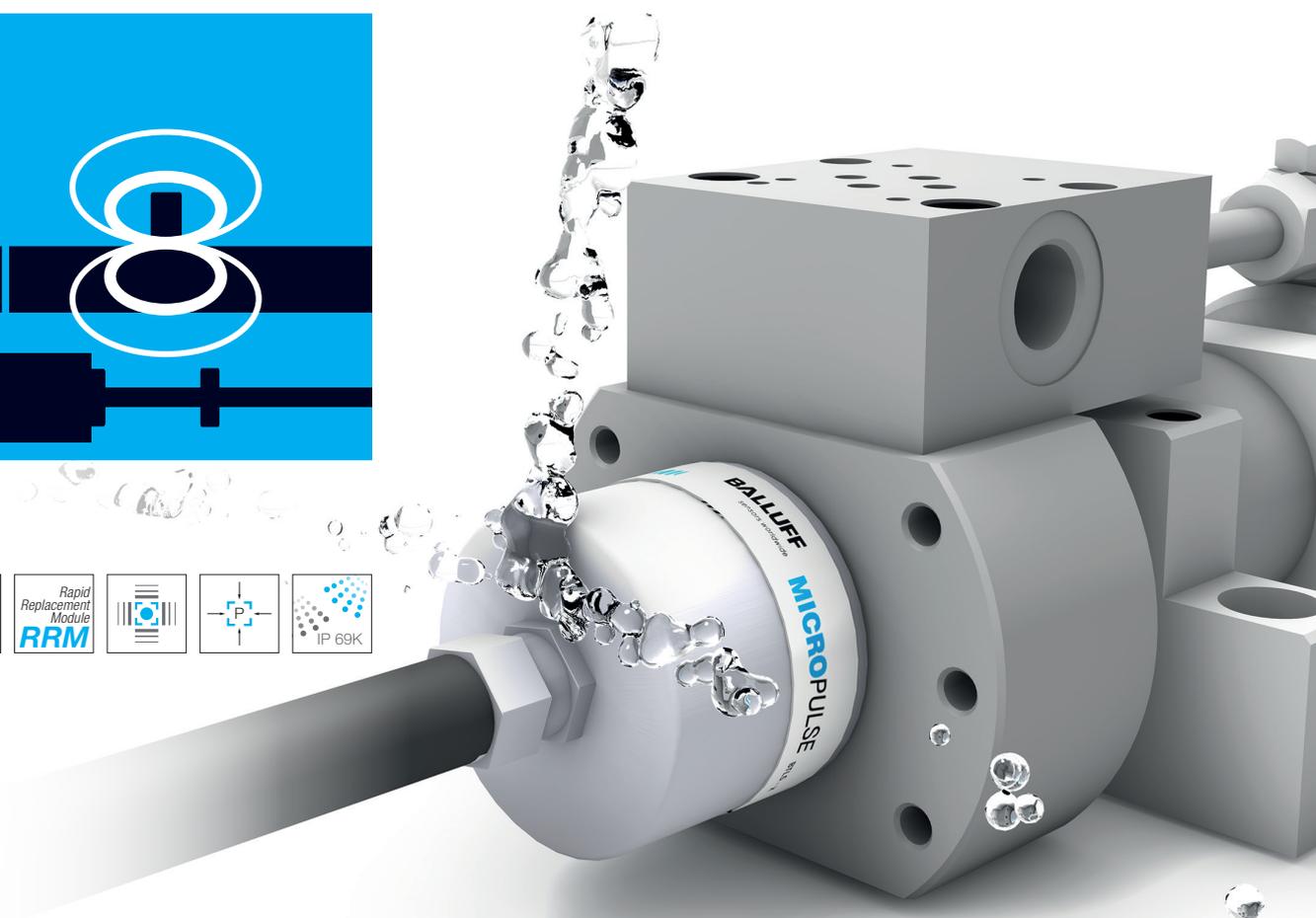
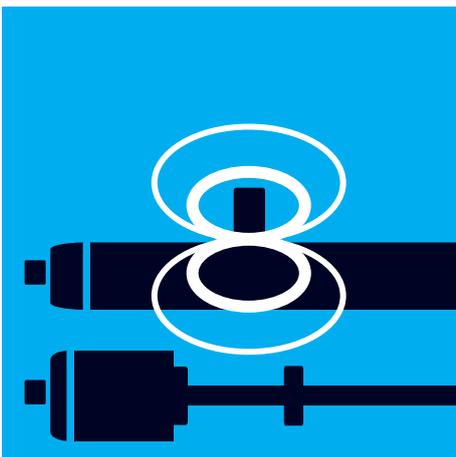


BALLUFF

sensors worldwide

Rugged Linear Position Transducers

Achieve precise positioning in extremely harsh environments





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

Balluff products represent the entire technological spectrum with varied operating principles, including high-quality sensors and systems for position and measurement and identification, as well as sensors for detecting objects and measuring fluids. The full-range assortment includes optimal network and connection technology and a comprehensive line of accessories.

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

Balluff stands for application-specific customer solutions, comprehensive services, individual consultation and prompt service. Our staff of more than 3000 employees is committed to providing outstanding service worldwide.

Rugged Linear Position Transducers

For the most difficult operating conditions

High humidity, ambient temperature fluctuations, high-pressure washdown or strong shock and vibration can quickly take linear transducers to their limits. But not Balluff transducers – they continue to provide full performance even under these challenging conditions.

