**ethernet-apl**™

**Ethernet-APL Field Switch Zone 1**
9740/12-16-40 EAFS Z1 3TX 16A PA

THE STRONGEST LINK. **STAHL**

# STATE-OF-THE-SMART

Ethernet-APL Field Switch for
Zone 1 and Zone 2 installation

# GOES EVERYWHERE:
## ETHERNET-APL.

### THE NEW DATA TRANSMISSION STANDARD FOR PROCESS AUTOMATION

Ethernet Advanced Physical Layer (Ethernet-APL) is the new 2-wire solution for Ethernet, based on IEEE and IEC standards. This allows you to digitalise your process facilities from the devices in the field all the way to the control room.

The new technology is also making inroads into explosive atmospheres: Ethernet-APL supports the type of protection intrinsic safety "i" and thus enables Ethernet access in hazardous areas up to Zone 0.

Another advantage of digitalisation lies in the extensive possibilities for process monitoring and diagnostics. This optimises the availability of your equipment.

Reach out to us! We bring Ethernet-APL to your process facilities. Since we are one of the partners developing this new technology, you benefit from our know-how first hand. You can rely on our expertise – from consulting to commissioning and beyond.

### THE ADVANTAGES OF ETHERNET-APL AT A GLANCE:

#### DIGITALISES THE COMPLETE PROCESS FACILITY.

Ethernet-APL creates a continuous high-performance Ethernet connection from the devices in the field to the control room, enabling vertical and horizontal integration across the entire facility.

#### ENABLES ETHERNET EVEN IN EXPLOSIVE ATMOSPHERES.

For the first time, intrinsically safe Ethernet access is possible up to the field devices in Zones 0, 1 and 2 – the 2-WISE concept was specially developed for this purpose: "2-Wire Intrinsically Safe Ethernet – IEC TS 60079-47."

#### FLEXIBLE APPLICATION POSSIBILITIES LIKE NEVER BEFORE.

Ethernet-APL brings high data rates of 10 MBit/s into the field and supplies the field devices with intrinsically safe power via the network – over a distance of up to 1000 m.

Ethernet-APL Field Switch Zone 1
9740/12-16-40 EAFS Z1 3TX 16A PA

MAC:
9740/12-16-40 EAFS 3TX16A Z1
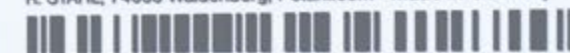PTB XX ATEX XXXX X       IECEx PTB XX.XXXXX
⟨Ex⟩ II 2 (1) G          Ex eb ia q [ia Ga] IIC T4 Gb
2-WISE Device/Power Source       Ta = -40°C - +70°C
CE 0158

R. STAHL, 74638 Waldenburg, r-stahl.com - Made in Germany

10005047327-044       Rev.A V01-00-11       0823

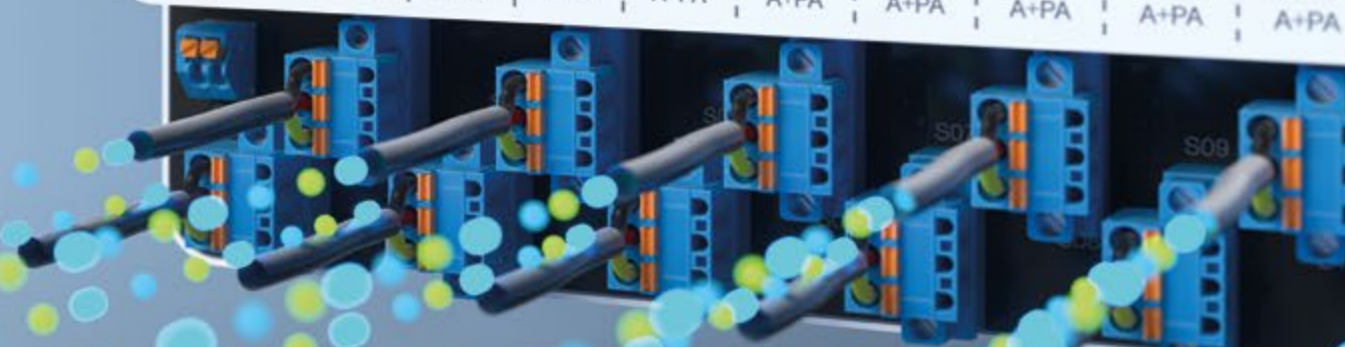| SPT Pt100 | S01 A+PA | S02 A+PA | S03 A+PA | S04 A+PA | S05 A+PA | S06 A+PA | S07 A+PA | S08 A+PA | S09 A+PA | S10 A+PA |

# MAKE INROADS INTO NEW AREAS.

## THE R. STAHL ETHERNET-APL FIELD SWITCH: FULLY OPERATIONAL EVEN IN ZONE 1

The field switch is a central component in the Ethernet-APL network of your process facility. R. STAHL offers particularly robust and durable field switches for the new technology, which are characterised by two key advantages: The R. STAHL Ethernet-APL field switch supports the operation of intrinsically safe devices in the field and, depending on the version, it can be used in the explosive atmospheres of Zones 1 and 2. Thanks to their fault diagnostics and status messages, they provide extensive support for commissioning and network troubleshooting.

