

**BALLUFF**

**B** *innovating automation*

**Energy  
Production**

**SENSORS  
AND SYSTEMS FOR  
HIGH EFFICIENCY**

Balluff and Energy Production

# WE ARE AT HOME IN MANY DIFFERENT SECTORS



At home in the world of energy

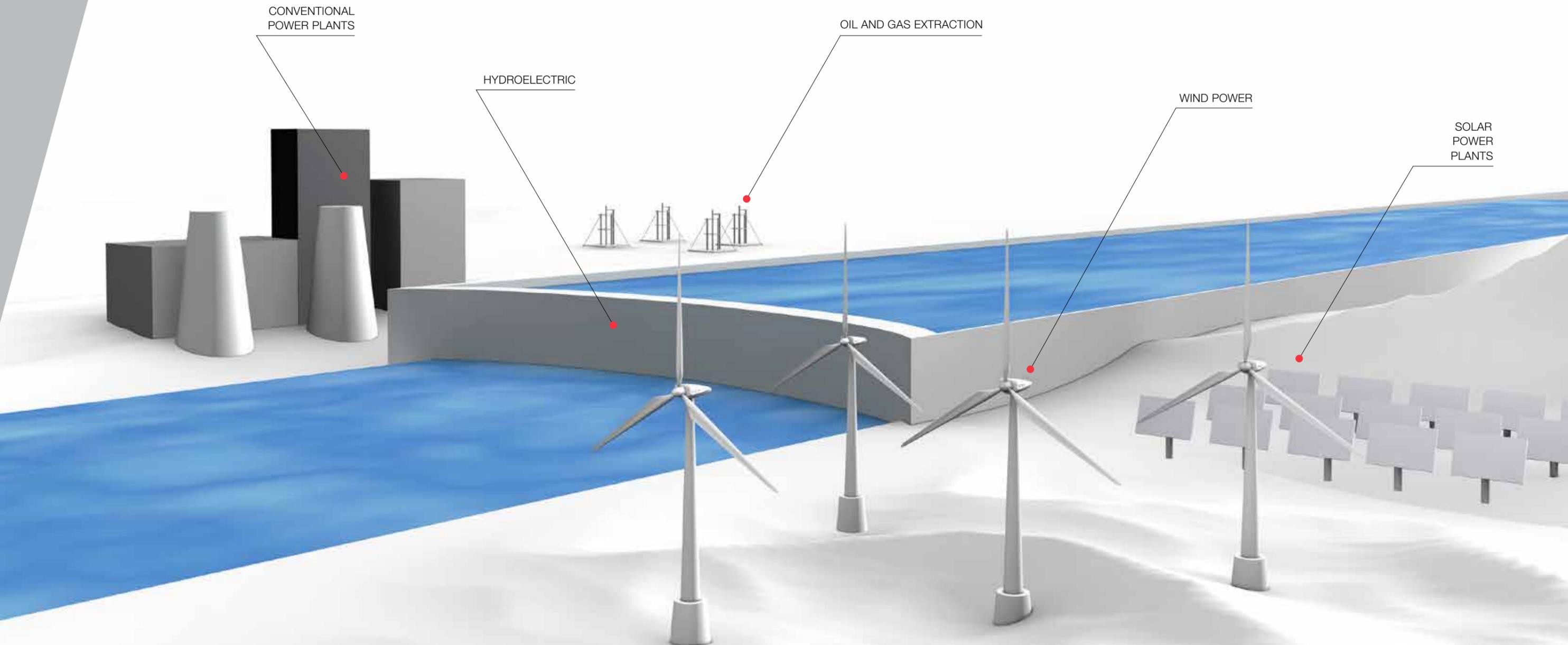
# STAYING PROFITABLE TODAY AND TOMORROW

Climate change, demographic trends and the limited availability of fossil fuels all demand new, innovative solutions from the energy sector. Whether offshore wind farms or solar energy plants in the desert, the distribution of power generation to a large number of individual systems and the immediate influence of extreme environmental factors place stringent requirements on the quality of the components used.

Balluff delivers significant contribution to all the areas of energy: we provide you with reliable solutions for oil and gas extraction, for conventional energy production, as well as for harnessing the renewables, including wind, sun and water. Every single component stands out with ruggedness and quality.

With us you get a global network of technical advice, sales, after-sales service, and fast supply of spare parts.

We also work together with systems builders and suppliers of sub-systems. This guarantees you optimal solutions.



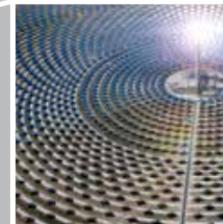
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Wind power

# HIGH-TECH POWER PLANTS WITH HIGH EFFICIENCY.

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Modern wind power systems deliver extremely high efficiency. For example, today's plants produce approximately 20 times more electricity than plants 20 years ago – and at lower cost. Still, wind farms are a large investment that requires high availability of the parts. This can be achieved only if all components are extremely reliable and feature fail-safe performance. To this end, Balluff has long been working closely together with leading manufacturers. We offer you industry-specific know-how and ensure the highest level of quality – for both onshore and offshore facilities.



**ROTOR BLADE PITCH CONTROL**  
With BTL magnetostrictive linear position sensors

Our magnetostrictive linear position sensors have been especially developed for use in the hydraulic cylinders of wind turbines. Using the systems' pitch adjustment, the rotor blade angles can be adjusted precisely to the wind speed to maximize power generation and ensure system reliability.

#### Features

- Low-maintenance
- Pressure rated to 600 bar
- Vibration and shock-resistant for trouble-free use in adverse conditions



**HOLD TOLERANCES**  
With BAW inductive distance sensors

Imbalances and wind loads shorten the durability of the bearings and the drive train. Inductive distance sensors from Balluff let you monitor compliance with tolerances at the critical locations (air gaps). These sensors help to extend the service life of bearings and the drive train.

#### Features

- Non-contact, wear-free
- Compact design
- Simple installation, large distances



**MONITOR BRAKES**  
With BAW inductive distance sensors

Inductive distance sensors continuously check the brakes used at various locations in wind farms. These rugged and precision measurement inductive sensors warn you when the brake linings need to be replaced. Now you can service all the disc brakes before stoppage of the turbine becomes necessary.

#### Features

- Reliable condition monitoring
- Predictive maintenance



**MEASURE TOWER FLEX**  
With BSI inclination sensors

Any significant tilt of a wind energy plant's tower can shorten the overall equipment lifetime. This is particularly problematic during strong gusts of wind, storms, or the plant's start-up phase. Inclination sensors from Balluff reliably measure the absolute inclination angle, preventing limit values from being exceeded and reducing the load on the system.

#### Features

- Easy to install
- Temperature range  $-40...+85$  °C
- Rugged metal housing



**MONITOR LEVELS**  
With BCS capacitive sensors

Ensure optimal fill level in the expansion tanks of your cooling, drive and hydraulic systems. Our capacitive sensors detect the maximum and minimum fill levels without direct contact – through the container wall or with the help of adapters. When installed in the oil pan as a leak sensor, they reliably report any oil loss.

#### Features

- HALT tested capacitive sensors
- Measure through plastic walls
- Detect oil and water



**DETECT ROTOR SPEED**  
With BES inductive sensors

Inductive sensors from Balluff detect the rotor speed in your turbine with extreme reliability even at temperatures  $-40\text{ }^{\circ}\text{C}$ . Two inductive sensors aimed at the rotor lock are all you need for detecting the speed and direction of rotation and protecting the plant from overspeed.

**Features**

- High switching distance
- Extended temperature range
- Contactless detection
- Insensitive to contamination



**MONITOR LOW SPEEDS**  
With BML magnetic encoders

Our magnetic encoders are also extremely precise at very slow rotational speeds. Simply install them on the main shaft. This allows the sensors to not only detect the direction of rotation, but also the correct position for the rotor lock using reference points. All of this is non-contact and thus wear-free.

**Features**

- Extremely accurate, even at very low speeds
- Approach of positions possible



**ENSURE OPTIMAL CONTROL QUALITY**  
With BML magnetic encoders

The generator speed is an important parameter for controlling the plant. Magnetic encoders from Balluff read the poles on the magnet ring without contact. These rugged and precise sensors offer you great flexibility including various ring diameters or in strip form for large diameter shafts. For your grid feed, this means optimal control quality under any circumstances.

