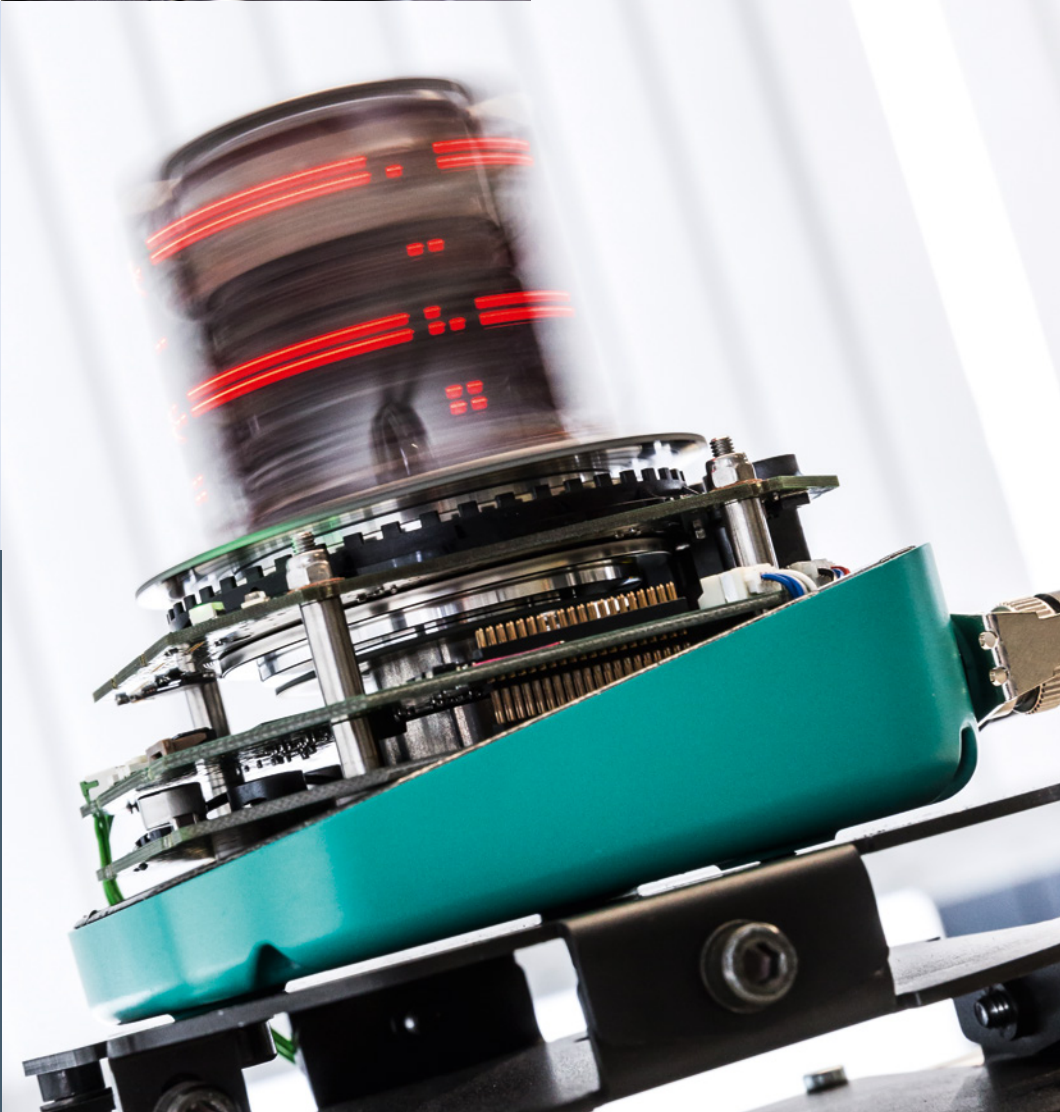
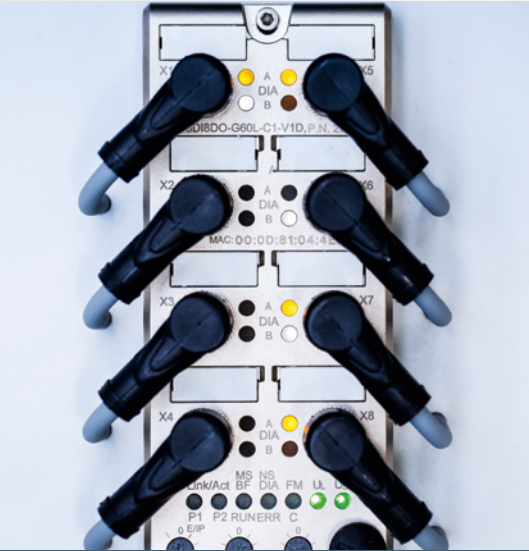
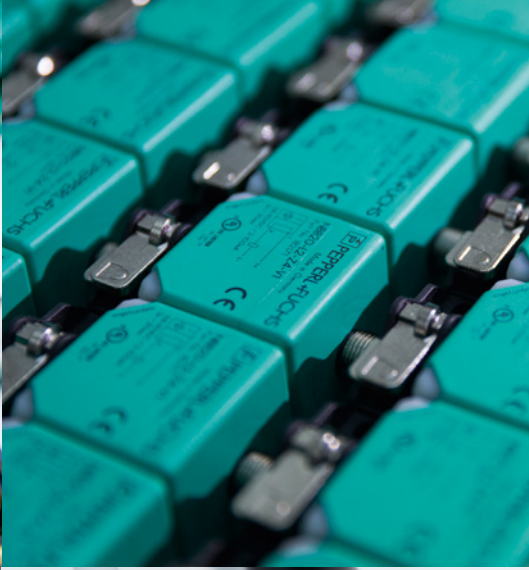