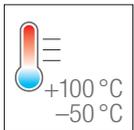
The benefits to you

- High durability and long service life
- Wear- and maintenance-free magnetostrictive operating principle
- Resistant to shock, vibration and contamination
- Strict, no-compromise quality inspection

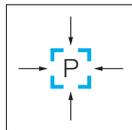
Four reasons

why Balluff offers the best solutions for your most demanding applications in the most extreme conditions.

Extreme temperature ranges



Rugged and indestructible



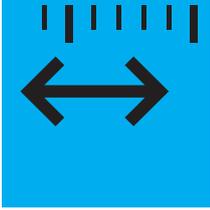
Highest up-time



Reliability and quality



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Extreme Temperature Ranges

Reliably handle heat and cold

Extreme heat and cold are significant stress factors on sensors and shorten their service life. Extreme temperatures can also result in direct sensor and machine failure, so these areas require the most resistant technology.

Balluff transducers are perfect for harsh conditions with temperatures from $-55\text{ }^{\circ}\text{C}$ to $+100\text{ }^{\circ}\text{C}$. This is because their discrete components such as seals and electronic parts are designed for such conditions. This design and the non-contact measuring technology mean that these wear-free transducers will reliably provide accurate positioning under extreme temperature ranges.

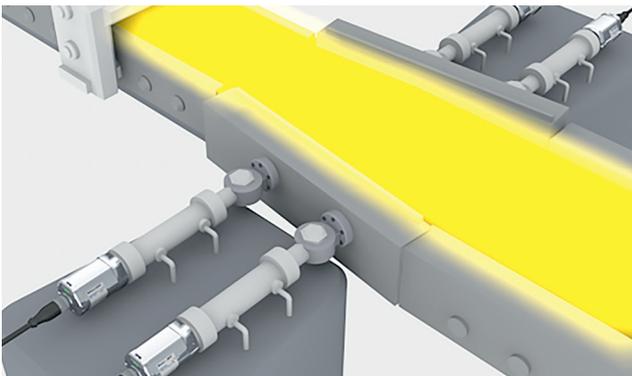
Balluff transducers keep performing at low temperatures down to $-50\text{ }^{\circ}\text{C}$ such as found in the oil and gas industry. On the other end of the spectrum, our transducers have for years been successfully used in the iron and steel industry in coke ovens and continuous casting.

Maximum high temperature resistance

High temperature solutions: transducers with an operating temperature of up to $+100\text{ }^{\circ}\text{C}$ and PTFE cable rated to $+200\text{ }^{\circ}\text{C}$. For products, see page 12

Maximum low temperature resistance

Low temperature solutions: transducers with an operating temperature of down to $-50\text{ }^{\circ}\text{C}$ and cables rated to $-55\text{ }^{\circ}\text{C}$. For products, see page 12



Monitoring slab feeding in a steel plant

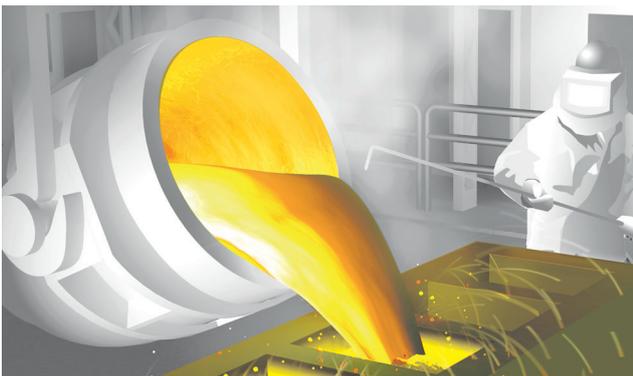
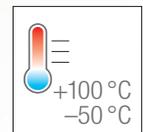
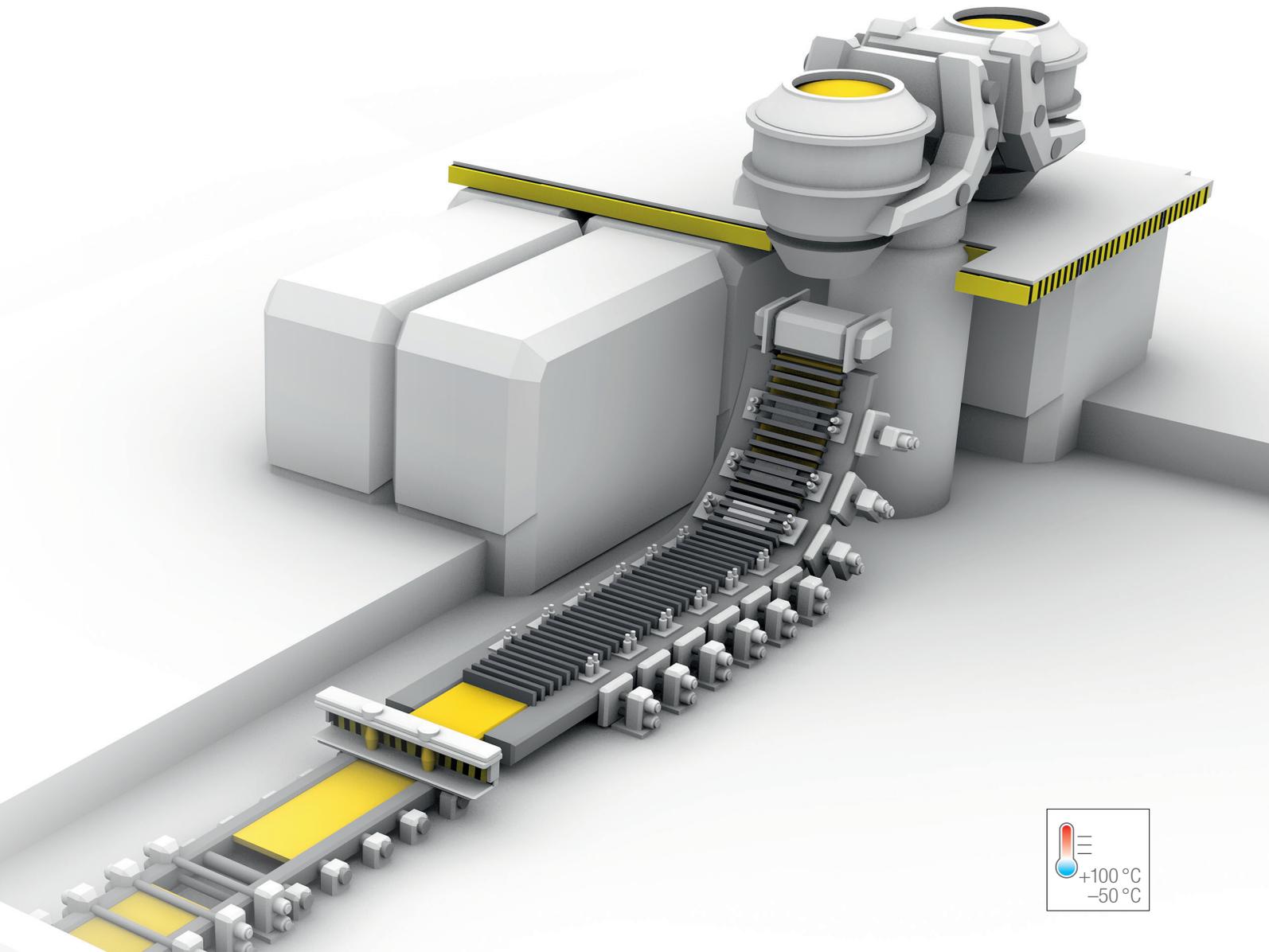
Micropulse transducers BTL in the hydraulic cylinder are ideal for positioning and guiding the slabs.