**Features**

- Simple, space-saving installation
- Non-contact for maximum service life
- High precision thanks to high resolution

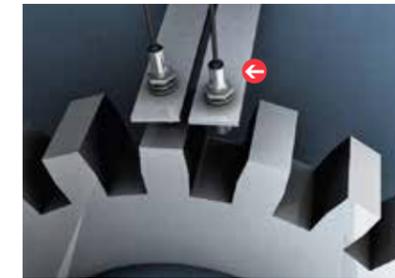


**DETERMINE POSITION**  
With BHS pressure-rated inductive sensors

In order to service the turbine you need to make sure it is safely stopped. Our high-pressure rated inductive sensors help you to reliably determine the piston position of the locking cylinder and the end position of the cylinder in hydraulic pitch systems.

**Features**

- Pressure rated to 500 bar, can be installed directly
- Stainless steel housing
- Also available in analog version for soft stop



**DETECT AZIMUTH ADJUSTMENT**  
With BES inductive sensors

Use our inductive sensors to reliably track the turbine pitch as wind direction changes. These rugged sensors detect the position directly on the sprocket of the azimuth adjuster. And are especially useful as a redundant solution to the standard encoder. Good to know: the outstanding price-performance ratio makes these sensors highly economical.

**Features**

- Rugged, non-contact
- Suitable for wide temperature and humidity fluctuations
- Stainless steel housing
- Shock and vibration resistant

Solar power plants

# THE SUN CAN PROVIDE MORE ENERGY THAN THE WORLD NEEDS.

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Solar-thermal power plants can today deliver power outputs of 100 megawatts or more. To generate this energy, many thousands of mirrors need to be aligned precisely and continuously with the sun. This requires exceptionally precise sensors which can also withstand the extreme environmental conditions found, for example, in desert regions. We have developed measurement systems that allow you to reliably detect these movements and realize efficient plants.



**POSITION HELIOSTATS**  
With BML magnetic encoders

Ensure the efficiency of the solar power plant by precisely positioning the heliostats. Here the sensors need to meet particularly strict requirements. With our highly precise magnetic encoder system you are ideally positioned even under the harsh conditions of desert regions. It operates contactlessly and is therefore very low-maintenance, which helps you to prevent downtimes.

#### Features

- Non-contact, low-wear and low-maintenance
- Cost-effective installation
- High accuracy



**POSITION PARABOLIC TROUGHS**  
With BML magnetic encoders

In parabolic trough power plants, our magnetic encoders help you achieve the highest possible level of efficiency. Their outstanding precision allows you to permanently track all the troughs with the course of the sun and exactly focus on the receiver tubes even under high temperature loads.

#### Features

- Direct measurement
- Precise position detection
- Determining reference points

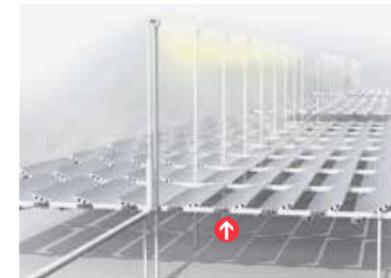


**TRACK PARABOLIC TROUGHS**  
With BSI inclination sensors

Alternatively you can track your parabolic troughs using our absolute output inclination sensors. These are highly accurate and ensure optimal orientation of the troughs with the sun's position, so that you achieve the required high temperatures and can increase the efficiency of the entire plant.

#### Features

- Installation made easy by compact, robust metal housing
- Continuous position detection, even after a power failure
- High accuracy
- No reference run required

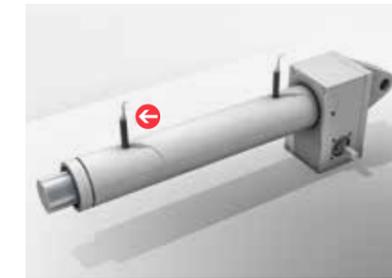


**ADJUST FRESNEL MIRRORS**  
With BSI inclination sensors

Inclination sensors from Balluff also ensure a high level of efficiency in Fresnel mirror collectors. These ensure you of precise orientation of each individual mirror element with the common focal point. The flat mirror elements arranged in parallel reflect the sunlight onto a fixed absorber tube and heat up the water flowing through it.

#### Features

- No reference run required
- High accuracy
- Compact dimensions
- Easy to install



**DETECT POSITIONS IN LINEAR DRIVES**  
With BES inductive sensors

Are you looking for an economical solution for position detection in your linear drives without having to sacrifice reliability? Our rugged inductive sensors are the perfect answer. They detect any position change by counting pulses. Their outstanding price-performance ratio makes these sensors especially economical.

#### Features

- Extended switching distance
- Extended temperature range

Hydroelectric

# INDISPENSABLE IN THE MIX OF RENEWABLE ENERGY SOURCES.

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Hydroelectric power is indispensable among renewable energies these days and still harbors plenty of untapped potential. To reliably operate the enormous hydroelectric plants you need dependable, extremely precise working control and regulating systems.

Balluff helps you with high-precision solutions using sensors and linear measurement systems.



**CONTROL KAPLAN TURBINES**  
With BTL magnetostrictive linear position sensors

For Kaplan turbines to run evenly, the position of the runner and guide vanes is adjusted to respond to need changes. With our magnetostrictive linear position sensors, you control your turbines efficiently and optimize their performance.

**Features**

- Extremely reliable
- No reference run required after voltage interruption
- Rugged, non-contacting

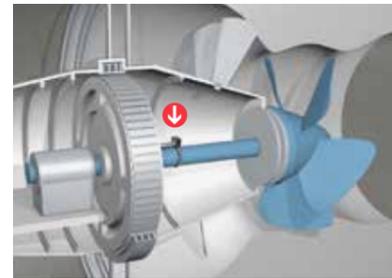


**TRACK PRESSURE**  
With BTL magnetostrictive linear position sensors

Ensure optimal water pressure in Pelton turbines to certify ideal speed of the runner. The pressure of the water stream, which can reach 200 bar, is reliably monitored at the inlet nozzle using magnetostrictive linear position sensors.

**Features**

- Reliable and rugged
- Compact design

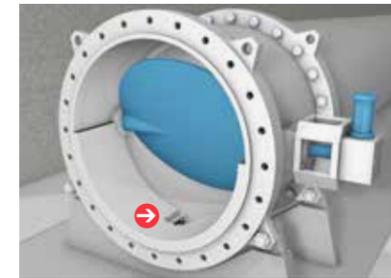


**MONITOR SHAFT POSITION AND SPEED**  
With BML magnetic encoders

Low speeds and even stopping can be monitored with high accuracy. This is accomplished by using our high-performance magnetic encoder. It tells you the exact rotational speed of the shaft in hydro turbines or can check for stoppage of hydrodynamic bearings in standby mode. This lets you reliably prevent bearing damage from insufficient lubrication.

**Features**

- Exact speed measurement
- Non-contact and wear-free
- Can monitor stop condition



**SHUT OFF FLOW**  
With BHS pressure-rated inductive sensors

To reliably shut off the flow at valves in hydroelectric plants, Balluff offers you pressure-rated inductive sensors. They check right at the sealing edge whether the valve is fully closed, thereby preventing any risk.

**Features**

- High pressure rating
- Variety of housing and thread variations
- With cable or connector



**DETECT RAKE POSITION**  
With BHS pressure-rated inductive sensors

Using pressure-rated inductive sensors the end positions on the rake is easily and reliably detected. Correct function of the rake ensures that floating trash at the inlet cannot result in a costly shutdown or in diminished performance. The overall efficiency of the system is maximized.

**Features**

- High pressure rating
- Easy to install



**DETECT INTERMEDIATE POSITIONS**  
With BSI inclination sensors

Today's requirements on a weir far exceed the mere opening or closing of a gate, since the level also needs to be precisely set. Here our inclination sensors enable precise detection of intermediate positions. These sensors are also highly compact and therefore easy to integrate.

