Connecting Worlds.

Go digital with all signals for control and optimization processes.

PEPPERL+FUCHS

Remote I/O Solutions for Use in Zone 1 and Zone 2/Div. 2

Your automation, our passion.

PEPPERL+FUCHS

Explosion Protection
It's All about Process Industry

"Safety first!"—At Pepperl+Fuchs, the pioneers in explosion protection, this claim stands behind all components and solutions that we have been developing for you for more than seven decades. Protecting your processes and applications with absolute reliability and continually optimizing them is what drives our actions. To achieve the best results, we intensively research your markets and the special challenges you face every day. Therefore, continuous dialog with you is essential, as is cooperation at eye level—working together is the path to our success.

Partnership requires proximity. That is why you will always find a technical expert at more than 50 Pepperl+Fuchs locations worldwide. And what's more: in six Solution Engineering Centers (SECs) on four continents, our experts develop your application-specific solution in every type of ignition protection, from the first consultation to the commissioning of your plant—close to you.

The fact that we always develop the right solution for every application is not only due to a complete portfolio for hazardous areas, but also due to the expertise we have been passing on and developing from generation to generation since 1945. This has made us the market leader and innovation driver in electrical explosion protection as well as a recognized expert in functional safety. With more than 10 million SIL components installed and the world's only complete SIL 3 portfolio that includes all signal types.

Whether conventional applications or complex tasks such as the digital transformation of your application to IIoT level: rethinking established technologies, turning forward-looking concepts such as Ethernet-APL into real innovations, integrating mobile devices for hazardous areas into your processes, and providing new digital products and services for automation— this is how we pave the way for upcoming challenges.

Join us in the future of process automation!
www.pepperl-fuchs.com

Connecting Technology Generations

The LB (Zone 2/Div. 2) and FB (Zone 1) remote I/O systems are the bridge between the analog and digital communications in process automation. They are used to integrate field devices with analog interfaces such as 4 ... 20 mA, NAMUR sensors, or solenoid valves into the digital communication of the DCS. Based on a modular design, these systems match a wide range of different requirements. They are designed for installation close to sensors in Zone 2/Div. 2 or Zone 1 hazardous areas.

A remote I/O system consists of four components: backplane, power supply, I/O modules, and gateway. In addition to communicating process data to the DCS, the system also transmits diagnostic and configuration data to other systems such as plant asset management. This not only enables full access to the process control instrumentation, it also supports ongoing process optimization and preventive-maintenance concepts without disturbing or interfering with process control.

Protection of Investment with Time and Cost-Saving Installation
- Installation in the field possible, minimizing necessary wiring, marshaling, or cross-over cabinets, and leading to significantly reduced hardware needs
- Upgrading of DCS or asset management level so that installed sensors and actuators can be reused 1:1
- High-performance HART connection included, with no additional hardware required
- Integrated signal isolation (galvanic), with no additional barriers required

Configurable High Plant Availability
- Installation of an asset management system with integration of diagnostic and configuration data available in the field device
- Redundant gateways and redundant power supplies selectable
- Hot-swap function for the exchange of all modules during operation

Modular Assembly
- Wide variety of analog interfaces and flexible bus connection

Reliable Data Transfer
- Direct galvanic isolation for all connected signals in hazardous areas

Simple Integration with Safety System
- External safety shutdown for AO and DO modules with SIL rating
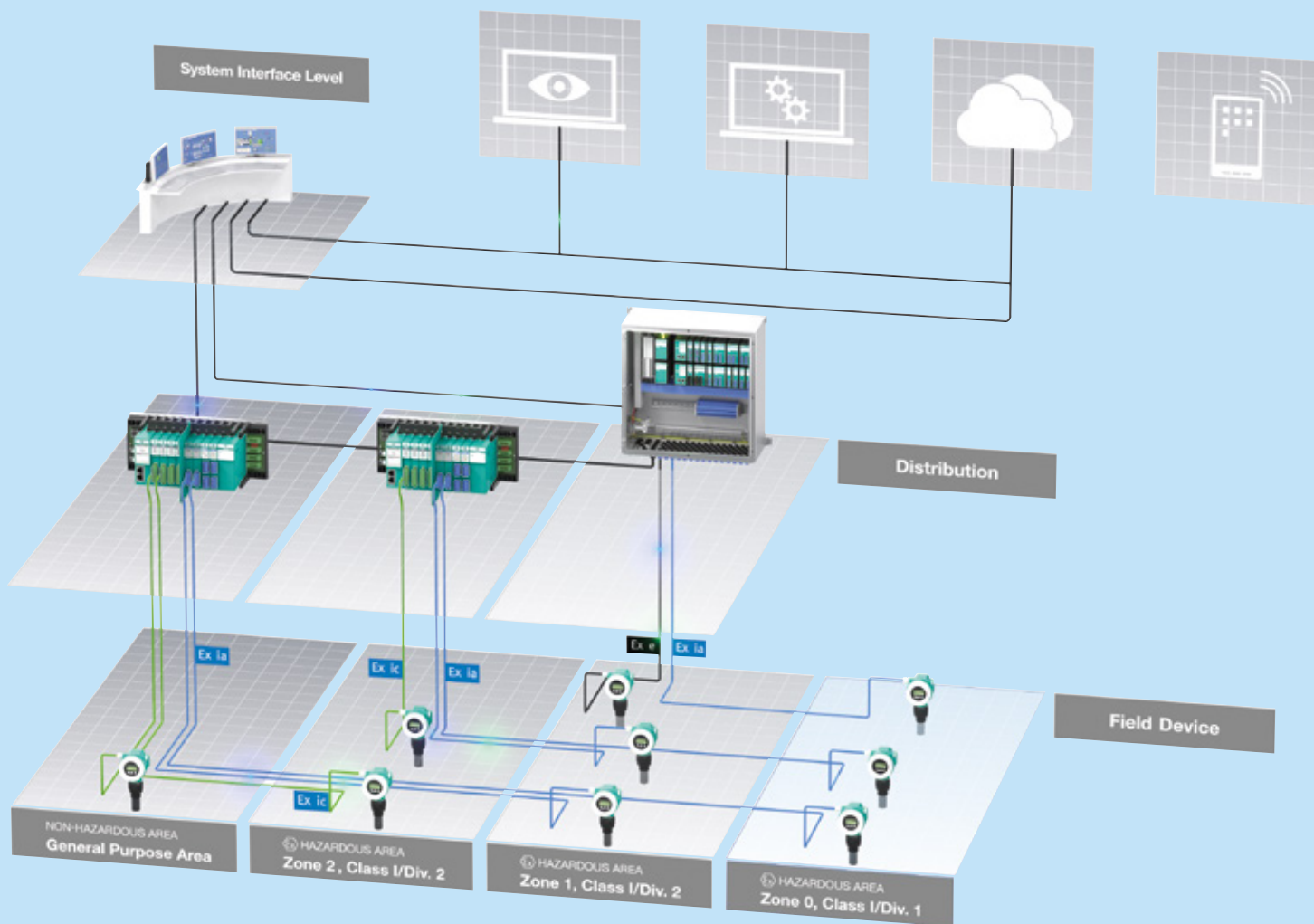- Simple implementation via external contacts