They check for the correct configuration of the lateral guides and accompany the slabs on their path through the rolling stand.



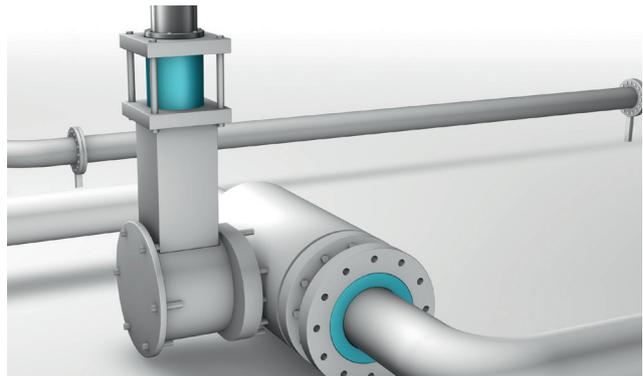
Controlling movements in the coke oven

A transducer embedded in the hydraulic cylinder controls all movements at the oven battery. The high ambient temperatures subject transducers to continuous heat stress.



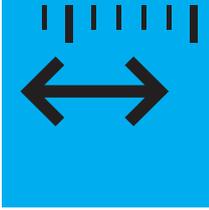
Cable connections for extreme temperature ranges

Both the sensor and the cables are highly stressed by the enormous temperatures and must be able to withstand harsh conditions. Special cables from Balluff have been developed for temperatures from -55 °C to $+200\text{ °C}$.



Controlling valve settings in oil and gas pipelines

Frigid outdoor temperatures are a common situation in the oil and gas industry. But even there the valves and integrated sensors have to monitor position without error. Balluff transducers provide this reliable control feedback.



Rugged and Indestructible

For the harshest ambient conditions

High mechanical loads, moisture and water often cause outdoor located sensors to fail. To provide continuous operation in highly demanding applications, quality, performance and reliability are needed.

Transducers from Balluff are subjected to extreme load conditions even during the development phase, to ensure that possible weak points are detected and eliminated and a rugged product design is the result. This is why these linear measurement sensors are able to exceed your expectations in difficult industrial environments.

Shock and vibration resistance

Transducers are often used in machines where mechanical shock and vibration occur. To ensure their reliability even under extreme loads, special attention is paid to shock (150 G) and vibration (20 g) resistance.

For products, see page 12

High pressure

High pressure rated transducers ensure that heavy loads are moved continually and precisely. The special flange and protective rod design as well as the rugged stainless steel tube make these transducers ideal for installation as a feedback system in high pressure and high-performance cylinders at pressures up to 1000 bar.

For products, see page 15

Extreme water resistance

The welded and sealed housing with IP68 protection withstands harsh ambient conditions. For the most demanding applications a cable protection system can be installed on the threaded housing connection. This gives the transducer an IP69K rating and additional cable protection.

For products, see page 14

Stable and indestructible housings

The solid stainless steel housings are mechanically unusually rugged and chemically resistant to a variety of media such as oils and saltwater. This construction ensures precision and reliability even in challenging outdoor applications.

