

**BALLUFF**



**B** *innovating automation*

**Intralogistics**

**UP THE TEMPO WHILE  
IMPROVING QUALITY**



Balluff in intralogistics

# WE ARE AT HOME IN MANY INDUSTRY SECTORS





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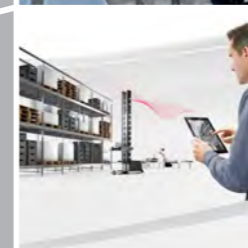
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Storage and retrieval

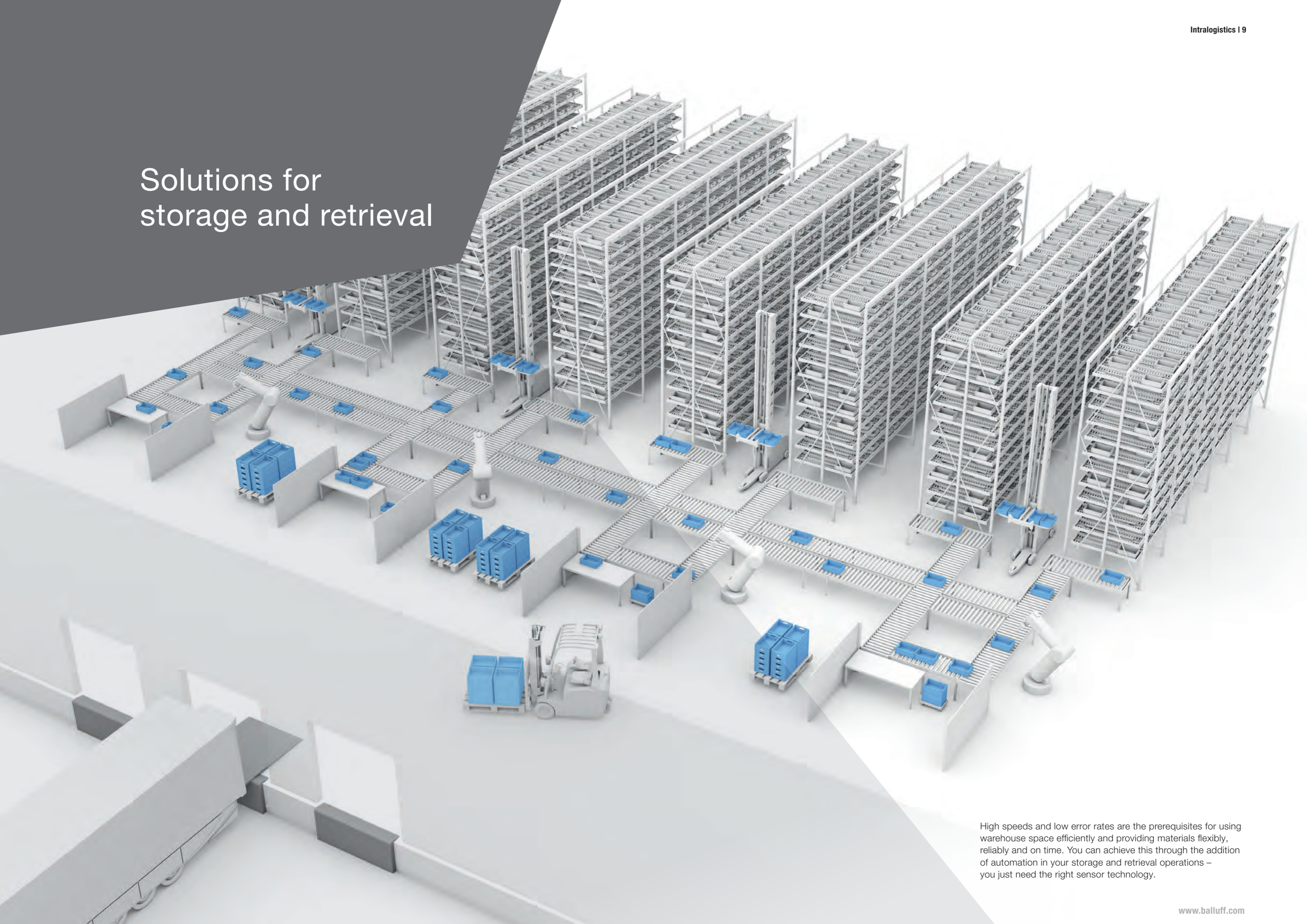
# MANAGE VARIETY – GET A GRIP ON TIME.

 *innovating automation*

Controlling inventories and material movements at all times while reliably avoiding errors: This is the challenge facing companies in all industries. Automated processes enable you to store and retrieve even large inventory quantities in less time and with greater precision. So it's no wonder that dynamic shuttle systems and stacker cranes are increasingly replacing manual warehouse operations; They ensure efficient supply levels of the required goods, provide continuous operation and maintain high throughput. With accuracy and transparency – thanks to reliable components, innovative identification solutions and software-driven control options from Balluff.



## Solutions for storage and retrieval



High speeds and low error rates are the prerequisites for using warehouse space efficiently and providing materials flexibly, reliably and on time. You can achieve this through the addition of automation in your storage and retrieval operations – you just need the right sensor technology.



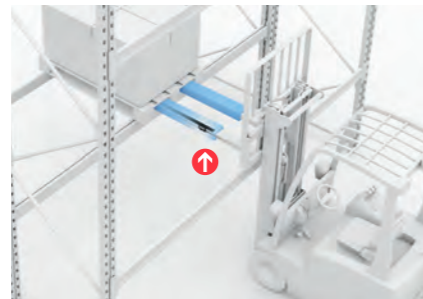


**DIGITIZING THE KANBAN SYSTEM**  
**BIS industrial RFID systems**

Our solutions for e-Kanban systems automate the flow of materials and enable efficient, demand-oriented material supply on the production line. Using UHF RFID, the material management system communicates continuously with the company logistics. Kanban cards become obsolete, the manual scanning of barcodes is no longer necessary and operating errors during material supply are a thing of the past.

**Features**

- Simple configuration via drag-and-drop web server
- Error detection in case of incorrect feeding and visualization
- Automated detection instead of manual scanning



**MEASURE FORK POSITION ON FORK LIFT TRUCKS**  
**BML magnetic encoder systems**

Our magnetic encoder systems are perfect for continuously measuring the depth position of the fork with millimeter accuracy – even in warehouses where it is difficult to see. For this, a magnetic tape embedded in the extendable part of the fork is scanned without contact by a receiver at the end of the fixed fork part. The driver can see every fork position on a display while working.

**Features**

- Contactless and wear-free
- Driving errors can be avoided by presetting defined extension lengths

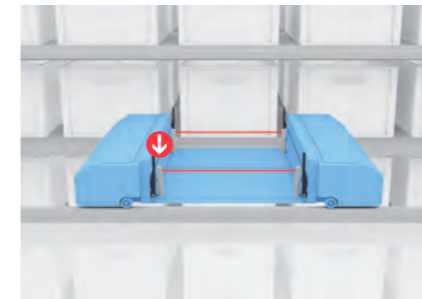


**ROBOT POSITIONING IN PHARMACEUTICAL AUTOMATED VENDING MACHINES**  
**BML magnetic encoder systems**

Automated picking machines in the pharmaceutical sector must meet specific demands: optimized goods circulation, streamlined warehousing and higher delivery capacity. Robots are therefore used for picking and gripping the drugs. The magnetically encoded measuring tapes of our magnetic encoder systems ensure their precise positioning in such highly dynamic applications.

**Features**

- Wear-free, since contactless
- Measuring lengths up to 48 m
- Very accurate thanks to high resolution



**CONTROL SHUTTLE SYSTEMS**  
**BOS photoelectric sensors**

Shuttle systems are particularly suitable for goods stored in standard containers in fully automatic (high) rack systems. An important component of the systems are our photoelectric through-beam and fork sensors. These ensure that containers and cartons are correctly placed in the correct shelf compartment.

**Features**

- Easy mounting and adjustment
- Space-saving, compact design
- Robust metal housing



**MONITOR CARRIAGE POSITION**  
**BES inductive sensors**

For shuttle systems in fully automated (high) bay racking systems, standard totes are often loaded and unloaded into and out of the racking compartment by carriage. Inductive sensors from Balluff monitor the position or end positions of the carriage and thus ensure the safe transport of your containers.

**Features**

- Easy mounting
- Space-saving, compact design
- Robust metal housing



**MANAGE INVENTORIES DIGITALLY**  
**SRS Smart Reordering System**

Manual efforts in inventory recording and warehousing cost time, money and storage space. Our Smart Reordering System enables intelligent, dynamic inventory management – as a fully automated Kanban system or as a supplement to existing systems – to digitize your entire intralogistics. You can see your inventories directly on the clear dashboard, reducing replenishment times and empty runs.

**Features**

- Easy integration into existing ERP systems
- Automatic notification or direct ordering when stocks fall below thresholds
- Ready for immediate use thanks to wireless sensors



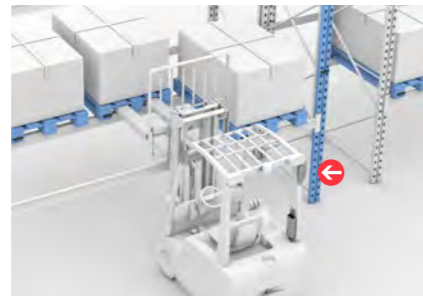


**RELIABLY CONTROL CRANE SYSTEMS**  
**BTL magnetostrictive linear position sensors**

To automate crane systems, continuous, accurate position monitoring is critical. Our long distance positioning system (LDPS) ensures this – even in harsh environments and over several hundred meters. It consists of a magnetostrictive linear position sensor with a Profinet interface and several position encoders that are flexibly positioned along the travel path and read by the magnetostrictive sensor mounted on the crane.

