



THE STRONGEST LINK.



NETWORK TECHNOLOGY

Connecting your Ex area to the 21st century is this simple.

NETWORK SOLUTIONS – LOOKING TO THE FUTURE OF EX AREAS

Digital progression is transforming whole industries and will inevitably become a key measure of competitiveness for companies in the future. Also in process automation, new and more efficient solutions for the digitalisation of plants are in development.

For this purpose, R. STAHL is also actively involved in working groups such as **NOA** (NAMUR Open Architecture) and **OPAF** (Open Process Automation Forum).

Ethernet and wireless technology are intended to play key roles in the implementation of digitalisation concepts in the process industry. Their main applications will be in data transmission for mobile operating devices, monitoring process technology sequences, and integration and diagnostics for sensors and actuators. The technical challenge is to ensure that the solutions meet the requirements of digital transmission technology, on the one hand, and **explosion protection**, on the other. Together with other notable manufacturers, R. STAHL is therefore working on future standards for intrinsically safe

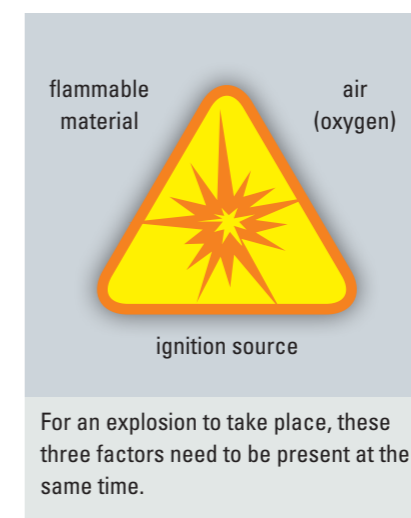
2-wire **Ethernet APL** (Advanced Physical Layer) and intrinsically safe 4-wire Ethernet (**100BASE-TX-IS**).

R. STAHL aims to provide products and solutions that combine **safe explosion protection** and **easy handling**. The R. STAHL network technology range currently includes explosion-protected products and solutions for installing **Ethernet networks** and **wireless solutions** in process plants. We also see ourselves as your partner when it comes to designing networks in hazardous areas using devices and technologies of your choice.

IT MEETS EXPLOSION PROTECTION

The use of Ethernet in the process industry gives rise to an aspect that for most IT experts is absolutely new – explosion protection.

Protective regulations in the form of laws, decrees and standards have been adopted across the world to prevent explosions. The primary aim is to prevent the formation of dangerous explosive atmospheres. In the production areas of the process industry, this often cannot be completely excluded. Measures are therefore required that prevent the ignition of this atmosphere. Potential



One or more standardised types of protection can be used for electric and electronic devices. The specific choice of protection depends on the type of hazardous area and the device application. The need to unite both aspects in a single solution poses a real challenge.

More than 50 years of experience in the field of explosion protection and our own products that communicate via Ethernet make R. STAHL your ideal partner for your network solution.

ignition sources include sparks, hot surfaces and electromagnetic radiation from a radio signal.



