



# LS1+ remote I/O

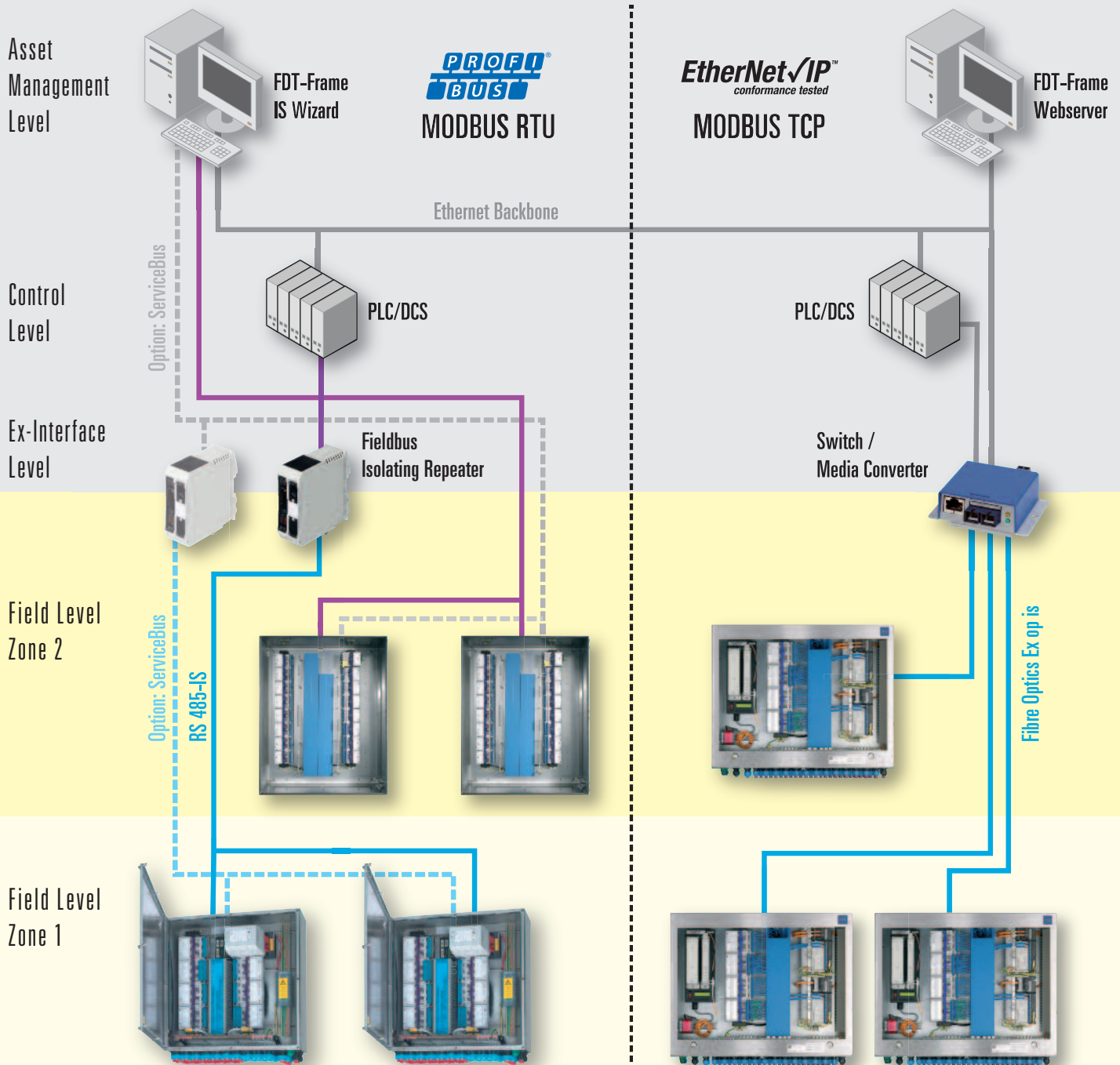
future inside





# Remote I/O solutions for today and tomorrow

## Systems with PROFIBUS DP and Ethernet



## Think today about tomorrow

For many years now, IS1 has been the system that is most often installed in explosive atmospheres all over the world. It is continuously improved and expanded by new functions, such as PROFIBUS redundancy, DTM support, integration of optical rings or modules with integrated solenoid valves. In combination with more than 30 years of expertise and know-how in system solutions by R. STAHL, almost every task can be solved.