IIoT Roadmap

A Digitalization Technology Guide



Your automation, our passion.

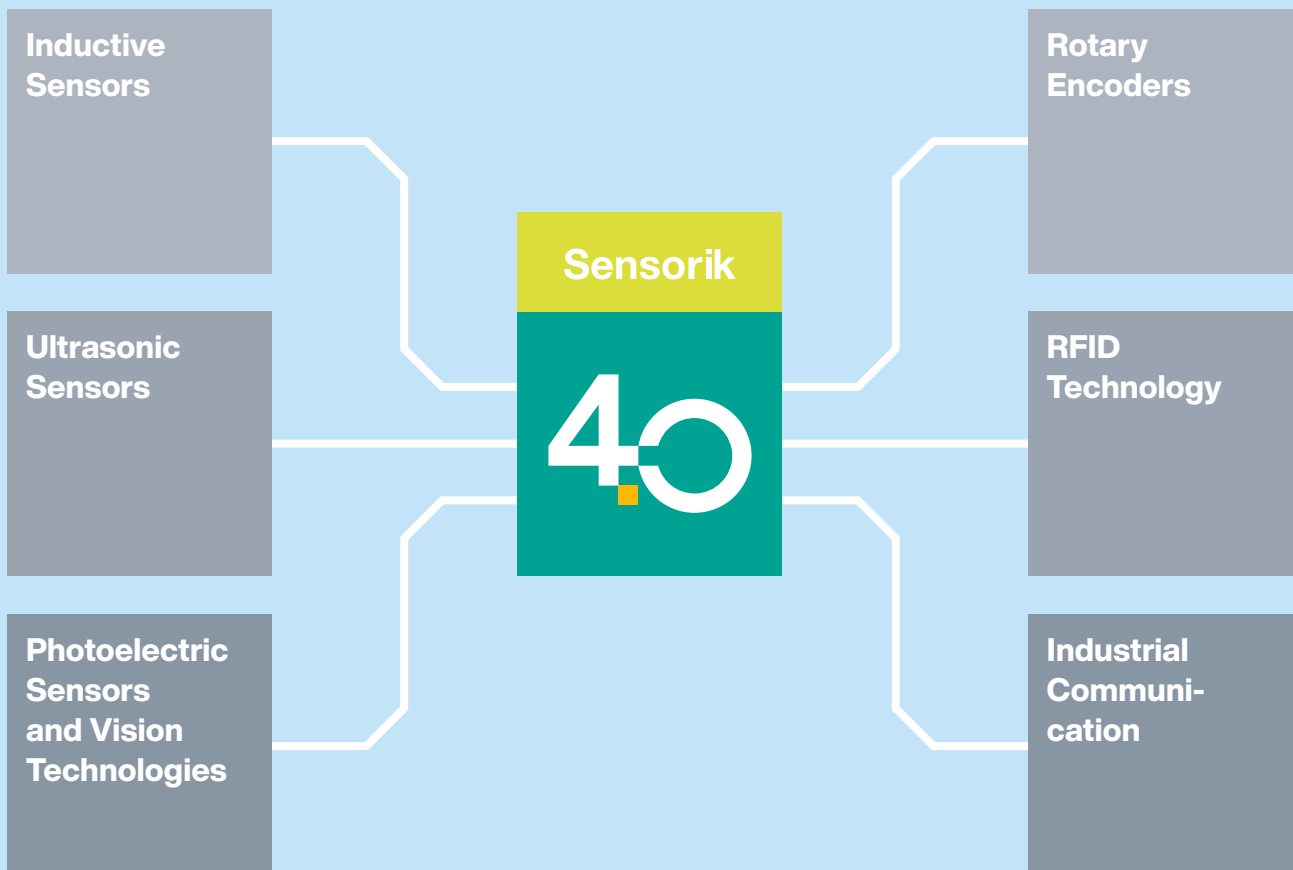


Sensorik4.0 from Pepperl+Fuchs

Innovative Solutions. Perfect Applications.

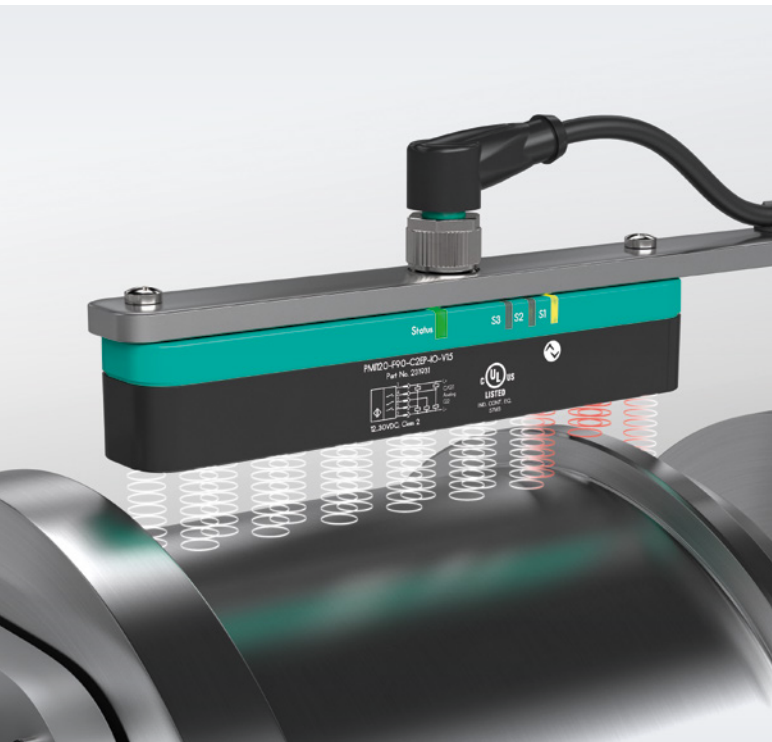
At Pepperl+Fuchs, the path forward is inspired by our commitment to helping you harness the possibilities of Industry 4.0. We are driven by the goal of enabling and supporting fully digitalized manufacturing processes. Sensorik4.0 is our vision for the next generation of technologies that make this digitalization a reality, offering you a competitive edge in an ever-changing environment.

The ideas behind Sensorik4.0 have not just led us to develop new sensors that can communicate with cloud frameworks and applications—they have expanded our focus beyond sensors to include the infrastructures central to Industry 4.0. As we plan and design our next innovations, this roadmap helps us navigate the challenges, possibilities, and opportunities ahead together. After all, our success has always been driven by our passion for your automation.



