

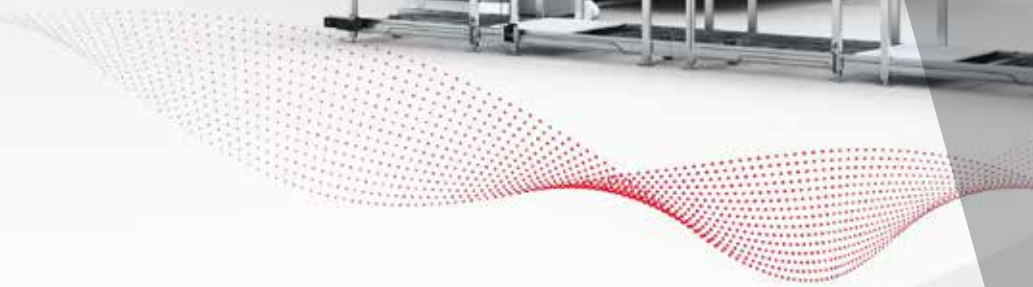
BALLUFF

Condition
Monitoring

CONTINUOUSLY MONITOR THE CONDITION OF MACHINERY



B *innovating automation*

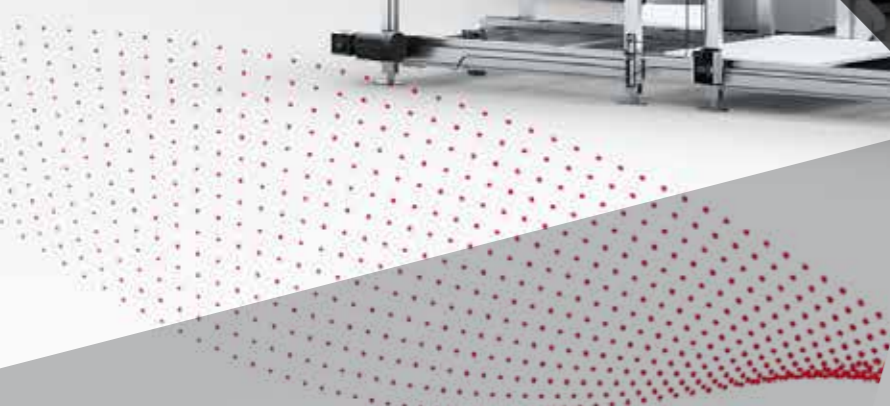


Balluff in condition monitoring

WE ARE AT HOME IN MANY SECTORS



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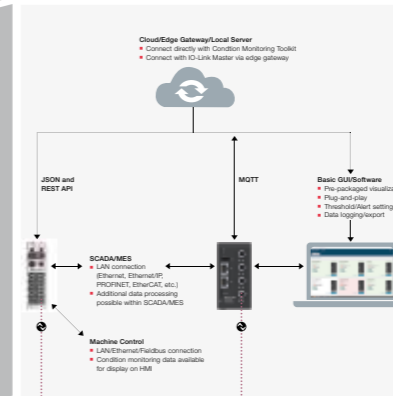


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Continuously monitor the condition of machines, plants and processes

CONDITION MONITORING

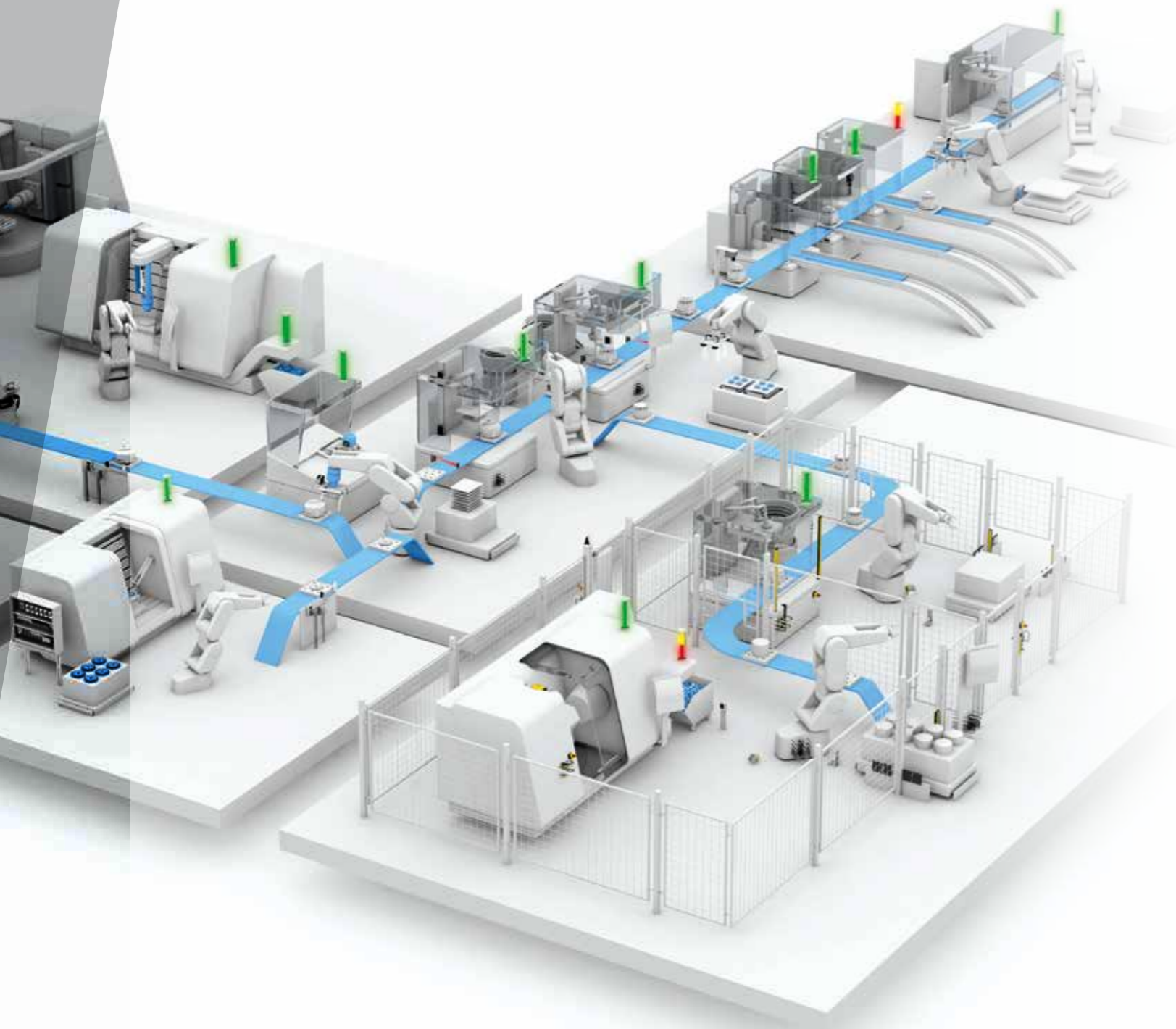
B innovating automation

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. When processed, this data provides information for the upkeep of machines and thus enables preventative and predictive maintenance. These condition monitoring systems allow changes, such as wear on individual components, to be detected more quickly and machine maintenance to be better coordinated.

Balluff has a deep experience and a broad portfolio in traditional sensing such as inductive, capacitive, photoelectric, magnetic and position sensors, but also in networking, RFID, vision and condition monitoring. We also look forward and provide innovative solutions for today's trends, including IIoT and Smart Manufacturing. This is how we support you: with a broad range of sensing and automation solutions for automated production systems.



Condition monitoring of the entire plant













Whether it is conveyor belts, industrial robots, hydraulic units, motors, pumps or air systems, the failure of individual components in complex plants can lead to a stop of the entire facility. At each component, various indicators can be used to monitor the condition.

Vibration monitoring, for example, is important for rotating machines, systems and individual parts because vibrations are a typical sign of increasing wear, which ultimately leads to damage and thus failure.

Temperature also acts as an important indicator to check the proper machine function. Sensors can be placed to measure the contact temperature on important components such as spindles, bearings or motors, but also temperatures of fluids.

Other indicators can also be monitored, depending on the equipment and potential failure modes. The indicator information gathered by these sensors must be communicated to control systems, supervisory systems or the cloud. And visualization makes monitoring and troubleshooting simpler.

