BUS/RUN	BUS/RUN
Indicators/input	Display/pushbutton	Display/pushbutton
Module status indicator: Mod LED	Yes	Yes
Network status indicator: Net LED	Yes	Yes
Port status indicator	green, red, yellow	green, red, yellow
Connection: Fieldbus	2x Push-Pull RJ45	2x Push-Pull SCRJ
Connection: AUX power	Push-Pull Power	Push-Pull Power
Connection: I/O ports	M12, A-coded, female	M12, A-coded, female
No. of I/O ports	8	8
Number of inputs/outputs	max. 16/max. 16	max. 16/max. 16
Configurable inputs/outputs	Yes	Yes
Max. load current, sensors/channel	200 mA	200 mA
Max. output load current	1.6 A / 2 A	1.6 A / 2 A
Port status indicator (signal status)	Yellow LED	Yellow LED
Port diagnostic indicator (overload)	Red LED	Red LED
Total current $U_{Actuator}/U_{Sensor}$	< 16 A	< 16 A
Degree of protection as per IEC 60529	IP 67	IP 67
Operating temperature T_a	-5...+70 °C	-5...+70 °C
Storage temperature	-25...+70 °C	-25...+70 °C
Mounting	2 mounting holes	2 mounting holes
Dimensions (LxWxH)	185.5x84 mm, 4x47 mm	185.5x84 mm, 4x47 mm
Housing material	Nickel-plated die-cast zinc	Nickel-plated die-cast zinc

IO-Link Version 1.1

No. of IO-Link master ports	8x master	8x master
Operating modes (3-wire)	SIO, COM 1, COM 2, COM 3	SIO, COM 1, COM 2, COM 3
Indicators	Communication	Green LED
	Error	Red LED
Max. load current for IO-Link device	1.6 A	1.6 A

SmartLight – LED Signal Tower Light with IO-Link
For signaling operating states



Holder not included in the standard scope of delivery.

The three function modes of the SmartLight: Segment, Level and Running Light mode

SmartLight – its broad color spectrum signals all common physical variables

The first LED signal tower light with IO-Link interface uses its color spectrum to signal operating states. And it does this with many individually definable colors. Depending on the requirement, the machine operator can have key and critical machine statuses displayed accurately. And from its color scale, one can even read tendencies, patterns and trends of physical variables. Temperature statuses, levels of systems, or the position of a slide over a position measurement system can be visualized on the tower light, which has up to 20 separate controllable LED circuits.

Colors can be defined individually and users have maximum flexibility

Connection and installation are easy. All that is needed to screw them in is a four-wire sensor cable, and there is no vast number of individual parts. This gives you maximum functionality quickly, so that the LED signal stack light provides previously unimagined benefits. With the IO-Link SmartLight, almost all common physical variables can be shown with a flexible color spectrum via multicolored LEDs. They are easily programmed via the PLC using bit address assignments of the IO-Link address range. Different colors can be assigned with a few commands, without having to mechanically change the LED tower lights.

With the Balluff SmartLight, you can implement all functions that users were able to display with the previously available systems. Thus, for example, it is possible to display different colors in different zones, whereby the signal light can be subdivided in up to 5 zones. Unlike the systems previously on the market, these colors and zones can be configured individually in terms of number, size and color definition, and can even be changed "on the fly" while the machine is operating. This gives users complete flexibility.

IO-Link SmartLight – the intelligent stack light

- The first LED signal tower light with an IO-Link interface
- Unimagined flexibility
- Very easy to program
- Extremely fast and easy to install
- Different colors can be easily assigned without having to mechanically change the LED tower lights

The SmartLight has three central function modes for displaying different warning and indicator signals, which are controlled by the process data and the SPDU index.

- Segment mode: Display of different color signals in up to five different segments
- Level mode: Color gradient display for showing aspects such as levels or temperature values
- Running light mode: Automatic running light with freely configurable foreground and background color



SmartLight – LED Signal Tower Light with IO-Link

For signaling operating states



IO-Link	Device	Device	Device
Description	SmartLight	SmartLight	SmartLight
Number of segments, max.	5	3	1
	BNI0072	BNI007F	BNI007T
Color spectrum per segment	Red, green, yellow, blue, white	Red, green, yellow, blue, white	Red, green, yellow, blue, white
Supply voltage U_S	18...30 V DC	18...30 V DC	18...30 V DC
Function indicator IO-Link RUN	Green LED	Green LED	Green LED
Power-on indicator	Green LED	Green LED	Green LED
Connection: IO-Link	M12, A-coded, male	M12, A-coded, male	M12, A-coded, male
Connection U_A	via IO-Link interface	via IO-Link interface	via IO-Link interface
Configurable	Yes	Yes	Yes
Max. load current of actuators	0.5 A	0.25 A	0.25 A
Degree of protection as per IEC 60529	IP 67	IP 67	IP 67
Operating temperature T_a	-5...+55 °C	-5...+55 °C	-5...+55 °C
Storage temperature	-25...+70 °C	-25...+70 °C	-25...+70 °C
Mounting	M18 thread	M18 thread	M18 thread
Dimensions (LxWxH)	60x60x278 mm	60x60x182 mm	60x60x117 mm
Housing material	Transparent plastic	Transparent plastic	Transparent plastic
Sound module	No	No	No
Volume			
Audio frequencies			

IO-Link	Version 1.1	Version 1.1	Version 1.1
Transfer rate	COM 2 (38.4 kbaud)	COM 2 (38.4 kbaud)	COM 2 (38.4 kbaud)
Cycle time	5 ms with IO-Link 1.1 Master 20 ms with IO-Link 1.0 Master	5 ms with IO-Link 1.1 Master 20 ms with IO-Link 1.0 Master	5 ms with IO-Link 1.1 Master 20 ms with IO-Link 1.0 Master
IO-Link process data length	2-byte input	2-byte input	2-byte input
Communication indicators	Green LED	Green LED	Green LED



Device	Device	Device
Smart Light Sound	Smart Light Sound	Smart Light Sound
5	3	1
BNI0083	BNI0086	BNI0087
Red, green, yellow, blue, white	Red, green, yellow, blue, white	Red, green, yellow, blue, white
18...30 V DC	18...30 V DC	18...30 V DC
Green LED	Green LED	Green LED
Green LED	Green LED	Green LED
M12, A-coded, male	M12, A-coded, male	M12, A-coded, male
via IO-Link interface	via IO-Link interface	via IO-Link interface
Yes	Yes	Yes
0.5 A	0.25 A	0.25 A
IP 67	IP 67	IP 67
-5...+55 °C	-5...+55 °C	-5...+55 °C
-25...+70 °C	-25...+70 °C	-25...+70 °C
M18 thread	M18 thread	M18 thread
60×60×330.5 mm	60×60×234.5 mm	60×60×138.5 mm
Transparent plastic	Transparent plastic	Transparent plastic
Yes	Yes	Yes
95 dB/1 m	95 dB/1 m	95 dB/1 m
1 Hz, 5 Hz, continuous tone, pulse	1 Hz, 5 Hz, continuous tone, pulse	1 Hz, 5 Hz, continuous tone, pulse
Version 1.1	Version 1.1	Version 1.1
COM 2 (38.4 kbaud)	COM 2 (38.4 kbaud)	COM 2 (38.4 kbaud)
5 ms with IO-Link 1.1 Master	5 ms with IO-Link 1.1 Master	5 ms with IO-Link 1.1 Master
20 ms with IO-Link 1.0 Master	20 ms with IO-Link 1.0 Master	20 ms with IO-Link 1.0 Master
2-byte input	2-byte input	2-byte input
Green LED	Green LED	Green LED

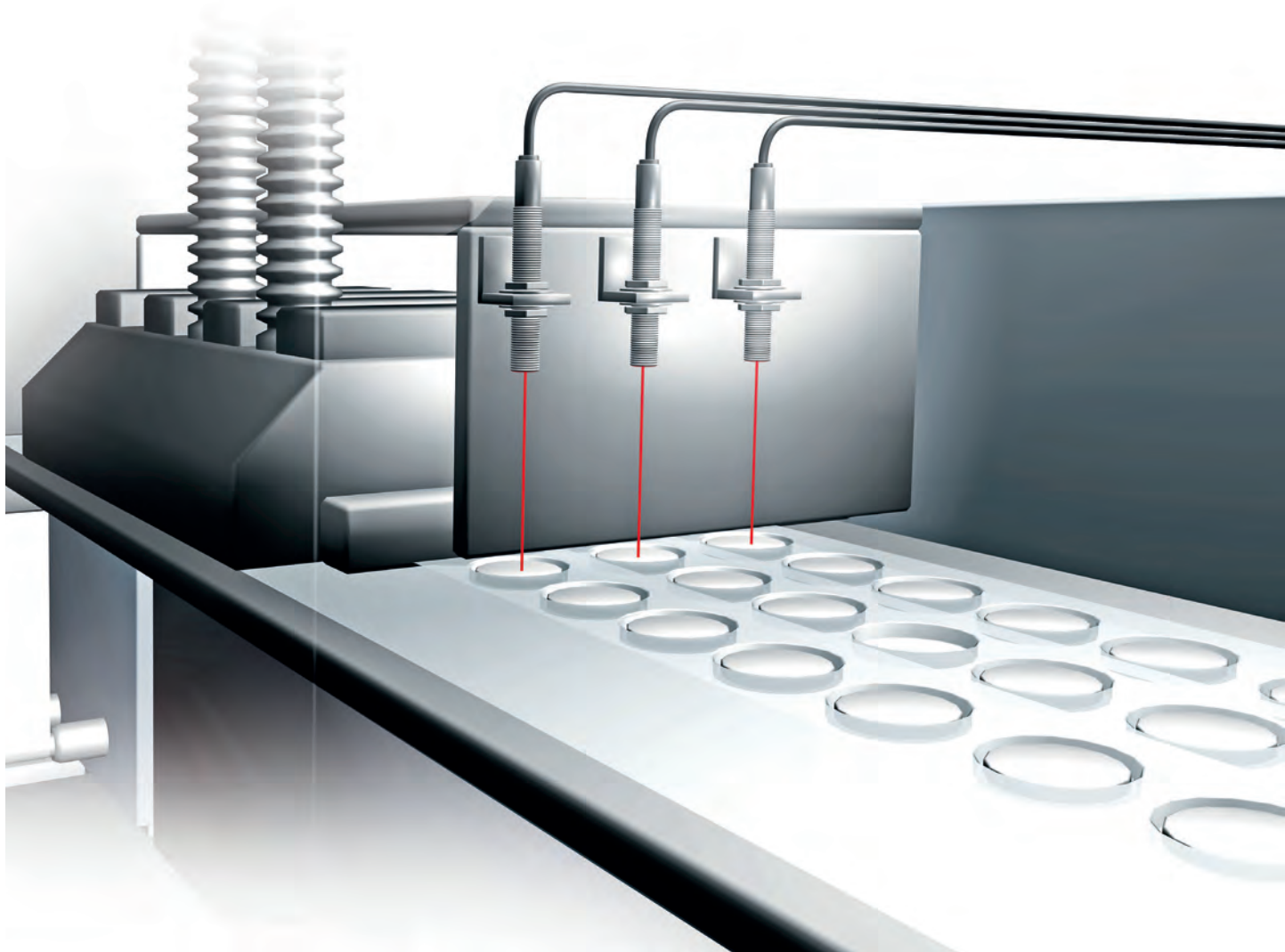


Object Detection



Photoelectric Sensors
Ultrasonic Sensors
Inductive Sensors
Capacitive Sensors

Photoelectric Sensors with Outstanding Precision
MICROmote®Sensors BOH



Diffuse sensors with integrated amplifier check whether the molds are completely filled.

Micro-optical sensors with unrivaled technical properties

Photoelectric MICROMote® sensors feature these micro-optical components: LED, photodiode, phototransistor and laser diode units with unrivaled technical properties.

Features

- Long ranges
- Excellent resolution
- Rugged thanks to integrated metal housing
- Highly flexible electrical cables for signal transmission
- Easy to operate via separate amplifiers

This results from our guideline of packing high optical performance into the smallest possible space. Therefore we developed our own manufacturing technology, had it patented and put the conditions in place for users to solve a wide variety of applications, even in tight spaces.

Separate amplifier

The miniaturized photoelectric sensors are operated with a separate amplifier that can be mounted outside of where the action is. Highly flexible electrical cables provide transmission of the sensor signals between the sensor head and the amplifier.

An additional plus: The amplifier provides convenient indicators and operating elements.



You can find products on this topic in our complete catalog:

**Object Detection –
Photoelectric Sensors with
Outstanding Precision**

Alternative to fiber optics

If highly flexible, purely electric sensor cables are required, photoelectric MICROMote® sensors are a technical alternative to fiber optics.

Broad range of standard products

The photoelectric sensor heads have exceptionally small dimensions, excellent technical characteristic values and outstanding flexibility. Thanks to our modular system, a broad spectrum of diverse, minimally sized standard products is available with a wide variety of unique selling points.

Application

MICROMote® sensors are particularly well suited to installation in moving machine parts and robot grippers. Small dimensions provide the perfect solution if not much installation space is available.

Additional fields of application

- Position detection of small parts
- Identification and counting of objects
- Level detection of foaming liquids
- Volume measurement and detection of microbubbles
- Applications in a high vacuum



MICROMote® sensors are operated with a separate amplifier outside of where the action is.



Laser Diffuse Sensors BOS Q08M

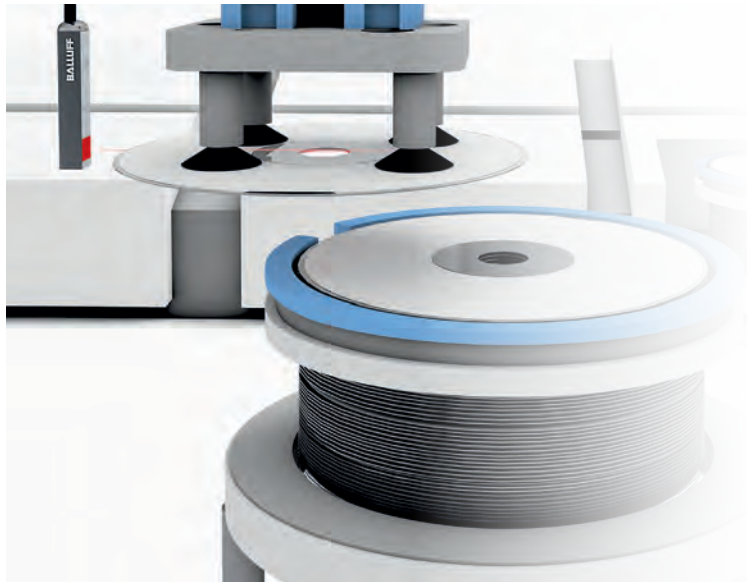
Extreme accuracy in a compact, high-performance design

Accurately detect even the smallest parts

The new laser diffuse sensor follows the motto of the BOS Q08M family: small size – big performance. Its excellent, fine light beam also detects the smallest objects and contours with absolute reliability and can be aligned with high precision, even amidst tightly packed parts. Therefore the laser diffuse sensor is ideally suited for small spaces.

Benefits

- Compact design for installation and use in the smallest of spaces
- Rugged metal housing with threaded holes
- Reliable detection of small parts up to 0.3 mm
- Uses a patented mounting concept for Bosch profiles that allows quick, precise positioning
- Laser class 1 – safe for the eyes!