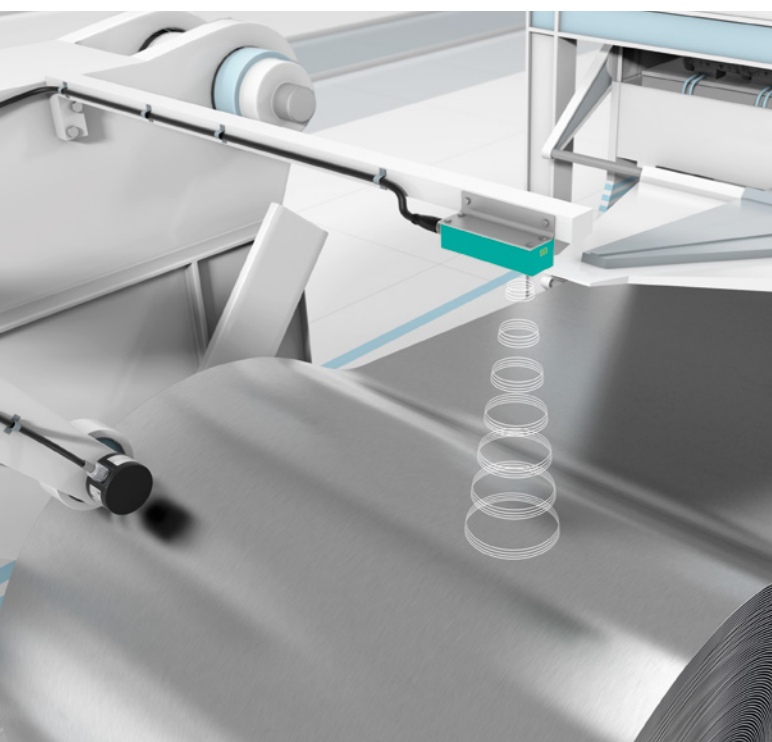
Core Technologies

To develop the innovations that will make your vision of the digitalized factory possible, we are building on our established areas of expertise. With a strong focus on innovation, user input, and close customer cooperation, Pepperl+Fuchs is continuously looking for new ways to solve existing problems and anticipate the roadblocks ahead. Our strong portfolio of core technologies is the ideal foundation for solving the automation challenges of the future.



Inductive Sensors

Chances are you know Pepperl+Fuchs for its unparalleled product depth and expertise in inductive sensors—the workhorse of automation. Ever since we invented the inductive sensor over 50 years ago, we have continued to develop new applications for this foundational technology, including noncontact positioning systems and wireless inductive power/sensing solutions.



Ultrasonic Sensors

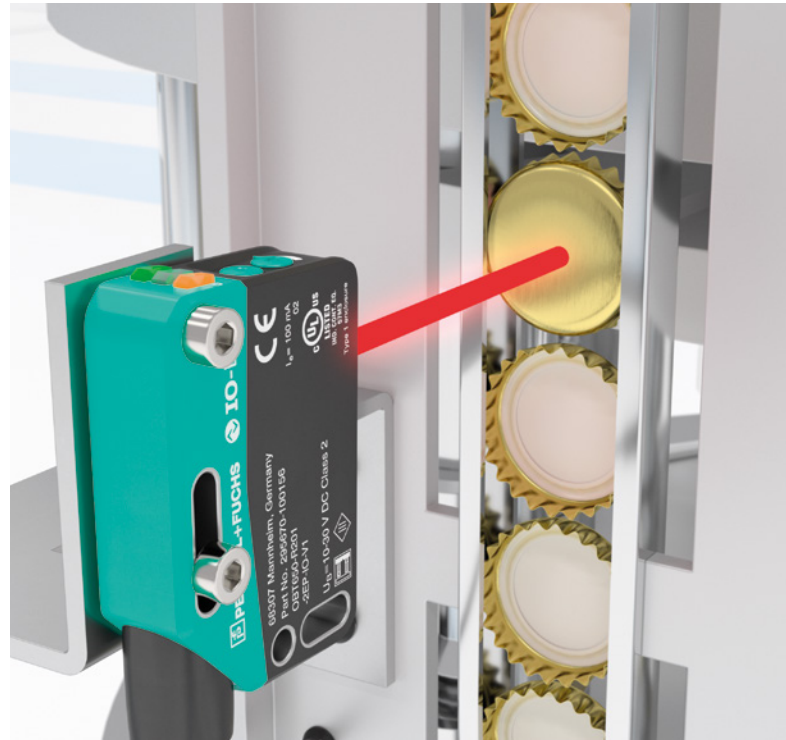
Pepperl+Fuchs is the world market leader in industrial sensing products that use ultrasonic technology. The strengths of this technology are its large detection range, color independence, and high immunity to dirt and dust. Advanced materials including aluminum, composites, and sophisticated alloys are all detected using ultrasonic sensors.

Sprayer height control in precision farming applications, double sheet detection on voting machines, and automotive presses are applications where we put our ultrasonic expertise to work.

Photoelectric Sensors

Light-based sensing is an indispensable solution in applications ranging from material handling to robotic vision. With the development of Pulse Ranging Technology (PRT), we have been a leader in high-precision time-of-flight 1-D sensing and 2-D LiDAR scanners.