The goal is to increase reliability in the automation and digitalization of your production, and 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 | BALLUFF PRODUCTS |
|--|---|--|--|
|  Vibrations, oscillations and accelerations | Motor, bearing, conveyor, pump, fan, spindle, compressor, gearbox, robot, machine tool, press | Condition monitoring sensors | BCM... |
| | | Smart automation and monitoring system sensors | BES..., BOS..., BDG..., BVS..., BIS M..., BIS U..., BIC..., BNI... (SAMS versions) |
|  Temperature | Motor, bearing, conveyor, pump, fan, spindle, compressor, gearbox, machine tool, electronics cabinet, oven, furnace | Temperature sensors | BFT... |
| | | Condition monitoring sensors | BCM... |
| | | Sensor internal measurement | Smart automation and monitoring system sensors BES..., BOS..., BDG..., BTL..., BVS..., BIS M..., BIS U..., BIC..., BNI... (SAMS versions) |
|  Pressure | Lubricant, coolant or hydraulic fluid reservoir or line, pump, valve | Pressure sensors | BSP... |
| | Cabinet, container or vessel ambient air pressure | Condition monitoring sensors | BCM... |
| | | Smart automation and monitoring system sensors | BES..., BOS..., BDG..., BIS U... (SAMS versions) |
|  Flow rate | Coolant, lubricant, hydraulic fluid or pneumatic line, pump, valve | Flow sensors | BFF... |
|  Humidity | Electronics cabinet, packaging machine, dryer | Condition monitoring sensors | BCM... |
| | Sensor internal measurement | Smart automation and monitoring system sensors | BES..., BOS..., BDG..., BTL..., BVS..., BIS U... (SAMS versions) |
|  Voltage and current | Sensor internal measurement | Smart automation and monitoring system sensors | BES..., BOS..., BDG..., BVS..., BIS M..., BIS U..., BNI... (SAMS versions) |
| | | Power supplies | BAE... |
|  Speed | Motor, conveyor, pump, fan, spindle | Encoders | BES... |
| | | Inductive sensors | BCS..., BAE... |
|  Level | Lubricant, coolant or hydraulic fluid reservoir, leak detection, pump, valve | Capacitive sensors | BDG... |
| | | Ultrasonic sensors | BUS... |
| | | Magnetostrictive sensors | BTL... |
|  Displacement and distance | Machine tool, press, robot, conveyor | Inductive sensors | BES... |
| | | Ultrasonic sensors | BUS... |
| | | Magnetostrictive sensors | BTL... |
|  Inclination | Conveyor, press, machine tool | Smart automation and monitoring system sensors | BES..., BOS..., BDG..., BVS..., BIS M..., BIS U... (SAMS versions) |
| | | Inclination sensors | BSI... |

Condition monitoring solutions

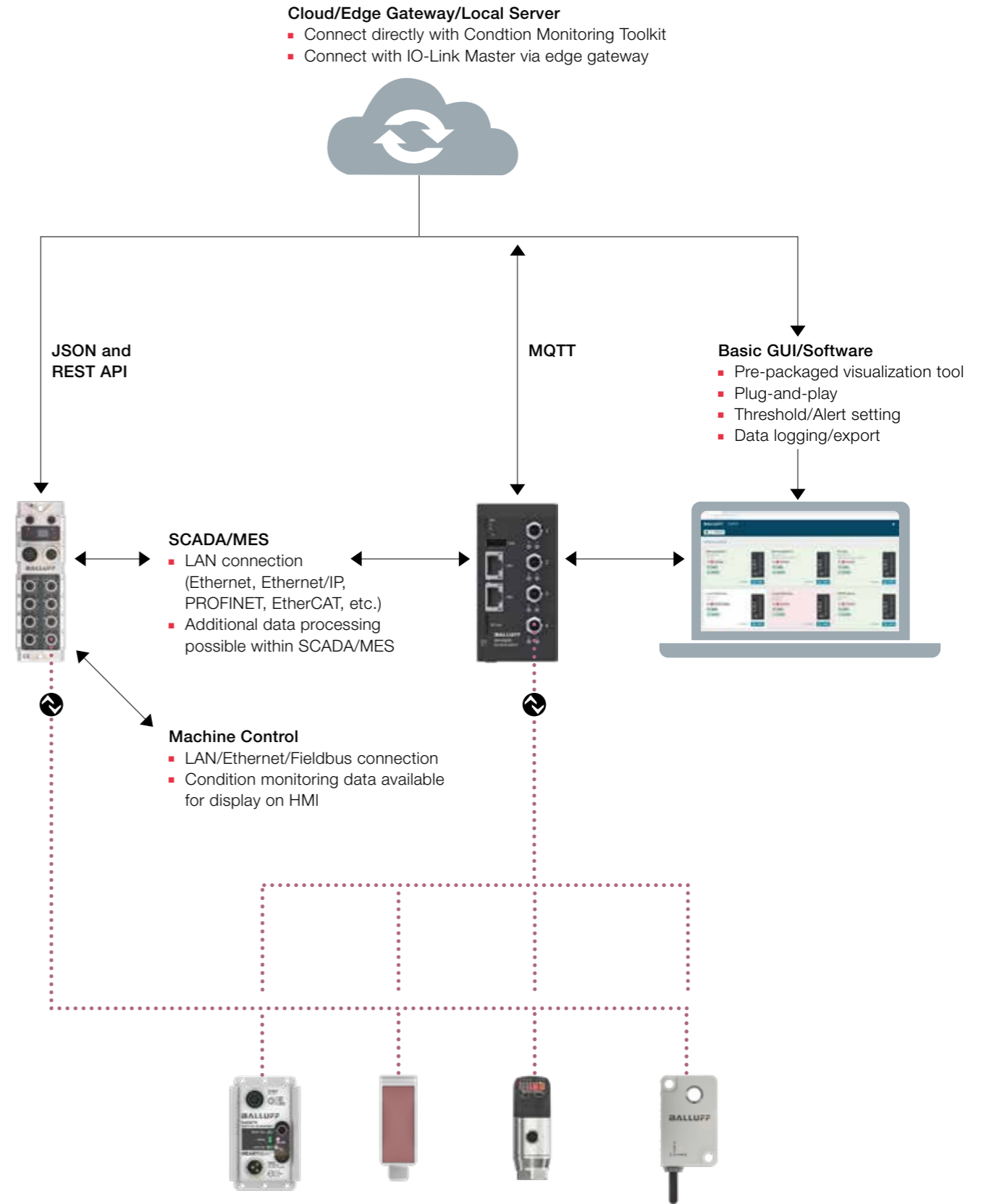
HOW DOES IT WORK?



Optimizing production or production processes in your company can be achieved by implementing sensors in your machines, plants and systems. The goal of condition monitoring is to enable you to successfully conduct predictive and preventive maintenance of your machines and systems. By using condition monitoring systems, you can optimize maintenance, which not only leads to process improvement, but also to reduced costs and more safety for your employees. Furthermore, breakdowns can be anticipated to avoid or minimize additional costs due to delays in production. Beyond these possibilities, an extensive information and data pool offers the opportunity to implement new business and pricing models for machines and plants.

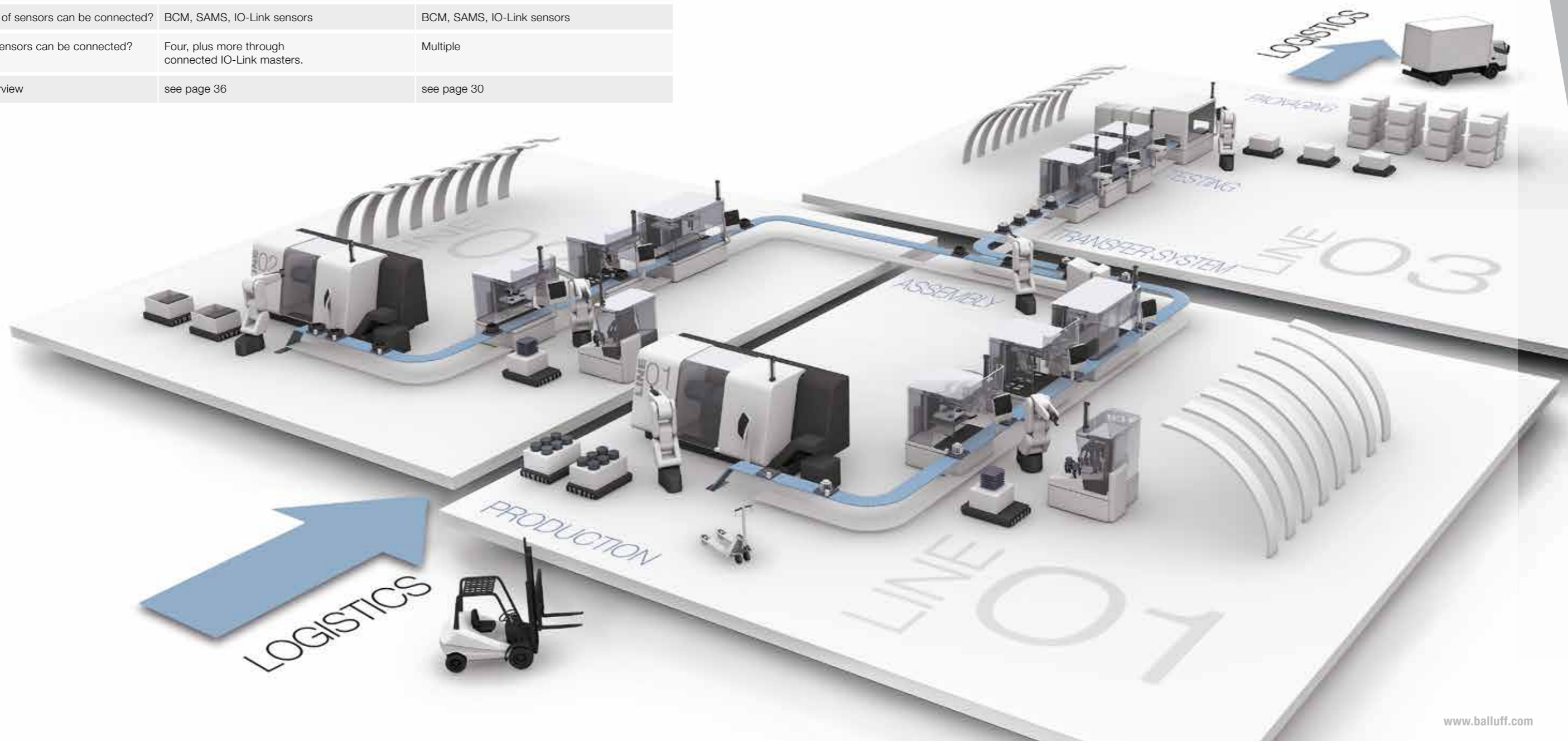
Technology and product components for condition monitoring systems