**Features**

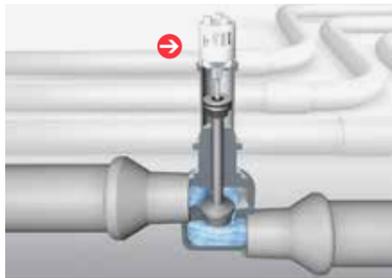
- Wide temperature range
- Analog output 4 to 20 mA

Conventional power plants

# ENERGY PROVIDERS THAT ARE STILL IMPORTANT

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Efficient and environmentally friendly combustion processes in conventional power plants require turbines and generators that can be controlled with great accuracy, for example in peak power stations. At the same time, the efficiency needs to be continually increased while ensuring availability. Your demands on the technology are extremely high here, and with good reason. By using extremely precise solutions from Balluff which were developed just for such applications, you can easily meet these demands.



USE QUICK CLOSING CHECK VALVES  
With BTL magnetostrictive linear position sensors

Quick acting control valves are subject to the highest requirements that often can only be met by a redundant system. Our BTL 7 magnetostrictive linear position sensor incorporates up to three independent measurement sections and three independent electronic systems in one rod. The robust, contact-free and absolute position measurement system is freely configurable. And: thanks to its compact dimensions, it can easily replace already installed, non-redundant position measuring systems.

Startpoints and endpoints can be set comfortably with a computer. And parameter sets are easy to apply, making startup fast and uncomplicated.



#### Features

- 2 or 3 completely separate systems in one housing for maximum availability
- With a measuring range of up to 7620 mm, it is also suitable for large valves
- Compact, space-saving housing
- Fast startup
- Non-contact and wear-free
- Monitoring of all channels via LEDs

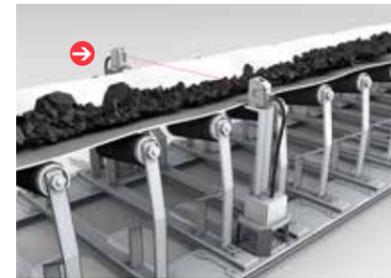


MONITOR FLAP POSITION  
With BTL magnetostrictive linear position sensors

Flaps are used in all areas of power plants to control gases and fumes. Rugged hydraulic cylinders with magnetostrictive linear position sensors open and close the flaps reliably. In this way integrated measuring systems contribute to reliable and safe operation of the power plant.

#### Features

- Wide temperature range for outdoor use
- Can be installed in the cylinders
- Reliable



MONITOR CONVEYORS  
With BOS photoelectric sensors

Our photoelectric sensors with IP69K protection are ideal for withstanding the harsh conditions on the conveyors in a power plant. Protected in their rugged housing, they reliably monitor your conveyor lines. As an option, you can choose an air nozzle to keep the sensor optics from becoming contaminated.

#### Features

- Protection from heat, dust, moisture (IP69K)
- Optional air nozzle for cleaning
- Optional air or water cooling
- Also available as Ex-version

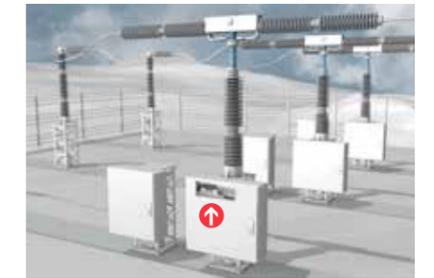


CONTINUOUSLY CHECK ROLLERS  
With BTL magnetostrictive linear position sensors

In coal mills the rollers are subject to wear or can be damaged by foreign bodies in the ground material. Continuous monitoring of the rollers with our profile style magnetostrictive linear position sensors. This ensures reliable operation of the coal mill.

#### Features

- Easy to install
- Also simple to retrofit
- Economical solution



ENSURE PROPER SWITCHING ACTUATIONS  
With BML magnetic encoders

When it comes to power switches, it is important to get exact data on the time characteristics of the switching movement: for startup, maintenance work or in-process. Magnetic encoders handle this reliably. This allows you to detect damage early or even prevent it.

#### Features

- For high-dynamic processes
- Absolute or incremental versions
- Connection and guide elements available as accessories

Oil and gas extraction

# STAY COMPETITIVE WITH FOSSIL ENERGY SOURCES.

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Oil and gas still make a critical contribution to the generation of energy, however other technologies have entered the public and political consciousness. For example Power-to-X technologies, whereby synthetic gases or fuels can be produced from renewable energy using electrolysis of hydrogen and downstream process steps (methanation). These fuels can be used where high energy density is required but proven components from plant construction (e.g. valves and compressors) are needed.

Balluff supports you with rugged, precise and low-maintenance sensors. Explosion protection with numerous international approvals go without saying.

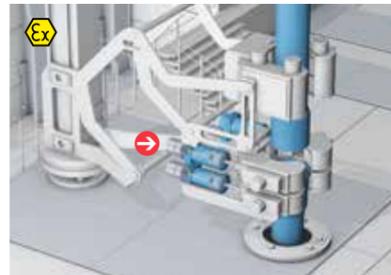


**MONITOR DRILLING DEPTH**  
With BTL PF magnetostrictive linear position sensors

Always know where the drill is: Magnetostrictive linear position sensors in our BTL PF family provide for reliable verification of the correct drilling depth when you are searching for new raw material deposits using mobile drills to take soil samples. Potential deposits can be then quickly verified.

#### Features

- Flat design, space-saving for mobile machines
- Robust profile housing
- Wear-free, since it is contact-free with up to 15 mm distance from the position encoder to the transducer



**MONITOR PIPE HANDLING**  
With BTL magnetostrictive linear position sensors

Iron roughnecks maximize the efficiency in making up or breaking down casings. Our explosion-proof magnetostrictive linear position sensors measure with absolute accuracy to control the movements when threading or disconnecting these heavyweights. This is how you play it safe and use the highest precision.

#### Features

- For explosion hazard environments
- With IECex, ATEX, NEC500/505 and additional international approvals
- Rugged stainless steel design



**ORIENT DELIVERY PUMPS**  
With BSI inclination sensors

Our inclination sensors assist in the precise alignment of delivery pumps. The sensors provide analog angle values you can use to position the pumps with extreme precision. Our inclination sensors are also ideal for harsh outdoor environments. What it means for you: less of a load on your delivery pumps and less wear.

#### Features

- High IP67 rating – can withstand harsh conditions
- Precise, absolute angle measurement
- Compact housing



**MEASURE THE POSITION OF DELIVERY PUMPS**  
With BTL magnetostrictive linear position sensors

Our BTL magnetostrictive linear position sensors in the profile housing prove themselves in the challenging location directly on the pump and guarantee reliable monitoring of position and travel. These measuring systems ensure reliable control of the pump parameters, so that delivery pumps can be used autonomously.

#### Features

- Robust design
- Exact measurement of path and position

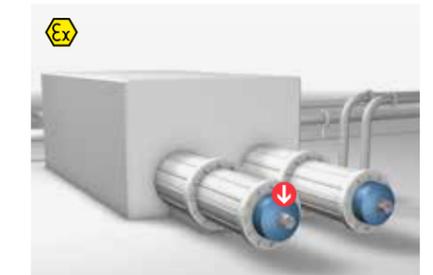


**MONITOR SHUT-OFF AND CONTROL VALVES**  
With BTL magnetostrictive linear position sensors

Our certified magnetostrictive linear position sensors ensure reliable and safe utilization of your shut-off and control valves. They are ideal for the critical areas of oil and gas extraction, in refineries and in petrochemical plants. Explosion protection and high reliability are the main features here.

#### Features

- High reliability
- With IECex, ATEX, NEC 500/505 and additional international approvals



**DETECT THE POSITION OF ADJUSTING DEVICES**  
With BTL magnetostrictive linear position sensors

Are you looking for ways to conserve energy and save costs? Compressors with variable capacity give the plant operator a way to adjust the compressor capacity to changing demands. Magnetostrictive linear position sensors from Balluff monitor the cylinder position of dynamic volume-variable compression chambers.

#### Features

- For explosion hazard environments
- With IECex, ATEX, NEC500/505 and additional international approvals
- Rugged stainless steel design

Our special strengths

## HIGH PRECISION AND COMMUNICATIONS EXPERTISE.

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At Balluff you get innovative concepts for ideal implementation of your individual requirements for producing energy. To this end, we offer you a wide and versatile range of solutions. In addition we have HALT tested the individual components during development, so that you benefit from their especially impressive robustness and durability: in wind or waves, under strong sunlight or in explosion hazard areas.

