BALLUFF

For efficient automation

PRODUCTS + NEWS

innovating automation

CONTENTS

For increased quality assurance

MAKING THE INVISIBLE VISIBLE: RADARIMAGER

Quality assurance is a crucial factor for many companies. Furthermore, they face the challenge of testing products efficiently, automatically and without in any way harming product quality. Only by ensuring product quality can a manufacturing company achieve maximum output.
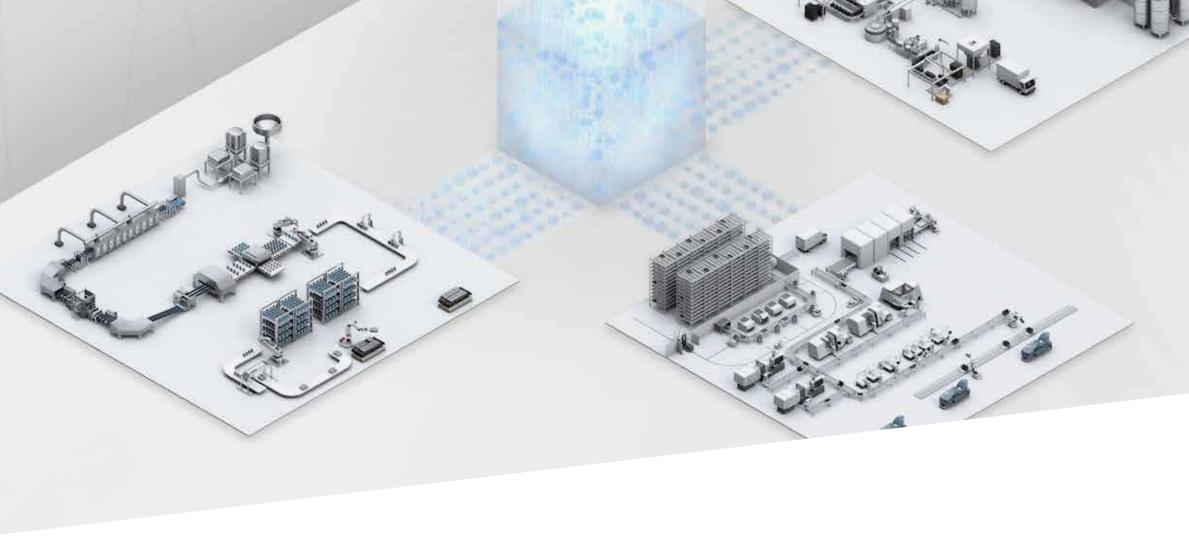
This is precisely where Balluff's RadarImager comes in. This industrial 3D imaging system – based on radar technology – screens a wide variety of packaging. It allows you to scan all kinds of otherwise "hidden" objects to make anomalies visible. With the RadarImager you can check packaging for completeness and product integrity, identify foreign bodies, and take quality control to a new level.

Possible areas of application

- Check for completeness
- Detection of impurities and foreign bodies
- Detection of surface condition

Features

- Making the invisible visible with a modern imaging radar system
- Scanning through non-conductive materials, such as foils, cardboard and plastics, among others
- Anomaly detection based on image and data analysis
- Light independent

ASSET
DATA
PROVIDER
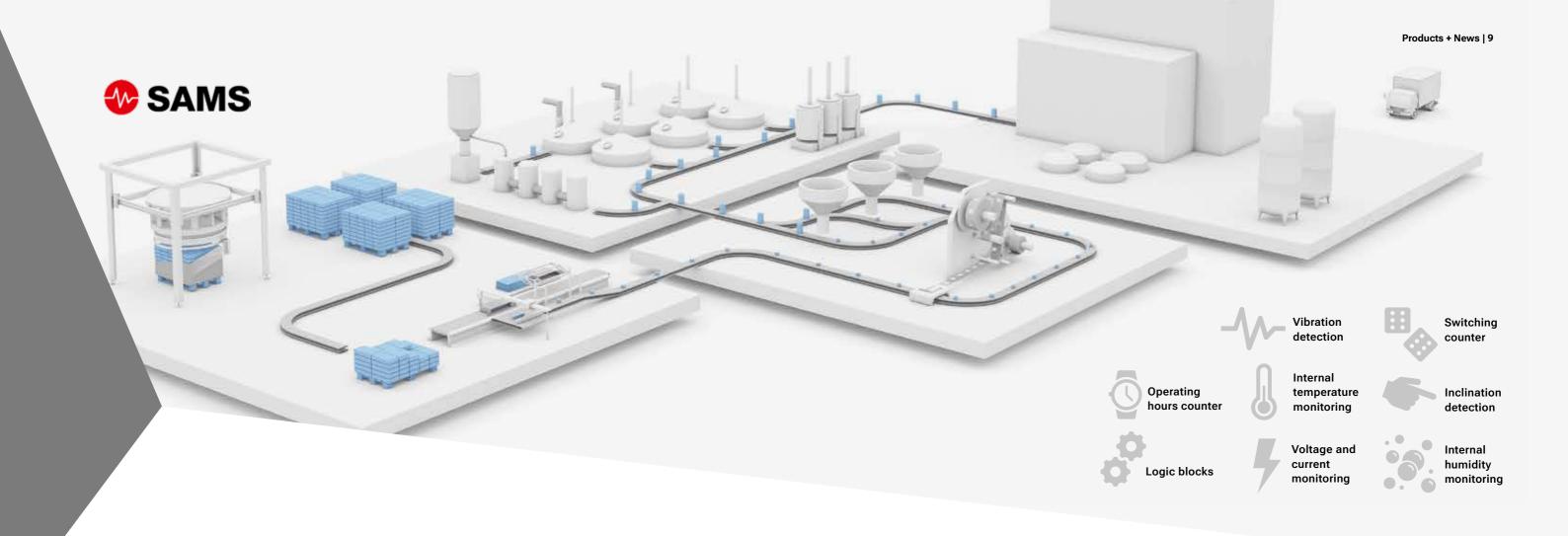
Driving digital transformation through intelligent IIoT software

ASSET DATA PROVIDER

The industrial world is changing: more and more companies are turning to digitalization and automation to make their production more efficient, flexible and future-proof. The key to this lies in the Industrial Internet of Things (IIoT), which enables intelligent networking and communication between machines, plants, sensors, systems and the Cloud.

But despite this great potential, industrial companies repeatedly encounter challenges that make the successful implementation and operation of IIoT solutions difficult. With the Asset Data Provider, Balluff offers an integrative solution to overcome these challenges and accelerate digital transformation. The Asset Data Provider is a software solution for the collection, pre-processing and provision of data to IIoT applications generated, for example, by industrial assets such as machines, plants, and sensors at the operational technology (OT) level.

CHALLENGE	ASSET DATA PROVIDER	ADDED VALUE
IT/OT teams face bottlenecks: High skills barriers, lack of talent, and slow pace of digitalization	Low code and Drag and Drop	Agile development enables low barriers and easier development of integration workflows
Limited data access, encapsulated data, multiple data types, stale data, data distributed across many sites, systems and assets	Any data: streaming data, APIs Any location: edge, on-premises, cloud	Integrate all data: Break through data silos with intelligent workflows for horizontal and vertical integrations
Poor data quality, no common data model, large volumes of raw data, and no actionable data	Advanced data transformation	Non-experts are empowered and can innovate without depending on IT
Very high hurdle in terms of IT infrastructure, skills and DevOps to execute advanced logic	Hybrid-first: distributed edge nodes	Future-proof infrastructure enables scalability. Any real-time and data workflow usecase can be implemented
Insufficient centralized control over distributed teams, data and software	Centralized control and governance	Centralized control reduces risk and increases efficiency for large rollouts
High cost, long term projects, difficult to calculate ROI	Intelligent data workflows including AI/ML	Low TCO: Low cost of development and lifecycle changes, low IT workload, and lower cloud costs

SAMS

Vibration detection

Switching counter

Operating hours counter

Internal temperature monitoring

Inclination detection

Logic blocks

Voltage and current monitoring

Internal humidity monitoring

Switch to optimal performance now

SMART AUTOMATION AND MONITORING SYSTEM

High-performance, multifunctional solutions are required to increase the efficiency of machines and plants. These solutions must not only serve to control the machine, but also provide data on the condition of the machine. With this information, you can optimize the performance of each machine and, consequently, the entire plant by designing processes that are both efficient and flexible. The innovative Smart Automation and Monitoring System (SAMS) from Balluff provides you with a system that enables you to implement automation of the entire production line in a uniform manner.

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/GO/SAMS

Your Balluff SAMS solutions

- Inductive sensors
- Photoelectric sensors
- Digital position indicators
- RFID
- Network blocks
- Inductive couplers
- I/O blocks
- Magnetostrictive position measuring systems

Look and Feel

With a consistent housing, connectors and mounting design, SAMS components are easy to install and connect. The consistent operating and configuration concept increases machine flexibility and availability, as all devices can be parameterized, configured, and even taught contactlessly using a mobile terminal and standard data profiles. Machine damage and production downtime due to incorrect handling are thus minimized.

Smart Features

Once commissioned, the devices with additional functions become data sources that you use to ensure the reliable operation of your plant – e.g. via temperature monitoring, humidity and tilt detection, vibration monitoring, signal quality display, operating hours counter, or time functions. These features provide additional monitoring capabilities without the need for further specialized devices to gain an overview. In addition, each component can be clearly localized in the plant through device recognition so that, for instance, you can find a sensor in the plant quickly and easily.

Health

Our intelligent components open up new possibilities, such as condition monitoring of machines and systems or predictive maintenance. The status data of your machines is consistently available to you everywhere and immediately – whether through colored LED signal display directly on the device or on dashboards for further analysis. In this way, you remain informed about every single sensor, every machine and the entire production, recognize trends and can significantly improve the performance of your production on a secure basis. In combination with powerful network technology and cloud computing from Balluff, smart manufacturing in the sense of the Industrial Internet of Things (IIoT) becomes a reality.

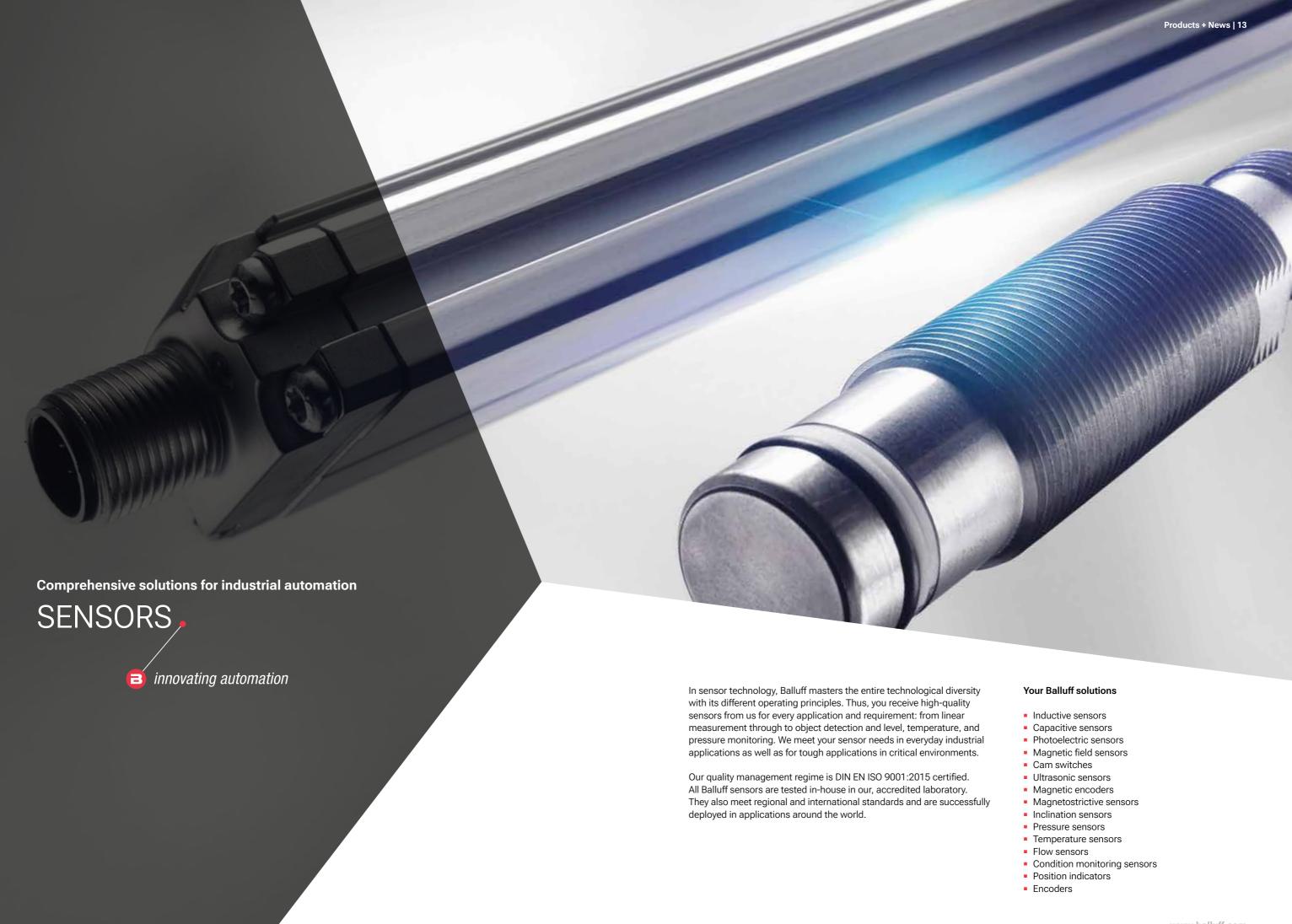**Continuously monitor the condition of machines, plants and processes**

CONDITION MONITORING

Condition monitoring systems and their components contribute to the efficient and trouble-free operation of machines and plants in industry. Disruptions in the production process due to unplanned downtimes can be prevented by using sensors. Monitoring devices such as vibration, temperature, pressure and level sensors provide data on the condition of a plant. Processing this data yields valuable information for machine maintenance, enabling preventative and predictive maintenance. With such condition monitoring systems, changes like the wear of individual components can be detected faster, and maintenance work can be better coordinated.

The goal is to increase reliability in the automation and digitalization of your production. Balluff offers the right solution for monitoring your machines and systems. From a simple standardized solution to the mapping of individual complex systems, our condition monitoring solutions set the standard.

WHAT IS MEASURED/ MONITORED		TYPICAL MACHINES/ASSET TO BE MONITORED	SENSOR TYPE
	Vibration, oscillation and acceleration	Motor, bearing, conveyor, pump, fan, spindle, compressor, gearbox, robot, machine tool, press	Condition monitoring sensors
			Smart automation and monitoring system sensors
	Temperature	Motor, bearing, conveyor, pump, fan, spindle, compressor, gearbox, machine tool, electronics cabinet, oven, furnace	Temperature sensors
			Condition monitoring sensors
		Internal sensor measurement	Smart automation and monitoring system sensors
	Pressure	Lubricant, coolant or hydraulic fluid reservoir or line, pump, valve	Pressure sensors
		Cabinet, container or vessel ambient air pressure	Condition monitoring sensors
			Smart automation and monitoring system sensors
	Flow rate	Coolant, lubricant, hydraulic fluid or pneumatic line, pump, valve	Flow sensors
	Humidity	Electronics cabinet, packaging machine, dryer	Condition monitoring sensors
		Internal sensor measurement	Smart automation and monitoring system sensors
	Voltage and current	Internal sensor measurement	Smart automation and monitoring system sensors
			Power supplies
	Speed	Motor, conveyor, pump, fan, spindle	Encoders
			Inductive sensors
	Level	Lubricant, coolant or hydraulic fluid reservoir, leak detection, pump, valve	Capacitive sensors
			Ultrasonic sensors
			Magnetostrictive sensors
	Displacement and distance	Machine tool, press, robot, conveyor	Inductive sensors
			Ultrasonic sensors
			Magnetostrictive sensors
	Inclination	Conveyor, press, machine tool	Smart automation and monitoring system sensors
			Inclination sensors

Comprehensive solutions for industrial automation

SENSORS .