Balluff's wide range of sensors and gateways enables you to gather machine condition data the way which best fits your application. The Balluff Condition Monitoring solutions utilize the IO-Link communication standard as an important basis for reliable systems. IO-Link condition monitoring sensors provide control-relevant data, condition data such as vibration and temperature, and service data such as operating hours, functional reserve and other machine critical data. The sensor data is communicated over IO-Link through your choice of various Balluff gateways to controls, supervisory systems and/or cloud in the way that fits best your needs and application.



Selecting a solution

| | CONDITION MONITORING TOOLKIT | IO-LINK MASTER |
|---|--|---|
| What should be monitored? | Plant, machine or manufacturing process. | Machine, manufacturing process or plant. |
| Where does the data storage take place and where is the information needed? | On-device directly on the CMTK or on-premise in a customer database in the company network. | In the PLC and/or on-premise in a customer database in the company network. |
| Which analysis functions are available? | Setting limit values is possible. The data is available for further processing by the customer. Individual solutions can be used directly on the system. | Analysis is done by user |
| How is the data sent? | Via LAN, data can be send via MQTT to a database or customer cloud. | Via IO-Link through the master to the network/ LAN. Transport data to the IT level using JSON and REST API. |
| How do I get the information about warnings? | Dashboard, E-Mails, alarms from sensors can be sent via MQTT. | Dashboard/visualization software (user created) |
| What is the data rate? | Data acquisition up to every 50 ms. | Data acquisition up to every 3 ms. |
| Which values can be monitored? | All that can be detected with IO-Link sensors. | All that can be detected with IO-Link sensors. |
| How is the data displayed? | Software/dashboards included with toolkit. | User must build their own screens (demo software shows capabilities). |
| Which types of sensors can be connected? | BCM, SAMS, IO-Link sensors | BCM, SAMS, IO-Link sensors |
| How many sensors can be connected? | Four, plus more through connected IO-Link masters. | Multiple |
| Product overview | see page 36 | see page 30 |



Example applications for the

CONDITION MONITORING SOLUTIONS

With a broad and systemically comprehensive product range, Balluff offers suitable solutions for the efficient gathering, communication and analysis of your machine condition data: From the sensor, which provides additional data for efficient condition monitoring via IO-Link, to standard systems with extensive communication and visualization options, to the customized overall solution. From evaluation to concept and implementation. Choose the right path for you. We will travel it with you.

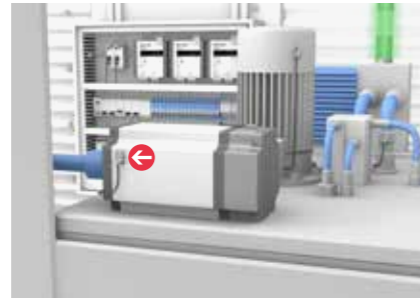


MONITOR THE CONDITION OF THE SYSTEM
BAV Condition monitoring toolkit

If a manufacturing system is at a standstill, products cannot be produced or moved. Balluff's Condition Monitoring Toolkit (CMTK) and condition monitoring sensor (BCM) are the ideal solutions to avoid such delays and associated costs. You get a deep insight into the actual condition of your machines and systems, which allows you to identify deviations and problems at an early stage and intervene before failure occurs. Physical variables such as vibration or temperature are collected and passed on to a higher-level system via IO-Link. If individually defined limit values are reached in advance, alarms are triggered. The sensors also monitor their own status. All this helps you to avoid unplanned, cost-intensive downtimes and manual inspections.

Features

- Easy to add-on solution for machine and process monitoring
- IIoT-capable through standardized interfaces such as MQTT
- Plug-and-play commissioning of the CMTK and visualization of the data
- Multiple measurements in one sensor: vibration, temperature, humidity and ambient pressure
- Integrated sensor evaluation electronics with configurable data pre-processing



FLEXIBLY MONITOR PROCESSES IN A LIMITED SPACE
BCM condition monitoring sensors

Unplanned downtimes and malfunctions in the production process are annoying and cost-intensive. With our multi-functional condition monitoring sensor, we support the efficient and trouble-free operation of your plant and increase the overall equipment effectiveness (OEE). The sensor provides you with condition data that you can use to automate inspections. It detects various physical variables such as vibration, temperature, humidity and ambient pressure, processes them and transmits the data to a higher-level system via IO-Link. It can also detect and communicate its own status.

Features

- Multiple measured variables in one device
- Integrated evaluation electronics with configurable data preprocessing
- Events and status displays configurable
- Quick to connect and easy to integrate via IO-Link
- Compact design for confined spaces



EASILY ADD CONDITION MONITORING TO EXISTING SYSTEMS
BAV Condition monitoring toolkit

Motors, pumps, fans and other moving parts are critical to manufacturing operations. If just one component fails, the entire process can come to a standstill, therefore monitoring the condition of key failure indicators such as vibration or temperature is critical. The challenge is to add condition monitoring capability to existing controls architecture without reconfiguring and reprogramming existing control systems.

This problem is solved by Balluff's Condition Monitoring Toolkit (CMTK), which can digitally and efficiently monitor motors, pumps, fans and machine tools. The CMTK can be easily added on and retrofitted to existing machinery without the need to change or reprogram the existing control system. A wide variety of condition monitoring and standard IO-Link sensors can be connected to gather the required machine condition data and built-in software allows automated visualization and analysis.

Features

- Connect up to four IO-Link sensors
- Additional ports/expansion through connection of additional IO-Link Masters
- Two LAN ports for data transmission to supervisory systems
- Easy setting of thresholds and alarms for equipment based on established vibration monitoring standards



ADD CONDITION MONITORING CAPABILITY TO STANDARD DEVICES
SAMS Smart automation and monitoring system sensors

With the Smart Automation and Monitoring System (SAMS), Balluff provides you with added value by enhancing our basic products with additional functions and measurement values, thus providing a system that not only fulfills its primary functions, but goes far beyond them and enables machine, process and plant monitoring.

To make it easier to work with the various functions and to align them across products, we have standardized our features as we developed SAMS. For example, vibration in inductive sensors and in the Digital Position Indicator is always found on the same indexes.

The Smart Features of the sensors unlock a variety of new possibilities for the automation of your machines and plants.

Features

- Wide range of sensor types available including photoelectric, inductive, digital position and RFID
- Networking/communications devices including masters, hubs and inductive couplers
- IO-Link for quick & simple setup and easy data transmission



DETECT SENSOR INCLINATION DEVIATION
SAMS Smart automation and monitoring system sensors

A misaligned sensor can cause machine stoppages, failures and product quality issues. Sensors are sometimes tilted incorrectly during installation or knocked out of position during service, cleaning or production.

Balluff's Smart automation and monitoring system sensors can detect their own inclination values and help you avoid a stoppage during start up and production.