For products, see page 14



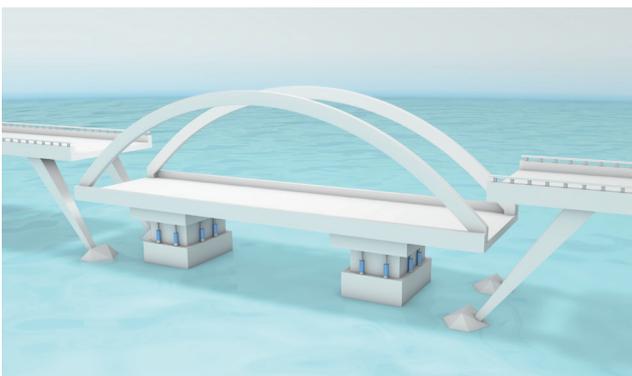
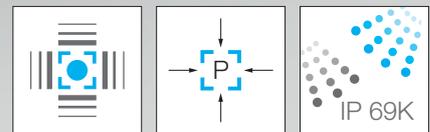
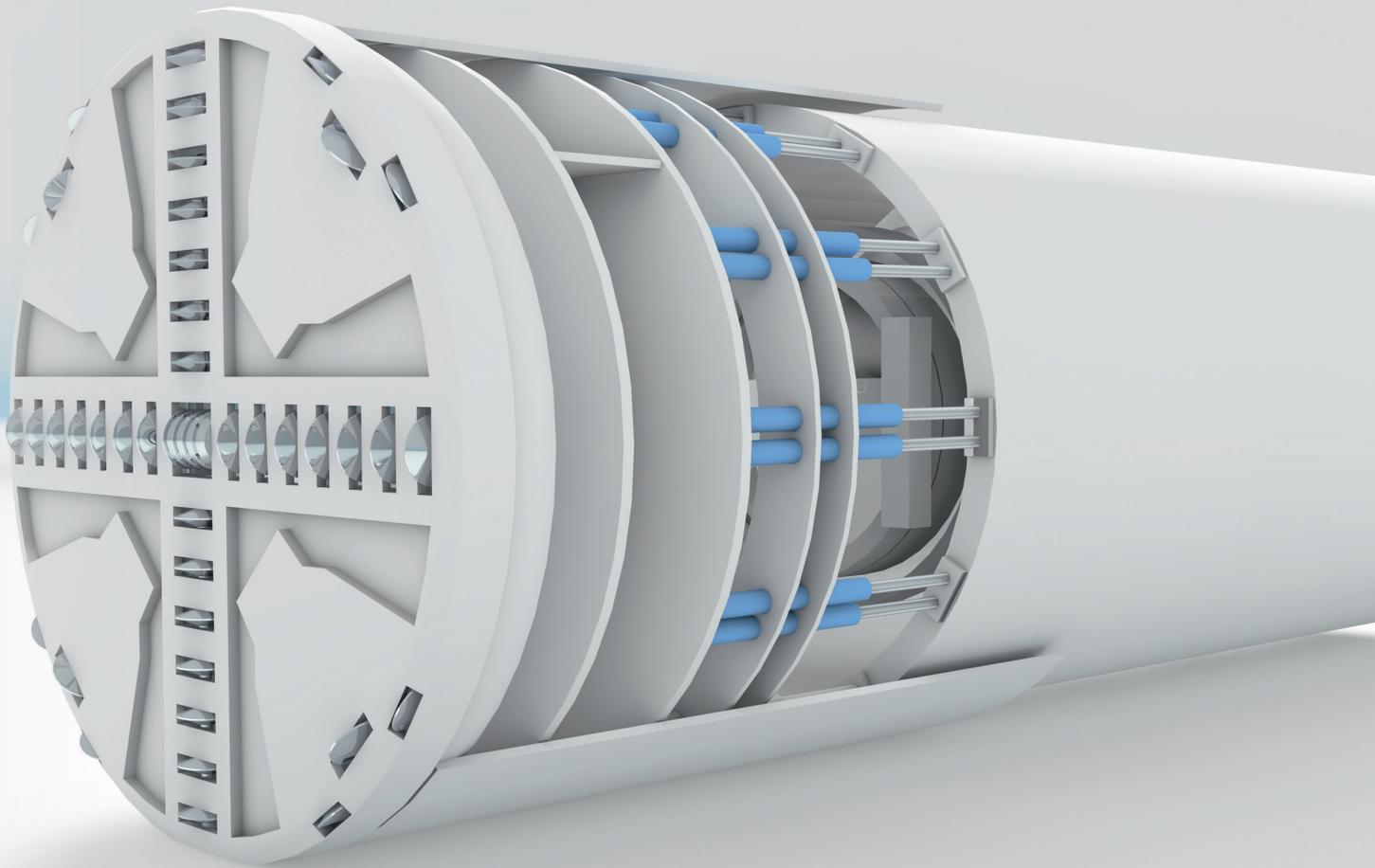
Ensuring exact drilling depth

In mining applications linear measurement systems monitor drilling of blast holes underground. This is the only way safe and reliable tunnel mining and efficient raw material excavation can be ensured. The drilling process results in extreme shock and vibration loads. Under these conditions, durable and resistant technology is a must.



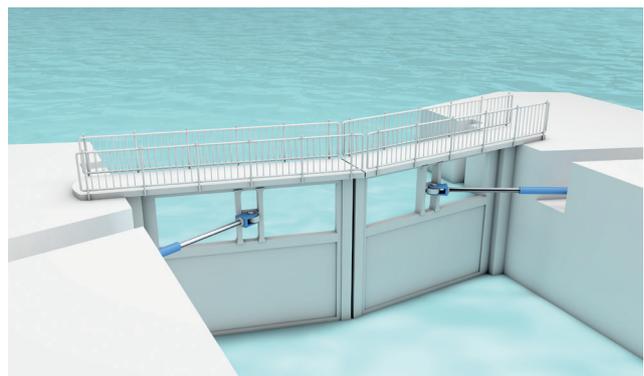
Monitoring hydraulic cylinders

Sensors for debarkers are exposed to strong vibrations. Transducers in hydraulic cylinders monitor the piston position of the feed unit. This enables logs of different thicknesses to be optimally fed.