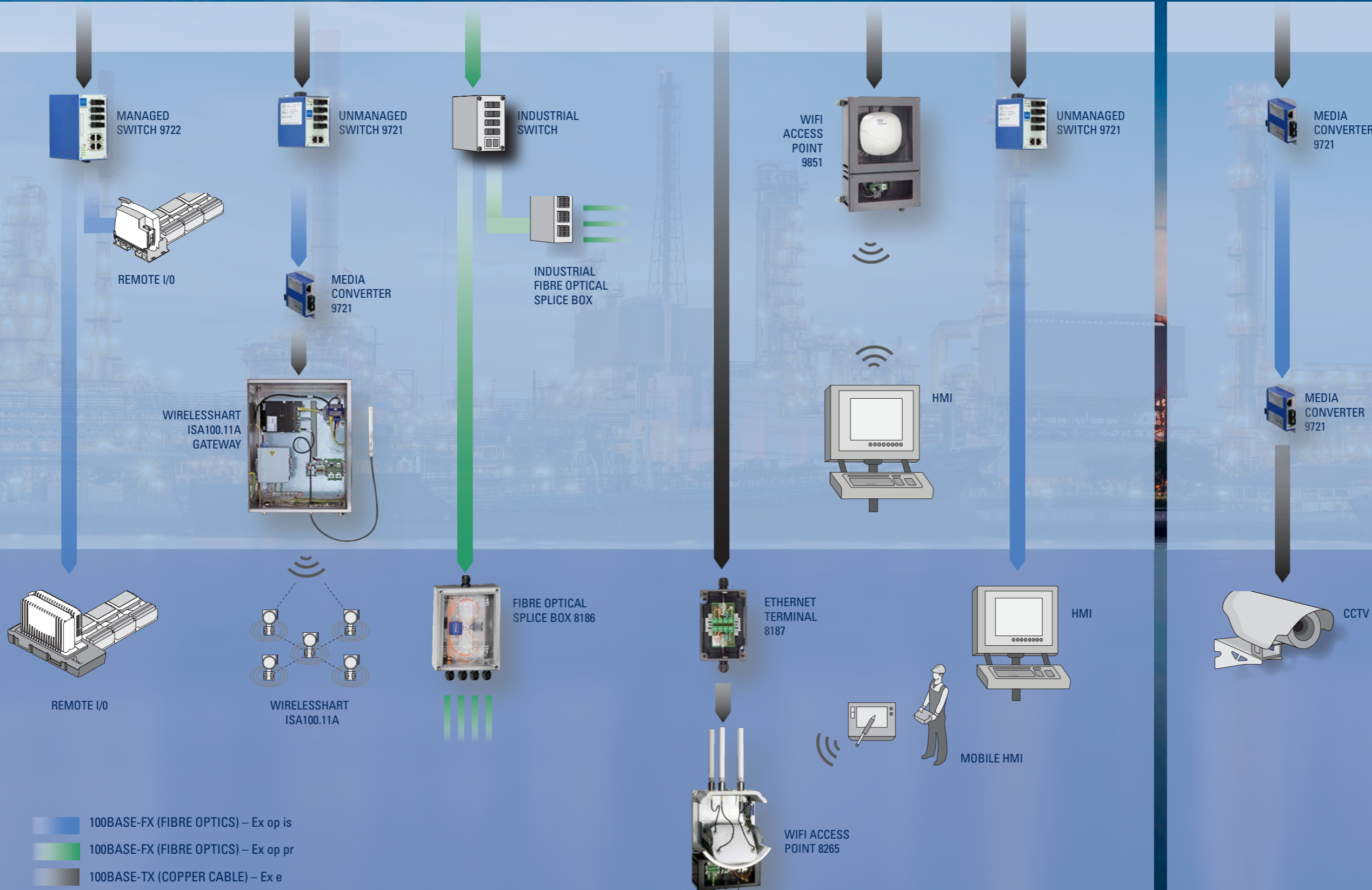
R. STAHL – SOLUTIONS FOR DIGITAL NETWORKS

ETHERNET NETWORK

CCTV CONTROL

ZONE 2

ZONE 1




MEDIA CONVERTER, UNMANAGED AND MANAGED SWITCHES

Ethernet data transmission via copper cables is limited to a distance of about 100 m. This is frequently not enough for the large production sites in the process industry. Also, data transmission via copper cables can be affected by electromagnetic interference.

In both cases, data transmission via optical fibre is a suitable alternative.

R. STAHL's media converters and switches work on the basis of explosion-protected laser sources, making installation and operation very simple.

Type of protection „op is“ – inherently safe optical radiation 
Laser sources, which are used for the transmission of signals via fibre optic, are considered as potential sources of ignition.

The „op is“ type of protection is based on limiting energy to a safe level, and is described in IEC EN 60079-28.

Media converter 9721



The media converter series 9721 converts electrical signals into inherently safe optical "op is" signals, allowing installation and maintenance work to be conducted on fibre optics in Zones 0, 1 and 2 without the need for downtime (hot swap/hot work). It is particularly suitable for the Ethernet remote I/O system IS1+.

- Transmission rate 100 Mbit/s.
- Transmission range up to 5 km (multi mode) or up to 30 km (single mode).
- Extended temperature range: -30 °C ... +75 °C.
- Suitable for installation in Zone 2.

Unmanaged switch 9721



The switch 9721 is used for linking electrical Ethernet networks with optical 100 Mbit/s Ethernet networks. The 4 FO ports are designed for operation in the hazardous areas with the „op is“ type of protection. This way, conventional fibre optic cables can also be used in hazardous areas and may be connected and disconnected during operation (hot swap).

- Transmission rate 100 Mbit/s.
- Transmission range up to 5 km (multi mode) or up to 30 km (single mode).
- Extended temperature range: -30 °C ... +70 °C.
- Suitable for installation in Zone 2.