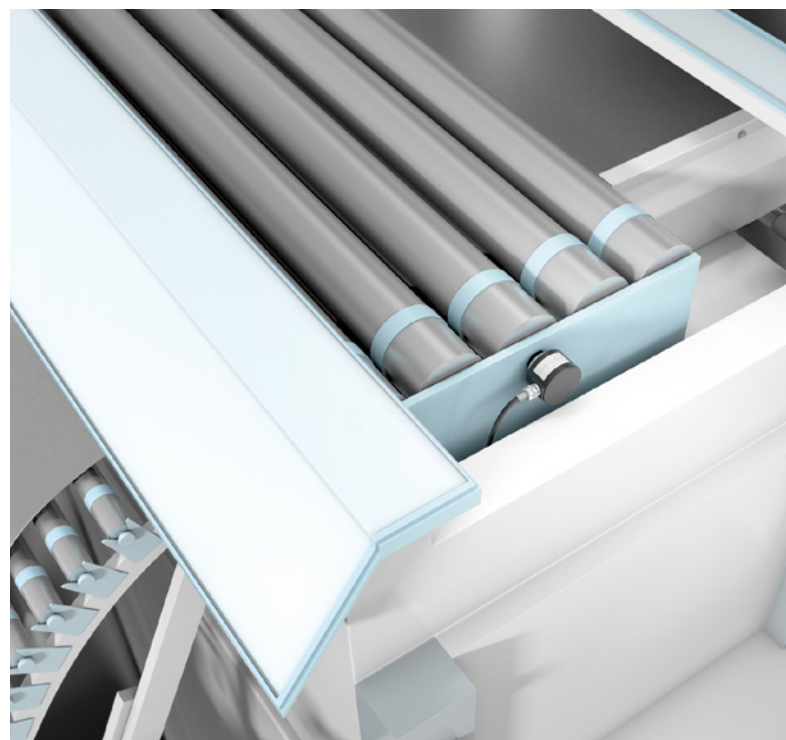
For the first time, our products allow automated guided vehicle (AGV) manufacturers to implement feature-based dynamic navigation in totally unstructured plant environments that are gradually changing up to 100%.



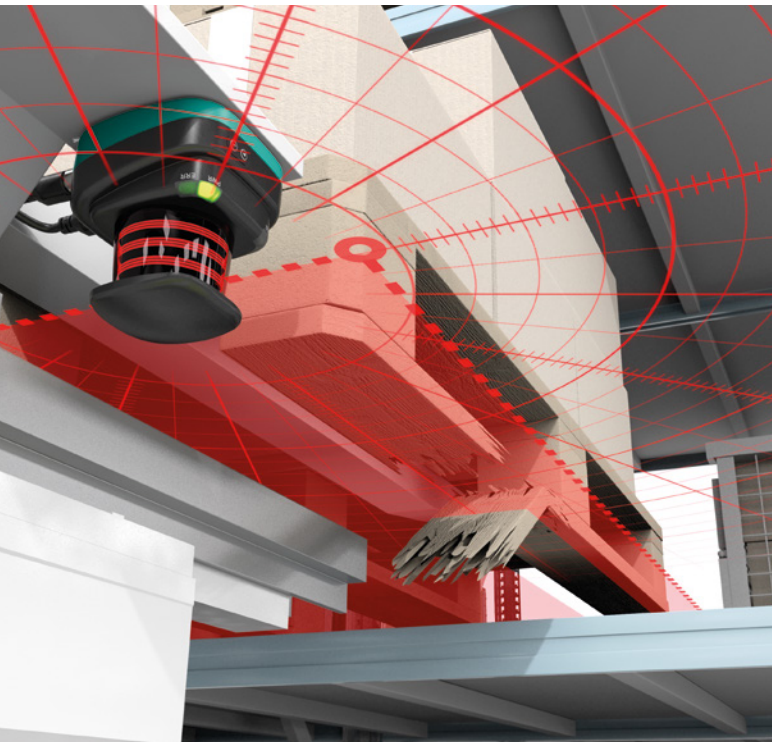
Rotary Encoders

Industrially hardened rotary encoders, used extensively in factory automation and on mobile and construction equipment, have been a core competence for decades. To support our Sensorik4.0 vision, an effort is underway to add IO-Link to the portfolio.

These revolutionary solutions will go hand in hand with enhancements made possible with our IO-Link masters and their Multilink™ technology. As one result, our customers will have direct access to extended encoder data for configuration, operation, and diagnostics.



Core Technologies



Pulse Ranging Technology

PRT is still a relatively new sensing principle, offering unprecedented performance. Originally, it was only applicable in high-end devices like long-range distance measurement sensors and precision navigation scanners.