Our solutions use highly reliable connectivity and mature networking technology which meets the high requirements of the energy industry with no compromises. This contributes to protecting your systems and control technology from failure. And with IO-Link you benefit from the communications expertise that you can use as well for future demands. Because with IO-Link you create an infrastructure for reliably managing the increasing volume of data. From the data you can obtain additional information and use it in a fast and flexible process, making you ready and able to respond in the future.



Indispensable for the world of energy

# HYDRAULICS – UNDER HIGH PRESSURE

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The powerful heart of hydraulic systems is the hydraulic unit, which generates the required pressure. For you to be able to utilize the hydraulics for control and regulation, the sensors have to meet some very high requirements: they must be extremely accurate, easy to integrate and highly reliable. Solutions from Balluff meet all of these demands with ease and feature an excellent price/performance ratio.

For more information go to: [www.balluff.de/go/fluid-power-technology](http://www.balluff.de/go/fluid-power-technology)



## MONITOR HYDRAULICS With BSP pressure sensors and BFT temperature sensors

Monitor your hydraulic power unit by detecting the fluid temperature or hydraulic pressure in on/off mode or continuously. To monitor the operating parameters we provide you with reliable solutions – with optional media-contacting temperature sensors or with pressure sensors. Their rugged housings with IP67 protection make them ideal for this harsh industrial environment.

### Features

- High operating convenience, versions with local display
- Rugged IP67 housing
- Binary switching outputs
- Analog output signals – pressure sensors also with IO-Link



## MONITOR LEVELS With BCS capacitive sensors

Ensure faultless operation of your hydraulic system by using our capacitive sensors to make sure there is always sufficient hydraulic fluid. They enable permanent level control and reliably detect the level in hydraulic tanks. When installed in the oil pan as a leak sensor they reliably let you know when there is a leak point.

### Features

- Reliably detect minimum and maximum levels
- For use in a broad temperature range

Innovative solutions assist in high system availability

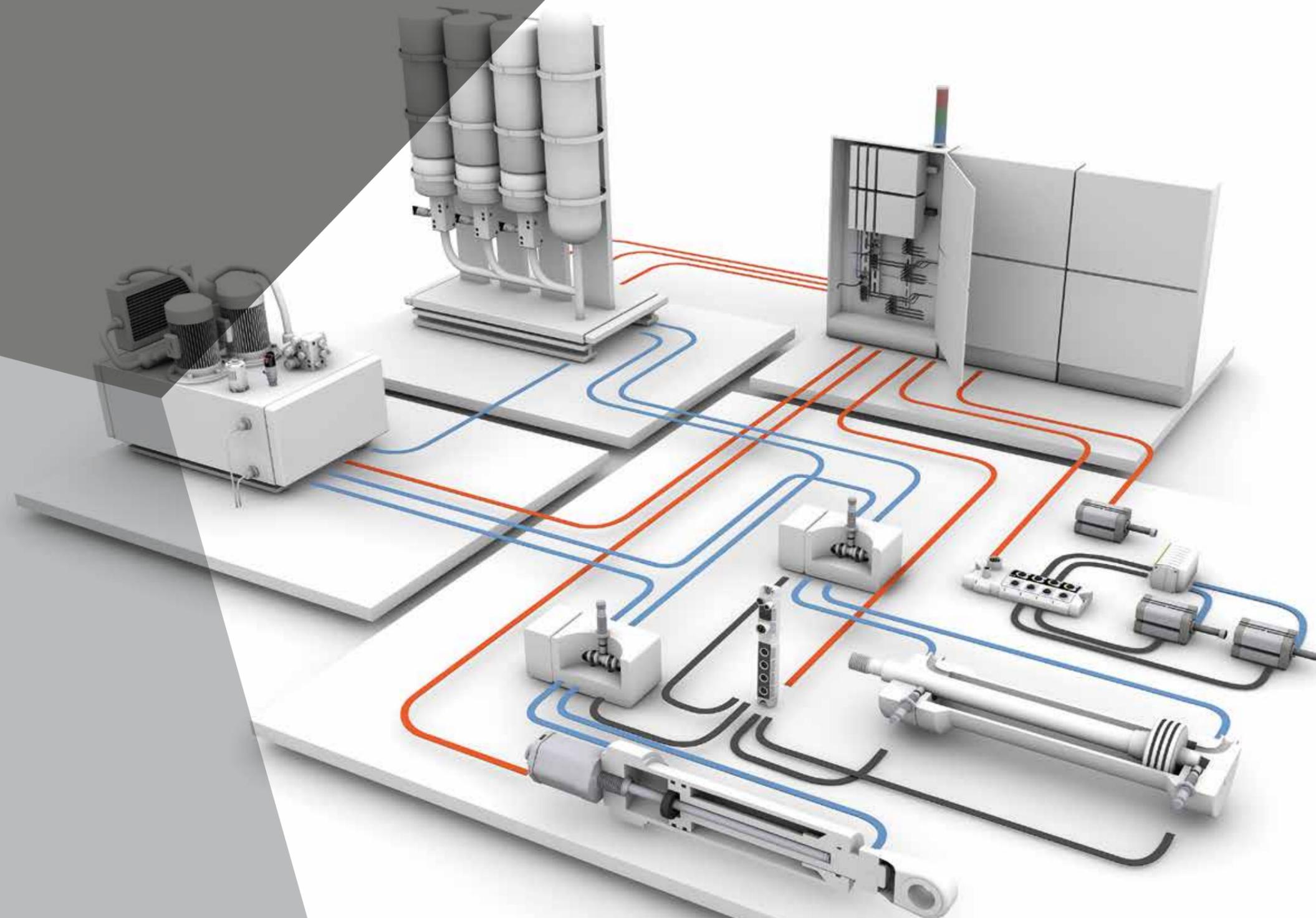
# VERSATILE RANGE OF PERFORMANCE – WITH IO-LINK.

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With Balluff you have at your disposal a wide, versatile performance portfolio consisting of compact sensors, easy to integrate systems and intelligent network technology. Our know-how lets you reliably monitor pressure, level, temperature, and travel.

#### Our performance range at a glance

- Sensors for position and end position detection in hydraulic cylinders and valves
- Capacitive sensors for monitoring liquids
- Pressure sensors for monitoring the hydraulic circuit
- Temperature sensors
- Machine safety with IO-Link
- Network and connection technology for industrial communication
- Worldwide locations with technical consulting, sales, after-sales service and spare parts provision



— Sensor signals  
— Hydraulic circuit

More efficiency, lower costs

# IO-LINK SAVES TIME AND MONEY.



### Easy to install

To install this universal interface all you need is an IO-Link master and an industry standard three- or four-wire standard cable. You can then quickly integrate this intelligent communication standard into the fieldbus world and easily incorporate even complex devices. One special feature: the digital communication ensures noise immunity even without the use of expensive shielded cabling. Analog signals are digitized with no conversion losses.

### Highest machine availability

IO-Link enables quick, error-free sensor replacement and prompt commissioning. You can significantly reduce downtimes since the parameters of a replaced IO-Link sensor are automatically written from the IO-Link master to the new sensor. Startups can be carried out centrally using the function blocks in the controller. This saves time and minimizes the potential for mistakes. Another advantage to you: IO-Link devices cannot be mixed up, since they are automatically identifiable via IO-Link.

### Requirements-based maintenance

Continuous diagnostic data for the entire process extends your service intervals, since automatic readjustment via IO-Link means you need to maintain equipment and machines much less often. Now, predictive error detection is even possible, because complete process parameters are consistently displayed in the controller.

### More efficient operation

With IO-Link you can position sensors in the machine just as the process requires, since accessibility of the sensors is no longer a factor. Process monitoring, configuration and error analysis of the IO-Link devices now takes place in the controller. Signal delays and distortions are reliably eliminated because the digital transmission of data also ensures high signal quality.

A wide range of application requirements can be easily met with IO-Link because you can use both binary and analog standard devices at the same time along with IO-Link sensors/actuators.