### THE MAIN FUNCTIONS AND FEATURES OF THE R. STAHL ETHERNET-APL FIELD SWITCH:

1. Distribution and coupling of data streams in the network.
2. Power supply of the connected field devices with intrinsically safe auxiliary power.
3. Installation directly on site in the field in Zone 1 or 2 due to robust design.
4. Diagnostic functions: Fault diagnosis, status messages, operating notes.
5. Optional use with fibre optic cable to bridge distances of several kilometres (Zone 2 versions only).
6. Optional use with PROFIBUS PA devices through integrated PA proxy.

**100BASE-TX Ethernet**
2 x RJ45 (Zone 2)
3 x Ex e terminals (Zone 1)

**100BASE-FX Ethernet**
option: 2 x SFP (Zone 2)

**Redundant supply**
wide range 19,2-57,6 V DC

**External temperature measurement**
Ex i, Pt100 in 2-wire circuit

**16 Ex ia ports 2-WISE / FISCO**
for Ethernet-APL devices and
for PROFIBUS PA devices

**Various port profiles**
12 x profile A (0.54 W) and
4 x profile A (0.54 W) + B (1.17 W)
or 16 x profile A (with PA proxy version)

**Status informationen**
clear LED displays

**Integrated humidity measurement**
measurement of humidity in the
field housing

**Local diagnoses**
extensive diagnostic information
with OLED display

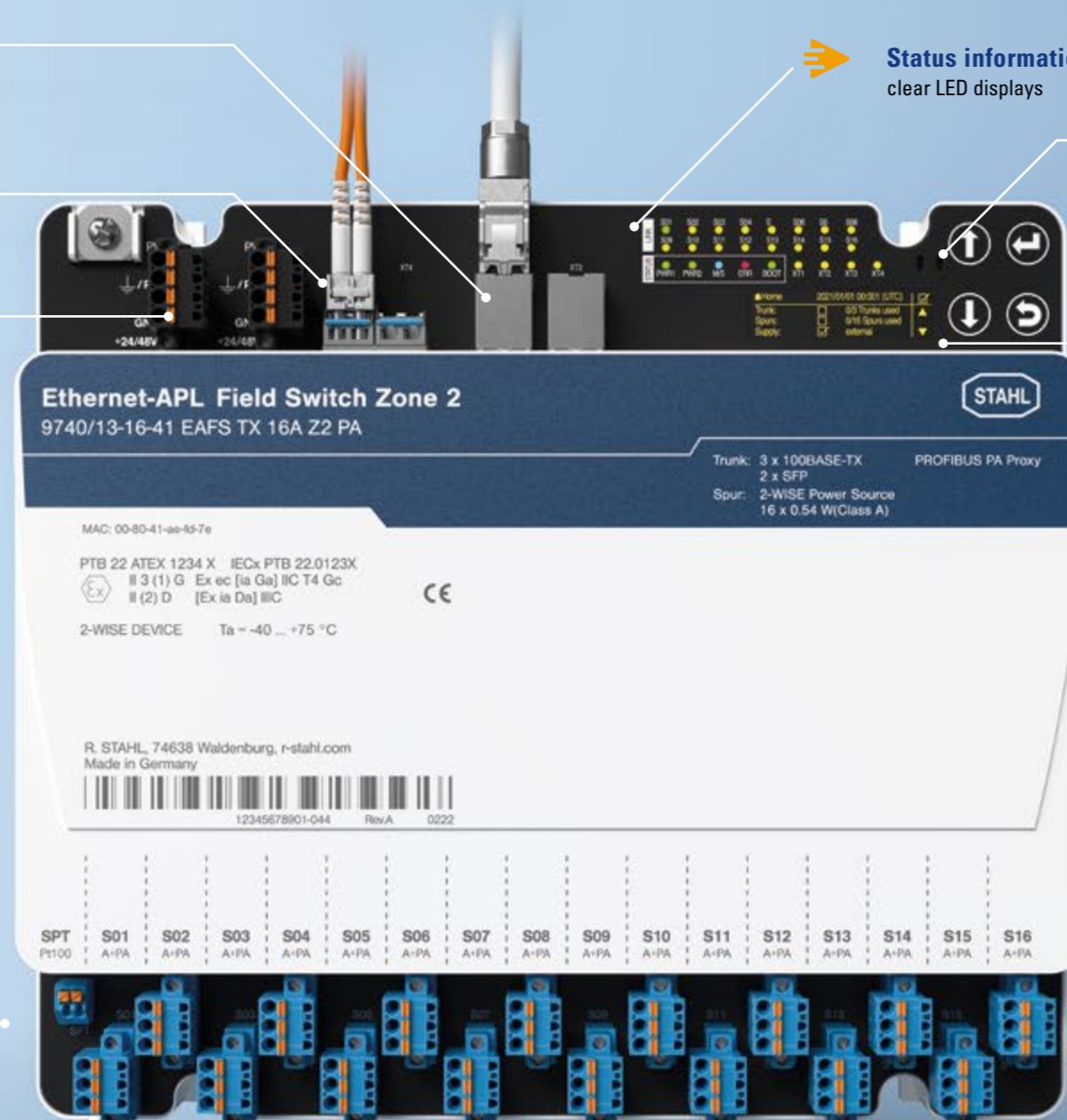**Compact design**
292 mm wide x 260 mm high x 52.6 mm deep