With IS1 Ethernet, the first step towards the future was taken in 2009 – the first Remote I/O with communication via Industrial Ethernet in Zone 1. PROFIBUS International as well as Fieldbus Foundation™ are currently working on specifications and solutions for the application of their Ethernet protocols PROFINET and FF HSE in connection with Remote I/O – and in both working groups, R. STAHL is actively taking part with prototypes to jointly design the “Future Remote I/O”.

Besides support of modern protocols, a long-lived and flexible I/O level is required as well. Based on experience with thousands of globally installed IS1 systems, R. STAHL now presents the most up-to-date I/O modules with IS1+. The future-proof system solution for complex requirements in hazardous areas of today and tomorrow.

- + **Multifunctional modules** allow for a mixture of analogue inputs/outputs, digital inputs/outputs and resistance thermometers/thermocouples
- + **Extended lifetime** of up to 15 years with the new low-power technology
- + **Increased temperature range** from -40 to +75°C, as well as for extreme environmental conditions
- + **Channel status LEDs** for Zone 1 modules for easy commissioning and troubleshooting.
- + **Integrated diagnostics**, inspired by NAMUR 107, gives warning of failures in due time and also give an optical alarm with a blue LED
- + **Zone 2 installation** and Zone 0/1 field devices – even more effective now with the new, cost-saving modules
- + **100% compatibility** with the previous modules – easy replacement and upgrading of existing installations



With PROFINET for PA, PROFIBUS lays the foundations for Ethernet solutions in process automation.



With IS1 Ethernet, Ethernet for process automation is available already – on the basis of MODBUS TCP and EtherNet/IP.



The new IO level IS1+ makes the Remote I/O system even more attractive for different applications – even in extremely rough environments.



Fieldbus Foundation™ addresses new markets with Foundation for Remote Operations Management, based on the FF High Speed Ethernet.



# The latest I/O level

## Less is more — multifunctional modules IS1+



### + Analog Universal Module HART, 8 channels

For the intrinsically safe operation of 2-wire transmitters, including supply, and of positioners with standard signals ranging from 0/4 to 20 mA. Digital communication with the connected field devices can be effected bidirectionally via the HART protocol. Every channel can be parameterized as input or output.

Versions: 9468/32-08-11 AUMH, 8 channels for Zone 1 with Ex i inputs/outputs and channel status LEDs  
9468/33-08-10 AUMH, 8 channels for Zone 2 with Ex i inputs/outputs



### + Digital Input Output Module, 16 channels

For the intrinsically safe operation of contacts, NAMUR proximity switches and low-power solenoid valves. Up to 8 channels may also be used for frequencies or counters that recognize direction of rotation. Every channel can be parameterized as input or output.

Versions: 9470/32-16-11 DIOM, 16 channels for Zone 1 with Ex i inputs/outputs and channel status LEDs  
9470/33-16-10 DIOM, 16 channels for Zone 2 with Ex i inputs/outputs



### + Temperature Input Module, 8 channels

For the intrinsically safe operation of resistance thermometers in 2-/3-/4-wire circuits, resistance transmitters and thermocouples. Application with internal or external cold junction compensation. Every channel can be parameterized as resistance or thermocouple input.