**Features**

- Simple, flexible mounting: no continuous rail required
- High accuracy even at long distances
- Extremely robust against environmental influences
- Contactless so minimal maintenance required



**KEEPING AN EYE ON INVENTORY**  
**BIS industrial RFID systems**

Objects that are rarely moved can be located using passive UHF RFID data carriers. To do this, you mount RFID readers on forklift trucks, for example, and equip storage locations with reference tags and objects with object tags. All data carriers can be read simultaneously as they pass by, and all objects can be located at any time. The more often this happens, the more accurate the localization information – without the need for costly battery-powered data carriers. Our software evaluates the read results and assigns the recorded object data carriers to the reference data carriers. This data is transmitted to a central server via WIFI.

**Features**

- Bulk detection in passing
- Information available in the central server

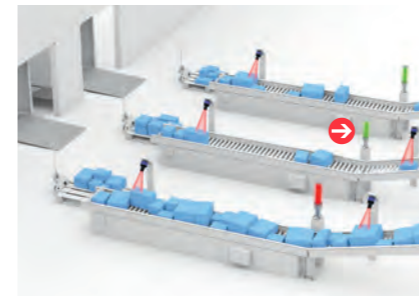


**CONTROL MATERIAL FLOW AND TRACK TRAILERS**  
**BIS industrial RFID systems**

To control and optimize the flow of materials, product and material movements must be continuously recorded – even beyond the warehouse gates. With RFID gate solutions, materials are automatically recorded as they are loaded onto the truck or container. You always keep track of where your products are. Direct integration with ERP systems also allows you to control material flows holistically, monitor containers and thus track material loss.

**Features**

- Continuous recording of goods movements
- High accuracy of inventory figures through synchronization of digital and real goods inventory
- Automated object registration in bulk over distances of up to 6 m



**EFFICIENT SUPPORT FOR WORKERS**  
**BNI SmartLight stack lights and indicator lights**

When loading trucks in the shipping area, confusion and backlog of packages can occur if they are fed via several routes. The consequence: Incorrect prioritization in the loading process and delayed deliveries. The right camera technology, detects material jams, and our SmartLight makes your employees aware of them. This increases efficiency in the loading process.


**Features**

- Configurable SmartLight
- IIoT-capable thanks to IO-Link



Conveying and transporting

# LEADING THE WAY IN MATERIAL FLOW.

 *innovating automation*

Transporting, sorting, loading and unloading, buffering, accumulating – in all intralogistics tasks, throughput and availability at the right place at the right time are what counts in the end. Whether in cartons, totes, on pallets or hanging on trolleys, the goods must get from A to B as efficiently as possible. And it must do so with maximum flexibility, since batch sizes are becoming smaller and smaller as a result of progressive individualization. The linchpin of optimal transport solutions are automated conveyor systems. For these, Balluff supplies innovative identification solutions so you know where your goods are at all times. With our sensors, cables and network technology, we also support you in optimizing your internal processes – from the load carrier to the control system to the conveyor system.



# Solutions for conveying and transporting

Getting the right materials to the right place at the right time is the fundamental task for internal transport systems. With a high degree of automation, you can make material transport transparent, minimize errors and respond flexibly to higher speeds and lower quantities.





**CONTROL MATERIAL FLOW  
(GATE SOLUTION)  
BIS industrial RFID systems**

In warehouse areas with high throughput, many material postings are made in order to always know exactly which stocks are leaving the warehouse and which items are arriving. Ideally, the identification is automated. Our stationary RFID gate is the optimal solution for this. It detects objects from up to 6 meters and fully automatically in batches, even at high speeds. This saves time and minimizes error rates. In addition, our SmartLight stack light can be integrated directly, allowing you to keep an eye on what is happening at all times from a distance.

**Features**

- Error minimization: automatic, time-optimized and correct recording of goods movements
- Higher accuracy of inventory figures by synchronizing digital with real goods stock
- Optimized user guidance thanks to our SmartLight which can also be integrated

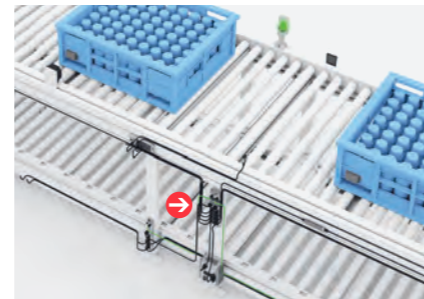


**CONTROL MATERIAL FLOW  
(TUNNEL SOLUTION)  
BIS industrial RFID systems**

The RFID tunnel system from Balluff, specially developed for robust, industrial automation, enables you to quickly identify a large number of objects – individually or in bulk. For this application, all goods are equipped with a transponder that can be read as they pass through the tunnel in the detection range of the RFID antennas. Information about the correct material as well as the location and time of detection is sent directly to your IT system. For a customized solution, the transport protocol (SOAP, REST API, ...) is also designed and implemented with project-specific needs for your warehouse management system, ERP system or quality assurance system.

**Features**

- Individual 360° IIoT solutions
- Integration possible with existing conveyor systems
- Time saving due to automatic recognition of goods



**ENERGY-EFFICIENT MOVEMENT  
BNI network modules with IO-Link**

Those who want to control the complexity of intralogistic processes in greater detail are increasingly relying on decentralized concepts. Our IO-Link masters with 4 A output current can be used to control up to four drives and thus operate both conveyor belt motors and electric stoppers on the roller conveyors. The advantages: Reduced load on the control system, pre-processing of information, increased productivity, and lower energy consumption.

**Features**

- Fast installation and simple integration
- Robust design
- Separate control
- Integrated web server for configuring and displaying module information
- Innovative address plug for simple module replacement



**RELIABLY DETECT AND CHECK OBJECTS  
BOS photoelectric sensors**

Photoelectric sensors reliably detect the presence of objects, but also precisely check shape, color, distance or thickness. Compared to proximity switches with inductive or capacitive technology, they offer a significantly higher detection range. For maximum flexibility, Balluff offers sensors with different light types, from red light to infrared to laser, and in a wide variety of designs.

**Features**

- Wide range of light types for many applications
- Very large detection distances and high accuracy
- Wide application use – can be used for almost any material, including glass, metal, plastic, wood, liquids



**UNIQUELY IDENTIFY BAGS  
BIS industrial RFID systems**

Space is often at a premium in overhead conveyor systems. Miniature read heads from Balluff can be installed even under difficult ambient conditions and with multiple benefits. In addition to sorting and sequencing, the use of our RFID systems can also ensure seamless traceability. Another plus point: All information reaches the higher-level system via our BIS V processor unit.

**Features**

- High-speed components (up to 8 times faster than ISO 15693)
- Medium ranges up to max. 400 mm
- Large assortment of accessories for easy integration at all locations



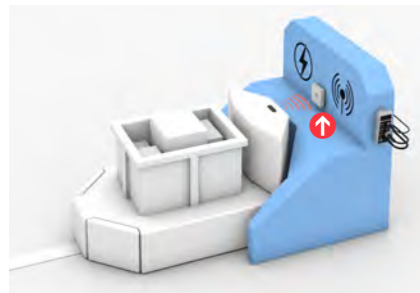
**RELIABLE TRACKING OF UNITS  
BIS industrial RFID systems**

If, for example, milk powder is filled from large stainless steel cans into defined packaging units, it is important to ensure a continuous supply and guarantee traceability. You can do this with the Balluff UHF RFID system, whose tags, unlike stick-on data matrix codes, can also withstand cleaning processes.

**Features**

- Reliable, error-free reading of data carriers
- Transparent process in which all information about material, time and use is available at all times
- Robust and insensitive to contamination





**MONITOR AUTOMATED GUIDED VEHICLES**  
**BIS industrial RFID systems**

Rely on RFID from Balluff to reliably monitor automated guided vehicles (AGVs). Our RFID systems ensure, for example, that the AGV moves to the right box to deliver or pick up the correct load. For a smooth flow of goods, all information is transferred directly to the transport system via data carriers and read with the read/write head mounted in the box.

**Features**

- Quick start-up time with auto set-up at the push of a button
- Reading and writing information between AGV and storage box
- Optical recognition of the operating status by all-round visible function and status LEDs



**USE ALL RFID TECHNOLOGIES SIMULTANEOUSLY**  
**BIS industrial RFID systems**

Our robust BIS V evaluation unit is available for fast data transmission, short cycle times and high data security in all applications. It enables mixed operation of RFID technologies (LF, HF and UHF), so that one type of evaluation unit is sufficient for all your tasks. For industry-independent use, our high-performer also includes all bus systems that are commonly used worldwide.