Application Flexibility
- Integration of small hazardous areas into existing higher-level systems

Transparent Design Focusing on Safety and Simplicity

System Interface Level

Distribution

Field Device

Ex ia

Ex ic   Ex ia

Ex ic

Ex e   Ex ia

NON-HAZARDOUS AREA
General Purpose Area

HAZARDOUS AREA
Zone 2, Class I/Div. 2

HAZARDOUS AREA
Zone 1, Class I/Div. 2

HAZARDOUS AREA
Zone 0, Class I/Div. 1

Available Protocols

| PROFIBUS | PROFINET | Modbus TCP | Modbus RTU |

Supported Signals

| HART | 🌡 | 🔧 | DI | AO | 4 … 20 mA |

Remote I/O systems from Pepperl+Fuchs reflect the experience and application know-how of a long-time technology partner of the process industry. Ethernet-based communication allows a totally new level of process control and plant visualization. The modular design with full integration of hazardous-area protection simplifies system design and maintenance. Direct access to device data supports preventive-maintenance concepts to minimize plant downtime.

Flexible Explosion Protection

Explosion protection is one of the key requirements in the international process industry, and Pepperl+Fuchs has over 70 years of experience in this field. We are able to provide any feasible combination of products for safe installation in any zone.

The FB system for Zone 1 installation is a solution based on real-life experience. Innovative front terminals allow the use of increased safety (Ex e) and intrinsic safety (Ex i) modules side by side, supporting the safe and easy exchange of modules.

The LB system for Zone 2/Div. 2 installation allows for a side-by-side operation of circuits with intrinsic safety and other terminals. This innovative solution saves valuable space inside the control cabinet while conforming to all established standards.

Transparency across All System Levels

With protocols such as HART, PROFIBUS, or MODBUS, Pepperl+Fuchs has continuously enhanced the transparency of process plants. Remote I/O systems from Pepperl+Fuchs now support the major Ethernet-based protocols for control and diagnostics, offering advanced remote control of field devices while providing comprehensive device data and diagnosis information. This provides plant operators and maintainers with new insights into the status of the process and the field devices.

Flexibility for Unlimited Data Flow

The remote I/O systems from Pepperl+Fuchs operate at the interface between field instrumentation and digital process control. Unlimited communication to PLCs or the Digital Control System (DCS) can utilize established bus standards, such as PROFIBUS, PROFINET, MODBUS TCP, or MODBUS RTU. Ethernet-based communication enables parallel access to the Plant Asset Management (PAM) system, IIoT gateways, and historical applications, even via cell phones.

Convenient Integration and Diagnosis

Easy integration into the Process Control System and Asset Management System is done via standardized integration tools such as GSD files, or EDDL, FDT, or FDI drivers. The well-established HART standard allows convenient configuration of field devices right from the control room. Status information about any device is available for plant asset management and preventive maintenance. This greatly contributes to improved plant availability and reduced downtimes of the plant.

For more information, visit
pepperl-fuchs.com/pf-rio

Cost-Efficient Modernization in Any Hazardous Area

Clear assignment of a signal to a terminal, while integrating existing instrumentation and wiring, in combination with significantly reduced wiring thanks to a bus interface for the control system, means remote I/O benefits from the best of two technologies. Therefore, it is the most cost-effective way for the modification or modernization of process plants in any hazardous area.

Marine Applications

Pepperl+Fuchs offers an expanded range of intrinsically safe products that are specifically certified for use in marine equipment and marine and offshore applications. Certificates for different product groups are available from Bureau Veritas, DNV, Germanischer Lloyd, and Lloyd's Register.

Pharmaceutics

The pharmaceutical industry relies on Pepperl+Fuchs to provide safety and availability for their plants. Our products are proven in use throughout the world in a wide range of applications including batch control automation and asset management systems.

Hydrogen

Hydrogen is considered a key technology of the future. Pepperl+Fuchs supports manufacturers along the entire value chain with innovative products and global support.

Chemical Industry

Pepperl+Fuchs equipment is used in all major chemical companies around the world where hazardous or flammable materials are handled. Our products are globally proven in a wide range of applications including emergency shutdown, fire and gas, automation, and asset management systems.

