



fieldbus solutions

modules and systems





For the last 80 years of our 130-year company history, we at R. STAHL have had a major impact in the sector of explosion protection. Development of explosion protected, electrical control devices and control units was speeded up consistently and successfully as of 1926. In 1993, three independent fieldbus systems at the R. STAHL company were used on an offshore drilling platform off the coast of Norway. What was then the company's largest fieldbus project required customer-specific, innovative solutions and a high engineering share. R. STAHL's Remote I/O System IS1 was introduced in the year 2000 as a decisive step into a new millennium, geared to the future. This pioneering system leads the market worldwide today in the fieldbus sector. At the time, safety standards were not barriers for us but challenges for us, as they still are today. We not only comply with all standards but are generally also involved in helping to create these standards and set new ones. The result is that the R. STAHL Schaltgeräte GmbH company numbers among the leading suppliers of explosion protected components and systems for measurement, control, instrumentation, power distribution, operator control and monitoring, besides lighting, worldwide. And the result of this is that we offer all-in services in the explosion protection sector.



Modules

Enclosures and Accessories

Engineering Support Service



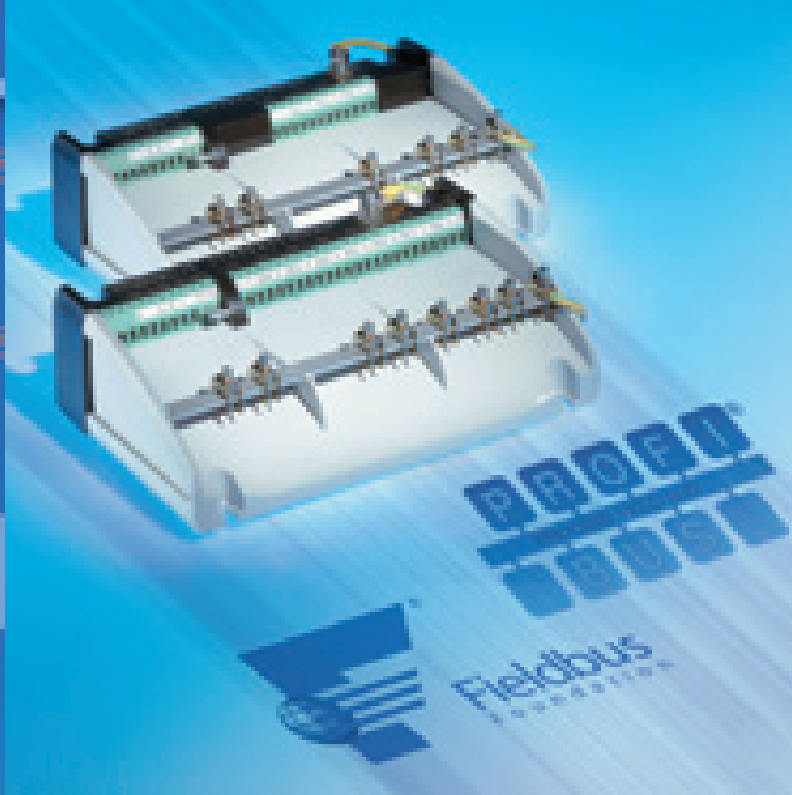
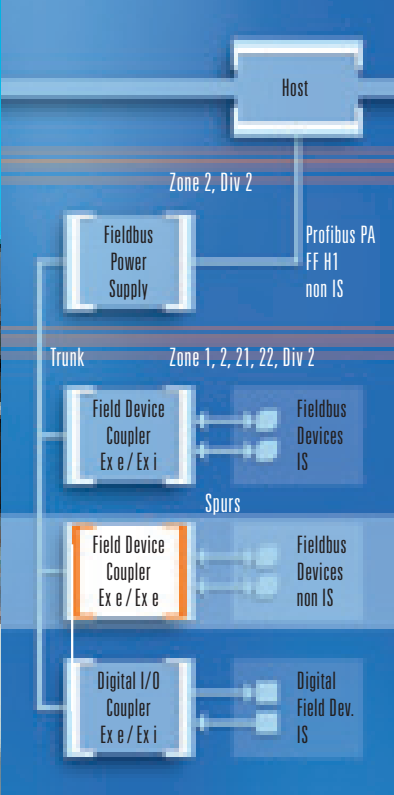
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fieldbus solutions

Three generations of field device are now in use in the process industries. Firstly, there are the classic, conventional sensors and actuators with analogue 4-20 mA signals and, secondly, the HART transmitters and positioners. The Foundation Fieldbus H1 and Profibus PA, the third generation of field device, were recently introduced. The predominant types of protection for explosion protected sensors and actuators continue to be intrinsically safe Ex i and flameproof encapsulated Ex d. The FISCO Specification in accordance with IEC 60079-27 has gained general acceptance for intrinsically safe fieldbus devices. The FISCO model was developed for the fieldbus (H1 and PA), standardised in accordance with IEC 61158-2, the explosion protected version of which was initially viewed as an intrinsically safe bus. However, the number of connectable devices is small. Far more current can be provided for more field devices if we do without intrinsic safety. However, we do not need to do without the intrinsic safety of the field device connection. Appropriate solutions must be provided for this. Besides the conventional IS isolators this does of course relate to Remote I/O Systems for hazardous areas and field device couplers for connection of H1 or PA field devices. Conventional and HART field devices can be interfaced efficiently with higher-level systems using Remote I/O. For example, this is possible with Profibus DP. R. STAHL now provides suitable couplers and a fieldbus power supply for fieldbus devices (H1 and PA). With this concept, the fieldbus is not operated intrinsically safe. This is the only way of implementing an efficient and economical installation powering an adequately large number of field devices. R. STAHL has made it its business to provide simple, efficient and economical solutions and integrate these.