**Features**

- Four independently parameterizable ports for simultaneous operation of up to four read/write heads
- Integrated IO-link master port for connecting IO-Link compatible sensors/actuators or sensor stroke with up to 16 sensors
- Ideal electromagnetic compatibility
- Streamlined network structure, as sensor data can be bundled in any network technology



**PREVENT DOWNTIMES OF CONVEYOR MOTORS**  
**CMTK Condition Monitoring Tool Kit**

If a conveyor is at a standstill, products often cannot be produced and packages cannot be shipped. Our CMTK Condition Monitoring Tool Kit is the ideal solution for avoiding such delays and the associated costs. It gives you deep insight into the actual condition of your machinery and equipment, allowing you to detect deviations and problems at an early stage and intervene in time.

**Features**

- Holistic retrofit solution for machine and process monitoring
- Flexible plug-and-play system with independent data storage for location-independent monitoring
- Automatic warning message when limit values are exceeded

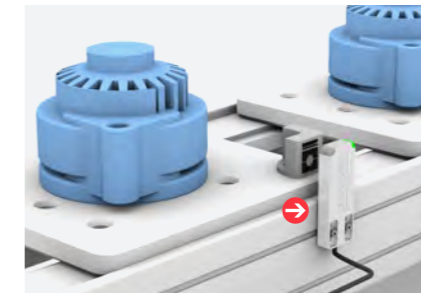


**RELIABLY DETECT OBJECTS**  
**BES inductive sensors**

Simple tracking solutions can be implemented without major effort. Even the simple interrogation of switching and measuring sensors is suitable here. Because each of these sensors is connected to the controller, all data is automatically flowing there for further processing. For maximum flexibility, Balluff offers sensors in a wide variety of sizes and designs.

**Features**

- Can be integrated into tight assemblies: particularly small, space-saving design
- No external amplifiers required: fully integrated electronics
- Smallest inductive sensors on the market (3 mm, 4 mm and 5 mm, housing length 6 mm)
- Contactless and wear-free



**PALLET TRACKING**  
**BIS industrial RFID systems**

Our high-speed RFID system ensures tracking of circulating stock and detailed traceability of products and pallets. With tags in a wide range of sizes, even extremely compact applications can be solved. Thanks to large read/write distances even at high speeds, you can implement a wide variety of applications and reduce throughput times.

**Features**

- Space for all information even in tight applications
- Highest data security through decentralized storage
- All data available in real time – continuous transparency in every process step



**CHECK THE FILL LEVEL OF CONTAINERS**  
**BOS photoelectric sensors**

The fully automated transport of standard containers often takes place in conjunction with automated racking systems. Because their compartments are adapted to the height of the crates, crates must not be overfilled. Otherwise, the protruding material can be damaged causing a shut down of the entire racking system. Photoelectric sensors from Balluff control the filling height during transport so that overfilled crates can be stopped in time and blockages prevented.

**Features**

- Easy mounting and adjustment
- Space-saving, compact design
- Robust metal housing





**TRACE PARTS IN PRODUCTION AND ASSEMBLY**  
**BIS industrial RFID Systems**

Our high-speed RFID system makes the circulating stock of your automated assembly traceable. Its flexible BIS V processor unit, in combination with high-speed read/write heads, processes the read/write heads to process large volumes of data in the shortest possible time. The latter are up to 8 times faster than the global ISO 15693 standard, allowing you to reduce cycle times and increase output rates. RFID tags enable accurate tracking of all products and can even be used to verify the authenticity of a product.

**Features**

- RFID and sensor technology can be flexibly combined via integrated IO-Link network modules
- All data available in real time
- Recording of the production process for quality assurance
- Unrivaled large memory up to 128 kByte
- Highest data security through decentralized storage

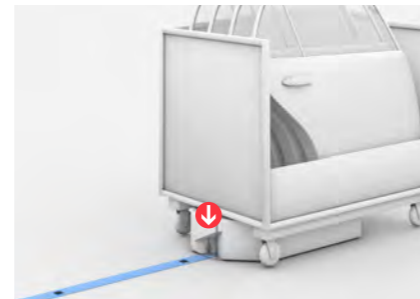


**WIRELESS DATA TRANSMISSION**  
**BNI IO-Link Wireless network modules**

Automated guided vehicles (AGVs) are constantly in motion and exchange sensor data with their environment. Wired communication is incompatible here. The best alternative: IO-Link Wireless. With this solution from Balluff, you transfer all the advantages of wired communication to the wireless world. And you further benefit from features such as data compression, cable savings and particularly simple installation.

**Features**

- Quick to install and easy to configure via integrated web server
- Powerful, end-to-end network
- Fast and reliable
- Range 10...20 m in industrial environment



**NAVIGATE AUTOMATED GUIDED VEHICLES**  
**BIS industrial RFID systems**

In order for automated guided vehicles (AGVs) to maneuver independently through warehouses, a wide variety of technologies are required for localization. Optical solutions orient themselves to the environment, which is prone to errors. You can additionally rely on RFID technology from Balluff: RFID tags can be positioned on or in the floor, which the AGV can read while moving by means of a built-in read head. This redundant solution allows precise position determination, even if the optical orientation fails.

**Features**

- Absolute position detection during drive-by
- Robust, reliable application independent of external influences such as light or dirt
- Wear-free and low-maintenance, since it is contactless



**CAPTURE DATA WHILE MOVING**  
**BIS industrial RFID systems**

The right goods in the right place at the right time: This is what a flexibly deployable automated guided vehicle system (AGV) makes possible. Our RFID systems ensure that your AGV transports the correct shelf with the required material. The reading head in the AGV reads the RFID tag positioned on the shelf. Light conditions and contamination are irrelevant, which makes the system extremely reliable.

**Features**

- Know at any time which goods are where and on which vehicle
- Robust, reliable application independent of external influences such as light or dirt
- Wear-free and low-maintenance, since it is contactless



Sorting and picking

# CORRECTLY ASSEMBLED – WHETHER PARTIALLY OR FULLY AUTOMATED.

 *innovating automation*

Whether for production or a customer order: Reliable sorting and picking are among the most complex and labor-intensive processes in intralogistics. To save costs, related tasks are continuously fully or partially automated. Our automation components and systems support you in the efficient implementation of such projects. The focus is on cost optimization in identification and quality control as well as in transport and labeling. This allows you to discover potential savings even where fully automated solutions are not possible, e.g. through collaborative robots or pick-by-light systems that specifically relieve your employees.



# Solutions for sorting and picking



Sorting and picking tasks are very labor-intensive processes in intralogistics and thus tie up a lot of manpower. However, this labor is already in short supply today and is becoming increasingly expensive at the same time. The right sensor technology makes it possible to partially or fully automate entire processes and solve these problems.





**PAPERLESS PICKING**  
**BNI SmartLight stack lights and indicator lights**

Put an end to endless picking or pick lists: Our SmartLight indicator light mounted on the picking tray simply shows your employees in color which item to pick. This allows you to avoid picking errors and ensure high process quality. But not only that: The bright LEDs can also display other useful information such as fill level.

**Features**

- IIoT-capable thanks to IO-Link
- Time-of-Flight: Light barrier reliably detects hand movements
- Six independent, bright, multicolor LED segments



**READ ALL COMMON CODES**  
**BVS handheld code reader**

Warehouse automation starts with identification systems. Our handheld code readers read all common 1D, 2D and stacked barcodes as well as postal codes in any rotational position (up to 40° tilt) as well as in motion. In addition, the ergonomic shape and low weight of the readers enable fatigue-free, hand-held operation.

**Features**

- Easy to operate
- Maximum reading range of 40 cm
- Read confirmation via acoustic signal, LED on the reader and LED spot projected onto the read code
- 200 g light

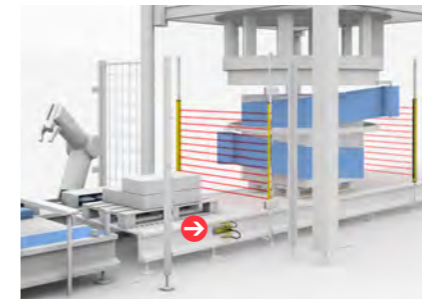


**VISUALLY INSPECT QUALITY IN COMMISSIONING PROCESSES**  
**BVS vision sensors**

Visual quality checks are an absolute must in order picking processes. Our portfolio for industrial image processing opens up almost unlimited possibilities for this: Whether it's checking the position, size, orientation and distance of objects or whether your focus is more on completeness checks, data tracing and quality checks.

**Features**

- Simple and easy integration thanks to comprehensive standardized programming interface
- High stability without image losses for quality control
- Seamless integration into an existing process environment

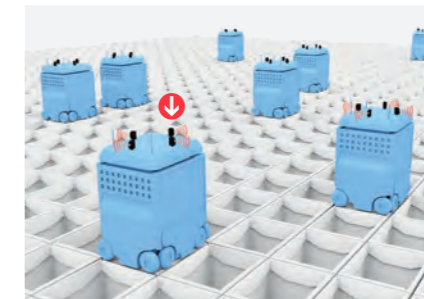


**CONNECT SAFETY DEVICES**  
**BNI Profisafe I/O module with IO-Link**

Our safe Profisafe I/O module connects automation and safety technology via IO-Link – thus enabling machine safeguarding in one system. IO-Link provides both sensor/actuator details and safe information for this purpose. Parameterization is performed centrally via the controller. Safety-relevant information is transmitted directly to the controller via the master, with Profisafe ensuring safe communication via Profinet.