Features

- Built-in inclination sensor available as additional capability on selected optical, inductive, position and RFID sensors
- IO-Link interface for easy communication of the data to control and condition monitoring systems



MONITOR DEVICE STATUS AND USAGE
SAMS Smart automation and monitoring system sensors

Balluff's smart automation and monitoring system components support condition monitoring and enable application-specific setups. The sensors in the family can provide data on a sensor's internal temperature, over-voltage/under-voltage detection, boot cycles and total operating hours. Remote monitoring of the operating conditions provides users with an early warning of potential problems.

Features

- Variety of sensor types: inductive, photoelectric, digital position, linear position
- Other devices include Masters, hubs, inductive couplers and RFID systems
- Process data and diagnostics via IO-Link
- Condition monitoring data including vibration, temperature and ambient humidity
- Device status/usage data including boot cycles, total operating hours, voltage/current and extreme environment status



MONITOR TEMPERATURE AND HUMIDITY IN CONTROL CABINET
BCM Condition monitoring sensors

Moisture, humidity and high temperatures inside an electrical controls cabinet can destroy sensitive components and terminations. For example, significant damage can occur if a cabinet is left open or if the cabinet is sprayed inside during a washdown process.

Balluff's BCM condition monitoring sensors report temperature and vibration, and include an option to report relative humidity and ambient pressure, making them ideal for checking conditions inside the control cabinet.

Features

- Real-time monitoring and continuous data reporting via IO-Link
- Monitor temperature, vibration, humidity and ambient pressure
- IP67 for harsh environments



DETECT EXCESSIVE EQUIPMENT VIBRATION
BCM Condition monitoring sensors

Vibration can provide important information on the condition of motors, pumps, fans, conveyors and gearboxes. Through monitoring and evaluation, excessive vibration, imbalance and wear can be detected at an early stage.

Balluff's BCM condition monitoring sensors provide you with vibration data for automating cost-intensive manual inspections and alarm notification. This condition data is also an essential component for implementing smart and flexible manufacturing – a key to IIoT.

Features

- IO-Link protocol means you can easily parameterize the sensor and match the processing in the sensor to your specific application
- Use automated monitoring of measurement or processing variables to define limit values for pre- or main alarms
- Sensor self-monitors internal temperature, number of operating hours, and start cycles



MONITOR PRESSURE IN THE DRIVE SYSTEM
BSP Pressure sensors

With Balluff's BSP pressure sensors you monitor the pressure in the entire drive system. And benefit from easy handling and high accuracy. The large display and simple operating concept per VDMA means it is simple and quick to configure. At the same time the current system pressure is shown on the bright LED display. Since the display and electrical output can be turned into a position independent of the flange, Balluff pressure sensors can be installed flexibly while saving space.

Features

- Binary switching outputs or analog output signals
- With IO-Link for thorough diagnostics
- Available up to $-40\text{ }^{\circ}\text{C}$ for handling demanding environments



DETECT LUBRICATION FLUID LEVELS IN TANKS
BCS Capacitive sensors

In machines and hydraulic systems, fluid, coolant and lubricants must always be available in sufficient quantity and reserve. Balluff's BCS capacitive sensors are the ideal limit sensors for these media. Whether in direct contact or with no contact, they provide exact results and detect the minimum and maximum levels through the media container wall or with the use of adapters. They compensate for moisture, foam, and deposits of any kind, even through glass and plastic walls up to 10 mm thick. This enables them to reliably monitor the levels of coolants and lubricants.

Features

- Both media and non-media contact sensors available
- Solutions for maximum, minimum or continuous level monitoring
- Smart Level technology allows sensors to compensate for moisture, foam, and adhesion of any kind
- Easy adjustment and setup
- IO-Link versions available



MEASURE AND MONITOR FLOW TO MINIMIZE UNPLANNED DOWNTIME
BFF flow sensors

Flow sensors let you measure and monitor the flow of process media, such as lubricant or cooling water, in a wide range of applications. Set the limit, and the sensor switches when the fluid flow falls below a user-defined rate and alerts you that the flow has slowed or stopped. You can respond quickly and prevent an unplanned machine downtime or even system stop, contributing to process security. Their rugged housing makes Balluff flow controllers ideal for harsh industrial environments. With our models for thread-in or direct inline installation, you can handle a variety of requirements in many different areas of applications. Applications include machine tools, such as on pumps and compressors and hydraulic systems.

Features

- Directly detect liquid media
- No moving parts, making them resistant to soiling
- Threaded or in-line versions, depending on the flow amount and tube diameter
- Simple to integrate, rugged M12 connector
- Visualize flow with LED line or display



POWER SUPPLIES WITH BUILT-IN CONDITION MONITORING
BAE Heartbeat® – IO-Link power supplies

Power supplies are an essential component for reliable operation of machines and equipment. Balluff's Heartbeat® power supplies assist you with continuous monitoring and display of load and stress conditions (stress level). Their Lifetime display also provides information about the remaining life expectancy. The IO-Link interfaces allow all the essential parameters to be read. These can be then processed in the higher level diagnostics system. Heartbeat® power supplies thereby provide users with reliable and efficient supply voltage. And the best possible assistance in the layout and operation of machines and equipment.

Features

- Local diagnostics with Heartbeat® via IO-Link
- Outstanding efficiency
- Extra narrow and space-saving
- IP20 and IP67

Selection a solution

PRODUCTS WITH CONDITION MONITORING FEATURES

 innovating automation



At the basic level, implementing condition monitoring and predictive maintenance requires data about the status of the machine and components. Balluff smart sensors gather this data and our gateway devices communicate it to the places you need it: the control system, the supervisory system and/or the cloud.

The Balluff Condition Monitoring and Smart Automation and Monitoring System (SAMS) sensors can monitor and measure internal temperature, internal humidity, inclination, vibration, signal quality, operating hours counters and time functions. And IO-Link Masters and the Condition Monitoring Toolkit move this data to higher levels of the controls architecture. Balluff's wide range of products allows you to create a condition monitoring solution to fit your unique needs.

Your Balluff solutions

- Inductive sensors
- Photoelectric sensors
- Pressure sensors
- Temperature sensors
- Flow sensors
- Condition monitoring sensors
- Digital position indicators
- RFID systems
- Networking devices
- Inductive couplers
- Optical identification
- Power supplies
- Condition monitoring toolkit

SENSORS WITH CONDITION MONITORING FEATURES

CONDITION MONITORING SENSORS WITH MULTI-FUNCTION



| | BCM0002 | BCM0001 |
|--------------------------------|--|--|
| Function modules | <ul style="list-style-type: none"> Vibration (velocity/acceleration) Contact temperature Relative humidity Ambient pressure Sensor self-awareness | <ul style="list-style-type: none"> Vibration (velocity/acceleration) Contact temperature Sensor self-awareness |
| Vibration, frequency range | 2...3200 Hz | 2...3200 Hz |
| Vibration, measuring principle | MEMS | MEMS |
| Measuring range | Vibration, velocity RMS | 0...220 mm/s at 79.4 Hz (3 measuring axes) |
| | Vibration, acceleration RMS | 0...16 g |
| | Contact temperature | 0...70 °C |
| | Relative humidity | 5...95 %RH |
| | Ambient pressure | 300...1100 hPa |
| Interface | IO-Link 1.1, COM3 (230.4 kBaud) | IO-Link 1.1, COM3 (230.4 kBaud) |
| Interface setting options | <ul style="list-style-type: none"> Flexible process data configuration Vibration measurement based on ISO 10816-3 Data preprocessing (e.g. RMS, peak to peak, mean, standard deviation, min, max) Events (pre-alarms and main alarms) Delay times for alarms Search function with LED display (device discovery) | <ul style="list-style-type: none"> Flexible process data configuration Vibration measurement based on ISO 10816-3 Data preprocessing (e.g. RMS, peak to peak, mean, standard deviation, min, max) Events (pre-alarms and main alarms) Delay times for alarms Search function with LED display (device discovery) |
| IP rating | IP67 | IP67, IP68, IP69K |
| Housing material | Stainless steel 1.4404 | Stainless steel 1.4404 |
| Dimensions | 32 × 20 × 10 mm | 32 × 20 × 10 mm |
| Connection | 1.5 m PUR cable with M12 male, 3-pole | 1.5 m PUR cable with M12 male, 3-pole |