For more information go to:  
[www.balluff.com/io-link](http://www.balluff.com/io-link)

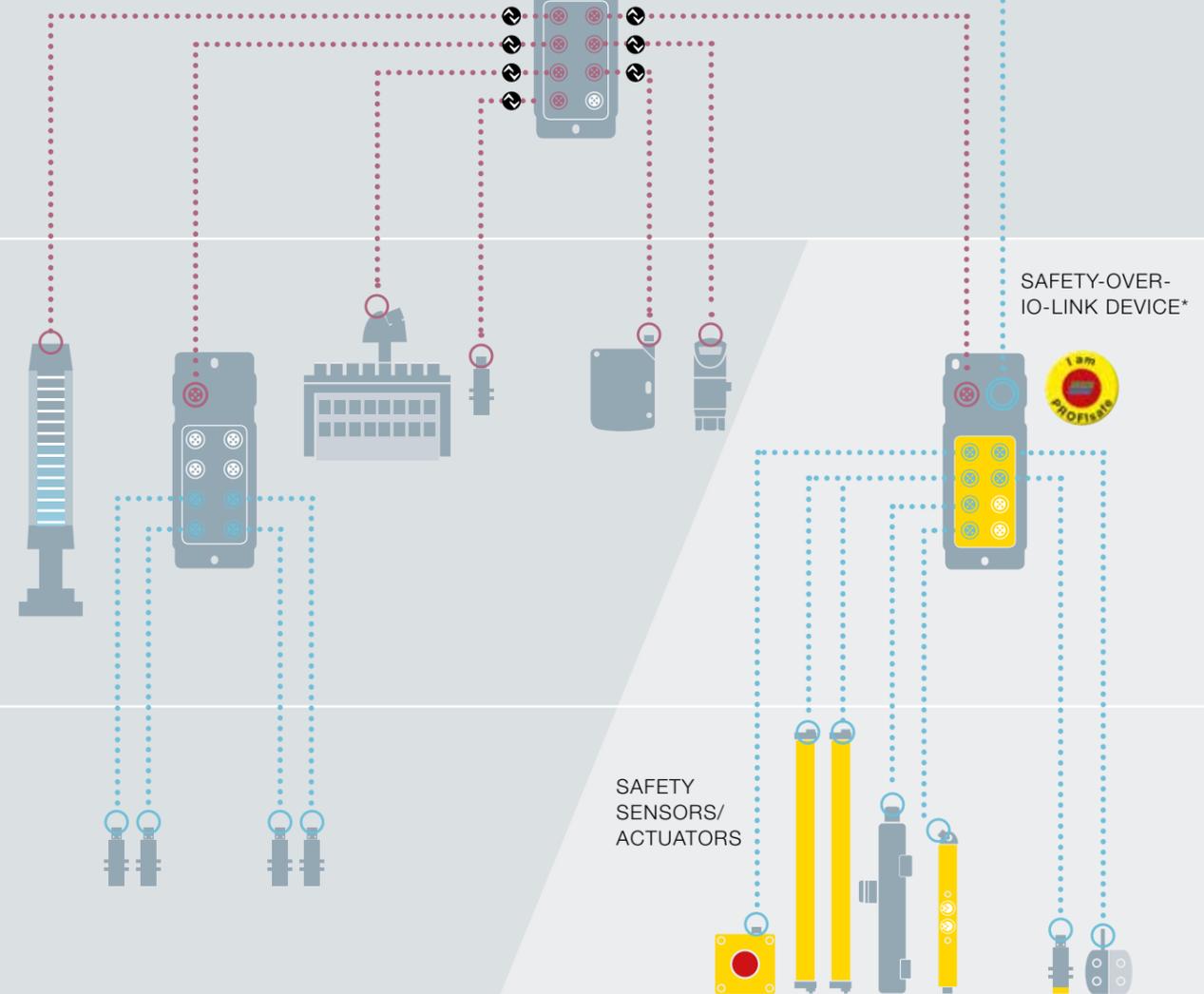
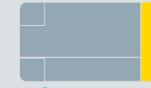
STANDARD SENSORS/ACTUATORS

IO-LINK DEVICES

FIELDBUS MASTER WITH IO-LINK INTERFACE

STANDARD PLC

SAFETY PLC



Safety starts with the components

# EX PROTECTION FOR DIFFERENT AREAS

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Whether in gas and oil extraction, in refineries or Power-to-X technology, explosion hazard areas are a fact of life in energy production. And processes often need to be carried out in hazardous atmospheres, for example when explosive gases or flammable liquids are present.

Our solutions using magnetostrictive linear position sensors ensure you of safe explosion protection in a variety of zones. We also have international approvals so that you can make use of our solutions anywhere in the world. Wherever you do business, we provide for reliable position feedback while you monitor with absolute safety.

For more information go to:  
[www.balluff.de/go/sensors-with-ex-certificates](http://www.balluff.de/go/sensors-with-ex-certificates)



RELIABLE POSITION FEEDBACK  
With BTL magnetostrictive  
linear position sensors

For reliable position feedback in the oil and gas industry Balluff offers magnetostrictive linear position sensors in various rod designs for Ex Zones 0 and 1. Our flameproof versions offer you various performance profiles which let you use them for example in areas characterized by gas or dust. Versions for use in Ex Zone 2 are also available.

#### Features

- IECEx, ATEX, NEC and many additional international certifications
- Approvals for zones 0 (1G), 1 (2G), 2 (3G), as well as 20 (1D), 21 (2D) and 22 (3D)
- Measurement ranges of up to 7620 mm
- Absolute output signal with high resolution of up to 5 µm



RELIABLE POSITION FEEDBACK  
With BHS pressure-rated inductive sensors

At Balluff you have access to a wide-ranging portfolio of inductive sensors for positioning and object detection in explosion hazard areas. For end-of-travel monitoring on hydraulic cylinders and for monitoring valve positions you can also choose from a broad range of high-pressure rated sensors. Our many different housing and thread sizes fit in virtually any installation scenario.

#### Features

- Approvals for zones 0 (1G), 1 (2G), 2 (3G), as well as 20 (1D), 21 (2D) and 22 (3D)
- Pressure rated to 500 bar
- High-temperature-resistant up to 100 °C
- Safe unit when using optionally available isolation amplifiers and cable versions



DETECT PISTON POSITION  
With BMF magnetic field sensors

Our magnetic field sensors offer you versions for Ex zones 0/20, so that you can use them in environments where explosive dusts, gases and vapors are present continuously, often or over a long period of time. When used in combination with our isolation amplifiers, these easy to install sensors create safe unit.

#### Features

- Approvals for zones 0 (1G) and 20 (1D)
- Can be quickly and easily inserted into the T-slot from above, with clamping fixture
- Sensor, mounting bracket and isolation amplifier from a single source

Each individual component makes its contribution

# REGULATING AND CONTROLLING – EVERYTHING UNDER CONTROL

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When we talk about the reliability of plant and control engineering, we often think first of the quality of the large components. Frequently, however, it is the less-noticed components in the background that are responsible for interruptions or even failures primarily the power supply, with implications for all system components. Yet cables and electrical connections also play an important role. After all, they transmit the sensor signals and report position and pressure as well as other parameters to the controller. With Balluff you enjoy reliable quality. We help you to operate your plant at the highest level of reliability.



FIELD INSTALLATION CONCEPT  
With BNI IO-Link network modules

System building often requires connecting sub-components to the controller over long distances. With IO-Link just one concept is all you need to handle field installation for various markets. To adapt the bus system, simply deploy the desired master. The circuit diagrams remain unchanged.

#### Features

- One fieldbus/IP address for up to 136 I/O signals and diagnostic points
- Digitized analog values instead of analog signals (no shielded cable necessary)
- Control actuators with up to 2 A

Additional information:  
[www.balluff.com/io-link](http://www.balluff.com/io-link)



INTELLIGENT NETWORK MONITORING  
With BAE power supplies

Heartbeat® power supplies from Balluff guarantee a high degree of reliability. They provide reliable power and help you to operate your equipment and machines with the greatest degree of efficiency. The LEDs tell you at a glance what the current load situation is, the degree of wear and the remaining service life of the unit. This lets you make the best possible use of their performance.