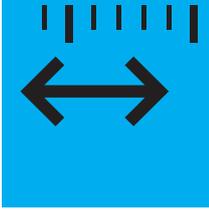
Positioning bridges weighing multiple tons

When building bridges, special heavy-duty cylinders carry out horizontal feed and vertical lifting motions to be able to move the bridge elements, which weigh multiple tons. The transducer is installed in the pressure area of heavy-duty cylinders and high pressure cylinders to position these extreme loads synchronously and with millimeter precision. Micropulse transducers reliably handle the extreme pressure loads.



Opening and closing locks

Hydraulic cylinders move the powerful gates of the large locks, which can take on enormous dimensions in seaports. Transducers are used in hydraulic cylinders to exchange the water efficiently and monitor the position of the gates. Moisture is the greatest challenge for sensors in this environment. Our sensors overcome this reliably.



Highest Up-time

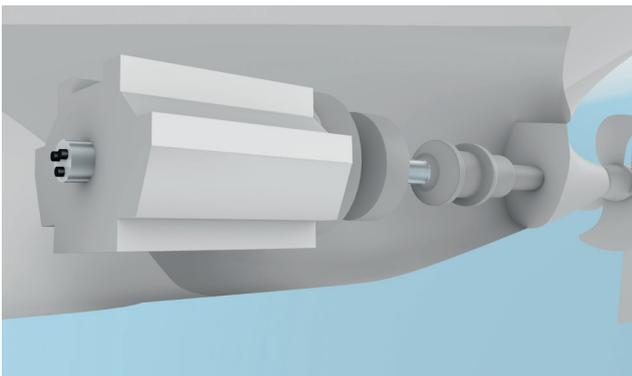
Minimal error rates – redundant systems

A sensor failure can stop the whole system. For fast replacement of the transducer Balluff offers a simple quick-change system. The transducer is changed out in-place without having to break the seal of the closed hydraulic system. And system functionality is immediately restored.

Installation of redundant technology prevents complete system failure. The defect rate is reduced. The service life is extended and system availability significantly increased.

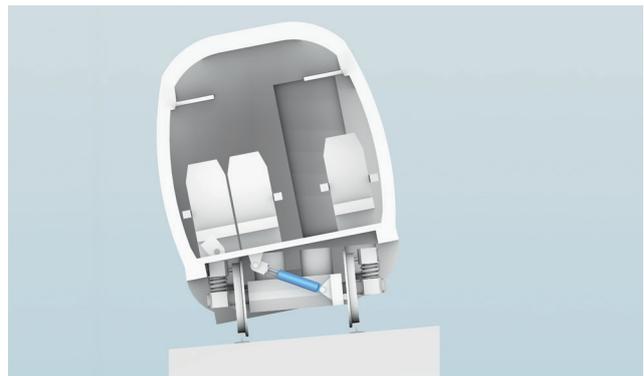
Redundant transducers from Balluff offer up to three independent measuring systems and electronic circuits in one. If one system fails, two others are immediately available. The robust, non-contact and absolute position measuring system is freely configurable. Thanks to its compact dimensions, it can easily replace already installed, non-redundant position measuring systems.