**Features**

- Nearly every safety device can be connected
- Low costs due to standardized lines
- Fewer IP addresses required
- Safe guard locking devices can be connected directly thanks to standardized wiring concept

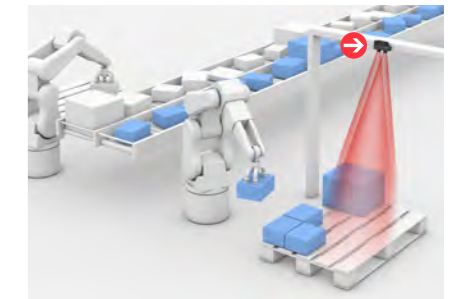


**AVOID ROBOT COLLISIONS**  
**BUS ultrasonic sensors**

Coordinating thousands of robots moving along a rail grid requires high computing power and sensor technology that detects other robots in time to prevent collisions. Ultrasonic sensors from Balluff are precise versatile components that reliably detect positions and distances without contact, especially in harsh industrial environments.

**Features**

- Large detection range
- Insensitive to dust and dirt
- Undeterred by color, transparency, reflective properties and surface condition of the object
- Actual distance measurement thanks to analog output



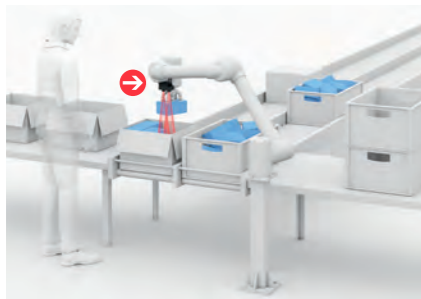
**AUTOMATED PICKING AND DEPALLETIZING**  
**BVS 3D cameras**

Picking and order picking using robots can greatly increase the efficiency of these labor-intensive processes. The prerequisite for this is reliable identification of the materials to be picked by the robot. With an integrated processor and application-specific software modules on the camera, this product family offers autonomous 3D image processing. Information such as pick points is passed directly to the robot application, ensuring efficiency.

**Features**

- Easy to operate via web-based user interface
- Very flexible due to optional software modules and GigE Vision interface
- Low system costs due to on-board processing and smart, application-specific software modules



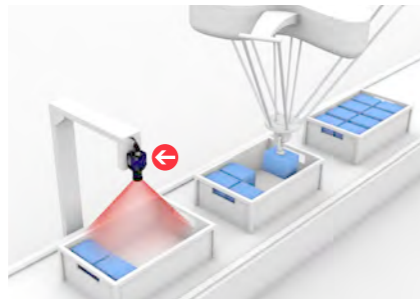


**COLLABORATIVE PICKING  
AND COMMISSIONING  
BVS 3D cameras**

When humans and robots work together collaboratively, picking and order picking run much more efficiently and with less strain on the worker. The prerequisite for this is reliable identification of the materials to be picked. With an integrated processor and application-specific software modules on the camera, this product family offers autonomous 3D image processing. Information such as pick points is passed directly to the robot application, ensuring efficiency. At the same time, the smaller version of these versatile products can even be mounted directly on the arm of the robot.

**Features**

- Easy to operate via web-based user interface
- Very flexible due to optional software modules and GigE Vision interface
- Low system costs due to on-board processing and smart, application-specific software modules



**CONTROL ROBOT WHEN  
LOADING CONTAINERS  
BVS industrial cameras**

When loading crates and other containers, robots must be controlled precisely to avoid damaging products and materials. Industrial image processing components – including the robust industrial cameras from Balluff – enable highly accurate object detection and thus the precise and efficient filling of a wide variety of containers.

**Features**

- Robust design for high accelerations with high resolutions and image repeat rates
- Enables two-dimensional object detection for highly precise robot control
- Allows for fast movements due to short latencies



**MOBILE IDENTIFICATION  
BVS handheld code reader**

Our BVS HS handheld code reader is used to clearly identify tagged products or containers regardless of location, for example, when you want to clearly identify cardboard boxes. In the event of a format change, you can thus ensure that the cardboard inserted in the magazine corresponds to the new format. The reader reads a wide range of 1D and 2D code types and can be easily and flexibly integrated via industrial fieldbus networks.

**Features**

- Read confirmation is provided by an acoustic signal, two LEDs and an LED spot projected onto the read code
- Intuitive target system through clearly visible laser marking frame
- Charge and read up to 30,000 times with lithium ion batteries
- Installation-free operation thanks to low weight and ergonomic shape



**CHARGE AUTOMATED  
GUIDED VEHICLES  
BIC inductive couplers**

Automated guided vehicles (AGVs) bring new flexibility to shop floors and warehouses. But even an AGV needs to be loaded every now and then. Optimally, this happens during a standstill that is necessary anyway, e.g. during unloading. With Balluff inductive couplers, high power is transmitted without contact – and your transport system can get right back to work.

**Features**

- No mechanical wear – completely maintenance-free
- Protection against overheating through internal temperature monitoring
- Visualization of the operating mode



Step by step into the digital world

## IIOT-CAPABLE WITH IO-LINK

 *innovating automation*

Balluff takes you step by step to the digital world. We offer a wide range of intralogistics solutions that contribute to simpler and ever faster processes, increase the efficiency of your materials management and help you remain competitive.

With our intelligent solutions, we are competently at your side to reliably manage your growing volume of data. Continuous communication via IO-Link is the key for this. IO-Link ensures transparency and facilitates high-performance infrastructure to be able to network processes. This means that the digital communication standard makes your in-house merchandising IIoT-capable. In the example below, you can learn how easy IO-Link can be used.





Sustainable support for production

# AUTOMATED KANBAN WITH SENSORS ON BOARD.



Capitalize on smart potential

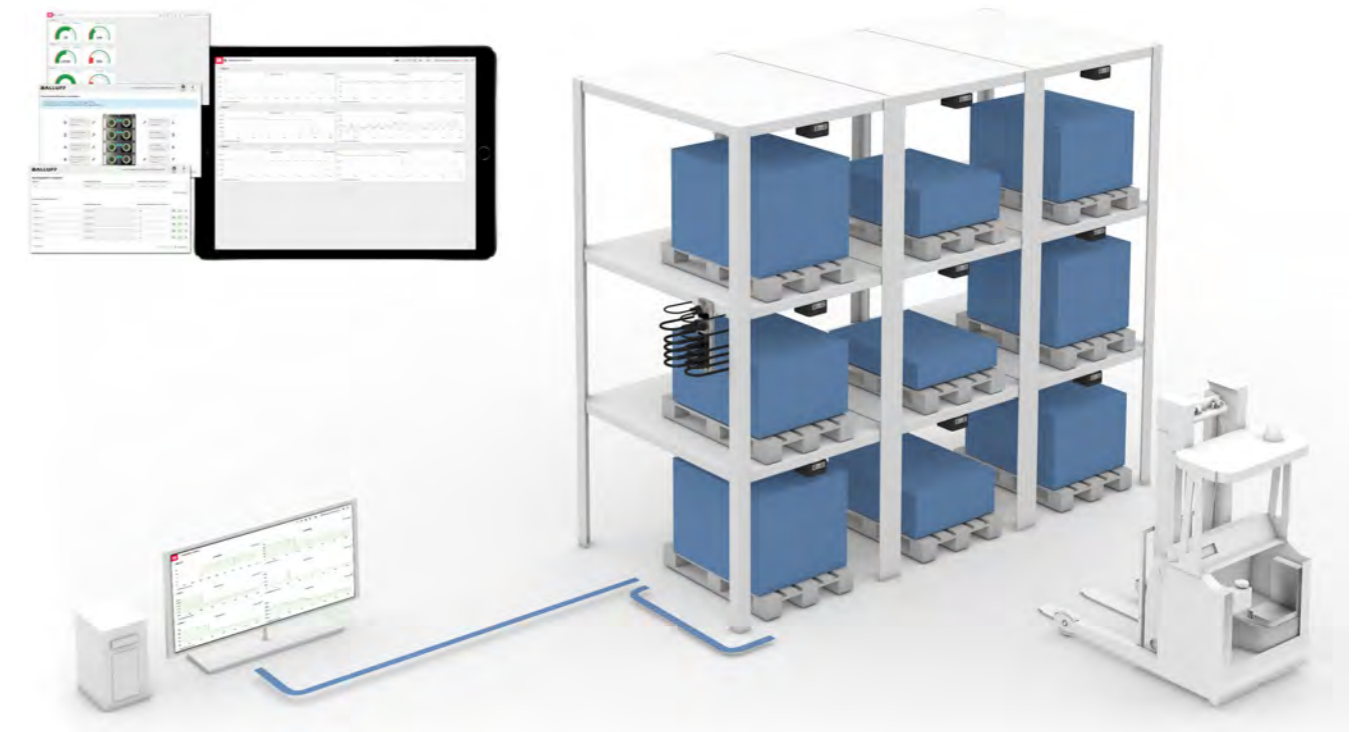
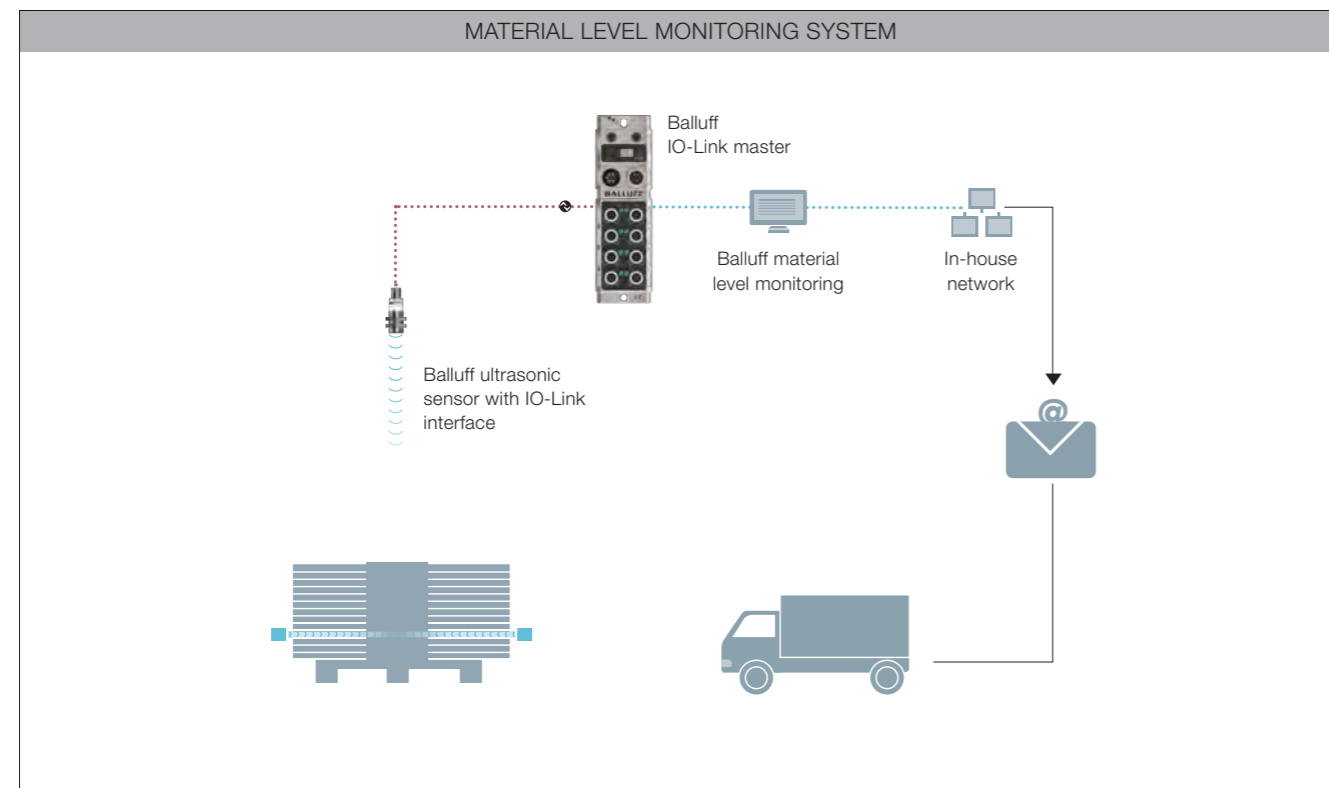
Our ultrasonic sensors detect solid, powdery and liquid media in the range from 25 mm to 6 m, so larger object distances are no obstacle. Thanks to high resolution and small blind zones, they offer extreme precision. For your processes, this means great reliability and a high variety of possible applications on the factory floor or in the warehouse.