#### Features

- Continuous monitoring of machines and systems
- Easy monitoring via LEDs
- Reliable power supply units guarantee efficient operation
- Optimized use of devices and a longer service life
- Maintenance planning



RELIABLE CONNECTION  
With BCC connectors

Each system is only as good as its weakest component. This also applies to electrical systems. Here it is often the connections whose significance for signal quality and reliability is underestimated. With Balluff you don't need to make any compromises, rather our connectors and cables offer the same quality as our sensors and systems.

#### Features

- The right cable for each sensor
- Up to -40 °C when fixed installed
- Made of PUR or PVC

Power plant components need to meet exceedingly high requirements

# TESTING AND CERTIFICATION – INSPECTED QUALITY

**B** innovating automation

At Balluff, high product reliability, low maintenance effort, and a long service life are not empty promises, but the result of many years of experience and systematic quality control. As early as the development phase, the sensors are subjected to an accelerated aging process in our in-house testing facility to identify weak points at an early stage and correct them during development. In this HALT (Highly Accelerated Life Test) test, a gradual temperature increase, fast temperature changes and vibration tests simulate the loads to which a sensor is exposed over its entire product life. Numerous certifications such as CE, CCC, UL, cULus and TR (formerly GOST) are proof of the high quality standards at Balluff.

## IN-HOUSE TESTING LABORATORY

Many years of experience, comprehensive design engineering expertise, and high production standards are the prerequisites for first-class products. But only the use of intensive test methods even during design engineering, as well as during and after production, guarantees compliance with the promised product characteristics. Balluff therefore has an in-house testing laboratory that is approved by German accreditation body DAKKS for testing electromagnetic compatibility. In addition shock, sine-wave and noise testing can be carried out, as well as product-specific testing including x-ray analysis and HALT testing.

## CERTIFICATIONS



IEC IECEx ATEX



# INNOVATIVE SOLUTIONS FOR ALL REQUIREMENTS



# PRODUCT OVERVIEW



Application	Product group	Example	Temperature range, enclosure rating	Functions, interfaces and properties
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## WIND POWER

Rotor blade pitch control	BTL magnetostrictive linear position sensors	Rod style BTL-...-B-...*	-40...+85 °C IP68 with cable IP67 with connector	Measuring range up to 7620 mm: Output (alternative) analog 0...10 V, 4...20 mA; SSI, Profinet, EtherCAT, digital pulse Start/Stop Measuring range up to 4000 mm: Output (alternative) IO-Link, CANopen, Profibus
		Rod style BTL-...-E2-...*	-40...+85 °C IP67	Measuring range up to 2000 mm: Output (alternative) analog 0...10 V, 4...20 mA; digital pulse Start/Stop
Hold tolerances (detect imbalance)	BAW inductive distance sensors	BAW002W	-10...+70 °C IP67	M30 × 1.5, measuring range 2...10 mm, output analog 0...10 V
		BAW0051	-40...+80 °C IP68	M12 × 1, measuring range 0.2...3.5 mm (teachable), output analog 4...20 mA
Monitor brakes	BAW inductive distance sensors	BAW002H	-10...+70 °C IP67	M18 × 1, measuring range 1...5 mm/output analog 4...20mA
		BAW004T	-40...+80 °C IP68	M12 × 1, measuring range 0.2...7 mm (teachable), output analog 4...20 mA
	BES inductive sensors	BES03UZ	-40...+85 °C IP68	M12 × 1, switching distance 2 mm, PNP/normally open, flush mountable
		BES01H6	-40...+85 °C IP68	M12 × 1, switching distance 4 mm, PNP/normally open, non-flush mountable
Measure tower flex	BSI inclination sensors	BSI0002	-40...+85 °C IP67	-45...+45°, resolution 0.01°, output analog 4...20 mA, low temperature drift ( $\leq \pm 0.01\%$ /10 K)
Monitor levels	BCS capacitive sensors	BCS00EL	-40...+75 °C IP67	M18 × 1, switching distance 15 mm, can switch through container wall
Detect rotor speed	BES inductive sensors	BES02H0	-40...+85 °C IP68	M18 × 1, switching distance 8 mm, PNP/normally open, flush mountable
		BES02YM	-25...+70 °C IP67	M30 × 1.5, switching distance 22 mm, PNP/normally open, quasi flush mountable
Monitor low speeds	BML magnetic encoders	BML-S2E0-...*	-20...+80 °C IP67	Read distance 2 mm, speed max. 20 m/s, output HTL, TTL
Ensure optimal control accuracy (generator RPMs)	BML magnetic encoders	BML-S2E0-...*	-20...+80 °C IP67	Read distance 2 mm, speed max. 20 m/s, output HTL, TTL
Determine position (rotor lock)	BHS high-pressure rated inductive sensors	BHS001L	-25...+80 °C IP68	M12 × 1, switching distance 1,5 mm, PNP/normally open, pressure rated to 500 bar, flush mountable
		BES03W0	-40...+85 °C IP68	M12 × 1, switching distance 4 mm, PNP/normally closed, flush mountable
Detect azimuth adjustment	BES inductive sensors	BES02F0	-40...+105 °C IP69K	M30 × 1.5, switching distance 10 mm, PNP/normally open, flush mountable

## SOLAR POWER PLANTS

Position heliostats (two-axis)	BML magnetic encoders	BML-S2B0-...*	-20...+85 °C IP67	Read distance 2 mm, system accuracy $\pm 50\ \mu\text{m}$ , output RS422 (level same as operating voltage)
Position parabolic troughs (single axis)	BML magnetic encoders	BML-S2E0-...*	-20...+80 °C IP67	Read distance 2 mm, system accuracy $\pm 100\ \mu\text{m}$ , output RS422 (level same as operating voltage)

Application	Product group	Example	Temperature range, enclosure rating	Functions, interfaces and properties
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Track parabolic troughs	BSI inclination sensors	BSI0004	-40...+85 °C IP67	0...360°, low temperature drift ( $\leq \pm 0.01\%$ /K), output analog 4...20 mA
Adjust Fresnel mirrors	BSI inclination sensors	BSI0003	-40...+85 °C IP67	0...360°, overall accuracy $\pm 0.15^\circ$ over the entire temperature range, output Modbus RTU
Detect positions in linear drives	BES inductive sensors	BES0068	-25...+70 °C IP68	M12 × 1, switching distance 4 mm, PNP/normally open, flush mountable
Guiding PV panels (solar tracker)	BSI inclination sensors	BSI001A	-40...+85 °C IP67	-90...+90°, resolution 0.01°, output analog 4...20 mA
<b>HYDROELECTRIC</b>				
Control Kaplan turbines (regulate blades)	BTL magnetostrictive linear position sensors	Rod style BTL-...-B-...*	-40...+85 °C IP68 with cable IP67 with connector	Measuring range up to 7620 mm: Output (alternative) analog 0...10 V, 4...20 mA; SSI, Profinet, EtherCAT, digital pulse Start/Stop Measuring range up to 4000 mm: Output (alternative) IO-Link, CANopen, Profibus
Adjusting the guide vanes	BTL magnetostrictive linear position sensors	Profile style BTL-...-P-...*	-40...+85 °C IP68 with cable IP67 with connector	Measuring range up to 7620 mm: Output (alternative) analog 0...10 V, 4...20 mA; SSI, Profinet, EtherCAT, digital pulse Start/Stop Measuring range up to 4000 mm: Output (alternative) CANopen, Profibus, DeviceNet
Track pressure (control Pelton turbine nozzles)	BTL magnetostrictive linear position sensors	Compact BTL-...-H-...*	-40...+85 °C IP68 with cable IP67 with connector	Measuring range up to 7620 mm: Output (alternative) analog 0...10 V, 4...20 mA Measuring range up to 4000 mm: Output (alternative) SSI, CANopen, digital pulse Start/Stop
Monitor shaft position and speed	BML magnetic encoders	BML-S2C...*	-20...+80 °C IP67	Read distance 5 mm, speed maximal 10 m/s, output digital A/B signals, HTL
Shut off flow	BHS high-pressure rated inductive sensors	BHS005U	-25...+90 °C IP68	M12 × 1, switching distance 2.5 mm, PNP/normally open, pressure rated to 500 bar, flush mountable
Hydraulic steel structures	BTL magnetostrictive linear position sensors	ProCompact BTL-...-HB-...*	-40...+85 °C IP68 with cable IP67 with connector	Measuring range up to 7620 mm: Output (alternative) analog 0...10 V, 4...20 mA Measuring range up to 4000 mm: Output (alternative) SSI, digital pulse Start/Stop
Detect rake position	BHS high-pressure rated inductive sensors	BHS001L	-25...+80 °C IP68	M12 × 1, switching distance 1.5 mm, PNP/normally open, pressure rated to 500 bar, flush mountable
Detect intermediate positions (inclination angle on weirs)	BSI inclination sensors	BSI0004	-40...+85 °C IP67	0...360°, low temperature drift ( $\leq \pm 0.01\%$ /10 K), output analog 4...20 mA

\* Please contact our Sales department to configure your product.