🅑 *innovating automation*

In sensor technology, Balluff masters the entire technological diversity with its different operating principles. Thus, you receive high-quality sensors from us for every application and requirement: from linear measurement through to object detection and level, temperature, and pressure monitoring. We meet your sensor needs in everyday industrial applications as well as for tough applications in critical environments.

Our quality management regime is DIN EN ISO 9001:2015 certified. All Balluff sensors are tested in-house in our, accredited laboratory. They also meet regional and international standards and are successfully deployed in applications around the world.

Your Balluff solutions

- Inductive sensors
- Capacitive sensors
- Photoelectric sensors
- Magnetic field sensors
- Cam switches
- Ultrasonic sensors
- Magnetic encoders
- Magnetostrictive sensors
- Inclination sensors
- Pressure sensors
- Temperature sensors
- Flow sensors
- Condition monitoring sensors
- Position indicators
- Encoders

When red light sensors reach their limits

BOS 6K PHOTOELECTRIC SENSORS WITH BLUE LIGHT TECHNOLOGY

The BOS 6K photoelectric sensor family consists of cubic midi-sensors that cover all relevant detection principles, using a range of light sources. The latest generation convinces with proven, but also entirely new functional principles and technologies.

All sensors of the product family share the same housing design, operating principle, and the communication standard IO-Link. This uniformity significantly simplifies their configuration and integration. In conjunction with the intelligent PNP/NPN output, the number of required variants is also reduced.

A highlight of the new generation are sensors with blue light technology for background suppression – ideal for reliably detecting transparent objects and similarly difficult parts.

Easy detection of objects difficult to see

The use of sensors with blue light is particularly recommended in applications where red light reaches its physical limits.

Since blue light has a shorter wavelength than other colors of visible light, it scatters less and the light beam is better focused. The lower scattering means that blue light sensors can detect finer details and, depending on the application, work even more reliably than their red light counterparts.

In addition, blue light penetrates less deeply into materials compared to other light wavelengths. This minimizes interference with other objects and surfaces and makes object detection even more precise. Even difficult materials or surface textures, for example in the case of transparent or dark and shiny objects, are detected more reliably than would be possible with red light.

Finally, the sensors also impress with their robustness. The dustproof and waterproof blue light sensors with protection class IP69 are – like all BOS 6K sensors – ideally suited for use in harsh industrial environments.

Features

- Uniform space-saving housing shape for all variants
- Uniform operating concept and simple integration thanks to IO-Link
- Reliable object detection even in difficult conditions
- Detects a wide range of materials and surface structures
- Robust, dustproof and waterproof for industrial environments

BOS PHOTOELECTRIC SENSORS WITH BLUE LIGHT TECHNOLOGY

	BOS02FU	BOS02FW	BOS02FY		BOS02FZ	BOS02F8	BOS02F9	BOS02FA
Series	BOS 6K	BOS 6K	BOS 6K		BOS 6K	BOS 6K	BOS 6K	BOS 6K
Special optical feature	FixFocus	FixFocus	FixFocus		FixFocus	Background suppression	Background suppression	Background suppression
Range	0...80 mm	0...80 mm	0...80 mm		0...80 mm	0...200 mm	0...200 mm	0...200 mm
Gray value shift (20 %/90 %)						≤ 5 %	≤ 5 %	≤ 5 %
Light type	Blue light	Blue light	Blue light		Blue light	Blue light	Blue light	Blue light
Beam characteristic	Focused at 60 mm	Focused at 60 mm	Focused at 60 mm		Focused at 60 mm	Divergent	Divergent	Divergent
Light spot size	Ø 2 mm at 60 mm	Ø 2 mm at 60 mm	Ø 2 mm at 60 mm		Ø 2 mm at 60 mm	10 × 10 mm at 150 mm	10 × 10 mm at 150 mm	10 × 10 mm at 150 mm
Interface	Pin 4: PNP NO/NC selectable	Pin 4: NPN NO/NC selectable	Pin 4: PNP NO/NC selectable		Pin 4: NPN NO/NC selectable	IO-Link 1.1, COM 2	IO-Link 1.1, COM 2	—
	Pin 2: Teach	Pin 2: Teach	White: Teach		White: Teach	Pin 4: AutoDetect (PNP/NPN) NO/NC selectable	Black: AutoDetect (PNP/NPN) NO/NC selectable	Pin 4: AutoDetect (PNP/NPN) NO/NC selectable
Switching hysteresis	~ 1 %	~ 1 %	~ 1 %		~ 1 %	Pin 2: Teach	White: Teach	Pin 2: Teach
Switching frequency	≤ 1000 Hz	≤ 1000 Hz	≤ 1000 Hz		≤ 1000 Hz	≤ 5 %	≤ 5 %	≤ 5 %
Connection	Connector, M8 male, 4-pin	Connector, M8 male, 4-pin	Cable, 4 wires, 2 m		Cable, 4 wires, 2 m	≤ 700 Hz	≤ 700 Hz	≤ 700 Hz
Operating voltage						Connector, M8 male, 4-pin	Cable, 4 wires, 2 m	Connector, M8 male, 3-pin
Operating voltage	10...30 V DC	10...30 V DC	10...30 V DC		10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
Dimensions	34 × 20 × 12 mm	34 × 20 × 12 mm	34 × 20 × 12 mm		34 × 20 × 12 mm	34 × 20 × 12 mm	34 × 20 × 12 mm	34 × 20 × 12 mm
Housing material	ABS	ABS	ABS		ABS	ABS	ABS	ABS
Material sensing surface	PMMA	PMMA	PMMA		PMMA	PMMA	PMMA	PMMA
Approval/conformity	CE, UL, UKCA	CE, UL, UKCA	CE, UL, UKCA		CE, UL, UKCA	CE, UL, UKCA	CE, UL, UKCA	CE, UL, UKCA

The BOS 6K photoelectric sensor family, consisting of cubic midi sensors, utilizes various light sources and is suitable for all relevant detection principles. Furthermore, in order to meet the requirements of even more customers, we have also further developed the latest product generation both functionally and technologically.

The parameterization and integration of the sensors have also been significantly simplified for optimized usability. It is supported by intelligent PNP/NPN output.

In addition to the standard red light and laser variants, Balluff now also offers sensors for (long-range) distance scanning. Equipped with Time-of-Flight technology (TOF) and despite their small size, these sensors are capable of detecting objects safely and reliably even at great distances.

Multi-talented sensors with Time-of-Flight technology

The new BOS 6K sensors with TOF are a precise, fast and versatile solution for distance measurement. Their Time-of-Flight technology sends light pulses and measures the time they take to travel to the object and back. This is particularly advantageous for background suppression, as it means that even a background close to the object can be reliably distinguished from the object and the distance precisely measured.

The Time-of-Flight method also works reliably at greater distances, which means that the sensors can be used for distances of up to 1.5 m despite their compact design. This opens up completely new possibilities in the design of automation systems and makes the sensors very flexible to use. These sensors achieve significantly better performance with a much smaller design than was previously possible with considerably larger sensors.

Another major advantage of TOF sensors is their versatility: they can be used in a variety of environments, as they operate independently of the surface of the object. They reliably detect both smooth and rough surfaces. In addition, they operate largely independent of color, making them equally suitable for detecting light and dark objects.

Features

- Uniform space-saving housing shape for all variants
- Uniform operating concept and simple integration thanks to IO-Link
- Time-of-Flight sensors for precise distance measurement up to 1.5 m
- Object detection independent of object surface and color
- Robust, dust-proof and waterproof for industrial environments

Precise, fast and high-range

BOS 6K SENSORS WITH TIME-OF-FLIGHT TECHNOLOGY
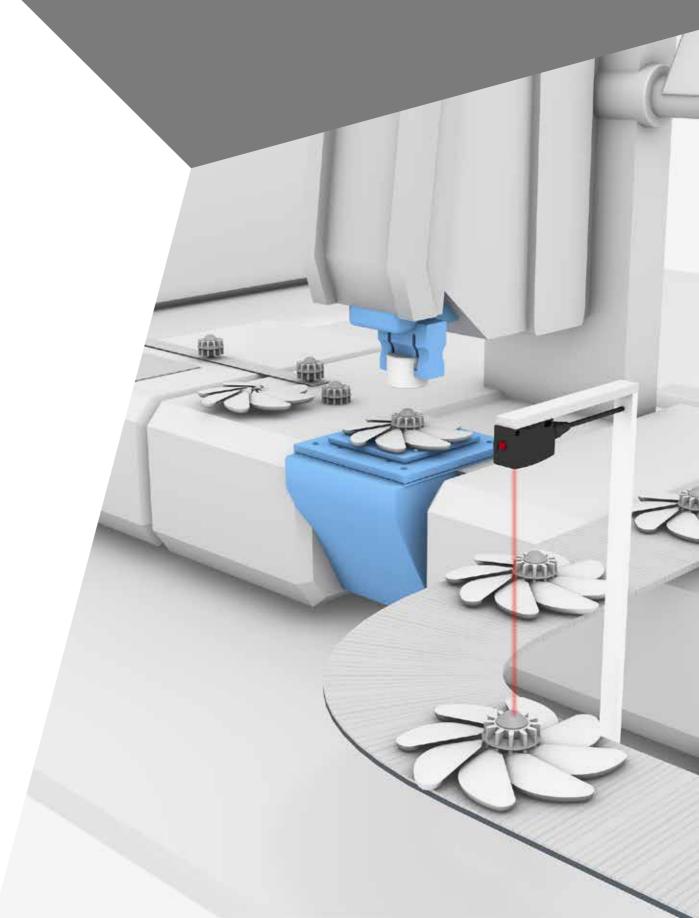
BOS PHOTOELECTRIC
SENSOR WITH TIME-OF-FLIGHT-
TECHNOLOGY
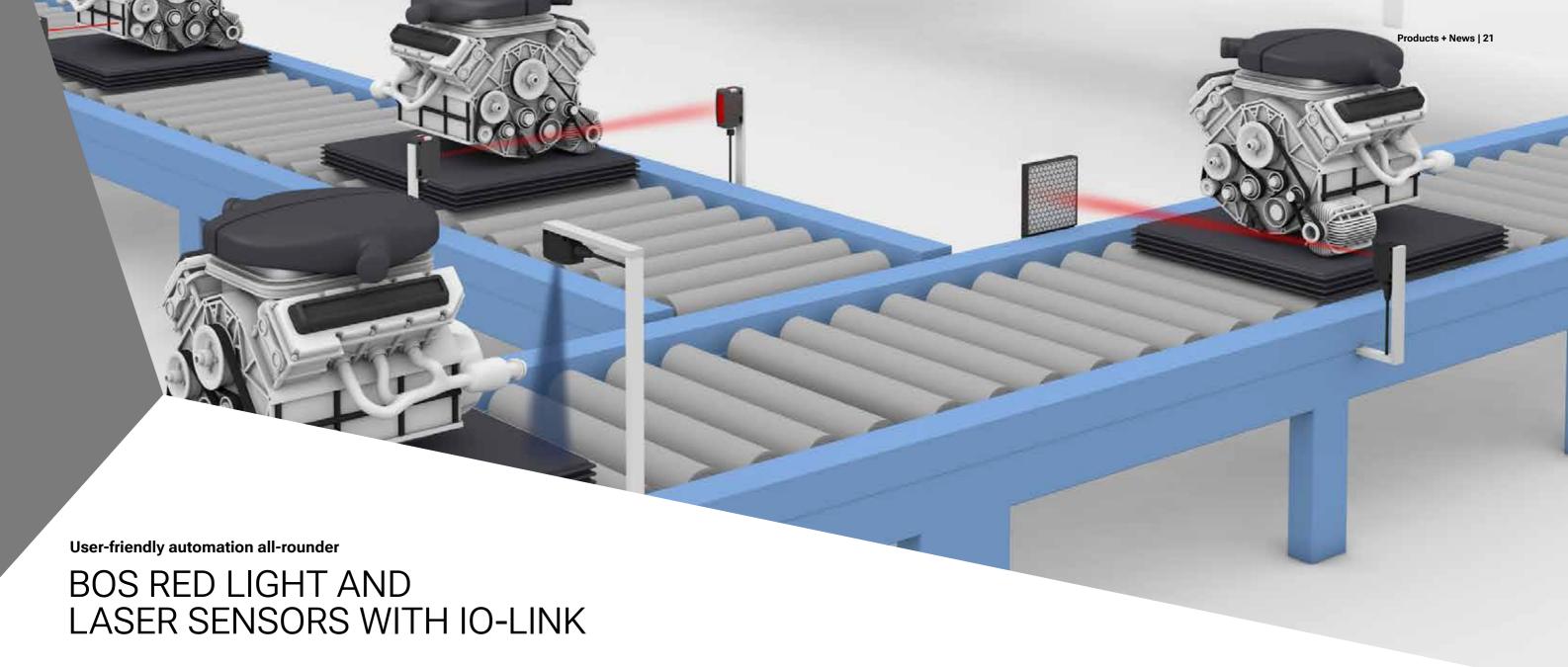
	BOS02EK
Series	BOS 6K
Optical operating principle	Background suppression
Range	0...1500 mm
Gray value shift (20 %/90 %)	≤ 15 mm
Light type	Laser red light, 655 nm
Laser class	1
Beam characteristic	Collimated
Light spot size	2 × 3 mm at 1500 mm
Interface	IO-Link 1.1.3 COM 2
Output function	Pin 4: Auto Detect (PNP/NPN) NO/NC selectable, Pin 2: Teach
Switching hysteresis	4...7 mm (at switching frequency 5 Hz)
Switching frequency	5...500 Hz
Connection	Connector, M8 male, 4-pin
Operating voltage	18...30 V DC
Dimensions	34 × 20 × 12 mm
Housing material/material sensing surface	ABS/ PMMA
Approval/conformity	CE, UL, UKCA

User-friendly automation all-rounder

BOS RED LIGHT AND LASER SENSORS WITH IO-LINK

The BOS 6K photoelectric sensor family consists of cubic midi sensors that cover all relevant detection principles and use various types of light sources.

The BOS 6K sensors are now available in a new generation, featuring new variants and innovative technologies. Common to all sensors in the family is their housing shape, operating concept and IO-Link. This considerably simplifies the parameterization and integration of the sensors and improves their usability. The intelligent PNP/NPN output also reduces the number of variants required.

With this very versatile sensor family, a wide variety of applications can be solved safely and reliably thanks to their diverse range of functional principles. Sensor variants with red light and laser are proven and therefore an integral part of the portfolio.

Red light is a reliable technology with a very good cost-benefit ratio, making it the light type par excellence for almost all standard applications. Its well-focused light spot, which is large and highly visible, makes the sensor easy to align, while its housing design makes it easy to mount and align.

Laser sensors are ideally suited for reliably detecting small parts such as wires, even when scanning at greater distances. This is ensured by the minimal diameter of the emitted laser beam. Due to its good visibility, the laser spot can be aimed to easily detect objects very precisely with high repeatability.