Oil and Gas

For decades, the fossil fuels industry—with emphasis on oil and gas production—has relied on Pepperl+Fuchs to provide safety and availability for their plants. Our equipment is used in exploration platforms, pipelines, and refineries.
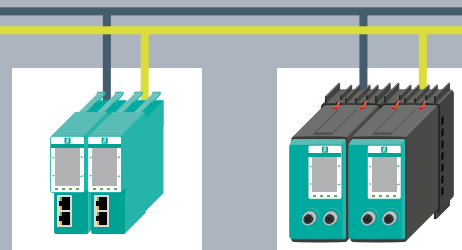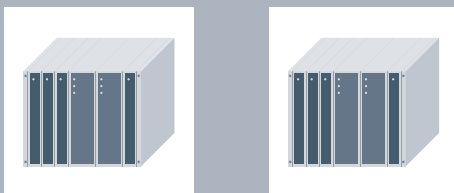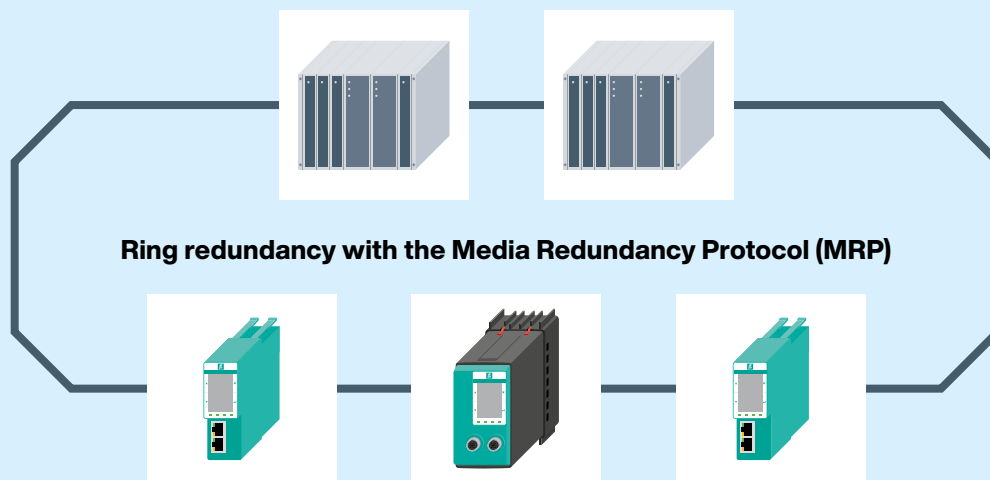
Achieving a High Level of Availability

The worldwide process industry operates in highly competitive markets. Operational efficiency and profitability of a process plant are therefore of utmost importance. LB/FB remote I/O systems not only enable redundant design of all key components, they also allow the detection of field device failure at an early stage, supporting system concepts for high plant availability.
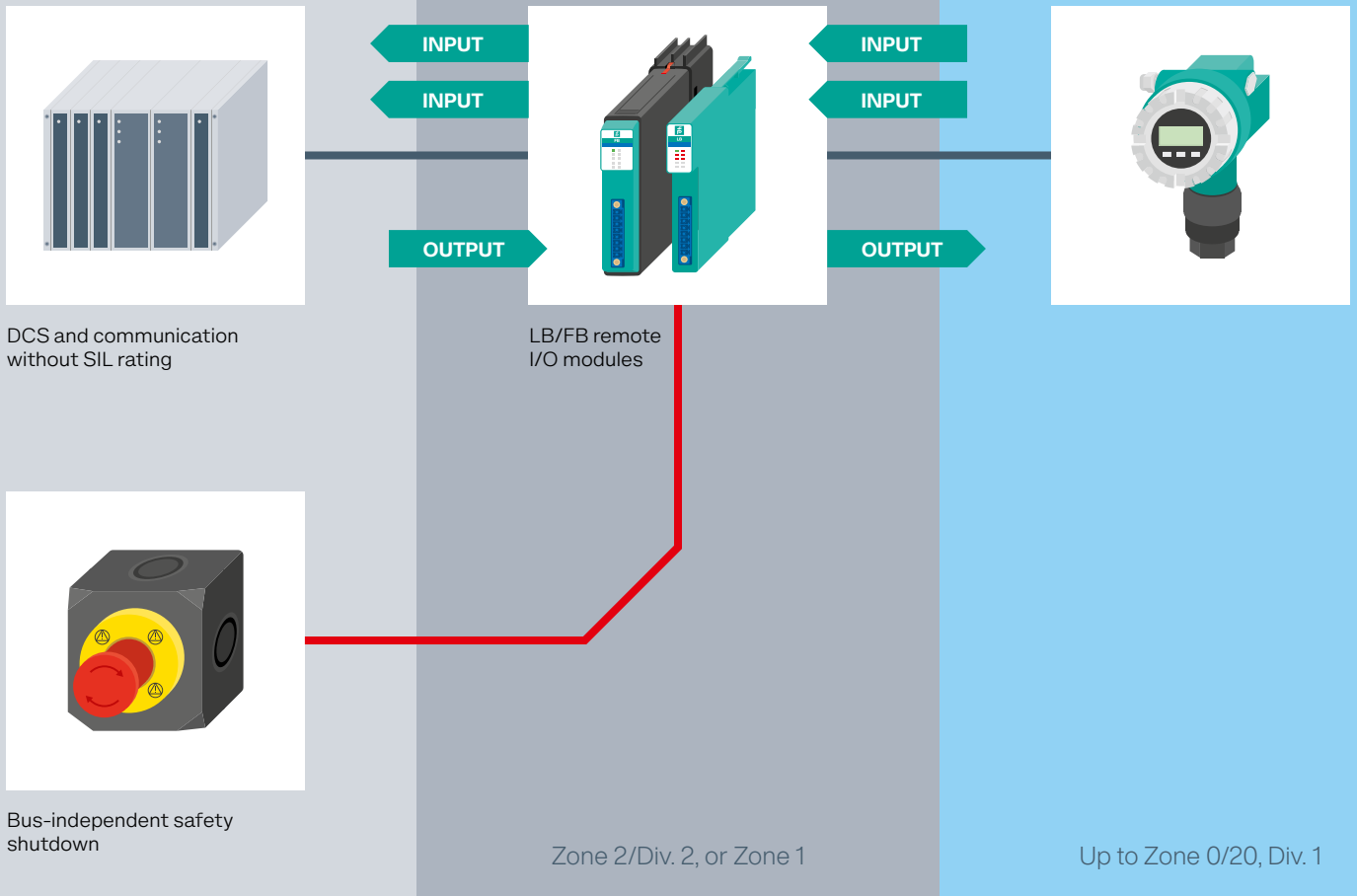
At Pepperl+Fuchs, redundancy is considered an important part of the design of any remote I/O system. All components of the system operate independently of each other. This means that increasing the redundancy of a system simply requires the addition of additional components. This can be done anytime during the plant life cycle. This modularity and flexibility is proving to be highly cost-efficient, since it allows plant operators to invest only in the level of redundancy required for any given installation.