Additional products can be found on our website at: [www.balluff.de/go/product-finder](http://www.balluff.de/go/product-finder)

Application	Product group	Example	Temperature range, enclosure rating	Functions, interfaces and properties
<b>CONVENTIONAL POWER PLANTS</b>				
Use quick closing check valves	BTL magnetostrictive linear position sensors	Compact BTL-...-K-...*	-40...+85 °C IP68 with cable IP67 with connector	Measuring range up to 7620 mm: Output (alternative) analog 0...10 V, 4...20 mA Measuring range up to 4000 mm: Output (alternative) SSI, CANopen, digital pulse Start/Stop
		Rod style BTL-...-NEX-...*	-40...+60 °C IP68 with cable IP67 with connector	For use in explosion hazard areas / Zone 2**, measuring range up to 7620 mm: Output (alternative) analog 0...10 V 4...20 mA; SSI
		Rod style BTL-...-DEXB-...*	-40...+80 °C IP68 with cable	For use in explosion hazard areas/ Zone 1**, measuring range up to 7620 mm: Output (alternative) analog 0...10 V, 4...20 mA, measuring range up to 4000 mm: Output (alternative) SSI, digital pulse start/stop
		Rod style BTL-...TB2-...*	-40...+85 °C IP67 with connector	Dual redundant measuring range up to 7620 mm: Output (alternative) analog 0...10 V, 4...20 mA
		Rod style BTL-...TB3-...*	-40...+85 °C IP67 with connector	3 × redundancy, measuring range up to 7620 mm: Output (alternative) analog 0...10 V, 4...20 mA
Monitor flap position	BTL magnetostrictive linear position sensors	Rod style BTL-...-B-...*	-40...+85 °C IP68 with cable IP67 with connector	Measuring range up to 7620 mm: Output (alternative) analog 0...10 V, 4...20 mA; SSI, Profinet, EtherCAT, digital pulse Start/Stop Measuring range up to 4000 mm: Output (alternative) IO-Link, CANopen, Profibus
Monitor conveyors	BOS photoelectric sensors	BOS016E (emitter), BOS01FP (receiver)	-20...+60 °C IP67/IP69K, -20...+60 °C IP67/IP69K	23 × 51 × 52.4 mm, red light LED
	BAM protective housing (disc material)	BAM029M (PMMA), BAM029L (glass)	-5 ...+90 °C <sup>1</sup> IP67, -5...+90 °C <sup>1</sup> IP67	Protection against heat, dust, chemicals and water. Optional air or water cooling, optional air nozzle, glass version: for use in explosion hazard areas/Zone 22** <sup>1</sup> with water cooling +160 °C
	BOS photoelectric sensors	BOS01CN (emitter), BOS01CK (receiver)	-5...+55 °C IP67/IP69K, -5...+55 °C IP67/IP69K	28.5 × 80.5 × 62 mm, red light LED
	BAM protective housing (disc material)	BAM02H4 (PMMA), BAM029C (glass)	-5...+90 °C <sup>1</sup> IP67, -5...+90 °C <sup>1</sup> IP67	Protection against heat, dust, chemicals and water. Optional air or water cooling, optional air nozzle, glass version: for use in explosion hazard areas/Zone 22** <sup>1</sup> with water cooling +160 °C
	BOS photoelectric sensors	BOS0235 (emitter), BOS01KM (receiver)	-25...+70 °C IP68/IP69K, -25...+70 °C IP68/IP69K	M18×1, red light LED
	BOS photoelectric sensors	BOS0237 (emitter), BOS023A (receiver)	-25...+70 °C IP68/IP69K, -25...+70 °C IP68/IP69K	M18 × 1, infrared (infrared especially suited for dirty environments)
	Continuously check rollers	BTL magnetostrictive linear position sensors	Profile style BTL-...-P-...*	-40...+85 °C IP68 with cable IP67 with connector
Ensure proper switching actuations (circuit breakers)	BML magnetic encoders	BML-S2B0...*	-20...+80 °C IP67	Read distance 2 mm, speed maximum 20 m/s, output digital A/B signals, HTL

Application	Product group	Example	Temperature range, enclosure rating	Functions, interfaces and properties
<b>OIL AND GAS EXTRACTION</b>				
Monitoring drilling operations, monitoring drill depth	BTL magnetostrictive linear position sensors	Profile style BTL-...-PF-...*	-25...+70 °C IP67	Measuring range up to 4572 mm, Output (alternative) analog 0...10 V, 4...20 mA; IO-Link, VARAN
Hydraulic drive monitoring, e.g. control and check valves, flow pumps	BTL magnetostrictive linear position sensors	Rod style BTL-T500-...-DEXA-...*	-40...+60 °C IP68	For use in explosion hazard areas/Zone 1**, measuring range up to 7620 mm: Profibus output
Measure drill angle, align flow pumps	BSI inclination sensors	BSI0002	-40...+85 °C IP67	-45...+45°, resolution 0.01°, low temperature drift (< ±0.01%/10 K), output analog 4...20 mA
Monitor shut-off and control valves	BTL magnetostrictive linear position sensors	Rod style BTL-...-DEXC-TA12-...*	-40...+60 °C IP68	Especially developed for the oil and gas industry, e.g. for use in explosion hazard areas/Zone 1** Measuring range up to 7620 mm: Output (alternative) analog 0...10 V, 4...20 mA Measuring range up to 4000 mm: Output (alternative) SSI, digital pulse Start/Stop, Profibus, CANopen
Monitoring end positions of hydraulic cylinders	BES inductive sensors	BHS004K	-25...+70 °C IP68	For use in explosion hazard areas/Zone 1 (with the appropriate isolating amplifier)**
	BAE isolating amplifier	BAE00ZU	-20...+60 °C IP20	2-channel
Monitoring tank systems	BTL magnetostrictive linear position sensors	Rod style BTL-...-DEXA-...*	-40...+80 °C IP67	For use in explosion hazard areas/ Zone 1 (Zone 0 float)** Measuring range up to 7620 mm: Output (alternative) analog 0...10 V, 4...20 mA Measuring range up to 4000 mm: Output (alternative) SSI, digital pulse Start/Stop
<b>HYDRAULICS</b>				
Monitor hydraulics	BSP pressure sensors	BSP00Y2	-40...+85 °C IP67	G¼", 0...10 bar, configurable outputs (PNP/NPN/IO-Link and PNP/NPN/4...20 mA/0...10 V)
		BSP00YC	-40...+85 °C IP67	G¼", 0...250 bar, configurable outputs (PNP/NPN/IO-Link and PNP/NPN/4...20 mA/0...10V)
		BSP00YH	-40...+85 °C IP67	G¼", 0...400 bar, configurable outputs (PNP/NPN/IO-Link and PNP/NPN/4...20 mA/0...10V)
	BSP pressure transmitter	BSP00H1	-40...+85 °C IP67	G¼", 0...10 bar, 4...20 mA
		BSP00PN (IO-Link)	-40...+85 °C IP67	G¼", 0...10 bar, 1 × PNP and IO-Link interface
		BSP00H5	-40...+85 °C IP67	G¼", 0...250 bar, 4...20 mA
		BSP00PU (IO-Link)	-40...+85 °C IP67	G¼", 0...250 bar, 1 × PNP and IO-Link interface
		BSP00F3	-40...+85 °C IP67	G¼" 0...400 bar, 4...20 mA
		BSP00PW (IO-Link)	-40...+85 °C IP67	G¼", 0...400 bar, 1 × PNP and IO-Link interface

\* Please contact our Sales department to configure your product.