Special retro-reflective sensors for the detection of transparent objects are also part of the large BOS 6K sensor portfolio, as are powerful distance sensors with red light and, most recently, laser technology.

Features

- Uniform housing shape for all variants
- Small design for space-saving use in tight installation spaces
- Uniform operating concept and simple integration thanks to IO-Link
- Laser and red light sensors for almost all standard applications
- Broad sensor portfolio with distance and special sensors
- High precision, easy installation and adjustment
- Very good cost-benefit ratio

BOS PHOTOELECTRIC SENSORS, RED LIGHT

M8 connector, 4-pin, ⊙ **IO**-Link	BOS02CL	BOS02CP	BOS02CU		BOS02CZ	BOS02E2	BOS02E7	BOS02E5
PVC cable, 4 wires, 2 m, ⊙ **IO**-Link	BOS02CM	BOS02CR	BOS02CW		BOS02E0	BOS02E3	BOS02E8	BOS02E6
M8 connector, 3-pin	BOS02CN	BOS02CT	BOS02CY		BOS02E1	BOS02E4	BOS02E9	BOS01MF
Series	BOS 6K, diffuse, background suppression	BOS 6K, diffuse, background suppression	BOS 6K, diffuse		BOS 6K, retroreflective	BOS 6K, retroreflective, autocollimation	BOS 6K, thru-beam, receiver	BOS 6K, thru-beam, emitter
Special optical feature						Transparent object detection		
Range	3…400 mm	1…200 mm	0…800 mm		0,1…6 m	0…2 m	0…13 m	0…13 m
Gray value shift (20 %/90 %)	≤ 4 %	≤ 4 %						
Light type	Red light, LED	Red light, LED	Red light, LED		Red light, LED	Red light, LED	Red light, LED	Red light, LED
Beam characteristic	divergent	divergent	divergent		divergent	divergent	divergent	divergent
Light spot size approx.	27 × 27 mm at 400 mm	15 × 15 mm at 200 mm	70 × 70 mm at 800 mm		500 × 500 mm at 6 m	40 × 40 mm at 1 m		1 × 1 m at 13 m
Interface	IO-Link 1.1, COM 2 (only M8 connector, 4-pin or cable, 4 wires)	IO-Link 1.1, COM 2 (only M8 connector, 4-pin or cable, 4 wires)	IO-Link 1.1, COM 2 (only M8 connector, 4-pin or cable, 4 wires)		IO-Link 1.1, COM 2 (only M8 connector, 4-pin or cable, 4 wires)	IO-Link 1.1, COM 2 (only M8 connector, 4-pin or cable, 4 wires)	IO-Link 1.1, COM 2 (only M8 connector, 4-pin or cable, 4 wires)	IO-Link 1.1, COM 2 (only M8 connector, 4-pin or cable, 4 wires)
Output function	AutoDetect (PNP/NPN) NO/NC selectable, teach-in	AutoDetect (PNP/NPN) NO/NC selectable, teach-in	AutoDetect (PNP/NPN) NO/NC selectable, teach-in		AutoDetect (PNP/NPN) NO/NC selectable, teach-in	AutoDetect (PNP/NPN) NO/NC selectable, teach-in	AutoDetect (PNP/NPN) NO/NC selectable, teach-in	
Switching hysteresis	≤ 3 %	≤ 3 %						
Switching frequency	≤ 1 kHz	≤ 1 kHz	≤ 1 kHz		≤ 1 kHz	≤ 1 kHz	≤ 1 kHz	
Operating voltage	10…30 V DC	10…30 V DC	10…30 V DC		10…30 V DC	10…30 V DC	10…30 V DC	10…30 V DC
Dimensions	34 × 20 × 12 mm	34 × 20 × 12 mm	34 × 20 × 12 mm		34 × 20 × 12 mm	34 × 20 × 12 mm	34 × 20 × 12 mm	34 × 20 × 12 mm
Housing material	ABS	ABS	ABS		ABS	ABS	ABS	ABS
Material sensing surface	PMMA	PMMA	PMMA		PMMA	PMMA	PMMA	PMMA
Approval/conformity	CE, cULus, UKCA	CE, cULus, UKCA	CE, cULus, UKCA		CE, cULus, UKCA	CE, cULus, UKCA	CE, cULus, UKCA	CE, cULus, UKCA

BOS PHOTOELECTRIC SENSORS, LASER
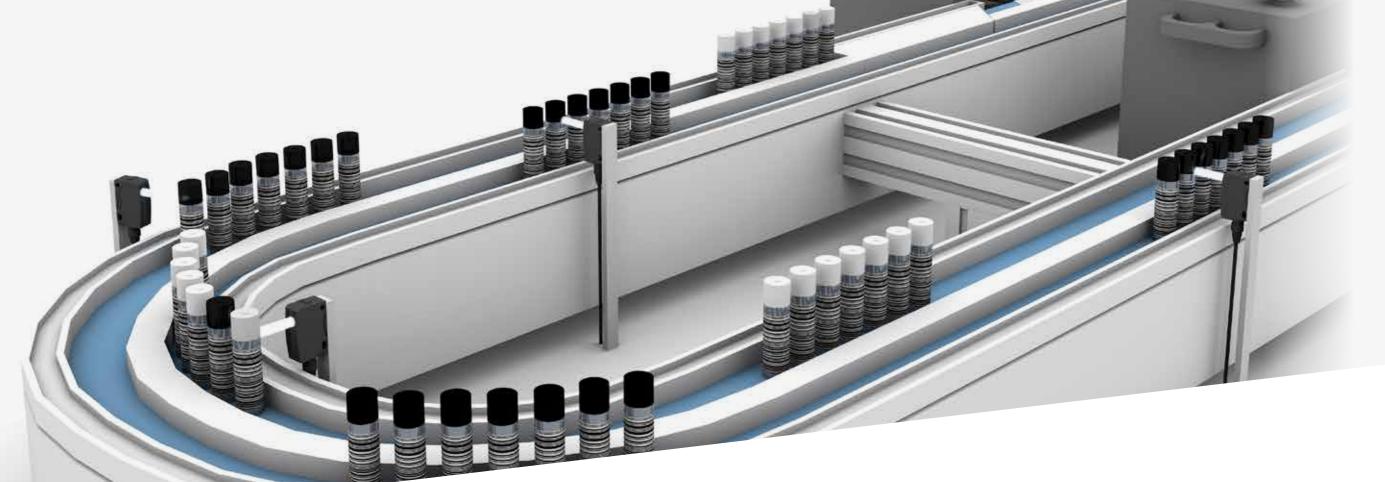
M8 connector, 4-pin, ⟳ **IO**-Link	BOS02EF	BOS02EM		BOS02EW	BOS02F0	BOS02F5	BOS02F3
PVC cable, 4 wires, 2 m, ⟳ **IO**-Link	BOS02EH	BOS02EN		BOS02EY	BOS02F1	BOS02F6	BOS02F4
M8 connector, 3-pin	BOS02EJ	BOS02EP		BOS02EZ	BOS02F2	BOS02F7	BOS01M1
Series	BOS 6K, diffuse, background suppression	BOS 6K, diffuse		BOS 6K, retroreflective	BOS 6K, retroreflective, autocollimation	BOS 6K, thru-beam, receiver	BOS 6K, thru-beam, emitter
Special optical feature		High switching frequency			High precision, small parts, high switching frequency		
Range	4...150 mm	1...250 mm		0.1...13 m	0...4 m	0...18 m	0...18 m
Gray value shift (20 %/90 %)	≤ 3 %						
Light type	Laser, red	Laser, red		Laser, red	Laser, red	Laser, red	Laser, red
Laser class	1	1		1	1		1
Beam characteristic	Slightly focussed	Focussed		Divergent	Collimated	Divergent	Divergent
Light spot size approx.	1.5 × 1.5 mm at 70 mm, 1 × 1 mm at 150 mm	1.4 × 1.4 mm at 100 mm, 0.7 × 0.7 mm at 250 mm		12 × 12 mm at 13 m	4 × 2 mm at 2 m		13 × 13 mm at 18 m
Interface	IO-Link 1.1, COM 2 (only M8 connector, 4-pin or cable, 4 wires)	IO-Link 1.1, COM 2 (only M8 connector, 4-pin or cable, 4 wires)		IO-Link 1.1, COM 2 (only M8 connector, 4-pin or cable, 4 wires)	IO-Link 1.1, COM 2 (only M8 connector, 4-pin or cable, 4 wires)	IO-Link 1.1, COM 2 (only M8 connector, 4-pin or cable, 4 wires)	IO-Link 1.1, COM 2 (only M8 connector, 4-pin or cable, 4 wires)
Output function	AutoDetect (PNP/NPN) NO/NC selectable, teach-in	AutoDetect (PNP/NPN) NO/NC selectable, teach-in		AutoDetect (PNP/NPN) NO/NC selectable, teach-in	AutoDetect (PNP/NPN) NO/NC selectable, teach-in	AutoDetect (PNP/NPN) NO/NC selectable, teach-in	
Switching hysteresis	≤ 4%						
Switching frequency	≤ 1 kHz	≤ 4 kHz		≤ 1 kHz	≤ 4 kHz	≤ 2 kHz	
Operating voltage	10...30 V DC	10...30 V DC		10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
Dimensions	34 × 20 × 12 mm	34 × 20 × 12 mm		34 × 20 × 12 mm	34 × 20 × 12 mm	34 × 20 × 12 mm	34 × 20 × 12 mm
Housing material	ABS	ABS		ABS	ABS	ABS	ABS
Material sensing surface	PMMA	PMMA		PMMA	PMMA	PMMA	PMMA
Approval/conformity	CE, cULus, UKCA	CE, cULus, UKCA		CE, cULus, UKCA	CE, cULus, UKCA	CE, cULus, UKCA	CE, cULus, UKCA

BOS PHOTOELECTRIC SENSORS,
DISTANCE SENSORS

		BOD002R	BOD002U	BOD002Y
M8 connector, 4-pin, ⊘ **IO**-Link		BOD002R	BOD002U	BOD002Y
PVC cable, 4 wires, 2 m, ⊘ **IO**-Link		BOD002T	BOD002W	
Series		BOD 6K, red light, short range	BOD 6K, red light, long range	BOD 6K, Laser
Measuring range		20...80 mm	30...200 mm	20...100 m
Resolution		0.12 mm (12 bit)	0.68 mm (12 bit)	0.12 mm (12 bit)
Linearity		±0.4 mm	±2 mm	±0.25 mm
Repeatability		< 0.4 mm	< 1 mm	< 0.25 mm
Temperature drift		< 0.1 mm/K	< 0.2 mm/K	< 0.1 mm/K
Gray value shift (20 %/90 %)		≤ 4 %	≤ 6 %	≤ 4 %
Light type		Red light, LED	Red light, LED	Laser, red
Laser class				1
Beam characteristic		Focussed at 50 mm	Focussed at 60 mm	Collimated
Light spot size approx.		5 × 5 mm at 50 mm, 8 × 8 mm at 80 mm	7 × 7 mm at 60 mm, 16 × 16 mm at 200 mm	1.5 × 1.5 mm at 80 mm
Interface		IO-Link 1.1, COM 2, 1...10 V analog	IO-Link 1.1, COM 2, 1...10 V analog	IO-Link 1.1, COM 2, 1...10 V analog
Output function		AutoDetect (PNP/NPN) NO/NC selectable, teach-in	AutoDetect (PNP/NPN) NO/NC selectable, teach-in	AutoDetect (PNP/NPN) NO/NC selectable, teach-in
Switching hysteresis		≤ 4 %	≤ 4 %	≤ 4 %
Switching frequency		≤ 1 kHz	≤ 1 kHz	≤ 1 kHz
Operating voltage		13...30 V DC	13...30 V DC	13...30 V DC
Dimensions		34 × 20 × 12 mm	34 × 20 × 12 mm	34 × 20 × 12 mm
Housing material		ABS	ABS	ABS
Material sensing surface		PMMA	PMMA	PMMA
Approval/conformity		CE, cULus, UKCA	CE, cULus, UKCA	CE, cULus, UKCA

Perfect and fast detecting and positioning

POWERFUL BKT 6K CONTRAST SENSORS

The BOS 6K photoelectric sensor family consists of cubic midi-sensors that cover all relevant detection principles and use various light sources. The latest generation impresses with both proven and entirely new functional principles and technologies, meeting even more industrial applications.

Common to all sensors in the family is their housing shape, operating concept and IO-Link. This considerably simplifies the parameterization and integration of the sensors and improves their usability. The intelligent PNP/NPN output also reduces the number of variants required.

With this very versatile sensor family, a diverse variety of applications can be solved safely and reliably thanks to their wide range of functional principles.

The BOS 6K contrast sensors are a reliable, flexible and simple solution for detecting contrasts. They can be easily connected to the controller via a standardized output. Parameterization is just as straightforward using IO-Link.The sensors detect bright objects or markings on a dark background or vice versa, and do so largely independent of the object surface.

This and their high switching frequency make them ideal for applications in which objects and markings must be detected precisely and, above all, quickly – for example, in packaging or labeling applications.

The contrast sensors of the new BOS 6K portfolio impress with their miniature design. They, like all sensors in the family, can be mounted in a space-saving manner thanks to their bullnose design and can be easily used in a wide variety of applications.

Features

- New sensor generation with uniform, space-saving housing shape for all variants
- Uniform operating concept and simple integration thanks to IO-Link
- Contrast sensors with two types of light for optimum detection
- Flexible, fast and precise detection of grayscales
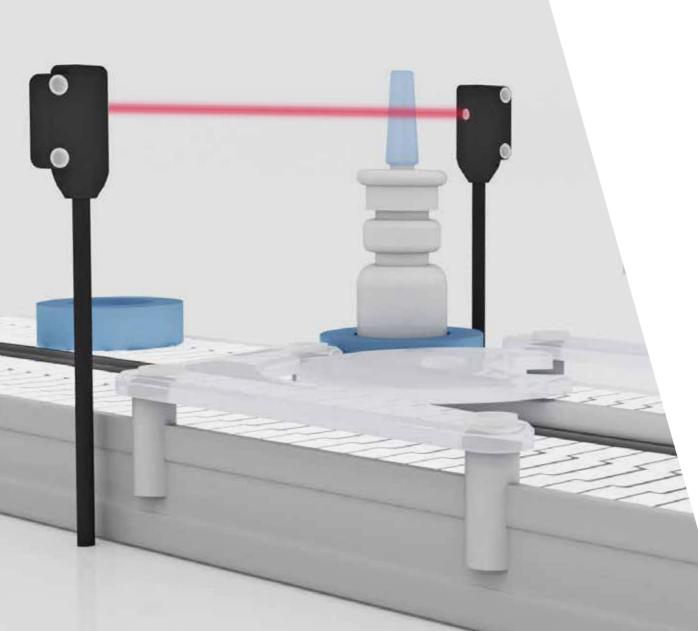- Suitable for various applications, as it is largely independent of the object surface

BKT PHOTOELECTRIC SENSORS, CONTRAST

	BKT0014	BKT0015	BKT0016	BKT0017	BKT0018
Series	BKT 6K, contrast white	BKT 6K, contrast white	BKT 6K, contrast RGB	BKT 6K, contrast RGB	BKT 6K, contrast RGB
Range	12 mm	12 mm	12 mm	12 mm	12 mm
Depth of focus	±2.5 mm	±2.5 mm	± 3 mm	± 3 mm	± 3 mm
Light type	White light, LED	White light, LED	RGB, LED	RGB, LED	RGB, LED
Light spot size approx.	1 × 4 mm	1 × 4 mm	1 × 4 mm	1 × 4 mm	1 × 4 mm
Interface	IO-Link 1.1, COM 2	IO-Link 1.1, COM 2	IO-Link 1.1, COM 2	IO-Link 1.1, COM 2	IO-Link 1.1, COM 2
Output function	PushPull (PNP/NPN) NO/NC selectable, teach-in	PushPull (PNP/NPN) NO/NC selectable, teach-in	PushPull (PNP/NPN) NO/NC selectable, teach-in	PushPull (PNP/NPN) NO/NC selectable, teach-in	PushPull (PNP/NPN) NO/NC selectable, teach-in
Special feature					Fast switching output on pin 2 with IO-Link in parallel on pin 4
Switching frequency	≤ 25 kHz	≤ 10 kHz	≤ 25 kHz	≤ 10 kHz	≤ 25 kHz
Response time	≤ 20 μs	≤ 50 μs	≤ 20 μs	≤ 50 μs	≤ 20 μs
Operating voltage	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
Connection	Connector, M8 male, 4-pin	Connector, M8 male, 4-pin	Connector, M8 male, 4-pin	Connector, M8 male, 4-pin	Connector, M8 male, 4-pin
Dimensions	34 × 20 × 12 mm	34 × 20 × 12 mm	34 × 20 × 12 mm	34 × 20 × 12 mm	34 × 20 × 12 mm
Housing material	ABS	ABS	ABS	ABS	ABS
Material sensing surface	PMMA	PMMA	PMMA	PMMA	PMMA
Approval/conformity	CE, UL, UKCA	CE, UL, UKCA	CE, UL, UKCA	CE, UL, UKCA	CE, UL, UKCA

Balluff's smallest self-contained photoelectric sensors – the BOS R030K family

A MINIATURE EAGLE EYE

NEW

Photoelectric mini sensors from Balluff are the right choice when small parts need to be detected precisely, space is tight, and high reliability is important. From factory automation to life sciences and the semiconductor industry, these space-saving wonders provide great solutions and offer great design freedom.