Managed switch 9722



The managed 100 Mbit/s switches series 9722 are specifically designed for use in PROFINET networks. They feature ring functionality based on the Media Redundancy Protocol. The 4 FO ports are designed with the „op is“ type of protection, making maintenance of the devices in Zones 0, 1 and 2 easy (hot swap, hot plug).

- Robust industrial design.
- Suitable for PROFINET.
- Extended temperature range: -40 °C ... +70 °C.
- Suitable for installation in Zone 2.



INSTALLATION TECHNOLOGY FOR CABLES AND FIBRE OPTICS

The installation of Ethernet in hazardous areas is a balancing act between the requirements of explosion protection and those of digital signal transmission.

Whilst minimum distances and separate circuits are required on the one hand, parallel wiring may on the other hand result in interference.

The known installation methods from the industrial area like RJ45 connectors or FO patch panels are not easy to use in hazardous areas.

R. STAHL provides unique solutions that combine both worlds, while at the same time making installation simple and fast.

Type of protection "e" – increased safety

Special measures are taken for this type of protection to prevent excessively high temperatures and the generation of sparks within or outside of electric equipment. For this type of protection to work, there must be no sources of ignition during normal operations.

Type of protection "op pr" – protected optical radiation

Laser sources, which are used for the transmission of signals via fibre optic, are considered as potential sources of ignition. The „op pr“ type of protection is based on the safe encapsulation of the optic radiation within the fibre optic and the connection technology.

Ethernet terminal 8187



Ethernet terminal 8187 is used to connect CAT5/6/7 cables with transmission rates of up to 1 GBit/s in Zone 1 hazardous areas and replaces the not permitted industrial connectors.

- Simple installation in Zone 1 in the Ex e enclosure.
- For transfer rates of up to 1 GBit/s on up to 4 pairs of wires.
- High-quality shield for interference-free transmission.
- Also suitable for Power over Ethernet (PoE).

Fibre optics splice cassette 8186



Fibre optics splice cassette 8186 with „op pr“ type of protection is used to connect 6 or 12 fibre optic cables quickly and correctly in hazardous areas.

- Simple installation in Zone 1 in the Ex e enclosure.
- For up to 12 fibre optics per cassette – cassettes can be stacked.
- No limit to FO transfer rates.
- Integrated crossing field for bend-radius-limited crossing of fibres.

INSTALLATION TECHNOLOGY FOR WIRELESS SOLUTIONS

Wireless technologies such as WiFi are being used more and more frequently in the process industry. When used in hazardous areas, ignition protection for the wireless interface can be particularly challenging.

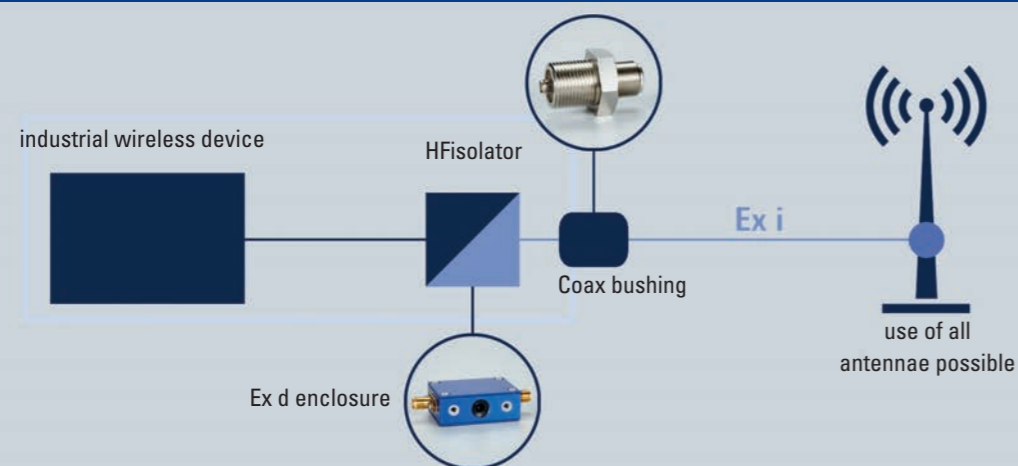
The best balance between explosion protection and ease of use of the antennae is achieved by converting the radio signal to an intrinsically safe radio signal. This allows the planner and user to choose from the entire range of antennae and plug connectors that are suitable for industrial applications.