Power Supply Redundancy

Depending on individual requirements, power supply redundancy can be achieved in different ways. Adding a backup power supply unit will offer extra protection from failures. Both units can either be connected to the power source via one common power line or via separate lines to provide added protection. It is also possible to connect one bulk power supply via two independent supply lines to protect against power line lead breakages. If the external power supply or any power supply module fails, an error message is triggered via the gateway.

Ring redundancy with the Media Redundancy Protocol (MRP)

Line, coupler, and system redundancy

INPUT
INPUT

INPUT
INPUT

DCS and communication
without SIL rating

LB/FB remote
I/O modules

Bus-independent safety
shutdown

Zone 2/Div. 2, or Zone 1

Up to Zone 0/20, Div. 1

Communication Redundancy

LB/FB remote I/O systems offer several concepts to ensure the continuation of communication. Plant operators are free to select and combine the concepts to tailor communications availability depending on the availability needs of their plant.

Using a ring topology with Media Redundancy Protocol (MRP), this mechanical solution creates a highly reliable network structure throughout the plant. This suppresses the far-reaching effects that a simple lead breakage can have on plant performance. MRP will route data packages the other way around the ring to maintain network communication despite an existing failure.

Alternatively, cables, couplers, and controllers can be selected independently in a redundant configuration, providing protection from any failure and even multiple concurrent faults. Combining all methods results in complete system redundancy, providing the highest level of availability.

Safety Shutdown According to SIL 2

Establishing operational safety according to SIL 2 can be a complex task requiring the installation of costly safety operating elements and/or special safety bus systems. LB/FB remote I/O systems, however, support a bus-independent safety shutdown.

There are modules with safety shutdown function for digital and analog outputs. They simply cut off the energy supply of up to five independent SIL 2 safety loops, while the remote I/O system itself remains active.

When it comes to valves, the activation of an emergency stop button will immediately cause the valve to go to the fail-safe state independently from the remote I/O system. The system will merely detect the safety shutdown and visualize this situation via an LED. This hardware-only solution conforms to SIL 2 standards. It utilizes the existing safety actuators without the need for additional installation and does not require any complex hardware installations, additional signal isolators, such as for intrinsic safety, or a separate safety bus.
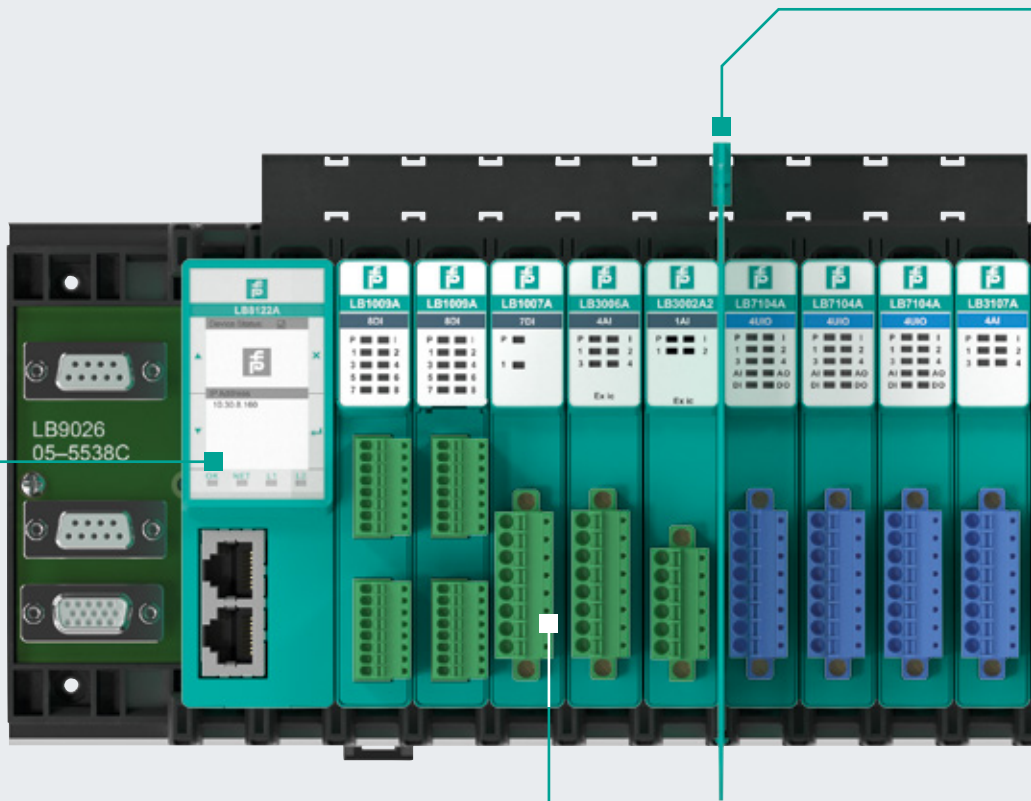
The Most Compact Solution for Seamless Communication

Gateway

Connection to the corresponding bus systems (PROFIBUS, PROFINET, MODBUS RTU, MODBUS TCP)

I/O modules

Intrinsically safe Ex ic or increased safety/not intrinsically safe

A remote I/O system that provides more power and requires less space. That was the goal. The innovative solution is the system with the highest packing density in process automation, providing maximum power.

LB Remote I/O System for Zone 2/Div. 2

Maximum performance in the smallest space: the LB remote I/O system from Pepperl+Fuchs. Compact high-performance modules are simply plugged into a backplane. The energy-saving power management system and low power dissipation allow maximum packing density. With up to 8 channels per I/O module, the LB system is the most compact system on the process automation market.