This new BOS R030K family is an effective solution for applications in which other sensors – even previous mini sensors – literally do not fit. It expands our comprehensive, successful portfolio of optical miniature sensors and is a real asset.

Great potential in small spaces

The smallest self-contained sensor in the Balluff photoelectric portfolio solves applications for position and presence detection in places with extremely limited installation space. It does not require any external electronics and is available with two operating principles: diffuse sensor/background suppression for short distances and through-beam sensor for medium distances. A total of 24 variants offer maximum flexibility and

user-friendliness. They scores not only with obvious size advantages and the usual high precision, but also with an attractive price-performance ratio that enables it to be used in large quantities.

Features

- Smaller than any other sensor in Balluff's photoelectric portfolio, with a maximum thickness of 4 mm
- Precise detection, high repeat accuracy
- Diffuse sensors with background suppression in front-facing version (range 30 mm)
- Through-beam sensor in front or side-facing versions (range 1 m)
- Connect via cable or M8 pigtail

BOS R030K PHOTOELECTRIC SENSORS								
PNP	NO	BOS02H7	BOS02HC	BOS02HL	BOS02HR	BOS02HY	BOS02J2
	NC	BOS02H9	BOS02HF	BOS02HJ	BOS02HN	BOS02HU	BOS02J0
NPN	NO	BOS02H8	BOS02HE	BOS02HM	BOS02HT	BOS02HZ	BOS02J3
	NC	BOS02HA	BOS02HH	BOS02HK	BOS02HP	BOS02HW	BOS02J1
Version		Diffuse with background suppression, front looking		Thru-beam, emitter and receiver, front looking		Thru-beam, emitter and receiver, side looking	
Connection	2 m PVC cable	■		■		■	
	M8 connector, 4-pin with 0.2 m PUR cable		■		■		■
Range		3...30 mm		0...1000 mm		0...1000 mm	
Smallest detectable object		> 0.2 mm		> 2 mm		> 2 mm	
Gray value shift (20 %/90 %)		~10 % typ.					
Repeatability		< 0.1 mm		< 0.05 mm		< 0.05 mm	
Light type		Red light, LED		Red light, LED		Red light, LED	
Beam characteristic		Focussed at 15 mm		Divergent		Divergent	
Light spot size approx.		Ø 4 mm at 30 mm		Ø 336 mm at 1000 mm		Ø 215 mm at 1000 mm	
Switching frequency		> 800 Hz		> 800 Hz		> 800 Hz	
Operating voltage		10...30 V DC		10...30 V DC		10...30 V DC	
Load current max.		< 50 mA		< 50 mA		< 50 mA	
Ambient temperature		−25...+55 °C		−25...+55 °C		−25...+55 °C	
Dimensions	Diffuse	14 × 20.5 × 4.2 mm					
	Emitter			10 × 19 × 4.2 mm		5.2 × 19 × 10 mm	
	Receiver			10 × 20.5 × 4.2 mm		5.2 × 20,5 × 10 mm	
Housing material		PBT, ABS		PBT, ABS		PBT, ABS	
Material sensing surface		PMMA		PMMA		PMMA	
Approval/conformity		CE, UKCA, cULus		CE, UKCA, cULus		CE, UKCA, cULus	

Balluff's M18-sized cylindrical photoelectric sensor portfolio is expanding to include models with background suppression and IO-Link to extend their features and help future-proof your applications.

IO-Link versions offers additional functions – e. g. monitoring signal quality or the boot cycle counter – that are of great benefit. Settings can also be changed remotely via IO-Link, so installations that are physically out of reach can be managed without a problem.

Balluff's 18M series has long proven itself in precise object detection, even under harsh industrial conditions.

Features

- Robust, standardised M18 housing for quick installation
- Simple remote adjustment with IO-Link
- Reliable object detection even in tricky applications and harsh environments
- Provision of additional IO-Link functions such as signal quality, boot cycle counter
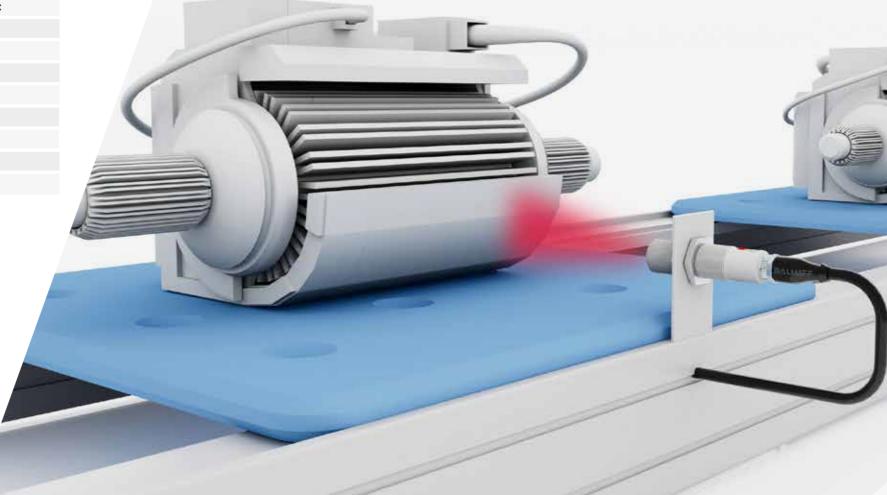
Advanced functions thanks to IO-Link

M18 CYLINDRICAL PHOTOELECTRIC SENSORS

NEW

	BOS02C7	BOS02C8
Series	BOS 18M	BOS 18M
Principle of operation	Diffuse sensor, triangulation	Diffuse sensor, triangulation
Optical feature	Background suppression	Background suppression
Range	30...300 mm	30...150 mm
Dimension	Ø 18 × 75 mm	Ø 18 × 75 mm
Interface	IO-Link 1.1 Pin 4: PNP/NPN/push-pull NO/NC Pin 2: PNP/NPN/push-pull NO/NC	IO-Link 1.1 Pin 4: PNP/NPN/push-pull NO/NC Pin 2: PNP/NPN/push-pull NO/NC
Beam characteristic	Divergent	Divergent
Light type	LED, red light	LED, red light
Light spot size	27 × 27 mm at 300 mm	10 × 10 mm at 150 mm
Connection	M12 male, 4-pin	M12 male, 4-pin
Housing material	Brass	Brass
Material sensing surface	Glass	Glass
Operating voltage	10...30 V DC	10...30 V DC
Approval/conformity	CE, UKCA, cULus	CE, UKCA, cULus

Focus on the essentials with the BGL entry series

BGL NEW GENERATION OF BASIC FORK SENSORS

Fork sensors are photoelectronic sensors that have a light transmitter and receiver integrated in one housing. In industrial automation, they are used to detect objects, monitor positions and thus control processes.

Balluff is adding a basic fork sensor variant as an extension of its portfolio. This „entry series" represents the perfect balance between functionality and user-friendliness, built into an extremely robust design. In short, it is probably the easiest way to use an optical sensor.

Straightforward and efficient

The Entry series of fork sensors is the ideal solution for users who need a sensor solution that is as economical as it is reliable. Thanks to the transmitter and receiver being in one housing and the practical plug-and-play system, complex settings are eliminated, with the fork sensors immediately ready for use.

The BGL Entry variants use red light, offer basic functions and are cost-optimized but do not compromise on the usual Balluff robustness: the sensors detect objects regardless of color and surface, even under demanding industrial conditions thanks to the robust metal housing. Mechanically, they are fully compatible with the existing variants.

Features

- Ready for immediate plug and play use
- Transmitter and receiver already adjusted in one housing
- Simple alignment and monitoring thanks to visible red transmitter light
- Reliable object detection regardless of color and surface
- IP67 die-cast zinc housing for use, even in harsh environments
- Three fork size openings for different requirements: 30, 50 and 80 mm
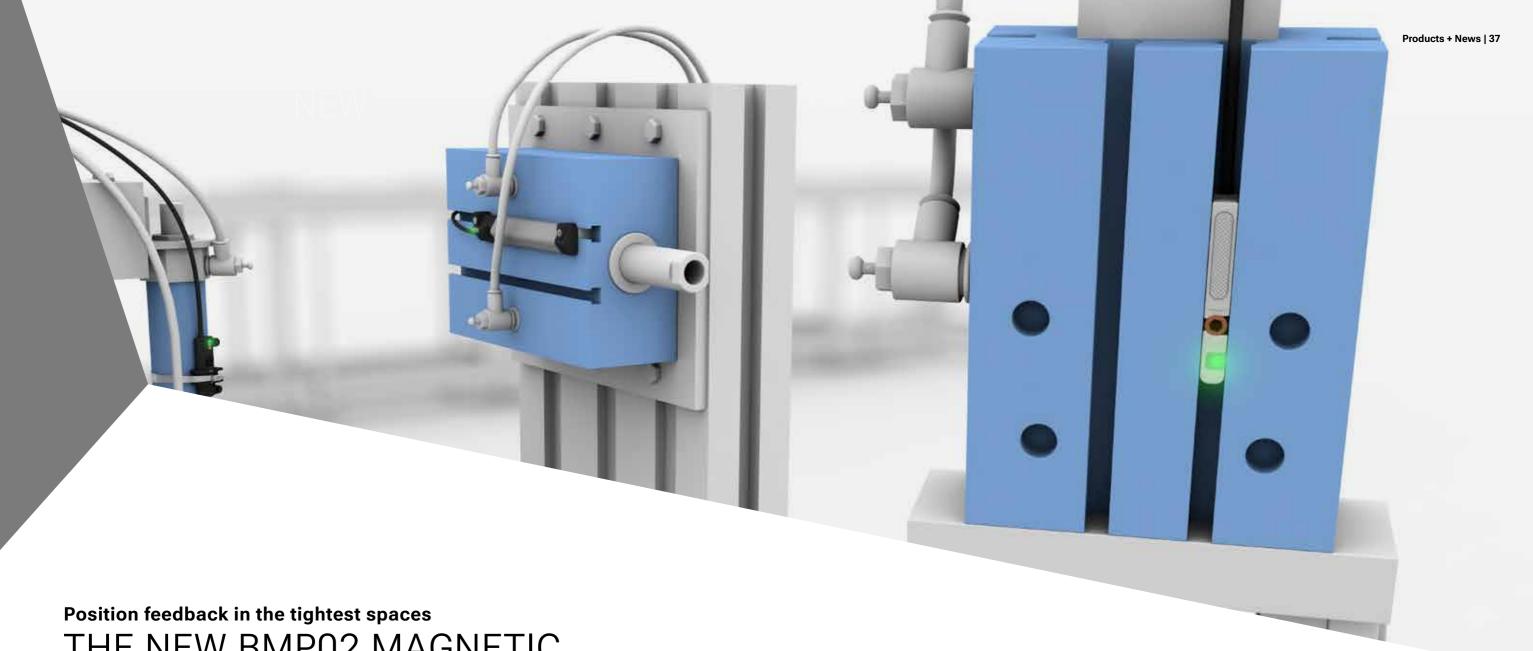- Mechanically fully backwards compatible

BGL FORK SENSORS

	BGL0070	BGL006Y	BGL006Z
Dimension	10 × 50 × 68 mm	10 × 70 × 88 mm	10 × 100 × 88 mm
Fork opening	30 mm	50 mm	80 mm
Interface	Push-pull NO PNP/NC NPN	Push-pull NO PNP/NC NPN	Push-pull NO PNP/NC NPN
Principle of optical operation	Through-beam sensor	Through-beam sensor	Through-beam sensor
Beam characteristic	Divergent	Divergent	Divergent
Light type	LED, red light	LED, red light	LED, red light
Light spot size	Ø 0.85 mm light exit	Ø 1 mm light exit	Ø 1.2 mm light exit
Connection	Connector, M8 male, 3-pin	Connector, M8 male, 3-pin	Connector, M8 male, 3-pin
Housing material	Die cast zinc, coated, black	Die cast zinc, coated, black	Die cast zinc, coated, black
Material sensing surface	Glass	Glass	Glass
Operating voltage	10...30 V DC	10...30 V DC	10...30 V DC
Approval/conformity	CE, UKCA	CE, UKCA	CE, UKCA

NEW

Position feedback in the tightest spaces
THE NEW BMP02 MAGNETIC FIELD POSITIONING SYSTEM

With the BMP series, Balluff has a smart position system in its product range that delivers an absolute position signal for the stroke path of a piston and also provides information on the sensor status and the current ambient conditions via IO-Link.

With the BMP02, we are expanding our portfolio to include a magnetic field position measuring system whose size makes it particularly excel when used in pneumatics. This is because we have shrunk it down to be an ideal fit in applications that offer little space for a sensor, e.g. in factory automation, material handling or robotics.

As with the BMP, the BMP02 provides continuous and precise contactless position feedback – the basis for high process reliability and automation quality. Due to the small form factor and the simple parameterization of the system, commissioning and adjustment in particular have been significantly improved. Condition monitoring, an intelligent stroke profile and the measuring sensor profile also ensure the BMP02 is smart and powerful. This enables you to achieve the dynamics, precision, and flexibility required by the smart factory and its complex manufacturing lines.