Presence verification of CDs in a vacuum gripper

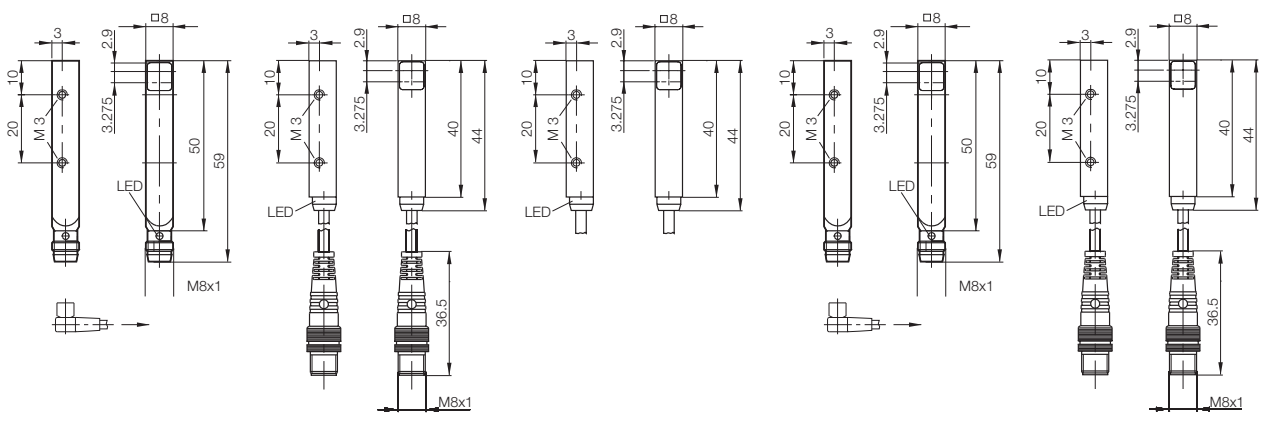


Type	
Detection range	
PNP, NO	
PNP, normally closed	
Emitter, light type	
Laser class	
Smallest detectable part	
Degree of protection as per IEC 60529	
Ambient temperature T_a	
Material	Housing
	Optical surface
Connection	

NPN versions on request.



Diffuse sensor 1...60 mm BOS01WC	Diffuse sensor 1...60 mm BOS01WH	Diffuse sensor 1...60 mm BOS01WL	Diffuse sensor 1...60 mm BOS01WE	Diffuse sensor 1...60 mm BOS01WJ
Laser, red light 1	Laser, red light 1	Laser, red light 1	Laser, red light 1	Laser, red light 1
up to 0.3 mm	up to 0.3 mm	up to 0.3 mm	up to 0.3 mm	up to 0.3 mm
IP 67	IP 67	IP 67	IP 67	IP 67
-5...+55 °C	-5...+55 °C	-5...+55 °C	-5...+55 °C	-5...+55 °C
Cast zinc, nickel-plated	Cast zinc, nickel-plated	Cast zinc, nickel-plated	Cast zinc, nickel-plated	Cast zinc, nickel-plated
PMMA	PMMA	PMMA	PMMA	PMMA
M8 connector, 3-pin	0.2 m PUR cable with M8 connector, 3-pin	2 m PUR cable, 3x0.14 mm ²	M8 connector, 3-pin	0.2 m PUR cable with M8 connector, 3-pin



BOS 08E Photoelectric Sensors

Background suppression in mini-format

Fixed range

The BOS-08-E family, tried and proven over a long time, now has a new member. For the first time, background suppression is available in this very compact design. Thanks to innovative LED technology, this sensor offers a very sharp and homogeneous red light spot that enables reliable and precise detection of even the smallest parts.

Benefits

- Precise, almost color-independent object detection up to 30 mm
- Easy alignment thanks to bright, sharply contoured light spot
- Fixed range for fast startup



Drill break monitoring

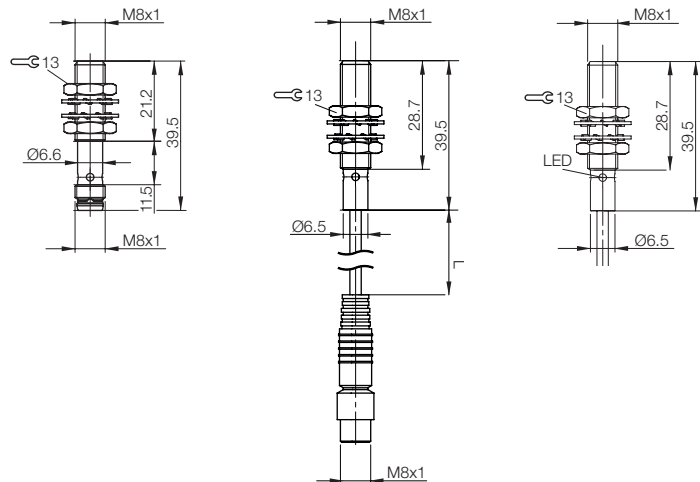
NEW



Type	Diffuse sensor with background suppression	Diffuse sensor with background suppression	Diffuse sensor with background suppression
Detection range	20 mm fixed	20 mm fixed	20 mm fixed
PNP, NO	BOS01H6	BOS01H2	BOS01H9
NPN, NO	BOS01H7	BOS01H3	
Light type	Red light, PinPoint LED	Red light, PinPoint LED	Red light, PinPoint LED
Supply voltage U_s	10...30 V DC	10...30 V DC	10...30 V DC
Switching frequency	500 Hz	500 Hz	500 Hz
Degree of protection as per IEC 60529	IP 67	IP 67	IP 67
Ambient temperature T_a	-5...+55 °C	-5...+55 °C	-5...+55 °C
Material	Housing: Stainless steel 1.4404 Optical surface: PMMA	Stainless steel 1.4404 PMMA	Stainless steel 1.4404 PMMA
Connection	M8 connector, 3-pin	0.2 m PUR cable with M8 connector, 3-pin	2 m PUR cable



Normally closed variants on request



Laser Through-beam Sensors BOS 08E

Small, accurate, precise

Excellent performance

The Balluff laser through-beam sensor BOS 08E is an innovative, compact product with a high performance level. Nothing else produces comparable results under similar conditions. Its excellently focused light beam is able to detect even the smallest of parts, grooves or holes with absolute reliability. Thus the laser through-beam sensor very accurately monitors stack heights, for example. Thanks to its very compact design, even mounting multiple sensors in a row in narrow systems is no problem.

Benefits

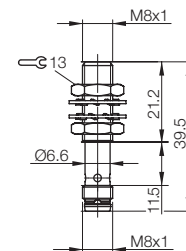
- Compact design for installation and use in the smallest of spaces
- Rugged stainless steel housing
- Cylindrical design – Easy assembly
- Reliable detection of small parts up to 0.3 mm
- Laser class 1 – safe for the eyes!



Type	Through-beam sensor	
Detection range	3 m	
PNP, NO	Receiver	Emitter
		BOS01U8
Emitter, light type	Laser, red light	
Laser class	1	
Smallest detectable part	up to 0.3 mm	
Degree of protection as per IEC 60529	IP 67	
Ambient temperature T _a	-5...+55 °C	
Material	Housing	Optical surface
	Stainless steel	PMMA
Connection	M8 connector, 3-pin	



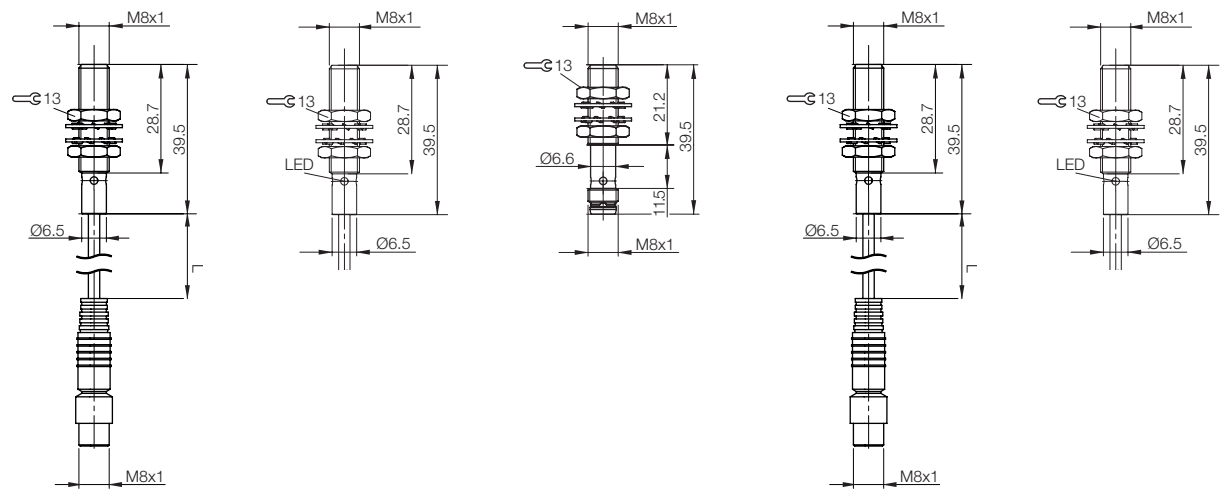
NPN on request



Position monitoring in an assembly line for hard drives



Through-beam sensor 3 m	Through-beam sensor 3 m	Through-beam sensor 3 m	Through-beam sensor 3 m	Through-beam sensor 3 m
BOS01U7	BOS01UL	BOS01U3	BOS01U1	BOS01UH
Laser, red light	Laser, red light	Laser, red light	Laser, red light	Laser, red light
1	1	1	1	1
up to 0.3 mm	up to 0.3 mm	up to 0.3 mm	up to 0.3 mm	up to 0.3 mm
IP 67	IP 67	IP 67	IP 67	IP 67
-5...+55 °C	-5...+55 °C	-5...+55 °C	-5...+55 °C	-5...+55 °C
Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
PMMA	PMMA	PMMA	PMMA	PMMA
0.2 m PUR cable with M8 connector, 3-pin	2 m PUR cable, 3x0.14 mm ²	M8 connector, 3-pin	0.2 m PUR cable with M8 connector, 3-pin	2 m PUR cable, 3x0.14 mm ²



Photoelectric Sensors BOS 12M

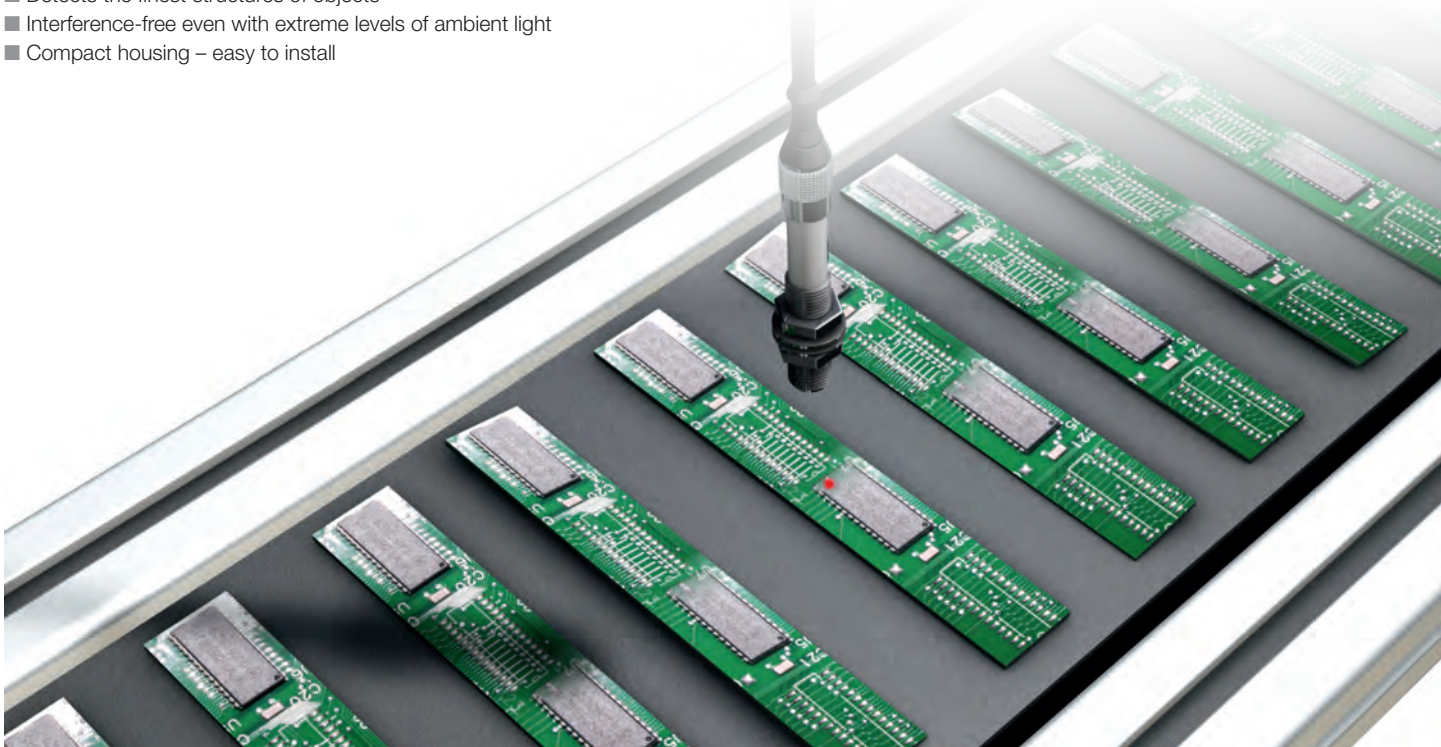
Preset background suppression enables high-precision switching behavior

Precise light spot

Reliably detecting the finest structures on objects is something that most photoelectric sensors are barely able to handle. In particular, dark objects in front of a bright background make this task difficult. But that is not the case for the new photoelectric sensors BOS 12M with preset background suppression. Their extremely precise spot of light covers only about 1.5 mm. As a result, the sensors are capable – just like a laser – of detecting very small and fine details. Another plus is the additional stability output. The sensor detects and indicates any misalignment right away. This increases the reliability and productivity of your machines.

Benefits

- Small spot of light like a laser – extremely precise
- Detects the finest structures of objects
- Interference-free even with extreme levels of ambient light
- Compact housing – easy to install

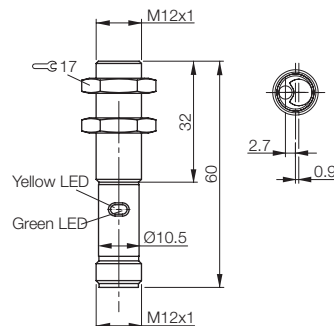


Quality inspection in automated circuit board assembly



Type	Diffuse sensor with background suppression	Diffuse sensor with background suppression	Diffuse sensor with background suppression
Detection range	1...25 mm	1...25 mm	1...25 mm
PNP, complementary	BOS01UM		
PNP, NO contact, stability output		BOS01UN	
NPN, complementary			BOS01UP
Emitter, light type	Red light, PinPoint	Red light, PinPoint	Red light, PinPoint
Light spot diameter	~1.5 mm	~1.5 mm	~1.5 mm
Gray value shift	90 %/18 % 90 %/5 %	< 1% < 5 %	< 1% < 5 %
Smallest detectable part	Wire Ø 0.05 mm	Wire Ø 0.05 mm	Wire Ø 0.05 mm
Switching frequency f	1 kHz	1 kHz	1 kHz
Ambient temperature T _a	-5...+55 °C	-5...+55 °C	-5...+55 °C
Permissible ambient light	Max. 50 kLux	Max. 50 kLux	Max. 50 kLux
Material	Housing: Nickel-plated brass Optical surface: PMMA	Nickel-plated brass PMMA	Nickel-plated brass PMMA
Connection	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin

Reference object: white, 90% reflection, 100x100 mm



Photoelectric Sensors BOS 12M

Your first choice for standard applications

NEW

In a fully potted metal housing

Easy operation, fast installation, affordable price – the highlights of our photoelectric BOS 12M Global sensors.

These easy to install sensors in a fully potted metal housing are optimized for common applications. The broad spectrum of high-performance diffuse sensors, retroreflective light sensors and through-beam sensors has a wide variety of applications. Thanks to the extremely short housing of just 60 mm length, even tight mounting spaces are no problem.

Benefits

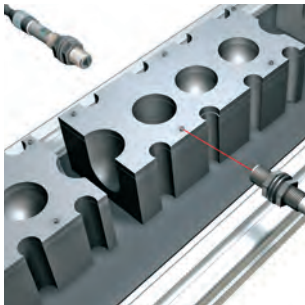
- Sound performance and reliable object detection
- Ideal for standard applications
- Attractive pricing, immediately available



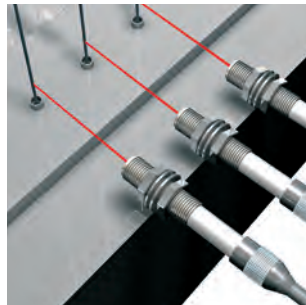
Type	Diffuse sensor	Diffuse sensor
Detection range	1...100 mm	1...200 m
PNP, NO	BOS01TN	BOS01TU
PNP, NO contact, emitter		
Supply voltage U_S	10...30 V DC	10...30 V DC
Output current	100 mA	100 mA
No-load supply current I_0 max.	20 mA	20 mA
Polarity reversal/short-circuit protected	Yes/Yes	Yes/Yes
Settings		
Emitter, light type	LED, red light	LED, red light
Switching frequency f	1000 Hz	1000 Hz
Degree of protection as per IEC 60529	IP 67	IP 67
Ambient temperature T_a	-5...+55 °C	-5...+55 °C
Material	Housing	Nickel-plated brass
	Optical surface	PMMA
Connection	M12 connector, 4-pin	M12 connector, 4-pin

Reference object: white, 90% reflection, 200x200 mm

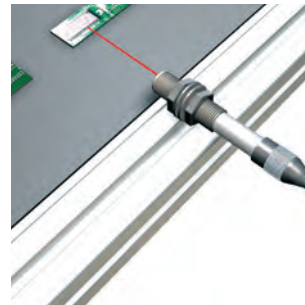
Other variants on our website or on request.



