# Shaping the Future.

ethernet-apl ™
advanced physical layer

The world's first switch that brings Ethernet into the field of process plants.

Ethernet-APL Rail Field Switch—
the Latest FieldConnex® Innovation

Your automation, our passion.

PEPPERL+FUCHS

# Ethernet-APL—Digitization Reaches the Field of Process Industries

**Long-term investment protection , sustainable cost reduction, and end-to-end device diagnostics down to sensor/actuator level in the process industry—this is what Ethernet-APL stands for.**

Industry 4.0 and the Industrial Internet of Things have been standard in the manufacturing industry for years. In the process industry, there was so far no network standard capable of quickly transferring large amounts of data from the field level to the information level of the Industry 4.0 architecture.

With the Ethernet Advanced Physical Layer, Ethernet-APL for short, Pepperl+Fuchs and other companies set a major milestone: It is the key technology and the only way to bring digitization into every corner in the field of process plants. Ethernet-APL includes long cable lengths, explosion protection, and interoperability, enabling continuous and transparent communication across all hierarchy levels.

This means that Ethernet-APL makes standard Ethernet technologies usable for the process industry and at the same time offers the simple, uncomplicated handling expected by the user. For the first time, the use of modern Ethernet technology is possible in hazardous areas up to Zone 0/Class I, Div. 1—enabling seamless communication from the field of the process plant to the process control system or to the cloud.

**More information online**

**More information in the video**

**From Hazardous Areas to the Cloud—Seamless and Highly Efficient Communication**

- The quickest and most efficient way to continuously communicate large amounts of data from hazardous areas to the cloud—without limitation
- Increased availability of process plants
- Simple and cost-effective plant modernization
- Flexible applications worldwide

**Highlights**

- Cable length of up to 1000 m: spur of up to 200 m, trunk of up to 1000 m
- Supply of up to 50 field devices with up to 60 W
- High-speed communication: 10 Mbit/s, full-duplex
- Download of approx. 100 configuration parameters in just a few seconds per field device
- Intrinsic safety protection with easy verification

Ethernet-APL

# Simple Ethernet—Multipurpose Applications and Efficient Integration


**A key advantage of Ethernet-APL is that existing installations and instrumentation can be retained. Given the decades-long lifetimes of process plants that are common in the process industry, this means enormous savings during migration. With Ethernet-APL, field devices can be connected directly to all common Ethernet-based systems. There is no need for network transitions or interfaces and the associated complex configuration processes.**

## Reduced Planning and Time

Ethernet-APL specifies standard type A fieldbus cables, allowing plant operators to use their existing cabling. Ethernet-APL works as a physical layer for all industrial Ethernet protocols such as EtherNet/IP, HART IP, OPC UA, PROFINET, or others. There is no need to plan and implement protocol transitions.

The Ethernet-APL rail field switch supports both field devices with an APL interface and conventional fieldbus devices. It automatically detects if a PROFIBUS PA device is connected instead of an Ethernet field device and translates the data into PROFINET. This enables mixed operation of different technologies on one infrastructure and therefore a step-by-step migration as part of the FieldConnex® APL concept. This allows plant operators to take advantage of Ethernet communication and the wealth of information from field devices and sensors without having to completely convert the plant.

**The Ethernet-APL Rail Field Switch from FieldConnex® is the Enabler For:**

- Joint operation of PROFIBUS PA and PROFINET on one infrastructure
- Easy operation and simplified upgrade processes
- Quick access to complex device data
- Synchronized configuration of field devices for optimized asset management
- Automatic detection of field devices

**Unique Insight into Plant Status via Ethernet-APL**

Ethernet-APL enables full access to instrumentation working in parallel, which can be used completely independently of each other by engineering, asset management, and the control system. This offers a high level of operating convenience, as new devices can be automatically assigned in the system by reading out the address and identifier as soon as they have been commissioned.

Users can therefore easily access diagnostic data for the devices and the entire installation. To illustrate this with an example: A service technician can use a mobile device, such as a smartphone or tablet, to read the status of the field devices from anywhere in order to prepare and plan any necessary interventions. Automatic neighborhood and topology detection enable additional support through higher-level systems when replacing devices. Device configurations are automatically backed up or the configuration is simply transferred to the new device. Furthermore, an infrastructure based on Ethernet-APL offers another advantage: software updates can be managed and installed automatically in the future.

Companies can therefore gain new information and additional insights about the field devices that are relevant to digitalization. The parallel access that Ethernet-APL provides is in line with NAMUR requirements. Within the framework of NAMUR Open Architecture (NOA), NAMUR has specified how systems should obtain data from the field.