**For field installations**
rugged aluminium housing
Zone 1: Type of protection Ex q

**Stable installation**
on mounting plate or
optionally on DIN rail

Ethernet-APL Field Switch Zone 2
9740/13-16-41 EAFS TX 16A Z2 PA

Trunk: 3 x 100BASE-TX    PROFIBUS PA Proxy
       2 x SFP
Spur:  2-WISE Power Source
       16 x 0.54 W(Class A)

STAHL

MAC: 00-80-41-ae-fd-7e

PTB 22 ATEX 1234 X    IECx PTB 22.0123X
II 3 (1) G   Ex ec [ia Ga] IIC T4 Gc
II (2) D    [Ex ia Da] IIIC

2-WISE DEVICE    Ta = -40 ... +75 °C

CE

R. STAHL, 74638 Waldenburg, r-stahl.com
Made in Germany

12345678901-044    Rev.A    0222

SPT   S01   S02   S03   S04   S05   S06   S07   S08   S09   S10   S11   S12   S13   S14   S15   S16
Pt100 A+PA  A+PA  A+PA  A+PA  A+PA  A+PA  A+PA  A+PA  A+PA  A+PA  A+PA  A+PA  A+PA  A+PA  A+PA  A+PA

# TWO NETWORK ARCHITECTURES FOR THE NEW ETHERNET TECHNOLOGY.

## ETHERNET-APL IN THE STAR TOPOLOGY OR IN THE TRUNK-AND-SPUR TOPOLOGY

When installing Ethernet-APL networks, you can choose between two common topologies: the star topology with 4-wire Ethernet or the trunk-and-spur topology, which has a powered main line (trunk) with increased safety (Ex e). The R. STAHL Ethernet-APL field switch exhibits its strengths in both installation options.

The star topology is easy to plan: You can typically integrate up to 250 field devices per network because the field switches have a separate power supply. For longer distances from the field switch to the control room, fibre optic technology is available as an option – only for Zone 2 installations.
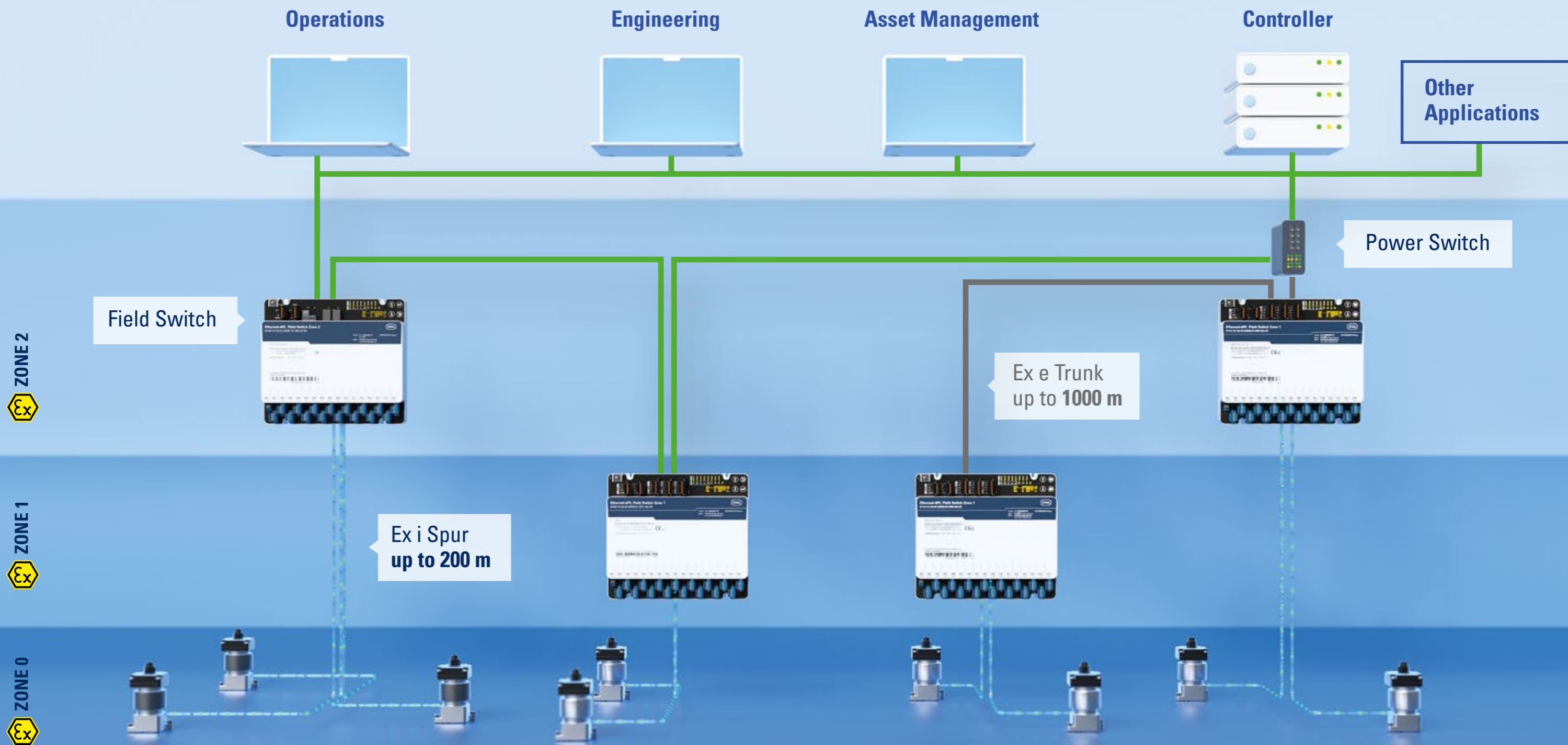
Trunk lines up to 1000 m long have the greatest advantage of the trunk-spur topology, especially in extensive facilities of the process industry. The power supply for the network, the field switches and the connected field devices are provided by the Ethernet-APL Power Switch (available end of 2024).