Versions: 9482/32-08-11 TIM, 8 channels for Zone 1 with Ex i temp. inputs and channel status LEDs  
9482/33-08-10 TIM, 8 channels for Zone 2 with Ex i temp. inputs



### + Digital Output Module, 4 and 8 channels

For the intrinsically safe operation of solenoid valves, also suitable for hydraulic valves. All versions with separate process shutdown for SIL2-compliant output deactivation. Different output characteristics for optimal operation of different solenoid valves.

Versions: 9475/32-04-x2 DOM, 4 channels for Zone 1 with Ex i outputs, process shutdown and channel status LEDs  
9475/32-08-x2 DOM, 8 channels for Zone 1 with Ex i outputs, process shutdown and channel status LEDs  
9475/33-08-x0 DOM, 8 channels for Zone 2 with Ex i outputs



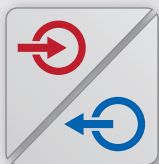
### + Special Modules, up to 8 channels

Supplementary modules for many further applications with intrinsically safe and non-intrinsically safe field devices. Excerpt from the general catalogue:

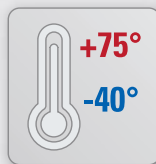
Versions: 9478/22-08-51 DOMV, 8 channels for Zone 1 with integrated 3/2-way valve, process shutdown  
9477/12-08-12 DOM-R, 8 channels for Zone 1 with relay outputs 60 W/100 VA  
94xx/35-xx-xx I/O modules for Zone 2 installation with non-Ex / Ex nA connection  
9164/13-22-09 mA-isolating repeater, 1 channel for the connection of 4-wire transmitters to 9468  
9174/10-15-00 Electronic relay module, 1 channel, Ex i triggering, for loads up to 250 V / 1 A

## Your plus: the new I/O modules IS1+

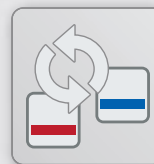
Plants can now be operated even more effectively with the new or improved functions of the multifunctional modules. Extended diagnostics and status messages make processes more transparent and give warning of failures in due time. The innovative low-power design does not only save energy but also significantly extends lifetime – even at higher ambient temperatures. New modules, optimized for Zone 2, allow for further savings and the guaranteed downward compatibility protects your investments.



Multifunctional – parameters can be configured per channel as input or output



Increased temperature range for all I/O modules



100% compatible – old modules can be replaced without any modifications



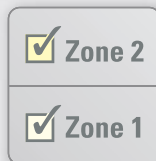
Even more effective and cost-saving for all applications due to the new features



Integrated diagnostic functions inspired by NAMUR NE107



With the new low-power design, the typical lifetime is extended to up to 15 years



Optimized modules for either Zone 1 or Zone 2 application



Additional indications with maintenance LED, status LEDs per channel and signal-status bit





# IS1+ the Remote I/O

## Leading for explosive atmospheres



With the explosion-protected Remote I/O system IS1, R. STAHL set standards that still serve as market standards to this day: unique flexibility, efficiency and profitability. IS1+ fulfils all these requirements even better, no matter how complex your facility is. With the completely intrinsically safe system structure with intrinsically safe fieldbus, IS1+ can be easily extended and modified in hazardous areas (hot work, hot swap). Our long-standing experience with almost all automation systems and the respective bus protocols, and of course the required international approvals for explosion protection and shipbuilding, make IS1+ the ideal solution for your applications all over the world.



IECEx



### + Versatile communication – flexible connection to any system

IS1+ supports the major fieldbuses & HART in Zone 1, Zone 2 and USA Div. 1 and Div. 2. All bus connections are realized with comfortable hot swap solutions, either intrinsically safe with copper lines (PROFIBUS DP V1, MODBUS RTU) or via interference-free, optically inherently safe fibre optics (Ethernet-MODBUS TCP, EtherNet/IP and PROFIBUS DP, MODBUS RTU). Of course, configuration and diagnosis is also done via the fieldbuses.



### + Hot swap – easy maintenance for all modules

The uniform intrinsically safe concept for the connection of field devices, supply of I/O modules, internal data transfer and the communication links as well as the combination with intelligent solutions for non-intrinsically safe components enable live work on the systems in potentially explosive atmospheres, such as installations, extensions or maintenance, without the need for special precautions.