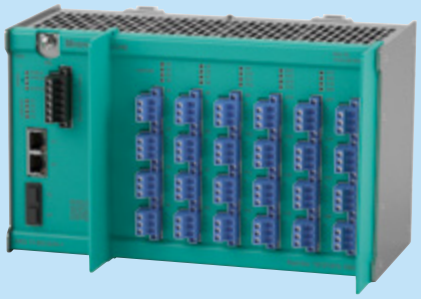
In addition to the convenience already described and the associated reduced effort, this software-supported device management offers further advantages: The susceptibility to errors during operation is lowered because repetitive, manual activities are significantly reduced. As a result, companies can reduce their maintenance costs while increasing the reliability of devices and plants.

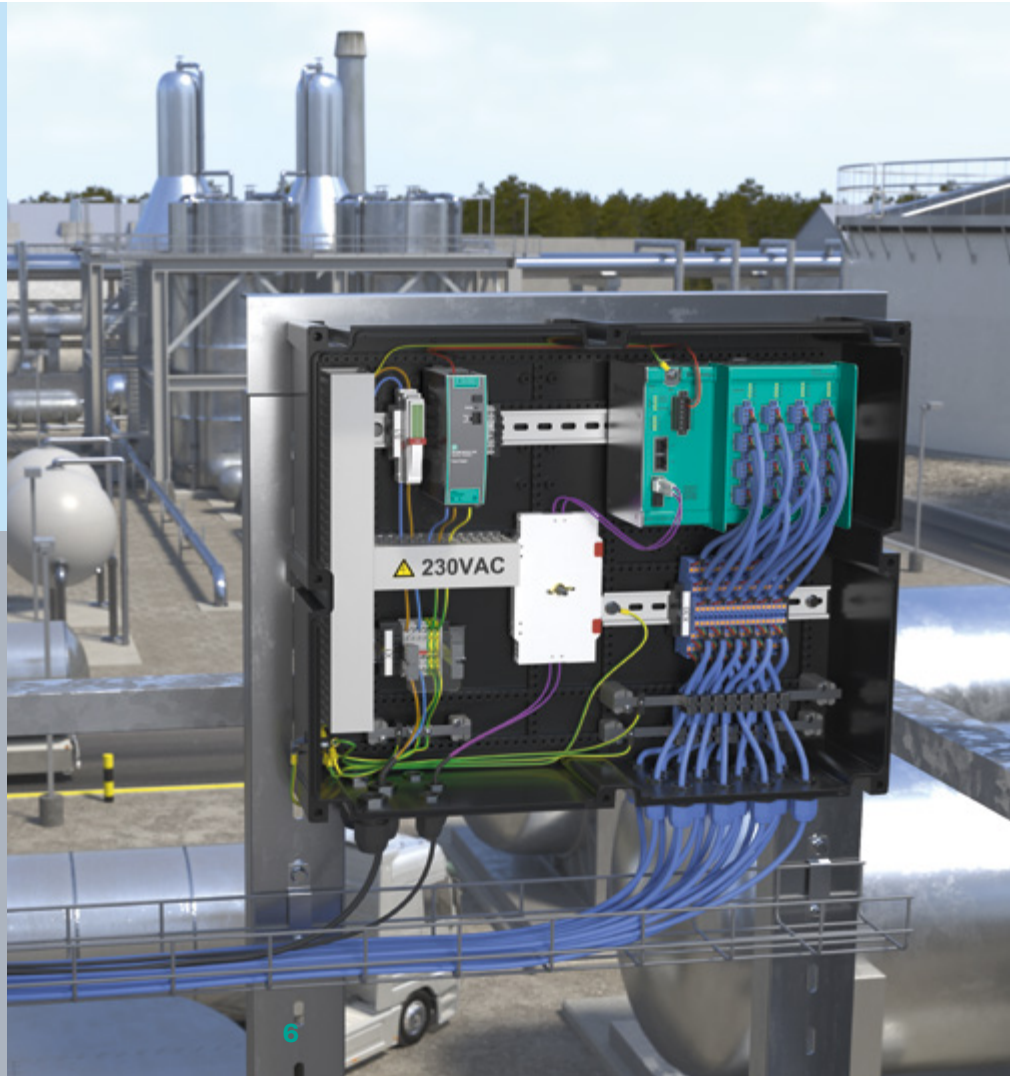
Ethernet-APL Rail Field Switch

# The First Ethernet-APL Field Switch for Process Automation

**The digital transformation is reaching the field level in process plants: The Ethernet-APL rail field switch from FieldConnex® is the first switch in process automation to enable direct, quick, and seamless access to field devices via Ethernet-APL.**

| Ethernet-APL Rail Field Switch | Attribute |
|---|---|
| **Type code** | ARS11 with proxy, ARS12 without |
| **PROFIBUS PA devices** | Automatic detection with built-in proxy |
| **Intrinsic safety** | Ex ic IIC and Ex ia IIC on spur port |
| **Number of spur ports** | 8, 16, 24 can be selected |
| **Connector** | Screw or spring terminal can be selected |
| **Installation** | Up to 30 km cable length through fiber optic cable<br>Certified for installation in Zone 2/Div. 2 |
| **Voltage supply** | External, 20–60 V DC |
| **Media redundancy** | Ring redundancy in the company network |
| **PROFINET redundancy** | S2 system redundancy |
| **Network management** | Yes, layer 3 with PROFINET |
| **Physical layer diagnosis included** | Continuous monitoring of the infrastructure itself |