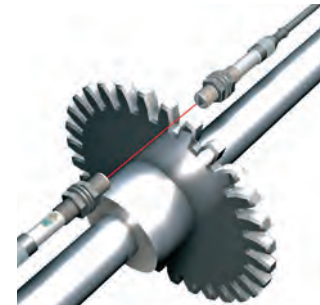
Automotive industry



Automation



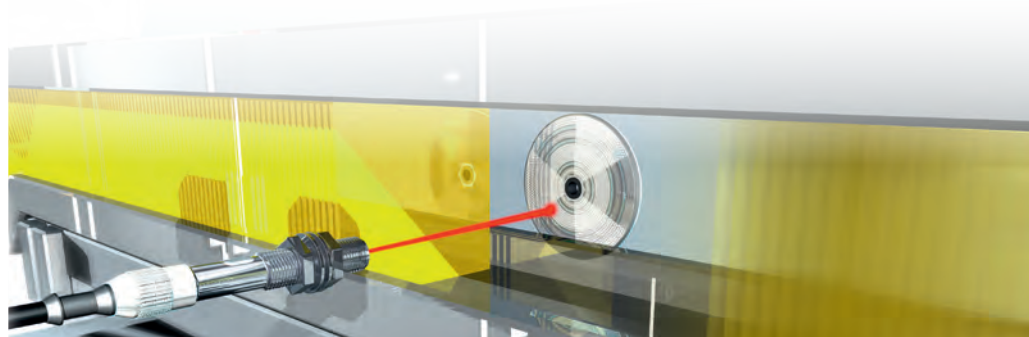
Packaging industry



Machine tool building



Diffuse sensor	Diffuse sensor	Retroreflective sensor with polarization	Through-beam sensor	Through-beam sensor
1...250 m	1...250 m	0...3 m	0...8 m	0...8 m
BOS01TP	BOS01TR	BOS01TT	BOS01TW	BOS01TY
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
100 mA	100 mA	100 mA	100 mA	100 mA
20 mA	20 mA	20 mA	20 mA	20 mA
Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
Potentiometer, 270°	Potentiometer, 270°		Potentiometer, 270°	Potentiometer, 270°
LED, red light	LED, red light	LED, red light	LED, red light	LED, red light
1000 Hz	1000 Hz	1000 Hz	1000 Hz	1000 Hz
IP 67	IP 67	IP 67	IP 67	IP 67
-5...+55 °C	-5...+55 °C	-5...+55 °C	-5...+55 °C	-5...+55 °C
Nickel-plated brass	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass
PMMA	PMMA	PMMA	PMMA	PMMA
M12 connector, 4-pin	2 m PVC cable, 4x0.34 mm ²	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin



Assembly and handling technology

Photoelectric Sensors BOS 6K

With a high degree of protection

Suitable for the foods industry

The BOS 6K compact class product family features exceptional performance and can be used almost anywhere. The new generation has the IP 67 and IP 69K degrees of protection, making it ideally suited to food industry applications. With its resistance to cleaning agents and rugged design that withstands water jets, it is the solution for your toughest applications.

Easy installation and operation

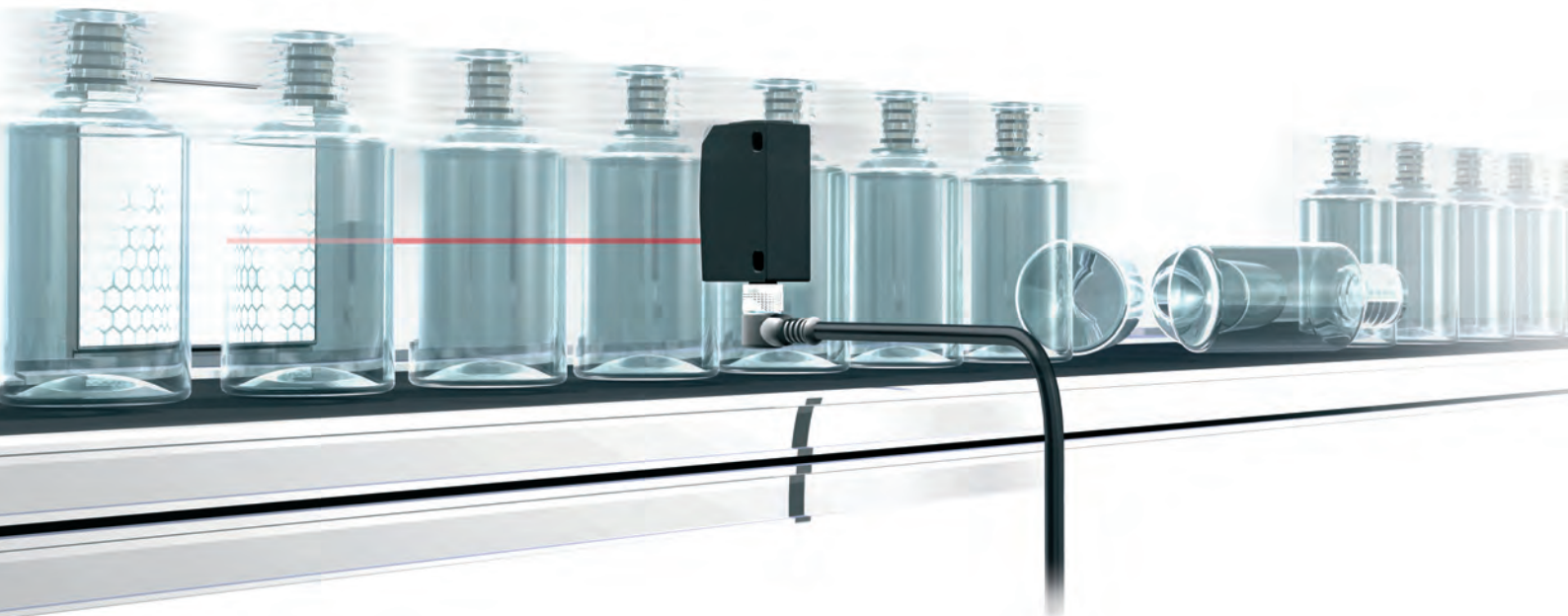
- Easy to install – its dovetail is the hallmark of an intelligent fastening concept
- Extensive mounting accessories
- Aligned quickly: red light and laser are readily visible – even over large distances
- Simple, tried-and-tested adjustment features using teach-in buttons
- Integrated, easily visible LEDs

Other features

- Through-beam sensors with a respectable range up to 18 m
- Protected optics
- Rugged buttons
- Abrasion-resistant laser inscription
- Extremely heavy-duty metal plug
- NO/NC switchable

Application

- Positioning clamping jaws
- Detecting circuit boards
- Detecting clear glass bottles
- Detecting small objects in assembly technology



Simple, reliable detection of transparent objects



Type	Diffuse sensor with Background suppression	Diffuse sensor with Background suppression	Diffuse sensor with Background suppression
Detection range	1...200 mm	3...400 mm	4...120 mm
PNP, NO/NC contact	BOS01KY	BOS01L3	BOS01LE
Supply voltage U_S	10...30 V DC	10...30 V DC	10...30 V DC
Output current	100 mA	100 mA	100 mA
No-load supply current I_0 max.	≤ 30 mA	≤ 30 mA	≤ 30 mA
Switching type	Light/dark	Light/dark	Light/dark
Polarity reversal/short-circuit protected	Yes/Yes	Yes/Yes	Yes/Yes
Settings	Teach-in	Teach-in	Teach-in
Emitter, light type	LED, red light	LED, red light	Laser, red light
Laser class			1
Light spot diameter	Approx. 5x5 mm at 50 mm	Approx. 8x8 mm at 60 mm	1.2x1.2 mm at 120 mm
Power-on indicator	Green LED	Green LED	Green LED
Output function indicator	Yellow LED	Yellow LED	Yellow LED
Response time	0.5 ms	0.5 ms	0.5 ms
Switching frequency f	1 KHz	1 KHz	1 KHz
Degree of protection as per IEC 60529/DIN 40050	IP 67/IP 69K	IP 67/IP 69K	IP 67/IP 69K
Ambient temperature T_a	-20...+60 °C	-20...+60 °C	-20...+60 °C
Permissible ambient light per	5 kLux	5 kLux	5 kLux
Material	Housing: ABS Optical surface: PMMA	Housing: ABS Optical surface: PMMA	Housing: ABS Optical surface: PMMA
Connection	M8 connector, 4-pin	M8 connector, 4-pin	M8 connector, 4-pin

Reference object: white, 90% reflection, 200x200 mm
NPN and cable types on request.

Photoelectric Sensors BOS 6K and BKT 6K

With a high degree of protection



Type	Diffuse sensor	Retroreflective light sensor with autocollimation	Retroreflective light sensor with autocollimation
Detection range	0...800 mm	0...2 m	0...4 m
PNP, NO/NC contact	BOS01LL	BOS01L8	BOS01M4
PNP, NO/NC contact	Receiver		
	Emitter		
Supply voltage U_S	10...30 V DC	10...30 V DC	10...30 V DC
Output current	100 mA	100 mA	100 mA
No-load supply current I_0 max.	≤ 30 mA	≤ 30 mA	≤ 30 mA
Switching type	Light/dark	Light/dark	Light/dark
Polarity reversal/short-circuit protected	Yes/Yes	Yes/Yes	Yes/Yes
Settings	Teach-in	Teach-in	Teach-in
Emitter, light type	LED, red light	LED, red light	Laser, red light
Laser class			1
Light spot diameter	20×20 mm at 180 mm	45×45 mm at 2 m	2×4 mm at 2 m
Supply voltage/output function indicator	Green LED/Yellow LED	Green LED/Yellow LED	Green LED/Yellow LED
Response time	0.5 ms	0.5 ms	0.5 ms
Switching frequency f	1 KHz	1 KHz	1 KHz
Degree of protection as per IEC 60529/DIN 40050	IP 67/IP 69K	IP 67/IP 69K	IP 67/IP 69K
Ambient temperature T_a	-20...+60 °C	-20...+60 °C	-20...+60 °C
Permissible ambient light per	5 kLux	5 kLux	5 kLux
Material	Housing		
	Optical surface		
	ABS	ABS	ABS
	PMMA	PMMA	PMMA
Connection	M8 connector, 4-pin	M8 connector, 4-pin	M8 connector, 4-pin

Reference object: white, 90% reflection, 200×200 mm.
NPN and cable types on request.

Reference reflector:
BOS R-22

Reference reflector:
BOS R-22



Retroreflective sensor

Through-beam sensor

Through-beam sensor

Contrast sensor

0...6 m

0...13 m

0...18 m

1...250 mm

BOS01MJ

BOS01M9
BOS01LR

BOS01LW
BOS01M2

BKT0010

10...30 V DC

10...30 V DC

10...30 V DC

10...30 V DC

100 mA

100 mA

100 mA

100 mA

≤ 30 mA

≤ 30 mA

≤ 30 mA

≤ 25 mA

Light/dark

Light/dark

Light/dark

Light/dark switching (selectable)

Yes/Yes

Yes/Yes

Yes/Yes

Yes/Yes

Teach-in

Teach-in

Teach-in

Teach-in

LED, red light

LED, red light

Laser, red light

Laser, red light

1

1

500×500 mm at 6 m

1×1 mm at 13 m

13×13 mm at 18 m

0.7×0.7 mm at 250 mm

Green LED/Yellow LED

Green LED/Yellow LED

Green LED/Yellow LED

Green LED/Yellow LED

0.5 ms

0.5 ms

0.5 ms

0.5 ms

1 KHz

1 KHz

1 KHz

1 KHz

IP 67/IP 69K

IP 67/IP 69K

IP 67/IP 69K

IP 67/IP 69K

-20...+60 °C

-20...+60 °C

-20...+60 °C

-20...+60 °C

5 kLux

5 kLux

5 kLux

5 kLux

ABS

ABS

ABS

Impact-resistant ABS

PMMA

PMMA

PMMA

PMMA

M8 connector, 4-pin

M8 connector, 4-pin

M8 connector, 4-pin

M8 connector, 4-pin

Reference reflector:
BOS R-1



Photoelectric Sensors BOS 23K with IO-Link

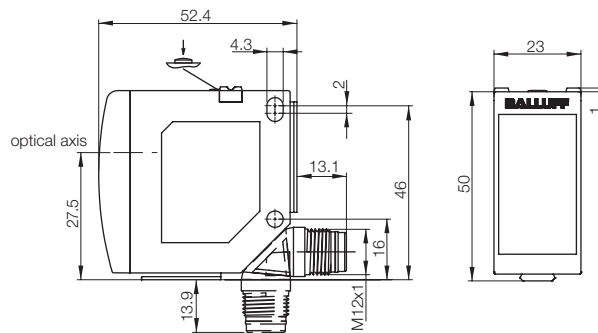
Standard sensors with added value

Designed for industry

The product characteristics of our BOS 23K photoelectric sensors have proven themselves many times over in actual practice. These include the long ranges and high switching accuracy as well as their industry-tailored sensor design. With IO-Link these sensors can be configured even more simply. The sensor process data includes switching signals and the actual remission values. After a sensor is replaced, all the settings can be easily sent from the master to the new sensor. This saves time and increases equipment availability.

Benefits

- Simple parameterizing via IO-Link
- Decentralized data storage in the master
- Unambiguous sensor identification
- Simplified installation



Type

Detection range

PNP, NO/NC selectable

PNP, receiver

PNP, emitter

Supply voltage U_S

Output current

No-load supply current I_0 max.

Polarity reversal/short-circuit protected

Settings

Emitter, light type, wavelength

Power-on indicator

Output function indicator

Stability indicator

Switching frequency f

Degree of protection as per IEC 60529/DIN 40050

Ambient temperature T_a

Material

Housing

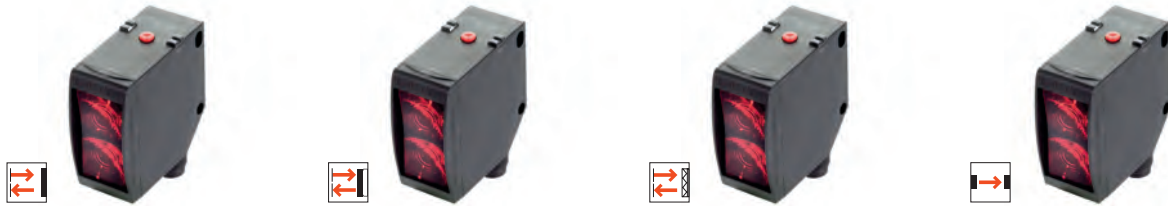
Optical surface

Connection

Reference object: white, 90% reflection, 200×200 mm.

Recommended reflector: BAM00UK

NEW



Diffuse sensor, energetic	Diffuse sensor with background suppression	Retroreflective sensor	Through-beam sensor
5...2000 mm	3...1200 mm	0.3...12 m	0...20 m
BOS0171	BOS017A	BOS016T	BOS016J BOS01UT
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
100 mA	100 mA	100 mA	100 mA
≤ 30 mA	≤ 30 mA	≤ 30 mA	≤ 30 mA
Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
Teach-in button/IO-Link	Potentiometer/IO-Link	Teach-in button/IO-Link	Teach-in button/IO-Link
LED, red light 640 nm	LED, red light 640 nm	LED, red light 640 nm	LED, red light 640 nm
Green LED	Green LED	Green LED	Green LED
Yellow LED	Yellow LED	Yellow LED	Yellow LED
Flashing yellow LED	Flashing yellow LED	Flashing yellow LED	Flashing yellow LED
600 Hz	600 Hz	600 Hz	500 Hz
IP 67/IP 69K	IP 67/IP 69K	IP 67/IP 69K	IP 67/IP 69K
-20...+60 °C	-20...+60 °C	-20...+60 °C	-20...+60 °C
PC-ABS	PC-ABS	PC-ABS	PC-ABS
PMMA	PMMA	PMMA	PMMA
M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin



High-Resolution Lighting Strip BLA Enables Numerous Measuring Modes

Identify parts, determine positions and count objects with high precision

Intuitive operation

If various objects have to be identified in production, when packaging or in quality control, the new high-resolution lighting strip BLA is ideal. Because it identifies, compares or sorts objects based on minimum size or height differences.