# Easy — flexible — safe!

The real innovation is its simplicity — another advantage of IS1+. The system can be mounted and modified without any requirement for special engineering software, complicated regulations or tools. Almost anything is possible — horizontal or vertical assembly, vacant positions and preconfigured vacancies or a last-minute change of modules on site.



## + BusRail — the modular & stable system basis

The internal wiring of the system for energy, data and address lines. Sensitive backplane solutions or numerous interference-susceptible plug connectors are not required. Just snap it onto a DIN rail and the installation is complete.



## + Terminating elements — fastening or transmission

For optional mechanical stabilization, especially in cases of vertical assembly and strong vibrations, such as on ships. Alternatively available with integrated BusRail extension for flexible system design on several levels.



## + CPU & Power Module — power supply and bus connection

This is applied as the first module in the system, twice in case of system redundancy. Like any I/O module, this module can also be replaced during operation while the system is energized. It is also available for Zone 2 and Ethernet.



## + I/O Modules — 8 and 16-channel devices with Ex i interface

These are snapped on the BusRail in any desired order. Addressing is done automatically. Zone 1 I/O modules and cost-optimized Zone 2 I/O modules are available. All modules can be completely replaced any time during operation while the system is energized.



## + Connection of field devices — intrinsically safe and other signals

Connection via conveniently accessible, pluggable terminals. With the new programmable multifunctional IS1+ modules, only a few different variants are required. Suitable for intrinsically safe and other field devices such as Ex d solenoid valves — all settings are made via standard tools like GSD or DTM.



## + Fieldbus — for PROFIBUS DP, MODBUS RTU, MODBUS TCP and EtherNet/IP

The different fieldbuses are quickly and easily connected via plug connectors. With the intrinsically safe or optically inherently safe solutions, there are no restrictions with regard to working on the energized system. Of course, redundant systems are supported as well.

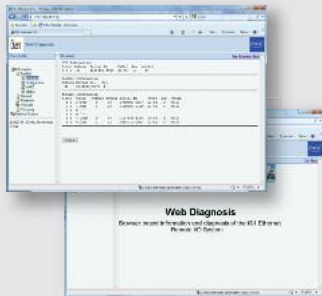


# Optimal process availability

## Extensive diagnostic features



**EDDL™**



To optimize processes in process engineering plants and to reduce downtime, informative diagnoses and integration of the devices in Asset Management Systems become more and more important. For conventional analogue field devices, the well-established HART protocol is used in most cases. Remote I/O systems also have to offer the option of being integrated into the diagnostic structure and making HART information transparently available. The times in which each manufacturer offered their own, proprietary software tool are long over. Today, unique interfaces between field device technology and control level – independent of manufacturers – are standard, such as EDDL and FDT/DTM. For IS1+, transmission is done either directly via the process bus or, alternatively, for PROFIBUS DP and Modbus RTU, via the independent IS1+ ServiceBus.

### Remote I/O device DTM

- + Com-DTM for PROFIBUS DP, Modbus RTU, Ethernet Modbus TCP and EtherNet/IP
- + Including HART gateway DTM for the connection of HART field devices
- + Modular device DTM for parameterization and diagnosis of IS1+ modules
- + Online alteration of parameters and configuration
- + Diagnoses and status displays are also accessible offline, without automation system
- + Support of condition monitoring for HART field devices
- + Convenient functions such as HART-Live-List, topology generation, Audit Trail, I&M query

HART field devices can alternatively be accessed via the ServiceBus DTM.