LINEAR POSITION SENSORS WITH CONDITION MONITORING FEATURES



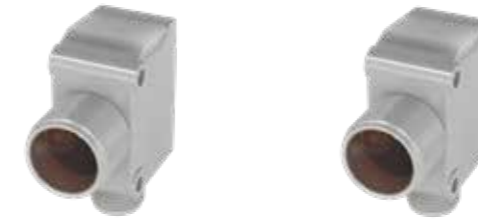
| | BTL PF_400-___ | BTL PA_400-___ | BTL_NC_00-___ |
|--------------------------------------|--|--|--|
| Housing geometry | Flat profile PF: 35 × 20.8 mm | Round profile PA: Ø 30 mm | Round electronic head, rod-style |
| Measuring length | 25...4000 mm | 25...4000 mm | 25...4000 mm |
| Resolution | 5 µm | 5 µm | 5 µm |
| Repeat accuracy | ≤ ±10 µm | ≤ ±10 µm | ≤ ±10 µm |
| Analog output | 0...10 V, 10...0 V, 4...20 mA, 20...4 mA, 0...20 mA, 20...0 mA | 0...10 V, 10...0 V, 4...20 mA, 20...4 mA, 0...20 mA, 20...0 mA | 0...10 V, 10...0 V, 4...20 mA, 20...4 mA |
| Interface | IO-Link: V1.1 | IO-Link: V1.1 | IO-Link: V1.1 |
| Transmission rate | COM2 (38.4 kBaud), COM3 (230.4 kBaud) | COM2 (38.4 kBaud), COM3 (230.4 kBaud) | COM2 (38.4 kBaud), COM3 (230.4 kBaud) |
| Length-dependent measuring frequency | Measuring length ≤ 1270 mm...1000 Hz > 1270 to ≤ 2650 mm...500 Hz > 2650 mm...250 Hz | Measuring length ≤ 1270 mm...1000 Hz > 1270 to ≤ 2650 mm...500 Hz > 2650 mm...250 Hz | Measuring length ≤ 1270 mm...1000 Hz > 1270 to ≤ 2650 mm...500 Hz > 2650 mm...250 Hz |
| Connection | Connector, M12x1-Male, 4-pin | Connector, M12x1-Male, 4-pin | Connector, M12x1-Male, 4-pin |
| IP rating | IP67 | IP67 | IP67, IP69K with connector |
| Housing material | Aluminum | Aluminum | Stainless steel |
| Cover material | Zinc die cast, galvanized | Zinc die cast, galvanized | |
| Operating voltage U _B | 18...30 V DC | 18...30 V DC | 18...30 V DC |
| Approval/conformity | CE, EAC, UKCA | CE, EAC, UKCA | CE, cULus, EAC, UKCA |
| Condition monitoring features | Internal temperature monitoring, internal humidity | | |
| Multi-functions | Extreme environment status, LED diagnostics, operating hours counter, boot cycle counter, device discovery, delay timer function, logic blocks, basic statistics | | |

PHOTOELECTRIC
SENSORS WITH CONDITION
MONITORING
FEATURES



| | BOS0285 | BOS0286 | BOS0288 | BOS0289 |
|----------------------------------|--|--------------------------------|--------------------------------|--------------------------------|
| Series | R254K | R254K | R254K | R254K |
| Principle of optical operation | Diffuse sensor, triangulation | Retroreflective sensor | Through-beam sensor, receiver | Through-beam sensor, emitter |
| Dimension | 20.4 x 60.3 x 49.5 mm | 20.4 x 60.3 x 49.5 mm | 20.4 x 60.3 x 49.5 mm | 20.4 x 60.3 x 49.5 mm |
| Switching output Pin 4 | Push-pull | Push-pull | Push-pull | Push-pull |
| Switching output Pin 2 | PNP/NPN/push-pull programmable | PNP/NPN/push-pull programmable | PNP/NPN/push-pull programmable | PNP/NPN/push-pull programmable |
| Switching function | NO/NC programmable | NO/NC programmable | NO/NC programmable | NO/NC programmable |
| Analog output | Analog, current 4...20 mA | Analog, current 4...20 mA | Analog, current 4...20 mA | Analog, current 4...20 mA |
| Interface | IO-Link 1.1 | IO-Link 1.1 | IO-Link 1.1 | IO-Link 1.1 |
| Time function | Single pulse, on/off delay | Single pulse, on/off delay | Single pulse, on/off delay | Single pulse, on/off delay |
| Beam characteristic | Focus, typical at 400 mm | Divergent | | Divergent |
| Light type | Laser red light | LED red light | LED red light | LED red light |
| Range | 30...250 mm | 8 m | 0...20 m | 0...20 m |
| Connection | Connector, M12x1-Male, 4-pin | Connector, M12x1-Male, 4-pin | Connector, M12x1-Male, 4-pin | Connector, M12x1-Male, 4-pin |
| IP rating | IP67, IP69K | IP67, IP69K | IP67, IP69K | IP67, IP69K |
| Housing material | PA 12, PA PACM 12 | PA 12, PA PACM 12 | PA 12, PA PACM 12 | PA 12, PA PACM 12 |
| Material sensing surface | PA PACM 12 | PA PACM 12 | PA PACM 12 | PA PACM 12 |
| Operating voltage U _B | 10...30 V DC | 10...30 V DC | 10...30 V DC | 10...30 V DC |
| Approval/conformity | CE, cULus, EAC, Ecolab | CE, cULus, EAC, Ecolab | CE, cULus, EAC, Ecolab | CE, cULus, EAC, Ecolab |
| Condition monitoring features | Vibration detection, inclination detection, internal temperature monitoring, internal humidity | | | |
| Multi-functions | Voltage and current monitoring, signal quality check, extreme environment status, LED diagnostics, operating hours counter, boot cycle counter, device discovery, Pin 2 for output of internal digital signals, switching counters, delay timer function, logic blocks, basic statistics | | | |

PHOTOELECTRIC
SENSORS WITH CONDITION
MONITORING
FEATURES



| | BOS0283 | BOS0284 |
|----------------------------------|--|--------------------------------|
| Series | R080K | R080K |
| Principle of optical operation | Through-beam sensor, emitter | Through-beam sensor, receiver |
| Dimension | 19 x 44.2 x 37.5 mm | 19 x 44.2 x 37.5 mm |
| Switching output Pin 4 | Push-pull | Push-pull |
| Switching output Pin 2 | PNP/NPN/push-pull programmable | PNP/NPN/push-pull programmable |
| Switching function | NO/NC programmable | NO/NC programmable |
| Analog output | Analog, current 4...20 mA | Analog, current 4...20 mA |
| Interface | IO-Link 1.1 | IO-Link 1.1 |
| Time function | Single pulse, on/off delay | Single pulse, on/off delay |
| Beam characteristic | Divergent | - |
| Light type | LED Red light | LED Red light |
| Range | 0...20 m | 0...20 m |
| Connection | Connector, M12x1-Male, 4-pin | Connector, M12x1-Male, 4-pin |
| IP rating | IP67, IP69K | IP67, IP69K |
| Housing material | PA 12, PA PACM 12 | PA 12, PA PACM 12 |
| Material sensing surface | PA PACM 12 | PA PACM 12 |
| Operating voltage U _B | 10...30 VDC | 10...30 VDC |
| Approval/conformity | CE, cULus, UKCA, WEEE, Ecolab | CE, cULus, UKCA, WEEE, Ecolab |
| Condition monitoring features | Vibration detection, inclination detection, internal temperature monitoring, internal humidity | |
| Multi-functions | Voltage and current monitoring, signal quality check, extreme environment status, LED diagnostics, operating hours counter, boot cycle counter, device discovery, Pin 2 for output of internal digital signals, switching counters, delay timer function, logic blocks, basic statistics | |

INDUCTIVE SENSORS
WITH CONDITION MONITORING
FEATURES

| | BES05Y7 | BES05ZW | BES05WY | BES0601 |
|-------------------------------|--|--|--|--|
| Dimension | Ø 12 × 65 mm | Ø 12 × 65 mm | Ø 18 × 66 mm | Ø 18 × 66 mm |
| Size | M12 × 1 | M12 × 1 | M18 × 1 | M18 × 1 |
| Installation | quasi-flush | non-flush | quasi-flush | non-flush |
| Rated operating distance | 4 mm | 8 mm | 8 mm | 12 mm |
| Interface | IO-Link 1.1 | IO-Link 1.1 | IO-Link 1.1 | IO-Link 1.1 |
| Switching output | PNP/NPN/push-pull NO/NC, Push-pull NO/NC | PNP/NPN/push-pull NO/NC, Push-pull NO/NC | PNP/NPN/push-pull NO/NC, Push-pull NO/NC | PNP/NPN/push-pull NO/NC, Push-pull NO/NC |
| Switching frequency | 1000 Hz | 1000 Hz | 500 Hz | 700 Hz |
| Housing material | Stainless steel 1.4404 | Stainless steel 1.4404 | Stainless steel 1.4404 | Stainless steel 1.4404 |
| Material sensing surface | PBT | PBT | PBT | PBT |
| Connection | M12 male, 4-pin, A-coded | M12 male, 4-pin, A-coded | M12 male, 4-pin, A-coded | M12 male, 4-pin, A-coded |
| Operating voltage U_B | 10...30 V DC | 10...30 V DC | 10...30 V DC | 10...30 V DC |
| Ambient temperature | -40...85 °C | -40...85 °C | -40...85 °C | -40...85 °C |
| IP rating | IP68, IP69K | IP68, IP69K | IP68, IP69K | IP68, IP69K |
| Approval/conformity | CE, EAC, cULus, IO-Link, Ecolab | CE, EAC, cULus, IO-Link, Ecolab | CE, EAC, cULus, IO-Link, Ecolab | CE, EAC, cULus, IO-Link, Ecolab |
| Condition monitoring features | Vibration detection, inclination detection, internal temperature monitoring, internal humidity | | | |
| Multi-functions | Voltage and current monitoring, signal quality check, extreme environment status, LED diagnostics, operating hours counter, boot cycle counter, device discovery, Pin 2 for output of internal digital signals, switching counters, delay timer function, logic blocks, basic statistics | | | |