The intuitively operated device can be put into operation easily. It consists of a high-performance red-light laser and a receiver and operates entirely on its own. It does not need any other accessories such as a controller, a computer or special software.

The range encompasses up to 2 m. The consistent and well visible lighting strip provides an excellent resolution of 0.01 mm.

Application

The multi-functional device provides numerous measuring modes such as object diameter, object position, gap width, gap position, edge position, etc. To do so, the user can teach in up to six different objects using buttons and hide unwanted objects in the measuring field (blinking).

New Functions

In addition, the number of objects located in the light strip at the same time can be detected. This enables fully automated inspection of power strips, a task that until now required highly complex vision systems.

Can be used in a versatile manner—even in particularly harsh environments

- Highly accurate position monitoring and detection
- Easy and fast sorting of parts according to size/diameter
- Quality assurance and monitoring, e.g. of object heights, gap dimensions, etc.
- Detect object number and monitor objects
- Easy to align using the new mounting bracket (available as an accessory)

Monitoring wire thickness, position and thickness in a wire winding machine.





CE

Type	Lighting strip BLA
Lighting strip width	50 mm
	BLA0001
Usable lighting strip width	48.6 mm
Max. emitter-receiver distance	2000 mm
Best resolution	0.01 mm
Smallest object	0.3 mm
Supply voltage U_S	15...30 V DC
No-load supply current I_0 max.	< 100 mA
Output current max.	100 mA per switching output
Analog outputs	2× current 4...20 mA or 2× voltage 0...10 V (individually selectable)
Digital outputs	3× PNP
Output function	Differentiation of up to 6 objects (binary coded), as well as output of the object number and number "OK" or "NOK"
Polarity reversal/short-circuit protected	Yes/Yes
Settings	Using multifunction display and 4 teach buttons
Emitter, light type	Laser 650 nm
Laser class	1
Supply voltage/output function indicator	Green LED/Yellow LED
Scanning period	Typ. 5 ms
Degree of protection as per IEC 60529	IP 65
Ambient temperature T_a	+5...+55 °C
Material	Housing Anodized aluminum Optical surface Glass



BFS 33M Color Sensor with IO-Link

See better than the human eye

For distinguishing the finest color nuances

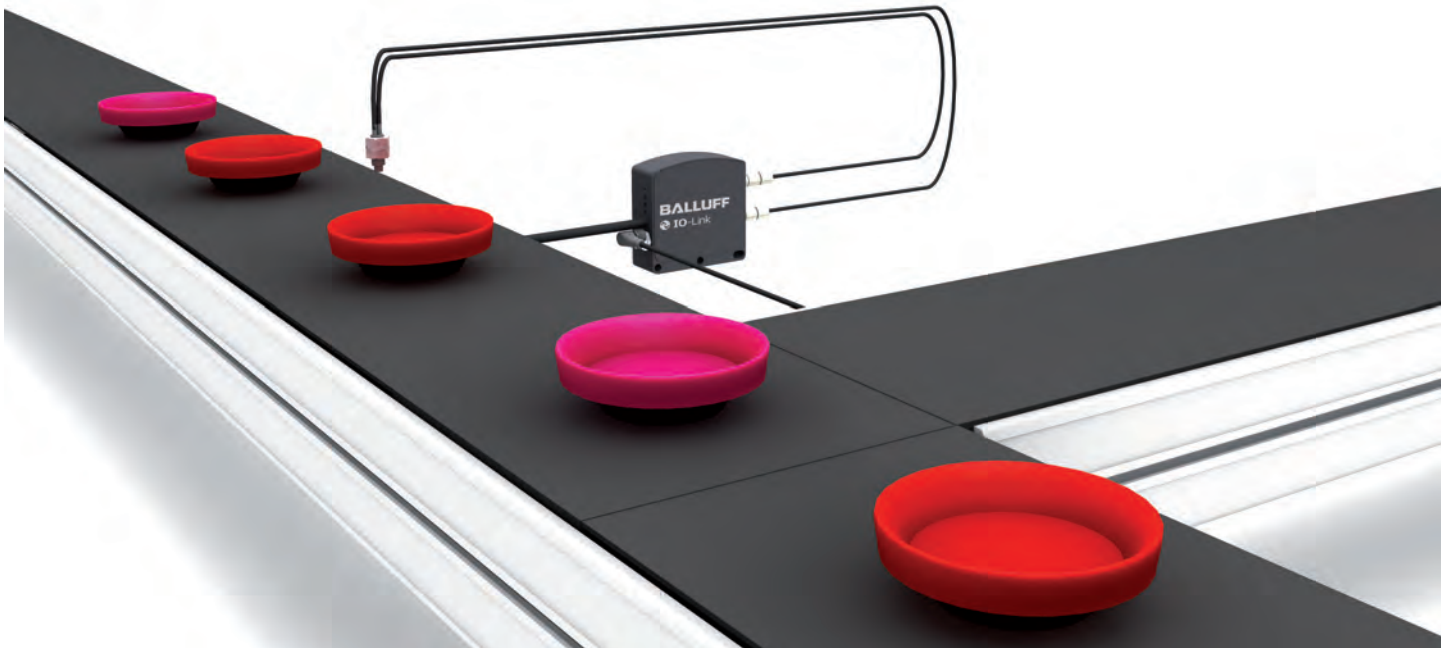
Compared to traditional RGB sensors, the BFS 33M true color sensor is in a league of its own. Thanks to its high resolution, it not only detects colors but can also reliably distinguish between nuances. The True Color sensor thus detects for instance minimal color deviations in injection molded parts. And it can also tell if a metal enters production polished or unpolished. Faded colors or poor print quality are detected in an instant and separated. It thus opens up completely new dimensions in quality control. The integrated IO-Link interface enables simple, bi-directional communication with the controller.

Benefits

- Detection of and distinguishing between a random number of colors
- Distinguishes between the slightest color shade differences
- Large sensing distance up to 400 mm
- Simple parameterizing via IO-Link
- Robust metal housing

Industries

- Automotive industry
- Plastics processing
- Packaging industry
- Handling and assembly
- Printing industry
- Wood processing



Plastic parts having slight color deviations can be reliably detected and quickly separated out.

NEW

CE
IO-Link



256 colors



Type	BFS 33M (True Color sensor)	
Interface	IO-Link	
Working range	Key operation	Fiber-dependent (up to 400 mm)
Measuring range	Reflector mode	Fiber-dependent
BFS000M		
Supply voltage U_S	21.6...26.4 V DC	
No-load supply current I_0 max.	≤ 60 mA	
Emitter, light type	Pulsed white light	
Light spot geometry/diameter	Fiber-dependent	
Range/color resolution tolerance	Adjustable	
Supply voltage/output function indicator	Green LED/Yellow LED	
Dimensions	58×58.3×21 mm	
Connection	M8 connector, 4-pin	
Housing material	Aluminum-coated	
Optical surface	Fiber-dependent	
Weight	150 g	
Degree of protection as per IEC 60529	IP 54	
Polarity reversal/short-circuit protected	Yes/Yes	
Ambient temperature T_a	+10...+55 °C	
Ambient light limit according to	EN 60947-5-2	
IO-Link		
Version 1.1		
Mode	COM 3	
Transfer rate	230.4 kBit/s	
Cycle time	9.2 ms	
IO-Link process data length	2 bytes	
Parameters	256 colors, operating mode, tolerance, calibration	

Recommended fiber optics: BFO00C9
Recommended cable: BCC03JW (2 m), BCC03JZ (5 m)

Ultrasonic Sensors BUS M30E2

Level meter that is resistant to chemicals

Up to 6 bar

Ultrasonic sensors BUS M30E2 provide contact-free level measurement at normal pressure and in tanks and containers with positive pressure up to 6 bar. The combination of switching and analog outputs enables level measurement and overflow protection. A PTFE membrane protects the sensor from aggressive liquids.

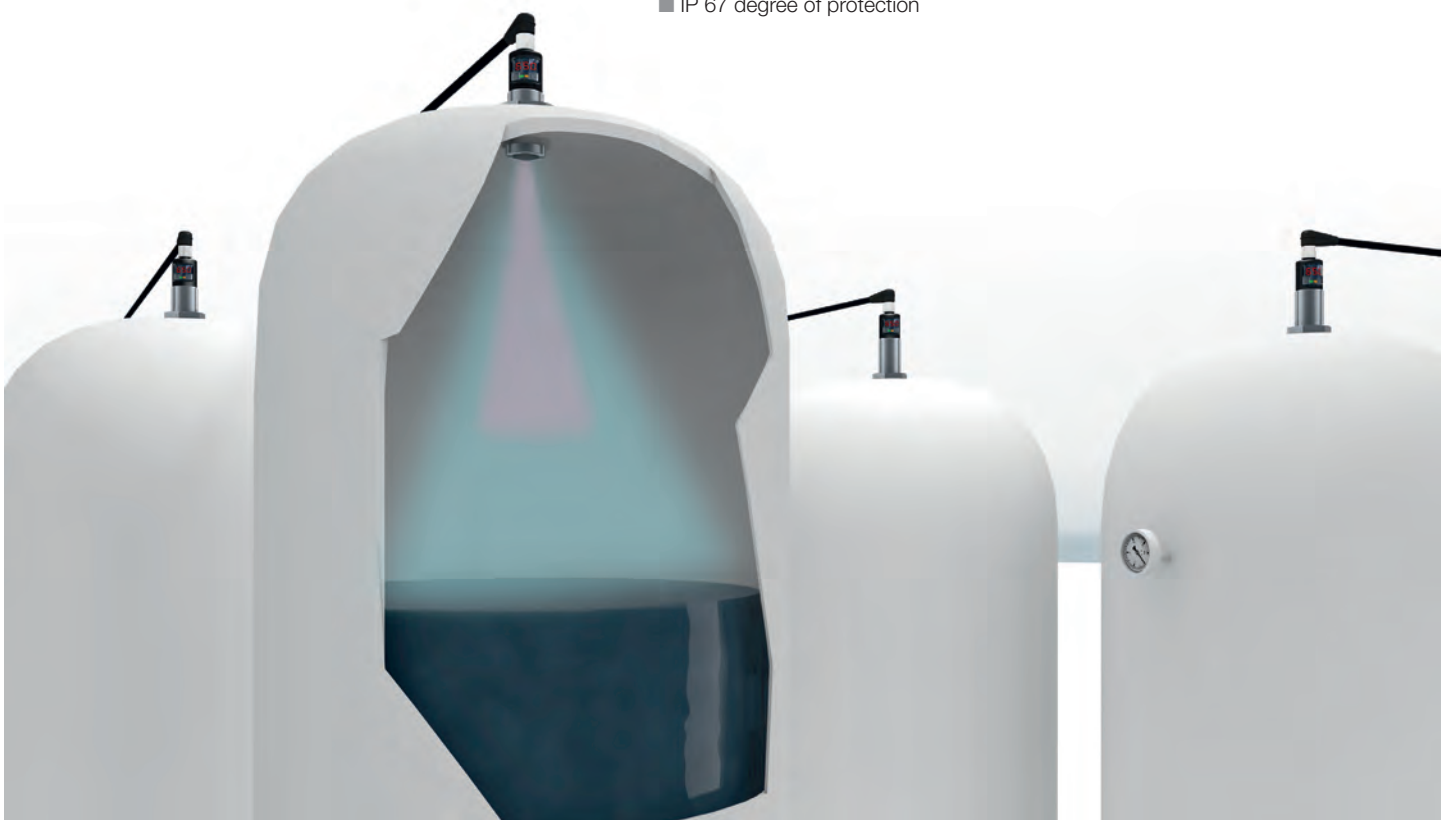
The pressure-tight installation in a tank uses a 1" threaded flange. Special software filters enable use in tanks that are filled from above or have an agitator.

Benefits

- Contact-free measurement of 30 mm to 1.3 m operating scanning width/5 m limiting scanning range
- PTFE membrane for protection against aggressive media
- Pressure-resistant to 6 bar
- Process connection G1"
- Stainless steel housing for use in the food industry

Other features

- Switching output and analog output in one sensor or version with 2 PNP switching outputs
- Easy setting of the sensor using digital display
- IP 67 degree of protection



Level measurement and overflow protection all in one - the combination of switching and analog makes both possible.

CE



Operating scanning range	85...350 mm	200...1300 mm
Limiting scanning range	1500 mm	5000 mm

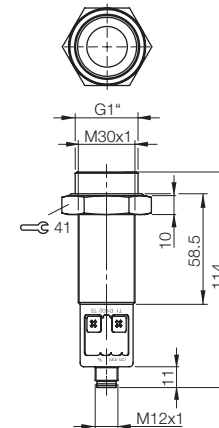
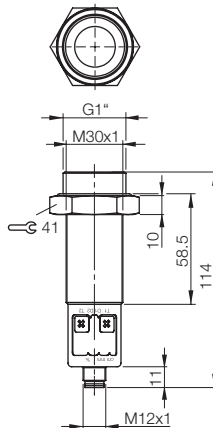
BUS M30E2 switching output

Resolution	0.18 mm	
2× PNP, NO/NC	BUS005U	

BUS M30E2 switching and analog output

Resolution (dependent on set window)	0.18...0.45 mm	0.18...1.5 mm
0...10 V/4...20 mA and PNP, NO/NC	BUS005Y	BUS005W

Supply voltage	9...30 V DC	
Output current	200 mA	
Degree of protection as per IEC 60529	IP 67	
Operating temperature	-25...+70 °C	
Material	Housing	Stainless steel 1.4571
	Plastic parts	PBT, TPU
	Sensing surface	PTFE
Connection	M12 connector, 5-pin	



BES Inductive Sensors: Ø 3 mm and M4 in Short Housing

The smallest one with new features

Flush installation in steel possible

Inductive mini-sensors are now available in Ø 3×22 mm and M4×22 mm. New features make this series unique. For example, consistent characteristics simplify your product selection. Increased switching frequency of 3.5 kHz and unrestricted flush mounting in steel are just two of these features.



Series	Ø 3×22 mm
Installation type (observe instructions in the Basic Information chapter)	Flush
Rated switching distance s_n	1 mm
Assured switching distance s_a	0...0.8 mm
Switching distance marking	■ ■
PNP, NO	BES040F
PNP, normally closed	
NPN, NO	
NPN, NC	
Supply voltage U_s	10...30 V DC
Voltage drop U_d at I_e max.	2 V
Rated insulation voltage U_i	75 V DC
Rated operating current I_e	100 mA
Polarity reversal protected/transposition protected/short-circuit protected	Yes/Yes/Yes
Ambient temperature T_a	-25...+70 °C
Switching frequency f max.	3.5 kHz
Output function indicator	Yellow LED
Degree of protection as per IEC 60529	IP 67
Approvals	CE, cULus
Special properties	Short design
Material	Housing Sensing surface
	Stainless steel PBT
Connection	0.2 m PUR cable with M5 connector, 4-pin

Additional cable lengths on request

Mini-sensors permit use of small automated handling machines.