For products, see page 13



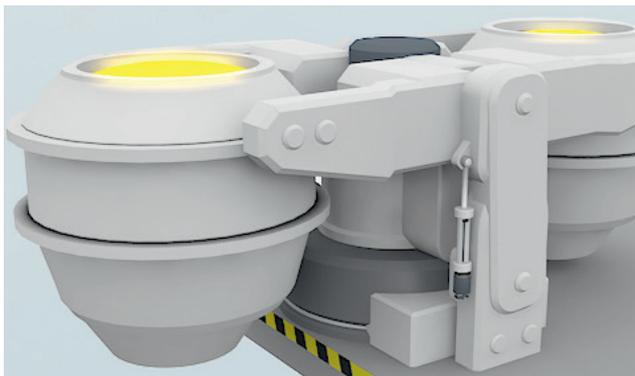
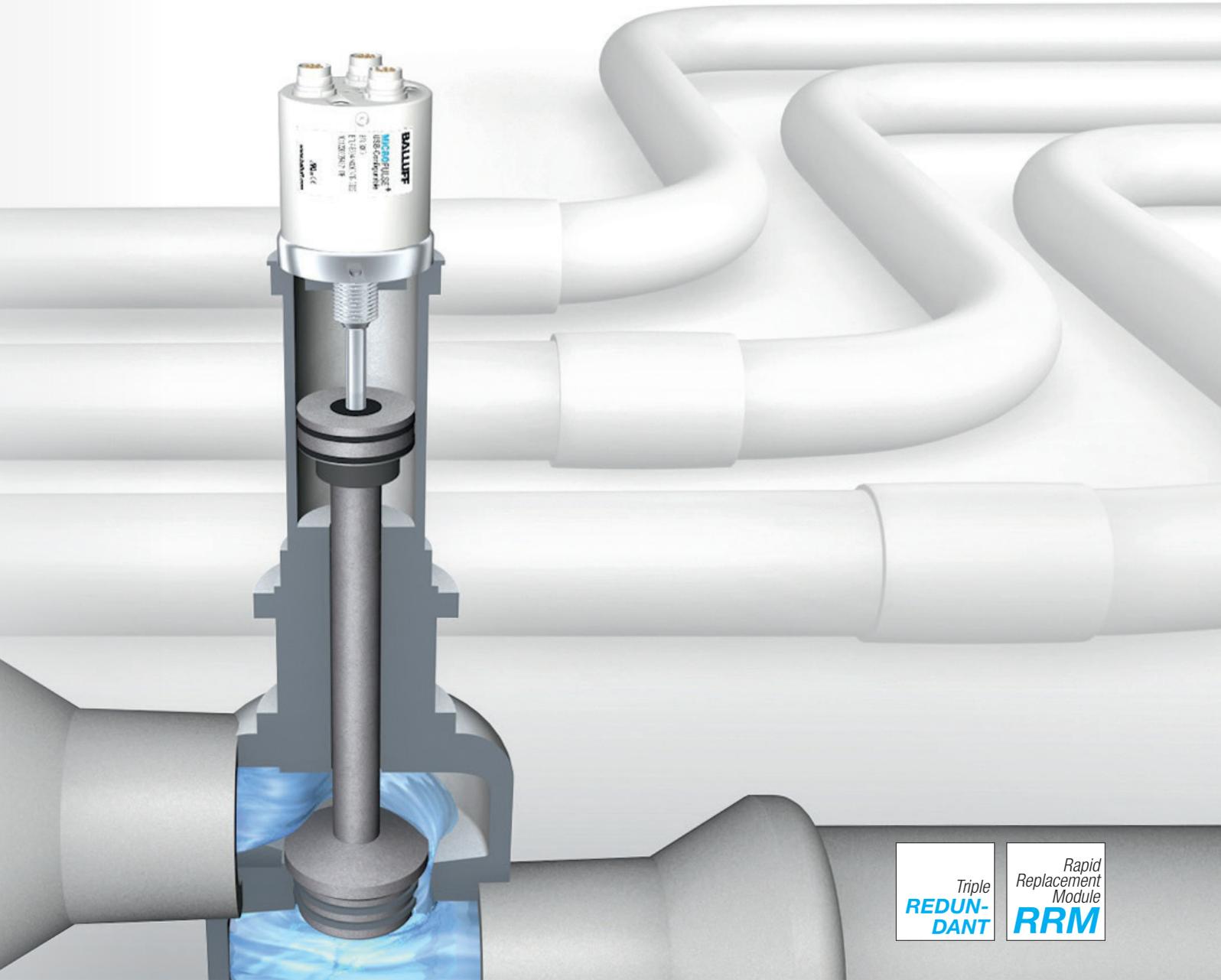
Checking variable pitch propellers

Variable pitch propellers bring critical advantages to the ship propulsion system. This is particularly worthwhile when there are frequently changing speeds, such as on ferries or cruise ships. Transducers monitor the hydraulic adjustment of the propeller angle and ensure maneuverability of the ship. This is a safety-critical application, so that a system failure must be prevented under every circumstance. Precise, reliable linear measurement technology ensures this.



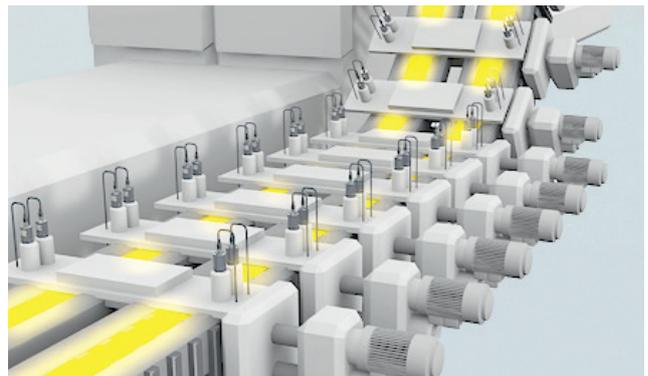
Controlling train tilt

For shortened travel time and high cornering speeds, express trains are actively tilted up to 8°. Hydraulic cylinders with redundant position measurement systems are used in inclination technology. For maximum passenger safety and optimal angles in every curve.



Fail safety through redundant, independent systems

Redundant transducers are suitable for the failsafe detection of distances on safety valves, for example, and independently monitoring positions and adjustment speeds. Up to 3 fully independent distant measuring systems in the same housing guarantee safe operation. Two different interfaces provide diverse redundancy.

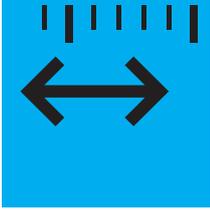


Quick on-site replacement

The quick-change system allows a transducer to be replaced in a hydraulic cylinder without loss of pressure or fluid. The complete sensor unit is replaced together with the integral waveguide so that the hydraulic circuit remains closed.

The benefits to you

- Fast, simple maintenance on-site
- The hydraulic seal remains intact: no lost fluid, no special environmental precautions necessary, no risk of air or contamination entering the hydraulic system
- Simple method for replacing the sensor unit prevents errors



Reliability and Quality

Testing and certification during the development phase

The great security, low maintenance required and long service life of Balluff products is based on extensive design expertise and long years of experience. The practical result is our systematic quality inspections and high manufacturing standards.