Remarkably Simple: The Partition Principle

The partition enables intrinsically safe and non-intrinsically safe modules to be located directly next to one another. Simply plugged into the backplane, the partition ensures the required clearance of 50 millimeters. The partition is simply inserted between two modules so that all slots can be utilized.
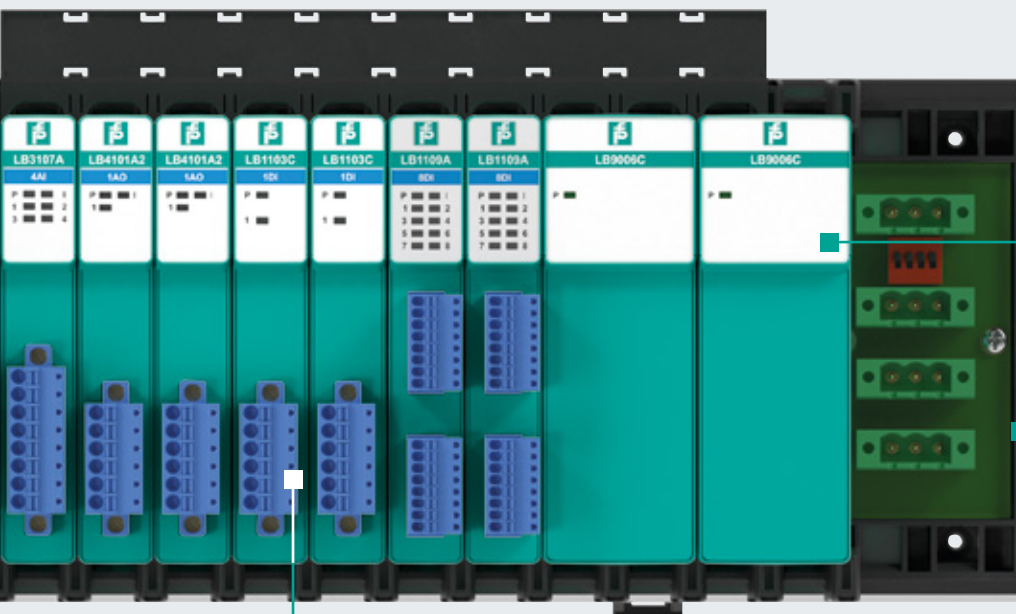
Partition wall
Side-by-side installation of modules with intrinsic safety and other terminals