Features

- Reliable and wear-free position feedback in confined spaces
- Measuring range up to 22 mm
- Axial and radial magnetic polarization
- Application-relevant linearity and repeatability
- Low temperature drift and very good electromagnetic compatibility
- Ideal for condition monitoring, predictive maintenance and format change thanks to IO-Link

BMP MAGNETIC FIELD POSITIONING SYSTEMS

ORDERING EXAMPLE	BMP 02 - **a** **b** **c** **d** **d** **e** **f** **g** - **h** **h** **h** **h** - **i** **i** - **k** - **l** **l** **l** **l** - **m** **m** **m**
Model	BMP 02 plastic housing, (polypropylene), 22.5 × 2.9 × 7 mm
Interface, analog **(a)**	Z = no analog output, A = 0...10 V
Intelligent interface **(b)**	P = IO-Link interface for parametrization and measurement value output
Resolution analog signal **(c)**	1 = 12 bit
Switching output **(dd)**	PP = PNP, NO/NC programmable, NP = NPN, NO/NC programmable
Output characteristics **(e)**	2 = switchable, rising is default ex works, 3 = switchable, falling is default ex works
Switching output, number **(f)**	2 = 2 programmable switching output
Adjustment of working area **(g)**	A = Null point and end point of characteristics, resp. switching points via teach-in button or IO-Link
Working area **(hhhh)**	0022 = 22 mm
Mounting **(ii)**	06 = via clamping bars for T-slot, 07= via clamping bars for C-slot
Connection **(k)**	P = Polyurethane (PUR)
Cable length **(llll)**	00,3 = 0.3 m, 02 = 2 m, 05 = 5 m, 10 = 10 m
Connector **(mmm)**	S4 = M12 connector, 4-pin, S75 = M8 connector, 4-pin

Balluff's BMF T-slot magnetic sensors set new standards in this product category, especially due to their outstanding price-performance ratio and their innovative ability to automatically function with both axially and radially-oriented magnets. This makes it the first choice for OEMs and end users in the material handling, pneumatic systems and packaging equipment segments.

Magnetic sensors from Balluff are indispensable in modern industry. They are used in a wide range of applications, from factory automation to robotics. With their non-contact position detection, magnetic field sensors from Balluff are reliable and wear-free, with no contact wear, no switch bounce and accurate switching points, even at high travel speeds.

Cost efficiency meets advanced detection

The BMF T-slot represents a clever simplification within our product range by focusing on the essentials without compromising on performance. This presents a leaner and more efficient offering which not only simplifies the selection process for our customers but also leads to significant cost savings.

An example of this is the sensor's ability to automatically detect the orientation of solenoids both axially and radially. With the BMF T-slot, you no longer have to worry about which sensor variant you need in advance. The transparency and high availability of the system ensure smooth operation and easy maintenance. At the same time, assembly and disassembly f

rom above are particularly easy and allow quick and simple integration into existing systems. Combined with the optimization of the clamping screw, this makes the BMF T-Slot an unsurpassed solution that not only increases efficiency, but also enhances operational reliability.

Features

- Best price-performance ratio
- Automatic detection of axial and radial magnet alignment
- Optimization of clamping screw
- High transparency and availability of the system
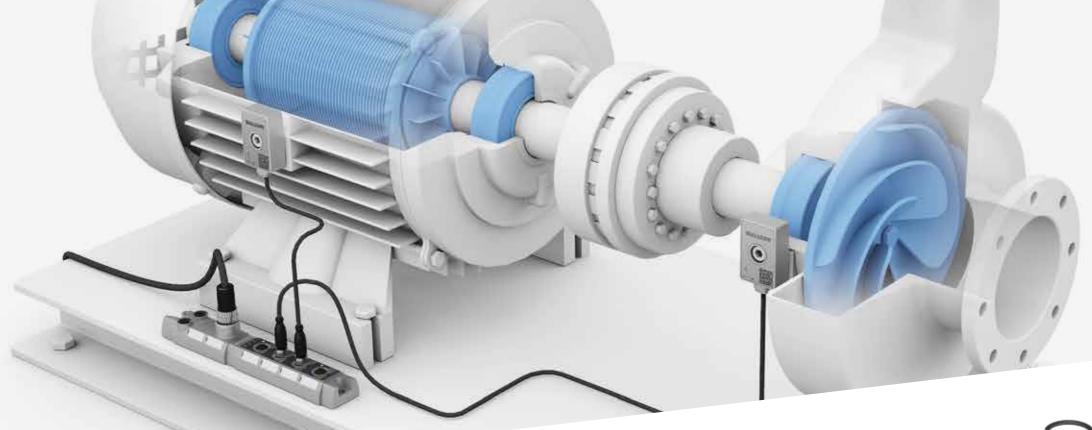- Simple assembly/disassembly from above

For more flexibility in automation

THE BMF T-SLOT MAGNETIC SENSOR

NEW

MAGNETIC
FIELD SENSORS

	BMF00PM	BMF00PN	BMF00PP
Slot type	T-slot	T-slot	T-slot
Dimension	23.5 × 5 × 5.5 mm	23.5 × 5 × 5.5 mm	23.5 × 5 × 5.5 mm
Connection	0.3 m TPU cable with M8 male, 3-pin	1 m TPU cable with open cable end	0.3 m TPU cable with M8 male, 4-pin
Application	Gripper, pneumatic cylinder	Gripper, pneumatic cylinder	Gripper, pneumatic cylinder
Mounting part	Can be installed in T-slot from above	Can be installed in T-slot from above	Can be installed in T-slot from above
Housing material	PA 12	PA 12	PA 12
Switching output	PNP NO	PNP NO	PNP NO
Switching frequency	3000 Hz	3000 Hz	3000 Hz
Operating voltage	10...30 V DC	10...30 V DC	10...30 V DC
Ambient temperature	−25...+85 °C	−25...+85 °C	−25...+85 °C
IP rating	IP67	IP67	IP67
Approval/conformity	CE, UKCA, cULus	CE, UKCA, cULus	CE, UKCA, cULus

CONDITION MONITORING
SENSOR BCM GENERATION 2

SAMS PRODUCTS

Smart condition monitoring at a new level

CONDITION MONITORING SENSOR BCM GENERATION 2

Unplanned downtime and disruptions in the production process can be efficiently avoided with BCM condition monitoring sensors from Balluff. These intelligent sensors provide condition data that you can use to automate costly manual inspections. At the same time, this additional data is an important building block for highly automated and networked production. A standardized IO-Link interface combined with integrated intelligent data pre-processing – the new generation of the popular BCM now sets another milestone in the field of smart IO-Link sensor technology. From condition monitoring of critical components and assemblies through to the detection of critical process states and the detection of relevant process parameters for inline process optimization: With the BCM Generation 2 you solve your condition monitoring applications optimally.

Upgrade instead of update

The new condition monitoring sensor is more than an iterative further development of the first generation. Rather, it is a completely new platform with different hardware and firmware. The significantly improved measurement performance in combination with more sophisticated algorithms allow the sensor to detect the smallest changes in condition even earlier and more precisely than before. Thanks to the new, convenient mounting design with just one screw, it is also even easier to install. The small, round mounting surface makes it much simpler to set about mounting on curved surfaces. This offers you enormous advantages, especially for retrofit solutions.

In short: Compared to the first generation, the new BCM scores with an even significantly higher performance level, intelligent algorithms and a sophisticated and efficient mounting design.

Features

- Smart condition monitoring sensor with standardized IO-Link interface
- Multiple measured variables in one device: vibration and temperature
- Very high performance of vibration measurement with a frequency range of up to 6 kHz in three measurement axes
- Early and targeted detection of critical condition changes through integrated frequency analysis
- Simple and efficient installation and retrofitting due to sophisticated mounting design
- Sensor self-monitoring with Balluff Smart Automation and Monitoring System (SAMS)

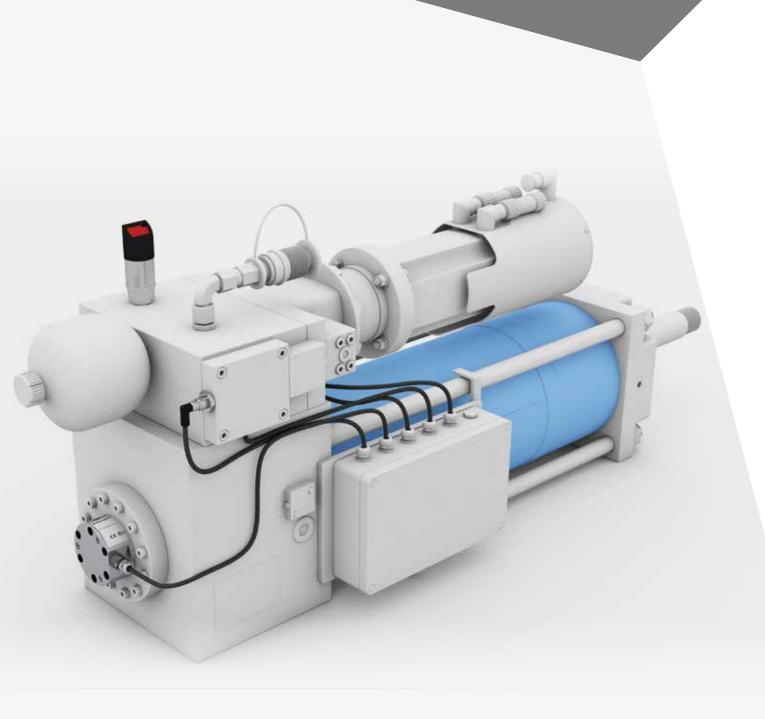|		BCM0003	BCM0004
Function modules		▪ Vibration time domain analytics ▪ Vibration frequency domain analytics ▪ RPM input ▪ Contact temperature	▪ Vibration time domain analytics ▪ Contact temperature
Vibration	Measuring range	–16...16 g	–16...16 g
	Measuring axes	3	3
	Frequency range	2...4000 Hz (±10 %) 2...6000 Hz (3 dB)	2...4000 Hz (±10 %) 2...6000 Hz (3 dB)
	Evaluation time domain	▪ RMS ▪ Peak ▪ Max ▪ Crest factor ▪ Skewness ▪ Kurtosis	▪ RMS ▪ Peak ▪ Max ▪ Crest factor ▪ Skewness ▪ Kurtosis
	Evaluation frequency domain	▪ Amplitude spectrum (FFT) ▪ Envelope spectrum (FFT)	
Interface		IO-Link 1.1.3, COM3 (230.4 kBaud)	IO-Link 1.1.3, COM3 (230.4 kBaud)
Operating mode		IO-Link Mode, SIO-Mode	IO-Link-Modus, SIO-Modus
Ambient temperature		–40...+80 °C	–40...+80 °C
IP rating		IP67, IP68, IP69K	IP67, IP68, IP69K
Housing material		Stainless steel 1.4404	Stainless steel 1.4404
Dimensions		34 × 22 × 12 mm	34 × 22 × 12 mm
Connection		1.5 m PUR cable with M12 male, 4-pole	1.5 m PUR cable with M12 male, 4-pole
Secondary features		▪ Identification ▪ Device discovery ▪ Signal delay ▪ Switching counter ▪ Basic statistics ▪ Operating hours counter ▪ Boot cycle counter ▪ Voltage and current monitoring ▪ Variant configuration ▪ Pin assignment ▪ Internal temperature monitoring	▪ Identification ▪ Device discovery ▪ Signal delay ▪ Switching counter ▪ Basic statistics ▪ Operating hours counter ▪ Boot cycle counter ▪ Voltage and current monitoring ▪ Variant configuration ▪ Pin assignment ▪ Internal temperature monitoring

**Precise cylinder position measurement
and relevant process data with radial mounting**

THE NEW BTL K-ROD MAGNETO-STRICTIVE SENSORS FROM BALLUFF

NEW

Magnetostrictive sensors are precise and reliable position measurement systems and are therefore essential for modern industrial applications. The BTL K in rod design for continuous position measurement in hydraulic cylinders completes the Balluff portfolio in this area.

Thanks to its compact housing and radial mounting points, the new BTL K can be conveniently integrated into a wide range of applications in various industries. In addition to the precision typical of the sensors in this portfolio, it also scores points for its great robustness and durability thanks to its use of corrosion-free stainless steel.

IO-Link and SAMS for efficient processes

Small but powerful: The BTL K in rod design has an IO-Link interface. This simplifies sensor parameterization and makes its use more flexible. The BTL K also supports cross-machine process monitoring and optimization with the smart, expanded IO-Link features of Balluff's SAMS (Smart Automation and Monitoring System) portfolio.

With these added features, you not only achieve your daily goals but can also reduce machine downtimes in the long term. In short, these magnetostrictive sensors use a proven measuring principle with high precision, now with more powerful and smarter IO-Link features.

Features

- Simple parameterization and use thanks to IO-Link interface
- Additional, smart IO-Link functionalities and measured values from SAMS
- Compact, corrosion-resistant stainless steel housing
- Contactless and wear-free

BTL MAGNETOSTRICTIVE LINEAR POSITION SENSORS IN ROD-STYLE HOUSING

SAMS PRODUCTS

Order code	BTL49TF	BTL49TE	BTL49TC
Rod version, fastening	Plug-in flange with 6 holes, O-ring, rod diameter 10.2 mm	Plug-in flange with 6 holes, O-ring, rod diameter 10.2 mm	Plug-in flange with 6 holes, O-ring, rod diameter 10.2 mm
Measuring range	500 mm	500 mm	500 mm
Performance class	C1	C1	C1
Power supply	10...30 V DC	10...30 V DC	18...30 V DC
Interface details	Analog output 1: ▪ Voltage output 0...10 V Analog output 2: ▪ Voltage output 10...0 V	Analog output 1: ▪ Current output 4...20 mA Analog output 2: ▪ Current output 20...4 mA	IO-Link output: ▪ V1.1 COM3 IO-Link version: ▪ Position with one position magnet
Output configuration	Configurable with IO-Link and BET software tool	Configurable with IO-Link and BET software tool	Configurable with IO-Link and BET software tool
Approval/conformity	CE, UKCA	CE, UKCA	CE, UKCA
Connection	M16 connector, 8 pin	M16 connector, 8 pin	M12 connector, 4 pin

Discover SAMS, the innovative Smart Automation and Monitoring System for optimal performance: Page 8

Automatic identification and tracking in production

RFID – RADIO FREQUENCY IDENTIFICATION.

innovating automation

Our BIS Industrial RFID systems provide you with the key technology for implementing the essential features of a modern manufacturing facility. Using RFID lets you categorize objects unambiguously and trace them at any time. Processes become transparent, and your facility is forward-looking.

Industrial identification contributes to the interplay of all the levels involved in production and clears the path for self-regulating processes. That makes autonomous systems an important component of the Smart Factory and the IIoT.

At Balluff you have access to the entire spectrum of RFID technologies with low (LF), high (HF) and ultra-high (UHF) frequency operation for virtually unlimited application. One special feature: with our BIS V multi-frequency processor unit, you can combine all our RFID systems flexibly with each other.

Another plus: our RFID Configurator lets you assemble your custom system online. And it's easy to use. Simply allow yourself be guided by your own application, and in just a few clicks you're there.

Your Balluff solutions

- UHF (860...960 MHz) BIS U
- HF (13,56 MHz) BIS M
- LF (70/455 kHz) BIS C
- LF (125 kHz) BIS L
- RFID configurator

Assemble your own system online
www.balluff.com/go/rfid-configurator

Your RFID solution for the smart factory of the future

RFID PROCESSORS WITH IIoT CAPABILITY

In the era of digitalization, data has become extremely important. It drives technological innovation, provides deeper insights and increases efficiency. However, obtaining, processing and using this data, especially if they are in binary form, poses a significant challenge.

With our BIS V IIoT processors, you can easily integrate your RFID solution into the Industrial Internet of Things (IIoT). With these intelligent devices the shop floor data is forwarded via MQTT and REST API to the higher-level IT systems for further processing. These widely-used open standards simplify implementation and standardization.

Read/write heads (LF, HF, UHF) of your choosing can be connected to the four RFID ports of the BIS V IIoT processor regardless of frequency, delivering maximum flexibility in your application. Additional IO-Link devices can also be connected to the integrated IO-Link master port. You can configure the BIS V IIoT processor and the connected components quickly and intuitively via the graphical user interface in the browser and the REST API.