### STAR TOPOLOGY
- For 100BASE 4-wire Ethernet
- Trunk 100 m (TX) or several km (FX)
- Spurs 200 m, Ex ia / 2-WISE / FISCO
- 16 spurs APL and PROFIBUS PA

### 2. TRUNK-AND-SPUR TOPOLOGY
- With Power Switch 48 V / 92 W
- Trunk max. 1000 m (type A cable)
- Spurs 200 m, Ex ia / 2-WISE / FISCO
- 16 spurs APL and PROFIBUS PA



Operations    Engineering    Asset Management    Controller

Other Applications

Power Switch

Field Switch

ZONE 2

ZONE 1

ZONE 0

Ex e Trunk up to **1000 m**

Ex i Spur up to **200 m**

# EVERYTHING SMART AND UNDER CONTROL.

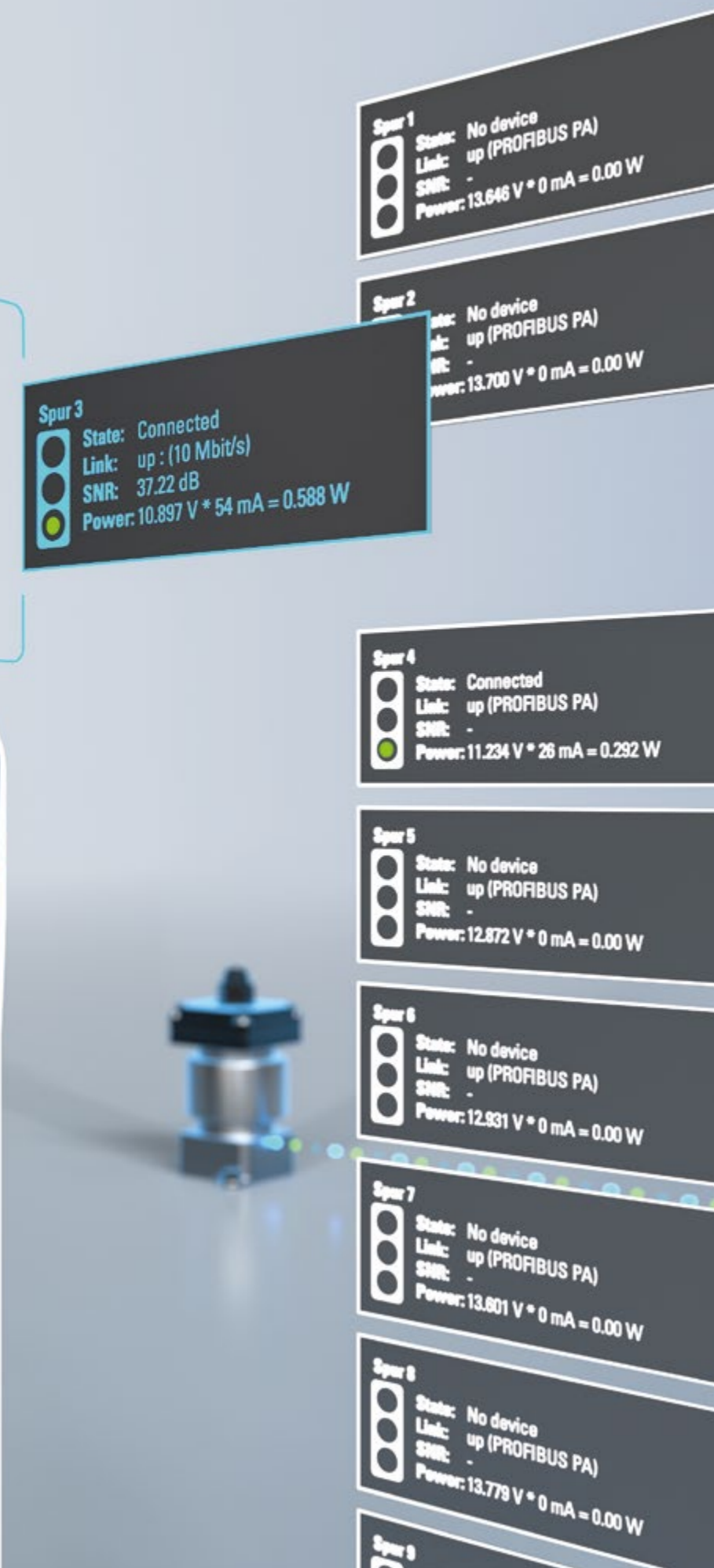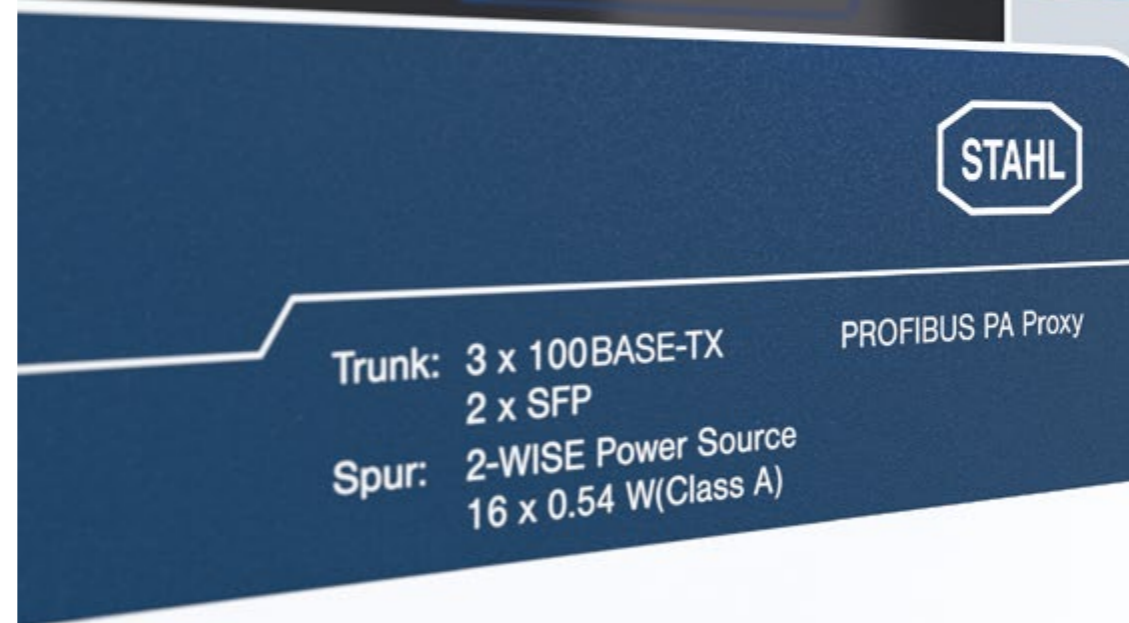## THE R. STAHL ETHERNET-APL FIELD SWITCH ENABLES EXTENSIVE NETWORK DIAGNOSTICS