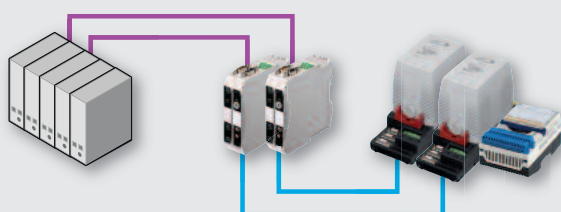
### Integrated web server for Ethernet

- + No separate ServiceBus required, direct access via the installed network
- + Integrated web server in IS1+ Ethernet CPUs – no software installation required
- + Use of standard internet browser for all operating systems
- + Application as loop check during start-up: indication of all the installed and configured I/O modules even without connected automation system
- + Access to I&M functions with serial numbers and software/hardware versions
- + Extensive, password-protected system diagnosis in the specialist mode, including firmware updates via FTP access



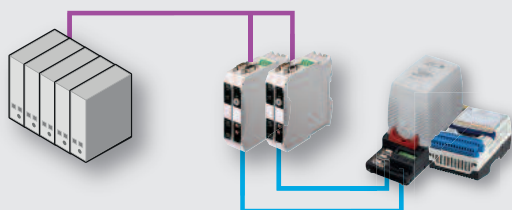
# Optimize plant availability

IS1+ offers various configuration possibilities to maximize the plant availability for critical processes.



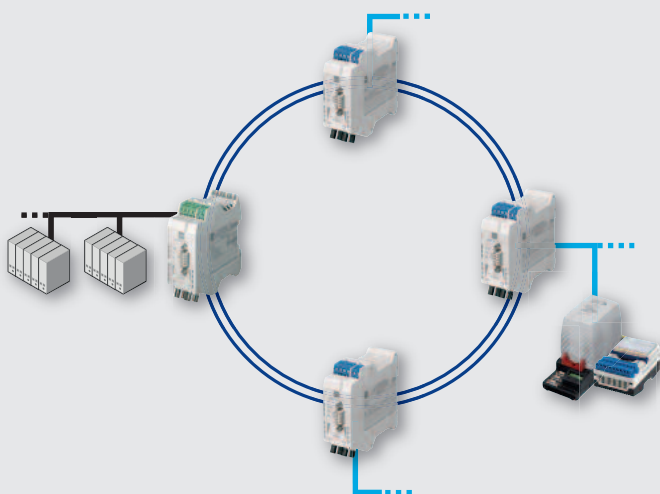
## +System redundancy

To achieve the best availability, all system components and cables are installed in a redundant way. The standard PROFIBUS slave redundancy is used with PROFIBUS DP, extended with IS1+ to support other flying master systems too. For Ethernet, redundant networks are supported as well – with a reaction time of less than 200 ms.



## +Media redundancy

The good-value solution that works together with any PROFIBUS DP master. Two cables are connected together to one master via two linked fieldbus isolating repeaters. Only one CPU & Power Module is required; it controls the redundancy handling via the two integrated ports – the master does not need to interfere in any way.



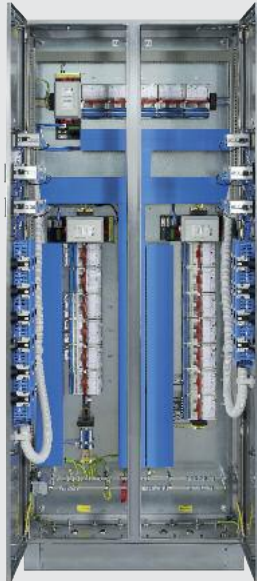
## +Optical ring

Fibre optic cables and PROFIBUS DP or Modbus RTU allow the installation of a ring for up to 32 participants. With this, the process bus becomes highly available so that if one transmission line fails, the plant still keeps on running. With early warnings, the integrated diagnostics for the fibre optic cable help to detect potential problems in good time. For highest availability requirements, the ring can be designed redundantly as well.