NEW



Ø 3×22 mm	Ø 3×22 mm	M4×22 mm	M4×22 mm	M4×22 mm
Flush	Flush	Flush	Flush	Flush
1 mm	1 mm	1 mm	1 mm	1 mm
0...0.8 mm	0...0.8 mm	0...0.8 mm	0...0.8 mm	0...0.8 mm
■ ■	■ ■	■ ■	■ ■	■ ■
BES0409	BES03Z6	BES040Y	BES040R	BES03Z8
BES040A	BES03Z7		BES040T	BES03Z9
BES040C	BES03ZF		BES040U	BES03ZJ
BES040E	BES03ZH		BES040W	BES03ZK
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
2 V	2 V	2 V	2 V	2 V
75 V DC	75 V DC	75 V DC	75 V DC	75 V DC
100 mA	100 mA	100 mA	100 mA	100 mA
Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
-25...+70 °C	-25...+70 °C	-25...+70 °C	-25...+70 °C	-25...+70 °C
3.5 kHz	3.5 kHz	3.5 kHz	3.5 kHz	3.5 kHz
Yellow LED	Yellow LED	Yellow LED	Yellow LED	Yellow LED
IP 67	IP 67	IP 67	IP 67	IP 67
CE, cULus	CE, cULus	CE, cULus	CE, cULus	CE, cULus
Short design	Short design	Short design	Short design	Short design
Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
PBT	PBT	PBT	PBT	PBT
0.2 m PUR cable with M8 connector, 4-pin	2 m PUR cable, 3×0.1 mm ²	0.2 m PUR cable with M5 connector, 4-pin	0.2 m PUR cable with M8 connector, 4-pin	2 m PUR cable, 3×0.1 mm ²

Inductive Sensors BES: Steelface and Factor 1

Stainless steel and coated – extremely rugged

Weld splatter resistant

The extremely high-quality coating has a PTFE and ceramic base. It prevents deposits of weld splatter, increasing the pot life of the sensors.

Benefits

- More functional reliability thanks to robust steel housing
- Increased reliability during use, even in direct contact with the object
- Housing and sensor labeling optimized for the requirements of the automotive industry
- Weld splatter resistant cables: containing silicone or silicone-free
- Best suited for applications with variable detection objects (steel, Al, CuZn and Cu)
- 20x32 mm Steelface sensors: high-strength ceramic coating and weld splatter-resistant
- Steelface sensors M12 with factor 1

Application

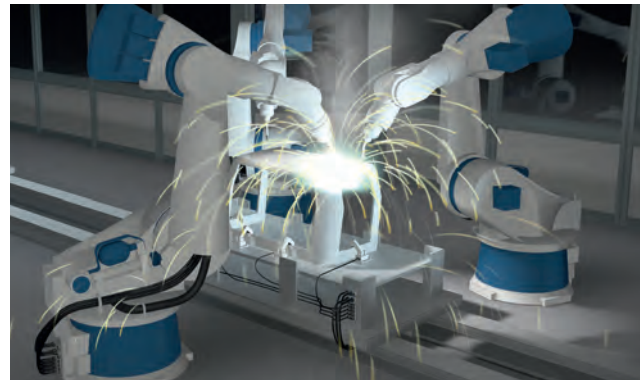
- Welding equipment
- Lightweight construction
- Automotive industry
- Conveyor technology
- Handling
- Assembly
- Machine tool building



Size
Installation type
Rated switching distance s_n
PNP, NO
Supply voltage U_S
Rated operating current I_o
Polarity reversal/short-circuit protected
Ambient temperature
Switching frequency f
Degree of protection as per IEC 60529
Approvals
Special properties
Material
Housing
Sensing surface
Connection



Rugged Steelface sensors detect objects in harsh surroundings.



Factor 1 sensors ensure parts quality even when materials often change.

STEELFACE



W51 ceramic coating



20×32×8 mm	20×32×8 mm	M12×1
Flush	Flush	Flush
5 mm	5 mm	4 mm
BES04Z0	BES04RE	BES04Z5
10...30 V DC	10...30 V DC	10...30 V DC
200 mA	200 mA	200 mA
Yes/Yes	Yes/Yes	Yes/Yes
-25...+70 °C	-25...+70 °C	-25...+70 °C
80 Hz	80 Hz	80 Hz
IP 67	IP 67	IP 67
CE, cULus	CE, cULus	CE, cULus
Weld-immune, factor 1	Weld-immune, factor 1	Weld-immune, factor 1
Stainless steel	Stainless steel	Stainless steel
Stainless steel	Stainless steel with W51 ceramic coating	Stainless steel
0.3 m PUR cable silicon-free with M12 connector, 3-pin with LED	0.3 m silicone-free special cable with M12 connector, 3-pin with LED	M12 connector

Capacitive Immersion Sensors BCS

Detect levels with absolute reliability

Flexible use: in plastic or metal

BCS capacitive immersion sensors detect levels of plastic granulates or highly conductive media with absolute reliability. Their excellent foam and build-up compensation makes them highly flexible. They can be installed in plastic or metal tanks.

Benefits

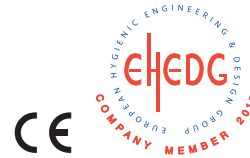
- High-quality 1.4404 stainless and PEEK housings
- Wire connection for remote teach-in
- EHEDG approved with special approved adapters
- Media temperature up to 105 °C
- Autoclave compatible (1 h)
- IO-Link versions available
- Pressure rated to 10 bar and IP 69K at the M12 connector

Applications

- Detect plastic granulates up to 105 °C
- Sense adhering foods such as yogurt, milk, beverages etc.
- Detect highly conductive acids and bases up to a value of 100 mS/cm



The BCS capacitive immersion sensor reliably detects the level of a milk tank.



Size	
Installation type	
Rated switching distance s_n	
PNP, NO	
PNP, normally closed	
NPN, NO	
NPN, NC	
IO-Link, PNP/NPN and NO/NC can be coded	
Supply voltage U_S	
Voltage drop U_d at I_e	
Rated insulation voltage U_i	
Output current max.	
No-load supply current I_0 max.	
Polarity reversal protected/transposition protected/short-circuit protected	
Ambient temperature T_a /media temperature	
Switching frequency f	
Output function indicator	
Degree of protection as per IEC 60529	
Special properties	
Material	Housing
	Sensing surface
	O-ring
Connection	

NEW



IO-Link



IO-Link



G$\frac{1}{2}$"	G$\frac{1}{2}$"	G$\frac{1}{2}$"	G$\frac{1}{2}$"
Non-flush	Non-flush	Non-flush	Non-flush
Level teachable	Level teachable	Level teachable	Level teachable
BCS011F		BCS011M	
BCS011H		BCS011N	
BCS011J		BCS011P	
BCS011K		BCS011R	
	BCS011E		BCS011L
12...30 V DC	18...30 V DC	12...30 V DC	18...30 V DC
≤ 2 V	≤ 2 V	≤ 2 V	≤ 2 V
75 V DC	75 V DC	75 V DC	75 V DC
50 mA	50 mA	50 mA	50 mA
15 mA	15 mA	15 mA	15 mA
Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
-40...+85 °C/105 °C	-40...+85 °C/105 °C	-10...+85 °C/105 °C	-10...+85 °C/105 °C
5 Hz	5 Hz	5 Hz	5 Hz
Yellow LED	Yellow LED	Yellow LED	Yellow LED
IP 68 10 bar/IP 69K	IP 68 10 bar/IP 69K	IP 68 10 bar/IP 69K	IP 68 10 bar/IP 69K
Autoclave compatible	Autoclave compatible	Autoclave compatible	Autoclave compatible
1.4404 stainless steel	1.4404 stainless steel	1.4404 stainless steel	1.4404 stainless steel
PEEK	PEEK	PEEK	PEEK
EPDM	EPDM	FKM, oil-resistant	FKM, oil-resistant
M12 connector, 4-pin, A-coded	M12 connector, 4-pin, A-coded	M12 connector, 4-pin, A-coded	M12 connector, 4-pin, A-coded

BCS Capacitive Sensors for Object Detection

Block-styles, 16x34x8 mm Micro-Box

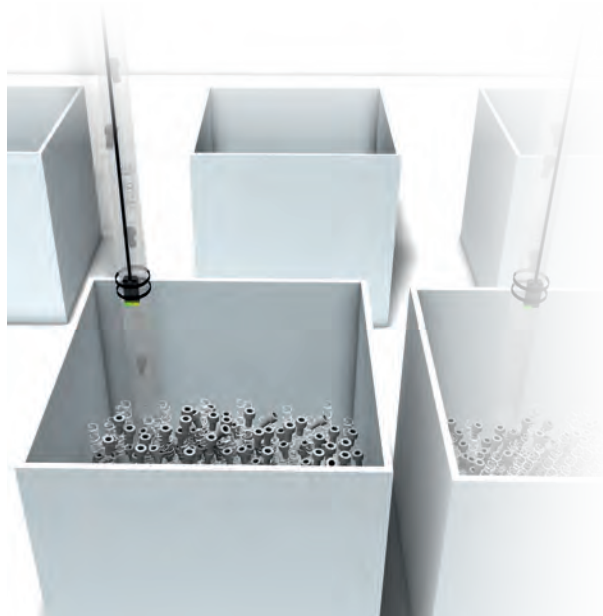
Compact

The highly compact housing of the capacitive Micro-Box sensors is absolutely compatible with their predecessor. The standard version is installed flush and features a switching distance of 8 mm. The variants for object detection are

- Teachable using the wire connection
- Available as IO-Link versions
- Easy to install on tubes with cable ties

Applications

- Detect objects at a distance of up to 8 mm
- Replaces tubular M18 sensors in spite of its compact size
- Detect non-conductive media in plastic or glass containers (wall thickness up to 4 mm)
- As leak detector: sense even the smallest amounts of liquid



The BCS Global sensors are simple to install using cable ties.



Size

Installation type

Rated switching distance s_n

PNP, NO

PNP, normally closed

NPN, NO

NPN, NC

PNP/NPN and NO/NC can be coded

Supply voltage U_s

Output current max.

Polarity reversal protected/transposition protected/short-circuit protected

Ambient temperature T_a

Switching frequency f

Supply voltage/output function indicator

Degree of protection as per IEC 60529

Material

Housing/active surface

Connection

 Preferred variants (available immediately)

Other variants on our website or on request.

Universal holder for mounting as

- Leak detector in troughs
- Sensor for object detection



Holder included in the scope of delivery!

NEW



Global



Global



IO-Link

16x34x8 mm Micro-Box

Flush

1...8 mm teachable

BCS012T

BCS012U

BCS012W

BCS012Y

10...30 V DC

50 mA

Yes/Yes/Yes

-25...+70 °C

50 Hz

Green LED/Yellow LED

IP 67

PP/PP

0.3 m PUR cable with
M8 connector, 4-pin

16x34x8 mm Micro-Box

Flush

1...8 mm teachable

BCS012A

BCS012C

BCS012E

BCS012F

10...30 V DC

50 mA

Yes/Yes/Yes

-25...+70 °C

50 Hz

Green LED/Yellow LED

IP 67

PP/PP

2 m PUR cable,
4x0.14 mm²

16x34x8 mm Micro-Box

Flush

1...8 mm teachable

BCS012N

18...30 V DC

50 mA

Yes/Yes/Yes

-25...+70 °C

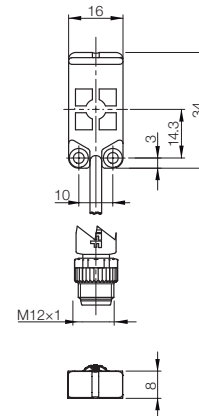
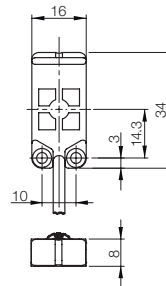
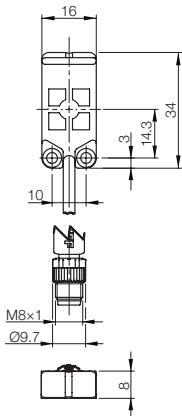
50 Hz

Green LED/Yellow LED

IP 67

PP/PP

0.3 m PUR cable with
M12 connector, 4-pin



BCS Capacitive Sensors for Level Detection

Block-styles, 16x34x8 mm Micro-Box

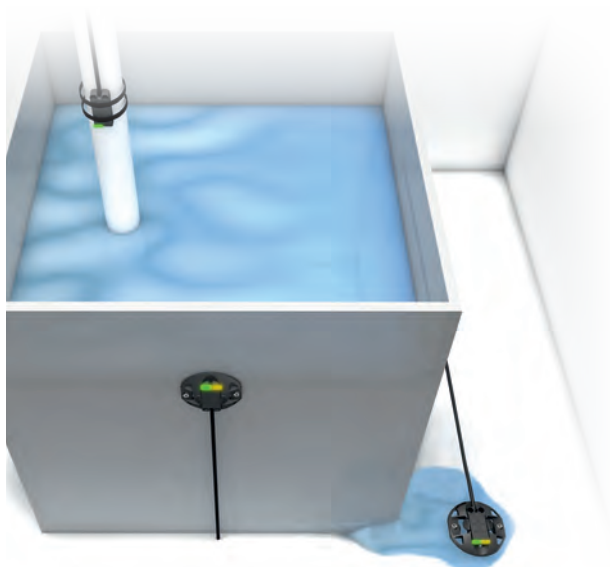
Compact – with foam suppression and build-up compensation

The highly compact housing of the capacitive Micro-Box sensors is absolutely compatible with their predecessor. SmartLevel 50 versions feature improved foam suppression and build-up compensation. They are

- Teachable using the wire connection
- Available as IO-Link versions
- Easy to install on tubes with cable ties

Applications

- Detect conductive media in plastic tubes or glass pipes
- Detect conductive media through the container wall with a thickness of up to 10 mm
- Sense highly conductive media up to 50 mS/cm, such as acids and bases
- Medical technology: detect body fluids (e.g. blood, even when foam has formed)
- Semiconductor industry: detect process fluids without direct media contact



Capacitive SmartLevel sensors permit a broad range of applications.



Size	
Installation type	
Rated switching distance s_n	
PNP, NO	
PNP, normally closed	
NPN, NO	
NPN, NC	
PNP/NPN and NO/NC can be coded	
Supply voltage U_s	
Output current max.	
Polarity reversal protected/transposition protected/short-circuit protected	
Ambient temperature T_a	
Switching frequency f	
Supply voltage/output function indicator	
Degree of protection as per IEC 60529	
Material	Housing/active surface
Connection	

Other variants on our website or on request.

Universal holder for mounting on containers



Holder included in the scope of delivery!

NEW



SMART LEVEL 50



SMART LEVEL 50



IO-Link
SMART LEVEL 50

16x34x8 mm Micro-Box

Flush

Level teachable

BCS012Z

BCS0130

BCS0131

BCS0132

10...30 V DC

50 mA

Yes/Yes/Yes

-25...+70 °C

10 Hz

Green LED/Yellow LED

IP 67

PP/PP

0.3 m PUR cable with
M8 connector, 4-pin

16x34x8 mm Micro-Box

Flush

Level teachable

BCS012H

BCS012J

BCS012K

BCS012L

10...30 V DC

50 mA

Yes/Yes/Yes

-25...+70 °C

10 Hz

Green LED/Yellow LED

IP 67

PP/PP

2 m PUR cable,
4x0.14 mm²

16x34x8 mm Micro-Box

Flush

Level teachable

BCS012P

18...30 V DC

50 mA

Yes/Yes/Yes

-25...+70 °C

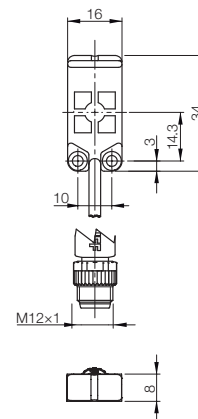
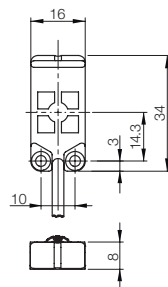
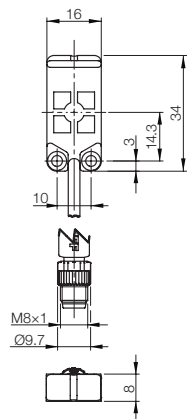
10 Hz