DIGITAL POSITION INDICATORS WITH
CONDITION MONITORING FEATURES

| | BDG0291 | BDG0292 |
|---|--|---------------------------------------|
| Type | With numerical display | Without numerical display |
| Resolution | 14000 increments/revolution | 14000 increments/revolution |
| Repeat accuracy | ±1 increment | ±1 increment |
| Absolute non-linearity | ±1° | ±1° |
| Rotation speed with external power supply | ≤ 600 rpm | ≤ 600 rpm |
| Connection | M12 male, 4 pin | M12 male, 4 pin |
| Output | Switching output PNP/NPN configurable | Switching output PNP/NPN configurable |
| Interface | IO-Link 1.1 | IO-Link 1.1 |
| Baud rate | COM3 (230.4 kBaud) | COM3 (230.4 kBaud) |
| Housing material | Vestamid, Trogamid, stainless steel | Vestamid, Trogamid, stainless steel |
| Dimensions | 60 × 106.3 × 74 mm | 60 × 106.3 × 74 mm |
| Ambient temperature | -20...+85 °C | -20...+85 °C |
| IP rating | IP68, IP69K | IP68, IP69K |
| Approval/conformity | CE | CE |
| Condition monitoring features | Vibration detection, inclination detection, internal temperature monitoring, internal humidity | |
| Multi-functions | Voltage and current monitoring, extreme environment status, LED diagnostics, operating hours counter, boot cycle counter, device discovery, Pin 2 for output of internal digital signals, switching counters, delay timer function, logic blocks, basic statistics | |

IDENTSENSOR WITH
CONDITION MONITORING
FEATURES



| | BVS0060 | BVS0061 |
|-------------------------------|--|---|
| Supported codes | Standard barcodes, standard 2D codes | Standard barcodes, standard 2D codes |
| Functionality | 1-click auto-setup, read optical codes, analyze, verify | 1-click auto-setup, read optical codes, analyze, verify |
| Working distance | 20...600 mm | 20...600 mm |
| Sensor resolution | 1280 × 960 Pixel | 1280 × 960 Pixel |
| Integrated lighting | White/red | White/infrared |
| Process data interface | IO-Link, TCP, UDP | IO-Link, TCP, UDP |
| IIoT interface and protocols | MQTT, REST API | MQTT, REST API |
| User interface | Sensor app as web client | Sensor app as web client |
| Dimension | 56 × 56 × 65.5 mm | 56 × 56 × 65.5 mm |
| IP rating | IP67 | IP67 |
| Condition monitoring features | Vibration detection, inclination detection, internal temperature monitoring, internal humidity | |
| Multi-functions | Voltage and current monitoring, signal quality check, extreme environment status, LED diagnostics, operating hours counter, boot cycle counter, device discovery, basic statistics | |

COMPONENTS WITH CONDITION MONITORING FEATURES

INDUSTRIAL RFID READ/WRITE HEADS WITH CONDITION MONITORING FEATURES



| | BIS01E5 | BIS01E6 | BIS01E7 | BIS01E2 |
|-------------------------------|--|--|--|--|
| Product group | HF 13.56 MHz | HF 13.56 MHz | HF 13.56 MHz | HF 13.56 MHz |
| Working frequency | 13.56 MHz | 13.56 MHz | 13.56 MHz | 13.56 MHz |
| Radio approval | Europe, Asia, Americas (special country-specific registrations upon request) | | | |
| Dimension | M12 × 65 mm | M18 × 65 mm | M30 × 65 mm | 50 × 25 × 10 mm |
| Antenna type | Round | Round | Round | Round |
| Polarization | – | – | – | – |
| Housing material | Stainless steel/PBT | Stainless steel/PBT | Stainless steel/PBT | ABS |
| Connection | Connector, M12x1-Male, 4-pin, A-coded | Connector, M12x1-Male, 4-pin, A-coded | Connector, M12x1-Male, 4-pin, A-coded | Connector, M12x1-Male, 4-pin, A-coded |
| Interface | IO-Link 1.1 | IO-Link 1.1 | IO-Link 1.1 | IO-Link 1.1 |
| Transfer rate | COM 3 (230.4 kBaud) | COM 3 (230.4 kBaud) | COM 3 (230.4 kBaud) | COM 3 (230.4 kBaud) |
| Process data IN/OUT | 10/10 bytes | 10/10 bytes | 10/10 bytes | 10/10 bytes |
| Output power adjustable | – | – | – | – |
| Operating voltage U_B | 18...30 VDC LPS Class 2 | 18...30 VDC LPS Class 2 | 18...30 VDC LPS Class 2 | 18...30 VDC LPS Class 2 |
| Ambient temperature | 0...+70 °C | 0...+70 °C | 0...+70 °C | 0...+70 °C |
| Storage temperature | –20...+85 °C | –20...+85 °C | –20...+85 °C | –20...+85 °C |
| IP rating | IP68, IP69K | IP68, IP69K | IP68, IP69K | IP68, IP69K |
| Approval/conformity | CE, UKCA, FCC Part 15, IC (Radio), WEEE, Ecolab, cULus | CE, UKCA, FCC Part 15, IC (Radio), WEEE, Ecolab, cULus | CE, UKCA, FCC Part 15, IC (Radio), WEEE, Ecolab, cULus | CE, UKCA, FCC Part 15, IC (Radio), WEEE, Ecolab, cULus |
| Supported standards | DIN ISO 15693, Balluff High Memory | DIN ISO 15693, Balluff High Memory | DIN ISO 15693, Balluff High Memory | DIN ISO 15693, Balluff High Memory |
| Condition monitoring features | Vibration detection, inclination detection, internal temperature monitoring | | | |
| Multi-functions | Voltage and current monitoring, signal quality check, extreme environment status, LED diagnostics, operating hours counter, boot cycle counter, device discovery, Pin 2 for output of internal digital signals, basic statistics | | | |

INDUSTRIAL RFID READ/WRITE HEADS WITH CONDITION MONITORING FEATURES



| | BIS01E4 | BIS01E8 | BIS01E9 |
|-------------------------------|--|--|---|
| Product group | UHF (860...960 MHz) | UHF (860...960 MHz) | UHF (860...960 MHz) |
| Working frequency | 865.6...867.6 MHz | 902...928 MHz | 920.5...924.5 MHz |
| Radio approval | Europe | USA | China |
| Dimension | M30 × 98 mm | M30 × 98 mm | M30 × 98 mm |
| Antenna type | Planar | Planar | Planar |
| Polarization | Circular | Circular | Circular |
| Housing material | Stainless steel/PBT | Stainless steel/PBT | Stainless steel/PBT |
| Connection | Connector, M12x1-Male, 4-pin, A-coded | Connector, M12x1-Male, 4-pin, A-coded | Connector, M12x1-Male, 4-pin, A-coded |
| Interface | IO-Link 1.1 | IO-Link 1.1 | IO-Link 1.1 |
| Transfer rate | COM 3 (230.4 kBaud) | COM 3 (230.4 kBaud) | COM 3 (230.4 kBaud) |
| Process data IN/OUT | 32/32 bytes | 32/32 bytes | 32/32 bytes |
| Output power adjustable | –9.25...+13.75 dBmERP | –7...+16 dBmEIRP | –9.25...+13.75 dBmERP |
| Operating voltage U_B | 18...30 VDC LPS Class 2 | 18...30 VDC LPS Class 2 | 18...30 VDC LPS Class 2 |
| Ambient temperature | 0...+70 °C | 0...+70 °C | 0...+70 °C |
| Storage temperature | –20...+85 °C | –20...+85 °C | –20...+85 °C |
| IP rating | IP68, IP69K | IP68, IP69K | IP68, IP69K |
| Approval/conformity | CE, UKCA, Ecolab, ETSI EN 302 208, cULus, WEEE | Ecolab, FCC Part 15, IC (Radio), cULus, WEEE | Ecolab, SRRC, cULus, WEEE |
| Supported standards | EPCglobal™ Class 1, Gen 2; ISO 18000-6C | EPCglobal™ Class 1, Gen 2; ISO 18000-6C | EPCglobal™ Class 1, Gen 2; ISO 18000-6C |
| Condition monitoring features | Vibration detection, inclination detection, internal temperature monitoring, internal humidity | | |
| Multi-functions | Voltage and current monitoring, signal quality check, extreme environment status, LED diagnostics, operating hours counter, boot cycle counter, device discovery, Pin 2 for output of internal digital signals, basic statistics | | |