„i“ type of protection – intrinsic safety



An electric circuit is intrinsically safe if no sparks or thermal effects cause an explosive atmosphere. This is achieved through failsafe limiting of the electric energy. The type of protection enables electrical circuits to be connected or separated without switching off the power source.

Intrinsically safe radio signal for high flexibility



HFisolator 9730



The HFisolator 9730 series from R. STAHL, which can easily be switched between a wireless device and an antenna and vice-versa, converts the radio signal into an intrinsically safe signal. R. STAHL offers two versions of this device, as a simple signal converter or a combined signal converter and coax bushing.

- Use the entire antennae spectrum.
- Additional frequency range.
- Temperature range: -40 °C ... +80 °C.

Antennae



Converting the signal into an intrinsically safe antennae signal means that the HFisolator is able to use the entire range of industrially capable antennae. The antennae, however, must meet certain requirements for use in hazardous areas, assessed according to standards. R. STAHL offers antennae for main applications that have already been assessed. Our services also include assessing an antenna of your choice.

PROJECT-SPECIFIC SOLUTIONS FOR ZONE 2

R. STAHL offers solutions to operate network components of your choice in hazardous areas – this includes devices that do not have corresponding approval.

Enclosure system 9851 allows us to supply this solution in a short time. The advantages of a WiFi network really come to the fore when a network is managed uniformly

across the company under central administration. Housing system 9851 enables the use of standard WiFi access points.



„nR“ type of protection – restricted breathing enclosure

These enclosures are designed to limit the potential ingress of explosive atmospheres. When these housings are used in a simple design, the user must test their impermeability at regular intervals. Housing system 9851, combined with a connection chamber, is designed to make these user tests unnecessary.



FLEXIBLE STRUCTURE – INTERNAL OR EXTERNAL ANTENNAE

The use of plastic enclosures means that the use of external antennae is not absolutely necessary. This also makes it possible to use devices that only feature an internal antenna, as is often the case with WiFi or RFID readers. This approach allows users to save both space and money.

LIGHTWEIGHT ENCLOSURE WITH MINIMAL MAINTENANCE REQUIREMENTS

Compared to Ex d enclosures, the plastic enclosures are up to 70% lighter and are significantly easier to install. A range of enclosure sizes are available, to ensure that the enclosure is optimally adapted for the size of the device to be protected. As the connection is made in the field via the separate connection chamber, the required maintenance is kept at a minimum.

EASY CONNECTION – EASILY ACCESSIBLE

The lower part of the enclosure is used for connecting the wireline communication and the power supply. The separate connection chamber enables the connection to be made during the installation process without affecting the explosion protection of the upper part of the enclosure or increasing the maintenance requirements.

PROJECT-SPECIFIC SOLUTIONS FOR ZONE 1

R. STAHL makes it possible to operate WiFi access points or other network components in hazardous areas.

This means that your network remains standardised across your business, with central administration.

We are happy to accommodate individual requirements and regional specifics.



„d“ type of protection – flameproof enclosure

Devices which can ignite a potentially explosive atmosphere are surrounded by an enclosure which withstands the pressure of an explosive mixture exploding inside the enclosure and prevents the transmission of the explosion to the atmosphere surrounding the enclosure.



CHOOSE FROM A FULL RANGE OF ANTENNAE

The HFisolator converts radio signals into explosion-protected wireless signals. Converting the signal makes the advantages of intrinsic safety (Ex i) for radio signals visible: The use of the full range of antennae, the use of standard coaxial connectors, and the ability to plug in and disconnect these connectors in hazardous areas.

GREATER DISTANCES WITH FIBRE OPTICS

The media converter is used to convert electrical Ethernet signals (TX) into optical Ethernet signals (FX). The optical Ethernet signals have „op is“ type of protection. Therefore, conventional fibre optic cables can also be used in hazardous areas and may be connected and disconnected during operation (hot swap).

FAST IMPLEMENTATION AND EASY REPLACEMENT

The enclosure system for Ex d explosion protection type enables solutions for standard Ethernet devices, such as a WiFi access point, to be constructed in a project-specific manner. International approvals mean that this approach can be implemented around the world. A project-specific solution can be created within a few weeks. The concept enables WiFi access points to be replaced easily, for instance when switching to the latest generation.

SIMPLE, TIME-SAVING INSTALLATION

The separate Ex e connection chamber makes installation significantly easier. Ethernet and power supply sources can be inserted into the enclosure in the usual way via simple cable glands. The connection chamber can be opened and closed very easily using four screws.