Green LED/Yellow LED

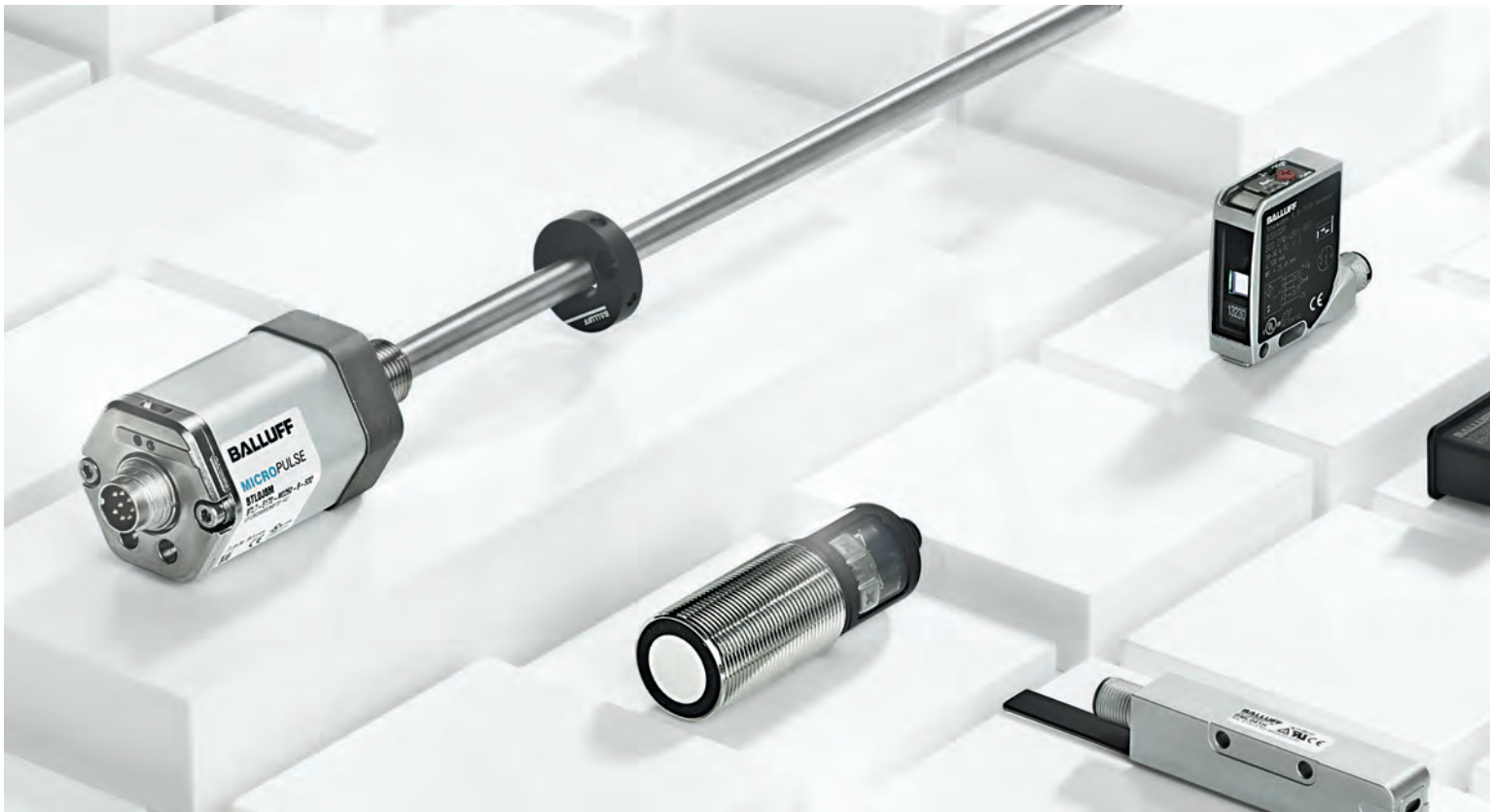
IP 67

PP/PP

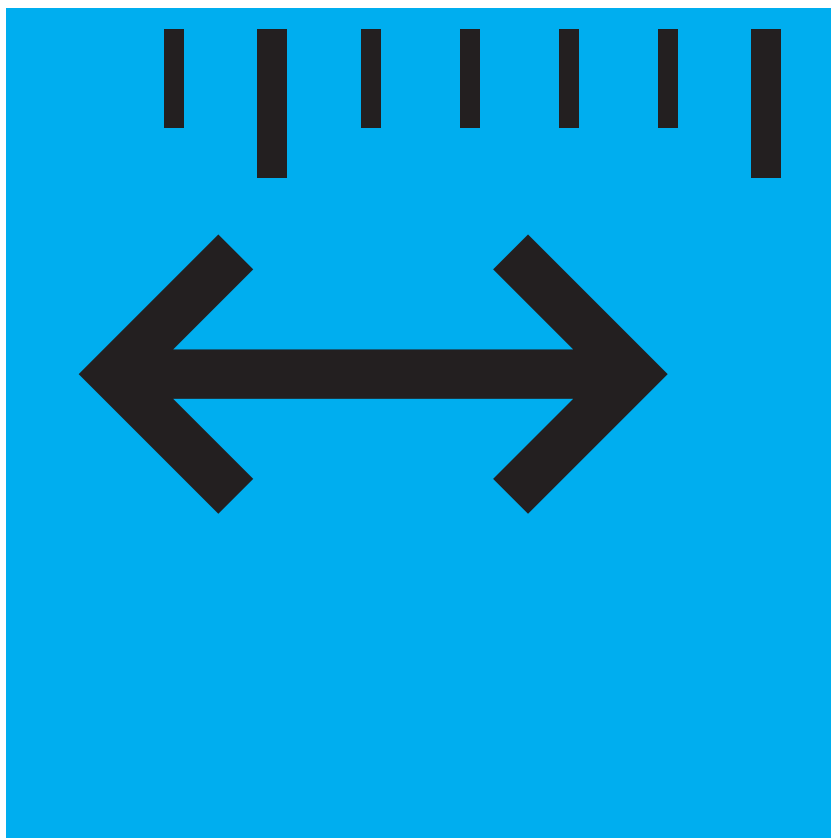
0.3 m PUR cable with
M12 connector, 4-pin



Linear Position Sensing and Measurement



Magnetically Coded Position and Angle Measurement System
Micropulse Transducers
Photoelectric Distance Sensors
Inclination Sensors



Magnetically Coded Position and Angle Measurement System BML-S1H

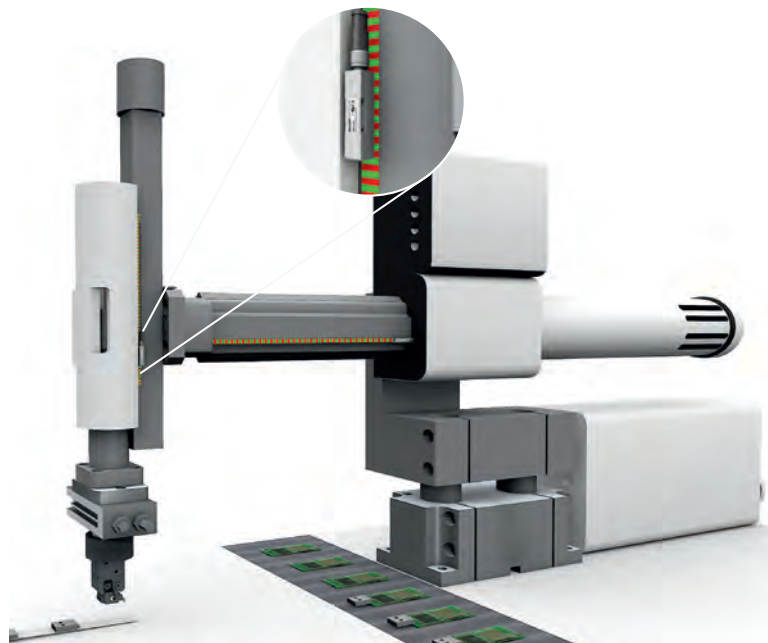
Absolute precision – now even up to a measuring length of 1024 mm

Absolute, direct-measuring system

Inaccuracy and tolerances in the drive train negatively affect the production and product quality, however, direct measuring systems provide a solution. They determine the current position directly on the slide or the load support. The magnetically encoded position and angle measurement system BML-S1H measures highly dynamic applications exactly and absolutely. It works contactlessly and wear-free. External factors such as dirt and temperature do not affect it. This ensures a long service life and high availability. This reduces the costs of machines and systems as a whole.

Benefits

- Absolute measuring system for short strokes up to 1024 mm
- With BiSS-C or SSI interface
- High system accuracy and resolution
- Mounted parallel or perpendicular to tape
- Tiny design in a robust metal housing



BML-S1H ensures highly dynamic and precise positioning of components.



Series

Output signal

Data format

Max. measuring length

Lengthwise approach direction

Crosswise approach direction

Resolution

Repeat accuracy

System accuracy

Supply voltage

Current consumption

Tape pole pitch

Max. read distance, sensor head/tape

Max. travel speed

Sampling rate

Operating temperature

Housing material

Degree of protection as per IEC 60529

Devices are also available with the BiSS-C interface.

Accessories

Series

Output signal

Length

Measuring length

Magnetic tape material

Cover strip and tape carrier material



BML-S1H...

Absolute: SSI interface,
Analog signal: sin/cos, 1 V_{pp}
16-bit
64 mm

BML0391

BML0392
1/1.024 μm per LSB

≤ 1 μm

±7 μm

5 V ±5%

< 90 mA + Controller current consumption,
at 120 Ω load resistance

1 mm

0.35 mm (without cover strip)

5 m/s

f_{Standard} = up to 50 kHz (SSI),

f_{Standard} = 10 MHz (BISS-C)

-20...+80 °C

Aluminum, stainless steel

IP 67

BML-S1H...

Absolute: SSI interface,
Analog signal: sin/cos, 1 V_{pp}
18-bit
256 mm

BML0393

BML0394
1/1.024 μm per LSB

≤ 1 μm

±7 μm

5 V ±5%

< 90 mA + Controller current consumption,
at 120 Ω load resistance

1 mm

0.35 mm (without cover strip)

5 m/s

f_{Standard} = up to 50 kHz (SSI),

f_{Standard} = 10 MHz (BISS-C)

-20...+80 °C

Aluminum, stainless steel

IP 67

BML-S1H...

Absolute: SSI interface,
Analog signal: sin/cos, 1 V_{pp}
20-bit
1024 mm

BML04Y3

BML04Y4
1/1.024 μm per LSB

≤ 1 μm

±7 μm

5 V ±5%

< 90 mA + Controller current consumption,
at 120 Ω load resistance

1 mm

0.35 mm (without cover strip)

5 m/s

f_{Standard} = up to 50 kHz (SSI),

f_{Standard} = 10 MHz (BISS-C)

-20...+80 °C

Aluminum, stainless steel

IP 67



Magnetic Tape

for BML-S1H with 64 mm measuring length

BML039J

90 mm

64 mm

Rubber - ferrite

Stainless steel

Magnetic Tape

for BML-S1H with 256 mm measuring length

BML039K

280 mm

256 mm

Rubber - ferrite

Stainless steel

Magnetic Tape

for BML-S1H with 997 mm measuring length

BML04YM

1024 mm

997 mm

Rubber - ferrite

Stainless steel

Magnetically Coded Position and Angle Measurement System BML-S2C 10 mm system for high read distance

For large tolerances

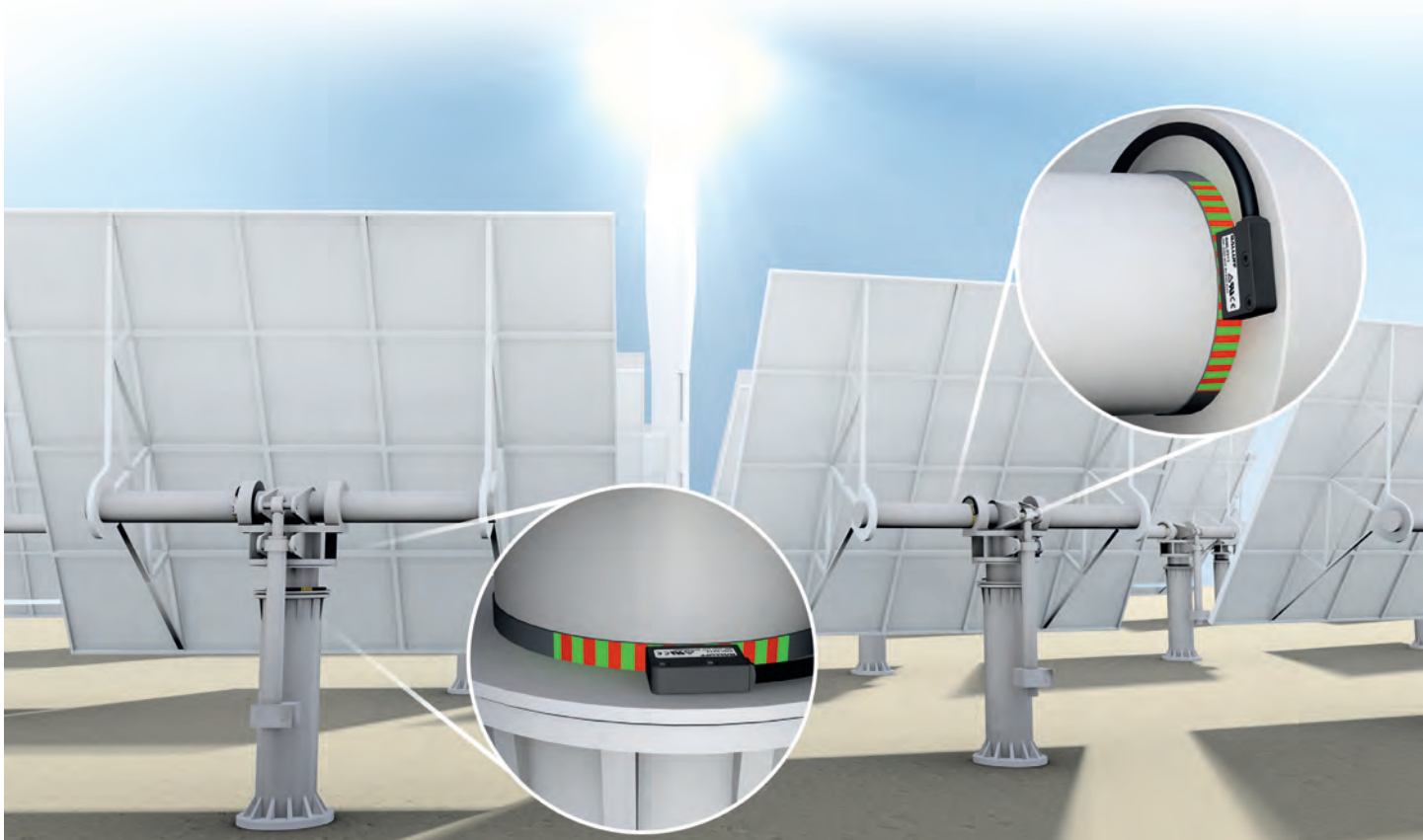
The long read distance of the new incremental measurement system BML S2C makes it ideal for installation situations where large tolerances can occur.

Application

- Applications with long measurement sections, such as determining speed and position in warehouse and conveyor technology
- Determining angles of rotation

Benefits

- Contactless, wear-free measuring principle
- Compensation for height tolerances in the measurement section up to 5 mm
- Rugged plastic housing with compact design
- Status LED and error function
- Easy installation and maintenance resulting in lower costs
- High system availability
- Long service life



The high-precision mirror tracking system supports the energy efficiency of solar towers and solar thermal power plants.



Series	BML-S2C Basic	BML-S2C Premium with LED and Error function
Output signal	Digital square-wave signals RS232 (TTL)	Digital square-wave signals RS232 (TTL)
Resolution	10 µm, 50 µm, 100 µm, 500 µm, 2500 µm	10 µm, 50 µm, 100 µm, 500 µm, 2500 µm
Repeat accuracy	±1 increment	±1 increment
	BML-S2C0-Q _ _ -M600- _ 0- _ _ _	BML-S2C0-Q _ _ -M624- _ 0- _ _ _
Output voltage (A/B/Z)	RS422 to DIN 66259	RS422 to DIN 66259
Overall system accuracy	±400 µm	±400 µm
Supply voltage	5 V ±5%	5 V ±5%
Current consumption	< 150 mA	< 150 mA
Max. read distance sensor/tape	1...5 mm	1...5 mm
Max. travel speed	10 m/s	10 m/s
Operating temperature	-20...+80 °C	-20...+80 °C
Housing material	PBT	PBT
Degree of protection	IP 67	IP 67
Ordering example	B M L - S 2 C 0 - Q 6 1 _ _ - M 6 _ _ _ - 0 - _ _ _	

B M L - S 2 C 0 - Q 6 1 _ _ - M 6 _ _ _ - 0 - _ _ _

Resolution

G = 10 µm, K = 50 µm, L = 100 µm,
N = 500 µm, T = 2500 µm

Reference signal

0 = none
2 = pole-periodic

Error signal

0 = No error signal
4 = Error signal
(not together with cable KF_ _)

Connection

KA0... = 5 m cable, PUR, 12×0.08 mm²
Available cable lengths: KA02 = 2 m, KA05 = 5 m,
KA10 = 10 m, KA15 = 15 m, KA20 = 20 m
KF0... = 5 m cable, PUR, 8×0.08 mm²
Available cable lengths: KF02 = 2 m, KF05 = 5 m,
KF10 = 10 m, KF15 = 15 m, KF20 = 20 m
KA00,3-S284 = 0.3 m cable with M12 connector, 12-pin

min. edge separation

K = 4 µs, L = 8 µs, M = 10 µs, N = 16 µs,
P = 24 µs, R = 100 µs, S = 1 ms, T = 2 ms



Accessories

Magnetic tape for BML-S2C	BML-M07-I68-A0-M _ _ _ -R0000
Length	max. 48 m
Magnetic tape material	Rubber - ferrite
Cover strip and tape carrier material	Stainless steel
Ordering example	B M L - M 0 7 - I 6 8 - A 0 - M _ _ _ - R 0 0 0 0

Length

0500 = 5 m
Other lengths on request.