Redundant power supplies

Backplane

Intrinsically safe I/O modules

Features

- I/O modules for non-explosive and intrinsic safety field connections up to Zone 0 for gas and dust environments
- LB I/O modules can be inserted into any slot, enabling a customized mix of I/O signals
- Modules can be replaced during ongoing operation ("hot swap")
- Combination of 1-channel, high-availability modules with multi-channel modules to achieve maximum packing density
- Configuration during ongoing operation with no bus loss
- Bus and power supply can be redundant
- Maximum of 80 analog and 184 digital inputs and outputs
- Approved for mounting in Zone 2, Class I, Div. 2
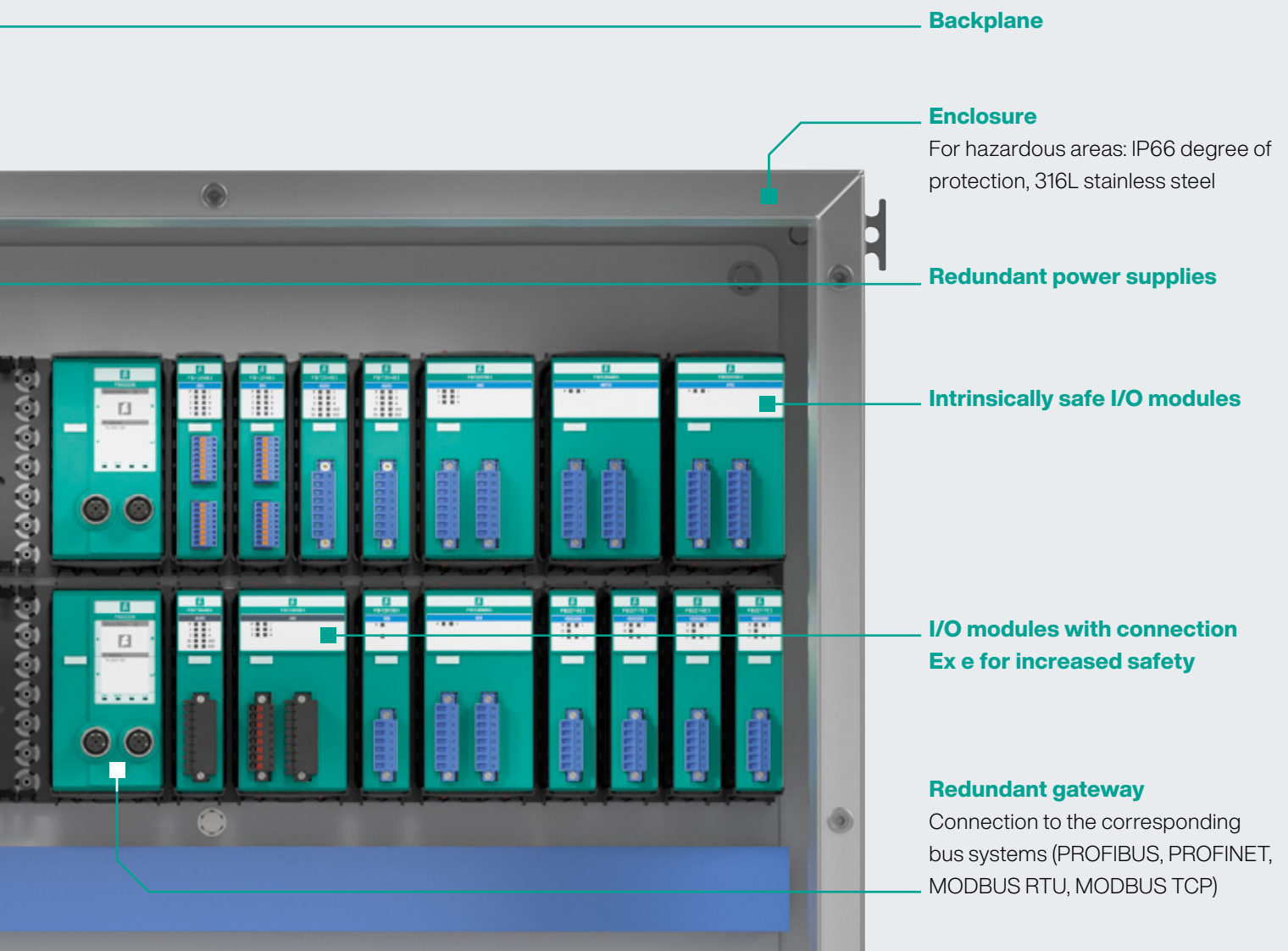
Robust Combination of Efficiency and Safety
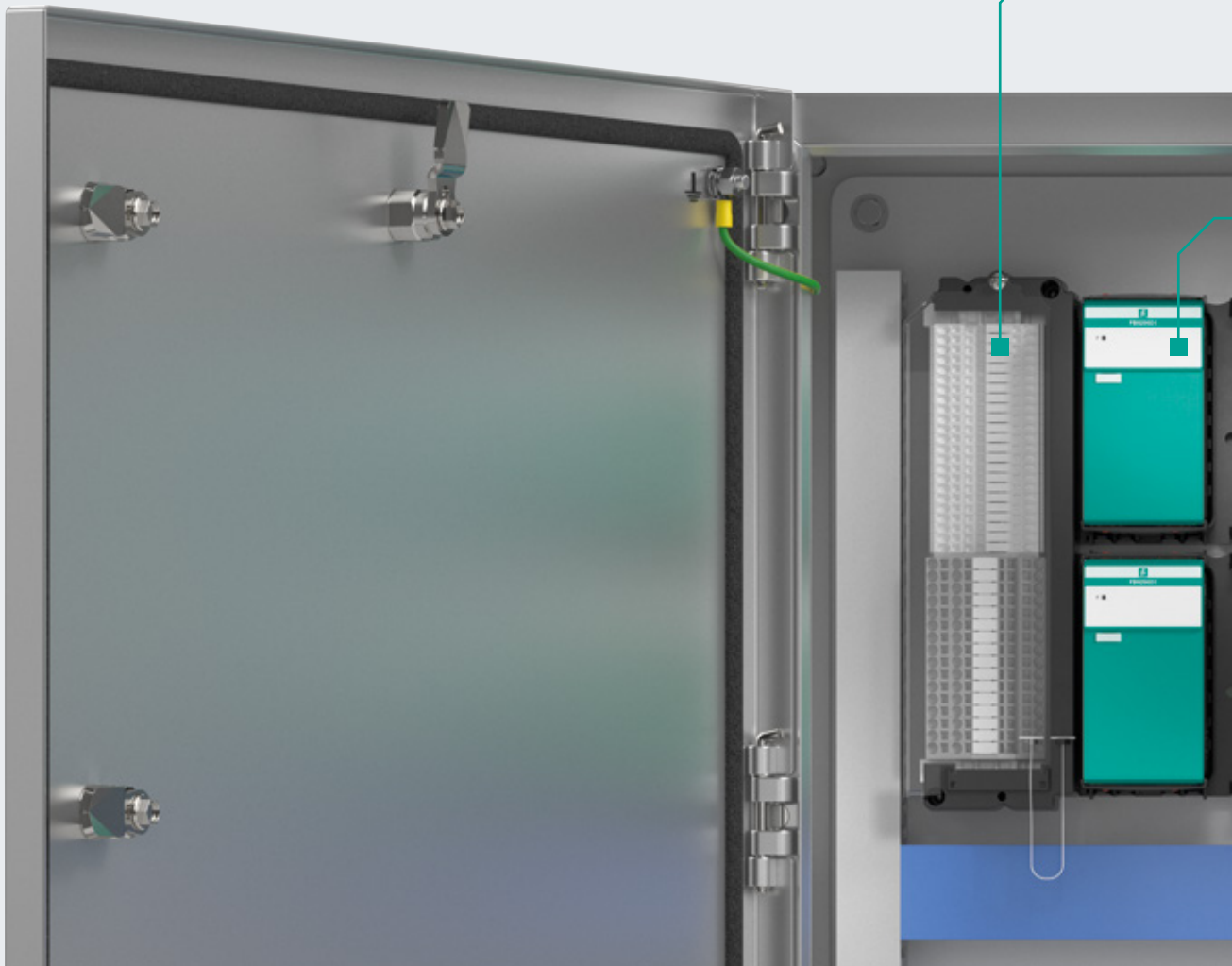
This technology is the perfect match for harsh ambient conditions. An efficient design that makes optimum use of the space available—FB remote I/O systems from Pepperl+Fuchs are ideal for demanding applications in hazardous areas.

FB Remote I/O System for Zone 1

R obust, durable technology: the FB remote I/O system from Pepperl+Fuchs. Highly efficient and reliable, Ex e and Ex i modules can be effortlessly combined. The modules are simply plugged into integrated backplanes of the housing. The corrosion-resistant housings are available in robust glass-fiber reinforced plastic or stainless steel. The product is the perfect match for the harsh ambient conditions that prevail in onshore and offshore plants. The system is based on the same engineering principle as the LB remote I/O system, delivering major benefits for plant operators: as the functionality of both systems appears identical at control level, less training is required for personnel.

Backplane

Enclosure
For hazardous areas: IP66 degree of
protection, 316L stainless steel

Redundant power supplies

Intrinsically safe I/O modules

**I/O modules with connection
Ex e for increased safety**

Redundant gateway
Connection to the corresponding
bus systems (PROFIBUS, PROFINET,
MODBUS RTU, MODBUS TCP)

Features

- I/O modules for Ex e and Ex i field connections up to Zone 0 for gas and
  dust environments
- FB I/O modules can be inserted into any slot, enabling a a customized
  mix of I/O signals
- Modules can be replaced during ongoing operation ("hot swap") for
  maintenance without the need to obtain a hot work permit
- Configuration during ongoing operation with no bus loss
- Available as a prefabricated and certified solution
- Maximum of 80 analog and 196 digital inputs and outputs
- Approved for mounting in Zone 1
- Various standardized enclosure sizes available

Standard Solutions—Ready to Connect

Applications in hazardous areas require solutions that provide reliable protection and have all the necessary certifications. With years of experience in the market, Pepperl+Fuchs' remote I/O solutions are proven to meet these requirements. With a high level of expert knowledge and high-quality components, the standard solutions are quickly ready for use and fit a wide range of applications.