The R. STAHL Ethernet-APL field switch saves time and effort. This is because it transmits meaningful network information directly to the control room, which enables effective diagnosis of all connected devices. A real relief, especially when the equipment is operating in explosive atmospheres. If you evaluate the collected data in an intelligent fashion, you also obtain valuable information for process optimisation.

A special advantage of the R. STAHL Ethernet-APL field switch is the on-site display of diagnostic parameters. An integrated OLED display and a clear traffic light system with LEDs provide service technicians with important information at a glance — and save them the trouble of having to walk to the individual devices in the field.

### THE DIAGNOSTIC FUNCTIONS IN DETAIL:

- Monitoring of network quality via Signal Noise Ratio (SNR), analysis per port.
- Detection of cable faults and accurate positioning using Time Domain Reflectometry (TDR analysis) per APL port.
- Notification of shielding termination (Unbalance Detection).
- NE107-compliant alarm messages (current, history).
- Detailed port status (link, supply current, short circuit cable break).
- Frame and failure count, lost frames (per port).
- LLDP information, MAC address table, CPU utilisation, network load.
- Integrated measurement of field switch temperature as well as measurement of temperature (ext. Ex i Pt100) and humidity in the field housing.

# OPEN TO OLD AND NEW.

## ETHERNET-APL FIELD SWITCH BY R. STAHL FOR NEW AND EXISTING INSTALLATIONS

In new installations, you can operate Ethernet-APL field switches on modern IP-based automation networks. Data from Ethernet-APL field devices is seamlessly transferred to the automation level.