## IIoT Applications for the Process Industry

The Ethernet-APL rail field switch has been designed with intrinsic safety explosion protection, Ex ia IIC and Ex ic IIC, which allows Ethernet in hazardous areas of Zone 2 and Division 2. It is installed on a DIN mounting rail. In addition, the switch supports the Manchester Bus-powered Physical Layer (MBP) alongside Ethernet-APL and can therefore be easily added to the existing base of PROFIBUS PA devices. The Ethernet-APL field switch has the most effective implementation directly in the chip (patented).

## Highlights

- For the first time, Ethernet can be used in hazardous areas
- More availability through direct access to all diagnostic data simultaneously
- Retaining of existing field devices reduces costs
- Highly efficient electronics achieve optimal heat management
- Integrated intrinsic safety and familiar two-wire cable facilitate easy installation
- Concept with two physical layers allows cost-effective plant modernization

**More information online**

Ethernet-APL Rail Field Switch

# Investment Protection by Retaining Field Devices and Installation

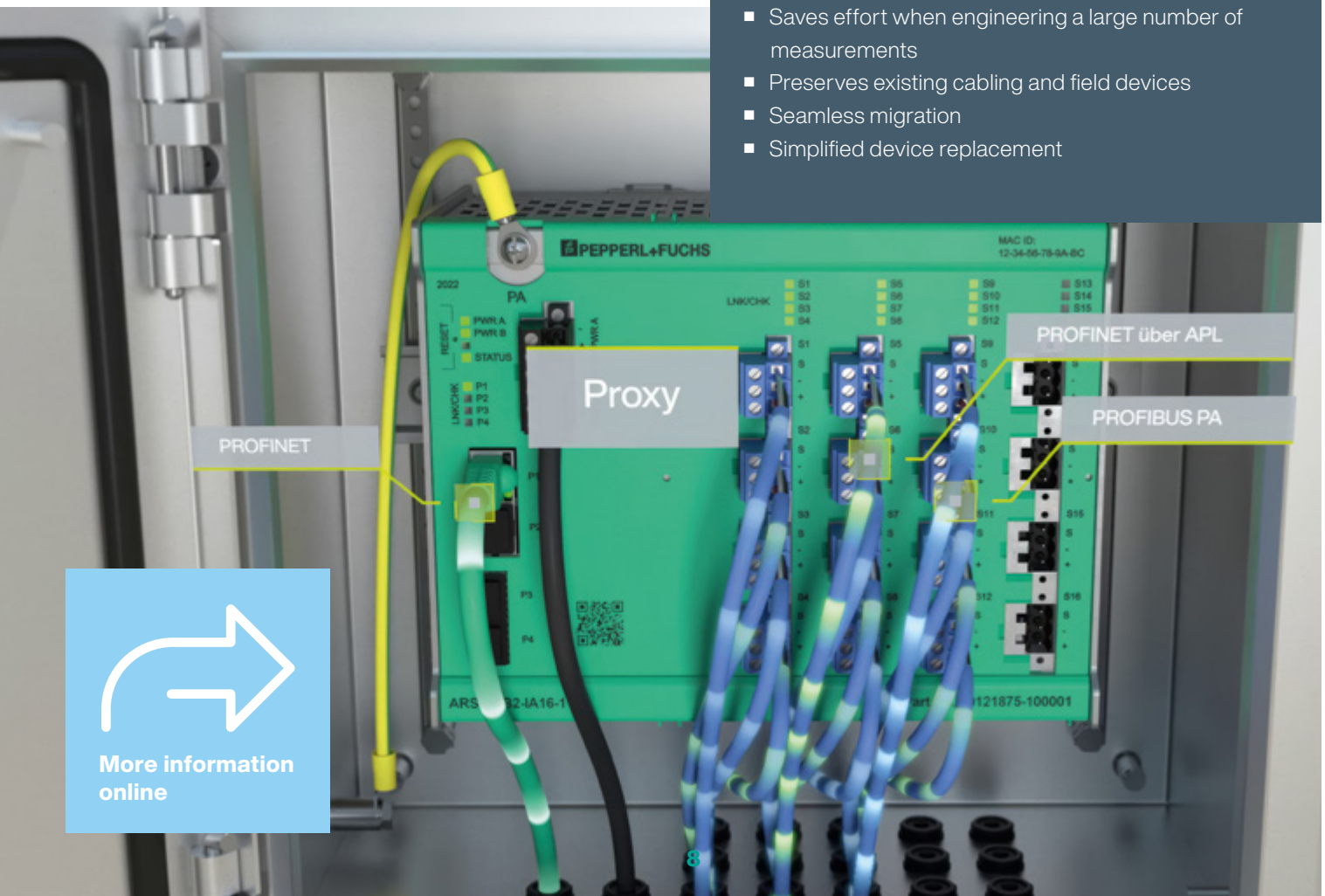
**Parallel Operation of Field Devices with PROFIBUS PA and PROFINET via Ethernet-APL**