To find your perfect solution, one thing is particularly important: the right consultation. At the beginning, there is often only a specification sheet with requirements and framework conditions. However, the experienced application experts at Pepperl+Fuchs know your industry and your applications. Based on your specifications, they define the requirements and select the ready-to-connect remote I/O solution that perfectly fits your application. Two enclosure solutions are available.

**GR Series—
Glass-Fiber Reinforced Enclosure Series**

Designed for customized solutions, the GR enclosure series is available for several products in our portfolio—including certification for global use in your plant.
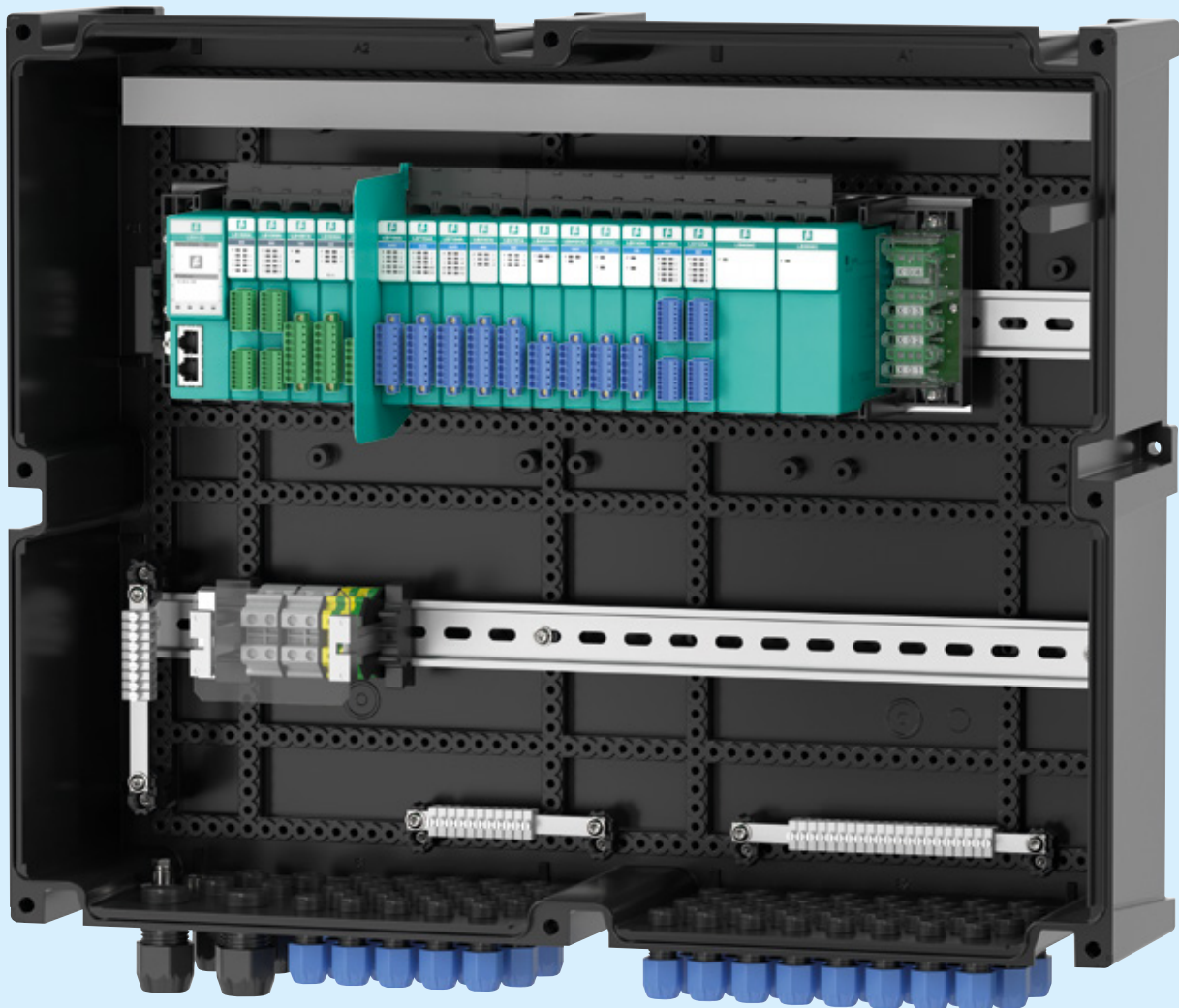
SR Series—
Stainless-Steel Enclosures for Hazardous Areas

The new SR enclosure series made of stainless steel impresses with its modular concept. It allows the integration of any accessories, such as flange plates, hinges, mounting brackets, or lid security, according to customer requirements.