# System solutions with IS1+

Engineering made by R. STAHL



Offshore and marine applications where space is restricted

- + Ready for connection for Zone 1 with ATEX and IECEx approvals
- + Compact cabinet with double door for space-saving opening
- + Installation of 3 Remote I/O systems for 150 analogue or 300 digital signals
- + Cable shields are attached directly to the input side – optimum EMC properties
- + Integration of mA displays in the front doors
- + Additional indicator lamps, push-buttons and emergency stop buttons integrated on the front of the cabinet and connected directly to the Remote I/O



Control of loading arms for chemical tankers, oil tankers and gas tankers

- + Design for Zone 1 installation, optionally also for Division 1
- + Compact system design, all functions in one enclosure
- + Redundant IS1 PROFIBUS DP station to Siemens S7
- + Control of sensors, control devices and signalling devices via IS1
- + Integration of the control of hydraulic motors and valves as well as radio remote control in the Ex d enclosure



Combination of Remote I/O with Foundation Fieldbus in a pharmaceutical plant

- + Switch cabinets for installation in Zone 2
- + Use of IS1 with PROFIBUS DP for all discrete I/O signals
- + Foundation Fieldbus H1 with R. STAHL Ex i field device couplers at the high-power-trunk
- + Integration of weighing systems and solenoid valve islands
- + Special top-side cable entries
- + Engineering, assembly and acceptance tests by R. STAHL in Waldenburg



## The whole is more than the sum of its parts

From the idea to the implementation of a project, R. STAHL is a competent partner. With our 30 years of experience world-wide with different system solutions in explosion protection we will surely find a solution. From planning to commissioning. From service to maintenance and modernization.



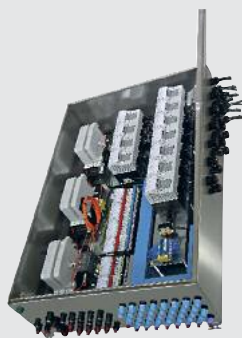
### Mobile offshore drilling unit

- + NEC500-conform solution for Class I Division 1
- + Remote I/O system IS1 with PROFIBUS DP communication
- + Non-intrinsically safe circuits with conduit connection
- + Installation in a high-quality stainless steel enclosure, suitable for offshore applications
- + Self-sufficient system operation possible
- + Engineering and assembly by the competence centre R. STAHL Inc. USA/Houston



### Remote I/O field station with integrated HMI in a chemical plant

- + Installation in Zone 1 to control processes on site
- + Remote I/O system IS1 with PROFIBUS DP communication
- + Zone 1 operation terminal by R. STAHL HMI systems with colour display and touch screen
- + Ex d and Ex i display elements and operating elements integrated in the front, control via IS1
- + Installation in a two-part stainless steel enclosure for easy opening



### Field station with IS1 Ethernet and integrated Remote I/O valve island

- + Installation in Zone 1 to control a process plant
- + 3 Remote I/O IS1 systems with communication via EtherNet/IP with Rockwell system
- + Data transfer via optical fibre cable that is immune to interference
- + Use of Digital Output Modules with Valve (DOMV) – space-saving solution compared to separate valve islands
- + New I/O module DOMV type 9478 with 8 integrated 3/2-directional valves



# Global customers – global projects

## A few examples from all over the world



### Ethernet and Remote I/O

In Germany, the country of origin of remote I/O, there is also one of the world's first installations with Ethernet in Zone 1 and it even features redundant communication.



### NEC standard for Remote I/O

The IS1 is one of the very few Remote I/O systems that can be fully utilized in a Division 1 in accordance with NEC500 requirements. This is for a customer from chemical industries who uses the system as their standard solution.



### Remote I/O goes offshore

Robust and compact – Remote I/O field stations certified for use in Zone 1 and Zone 2 on ships and offshore.



### Remote I/O in an ethylene plant, Nigeria

A good example of our international project business. The engineering was done in Indonesia with local support by R. STAHL. Furthermore, the project also involved local commissioning.



### IS1 used for an FPSO application

Another common application for remote I/O. The R. STAHL system is used on an FPSO close to Rio de Janeiro, where other IS1 systems are also installed on offshore platforms.