The FieldConnex® Ethernet-APL field switch offers a dual function for PROFIBUS PA instruments. In addition to Ethernet-APL, it automatically recognizes the PROFIBUS PA fieldbus protocol and maps the data from the instruments to PROFINET-based control systems. This function is defined as “Proxy” in the standards for PROFINET and PROFIBUS. A proxy seamlessly integrates PROFINET and PROFIBUS PA into the engineering station, creating clarity for planners and operators while simplifying the life cycle of the instrument, communication infrastructure, and automation system. Seamless device integration into the control station and the engineering system is achieved via the PA profile, which is standardized for PROFIBUS and PROFINET. It defines the measured values, configuration parameters, and summarized warnings and alarms of similar field devices, even from different manufacturers. It also saves effort when planning a large number of measurements and replacing devices.

Retaining the existing cabling and field devices protects the investment in instrumentation. Since new and retrofitted Ethernet-APL devices can be operated in parallel on the same communication infrastructure with the installed base of instruments, the migration path is seamless.

**Highlights**

- Seamless and complete device integration into the control and engineering system
- Saves effort when engineering a large number of measurements
- Preserves existing cabling and field devices
- Seamless migration
- Simplified device replacement

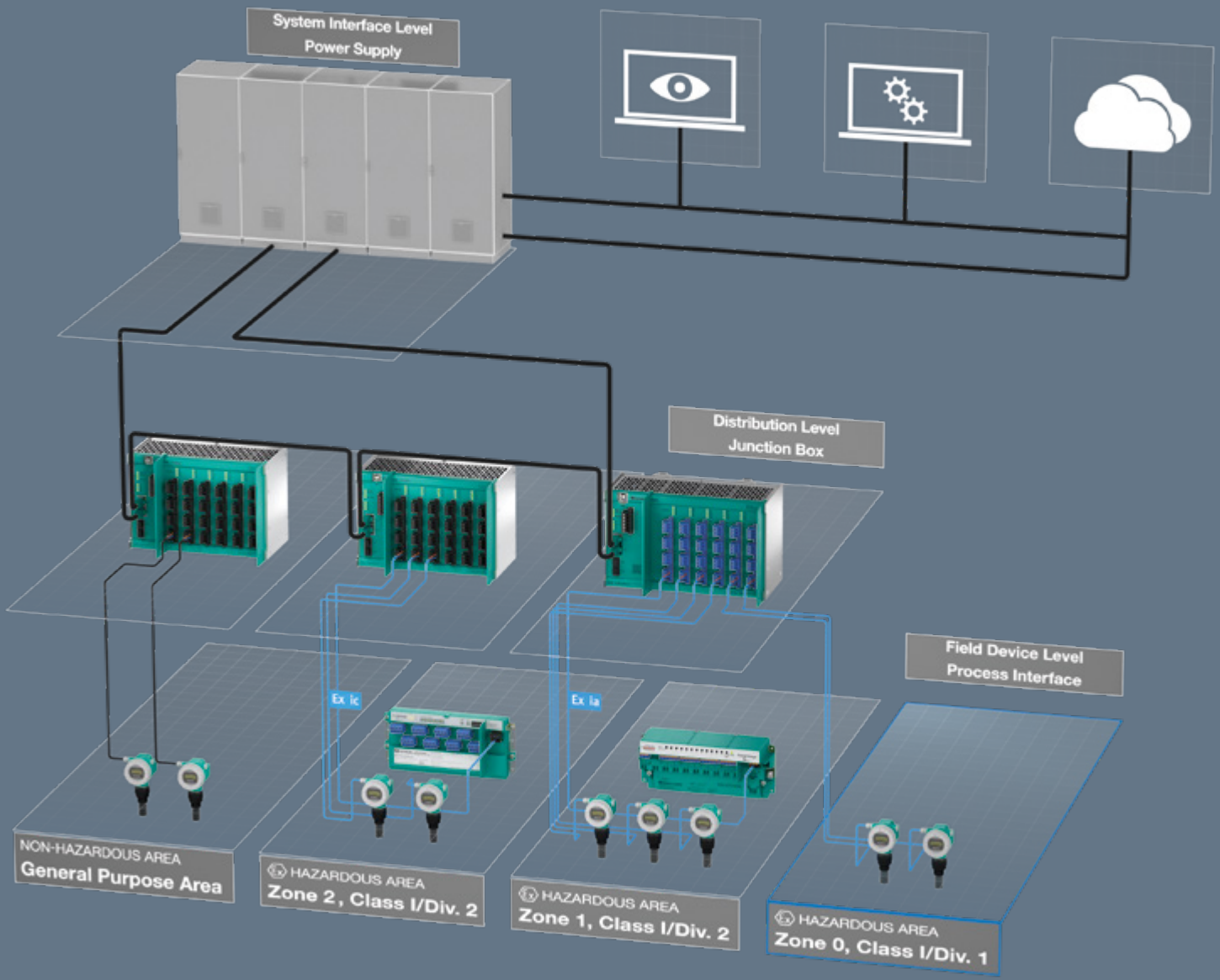



More information online

## Ideal for Star Topology

The Ethernet-APL rail field switch from FieldConnex® is designed for star topologies typically used in compact or indoor installations. It has the following features and meets these requirements:

- Cable lengths of up to 200 m to the field device
- Indoor installations, e.g. in the chemical and pharmaceutical industries