BML001M: Cover strip for tape on reel, length 48 m

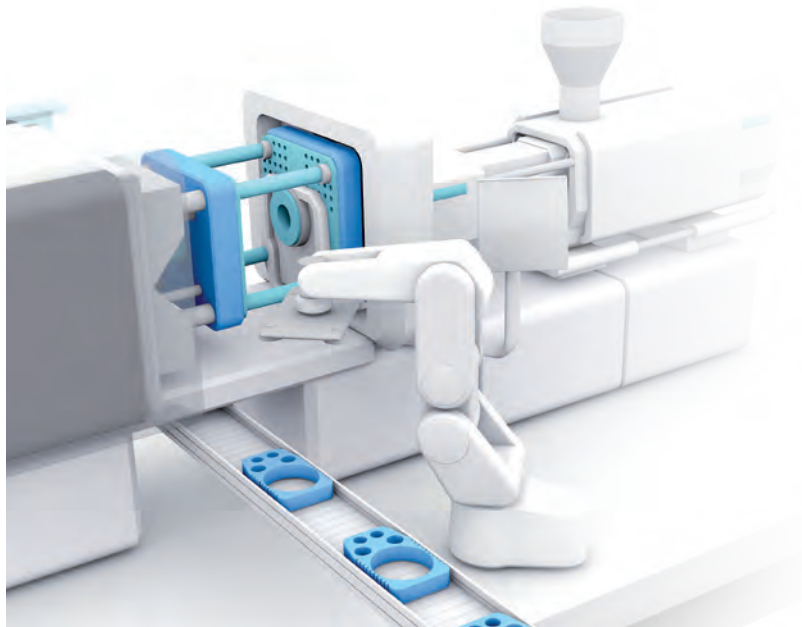
Micropulse Transducers BTL6-V and BTL7-V With Profinet, EtherCAT and VARAN interfaces

Data transmission in real-time

Micropulse transducers are now available either with your choice of Profinet, EtherCAT and VARAN Ethernet interfaces. This provides multiple advantages at once in mechanical engineering. For example, the integration into the controller and the replacement of parameters through the defined protocols is easy and time-saving. Measurement data are transmitted in the process synchronously in real time. This allows the system to be controlled faster and more accurately, increasing machine output and manufacturing quality. Finally, simple plug-and-play makes switching systems as easy as could be.

Benefits

- Fast, accurate and absolute position and speed measurement
- Non-contact and wear-free
- Insensitive to contamination
- Shock and vibration-resistant
- Fast and easy commissioning and communication
- Synchronous position measurement



Transducers with realtime Ethernet interfaces measure and monitor three motions at the same time on injection molding machines. Measurement of the injector movement, positioning of the ejector, and recording of the mold closing movement.

Series

Interface	Profinet IRT
	EtherCAT
	VARAN

Design

Max. measuring length
Resolution
Repeat accuracy
Max. scan rate
Max. measurable speed
Max. number of position encoders
Supply voltage
Operating temperature
Housing material
Degree of protection as per IEC 60529
Ordering example



BTL6-V11	BTL7-V50	BTL6-V11	BTL6-V55	BTL7-V50
No	Yes	No	No	Yes
Yes	Yes	Yes	No	Yes
Yes	No	Yes	Yes	No
Rod	Rod	Profile, round	Profile, flat	Profile
BTL6-V -M - -S115	BTL7-V50 -M - -C003	BTL6-V -M - -S115	BTL6-V -M - -S115	BTL7-V50 -M - -C003
4012 mm	7620 mm	4012 mm	4572 mm	7620 mm
< 10 µm	< 1 µm	< 10 µm	< 10 µm	< 1 µm
< 30 µm	≤ ±5 µm	< 30 µm	< 20 µm	≤ ±5 µm
2 kHz	1.1 kHz	2 kHz	4 kHz	1.1 kHz
10 m/s	10 m/s	10 m/s	10 m/s	10 m/s
2	16	2	2	16
20...28 V DC	10...30 V DC	20...28 V DC	10...30 V DC	10...30 V DC
0...+70 °C	-40...+85 °C	0...+70 °C	0...+85 °C	-40...+85 °C
Aluminum, stainless steel	Aluminum, stainless steel	Aluminum	Aluminum	Aluminum
IP 67	IP 67	IP 67	IP 67	IP 67



BTL7-V50 -M - -C003

Interface

T = Profinet IRT
E = EtherCAT

Nominal stroke

Design

P = Profil housing
B = metric mounting thread, M18×1.5, O-Ring, rod diameter 10.2 mm
Z = Inch thread 3/4"-16UNF, O-ring, rod diameter 10.2 mm

BTL6-V -M - -S115

Interface

11E = EtherCAT, 1 magnet
12E = EtherCAT, 2 magnets
11V = VARAN, 1 magnet
12V = VARAN, 2 magnets
55V = VARAN, Euromap 75

Nominal stroke

Design

A1 = Profil housing, round
PF = Profile housing, flat
B = Metric mounting-thread, M18×1.5, O-Ring, rod diameter 10.2 mm
Z = Inch thread 3/4"-16UNF, O-Ring, rod diameter 10.2 mm

Photoelectric Distance Sensors BOD 6K

With extended measuring range – for flexible adaptation to your application

Individually adjustable

Users now have greater flexibility in accurately positioning small parts. The Photoelectric Distance Sensors BOD 6K have an adjustable measuring range that can be optimally matched to a variety of applications.

They have an invertible characteristic. The switching outputs can be assigned individually as a normally open or normally closed. The adaptation via teach-in is fast and easy. BOD 6K offer a high degree of protection and give you high-resolution precision at a low price.

Application

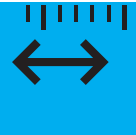
- Positioning small parts in manufacturing and assembly, e.g. in the automotive industry
- Positioning two separate pneumatic linear axes in the crimping machine

Benefits

- Adjustable measuring range between 30 and 200 mm
- Analog output 1...10 V with an additional switching output
- Resolution 0.68 mm
- Switching outputs NO/NC, dark/light switching adjustable using buttons
- Teach-in: measuring range and switching output can be adjusted independently
- Invertible characteristic
- IP 67/IP 69K degree of protection
- Ecolab certified
- Accurate position detection assured by optimized resolution and linearization of the analog characteristic
- Compact design for applications with tight installation tolerances



The compact housing can be perfectly integrated for quality control in assembly and production lines.



Series	BOD 6K	BOD 6K
Working range	30...200 mm	30...200 mm
PNP, NO/NC contact	BOD001R	BOD001T
Supply voltage U_S	13...30 V DC	13...30 V DC
Analog output	1...10 V	1...10 V
No-load supply current I_0 max.	30 mA	30 mA
Polarity reversal/short-circuit protected	Yes/Yes	Yes/Yes
Emitter, light type	LED, red light	LED, red light
Wavelength	632 Nm	632 Nm
Light spot diameter	Ø 9.5 mm at 100 mm	Ø 9.5 mm at 100 mm
Resolution	0.68 mm	0.68 mm
Linearity	± 2 mm	± 2 mm
Temperature drift	0.2 mm/°K	0.2 mm/°K
Power-on indicator	Green LED	Green LED
Output function indicator	Yellow LED	Yellow LED
Switching frequency f max.	1000 Hz	1000 Hz
Degree of protection as per IEC 60529	IP 67/IP 69K	IP 67/IP 69K
Ambient temperature T_a	-20...+60 °C	-20...+60 °C
Permissible ambient light	5 klx	5 klx
Material	Housing: ABS Optical surface: PMMA	ABS PMMA
Connection	M8 connector, 4-pin	2 m PVC cable, 4x0.14 mm ²

Measurement values referenced to 100x100 mm, 90% reflective gray card.

Photoelectric Distance Sensors BOD 23K with Laser Class 1

Reliable measurement – regardless of material and surface

Measuring range: 5 m

For reliable, stable measurement independent of the characteristics of the surface, we have developed the ideal solution in the photoelectric distance sensors BOD 23K. The Time-of-Flight (TOF) technology and high repeat accuracy in the mm range are convincing reasons.

Safe use is guaranteed by laser class 1, the high degree of protection and the Ecolab certification of the sensors.

Application

- Stack height measurement of metal and plastic parts
- Positioning of robots in the automotive industry
- Checking the diameter of coils in auto body construction

Benefits

- Stable measurement independent of the surface properties thanks to TOF technology
- Analog output with 2 teach points
- High range up to 5 m
- Maximum protection through laser class 1
- High repeat accuracy in the mm range
- High degree of protection in IP 67 and IP 69K
- Ecolab certified
- Laser class 1: variety of possible applications in the automotive industry
- Reliable positioning independent of material and surface characteristics
- Easy and intuitive operation of the sensor
- Compact design and convenient installation on the system
- Cost-effective solution for positioning tasks in 5 m measuring range



The BOD 23K permits reliable and precise positioning or measurement of the workpieces regardless of material and surface properties.



Series	BOD 23K	BOD 23K
Working range	100...5000 mm	100...5000 mm
PNP, NO/NC contact	BOD001N	BOD001P
Supply voltage U_S	18...30 V DC	18...30 V DC
Analog output	0...10 V	4...20 mA
No-load supply current I_0 max.	60 mA	60 mA
Polarity reversal/short-circuit protected	Yes/Yes	Yes/Yes
Emitter, light type	Laser, red light	Laser, red light
Wavelength	655 Nm	655 Nm
Laser class per IEC 60825-1	1	1
Light spot diameter	5.5×7 mm at 5000 mm	5.5×7 mm at 5000 mm
Resolution	< 5 mm (12 bits)	< 5 mm (12 bits)
Linearity	± 0.6% of Wh	± 0.6% of Wh
Temperature drift	0.1 mm/°K	0.1 mm/°K
Power-on indicator	Green LED	Green LED
Output function indicator	Yellow LED	Yellow LED
Switching frequency f max.	250 Hz	250 Hz
Degree of protection as per IEC 60529	IP 67/IP 69K	IP 67/IP 69K
Ambient temperature T_a	-40...+60 °C	-40...+50 °C
Permissible ambient light	5 klx	5 klx
Material	Housing: ABS Optical surface: PMMA	ABS PMMA
Connection	M12 connector, 5-pin	M12 connector, 5-pin

Measurement values referenced to 100×100 mm, 90% reflective gray card.

Mounting accessory: BAM027E

In addition to the analog distance sensors, photoelectric sensors with switching output are available.

Inclination Sensors BSI Q41

Angle measurement made easy

Direct position detection

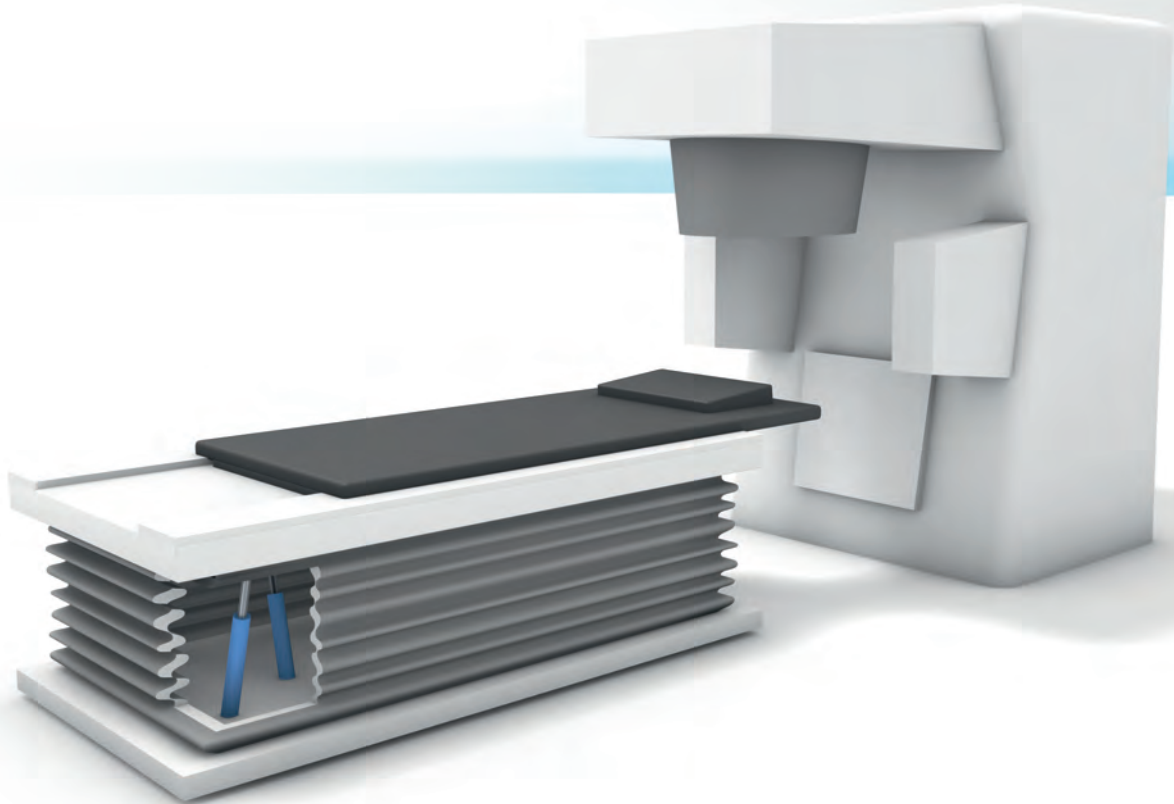
Inclination sensors BSI Q41 provide an easy means of directly detecting positions without making contact. Integrating them into systems is easy, because they operate without elaborate mechanisms or other targets.

Application

- Packaging machines
- Mobile implements
- Medical technology

Benefits

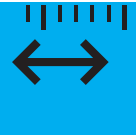
- Compact
- cost-effective
- Choice of one or two measurement axes



Inclination sensors BSI Q41 position patient tables in the medical field.



Design		Micro-Electro-Mechanical Systems (MEMS)			
Measuring range	±15°	BSI000J		BSI000W	
	±30°	BSI000K		BSI000Y	
	±45°	BSI000P		BSI0011	
	±90°	BSI000R		BSI0012	
	360°	BSI000H			
Supply voltage	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
Number of axes = 1/2"	1	1	1	2	2
Accuracy	0.6°	0.8°	1.0°	0.6°	0.8°
Resolution	0.09°	0.09°	0.09°	0.09°	0.09°
Output signal	4...20 mA	4...20 mA	4...20 mA	4...20 mA	4...20 mA
Housing	PBTP	PBTP	PBTP	PBTP	PBTP
Dimensions	40×40×25 mm	40×40×25 mm	40×40×25 mm	40×40×25 mm	40×40×25 mm
Temperature range	-25...+85 °C	-25...+85 °C	-25...+85 °C	-25...+85 °C	-25...+85 °C
Connection	M12 connector, 5-pin	M12 connector, 5-pin	M12 connector, 5-pin	M12 connector, 5-pin	M12 connector, 5-pin



Variants with voltage output available on request.