SYSTEM SOLUTIONS – SOPHISTICATED AND TAILOR-MADE

Your digitalisation projects do not need to fail due to explosion protection requirements. Not all installation tasks can be transferred 1:1 to hazardous areas – but there are useful alternative solutions for almost all requirements. Thanks to our comprehensive

product range and years of experience, we offer you tailor-made solutions for almost any challenge.

We work with you as a partner to construct networks in hazardous areas with the devices and technologies you choose: from FO bushings for Ex d control stations

over Zone 1 remote I/O systems with Ethernet communication up to the integration of our explosion-protected CCTV cameras into your IP networks.

Ethernet remote I/O for Class I, Division 1 with PROFINET



Use of the Ethernet remote I/O system IS1+ in a paint shop in USA with network connectivity via PROFINET protocol.

- Installation in Class I, Division 1, alternatively also possible in accordance with ATEX/IECEX in Zone 1.
- Communication via explosion-protected fibre optics („op is“ as per IEC 60079-28) and media converter series 9721.
- PROFINET protocol with a transfer rate of 100 Mbit/s, optionally with additional S2 redundancy.
- Full support for the HART protocol with integration into asset management systems via FDT/DTM.

Ex d control for Zone 1 with Ethernet connection



Use of FO splice cassette and Ethernet terminal in the Ex e connection chamber of an Ex d control system.

- Installation in Zone 1 in accordance with ATEX/IECEX requirements.
- „op pr“ fibre optics as per IEC 60079-28.
- CAT cable with Ex e type of protection.
- Scalable thanks to stackable splice cassettes, each with up to 12 fibre optics.
- Installation possible in the same way as for industrial systems.

WirelessHART/ISA100.11a for offshore use



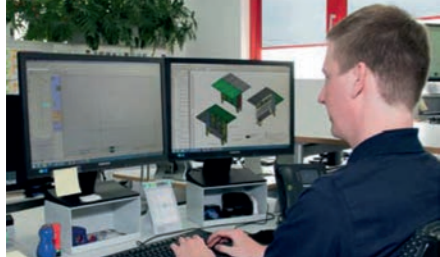
Use of WirelessHART and ISA100.11a gateways on offshore platforms in the North Sea.

- Installation in Zone 2 in accordance with ATEX/IECEX requirements.
- Increased availability thanks to gateway redundancy.
- Increased transmission distance using FO.
- Simple fibre optic connection using splice box.



BUNDELED COMPETENCE FOR DIGITALISATION

Engineering



In addition to components, R. STAHL can also provide project-specific solutions. Our experienced engineers work with you to design the ideal solution for your application fast.

Production



From an Ethernet terminal to an HMI with WiFi access point – our production facilities will construct your solution safely, on time and with certified quality according to ATEX, IECEx or NEC.

Factory Acceptance Test (FAT)



Visit us at our spacious production facility for the inspection and acceptance of your solutions. Should you require any changes our production team will be immediately available.

Support



Our cooperation certainly does not end with the delivery of your system. Our support team is available during the initial on-site commissioning and over the entire operating life.

R. STAHL AUTOMATION – MORE THAN YOU **EX**PECT

R. STAHL was founded as a family-run German company in 1876 and has been actively involved in explosion protection since the 1940s.

AUTOMATION has been firmly established in the company for **50 years**, and has resulted in significant pioneering work, for example, in explosion-protected remote I/O systems and intrinsically safe fieldbus solutions.

We actively cooperate in **future topics**, such as NAMUR Open Architecture (NOA), the Open Process Automation Forum

(OPAF), Ethernet APL (Advanced Physical Layer), and Cyber Security, so that our customers can digitalise their process plant of the future.

Nowadays, R. STAHL is one of the world's three largest providers of components and solutions for electrical explosion protection.

We are the number one company for **system solutions**, including for the most extreme ambient conditions. R. STAHL actively supports standardisation in accordance with ATEX, IECEx and NEC/CEC for its customers

in order to ensure a high safety standard within Germany and internationally.

From development through to production and operation in systems, we act true to the **„Made in Germany“** seal.

R. STAHL places great importance on the safety, quality and durability of its products. This is why we have been certified since 1993 in accordance with ISO 9001 and are one of the first manufacturers to be certified in explosion protection in accordance with IEC EN 80079-34.





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