- Installation of the switches in switch cabinets or junction boxes
- Ethernet redundancy at the plant level
- Explosion protection for all hazardous areas




**More information online**

Ethernet-APL Rail Field Switch

# Advanced Physical Layer Diagnostics via Unique Web Interface

**The Ethernet-APL rail field switch from FieldConnex® features integrated diagnostics for the physical layer. This enables users to monitor the installation itself at all times and to intervene early in the event of a fault—an important performance feature that ensures smooth operation and prevents unwanted downtime.**

### Automatic Commissioning

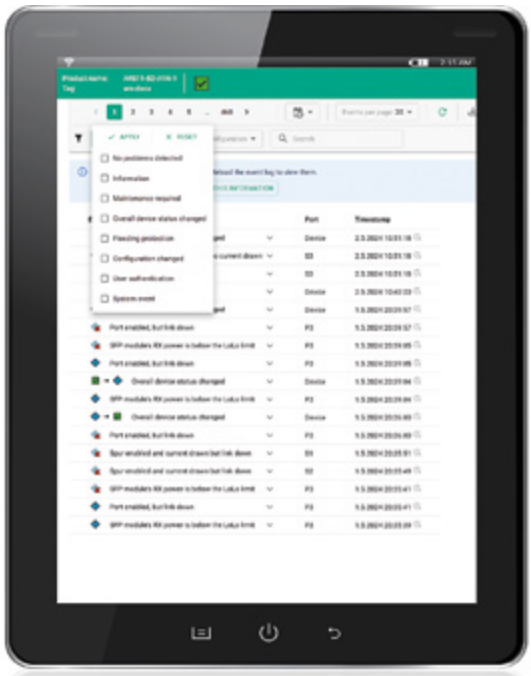
- Field switch automatically detects devices: Identifies device and physical layer status
- Engineering can recognize and classify signals
- Automation support to efficiently connect instruments to the master tag list and to control loops
- Snapshots document quality of the installation
- Clear quality check for installer and operator
- Repeated snapshots with long-term storage enable analysis to detect anomalies and deterioration
- Accept registered devices only (zero trust)
- Deny access to devices not engineered or registered

### Always up to Date: Automatic Documentation as Built

- Immediately identify and document any instrument connected
- Users can access current documentation about the device and higher-level systems:
  - Status and ID
  - Documents and certificates
  - Device packages and drivers
  - Automatic topology map generation

## Maintaining Quality

- Knowing the condition of the infrastructure during commissioning and operation
- Familiar two-wire installation
- Termination integrated and always correct
- Freedom of choice: cable glands or connectors
- Intrinsic safety integrated with simple verification
- Diagnostic information on the device and system
- App-supported work with instrumentation through higher-level systems