Driving down the cost of PRT while retaining its performance is a medium-term goal. However, applications for PRT will not only include low-cost standard sensors but also high-performance 2-D and possibly even 3-D solutions. The introduction of a 2.5-D LiDAR scanner is an exciting step toward enhancing robotics and AGV technology.



Vision Technologies

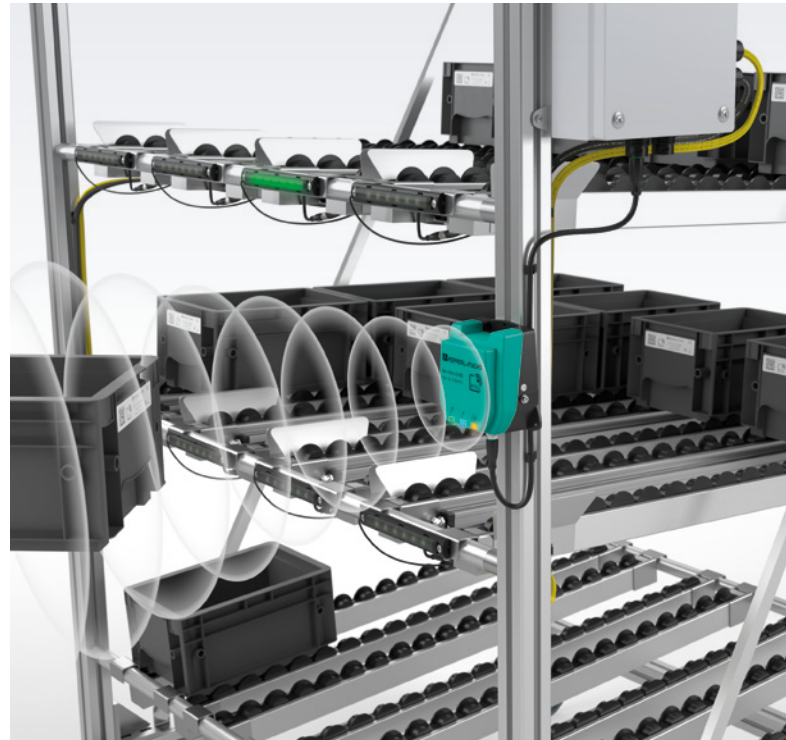
Our team of vision experts designs and builds automation technologies that use cameras to solve and simplify demanding automation tasks. This includes conventional 2-D cameras, light section sensors, highly specialized laser-line optical micrometers, and optical identification systems for Data Matrix and high-temperature applications.

In conjunction with the Pepperl+Fuchs subsidiary VMT, vision technology products are frequently used to provide totally integrated systems in automotive, pharmaceutical, and high-value aerospace applications.

RFID Technology

Industry 4.0 will result in the demand for individual, detailed product identification, and RFID is the best technology available for this. There is a clear need for lower-cost, easy-to-configure, yet more flexible RFID, and we see the combination of Sensorik4.0 and RFID solutions as the answer. RFID will also have applications in cases where edge computing is mandatory to meet performance goals and cost targets.

We are confident that, for the first time in automation, performance and simplicity are not a zero-sum game—the consumer market has clearly demonstrated that accessibility increases over time. Automation-quality services architecturally similar to common consumer web applications like IFTTT (If This Then That) are likely to emerge and will support this trend.



Industrial Communication

IIoT and Industry 4.0 require intelligent sensor connectivity to enable new and flexible solutions. Pepperl+Fuchs RFID IDENT applications using IO-Link allow new machine secure-access and operation solutions. RFID and IIoT offer dynamic machine and automation control that can save energy and improve machine health. By combining technologies, Pepperl+Fuchs puts the intelligence into Industry 4.0 connectivity!