Our in-house testing laboratory is the site of intensive product tests, both during the design state and after production. This guarantees that the promised properties are also delivered.

The high quality of our products is attested to by numerous certifications such as CE, CCC, UL, cULus and GOST.

Certifications



Germanischer Lloyd

IEC IECEx ATEX



In-house testing laboratory

Balluff has an in-house testing laboratory that is approved by German accreditation body DAkkS for testing electromagnetic compatibility. Here the products are subjected to HALT tests to verify their long-term reliability. Shock, vibration and noise tests or X-ray analyses are also performed.



HALT test

In HALT testing (High Accelerated Lifetime Test) components are subjected to accelerated aging during their development in order to uncover weak points early so that they can be eliminated. The samples are subjected to graduated ultra-low and ultra-high temperatures as well as extreme temperature changes.

The temperature range can extend from $-100\text{ }^{\circ}\text{C}$ to $+200\text{ }^{\circ}\text{C}$ with a temperature gradient of up to 70 K/min . This is followed by vibration tests with a maximum load of 50 G until the unit finally reaches its limit and is destroyed. The combination of temperature and vibration testing is the most severe test.



Micropulse Transducers

Product overview

Extreme temperature ranges



Series	BTL7-__-K-SA262	BTL7-__-B-SA418	BTL7-__-Z-SA418
Mounting	18h6 with 6 Allen screws	Thread M18x1.5 mm	Thread 3/4"-16UNF
Analog voltage	BTL7-A100-M__-K-SA262-K05		
Analog current	BTL7-E100-M__-K-SA262-K05	BTL7-E500-M__-B-SA418-S32	BTL7-E500-M__-Z-SA418-S32
Max. measuring length	1524 mm	2680 mm	2680 mm
Resolution max.	1 µm	< 10 µm	< 10 µm
Repeat accuracy	≤ ±10 µm	< 30 µm	< 30 µm
Sampling rate max.	250 Hz	2000 Hz	2000 Hz
Supply voltage	20...28 V DC	10...30 V DC	10...30 V DC
Shock load	150 g	150 g	150 g
Vibration	20 g	20 g	20 g
Operating temperature Sensor	-40...+100 °C	-50...+85 °C	-50...+85 °C
Operating temperature cable	-40...+120 °C	-55...+100 °C	-55...+100 °C
Pressure rating	600 bar	600 bar	600 bar
Housing material	Stainless steel	Aluminum, stainless steel	Aluminum, stainless steel
Degree of protection as per IEC 60529	IP68	IP67	IP67

-M____- stands for measuring length in millimeters. Example: 500 mm measuring length = -M0500-

Suitable Accessories

Type	Connection cable for BTL7-__-SA418
	BCC0HW5
Cable length	5 m
Operating temperature	-55...+100 °C

Shock and vibration resistance



Series	BTL7-__-B-SA42	BTL7-__-Z-SA42	BTL7-__-P-SA228
Mounting	Thread M18x1.5 mm	Thread 3/4"-16UNF	Mounting clamps
Analog voltage	BTL7-A501-M__-B-SA42-S32	BTL7-A501-M__-Z-SA42-S32	BTL7-A501-M__-P-SA228-S32
Analog current	BTL7-E501-M__-B-SA42-S32	BTL7-E501-M__-Z-SA42-S32	BTL7-E501-M__-P-SA228-S32
Start/Stop	BTL7-P511-M__-B-SA42-S32	BTL7-P511-M__-Z-SA42-S32	
SSI	BTL7-S510-M__-B-SA42-S32	BTL7-S510-M__-Z-SA42-S32	
Max. measuring length	4000 mm	4000 mm	1500 mm
Resolution max.	1 µm	1 µm	1 µm
Repeat accuracy	≤ ±5 µm	≤ ±5 µm	≤ ±5 µm
Sampling rate max.	4000 Hz	4000 Hz	4000 Hz
Supply voltage	10...30 V DC	10...30 V DC	10...30 V DC
Shock load	150 g	150 g	150 g
Vibration	20 g	20 g	20 g
Operating temperature	-40...+85 °C	-40...+85 °C	-40...+85 °C
Pressure rating	600 bar	600 bar	600 bar
Housing material	Aluminum, stainless steel	Aluminum, stainless steel	Aluminum
Degree of protection as per IEC 60529	IP67, IP68 cable version	IP67, IP68 cable version	IP67, IP68 cable version

-M____- stands for measuring length in millimeters. Example: 500 mm measuring length = -M0500-

Redundant Systems



Series	BTL7-_-_-TB	BTL7-_-_-TZ
Mounting	Thread M18x1.5 mm	Thread 3/4"-16UNF
Analog voltage	BTL7-A504-M_-_-_-TB-S32	BTL7-A504-M_-_-_-TZ-S32
Analog current	BTL7-E504-M_-_-_-TB-S32	BTL7-E504-M_-_-_-TZ-S32
Double redundant	-TB2-	-TZ2-
Triple redundant	-TB3-	-TZ3-
Max. measuring length	7620 mm	7620 mm
Resolution max.	1 µm	1 µm
Repeat accuracy	±5 µm	±5 µm
Sampling rate max.	500 Hz	500 Hz
Supply voltage	10...30 V DC	10...30 V DC
Shock load	100 g	100 g
Vibration	12 g	12 g
Operating temperature	-40...+85 °C	-40...+85 °C
Pressure rating	600 bar	600 bar
Housing material	Aluminum, stainless steel	Aluminum, stainless steel
Degree of protection as per IEC 60529	IP67	IP67