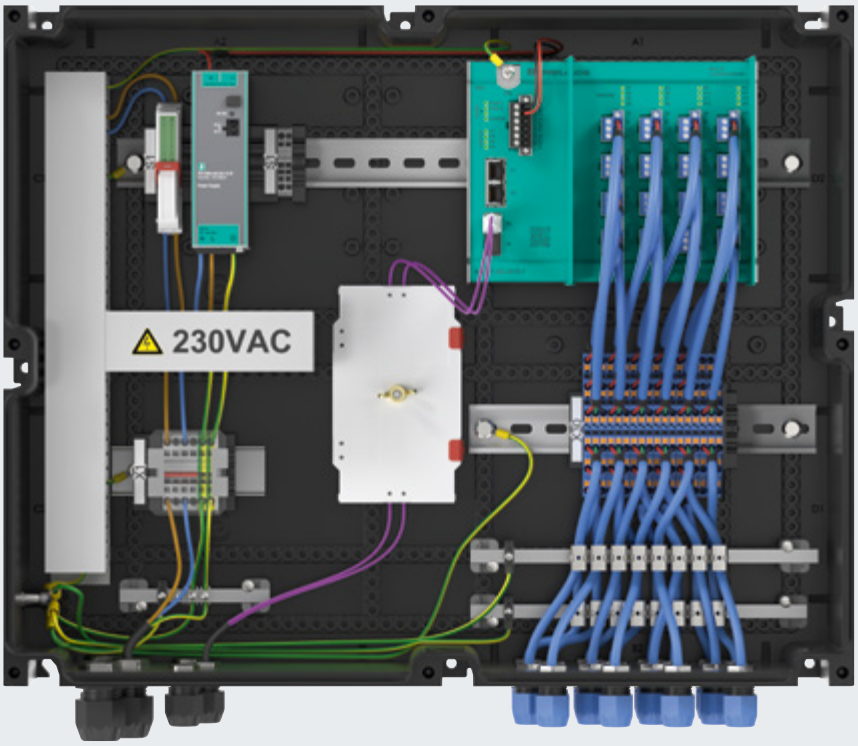
## Simplicity in the Field

- Continuous monitoring of the physical layer
- Event log tracks every detail
- Aggregation of long-term data for analysis (Historian)
- Remote access to data
- Finding the most difficult errors through data analysis
- Support and automation through apps:
  - Diagnosis of problems on site and remotely
  - Maintaining the quality of infrastructure and devices
  - Enabling proactive, targeted interventions

Ethernet-APL Rail Field Switch

# Enclosure Solutions and Accessories

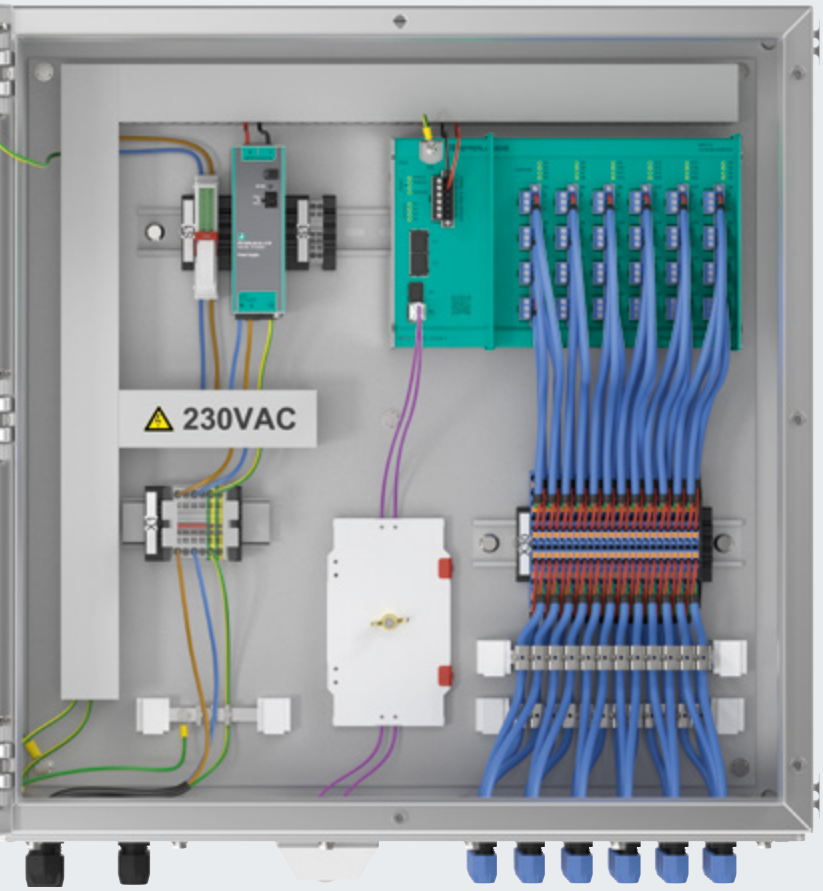
**Pepperl+Fuchs delivers the Ethernet-APL rail field switch with matching accessories as a cost-effective standard and customer-specific solution, optionally in a stainless steel or glass fiber reinforced polyester housing.**




### Solutions Tailored to Your Needs

As an established partner in the process industry, our highly experienced engineers develop pre-configured APL enclosure solutions that cover a wide range of applications for our customers. However, recognizing that each project comes with its unique challenges and specifications, we offer the flexibility to customize or design solutions from scratch to precisely match your requirements. To achieve this, Pepperl+Fuchs has established specialized Solution Engineering Centers (SECs) worldwide, where experienced experts design and produce custom solutions daily. Here, customers receive complete turnkey solutions—fully certified for hazardous areas and ready to install.

The FieldConnex accessories for Ethernet-APL field switches are ideally suited for easy installation and handling. For example, we offer surge protectors, SFP transceivers, and wall mounting kits.