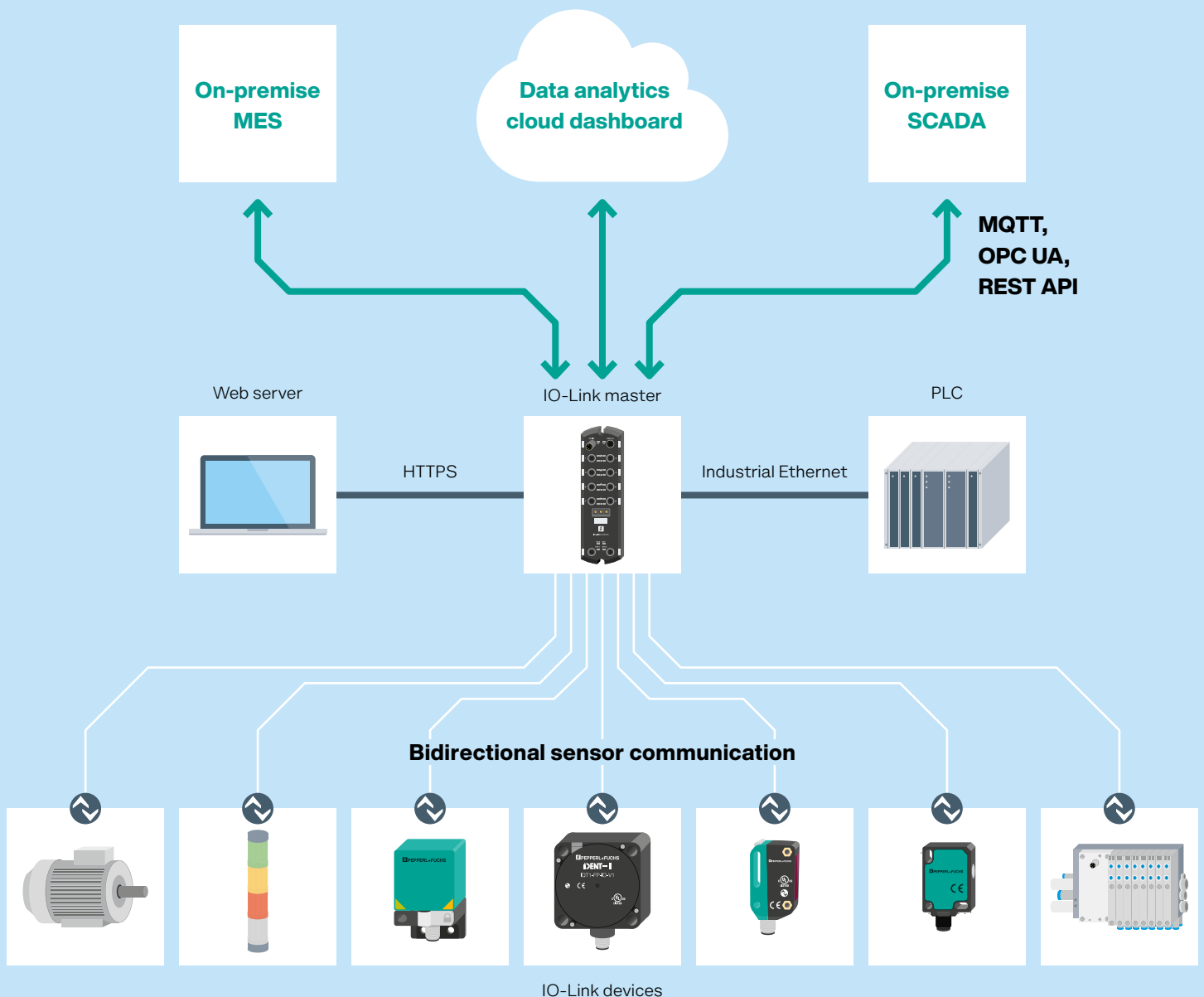
Stepping toward a New Generation

Powerful IIoT connectivity, extended functionalities, multi-sensor systems, and value-added services

IIoT and Industry 4.0 are not possible without bidirectional sensors. The ability to communicate automatically with every machine and production system is a fundamental requirement. This includes automation devices ranging from simple sensors to complex devices such as RFID, edge sensor gateways, and network communication solutions.

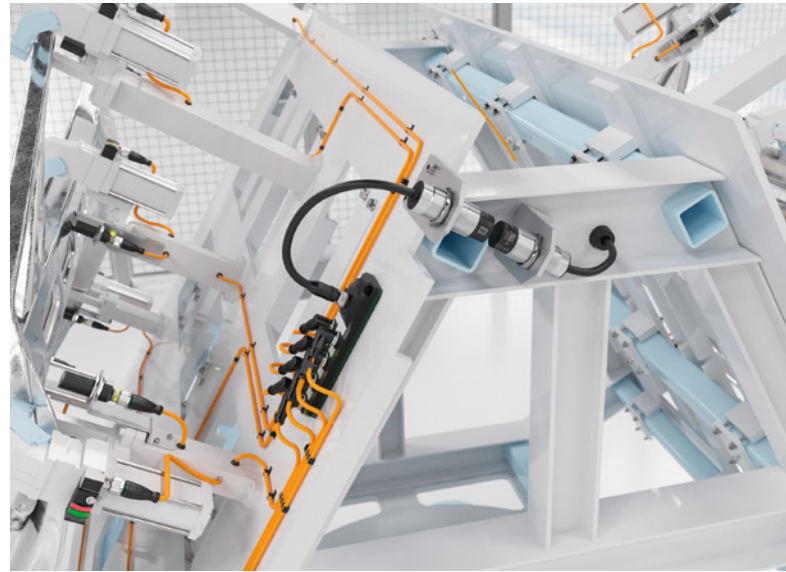
Sensorik4.0 lays the foundation for sensors and communication gateways to communicate with all levels of control. In partnership with software providers, new data protocols such as MQTT, OPC UA, and REST APIs allow direct sensor communication to share necessary data analysis with multiple roles within the company.