NETWORKING HUBS WITH
CONDITION MONITORING
FEATURES

| | BNI00F6 | BNI00F7 | BNI00F9 | BNI00FA |
|-------------------------------------|--|--------------------------------|--------------------------------|--------------------------------|
| Interface | IO-Link 1.1 | IO-Link 1.1 | IO-Link 1.1 | IO-Link 1.1 |
| Operating voltage U_B | 18...30.2 V DC | 18...30.2 V DC | 18...30.2 V DC | 18...30.2 V DC |
| Connection (COM 1) | M12 male, 4-pin, A-coded | M12 male, 4-pin, A-coded | M12 male, 4-pin, A-coded | M12 male, 4-pin, A-coded |
| Connection (supply voltage IN) | | M12 male, 5-pin, L-coded | | |
| Connection slots | 8 × M12 female, 5-pin, A-coded | 8 × M12 female, 5-pin, A-coded | 8 × M12 female, 5-pin, A-coded | 8 × M12 female, 5-pin, A-coded |
| Digital inputs | 16 × PNP/NPN, Type 3/1 | 16 × PNP/NPN, Type 3/1 | 8 × PNP, Type 3/1 | |
| Digital outputs | 16 × PNP | 16 × PNP | 8 × PNP | |
| Configurable digital inputs/outputs | Yes | Yes | Yes | |
| Analog inputs | | | 4 × voltage/current | 8 × voltage/current |
| Single-channel monitoring | Yes | Yes | Yes | Yes |
| Extension port | Yes | Yes | | |
| Housing material | Plastic | Plastic | Plastic | Plastic |
| Dimension | 68 × 36.8 × 183.5 mm | 68 × 36.8 × 183.5 mm | 68 × 36.8 × 183.5 mm | 68 × 36.8 × 183.5 mm |
| Ambient temperature | -25...+70 °C | -25...+70 °C | -25...+70 °C | -25...+70 °C |
| IP rating | IP68, IP69K | IP68, IP69K | IP68, IP69K | IP68, IP69K |
| Transfer rate | COM3 (230.4 kBaud) | COM3 (230.4 kBaud) | COM3 (230.4 kBaud) | COM3 (230.4 kBaud) |
| Condition monitoring features | Vibration detection, internal temperature monitoring | | | |
| Multi-functions | Voltage and current monitoring, extreme environment status, LED diagnostics, operating hours counter, boot cycle counter, device discovery, switching counters, delay timer function | | | |

NETWORK MASTER WITH
CONDITION MONITORING
FEATURES

| | BNI00EK |
|---------------------------------|--|
| Interface | Profinet |
| Operating voltage U_B | 18...30.2 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 |
| Digital outputs | 16 × PNP |
| Configurable inputs/outputs | Yes |
| Max. output current per port | 4 A |
| Current sum sensor/actuator | 16 A/16 A |
| Housing material | PPS |
| Dimension | 68 × 36.8 × 226 mm |
| Ambient temperature | -25...70 °C |
| IP rating | IP68, IP69K |
| Auxiliary interfaces | 8 × IO-Link |
| IO-Link version | 1.1 |
| Port-class | Type A |
| Condition monitoring features | Internal temperature monitoring |
| Multi-functions | Voltage and current monitoring, signal quality check, LED diagnostics, operating hours counter, boot cycle counter, device discovery |

INDUCTIVE COUPLERS
COMPONENTS WITH
CONDITION MONITORING
FEATURES



| | BIC0084 | BIC0086 | BIC0085 | BIC0087 |
|-----------------------------------|--|------------------------------------|------------------------------------|------------------------------------|
| Function | Signal transmission bi-directional | Signal transmission bi-directional | Signal transmission bi-directional | Signal transmission bi-directional |
| Component | Base | Base | Remote | Remote |
| Interface transparent channel | IO-Link 1.1 | IO-Link 1.1 | IO-Link 1.1 | IO-Link 1.1 |
| Interface diagnostic channel | IO-Link 1.1 | IO-Link 1.1 | | |
| Connection | M12 male, 4-pin, A-coded | M12 male, 4-pin, A-coded | M12 female, 5-pin, A-coded | M12 female, 5-pin, A-coded |
| Rated operating voltage | 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| Output voltage | 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| Output current max. | | | 1.5 A | 1.5 A |
| Absolute output current max. | | | 2.2 A | 2.2 A |
| Transmission distance | 0...5 mm | 0...5 mm | 0...5 mm | 0...5 mm |
| Ambient temperature | -25...+85 °C | -25...+85 °C | -25...+85 °C | -25...+85 °C |
| Housing material | Stainless steel 1.4404 | Stainless steel 1.4404 | Stainless steel 1.4404 | Stainless steel 1.4404 |
| Material sensing surface | LCP | LCP | LCP | LCP |
| IP rating | IP67, IP68, IP69K | IP67 | IP67, IP68, IP69K | IP67 |
| Transfer rate transparent channel | COM2/COM3 | COM2/COM3 | COM2/COM3 | COM2/COM3 |
| Transfer rate diagnostic channel | COM2 | COM2 | | |
| Dimension | Ø 30 × 85 mm | Ø 30 × 85 mm | Ø 30 × 85 mm | Ø 30 × 85 mm |
| Approval/conformity | CE, UKCA, cULus WEEE | CE, UKCA, cULus WEEE | CE, UKCA, cULus WEEE | CE, UKCA, cULus WEEE |
| Condition monitoring features | Vibration detection, internal temperature monitoring | | | |
| Multi-functions | Extreme environment status, LED diagnostics, operating hours counter, boot cycle counter, device discovery, Pin 2 for output of digital signals or as IO-Link diagnostic channel of the BIC system | | | |

HEARTBEAT® –
IO-LINK POWER SUPPLIES WITH
CONDITION MONITORING FEATURES



| | | |
|-------------------------------|--|------------------|
| 2,5 A | BAE00TR | |
| 3,8 A | | BAE00TP |
| 5 A | BAE00T4 | |
| 8 A | | BAE00TM |
| 10 A | BAE00LJ | |
| 20 A | BAE00M3 | |
| Output voltage | 24 V DC | 24 V DC |
| Power boost | 150 % 4 s | 150 % 4 s |
| Rated input voltage | 115...230 V AC | 100...240 V AC |
| Frequency range | 47...63 Hz | 48...62 Hz |
| Efficiency | up to 94 % | 91 % |
| IO-Link Specification | 1.1 (with optional BAE00TF) | 1.1 |
| Mounting type | DIN rail mounting | Flange mounting |
| Connection | Pluggable Terminal | 7/8" male/female |
| Enclosure Type per IEC 60529 | IP20 | IP67 |
| Condition monitoring features | Internal temperature monitoring | |
| Multi-functions | Voltage and current monitoring, signal quality check, LED diagnostics, operating hours counter, boot cycle counter, device discovery | |