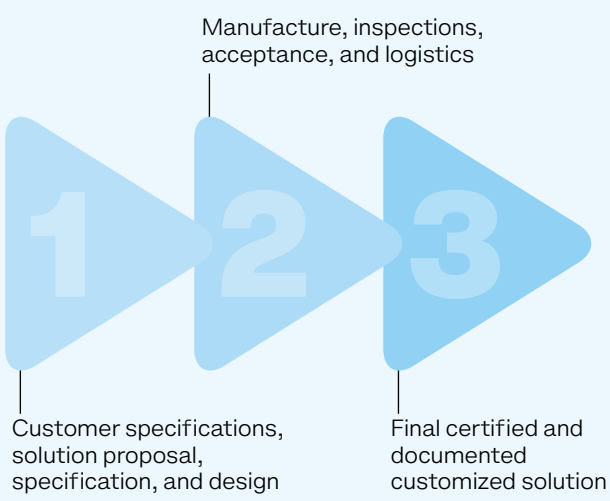



**Connecting Any Signal via One Junction Box**

Benefits from engineered enclosure solutions:

- Designed to meet customer requirements
- Fully certified
- Prewired and ready to install
- Many options and accessories
- One stop shop
- Pre-configured solutions for rapid availability

**Standard APL solutions**




## Three Steps to Your Next Solution

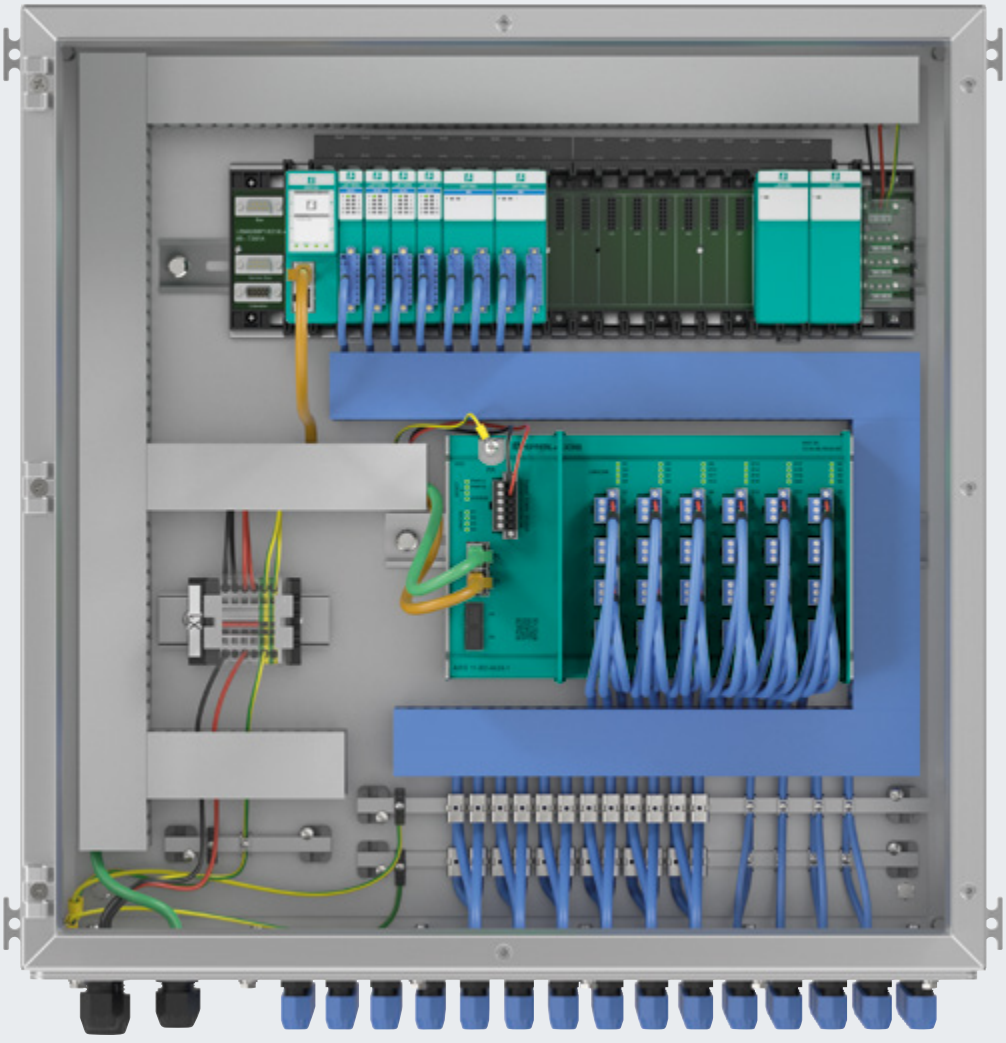
Plants in the process industry present increasingly complex challenges, not least in terms of explosion protection. Numerous legal regulations must be complied with; after all, people and the environment need to be protected even more so than plants and machinery. Not surprisingly, these changes are 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.