-M_ _ _ - stands for measuring length in millimeters. Example: 500 mm measuring length = -M0500-

Quick-Change System



Series	BTL7-_-_-BM	BTL7-_-_-ZM
Mounting	Thread M18x1.5 mm	Thread 3/4"-16UNF
Analog voltage	BTL7-A501-M_-_-_-BM-S32	BTL7-A501-M_-_-_-ZM-S32
Analog current	BTL7-E501-M_-_-_-BM-S32	BTL7-E501-M_-_-_-ZM-S32
Start/Stop	BTL7-P511-M_-_-_-BM-S32	BTL7-P511-M_-_-_-ZM-S32
SSI	BTL7-S510-M_-_-_-BM-S32	BTL7-S510-M_-_-_-ZM-S32
Max. measuring length	7620 mm	7620 mm
Resolution max.	1 µm	1 µm
Repeat accuracy	±5 µm	±5 µm
Sampling rate max.	4000 Hz	4000 Hz
Supply voltage	10...30 V DC	10...30 V DC
Shock load	150 g	150 g
Vibration	20 g	20 g
Operating temperature	-40...+85 °C	-40...+85 °C
Pressure rating	600 bar	600 bar
Housing material	Aluminum, stainless steel	Aluminum, stainless steel
Degree of protection as per IEC 60529	IP67	IP67

-M_ _ _ - stands for measuring length in millimeters. Example: 500 mm measuring length = -M0500-

Micropulse Transducers

Product overview

High degree of protection



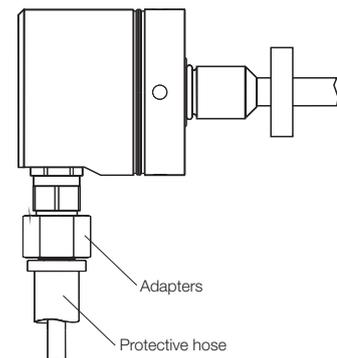
Series	BTL7-__-__-HB	BTL7-__-__-WB
Mounting	18h6 with 6 Allen screws	Thread 3/4"-16UNF
Analog voltage	BTL7-A510-M____-HB-FA05	BTL7-A510-M____-WB-FA05
Analog current	BTL7-E500-M____-HB-FA05	BTL7-E500-M____-WB-FA05
Start/Stop		
SSI		
Max. measuring length	7620 mm	7620 mm
Resolution max.	1 µm	1 µm
Repeat accuracy	±10 µm	±10 µm
Sampling rate max.	4000 Hz	4000 Hz
Supply voltage	10...30 V DC	10...30 V DC
Shock load	100 g	100 g
Vibration	12 g	12 g
Operating temperature	-40...+85 °C	-40...+85 °C
Pressure rating	600 bar	600 bar
Housing material	Stainless steel	Stainless steel
Degree of protection as per IEC 60529	IP68, IP69K*	IP68, IP69K*

* The cable protection system must be used for IP69K

-M____- stands for measuring length in millimeters. Example: 500 mm measuring length = -M0500-

Accessories for the cable protection system

Series	Adapters
	BAM01JY
Housing material	Stainless steel V2A (conditionally saltwater-resistant)
Series	Protective hose
	BAM PT-XA-001-095-0-____
Tube length	2, 5, 10, 15, 20, 30, 50 and 100 m
Degree of protection	IP68 (40 bar) IP69K (when mounted and threaded-in)
Housing material	PUR (resistant to saltwater, weld splatter and UV rays)
Outside diameter	16 mm
Inside diameter	9.5 mm
Temperature range	-40...+95 °C
Bending radius min. (static)	51 mm





BTL5-__-HB

Thread M18x1.5 mm

BTL5-__-WB

Thread 3/4"-16UNF

BTL5-P1-M__-HB-FA05-C

BTL5-S102-M__-HB-FA05-C

4000 mm

5 µm

≤ 10 µm

1500 Hz

20...28 V DC

100 g

12 g

-40...+85 °C

600 bar

Stainless steel

IP68, IP69K*

BTL5-P1-M__-WB-FA05-C

BTL5-S102-M__-WB-FA05-C

4000 mm

5 µm

≤ 10 µm

1500 Hz

20...28 V DC

100 g

12 g

-40...+85 °C

600 bar

Stainless steel

IP68, IP69K*

High pressure



Series

BTL7-__-CD

Analog voltage

BTL7-A501-M__-CD-S32

Analog current

BTL7-E501-M__-CD-S32

SSI

BTL7-S510-M__-CD-S32

Max. measuring length

2000 mm

Resolution max.

1 µm

Repeat accuracy

±5 µm

Sampling rate max.

4000 Hz

Supply voltage

10...30 V DC

Shock load

150 g

Vibration

20 g

Operating temperature

-40...+85 °C

Pressure rating

1000 bar

Pressure peaks

1350 bar

Housing material

Aluminum, stainless steel

Degree of protection as per IEC 60529

IP67, IP68 cable version

-M__- stands for measuring length in millimeters.

Example: 500 mm measuring length = -M0500-

Also for Ex area zone 2; non-incendive "nA" available.

The product description for the EX version is BTL7-__-CD-NEX-__



Additional transducers can be found in our complete catalog:

Linear Position Sensing and Measurement

The right measuring principle for the optimal result.

BALLUFF

sensors worldwide



Systems and Service



Industrial Networking and Connectivity



Industrial Identification



Object Detection



Linear Position Sensing and Measurement



Condition Monitoring and Fluid Sensors



Accessories

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