### Extreme temperature requirements

Outside installations in the Middle East typically require high ambient temperatures. In this project active cooling was not acceptable, so that R. STAHL developed a special passive cooling solution for the remote I/O installations.

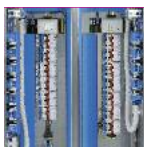






#### Various solutions for LNG carriers

Remote I/O is one of the most efficient solutions for use on ships with explosive atmospheres. Automation system providers in countries such as Norway or South Korea make use of its space- and weight-saving advantages.



#### Low-temperature requirements

IS1 is installed in an oil & gas application in Russia at extremely low temperatures with integrated Ex heater in Zone 1. Due to the long distances involved, fibre optic cables are used.



#### Combination of Remote I/O and Fieldbus

This is an application for pharmaceutical industries that combines the advantages of remote I/O technology with Foundation technology – both product ranges delivered by R. STAHL in customized stations.



#### Remote I/O in a synthetic rubber production

A mix of Zone 1 and Zone 2 stations, utilizing the unique IS1 flexibility for both types of installations with a similar design.



#### IECEx standard for Remote I/O

R. STAHL delivered a complete Zone 1 remote I/O system, certified for use in Australia, for a biodiesel plant.



#### IS1 for a supercritical fluid phase chromatography plant

Remote I/O stations with EtherNet/IP communication and the new DOMV module with integrated solenoid valves for a space-saving integrated solution.







# Innovations that set benchmarks



## 1987 ICS MUX

R. STAHL introduces the first remote I/O system for hazardous areas: ICS MUX. For this, the first intrinsically safe fieldbus was developed.



## 2000 IS1

Presentation of IS1 – today's market leader in hazardous areas. The intrinsically safe PROFIBUS DP becomes standardized – based on the Ex i PROFIBUS DP from R. STAHL development.



## 1997 VOS 200

Introduction of VOS 200, which is significantly smaller than the other products and is designed to support an open fieldbus (PROFIBUS DP). For the first time, this was developed to be intrinsically safe.

## 2012 IS1+

With IS1+ a fundamental new innovative I/O level is available – fully downward compatible of course. Besides programmable multifunctional modules and enhanced diagnostics, the modules are based on the new low-power design to achieve a significantly longer lifetime.



2010

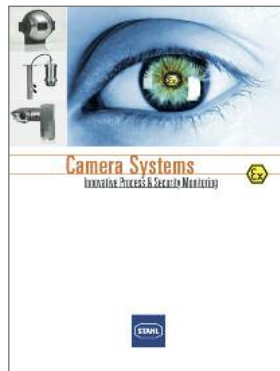
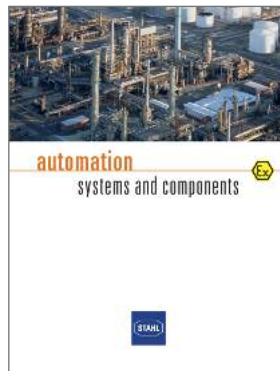
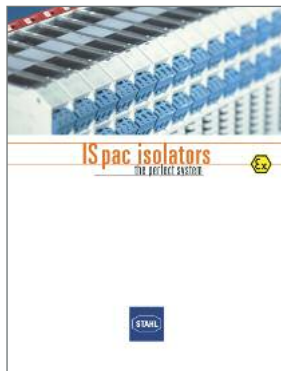


## 2009 IS1 Ethernet

R. STAHL introduces the world's first Zone 1 & Div. 1 remote I/O that runs on Fast Industrial Ethernet. The system is the basis for future Ethernet solutions such as PROFINET and FF HSE.

2015

Further information you can find in the following brochures:



R. STAHL  
Am Bahnhof 30, 74638 Waldenburg  
Germany  
Tel.: +49 7942 943-0  
Fax: +49 7942 943-4333

 [www.stahl.de](http://www.stahl.de)



ID 103144

2012-06 / en-02 · Printed in Germany