A key function is formatted reading, which allows you to convert the binary data into a desired format. This enables seamless integration into business software solutions such as MES or ERP. The individual configuration of data structures, content and output formats eliminates the need for additional conversion programs or manual reformatting.

Additional UHF tools such as loop filters for data pre-processing and filtering or power management support you in the commissioning and operation of your UHF applications.

Features

- One device for all RFID technologies (LF, HF, UHF)
- Simple IT integration thanks to MQTT and REST API
- Fast parameterization via web interface
- Individually formatted data output
- UHF tools to simplify commissioning
- Power connection selectable between M12 Power and 7/8"

NEW

BIS V IIoT
EVALUATION UNITS

		BIS V-6107-...	BIS V-6113-...
Power port M12, 5-pin, L-coded	BIS01AA	BIS01AC*	BIS01FR
Power port 7/8", 5-pin	BIS0186	BIS0187*	–
Power port 7/8", 4-pin	BIS018J	BIS018K*	BIS01FT
MQTT	X	X	X
REST API	X	X	X
007 protocol	X	X	–
Power supply		24 V DC ±10 % LPS Class 2	
Operatingtemperature		0...+60 °C	
Protection class according to IEC 60529		IP65	
IO-Link master		V 1.1	
Connectable read/write heads		4	
Compatible read/write heads	BIS VU-3 (UHF) BIS VM-3 (HF) BIS VL-3 (LF)	BIS VU-3 (UHF) BIS VM-3 (HF) BIS VL-3 (LF) BIS C-3 (LF)*	BIS VU-3 (UHF) BIS VM-3 (HF) BIS VL-3 (LF)
Max. Cable length read/write heads	50 m	50 m for BIS VU/VM/VL-3, 10 m with BIS C-3	50 m

* For BIS C-3 heads with plug, the adapter cable **BCC0FCK** is required

Image processing devices for reliable detection and capture

MACHINE VISION AND OPTICAL IDENTIFICATION

innovating automation

The demands on modern production equipment are high: they must be extremely productive and flexible, while achieving maximum quality. Our Balluff Vision Solutions are designed precisely to meet these requirements. They reliably detect errors, check quality, and are suitable for reliable reading and verification of codes. They scan objects, 1D and 2D barcodes, and plain text.

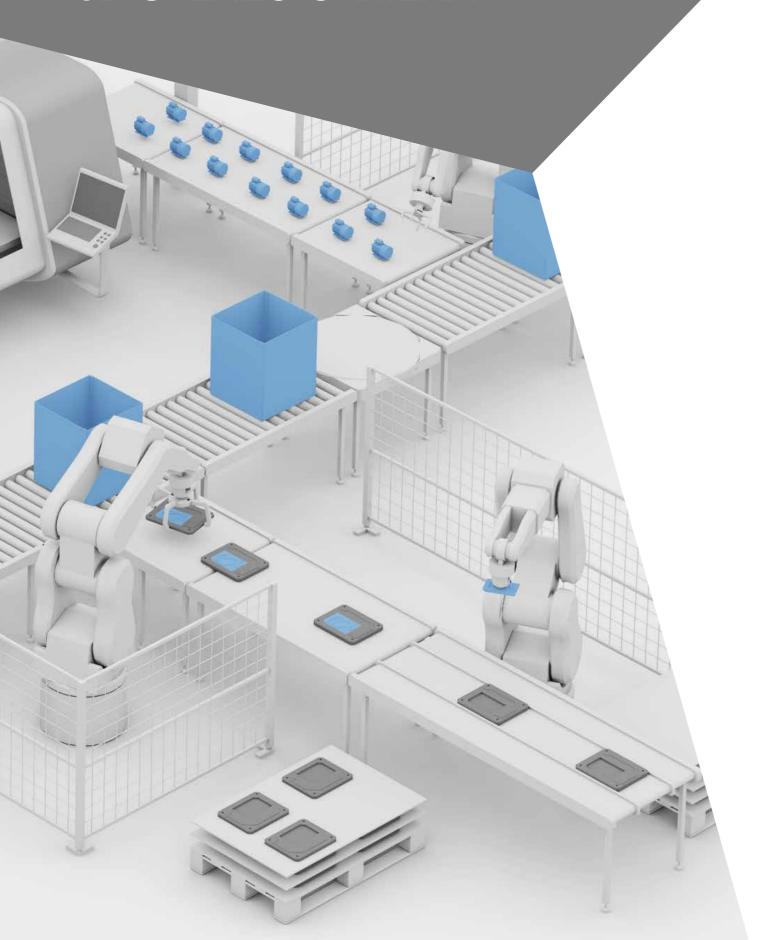The sensors are extremely flexible for parts checking in assembly or parts tracking in production. Thanks to their standardized interfaces, the devices are as easy to integrate as they are to operate.

Your Balluff solutions

- Industrial cameras
- Smart Vision
- Optical Identification
- 3D Machine Vision
- Embedded Vision
- Machine Vision Software
- Optics
- Lights for vision systems and machines

12 MPixels sensors and integrated projector for industrial 3D applications

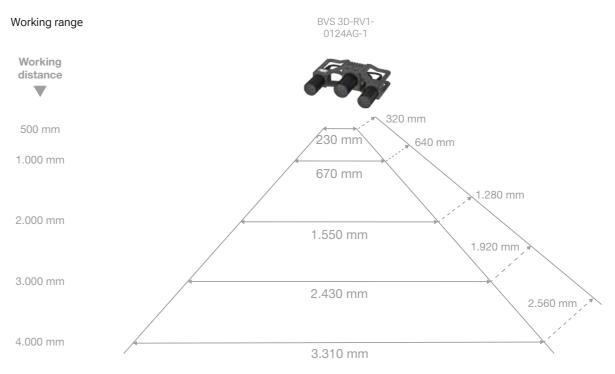# ROBUST AND HIGH RESOLUTION 3D STEREO CAMERA

Low system costs, quick implementation, a high flexibility in the application and a robust housing characterize the 3D stereo camera. With 12 million 3D data points and a 12 MPixels resolution, the camera captures every detail and does so with a frame rate of up to 9 Hz, depending on the resolution.

In addition, the adjustable lenses on the cameras and integrated projector lead to optimal results, no matter in which workspace the camera is used. Via the GigE Vision interface, own 3D applications can be created based on the camera data.With the software library included in the scope of delivery, the 3D calculation can be automatically outsourced to a graphics card, thus increasing the camera's performance.

Features

- High flexibility in application thanks to GigE Vision interface
- Performs even in harsh environments thanks to IP54 protected housing
- Enables highly accurate 3D image processing thanks to 12 MPix resolution of 3D data and 2D images
- Optimally adaptable to your workspace thanks to adjustable lenses on cameras and projector

Working range

BVS 3D-RV1-0124AG-1

Working distance ▼

500 mm	320 mm
1.000 mm	230 mm / 640 mm
	670 mm
	1.280 mm
2.000 mm	1.550 mm
	1.920 mm
3.000 mm	2.430 mm
	2.560 mm
4.000 mm	3.310 mm

Output data

- Camera data via GigE Vision: left and right camera image, depth image (disparity image), confidence image, error image. For high-performance calculation of the depth image on the host PC, the use of a graphics card is recommended.

3D STEREO CAMERA

		BVS0199
Base distance		210 mm
Focal length		16 mm
Image resolution		4096 × 3008 pixels (12 MPixels)
Field of view	Horizontal	47°
	Vertikal	35°
Depth of the measurement range[1]		0.5 m...4.0 m

[1] The 3D stereo camera can measure into infinite space. However, with the stereo method the accuracy is reduced as a square of the distance; hence we recommend the above measurement ranges.

Imaging beyond the visible spectrum

INDUSTRIAL CAMERAS WITH SWIR AND UV SENSORS

By integrating new short-wave infrared (SWIR) and ultraviolet (UV) image sensors into the proven GigE and USB3 cameras, Balluff has expanded its vision application possibilities to frequency ranges beyond visible light.

While most image processing applications are performed in the visible light range (380 nm –780 nm), some applications benefit from image capture outside of this range. Our latest camera models harness the extended capabilities of Sony Pregius S CMOS sensors with global shutter technology, enabling the generation of high-resolution, intricate images ranging from 200 nm (UV range) to 1700 nm (SWIR range).

The use of the existing GigE, 10GigE and USB3 camera platforms makes the use of SWIR and UV technology particularly easy. There are no changes to the integration and handling of the cameras compared to previous models. You also benefit from GigE Vision, USB3 Vision and GenICam compatibility with these SWIR and UV models.

The wide range of applications in the ultraviolet range includes wafer inspection, differentiation of transparent plastics in waste sorting, and the detection of corona discharges in insulation defects on high-voltage cables.

In the SWIR light range, agricultural products, for example, can be inspected, as can fill levels in opaque plastic containers. SWIR sensors offer advantages in monitoring tasks, as the objects of interest can still be easily recognized even in smoke or fog, which become transparent. SWIR sensors are also used in semiconductor inspection, as silicon also appears transparent in SWIR light ranges.

Features

- Utilization of UV and SWIR technologies within proven camera series
- Excellent image quality and sensitivity
- Easy integration thanks to the GigE Vision or USB3 Vision and GenICam standards
- Robust product design and internal image memory
- Excellent price-performance ratio

INDUSTRIAL CAMERAS
BVS-CA-SF2 (USB3)
BVS CA-GX0 (GIGE)
BVS CA-GT1 (10GIGE)

	BVS CA-**(zzz)** – **(xxxxxx)** – **(1) (2) (3) (4) (5) (6)** – 001
Interface **(zzz)**	SF2 = USB3 GX0 = GigE GT1 = 10GigE
Sensors **(xxxxxx)**	IMX487 (8.1 MP, 2848 × 2848 pixel, 2/3" global shutter UV CMOS, 2,74 µm pixel size) IMX990 (1.34 MP, 1296 × 1032 pixel, 1/2" global shutter SWIR CMOS, 5 µm pixel size) IMX991 (0.34 MP, 656 × 520 pixel, 1/4" global shutter SWIR CMOS, 5 µm pixel size)
Handling **(1)**	1 = Standard
Lens holder **(2)**	1 = C-Mount, adjusted backfocus, fixed square filter 2 = C-Mount, adjustable backfocus, round filter with screw ring Ø 23.2 mm 4 = C-Mount, adjustable back focus, filter Ø 20 mm 5 = C-Mount, adjustable back focus, filter Ø 23.2 mm
Filter **(3)**	0 = Without filter Other filters on request.
Housing **(4)**	1 = Standard C = IP67C compact housing F = Standard housing with fan
I/O **(5)**	0 = Without I/O 2 = Standard I/Os 3 = Optically isolated IOs 4 = Optically isolated input, high-side switch OUT, M12 connections 6 = Galvanically isolated input with PLC logic level, high-side switch OUT
Software **(6)**	0 = Standard

NEW

VisionSensor offers integrated lighting and autofocus

OPTICAL INSPECTION HAS NEVER BEEN SO EASY

Balluff is expanding its vision portfolio with its new VisionSensor, which raises the bar for speed and ease of use. With integrated lighting and autofocus optics without the need for additional components, optical quality control in automated production has never been easier.

Like Balluff's other smart vision products, the VisionSensor meets the increasing demands for high quality and great flexibility in modern production systems, thanks in part to its integrated industrial image processing. Their main advantage lies in their ability to perform multiple detections simultaneously and distinguish between complex brightness and shapes. This makes them an optimal solution, particularly in the automotive and electrical industries — whether for object verification or presence control.

Intelligence meets performance

The VisionSensor offers a simple way to obtain information about object characteristics in order to subsequently evaluate them. Both predefined application tools and generic functions are available for presence monitoring and object verification. Access to condition monitoring data makes production safe, efficient and transparent.

Simple integration of the sensor into the Profinet- or IO-Link network makes product control particularly easy. The independent process and IT interfaces are indispensable when it comes to future-proof and flexible applications. The VisionSensor has the communication protocols REST API and MQTT, is IIoT-capable, making it the epitome of a smart product.

Features

- Easy operation during configuration
- Integrated lighting and autofocus optics
- Profinet or IO-Link as process and data interface alternatively TCP, UDP or REST API
- This product is part of the SAMS (Smart Automation and Monitoring System)
- Additional IIoT data interfaces: MQTT and REST API
- Additional condition monitoring information for production optimization

BVS VISIONSENSOR

SAMS PRODUCTS
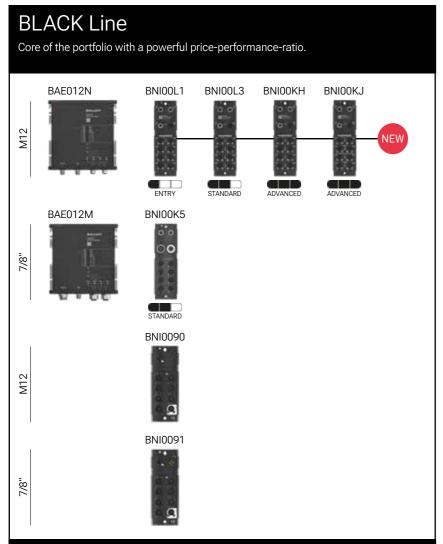
	BVS01ZC	BVS01ZE	BVS01ZF	BVS01ZH
Application	Presence check, object verification, brightness tool, BLOB tool, finder tool, code reader tool			
Functionality	Alignment light, locator, image analysis, reporting			
Condition monitoring	Temperature, vibration, humidity, position, signal quality, operating time			
Working distance	50...600 mm			
Image resolution	1.2 MP (1280 × 960 Pixel)			
Light emitter, integrated lighting	LED white, LED red	LED white, LED infrared	LED white, LED red	LED white, LED infrared
Process data interface	IO-Link,TCP, UDP, REST API		Profinet, TCP, UDP, REST API	
IIoT interface and protocols	MQTT, REST API			
User interface	Sensor app as web client			
Dimension	56 × 56 × 65.5 mm			
IP rating	IP67			

Discover SAMS, the innovative Smart Automation and Monitoring System for optimal performance: Page 8

Reliable information exchange across all levels

INDUSTRIAL
NETWORKING

innovating automation

Industrial networks are facing constantly increasing demands.
The rising quantities of data and ever more complex communication
require high-performance components that can reliably transport the
information across all levels. This is especially true when high protection
ratings, robustness, use at high temperatures or special interfaces and
connections for maximum security are needed.

With the intelligent combination of high-performance industrial networking
technology and the IO-Link communication standard, Balluff allows flexible
and seamless communication in the widest possible range of applications.

Your Balluff solutions

- IO-Link Wireless
- Network blocks
- Switches
- I/O modules
- Inductive couplers

INDUSTRIAL NETWORKING: EASILY FIND WHAT YOU ARE LOOKING FOR

BLACK Line
Core of the portfolio with a powerful price-performance-ratio.

	BAE012N	BNI00L1	BNI00L3	BNI00KH	BNI00KJ
M12		ENTRY	STANDARD	ADVANCED	ADVANCED **NEW**

	BAE012M	BNI00K5
7/8"		STANDARD

M12 BNI0090

7/8" BNI0091

SILVER Line
For a broad range of applications.

	BNI00K6	BNI00K7
M12	ADVANCED	ADVANCED **NEW**

	BNI00HL	BNI006A
7/8"	STANDARD	STANDARD

	BNI00JF	BNI00JH	BNI00AJ	BNI00CM
M12				

	BNI00CL	BNI0098	BNI0046
7/8"			

WASHDOWN Line
For applications in IP69K environments.