In existing installations with PROFIBUS PA field devices, the Ethernet-APL field switch serves as a PA proxy that translates PROFIBUS PA to PROFINET. This allows PA and APL devices to work in parallel and you can migrate new field devices step by step.
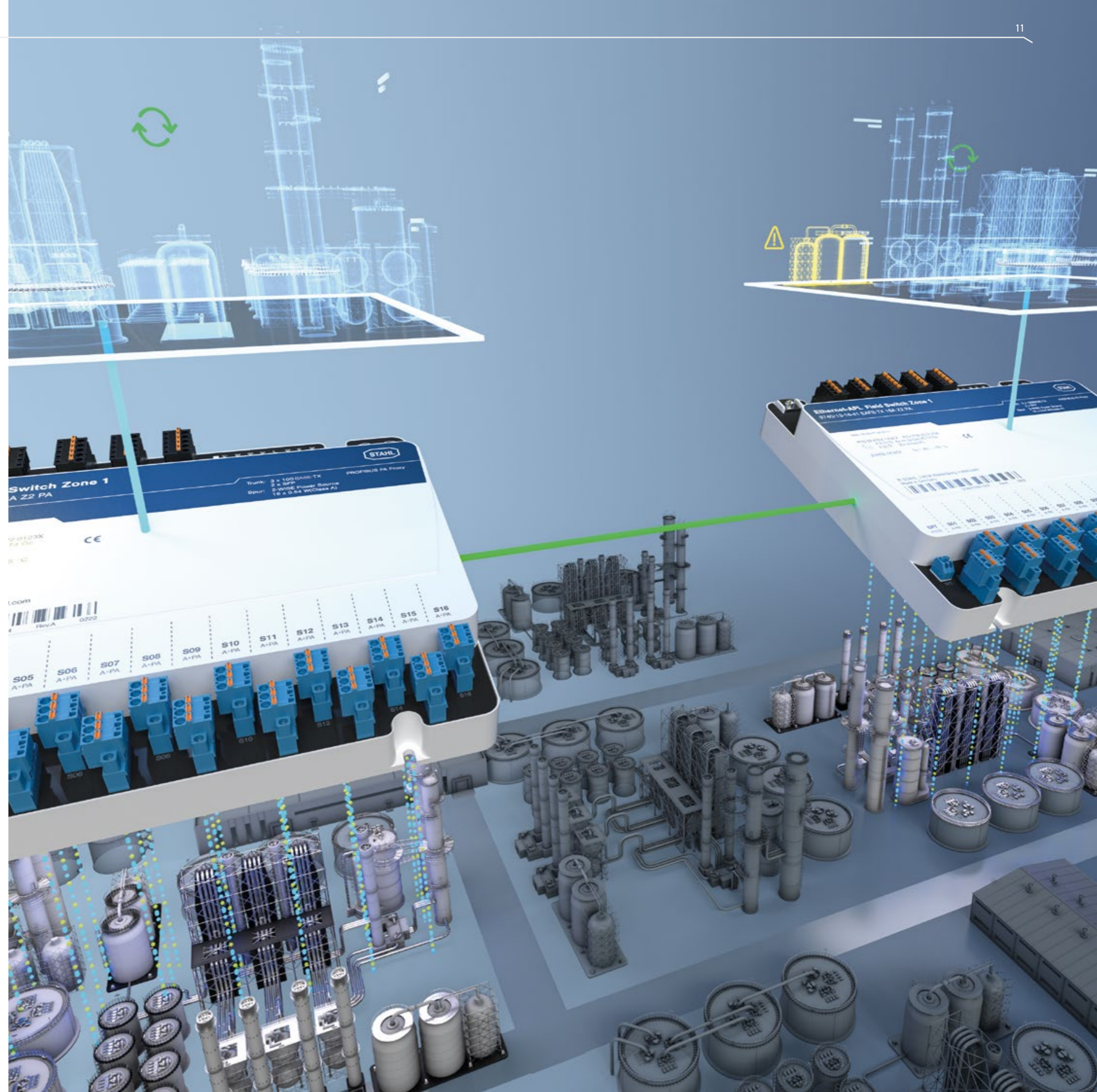
The R. STAHL Remote I/O system IS1+ is the ideal supplement to all conventional sensors and actuators of the classic 4...20 mA technology. This will bring your long-lived process facilities into the Ethernet age – even in Zone 1 and with the full support of the HART protocol.
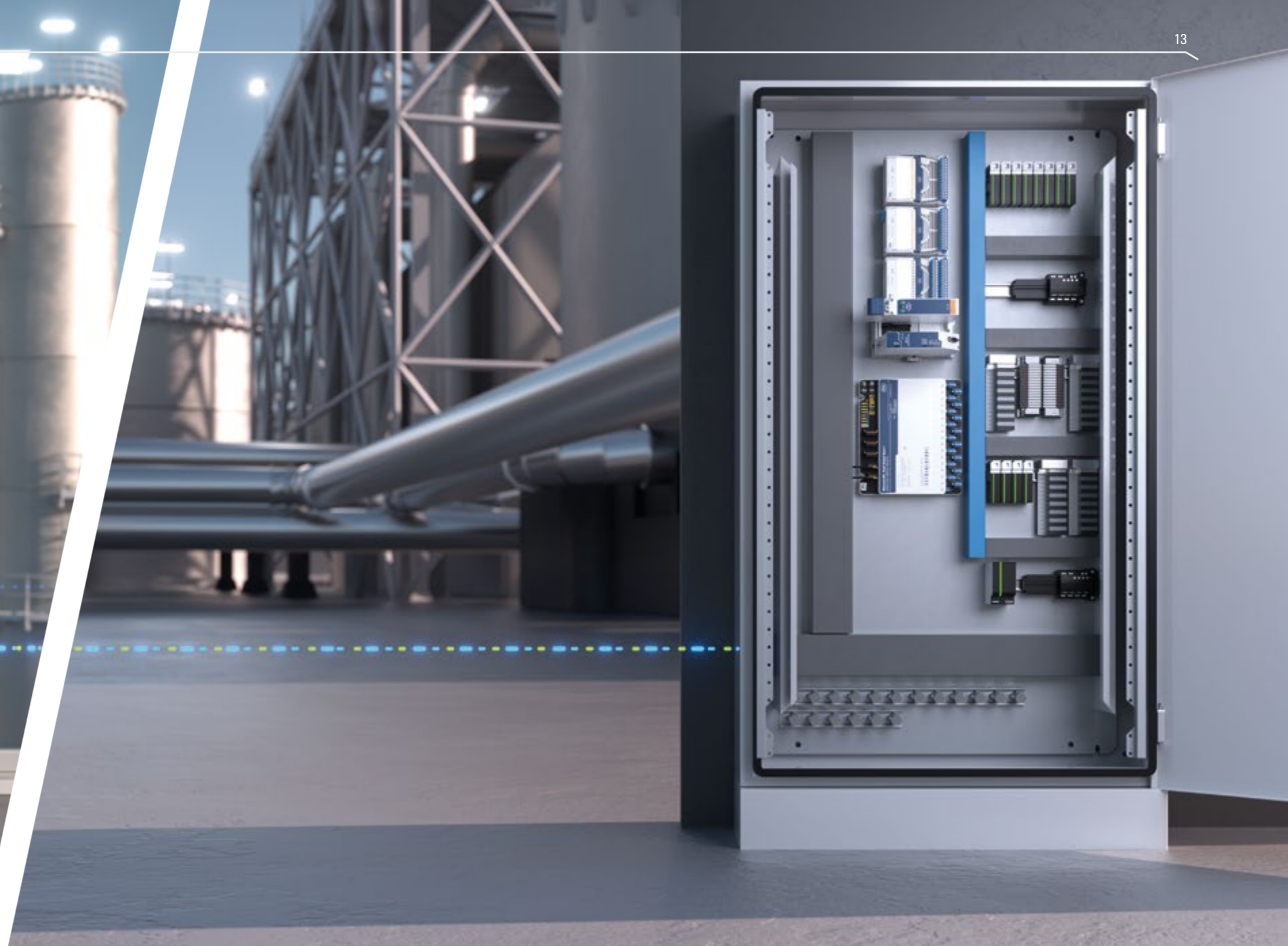
### ETHERNET-APL FOR MAXIMUM FLEXIBILITY:

- Support of all Industrial Ethernet protocols such as PROFINET, EtherNet/IP, HART-IP and OPC UA.

- Operation of PROFIBUS PA field devices on the field switch via integrated PA proxy.

- Mixed operation of PROFIBUS PA and "PROFINET via APL" devices at the field switch.

- Support of PA profile 3.02 and 4 as well as manu-facturer-specific GSD.

- Integration of field devices into asset management and engineering systems through consistent Ethernet infrastructure.

- Standardised device integration with OPC UA and FDI – Ready for NAMUR Open Architecture (NOA).

- Remote I/O IS1+ for Zone 1 and Zone 2 also brings the 4...20 mA/HART base into the Ethernet.

# EVERYTHING FROM A SINGLE SOURCE.

## SYSTEM SOLUTIONS BY R. STAHL

As we are the market leader in explosion protection, you benefit from our many years of international experience. Take advantage of our professional advice and support. We develop the exact explosion protection solution you need.

Thanks to our high systems expertise, we are able to combine all types of protection and explosion protection technologies. Of course, we tailor these individually to the requirements of your industry, for example, those in the chemical and pharmaceutical sectors or those in

the oil and gas industry. Our extensive product portfolio offers you forward-looking products and holistic systems for maximum safety of your process facilities. R. STAHL products are certified worldwide. Combined with our high level of application knowledge and extensive expertise, R. STAHL can provide you with optimum explosion protection for your needs.

### FIELD STATION FOR ETHERNET-APL AND CONVENTIONAL FIELD DEVICES

To combine Ethernet-APL with conventional field devices, we offer special field stations. These allow you to install, for example, up to three Ethernet-APL field switches alone or together with Remote I/O IS1+. The station is available for Zone 1 or Zone 2 explosive atmospheres — and can be adapted to your individual needs.

### SYSTEM SOLUTIONS FOR FUTURE-PROOF PLANT AUTOMATION

With system solutions by R. STAHL, you can connect conventional sensors and actuators in the field to modern Ethernet structures. Our IS1+ Remote I/O system for Zone 1 and Zone 2 is an ideal solution for this. The system is

based on the type of protection intrinsic safety "i", can be flexibly installed and expanded, and facilitates maintenance in explosive atmospheres.

The connection to Ethernet networks is made via a 100BASE-TX interface (intrinsically safe 100BASE-TX-IS in Zone 1). It supports PROFINET, EtherNet/IP and Modbus TCP as well as the classics PROFIBUS DP and Modbus RTU via RS485(-IS).

The integration of the system and the connected HART field devices into the asset management level works via a second channel. This is based on the NAMUR Open Architecture (NOA) with OPC UA or HART-IP or it is done "classically" via web server and FDT/DTM.