Sensor-to-Cloud Connection



IloT and Industry 4.0

With Industry 4.0 and IloT, global manufacturers, plants, and logistics companies are looking to capitalize on the new benefits provided by systems, software, and machines working together. Enterprises in every industry are turning to IloT to improve production efficiency, cut costs, and drive profitability. By sharing new data available from “talking” sensors and machines, information can flow from the edge to the boardroom. To achieve these goals, cloud dashboards are deployed with real-time information, metrics such as predictive maintenance and condition monitoring are displayed, and manufacturing downtime is avoided.



Industrial Networking

Our current suite of industrial networking products includes industrially hardened switches, serial-to-Ethernet gateways, and the world's first IO-Link master/edge gateway with MultiLink for concurrent industrial Ethernet and IloT communication via OPC UA, MQTT, and REST APIs. This industry-leading suite of products not only ensures that new equipment can be effortlessly constructed to harness the capabilities of Industry 4.0, but it also makes sure that existing legacy equipment can be easily and cost-effectively upgraded so that a fully Industry 4.0 connected enterprise can be realized.



Enterprise Mobility

ecom develops products and systems that interact seamlessly with each other to provide the best possible user experience. Our industrial phones, tablets, and smart watches simplify the daily work of mobile workers and enable them to be more productive in all industrial environments while staying connected with key information. Future-oriented innovations and holistic solutions in mobile computing and communication technologies help companies increase their productivity, improve the quality of their data, and accelerate and optimize decision-making.



From Sensor to Solution



Pepperl+Fuchs VMT

Vision systems represent the most complex step in image processing. Tailored to the specific requirements of each application, the turnkey image processing and laser sensor system solutions are suitable for almost all branches of industry, from automotive to pharmaceutical.

The responsible competence center is VMT Bildverarbeitungssysteme GmbH—a company belonging to the Pepperl+Fuchs Group. The highly qualified team of experts has 20 years of experience in industrial image processing.



Cloud Solutions from Neoception

The Pepperl+Fuchs subsidiary Neoception develops innovative software solutions and industrial IoT services that are specially tailored to our customers' individual business processes and requirements. Neoception solutions allow field devices to be smoothly integrated into existing IT infrastructures with real-time cloud access to parameters. This central availability of field device data allows remote monitoring and custom analysis so existing processes can be optimized and potential can be identified. For field device integration, users do not need specialized knowledge of the transfer technology—they can focus on selecting and analyzing their parameters.

Shaping the Future of Automation Solutions through Partnership

Developing innovative technology is only half the story in IIoT automation solutions. Successful IIoT and Industry 4.0 deployments require cooperation and integration with IIoT software partners as well as coordination with standards organizations. Pepperl+Fuchs and its leadership actively participate in standards, consortiums, and directives to ensure that the most advanced Industry 4.0 solutions will seamlessly integrate into every automation environment!



Standards Organization Memberships

Your automation, our passion.

Explosion Protection

- Intrinsic Safety Barriers
- Signal Conditioners
- FieldConnex® Fieldbus Infrastructure
- Remote I/O Systems
- Electrical Explosion Protection Equipment
- Purge and Pressurization Systems
- HMI Systems
- Mobile Computing and Communications
- HART Interface Solutions
- Surge Protection
- Wireless Solutions
- Level Measurement

Industrial Sensors

- Proximity Sensors
- Photoelectric Sensors
- Industrial Vision
- Ultrasonic Sensors
- Rotary Encoders
- Positioning Systems
- Inclination and Acceleration Sensors
- Vibration Sensors
- Industrial Ethernet
- AS-Interface
- IO-Link
- Identification Systems
- Displays and Signal Processing
- Connectivity

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