	BNI00EK	BNI00HZ
M12		

	BNI00F6	BNI00F7	BNI00FA	BNI00F9
M12				

SAFE Line
For functional safety applications.

	BNI00KY
M12	ADVANCED **NEW**

Balluff's expanded network portfolio sets new standards in user-friendliness and quick access to the right product for your needs.

The good remains: Balluff products, known for quality, innovation, and reliability.

The entire Balluff portfolio for industrial network technology

www.balluff.com

Our product lines Black, Silver, Washdown and Safe Line
ALWAYS THE RIGHT SOLUTION

Industrial networks face the challenge of dealing with increasing data volumes and complex communications. Our powerful and reliable components are specifically designed to efficiently transport information across all levels. This is particularly important when high protection types, robustness, use at high temperatures, or special safety are required.

The smart combination of powerful industrial networks with the IO-Link communication standard enables reliable and flexible information exchange in various application areas.

Discover our product lines Black, Silver, Wash, and Safe Line, which offer a particularly quick selection of our network components. Choose from three performance classes the solution that suits you best.

	ENTRY	STANDARD	ADVANCED
	Designed to effortlessly integrate IO-Link devices into your automation system and solve standard IO-Link applications.	Offers more power to scale up your automation and solve applications, that require more flexibility.	Designed to solve demanding applications. Seamlessly connect IO-Link devices, high-power outputs and leverage advanced IIoT features
	• Entry into IO-Link and IIoT • Connect IO-Link sensors and small actuators	• Standard IIoT protocols on board • Connect IO-Link hubs and standard actuators	• Future ready IIoT protocols on board • Class-B Ports e.g. for valve terminal
Multi-protocol	✓	✓	✓
Single-protocol		✓	
M12 L-coded	✓	✓	✓
7/8"		✓	
Intuitive Web User Interface	✓	✓	✓
Daisy chaining	✓	✓	✓
Total current/Max. output current per port	4 A/0,.5 A	9 A/2 A	16 A/4 A
MQTT	no parsing	✓	✓
Common platform for hard- and software	✓	✓	✓
REST API	✓	✓	✓
Port class type A	✓	✓	✓
Port class type B			✓
Expandable IIoT features			✓

The IO-Link communication standard is an essential building block for networked and smart production and for the industry of the future. This is probably not new to you – but the update in our IO-Link portfolio is: with the Advanced IO-Link masters, we offer you IIoT-capable network modules with which you can also drive devices with higher- power requirements, such as pneumatic valves.

User-friendly (further) development

The IO-Link network modules of Balluff's Advanced class not only score points with their standard M12 power connector. They, also offer extended functions for OT-IT integration as well as improvements to the classic I/O functions. Additional software enhancements for the existing hardware will follow.

Choose the right Advanced Master from two series: Silver Line and Black Line. The Silver Line masters have an integrated display, which enables direct configuration on the device, as well as a robust die-cast zinc housing.

High power for high currents

The Class A ports now have switchable outputs (pin 2) of up to 4 A with integrated current measurement and configurable current limiting. The Class B ports are electrically isolated in accordance with the standard requirements

and also support currents of up to 4 A. This means that devices with higher current requirements, such as pneumatic valves or electric grippers, can also be connected to the master and reliably controlled. Incredibly efficient, cost-saving and quickly scalable: In addition to direct access to I/O data via the well-established MQTT data protocol, the network modules offer further functions to minimize the amount of data and optimize the network load.

Features

- IIoT-capable: REST API (JSON for IO-Link), MQTT
- Support for the most common fieldbus protocols
- IO-Link connections type A/B (potentially separate U_S and U_A)
- More power: output current max. up to 4 A per port
- Power: M12 L-coded (16 A)
- Daisy-chaining

IIoT-capable network modules with multi-protocol support
ADVANCED IO-LINK MASTER

NEW

ADVANCED IO-LINK MASTER

	BNI00K6	BNI00K7	BNI00KH	BNI00KJ
Interfaces fieldbus	Multi-protocol (Profinet, Ethernet IP, EtherCAT)			
Interfaces IIoT	REST API, JSON for IO-Link, MQTT (parsed)			
Display	Yes	Yes	No	No
Supply voltage	18...30 V DC			
Connection COM 1	M12 female, 4-pin, D-coded			
Connection COM 2	M12 female, 4-pin, D-coded			
Connection supply voltage IN	M12 male, 5-pin, L-coded			
Connection supply voltage OUT	M12 female, 5-pin, L-coded			
Connection slots	8 × M12 female, 5-pin, A-coded			
Digital inputs	16 × PNP, Type 3	12 × PNP, Type 3	16 × PNP, Type 3	12 × PNP, Type 3
Digital outputs	16 × PNP	12 × PNP	16 × PNP	12 × PNP
In-/outputs configurable	Yes			
Max. output current per port	4 A (Pin 2), 2 A (Pin 4)			
Total current sensor/actuator	16 A/16 A			
Housing material	Zinc, die-cast		Plastic	
Dimensions	68 × 32 × 224 mm		68 × 38.3 × 226.2 mm	
Ambient temperature	−5...+70 °C		−25...+70 °C	
Protection class	IP67			
Auxiliary interfaces	8 × IO-Link			
IO-Link version	1.1.3			
Port class	8 × Type A	4/4 × Type A/B	8 × Type A	4/4 × Type A/B

For seamless communication from the sensor to the controller

STANDARD IO-LINK MASTER

NEW

The IO-Link communication standard is a central element for smart production processes, since it enables digital data exchange between sensors and controllers. The Standard IO-Link Master combines this proven technology with modern interfaces, expanding the possibilities in industrial automation.

Proven technology, enhanced with modern connections

The IO-Link network module is based on Balluff's established BNI family and features new, market-standard M12 L-coded connections. The L-coded M12 connections make it possible to deliver up to 2 A per port and up to 16 A total current. This facilitates the connection of actuators and high-power sensors and enables the efficient integration of a large number of IO-Link devices into your network structure the using Balluff I/O modules.

Extended interfaces for seamless integration

In addition to the M12 power connector, the standard IO-Link master is equipped with future-proof data interfaces such as REST API and MQTT, which enable simple OT-IT integration. This innovation enables you to meet increasing technical requirements – especially in the context of the Industrial Internet of Things (IIoT).

In addition, the BNI Master supports most common industrial Ethernet protocols such as Profinet or Ethernet IP in a single device. This reduces the number of components required and also cuts costs. A user-friendly web user interface (web UI) makes it easier to configure and monitor the devices. It ensures reliable monitoring of your applications and consistent transmission of process and device information from the IO-Link device to higher-level systems.

Features

- IIoT-capable: REST API (JSON for IO-Link), MQTT
- Support for the most common fieldbus protocols
- Power: Output current max. up to 2 A per port
- Power: M12 L-coded (16 A total)
- Usability: integrated and intuitive web UI

STANDARD IO-LINK MASTER

	BNI00L3
Interfaces fieldbus	Multi-protocol (Profinet, Ethernet IP, EtherCAT)
Interfaces IIoT	REST API, JSON for IO-Link, MQTT
Display	No
Supply voltage	18...30 VDC
Connection COM 1	M12 female, 4-pin, D-coded
Connection COM 2	M12 female, 4-pin, D-coded
Connection supply voltage IN	M12 male, 5-pin, L-coded
Connection supply voltage OUT	M12 female, 5-pin, L-coded
Connection slots	8 × M12 female, 5-pin, A-coded
Digital inputs	16 × PNP, Type 3
Digital outputs	16 × PNP
In-/outputs configurable	Yes
Max. output current per port	2 A (Pin 2), 2 A (Pin 4)
Total current sensor/actuator	16 A/16 A
Housing material	Plastic
Dimensions	68 × 38,3 × 226,2 mm
Ambient temperature	−25...+70 °C
Protection class	IP67
Auxiliary interfaces	8 × IO-Link
IO-Link version	1.1.3
Port class	8 × Type A

For easy integration of IO-Link devices

ENTRY IO-LINK MASTER

NEW

The intelligent combination of industrial networks with the IO-Link communication standard is the basis for ever faster, more flexible, more efficient and more versatile production. With the Entry IO-Link master, you can easily initiate the use of this powerful communication standard. This allows you to benefit from all the advantages of IO-Link.

Maximum flexibility thanks to multi-protocol capability

With our Entry IO-Link master, you can integrate IO-Link devices into your overall automation system: This module reliably collects the signals from the IO-Link sensors and provides an interface to the higher-level controller. It controls the communication between sensor and controller – even in harsh environmental conditions.

The Entry IO-Link masters support most established industrial Ethernet protocols in one device – for example Profinet or Ethernet IP. This significantly reduces the number of components required and also the costs incurred. The master module also meets the basic requirements for OT-IT integration, as the device also supports IoT data interfaces such as MQTT.

The user-friendly web user interface (web UI) allows you to set up the devices easily and conveniently. In addition, your applications are reliably monitored and process and device information is transmitted from the IO-Link device to higher-level systems.

Features

- Support for the most common fieldbus protocols
- Ideal for IO-Link beginners
- Simple and cost-saving installation and maintenance
- Reliable transmission of machine and diagnostic data as well as process parameters to the control system
- IIoT-capable: Support of REST API, MQTT
- Usability: integrated and intuitive web UI
- Power: M12 L-coded

ENTRY IO-LINK MASTER
WITH MULTI-PROTOCOL

	BNI00L1
Interfaces fieldbus	Multi-protocol (Profinet, Ethernet IP, EtherCAT)
Interfaces IIoT	REST API, JSON for IO-Link, MQTT
Display	No
Operating voltage	18...30 V DC
Connection COM 1	M12 female, 4-pin, D-coded
Connection COM 2	M12 female, 4-pin, D-coded
Connection power supply IN	M12 male, 5-pin, L-coded
Connection power supply OUT	M12 female, 5-pin, L-coded
Connection slots	8 × M12 female, 5-pin, A-coded
Digital inputs	16 × PNP, Type 3
Digital outputs	8 × PNP
Configurable inputs/outputs	Yes
Total current	4 A
Output current max. pin 4	0.25 A
Housing material	Plastic
Dimension	68 × 38.3 × 226.2 mm
Ambient temperature	−25...70 °C
IP rating	IP67
Additional interfaces	8 × IO-Link
IO-Link version	1.1.3
Port class	8 × Type A

Utilize all the advantages of IO-Link in the area of functional safety

IO-LINK SAFETY MASTER

AVAILABLE SOON

With Balluff's new IO-Link Safety Master, built on the official IO-Link Safety standard, you can now take advantage of all the benefits of IO-Link – the established communication standard for industrial automation – in the area of functional safety.

The next step for IO-Link

With one of the largest IO-Link portfolios, Balluff develops solutions for a wide range of requirements. In our strong product range, the IO-Link Safety Master is an innovative next step. It acts as a gateway that connects the components in your system to the safety controller.

A new safety standard: IO-Link Safety at a glance

Improved functional safety: IO-Link Safety enables the seamless integration of functional safety into existing IO-Link systems and offers a uniform approach for standard and safety-critical applications. The concept also meets the highest safety standards by ensuring reliable and safe communication between safety devices and control systems.

Simplified installation and configuration: The plug-and-play installation and simple configuration of IO-Link safety devices shortens set-up times and significantly minimizes the risk of errors during commissioning. This also applies to wiring, as IO-Link Safety uses the same standardized M12 connectors as IO-Link, which also ensures compatibility with existing systems.

Flexible and scalable solutions: The modular concept of IO-Link Safety allows you to easily expand or reconfigure the system to adapt to changing safety requirements and production needs.

Improved diagnostic capabilities: With IO-Link Safety, you can monitor the status of safety devices in real time, allowing you to identify and solve problems immediately. Continuous monitoring also enables predictive maintenance of your devices.
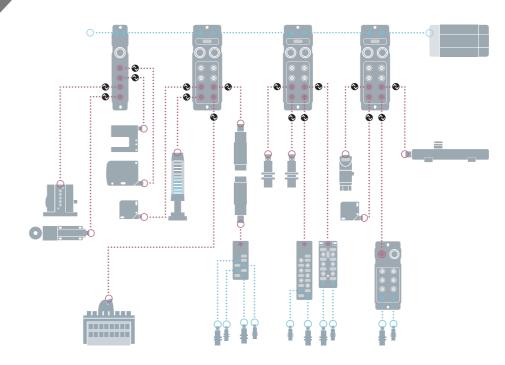
Features
- Brings all the advantages of IO-Link to the area of functional safety
- Can be used at the fieldbus level to connect a wide range of standard I/O safety devices
- Multiprotocol approach
- Safety and security on board
- Extended IIoT functionality with MQTT, OPCUA and REST API

IO-LINK SAFETY MASTER

	BNI00KY
Performance Level	e
Safety category (EN ISO 13849-1)	4
SIL (IEC 61508)	3
Approval/conformity	CE, UKCA, Safety, cULus
Interfaces fieldbus	Profisafe
Operating voltage	18...30 V DC
Display	No
Connection (COM 1)	M12 female, 4-pin, D-coded
Connection (COM 2)	M12 female, 4-pin, D-coded
Connection (supply voltage IN)	M12 male, 2-pin, A-coded
Connection (supply voltage OUT)	M12 female, 5-pin, L-coded
Connection slots	8 × M12 female, 5-pin, A-coded
Number of safe inputs	12
Digital inputs	12 × PNP, Type 3
Number of safe outputs	4
Digital outputs	4 × PM
In-/outputs configurable	No
Interfaces IIoT	REST API, MQTT
Total current sensors	8 A
Total current actuators	8 A
Housing material	PBT
Dimension	68 × 36,.8 × 226 mm
Ambient temperature	−25...+70 °C
IP rating	IP67
Auxiliary interfaces	6 × IO-Link Safety
IO-Link version	1.1
Port class	Type A
Secondary features	Counting of operating hours, current and voltage monitoring, boot-cycle-counter, internal temperature monitoring

**Generate, transport, visualize data –
create added value**

SOFTWARE

B *innovating automation*

The future of automation is increasingly networked and digital.
The growing diversity of technology, including in the private sector,
means the expectations of many users are increasing while the
demands on industry rise.

To be able to meet these increased demands, the merging of traditional
automation techniques (OT) with information technology (IT) is necessary,
and the increased use of software is the next logical step.

Balluff therefore offers you the most diverse types of software, which
together with our IIoT-capable hardware brings real added value. The
Balluff Engineering Tool (BET) is available for easy configuration and
commissioning of IO-Link devices. And easy operation of our camera
systems is served by the clearly designed user interface BVS-Cockpit.

Your Balluff solutions

- Simple commissioning and configuration

Smart Automation and Monitoring System

THE ENGINEERING TOOL MAKES IO-LINK EVEN EASIER

www.balluff.com/go/bet

More and more IO-Link devices are being used in industrial automation, all of which need to be parameterized and diagnosed. To ensure that this can be done efficiently, software that supports you in your processes is becoming increasingly important.

This software is our Balluff Engineering Tool BET, which enables cross-manufacturer commissioning and configuration of IO-Link devices according to the IO-Link standard for sensors and actuators. You can now parameterize and commission your IO-Link devices even more easily and extremely efficiently.

The BET engineering tool allows you to keep an eye on the status of all IO-Link devices in your network topology at all times. You receive notifications about IO-Link events, can easily document the current status of the topology and – without a PLC – test inputs and outputs.

You can also use this software to easily set up IO-Link devices regardless of the manufacturer. With concrete advantages: You need fewer different software tools. And you save time and money on both updates and staff training.