Inclination Sensors BSI R65

When high precision is what you need

For rotating movements

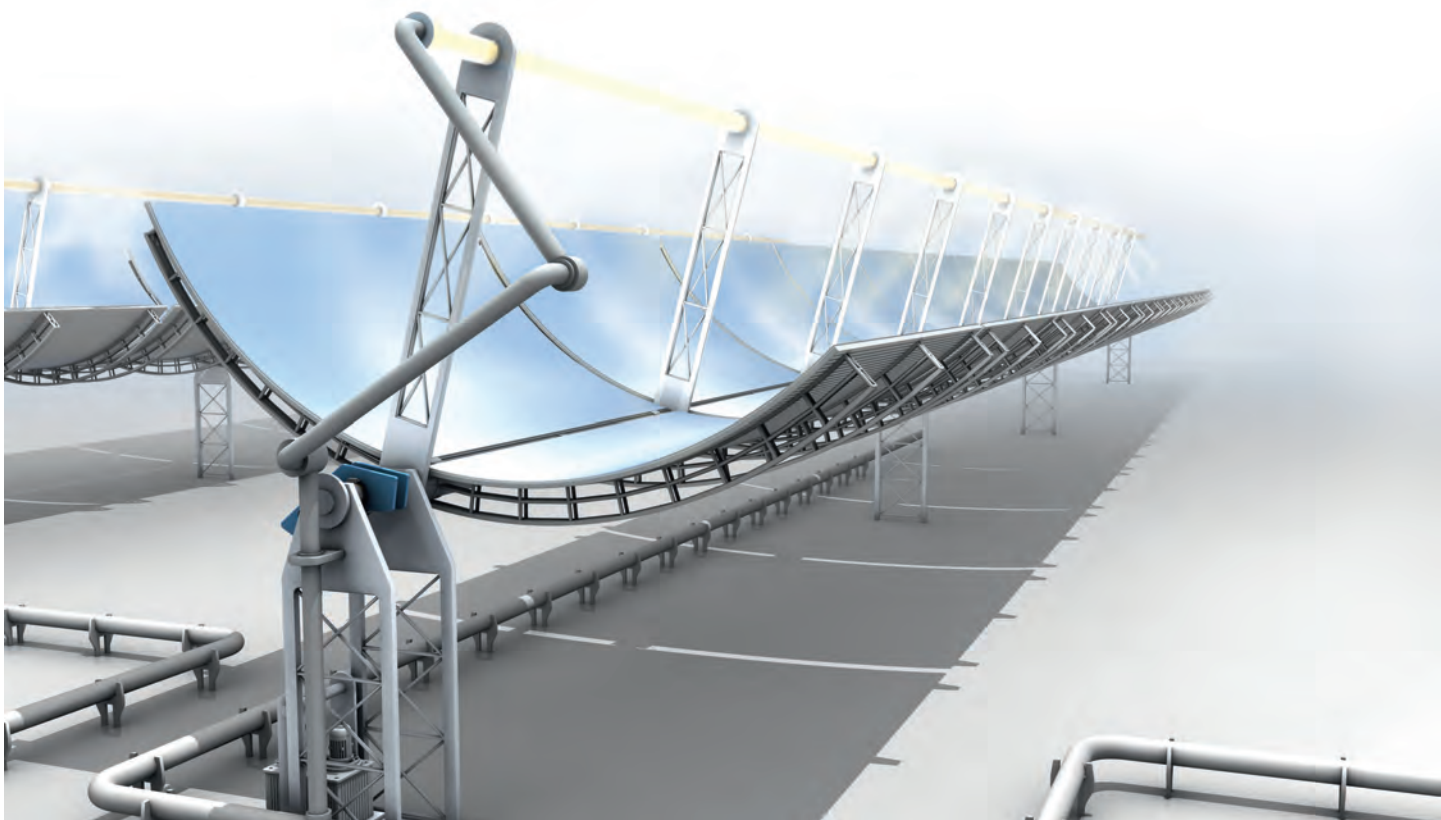
Inclination sensors BSI R65 enable continuous detection of rotational movements along one axis. Furthermore, they are ideally suited for monitoring the precise position of machine components in two axes.

Benefits

- High precision
- Large temperature range
- Contact-free measuring principle

Application

- Solar power systems
- Metal processing
- Oil and gas extraction

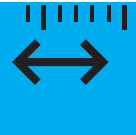


Inclination sensors BSI R65 enable precision guiding of parabolic troughs.



Design		Micro-Electro-Mechanical Systems (MEMS)			
Measuring range	±15°	BSI001E		BSI0006	
	±30°	BSI0018		BSI0007	
	±45°	BSI0019			BSI0008
	±90°	BSI001A			BSI0009
	360°		BSI0015		
Supply voltage		10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
Number of axes = ½"		1	1	2	2
Accuracy		0.2°	0.25°	0.12°	0.2°
Resolution		0.01°	0.01°	0.01°	0.01°
Output signal		4...20 mA	4...20 mA	4...20 mA	4...20 mA
Housing		PBTP	PBTP	PBTP	PBTP
Dimensions		60×50×27 mm	60×50×27 mm	60×50×27 mm	60×50×27 mm
Temperature range		-40...+85 °C	-40...+85 °C	-25...+85 °C	-25...+85 °C
Connection		M12 connector, 8-pin	M12 connector, 8-pin	M12 connector, 8-pin	M12 connector, 8-pin

Variants with voltage output available on request.





Line Lasers
Plug Connectors



Accessories

Line Lasers

Extraordinary uniform performance, focusable and high quality standard

Extraordinary uniform performance, focusable and high quality standard

Line lasers are used in industrial image processing and for aligning and positioning workpieces or accessories. The combination of laser lighting and image processing provides interesting options for automating visual quality control. They are used in many ways for detecting and measuring defects, presence, diameters, edges, gaps, steps, etc. Our line lasers with uniform power distribution can be precisely and securely adjusted without a tool and using a lock. The line position stays unchanged.



Series		BAE LX-XO	BAE LX-XO
Design		Line laser	Line laser
Projection type		Line, uniform	Line, uniform
		BAE00KE	BAE00KZ
Supply voltage U_s		5...30 V DC	5...30 V DC
Operating current		30 mA	30 mA
Trigger		Yes	Yes
Line width	100 mm line length	80 μm	70 μm
	500 mm line length	170 μm	107 μm
	1000 mm line length	320 μm	190 μm
	2000 mm line length	680 μm	360 μm
Emitter, light type		Laser, red light	Laser, red light
Wavelength		640 Nm	635 Nm
Dispersion angle		45°	10°
Weight		66 g	56 g
Degree of protection as per IEC 60529		IP 67	IP 67
Laser class per IEC 60825-1		2M	1M
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Ambient temperature T_a		-10...+50 °C	-10...+50 °C
Storage temperature		-10...+80 °C	-10...+80 °C
Material	Housing	Coated brass and anodized aluminum	Coated brass and anodized aluminum
	Optical surface	Glass	Glass
Connection		M12 connector, 4-pin	M12 connector, 4-pin



Caution

Do not view laser radiation directly with optical instruments (magnifiers, microscopes, etc.).
Laser class 1M and 2M (DIN EN 60825-1: 2008)



BAE LX-XO	BAE LX-XO	BAE LX-XO	BAE LX-XO	BAE LX-XO
Line laser	Line laser	Line laser	Line laser	Line laser
Line, uniform	Grid, 51x51 lines	Matrix, 11x11 dots	11 parallel lines	Line, uniform
BAE00MY	BAE00MZ	BAE00N0	BAE00N1	BAE00N2
5...30 V DC	5...30 V DC	5...30 V DC	5...30 V DC	5...30 V DC
Max. 100 mA	Max. 100 mA	Max. 100 mA	Max. 100 mA	Max. 100 mA
Yes	Yes	Yes	Yes	Yes
70 µm	80 µm	80 µm	80 µm	80 µm
107 µm	170 µm	170 µm	170 µm	170 µm
190 µm	320 µm	320 µm	370 µm	320 µm
360 µm		680 µm		680 µm
Laser, red light	Laser, red light	Laser, red light	Laser, red light	Laser, blue light
635 Nm	640 Nm	640 Nm	640 Nm	450 Nm
20°	22°x22° at 633 nm	20°	20°, x/y 30° at 633 nm	20°
56 g	56 g	56 g	56 g	56 g
IP 67	IP 67	IP 67	IP 67	IP 67
1M	2M	2M	2M	2M
Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
-10...+50 °C	-10...+50 °C	-10...+50 °C	-10...+50 °C	-10...+50 °C
-10...+80 °C	-10...+80 °C	-10...+80 °C	-10...+80 °C	-10...+80 °C
Coated brass and anodized aluminum	Coated brass and anodized aluminum	Coated brass and anodized aluminum	Coated brass and anodized aluminum	Coated brass and anodized aluminum
Glass	Glass	Glass	Glass	Glass
M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin



Push-Pull Connectors BCC

For Profinet push-pull modules BNI

For quick and simple installation

Balluff is offering suitable connectors for the new push-pull variants of Profinet modules. Select between fiber-optic cables (FO) and copper versions for transmitting signals or files. The push-pull connection technology for fieldbus and power lines has been specified by AIDA (Automation Initiative of German Automobile Manufacturers). Push-pull guarantees quick and easy installation.

Benefits

Optical data transmission is usually the method of choice for applications involving large amounts of data requiring high availability. The features provided by polymer optical fibers (POF) include excellent protection against electromagnetic effects (EMC), large transmission bandwidth, and long ranges. Equalizing currents and overvoltages can be effectively prevented through the potential isolation automatically on hand. Fiber-optic cables have now become established in industrial data communication for this reason.

Connector diagram and wiring

0.6 m

2 m

5 m

10 m

20 m

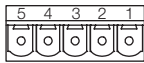
Supply voltage U_S

Cable material

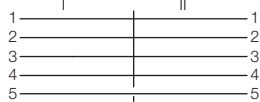
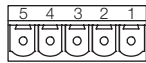
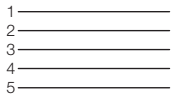
Number of conductors × conductor cross-section

Degree of protection as per IEC 60529

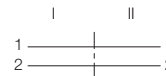
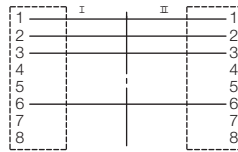
Ambient temperature T_a



PIN 1: brown
 PIN 2: black
 PIN 3: gray
 PIN 4: blue
 PIN 5: green/yellow



1...8



BCC0F4J	BCC0F4M	BCC0F4U	BCC0F51
BCC0F4K	BCC0F4N	BCC0F4W	BCC0F52
BCC0F4L	BCC0F4P	BCC0F4Y	BCC0F53
	BCC0F4R	BCC0F4Z	BCC0F54
	BCC0F4T	BCC0F50	BCC0F55
24 V DC	24 V DC	50 V DC	24 V DC
PVC	PVC	PUR shielded	PUR
5x2.5 mm ²	5x2.5 mm ²	4x0.34 mm ²	2x Ø 1 mm
IP 67	IP 67	IP 67	IP 67
-40...+70 °C	-40...+70 °C	-40...+70 °C	-20...+70 °C



New Valve Connectors BCC

Molded valve connectors for harsh environments

Long-lasting

Balluff valve connectors ensure the highest possible level of productivity for your machines and systems. High resistance to shock and vibration and degree of protection levels up to IP 69K ensure reliable electrical connections even under adverse conditions. The connector consists of high-quality materials. This means it is largely resistant to UV light and a vast assortment of chemicals and features a long service life.

Benefits

- IP 67 degree of protection with optional sealing in IP 68 or IP 69K
- High shock and vibration resistance
- Eyelets for labels
- Mounting collar for protective tubes

Application

Design

Cable length

Standard

Cable outlet

Suppressor

Standard

Cable outlet

Suppressor

Standard

Cable outlet

Suppressor

Standard

Cable outlet

Suppressor

This compilation is an excerpt from the complete portfolio.



Valve connector

A

2 m

BCC04W0

DIN 18 mm

0°/180°

Suppressor diode

Valve connector

B

2 m

BCC03YC

DIN 10 mm

0°

Suppressor diode

Valve connector

C

2 m

BCC04MZ

DIN 8 mm

0°/180°

Suppressor diode

For pressure switches

A

2 m

BCC071A

DIN 18 mm

0°

No

BCC04W6

DIN 18 mm

0°/180°

No

BCC03YH

DIN 10 mm

180°

Suppressor diode

BCC04RF

Industry 9.4 mm

0°/180°

Suppressor diode

BCC071F

DIN 18 mm

180°

No

BCC03YL

Industry 11 mm

0°

Suppressor diode

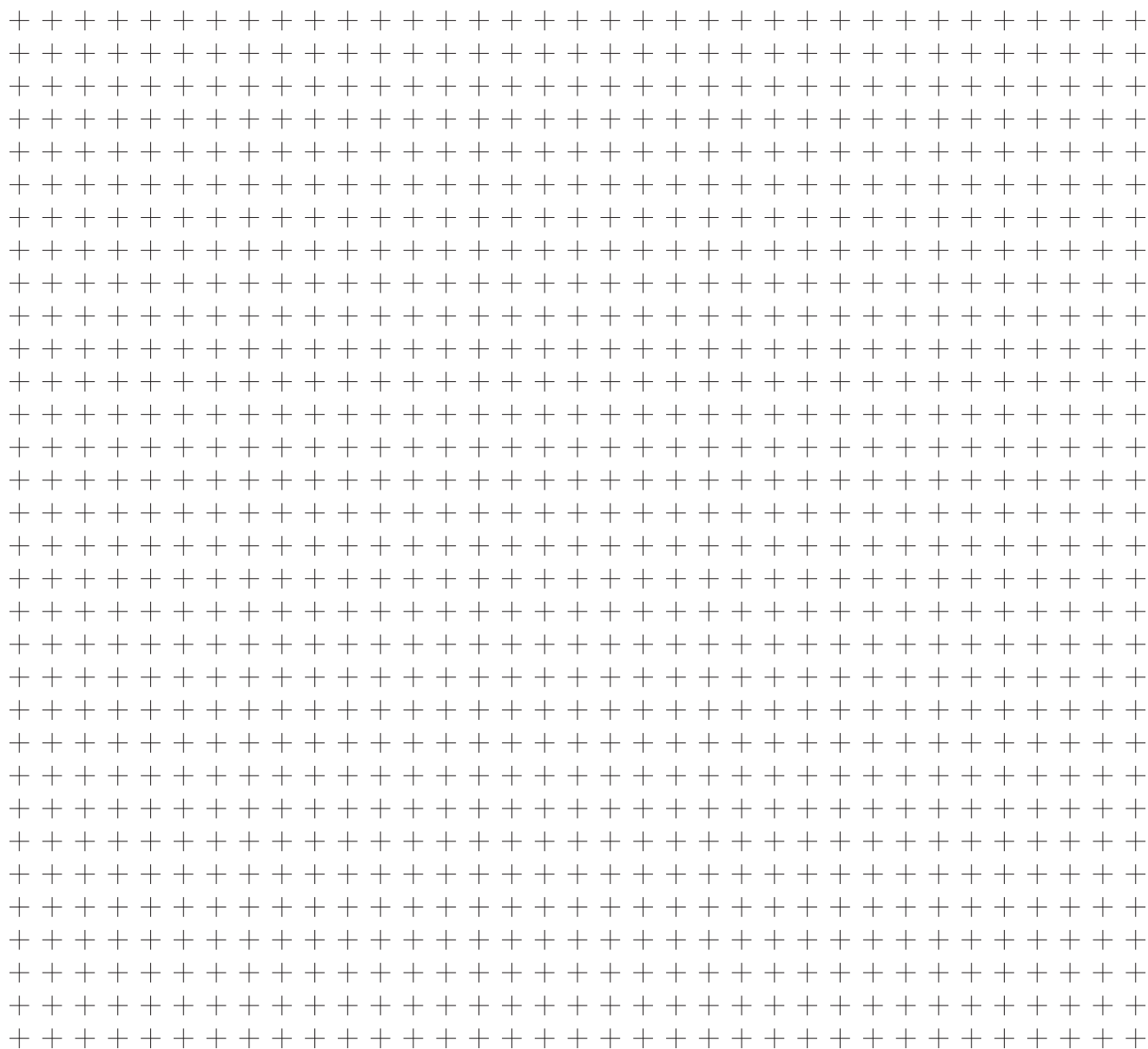
BCC03YP

Industry 11 mm

180°

Suppressor diode





IT'S A GOOD FEELING
TO ALWAYS KNOW
WHAT YOU CAN
RELY ON.



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Industrial Networking and Connectivity



Industrial Identification



Object Detection



Linear Position Sensing and Measurement



Condition Monitoring and Fluid Sensors



Accessories

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