Integrated in the carton warehouse, ultrasonic sensors automatically monitor the height of carton stacks and help to avoid bottlenecks in packaging material. This is because a distance measured by the sensor is converted into a piece count and used as an indicator of material stock in the SAP system. As soon as the stock falls below the minimum level, the SAP system automatically triggers an order to the supplier.

The application reduces large inventories that were previously needed as buffers and avoids bottlenecks. In line with the Smart Factory, it helps to sustainably improve the supply chain, eliminate waste in processes and avoid downtime. This reduces costs and makes your company more competitive.

For additional efficiency, you can link the solution to the IT level and thus to the ERP system. Inventory can be automatically booked out and the ERP system can trigger an order and send it to the supplier if the stock level falls below the minimum level. For this purpose, the IO-Link sensors transmit the fill level via the fieldbus module to the material level monitoring system, which forms the interface to modern IT systems.

All that is needed for this intelligent inventory management is a combination of Balluff standard hardware and software. If you have further requirements, we can, of course, also customize and expand the standard software.



Ultrasonic sensors monitor the height of carton stacks – integrated in the carton warehouse.



Modular control concepts

# WHY IO-LINK IS THE FAST LANE



From parallel wiring to fieldbus protocol

The replacement of parallel wiring by fieldbuses was a major advancement. It successfully minimized the immense installation effort required with expensive copper cables and significantly reduced costs. But fieldbus protocols are not without their pitfalls, namely low signal strength and noise susceptibility.

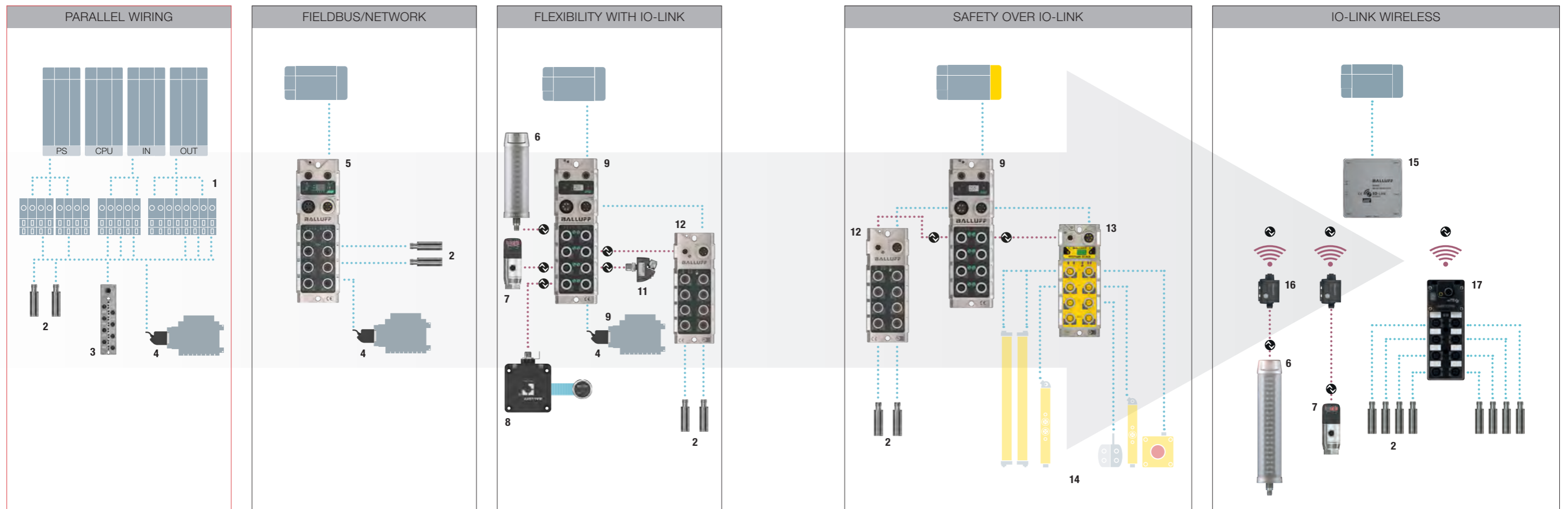
But flexibility goes much further with IO-Link. With Safety over IO-Link, Balluff offers you the first safety solution that can be integrated with IO-Link, which combines safety and automation technology in a single system. Safety over IO-Link provides both sensor/actuator details and secure information, so you can use the best of both worlds with our safety concept.

Universal, simple and flexible: IO-Link!

The weak points of the fieldbus protocol are a thing of the past with IO-Link. The required unshielded, three- or four-core standard industrial cables are highly flexible and suitable for many bending cycles. They are easy to connect, cost-effective and their connection is standardized with M5, M8 or M12 connectors. For this reason, you can use IO-Link to access a far-established standard to integrate a wide variety of devices. IO-Link guarantees you extremely flexible control concepts. Thanks to this versatility, simplicity and power intensity, IO-Link can be referred to as a universal interface – like USB for your automation system.

IO-Link: Now also available in wireless

Our wireless system consisting of master, hub and bridge is a new wireless standard that meets the high demands of factory automation. The wireless master does not receive its data via cable as usual, but receives the sensor data via a bridge or a hub by radio. This brings decisive advantages over a wired system – including simpler planning and installation, greater flexibility in design and mobility, and no wear and tear on connectors or cables. And it comes with the proven reliability and performance of wired IO-Link.



- 1 Clamping block
- 2 Sensors
- 3 Junction block
- 4 Valve interface
- 5 Fieldbus module
- 6 IO-Link SmartLight
- 7 IO-Link pressure sensor
- 8 Industrial RFID system
- 9 IO-Link master
- 10 IO-Link analog converter
- 11 IO-Link valve interface
- 12 IO-Link sensor hub
- 13 IO-Link safety hub
- 14 Safety components
- 15 IO-Link Wireless master
- 16 IO-Link Wireless bridge
- 17 IO-Link Wireless hub



Greater efficiency, lower costs

# IO-LINK SAVES TIME AND MONEY.



### Simple installation

To install IO-Link, in addition to the IO-Link master, you only need a standard industrial cable, which is universally applicable. You can therefore quickly integrate the intelligent communication standard into the world of fieldbus. So, even complex devices can be easily integrated. Particularly interesting: Digital communication ensures immunity to interference even without expensive shielded cabling. Analog signals are digitized without any conversion losses. Where classic data transmission was previously impossible or only possible with difficulty, the IO-Link Wireless standard offers a new, promising solution for the factory of the future.