\*\*For detailed information regarding use in explosion hazard areas, please refer to our homepage, the corresponding product catalogs, data sheets and the associated manuals and guides.

Additional products can be found on our website at: [www.balluff.de/go/product-finder](http://www.balluff.de/go/product-finder)

Application	Product group	Example	Temperature range, enclosure rating	Functions, interfaces and properties
	BFT temperature sensors	BFT0012	-20...+80 °C IP65, IP67	G½", 25 mm, -20...+80 °C, 1 × PNP and 1 × 4...20 mA
		BFT0013	-20...+80 °C IP65, IP67	G½", 50 mm, -20...+80 °C, 1 × PNP and 1 × 4...20 mA
		BFT0014	-20...+80 °C IP65, IP67	G½", 100 mm, -20...+80 °C, 1 × PNP and 1 × 4...20 mA
	BFT temperature transmitter	BFT0005	-40...+85 °C IP67, IP69, IP69K	G¼", 25 mm, -30...+150 °C, 4...20 mA
		BFT0006	-40...+85 °C IP67, IP69, IP69K	G¼", 50 mm, -30...+150 °C, 4...20 mA
		BFT0007	-40...+85 °C IP67, IP69, IP69K	G¼", 100 mm, -30...+150 °C, 4...20 mA
Monitor levels	BCS capacitive sensors	BCS006M	-30...+125 °C IP67	R¾", PNP/normally open (adjustable switching point), pressure rated to 10 bar
		BCS006H	-30...+125 °C IP67	M18 × 1, PNP/normally-open (adjustable switching point), pressure rated to 10 bar

## REGULATING AND CONTROLLING

Field installation concept	BNI Profibus network modules	BNI005R	-5...+70 °C	Profibus-IO-Link master, 8 × M12 ports, 4 × IO-Link ports, max. 16 configurable in-/outputs
		BNI003P	-5...+70 °C	Profibus-IO-Link master, 4 × M12 ports, 4 × IO-Link ports, max. 8 configurable in-/outputs
	BNI Profinet network modules	BNI007M	-5...+70 °C	Profinet-IO-Link master, 16 × M12 ports, 16 × IO-Link ports, max. 32 configurable in-/outputs
		BNI005H	-5...+70 °C	Profibus-IO-Link master, 8 × M12 ports, 8 × IO-Link ports, max. 16 configurable in-/outputs
		BNI0052	-5...+70 °C	Profinet fieldbus module, 8 × M12 ports, max. 16 configurable in-/outputs
	BNI CC-Link network modules	BNI0040	-5...+70 °C	CC-Link-IO-Link master, 8 × M12 ports, 4 × IO-Link ports, max. 16 configurable in-/outputs
		BNI002A	-5...+55 °C	CC-Link fieldbus block, 8 × M12 ports, maximum 16 configurable in-/outputs
	BNI Ethernet/IP network modules	BNI004A	-5...+70 °C	Ethernet/IP-IO-Link master, 8 × M12 ports, 4 × IO-Link ports, max. 16 configurable in-/outputs
		BNI006A	-5...+70 °C	Ethernet/IP-IO-Link master, 8 × M12 ports, 8 × IO-Link ports, max. 16 configurable in-/outputs
		BNI004F	-5...+70 °C	Ethernet/IP fieldbus module, 8 × M12 ports, max. 16 configurable in-/outputs
	BNI IO-Link hubs	BNI007Z	-5...+55 °C	IO-Link hub, plastic, 16 × M12 ports, configurable and expansion port
		BNI0035	-5...+70 °C	IO-Link hub 1.0, zinc die-cast, 16 × M12 ports, configurable and 7/8" supply
	BNI IO-Link analog hubs	BNI00AJ	-5...+70 °C	8 × analog, voltage/analog, current/ analog, temperature (0...10 V/-10...10 V/ 0...5 V/-5...5 V/5...10 V/4...20 mA/ 0...20 mA/Pt100/Pt1000/thermocouple Type J/thermocouple Type K)

Application	Product group	Example	Temperature range, enclosure rating	Functions, interfaces and properties	
	BNI IO-Link analog converter	BNI0042	-5...+70 °C	1 × analog input, 0...10 V DC	
		BNI0041	-5...+70 °C	1 × analog input, 0...20 mA	
		BNI004T	-5...+70 °C	1 × analog input, Pt100	
		BNI00C9	-5...+70 °C	1 × analog input, analog, voltage/analog, current/analog, temperature (0...10 V/-10...10 V/ 0...5 V/-5...5 V/5...10 V/4...20 mA/ 0...20 mA/Pt100/Pt1000)	
		BNI00C7	-5...+70 °C	1 × analog input, analog, temperature (Pt100/Pt1000/thermocouple Type J/ thermocouple Type K)	
		BNI004C	-5...+70 °C	1 × analog output, 4...20 mA	
		BNI004E	-5...+70 °C	1 × analog output, 0...10 V DC	
		BNI00C8	-5...+70 °C	1 × analog output, analog, voltage/analog, current (0...10 V/ -10...10 V/0...5 V/-5...5 V/5...10 V/ 4...20 mA/0...20 mA)	
		BNI00C6	-5...+70 °C	1 × analog in-/output, input: analog, voltage/analog, current/ analog, temperature (0...10 V/ -10...10 V/0...5 V/-5...5 V/5...10 V/ 4...20 mA/0...20 mA/Pt100/Pt1000/ thermocouple Type J/ thermocouple Type K) Output: Analog, voltage/analog, current (0...10 V/-10...10 V/0...5 V/-5...5 V/ 5...10 V/4...20 mA/0...20 mA)	
		BNI SmartLight	BNI0072	-5...+50 °C	5-segment display, IO-Link interface
			BNI0083	-5...+50 °C	5-segment display with sound, IO-Link interface
			BNI007T	-5...+50 °C	1-segment display, IO-Link interface
BNI0087	-5...+50 °C		1-segment display with sound, IO-Link interface		
BNI SmartLight Indicator	BNI00E0	-5...+55 °C	6-segment display, sensor (infrared laser)		
Intelligent network monitoring	BAE power supply units	BAE00EN	-25...+70 °C IP67	Heartbeat® with predictive maintenance function (Load, Stresslevel and Lifetime)	
		BAE00T4	-25...+70 °C IP20	Heartbeat® with predictive maintenance function (Load, Stresslevel and Lifetime)	
		BAE00TM (IO-Link)	-25...+70 °C IP67	Heartbeat® with predictive maintenance function (Load, Stresslevel and Lifetime) and IO-Link interface	
Reliable connection	BCC connectors		-40...+80 °C (fixed installation)	In PUR or PVC as well as other materials	

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Balluff

# OPENING NEW PERSPECTIVES

Balluff is one of the leading providers of high-quality sensor, identification, network and software solutions for your automation requirements. Family-run for more than 90 years, the company now employs more than 4000 employees in 38 subsidiaries with distribution, production and development sites worldwide, all working towards your success. Together with our branches, we guarantee the highest quality standards worldwide. This is how we empower you to always receive the best.

We give our all to provide top services for innovative solutions that increase your competitive edge. Through years of experience we bring the competence of a manufacturer and high personal engagement.

We live our motto 'innovating automation': we are automation pacesetters, developers and technological pioneers. In open interactions with associations, universities and research facilities, and in close contact with our customers, we create new industry solutions for automation. Innovative Balluff solutions prepare you for a successful future.

We keep the future firmly in sight. In everything we do. With sophisticated environmental management, we protect the environment and handle our resources carefully. This creates the best conditions for sustainable action, also for you.

You can always count on us, our products and our scheduling and delivery reliability. In the spirit of a good partnership.



 *innovating automation*

## REFERENCES

The demands on energy production are already high and continue to increase. Our complete commitment is to the success of our customers. Future-looking technologies, market-oriented solutions and the expertise of an experienced manufacturer are what we draw on to increase your competitiveness. This is why companies worldwide trust in Balluff solutions for the energy sector.

We work together with such companies as



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