COMPONENTS FOR TEMPERATURE AND PRESSURE

MEDIA-CONTACTING TEMPERATURE SENSORS



| | | | | | | | |
|-------------------------------|----------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------|
| 2 × PNP | Installation length 25 mm | BFT001H | BFT001L | | | | |
| | Installation length 50 mm | BFT001J | BFT001M | | | | |
| | Installation length 100 mm | BFT001K | BFT001N | | | | |
| 1 × PNP + 4...20 mA | Installation length 25 mm | BFT0012 | BFT0018 | | | | |
| | Installation length 50 mm | BFT0013 | BFT0019 | | | | |
| | Installation length 100 mm | BFT0014 | BFT001A | | | | |
| 1 × PNP + 0...10 V | Installation length 25 mm | BFT0015 | BFT001C | | | | |
| | Installation length 50 mm | BFT0016 | BFT001E | | | | |
| | Installation length 100 mm | BFT0017 | BFT001F | | | | |
| 4...20 mA | Installation length 25 mm | | | BFT0005 | BFT0008 | | |
| | Installation length 50 mm | | | BFT0006 | BFT0009 | | |
| | Installation length 100 mm | | | BFT0007 | BFT000A | | |
| Resistor | Installation length 25 mm | | | | | BFT0001 | BFT0003 |
| | Installation length 50 mm | | | | | BFT0002 | BFT0004 |
| Version of temperature sensor | With display | With display | Transmitter | Transmitter | Probe | Probe | |
| Operating voltage U_B | 15...35 V DC | 15...35 V DC | 10...30 V DC | 10...30 V DC | | | |
| Measuring range | -20...+80 °C | -20...+80 °C | -30...+150 °C | -30...+150 °C | -50...+150 °C | -50...+150 °C | |
| Process connection | G½" | NPT½" | G¼" | NPT¼" | G¼" | NPT¼" | |
| Pressure rating max. | 150 bar | 150 bar | 270 bar | 270 bar | 50 bar | 50 bar | |
| IP rating | IP65, IP67 | IP65, IP67 | IP67, IP69, IP69K | IP67, IP69, IP69K | IP66, IP67 | IP66, IP67 | |
| Approval/conformity | CE, cULus | CE, cULus | CE, cULus | CE, cULus | CE | CE | |
| Connection | M12 connector, 4-pin | M12 connector, 4-pin | M12 connector, 4-pin | M12 connector, 4-pin | M12 connector, 4-pin | M12 connector, 4-pin | |

BSP PRESSURE SENSORS WITH DISPLAY



| | | | |
|-----------------------------|----------------------------|----------------------------------|----------------------------|
| 0...0.1 BAR | | | BSP0102 |
| 0...0.5 BAR | | | BSP0103 |
| 0...1 BAR | | | BSP0100 |
| 0...2 BAR | | | BSP0101 |
| -1...2 BAR | BSP00YR | BSP00ZH | |
| 0...10 BAR | BSP00Y4 | BSP00Z6 | |
| 0...20 BAR | BSP00Y6 | BSP00Z7 | |
| 0...100 BAR | BSP00Y8 | BSP00Z9 | |
| 0...250 BAR | BSP00YC | BSP00ZC | |
| 0...400 BAR | BSP00YH | BSP00ZE | |
| 0...600 BAR | BSP00YK | BSP00ZF | |
| Operating voltage | 18...30 V DC | 18...30 V DC | 18...30 V DC |
| Output 1 selectable | PNP/NPN/IO-Link | PNP/NPN/IO-Link | PNP/NPN/IO-Link |
| Output 2 selectable | PNP/NPN/4...20 mA/0...10 V | PNP/NPN/4...20 mA/0...10 V | PNP/NPN/4...20 mA/0...10 V |
| Accuracy | ≤ ±0.5 % FSO BFSL | ≤ ±0.5 % FSO BFSL | ≤ ±0.5 % FSO BFSL |
| Media temperature | -40...+125 °C | -40...+125 °C | -10...+125 °C |
| Process connection | G¼" internal thread | G½" external thread, front-flush | 1½" TriClamp, front-flush |
| Transmission medium | - | Silicone oil | Food grade oil |
| Process connection material | Stainless steel 1.4301 | Stainless steel 1.4404 | Stainless steel 1.4404 |
| IP rating | IP67 | IP67 | IP67, IP69K |
| Approval/conformity | CE, cULus | CE, cULus | CE, cULus, ECOLAB |
| Connection | M12 male, 4-pole | M12 male, 4-pole | M12 male, 4-pole |

Monitor plants and processes, visualize and analyze states

CONDITION MONITORING TOOLKIT

Imagine knowing at an early stage which machine or component in your plant could cause problems in the near future. It is possible, however, that many existing plants do not have the technical prerequisites for condition monitoring, even though this can prevent unplanned downtime and unnecessary costs. Until now, the retrofitting of plants has often failed due to the high effort and the associated costs for the permanent monitoring of relevant machine and process parameters. Here, the CMTK system represents a new and easy-to-implement solution with an excellent cost-benefit ratio. With the flexible CMTK system, you quickly gain deeper insights into the actual condition of your machines and systems and can, therefore, detect deviations and problems at an early stage. In addition, the system is IIoT-capable through standardized interfaces and can be easily adapted to different applications on the software side.

Features




- Unified retrofit solution for machine and process monitoring
- High flexibility through the connection of up to four arbitrary IO-Link sensors
- Plug-and-play commissioning of the system and visualization of the data
- Output of warning messages when adjustable limit values are exceeded
- IIoT-capable through standardized interfaces such as MQTT
- Software customizable through Docker-technology



CMTK – simple, flexible, effective

The CMTK consists of three components: software, base unit and up to four arbitrary IO-Link sensors.



| | | |
|---|------------------------|--|
| CMTK | BAV002N | |
| Description | Base unit and software | |
| Order sensors, connection and network cables and power supplies individually using this QR code or link . | | |
|  | Base unit | The base unit is the central element of the Condition Monitoring Toolkit. It features: <ul style="list-style-type: none"> ▪ ARM quad core, 2 GB RAM ▪ 8 GB memory, expandable with SD card ▪ 4 × M8 IO-Link ports for sensors ▪ 2 × LAN ports for data transmission ▪ 24 V power supply connection ▪ Protection class IP20 ▪ Expansion/addition of ports possible through connection of additional IO-Link masters |
|  | Software | The software integrated on the base unit enables automated visualization and evaluation of the collected data on site. Key features of the software are: <ul style="list-style-type: none"> ▪ Easy access to the dashboard via the web browser ▪ Plug-and-play setup through automatic detection of IO-Link sensors as well as simple IO-Link configuration ▪ Rest API for further configurations IIoT-capable through standardized interfaces such as MQTT ▪ Software customizable through Docker-technology ▪ Possibility of automated alarming, e.g. via e-mail or directly via the SmartLight ▪ Languages: English, German, Portuguese, Spanish ▪ Easy setting of thresholds for motors, pumps, fans or compressors based on established vibration monitoring standards |
|  | Sensors | The Condition Monitoring Toolkit is compatible with all IO-Link 1.0 and V1.1 capable sensors on the market: <ul style="list-style-type: none"> ▪ Vibration and temperature sensors for monitoring motors and drives ▪ Pressure and flow sensors for monitoring pumps and compressors ▪ Temperature and/or humidity sensors for monitoring control cabinets ▪ Capacitive sensors or ultrasonic sensors for detecting fill levels ▪ Optical sensors for detecting presence and distance |



#B_IIoT

SEIZE THE OPPORTUNITIES OF THE INDUSTRIAL INTERNET OF THINGS WITH BALLUFF

The future of automation is digital and interlinked. As your automation partner we accompany you step by step on the path to the smart factory. And all the while we keep your competitive ability in view. Build on our expertise and experience – we support you in exploiting the potential of the Industrial Internet of Things (IIoT).

For higher productivity, more efficiency and transparent manufacturing

When it comes to generating and transporting data, we have many years of experience with outstanding success. It is on this basis that Balluff provides you with a constantly growing portfolio of smart devices. Through the use of software, we generate true added value for your production environment. By combining powerful hardware and software, you get intelligent automation solutions – all with the goal of technological advancement.

Utilize the potential of the Industrial Internet of Things – together with Balluff

Our portfolio ranges from the IIoT capable hard- and middleware to software to intelligent system solutions. By using standardized interfaces and protocols we ensure that you can run our solutions in your existing IIoT infrastructure and on common platforms. To this end we of course make use of the communication standard IO-Link. Because IO-Link is ideally suited for the IIoT.

All this makes Balluff an enabler and solution provider for the Industrial Internet of Things.

Questions? Our experts are eager and ready to assist you.

Global project management

WE ARE THERE FOR YOU — EVERYWHERE YOU ARE

We are global

Wherever you operate, we can support you directly on site. We work closely with machine and plant manufacturers, system integrators, planning offices and maintenance companies to create a worldwide network of technical consulting, sales and after-sales services for you.


Project manuals and release lists

To ensure that your projects are handled smoothly, we compile product data individually. You receive project-specific manuals and release lists. Your personal Balluff contact will provide you with support throughout the entire course of your project.

Customized services

If you would like our services to be even more tailored to your needs, we can make this possible: with personalized e-catalogs, application-specific product modifications, holistic software and system solutions, and comprehensive logistics concepts.

Do you have any questions? Contact us. We will be happy to assist you.

 **innovating automation**

Balluff

YOUR PARTNER FOR SUCCESS IN AUTOMATION



B *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 3600 employees in 37 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 61 countries so that you always get the best.

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 digitalization and IIoT applications for an increasingly digital and networked world.

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

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

Headquarters
Balluff GmbH
Schurwaldstrasse 9
73765 Neuhausen a. d. F.
Germany

www.balluff.com/go/contact

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