Features

- Reduced commissioning time thanks to faster setting up IO-Link devices, even without a PLC
- Avoid errors by testing the IO-Link wiring before commissioning /start up
- Easier setting of IO-Link networks thanks to clear interface and intuitive operation
- Centralise access to parameterization of all IO-Link devices and overview of the connection status of the entire IO-Link topology
- enhance efficiency – only one software for all IO-Link sensors and actuators regardless of the manufacturer and for all Profinet and Ethernet IP IO-Link network modules from Balluff
- Simpler reuse of parameters for sensors
- Quick and secure import entire IO-Link topologies from series machines into the machine, without the need for time-consuming programming of PLC modules
- Simple and secure update of IO-Link devices and Balluff IO-Link network modules
- Increased system availability due to reduced maintenance times

ENGINEERING TOOL

IO-Link

Balluff Engineering Tool	Software for IO-Link masters and IO-Link devices
Description	- Configure and commission Profinet and Ethernet IP devices - Find IO-Link masters and IO-Link devices in Profinet/Ethernet IP topology - Work with up to 50 IO-Link masters in a topology - Save and restore configurations of the IO-Link topology of entire systems - Document the IO-Link topology of your system - Test inputs and outputs of IO-Link devices even without a PLC - Write process data from IO-Link devices - Read/write IO-Link devices without/with PLC

Balluff

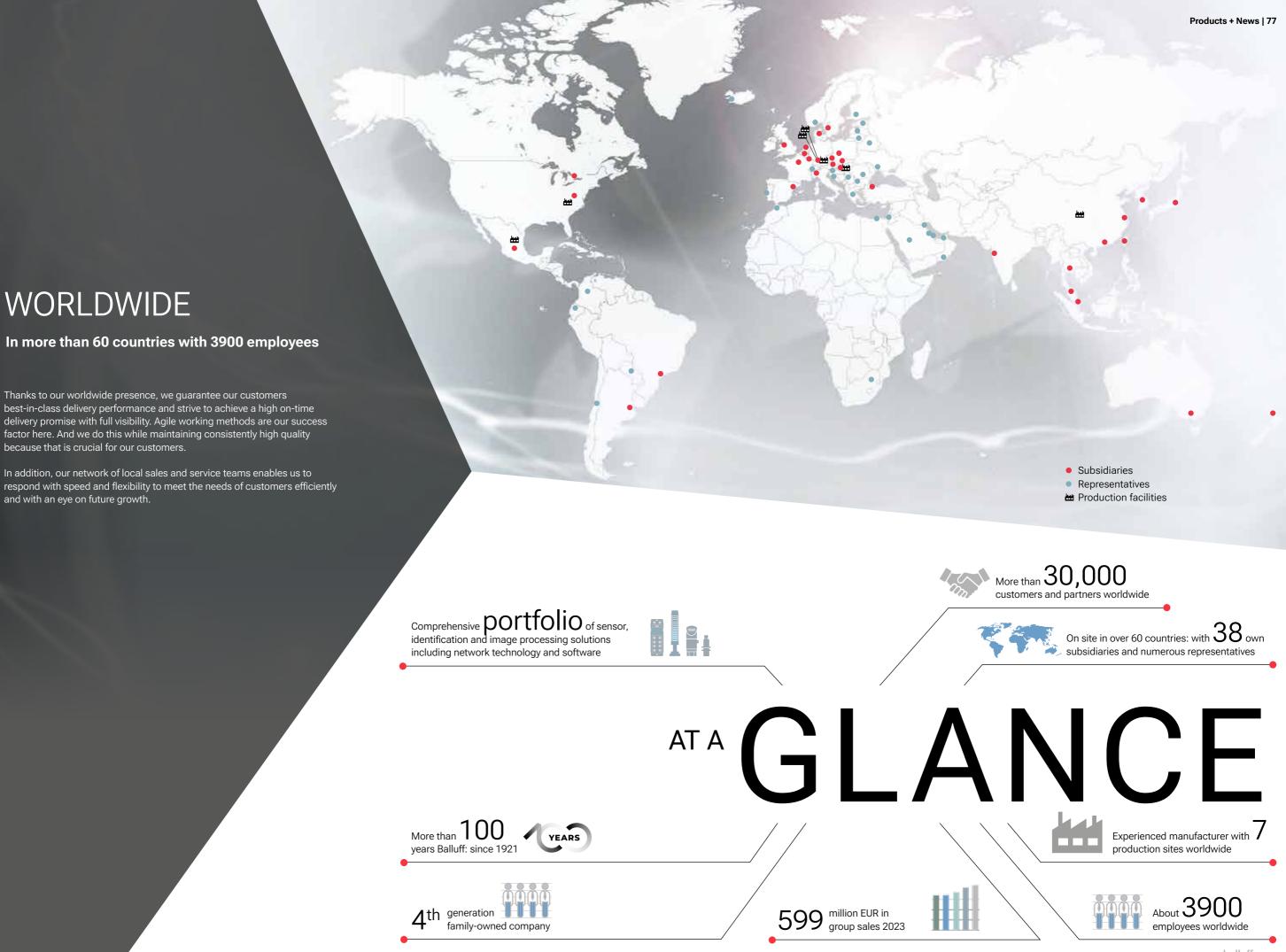# YOUR PARTNER FOR SUCCESS IN AUTOMATION

innovating automation

Balluff is a leading supplier of high-quality sensor, identification and image processing solutions, including network technology and software for all automation requirements. Family-run for more than 100 years, the company today employs about 3900 employees in 38 subsidiaries within sales, production, and development locations worldwide, all of whom are committed to your success. Together with our representatives, we guarantee the highest quality standards in over 68 countries so that you always get the best quality and service.

We deliver innovative solutions to increase your competitive ability. Our consistent digital orientation drives our joint progress and our innovative spirit factors directly into your success.

We adhere to our motto "innovating automation" as pacesetters of automation, refiners and new developers, and technical trailblazers. In our strategic incubation programs (SIPs), we develop new sustainable business models according to the lean startup principle. Open exchange with associations, universities and research institutes also helps us in this process. In this way, and in close contact with our customers, we create innovative industry solutions for automation. In doing so, we dedicate ourselves not only to the classic automation areas, but also to the development of digitalisation and IIoT applications for an increasingly digital and networked world.

We have the future firmly in view with everything we do. We plan with foresight, handle resources carefully and offer you long-term prospects.

You can rely on our commitment and Balluff quality – all in the name of a mutually beneficial partnership.

WORLDWIDE

In more than 60 countries with 3900 employees

Thanks to our worldwide presence, we guarantee our customers best-in-class delivery performance and strive to achieve a high on-time delivery promise with full visibility. Agile working methods are our success factor here. And we do this while maintaining consistently high quality because that is crucial for our customers.

In addition, our network of local sales and service teams enables us to respond with speed and flexibility to meet the needs of customers efficiently and with an eye on future growth.

• Subsidiaries
• Representatives
🏭 Production facilities

More than **30,000** customers and partners worldwide

Comprehensive **portfolio** of sensor, identification and image processing solutions including network technology and software

On site in over 60 countries: with **38** own subsidiaries and numerous representatives

AT A GLANCE

More than **100** years Balluff: since 1921

YEARS

Experienced manufacturer with **7** production sites worldwide

4th generation family-owned company

599 million EUR in group sales 2023

About **3900** employees worldwide

Technological diversity – A wide range of solutions

PRODUCT OVERVIEW

Sensors

In the field of sensor technology for machines and systems, Balluff offers the entire technological diversity with its different operating principles. We offer high-quality and precise sensors and systems for every application and requirement, from displacement measurement and identification to object detection and fluid measurement. Sensors for everyday industrial applications as well as for use in extreme and harsh environments. In addition, we offer you the best network and connection technology as well as an extensive range of accessories. Our sensor technology forms the basis for the automation and digitalization of your machines and plants. We offer sensors in highest precision and best quality for your processes.

Your Balluff solutions

- Inductive sensors
- Capacitive sensors
- Photoelectric sensors
- Magnetic field sensors
- Cam switches
- Ultrasonic sensors
- Magnetic encoders
- Magnetostrictive sensors
- Inclination sensors
- Pressure sensors
- Temperature sensors
- Flow sensors
- Condition monitoring sensors
- Position indicators
- Encoders

RFID

Our identification solutions BIS, offer you the key technology to implement essential requirements of modern manufacturing. With RFID technology, objects and products can be clearly assigned in the company and traced at any time. RFID systems are used to make all production steps transparent and traceable and are therefore an essential component for implementing the requirements of modern production and always keeping an eye on all data.

For unique identification and immediate traceability, a data carrier (RFID transponder) is attached to the object to be identified, which acts as a memory. The data is transmitted between the RFID transponder and the read/write head (reader) and passed on to the controller via the evaluation unit or an IO-Link network module. Our RFID solutions can be operated with almost any common controller and the evaluation units support all frequency ranges. And that is exactly what is special about RFID – the contactless exchange of information between RFID transponder and reader.

Your Balluff solutions

- UHF (860...960 MHz) BIS U
- HF (13,56 MHz) BIS M
- LF (70/455 kHz) BIS C
- LF (125 kHz) BIS L
- Multi-frequency RFID processors
- RFID configurator

Machine Vision and Optical Identification

The requirements for modern production systems are high: High productivity and flexibility to maintain maximum quality. Our Balluff Vision Solutions (BVS) image processing devices are designed to meet these requirements.
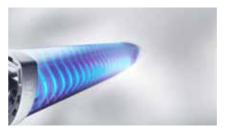
They reliably detect errors, inspect quality and are suitable for reliably reading and verifying codes. Their functions include the detection of objects, 1D and 2D barcodes and the detection of plain text. With this range of capabilities, these sensors are extremely flexible.

Balluff Vision Solutions are used both in part-checking during assembly and in part-tracking during production. With standardized interfaces, the units can be easy to integrate and operate.

Your Balluff solutions

- Industrial cameras
- Machine vision
- Optical identification
- 3D Machine vision

Human Machine Interfaces

Digitalisation has long since arrived in industrial production. In order to always be up to date, it is important to be able to rely on automated processes. With our signalling and display devices, you know at all times what the status of production is. They reliably visualise the status of the machine and system components to be monitored by converting the output signals of the sensors optically and acoustically. For example, a display device such as our SmartLight can be used to monitor the temperature at defined points on your machine or system. If the temperature exceeds a critical level for your machine, this is immediately indicated by the predefined optical warning signal. If the temperature continues to rise, this can also be signalled visually via the indicator.

Your Balluff solutions

- SmartLight – LED stack lights
- Displays

Industrial Networking

To reliably control and monitor your machines and systems, you need professional industrial communication and network technology. The requirements for industrial networks are extensive and diverse. The ever-increasing volume of data and complex communication require powerful and reliable components that are capable of transporting information across all levels.

This is especially true when high protection classes, robustness, use at high temperatures or special interfaces and connections for the greatest possible safety are required.

The intelligent combination of powerful industrial networks with the IO-Link communication standard enables the reliable and flexible exchange of information in a wide range of applications.

Balluff thus enables you to optimally network your network components and provides an important building block for the industrial automation of your company.

Your Balluff solutions

- IO-Link Wireless
- Network blocks
- Switches
- I/O modules
- Inductive Couplers

Connectivity

Flexible and reliable – for us, these are essential characteristics of good connection technology. At Balluff, you get everything from a single source: sensors, systems and network technology as well as suitable connectors and connection cables for a wide range of requirements and optimal use in your industry. With our diverse, flexible and reliable connection technology, we support you with rapid integration and ensure quick and easy commissioning of your machines and systems. In our product range you will find various connection cables, distributors and connectors for reliable sealing as well as signal and data transmission. The connections are used in both mobile and robust applications in all areas of industry.

Your Balluff solutions

- Single-ended cordsets
- Double-ended cordsets
- Bulk cables
- Y-splitters Receptacles
- Tees
- Field attachables
- Bulkheads
- Receptacles
- Adapters
- Terminating resistors
- Junction blocks

Safety

The safe operation of machines and systems is elementary for employee protection, safeguarding productivity as well as liability security. To ensure both the safe operation of your machines and systems and to meet the safety requirements for machines and systems in industry, Balluff offers a comprehensive portfolio and solutions for your safety. This enables you to meet and reliably comply with the requirements of ISO 13849-1 Functional Safety as the standard for the safety verification according to the Machinery Directive 2006/42/EC.

With the installation of protective devices on machines and systems, important machine safety measures are already implemented in accordance with the Machinery Directive. Balluff enables you to create unique safety concepts for your company that provide a high level of safety up to the highest safety level PL e (Performance Level e according to ISO 13849-1:2006).

Your Balluff solutions

- Safety I/O modules
- Safety switches and safety sensors

Power supplies

With us you will find a wide selection of voltages and power levels and thus the right power supply for a reliable and efficient power supply.

For applications in the control cabinet, you can obtain 1- and 3-phase solutions in IP20 design with a wide power range from 3.15 A to 40 A and an optimum price/performance ratio.

With the new generation of our intelligent IP67 field power supplies you get the best from one source: 1 and 3 phase devices in high power classes, IO-Link functionality for condition monitoring and remote parameterization and multiple outputs, available as 7/8" and M12 variants.

Intelligent solutions with predictive maintenance are also offered by our Heartbeat® products. Here, too, the extended diagnostics can be used plant-wide via IO-Link.

Your Balluff solutions

- Heartbeat® power supply units
- Heartbeat® power supply untis with IO-Link interface
- Power supplies for the control cabinet
- Field power supplies with IO-Link interface

Accessories

With our accessories you succeed in easy mounting, installation and exact positioning of our sensor technology, RFID systems, cameras as well as signalling and display devices for high machine availability. Our large selection of high-quality accessories supports you in the optimal mounting of hardware in machines and systems. The wide Balluff product range offers the optimal equipment in various designs, for almost all applications.

We not only offer accessories for precise sensor mounting, but also a wide range of machine accessories, such as protective housings or accessories for lighting, to optimally illuminate your machines, making it easier to use certain sensors and systems. The extensive portfolio of accessories is optimally matched to each version of our components and thus simplifies the design and installation of your machines and systems as well as your production processes. In addition to a wide range of reflectors and fibers for optical systems, we also offer signal converters and adapters to transport signals efficiently.

Your Balluff solutions

- Fastening Technology
- Lights for vision systems and machines
- Reflectors, Fibers, Optics
- Mechanical Protection
- Signal Converters and Communication Adapters

System Solutions

We offer our customers IIoT capable hard- and middleware in combination with powerful software. This means you benefit from system solutions for the widest variety of requirements in your production environment.

You get solutions for condition monitoring of your machines, for monitoring your production equipment or systems for tool management on injection molding machines or machine tools.

Your Balluff solutions

- Tool Management
- Monitoring

Software

The future of automation is increasingly interlinked and digital. The growing diversity of technology, including in the private sector, means the expectations of many users are increasing while the demands on industry rise.

Meeting these increasing demands necessitates the merging of traditional automation technology (OT) and information technology (IT). The increased use of software is the next logical step.

Balluff offers you a variety of software that, combined with our IIoT capable hardware, represents true added value.

Your Balluff solutions

- Setup and configuration

At home in many sectors
INDUSTRIES

Balluff sensor solutions and systems represent individual products that are optimally adapted to your industry, your application conditions and requirements. Our comprehensive sensor and networking expertise provides technological variety for use all around the globe.

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User management — Manage team members access

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Demo software — Download demo software

Invoices and delivery notes — Download and review quote, orders, invoices and delivery notes at any time

RMA and credits — Use our new RMA form to process your return quickly and easily.

Repeat previous order — Save time, repeat orders

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