# THE RIGHT FIELD SWITCH FOR YOUR APPLICATION.

## THE TECHNICAL DATA AND SPECIFICATIONS AT A GLANCE

R. STAHL Ethernet-APL field switches are available in different versions to suit your needs. What they all have in common is that they are designed for the harsh environment in the field of process facilities and have intrinsically safe spurs. These support Ethernet-APL with the new 2-WISE concept (2-Wire Intrinsically Safe Ethernet) and they are compatible with PROFIBUS PA as well as with FISCO. We offer different Ethernet-APL field switches for installation in Zone 1 or Zone 2.

Currently, these support the star topology. In addition to the two RJ45 ports, the Zone 2 versions have two optional fibre optic connections via SFP modules. A special feature of R. STAHL: Diagnostics and information are displayed directly on the Ethernet-APL field switch via LEDs and via an OLED display.



| TYPE | INSTALLATION | SPURS | APL POWER CLASS | PA | TX | FX |
|---|---|---|---|---|---|---|
| 9740/12-16-00 | Zone 1 | 16 | 12 x A, 4 x A+B | --- | 3 x Ex e | --- |
| 9740/13-16-01 | Zone 2 | 16 | 12 x A, 4 x A+B | --- | 2 x RJ45 | 2 x SFP (option) |
| 9740/12-16-40 | Zone 1 | 16 | 16 x A | Yes | 3 x Ex e | --- |
| 9740/13-16-41 | Zone 2 | 16 | 16 x A | Yes | 2 x RJ45 | 2 x SFP (option) |

## GENERAL TECHNICAL DATA

| | 9740/12-16-.. | 9740/13-16-.. |
|---|---|---|
| ATEX marking | ⟨Ex⟩ II 2 (1) G Ex eb ia q [ia Ga] | ⟨Ex⟩ II 3 (1) G Ex ec ia [ia Ga] |
| IECEx marking | Ex eb ia q [ia Ga] | Ex ec ia [ia Ga] |
| Installation | Zone 1, Zone 2 and safe area | Zone 2, safe area |
| Spurs | 16 x Ex ia, 2-WISE, FISCO | 16 x Ex ia, 2-WISE, FISCO |
| Ambient temperature | -40 °C … +70 °C | -40 °C … +70 °C |
| Dimensions L x W x H | 260 x 292 x 52.6 mm | 260 x 292 x 52.6 mm |



### AUXILIARY POWER

| | |
|---|---|
| Nominal voltage | 24 V DC; 48 V DC |
| Voltage range | 19.2…57.6 V DC |
| Connections | PWR1, PWR 2 (redundant) |
| Connection type | 4-pin screw terminal / spring clamp terminal block |



### ETHERNET INTERFACES ZONE 1 VERSION

| | |
|---|---|
| Version | XT1, XT2, XT3: 100BASE-TX (Ex eb) |
| Connections | 3 x 5-pin screw terminal / spring clamp terminal |
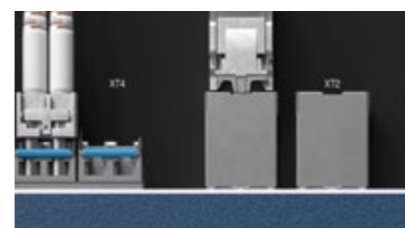


### ETHERNET INTERFACES ZONE 2 VERSION

| | |
|---|---|
| Version 1 | XT1, XT2: 100BASE-TX (Ex ec) |
| Version 2 | XT3, XT4: 100BASE-FX (SFP, option) |
| Connections 1 | 2 x RJ45 (EIA/TIA 568B) |
| Connections 2 | 2 x SFP-LC (option) |



### SPUR PORTS

| | |
|---|---|
| Version | S01…S016: Ethernet-APL (Ex ia / 2-WISE / FISCO) |
| Connections | 16 x 3-pin screw terminal / spring clamp terminal |
| Expression | Power Source 2-WISE / FISCO |
| Power Class | 16 x A (9740/1.-16-0.)<br>12 x A, 4 x A+B (9740/1.-16.4.) |
| Output power A<br>Output power B | 0.54 W<br>1.17 W |



### DIAGNOSTICS

| | |
|---|---|
| Version | 25 LED, OLED, web server |
| LED indicator | Status, Error, Alarm, Maintenance |
| OLED indicator | Read-only: Diagnostic and status information |
| Operation | 4 buttons (up / down / return / back) |
| Diagnostic functions | SNR, TDR, trace wire break / short circuit, shield fault, ambient temperature, humidity, noise (PA only), jitter (PA only) |

## ACCESSORIES

| VERSION | Contents |
|---|---|
| Terminal set Zone 1, screw terminals | 2 x 4-pin bw, 3 x 5-pin bw, 16 x 3-pin bl |
| Terminal set Zone 1, spring-loaded terminals | 2 x 4-pin bw, 3 x 5-pin bw, 16 x 3-pin bl |
| Terminal set Zone 2, screw terminals | 2 x 4-pin bw, 16 x 3-pin bl |
| Terminal set Zone 2, spring loaded terminals | 2 x 4-pin bw, 16 x 3-pin bl |
| SFP modules multimode | 2 x 100BASE-FX, MM, LC |
| SFP modules singlemode | 2 x 100BASE-FX, SM, LC |

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TION ABOUT ETHERNET-APL
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