Which devices are connected to the process control system via remote I/O? Which accessories and remote I/O components are required for this? Our specialists can provide the right answers to all these questions. And the results speak for themselves: pre-assembled remote I/O technology ready for installation that optimally supports your applications and is fully certified.
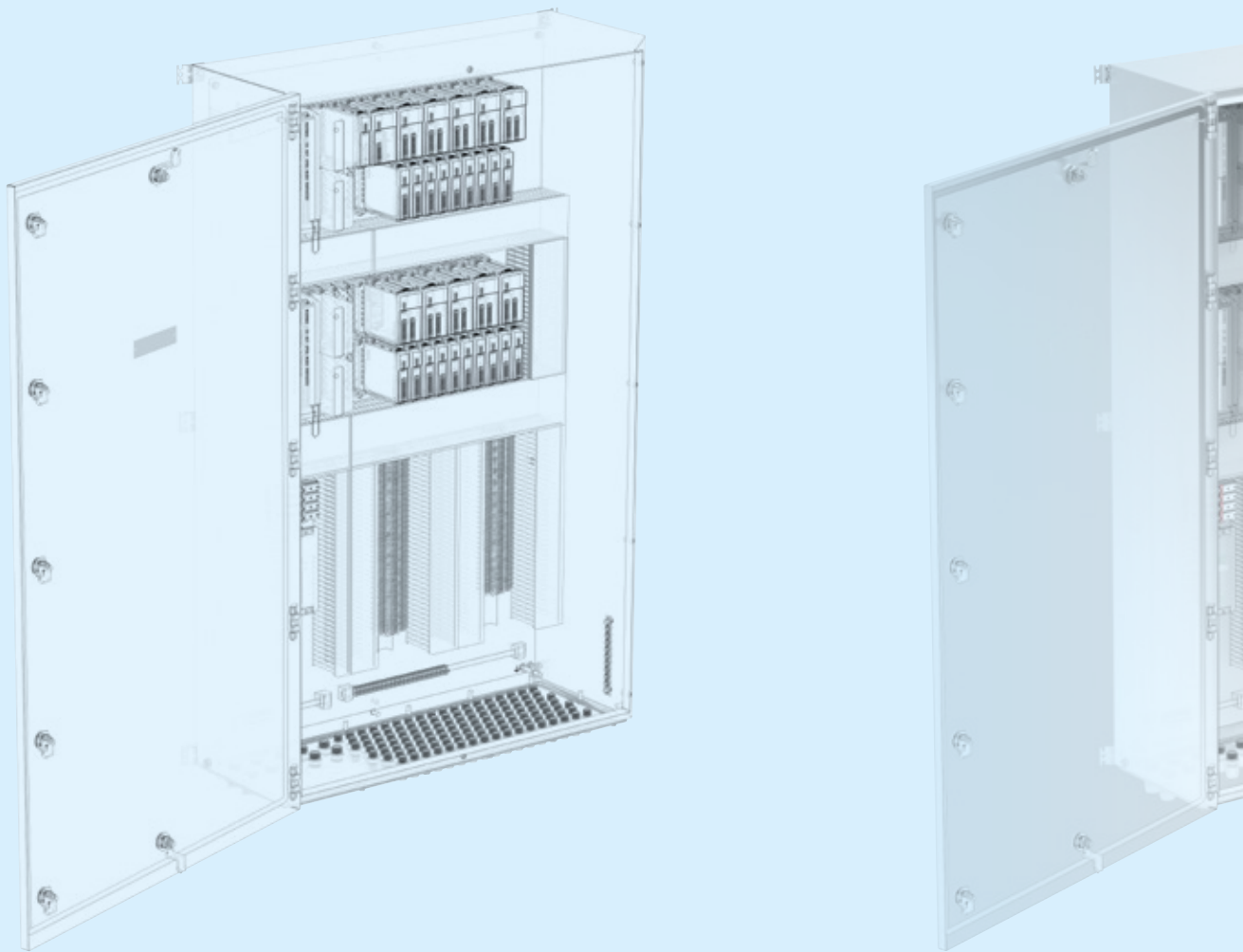
Solution Engineering Centers (SECs)
Custom-Designed Certified Solutions

Turning Products into Solutions

Each process plant comes with its own challenges and requirements. Efficiency, reliability, and availability of the plant call for a process control system that not only offers insight into the operation of the process, but also provides a well-founded basis for informed decision-making.

The remote I/O solutions from Pepperl+Fuchs provide the hardware basis for seamless communication between different technology generations. They represent an innovative solution designed for easy integration. The Pepperl+Fuchs Solution Engineering Centers (SEC) are there to assist plant operators and provide them with custom-designed solutions tailored to individual specifications. This not only guarantees firsthand knowledge and experience, but also greatly reduces on-site efforts for engineering, installation, and configuration. Besides remote I/O Pepperl+Fuchs also offers solutions with Ex e (increased safety), or Ex d (flameproof) type of protection and purge purge and pressurization systems.
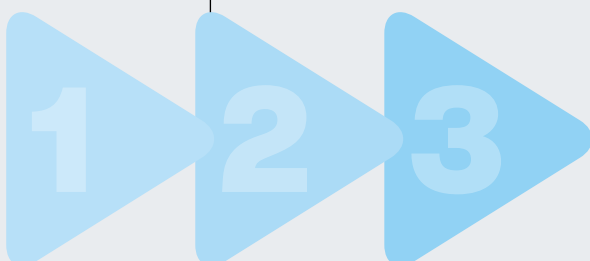
Global Teams with Local Experience

Pepperl+Fuchs Solution Engineering Centers are available on a global basis. They are familiar with local requirements and know the specific needs of the worldwide process industry. Using their services means tapping into deep insider knowledge and outsourcing responsibilities. As a result, the customer gets far more than just components to upgrade plants and bridge technology generations. They obtain a certified turnkey solution that is guaranteed to seamlessly integrate into the existing PCS to gain more control and enhanced system transparency.

For more information, visit
pepperl-fuchs.com/pf-solutions

Three Steps to Your Next Solution

1 Customer specifications, solution proposal, specification, and design

2 Manufacture, inspections, acceptance, and logistics

3 Final certified and documented customized solution

Plants in the process industry present increasingly complex challenges, not least in terms of explosion protection. Numerous legal regulations must be complied with; after all, people and the environment need to be protected even more so than plants and machinery. Not surprisingly, these changes are impacting the types of problems and tasks that companies face. To ensure that companies can continue to focus on their own core business, customized solutions from Pepperl+Fuchs are developed in collaboration with our customers to meet the global approval standards of a trusted partner.

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 Monitoring
- Industrial Ethernet
- AS-Interface
- IO-Link
- Identification Systems
- Displays and Signal Processing
- Connectivity

Pepperl+Fuchs Quality
Download our latest policy here:

www.pepperl-fuchs.com/quality

PEPPERL+FUCHS