### Optimized machine availability

IO-Link enables fast fault-free sensor replacement and prompt commissioning. This enables you to significantly reduce downtime because the parameters of a replaced IO-Link sensor are automatically written from the IO Link master or the controller to the new sensor. Commissioning, format changes and recipe changes can be performed centrally via the function modules of the control. This saves time and brings the potential for errors to a minimum. Another advantage for you: IO-Link devices cannot be mistakenly swapped, since they can be identified automatically via IO-Link.

### Demand-based maintenance

Continuous diagnostic data of the entire process extends your service intervals, since automatic readjustment via IO-Link means you need to maintain equipment and machines much less often. Predictive error detection is now also possible because the complete process parameters are continuously displayed in the control system.

### More efficient operation

With IO-Link you can optimally position sensors in the machine directly at the workplace because 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. This optimizes process time considerably. In addition, signal delays and distortions are reliably eliminated because digital data transfer ensures high signal quality.

Extensive application requirements can be easily achieved with IO-Link because you can use both binary and analog standard devices with IO-Link sensors/actuators at the same time.

STANDARD-SENSORS/  
ACTUATORS

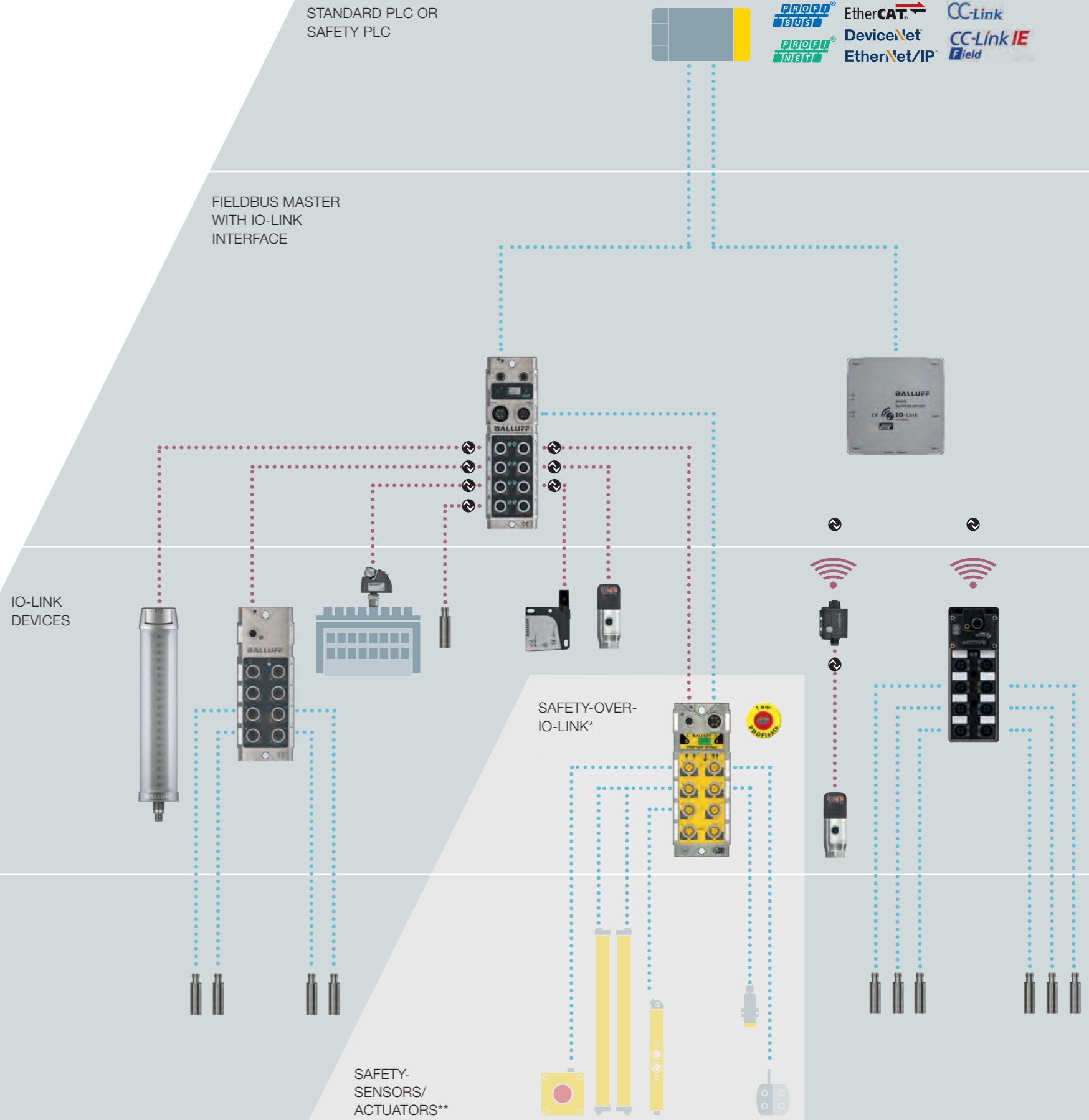
STANDARD PLC OR  
SAFETY PLC

FIELDBUS MASTER  
WITH IO-LINK  
INTERFACE

IO-LINK  
DEVICES

SAFETY-OVER-  
IO-LINK\*

SAFETY-  
SENSORS/  
ACTUATORS\*\*



\* can only be used with Profinet  
\*\* not in Balluff delivery program



A simple M12 connection is all it takes

# AUTOMATE ROBOTS



## Benefit from minimum downtime

Modern robot systems require a lot of sensor technology – especially in the robot arm. However, it is important the arm carries as little mass as possible in order to work dynamically and save energy. Similarly, the complex wiring of multiple cables makes it difficult for conventional solutions to achieve high efficiency.

Thanks to IO-Link, you can forget about such difficulties. Because a simple M12 connection is all that is needed to ensure this communication standard – without any special connectors at all. I/O modules and valve terminals are simply linked and complexity is reduced.

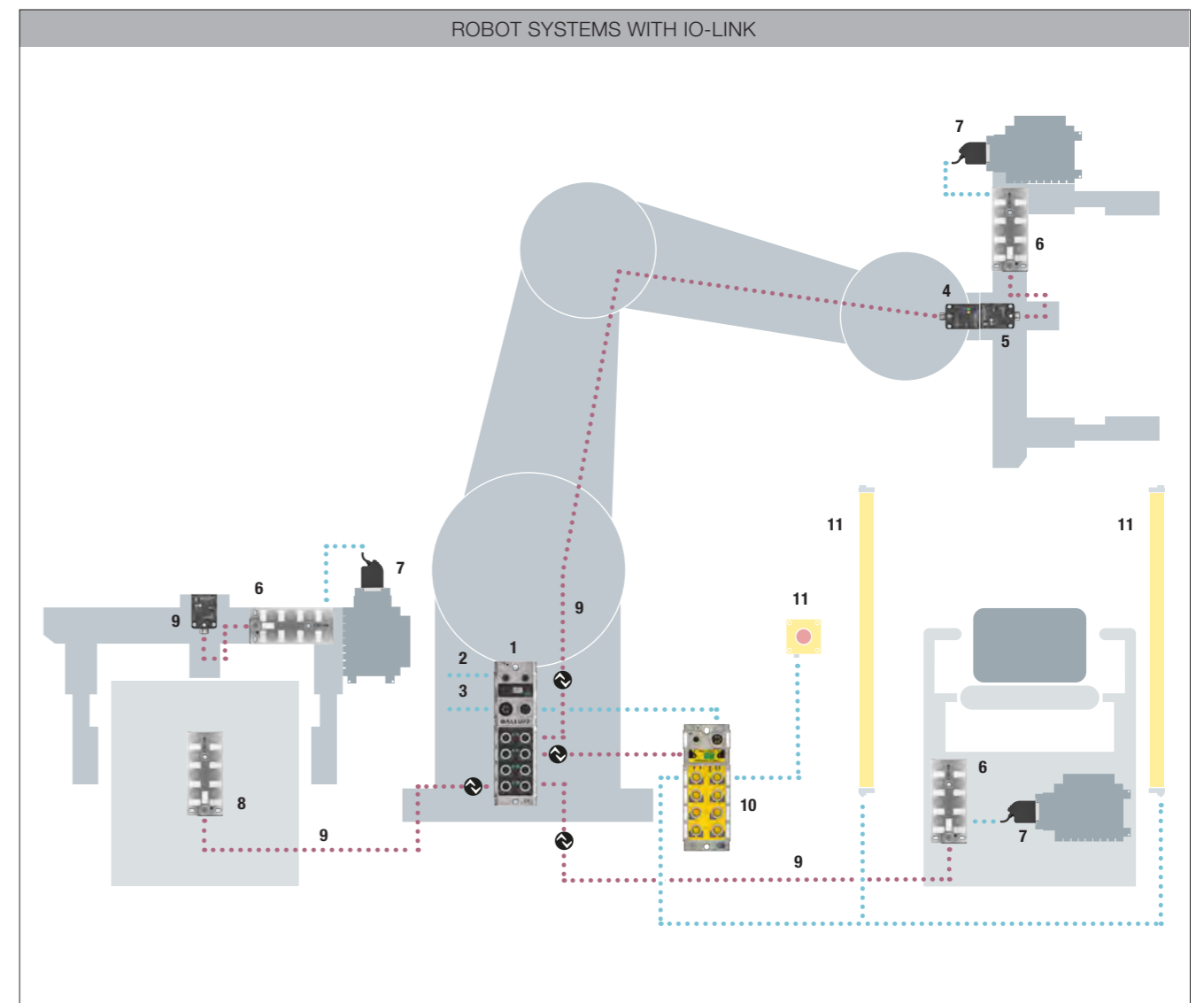
You can implement fast mold changes with inductive couplers, which simultaneously transmit data and energy without contact via an air gap. Thanks to plug-and-play capabilities, the new mold can be connected promptly and automatically parameterized with the controller via IO-Link. The innovative technology pays off: You no longer fight cable breakage, but benefit from high flexibility and minimal downtimes.