Many Connections, Simple Access

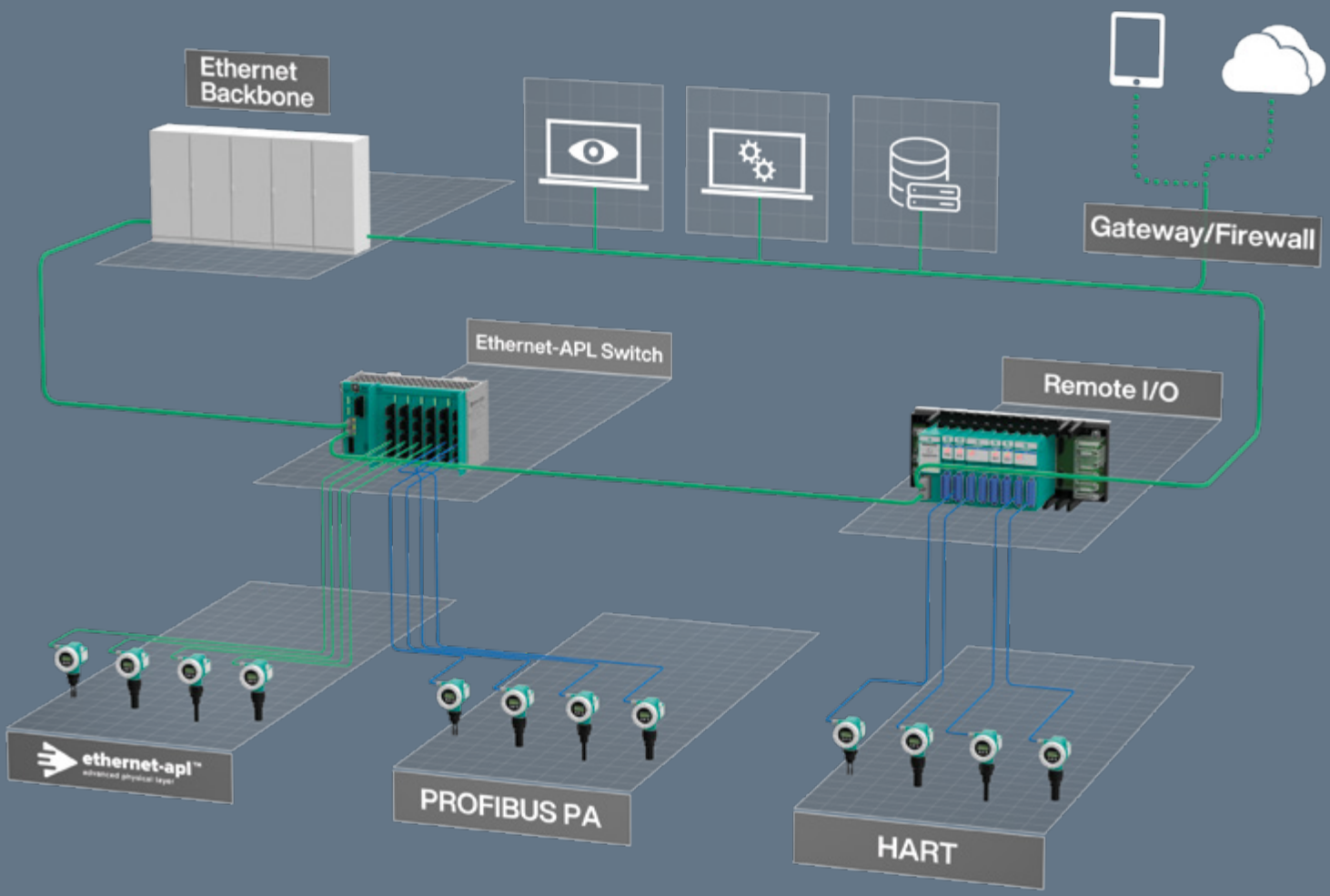
# IIoT Solutions for Industrial Communication in Process Industries

**A robust infrastructure with Ethernet-APL, fieldbus, and remote I/O as well as standardized information models enable powerful “end-to-end” communication from sensors and actuators to user-friendly end devices. Information is available when and where it is needed. Products and solutions from Pepperl+Fuchs based on these technologies enable convenient functions in all phases of a project, from planning to device replacement.**

**Get in touch with us!**



**Standard IIoT solution**


Ethernet Backbone
Gateway/Firewall
Ethernet-APL Switch
Remote I/O
ethernet-apl™
advanced physical layer
PROFIBUS PA
HART

# Your automation, our passion.

- Industrial Sensors
- Industrial Communication and Interfaces
- Enterprise Mobility
- Hazardous Area Products and Solutions

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