## Fast interaction between man and machine

In order to be able to quickly feed material to the robot despite safety light curtains, muting applications can be implemented at material locks, for example. Then the safety function is temporarily bypassed during material transport through the protective field. Good to know: Regardless of this, safety is maintained if a person enters the protective area unplanned.

## Gripper signals transmitted wirelessly from the mold

During mold changes, the hydraulic coupling literally gets in the way of signal transmission from the mold. The wireless IO-Link variant is the optimal solution here for attaching sensors and transmitting data, even in confined spaces.



- 1 IO-Link master
- 2 Fieldbus cable
- 3 Power cable, 7/8"
- 4 Inductive coupler 40 × 40 mm, Basic, IO-Link, bidirectional
- 5 Inductive coupler 40 × 40 mm, Remote, IO-Link, bidirectional
- 6 M12 sensor hub, configurable, I/O with extension

- 7 IO-Link valve interface (Festo, Bosch Rexroth)
- 8 M12 sensor hub, 16 inputs, PNP
- 9 Connection cable, M12 → M12, 4-wire
- 10 IO-Link safety hub
- 11 Safety components



INNOVATIVE SOLUTIONS  
FOR ALL YOUR REQUIREMENTS





# PRODUCT OVERVIEW



Application	Products	Example	Functions, interfaces and features
STORAGE AND RETRIEVAL			
Digitizing the Kanban system	BIS industrial RFID systems HF 13.56 MHz	BIS0186	Universal processor unit, Ethernet TCP/IP, USB, for high-memory and high-speed data carriers
		BIS0130	Read/write head, high memory, 80 × 40 × 84.5 mm, round antenna
		BIS0046	Data carrier, FRAM, 2000 bytes
Measure fork position on fork lift trucks	BML magnetic encoder systems	BML070J	Incremental, dimension 10 × 25 × 35 mm, housing material PBT, resolution 500 µm, read distance 0.01...6.5 mm, non-linearity max. ±400 µm, ambient temperature -20...+80 °C
		BML06CM	Measuring tape for magnetic encoder systems, dimension 10 × 1.43 × 2 m, measuring range 1.96 m
Robot positioning in pharmaceutical vending machines	BML magnetic encoder systems	BML05EE	Incremental, dimension 10 × 25 × 35 mm, housing material PBT, resolution 10 µm, read distance 0.01...6.5 mm, non-linearity max. ±400 µm, ambient temperature -20...+80 °C
		BML0699	Measuring tape for magnetic encoder systems, dimension 10 × 1.43 × 10 m, measuring range 9.96 m
Control shuttle systems	BOS photoelectric sensors	BOS01Y7 (receiver)	Through-beam sensor, LED red light, large performance reserve and contamination-resistant, range 2.2 m, dimension 8 × 8 mm, metal housing
		BOS01YK (emitter)	Through-beam sensor, LED red light, large performance reserve and contamination-resistant, range 2.2 m, dimension 8 × 8 mm, metal housing
Monitor slide position	BES inductive sensors	BES00P7	M8 × 1, Ø 8 × 45 mm, flush mounting, range 2 mm, 5000 Hz, stainless steel, -40...+85 °C
Manage inventory digitally	Smart Reordering System	BSG SRS	Control material flow digitally, through automated inventory management, ultrasonic sensor with LoRaWan, for simultaneous monitoring of multiple storage locations with one gateway, up to 1000 sensors
Reliable control of crane systems	BTL magnetostrictive linear position sensors	BTL7-V50T-...*	Magnetostrictive linear position sensors with magnets for outstanding measurement performance, Profinet interface, distances from 5 m to 250 m
Keeping an eye on inventory	BIS industrial RFID systems UHF 865...868 MHz	BIS01AW	Read/write head 300 × 49 × 300 mm, for Europe Patch antenna, IP67, different frequency ranges available for other world regions
		BIS0193	Processor unit, Linux controller, Ethernet TCP/IP, OPC UA, 4 antenna ports, IO-Link master port, integrated secure element
		BIS0168	Data carrier, 27 × 97 mm, self-adhesive label, dipole antenna, 512 bit memory, metal-free mounting

Application	Products	Example	Functions, interfaces and features
Control material flow and track trailers	BIS industrial RFID systems UHF 865...868 MHz	BIS01AW	Read/write head 300 × 49 × 300 mm, for Europe patch antenna, IP67, different frequency ranges available for other world regions
		BIS0193	Processor unit, Linux controller, Ethernet TCP/IP, OPC UA, 4 antenna ports, IO-Link master port, integrated secure element
		BIS0168	Data carrier, 27 × 97 mm, self-adhesive label, dipole antenna, 512 bit memory, metal-free mounting
Efficient support for workers	BNI SmartLight stack lights and indicator lights	BNI0084	Indicator light with buzzer, IO-Link 1.1, chaser mode, level mode, segment mode, flexi mode
CONVEYING AND TRANSPORTING			
Control material flow (gate solution)	BIS industrial RFID systems UHF 865...868 MHz  For more specifications, see RFID configurator: <a href="http://www.balluff.com/go/rfid-configurator">www.balluff.com/go/rfid-configurator</a>	BIS0193	Processor unit, long range
		BIS01AW	Antenna, long range
		BIS0167, BIS0168, BIS0169, BIS00NL	Label, different versions
		BIS016H, BIS0174, BIS0173	Data carrier, different versions
Control material flow (tunnel solution)	BIS industrial RFID systems UHF 865...868 MHz  For more specifications, see RFID configurator: <a href="http://www.balluff.com/go/rfid-configurator">www.balluff.com/go/rfid-configurator</a>	BIS0193	Processor unit, long range
		BIS01AW	Antenna, long range
		BIS0193	Processor unit, mid range
		BIS00P0	Antenna, mid range
		BIS018J	Processor unit, short range
		BIS015Z	Antenna, short range
		BIS0164, BIS0167, BIS0168, BIS0169, BIS00NL	Label, different versions
		BIS016H, BIS0174, BIS0173	Data carriers, different versions
Energy-efficient movement	BNI network modules with IO-Link	BNI00FW	Network block for Profinet, 16 × digital inputs PNP type 3, 16 × digital outputs PNP, 8 × IO-Link
Reliably detect and check objects	BOS photoelectric sensors	BOS02A3	Retroreflective sensor, 10.7 × 43.5 × 19.5 mm, PNP NO/NC, LED red light, range 0...5 m, M8 connector, 10...30 V DC (please order reflector separately: BAM00WL)
		BOS0294	Retroreflective sensor, 10.8 × 43.5 × 19.5 mm, PNP NO, LED red light, range 0...3 m, M12 connector, 10...30 V DC (please order reflector separately: BAM00UK)

\* Please contact our sales department to configure your product.  
For more products, visit our website at: [www.balluff.de/go/product-finder](http://www.balluff.de/go/product-finder)



Application	Products	Example	Functions, interfaces and features
Uniquely identify bags	BIS industrial RFID systems HF 13.56 MHz	BIS013U	Universal processor unit, Profinet I/O (IRT), for high-memory and high-speed data carriers
		BIS015P	Read/write head, Ø 18 × 65 mm, high memory, round antenna
		BIS0044	Data carrier, FRAM, 2000 bytes
Reliable tracking of units	BIS industrial RFID systems UHF 860...940 MHz	BIS0193	Processor unit, Ethernet/IP, operating frequency 902...928 MHz, other country variants available
		BIS00P0	Read/write head, 133 × 18.4 × 133 mm, operating frequency 865...868 MHz
Monitor automated guided vehicles	BIS industrial RFID systems UHF 860...940 MHz	BIS013U	Universal processor unit, Profinet I/O, dimension 172 × 48 × 62, ambient temperature 0...+60 °C
		BIS0174	Data carrier, dimension 25 × 12.85 × 110 mm, memory type EEPROM, ambient temperature -40...+85 °C
		BIS015Z	UHF read/write head (865...868 MHz), dimension 130 × 50.5 × 130 mm, ambient temperature -20...+55 °C
Use all RFID technologies simultaneously	BIS industrial RFID systems	BIS V...*	Universal BIS V processor unit for HF/LF/UHF, various fieldbus variants available
Prevent downtimes of conveyor motors	CMTK Condition Monitoring Tool Kit	BAV002N	Monitoring of plants, machines and processes, IO-Link, Ethernet TCP/IP, USB, up to four sensors per processor unit
Reliably detect objects	BES inductive sensors	BES05T8	Inductive sensor, M12 × 1, Ø 12 × 60 mm, non-flush installation, range 7...11 mm, 500 Hz, brass, nickel-free coating, -25...+70 °C
Pallet tracking	BIS industrial RFID systems HF 13.56 MHz	BIS013U	Universal processor unit, Profinet I/O (IRT), for high-memory and high-speed data carriers
		BIS015P	Read/write head, Ø 18 × 65 mm, high-memory, round antenna shape
		BIS0044	Data carrier, FRAM, 2000 bytes
Check the fill level of containers	BOS Photoelectric sensors	BOS01JP (emitter and receiver)	Through-beam sensor, 10.8 × 43.5 × 19.5 mm, PNP NO/NC, laser red light, range 0...30 m, M8 connector, 10...30 V DC
		BOS0290 (receiver), BOS028Y (emitter)	Through-beam sensor, 15 × 48.9 × 31 mm, PNP NO/NC, LED infrared, range 0.3...20 m, M12 connector, 10...30 V DC
Trace parts in production and assembly	BIS industrial RFID systems HF 13.56 MHz	BIS013U	Universal processor unit, Profinet I/O (IRT), for high-memory and high-speed data carriers
		BIS0140	Read/write head, M16 × 55 mm, brass, flush in steel, ISO 15693, IP67, circular antenna, 0.3 m cable with M12 connector
		BIS00NW	Data carrier, Ø 22 × 21 mm, PA12, flush in steel, ISO 15693, IP68, circular antenna, 2000 byte memory
Wireless data transmission	BNI IO-Link Wireless network modules	BNI00FF	IO-Link Wireless sensor/actuator hub, IO-Link 1.1, 8 × M12, -5...+50 °C
		BNI00FE	IO-Link Wireless master, IO-Link 1.1, 130 × 50.5 × 130 mm, -5...+50 °C

Application	Products	Example	Functions, interfaces and features
Navigate automated guided vehicles	BIS industrial RFID systems HF 13.56 MHz	BIS013U	Universal processor unit, Profinet I/O (IRT), for high-memory and high-speed data carriers
		BIS00T0	Read/write head, 80 × 40 × 84.5 mm, PBT, IP67, round antenna, M12 connector
		BIS00Y5	Data carrier, 51.5 × 6.4 × 51.5 mm, ISO 15693, ABS, round antenna, metal-free installation, IP67, 112 bytes
Capture data while moving	BIS industrial RFID systems HF 13.56 MHz	BIS013U	Universal processor unit, Profinet I/O (IRT), for high-memory and high-speed data carriers
		BIS00M6	Read/write head, 84.5 × 113.4 × 40 mm, PBT, IP67, round antenna, M12 connector
		BIS00Y9	Data carrier, Ø 30 × 9.7 mm, ISO 15693, PA, round antenna, non-flush on steel, IP67, 2000 bytes

**SORTING AND PICKING**

Paperless picking	BNI SmartLight stack lights and indicator lights	BNI00EE	Six segments (yellow, green, blue, red, orange, configurable), running light mode, level mode, segment mode, colour circle mode
Read all common codes	BVS handheld code reader	BVS0021	Reading of all common 1D, 2D and stacked barcodes as well as postal codes in any rotational position (up to 40° tilt) and in motion
Visually inspect quality in commissioning processes	BVS vision sensors	BVS CA ...*	For image analysis, object inspection, color analysis, measurement, object recognition and positioning
Connecting safe devices	BNI Profisafe I/O modules with IO-Link	BNI0098	2 × M12 female, 8-pin, 6 × M12 female, 5-pin, Profisafe over IO-Link 1.1, 68 × 32.4 × 181.5 mm
Avoid robot collisions	BUS ultrasonic sensors	BUS005C	Output 4...20 mA, range 1000 mm, IP67, universally applicable they work regardless of color and surface condition. Fog, dust or dirt are no problem for them.
Automated picking and depalletizing	BVS 3D cameras	BVS004K	Smart 3D camera, integrated image processing, application-specific software modules, LAN (Gigabit Ethernet), GigE Vision 2.0, TCP/UDP, 0.5...3 m, optimum depth range, 4 mm focal length
Collaborative picking and commissioning	BVS 3D cameras	BVS0047	Smart 3D camera, integrated image processing, application-specific software modules, LAN (Gigabit Ethernet), GigE Vision 2.0, TCP/UDP, 0.2...1 m, optimum depth range, 4 mm focal length
Control robot when loading containers	BVS industrial cameras	BVS CA ...*	Industrial camera, IP67, GigE vision/USB-3.0 interface, resolutions up to 31.5 MP, net data rates of up to 1245 MB/s
Mobile identification	BVS handheld code reader	BVS001Y	Handheld code reader for all common 2D, 1D and stacked codes, data transmission via Bluetooth 2.0, LED white light lighting, industrial-grade housing
Charge automated guide vehicles	BIC inductive couplers	BIC0075 (base), BIC0076 (remote)	120 × 120 mm, unidirectional version, power only, working range 0...4 mm

\* Please contact our sales department to configure your product. For more products, visit our website at: [www.balluff.de/go/product-finder](http://www.balluff.de/go/product-finder)





#B\_IloT

# 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.



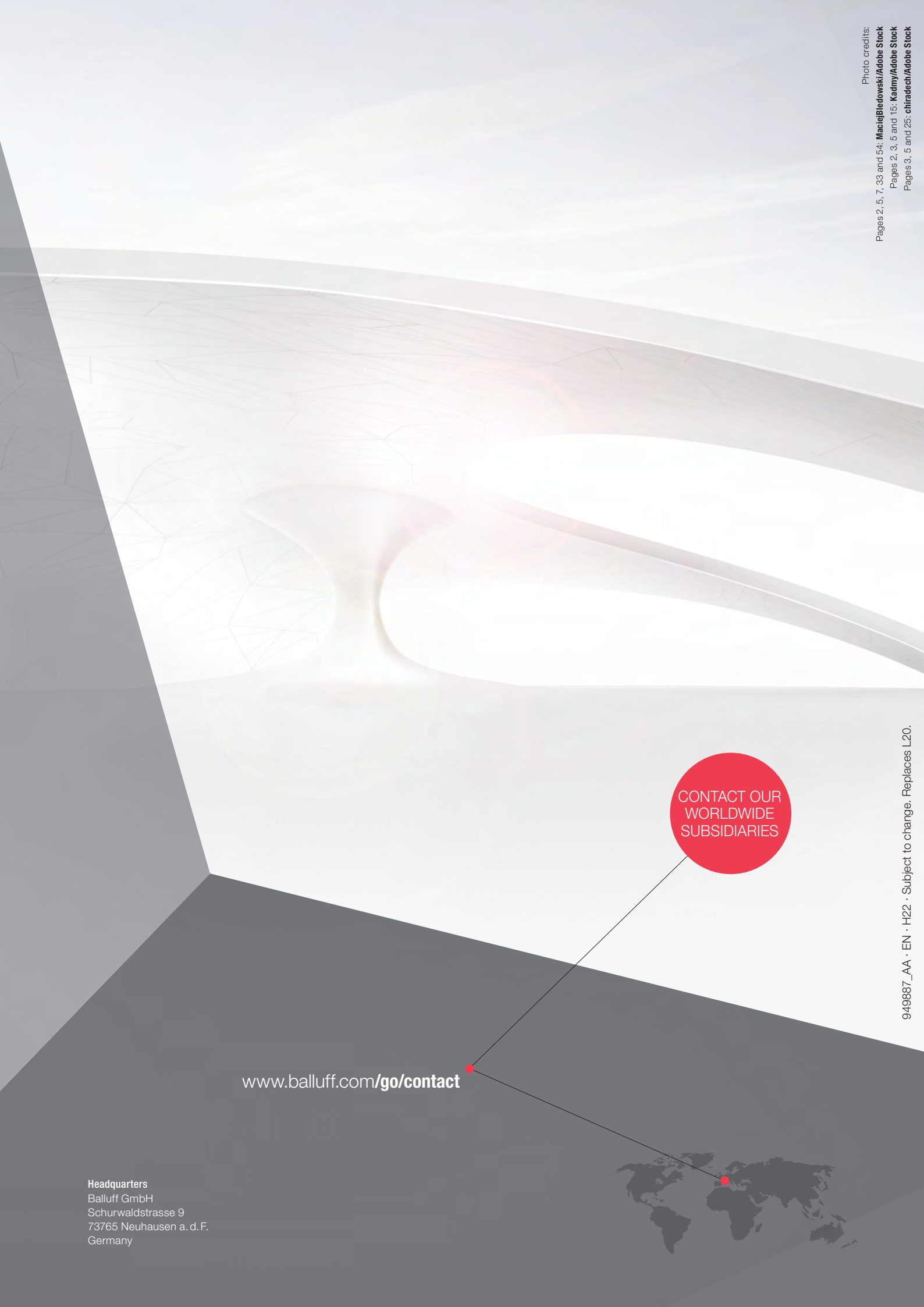


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**Headquarters**  
Balluff GmbH  
Schurwaldstrasse 9  
73765 Neuhausen a. d. F.  
Germany



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