Sbus fieldbus

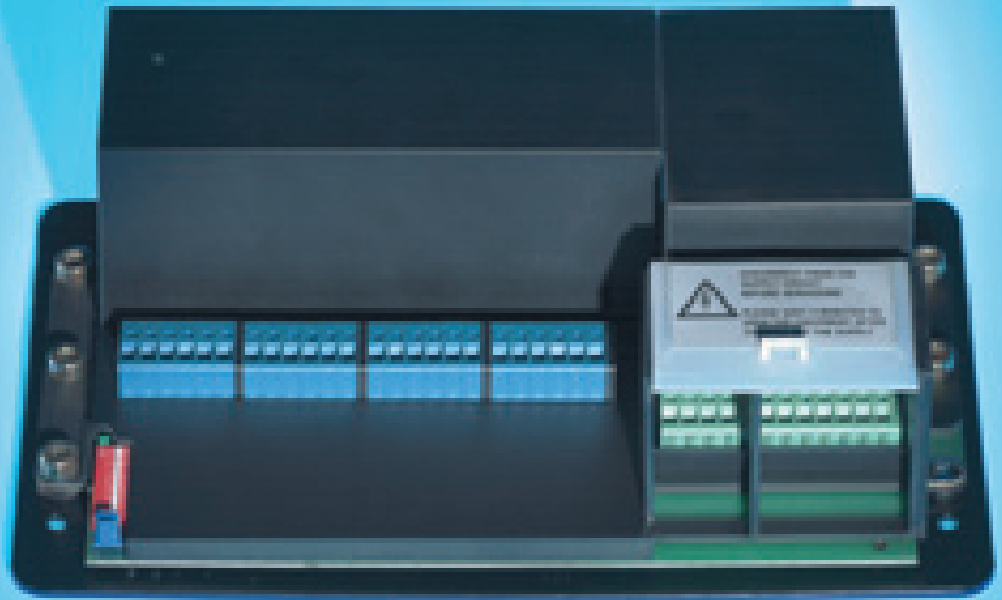
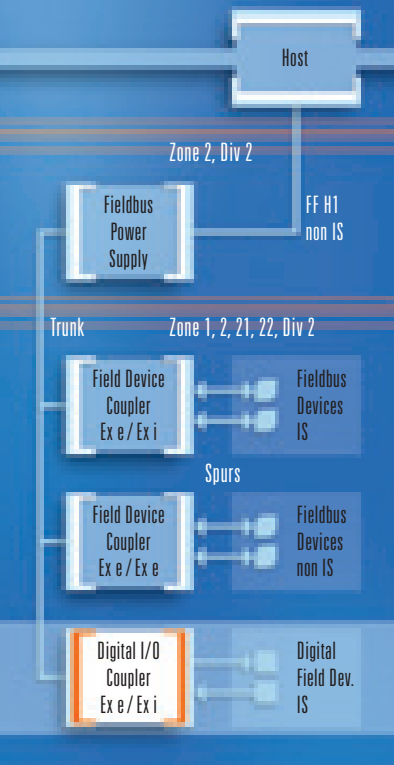
field device coupler ex e/ex e

The R. STAHL field device coupler Ex e/Ex e connects non-intrinsically safe field devices to the trunk which is also not intrinsically safe. Four or eight field devices can each be powered with 40 mA, so there is still adequate reserve for a hand-held tester. Here as well, each spur features 50 mA current limiting in order to prevent feedback effects on the trunk and, thus, on the entire system in the event of short-circuits. Installation, wiring, housings, terminals and shield earthing etc. are designed as on the field device coupler Ex e/Ex i.

Power management with the R. STAHL field device coupler: as soon as the voltage on the trunk exceeds 16 V, the spurs are activated one after the other. In the event of a short-circuit, the spur in question is deactivated until the short-circuit is eliminated. If several spurs are affected by the short circuit, the trunk is loaded only with maximum one short-circuit current. This minimises the current consumption of the trunk and the power loss of the coupler under all operating conditions.

Technical Details

- > for non-intrinsically safe Foundation Fieldbus H1 or Profibus PA field devices
- > 4 or 8 channels
- > 40 mA per spur, current limiting < 50 mA
- > power management
- > connection using screw terminals or cage clamp terminals
- > capacitive or direct earthing for cable shields
- > fitted terminating resistor



I Sbus fieldbus

digital I/O coupler ex e/ex i

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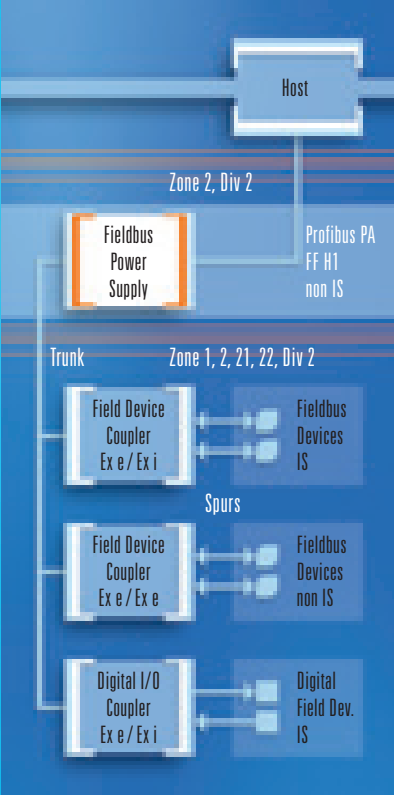
The R. STAHL digital I/O coupler Ex e/Ex i connects solenoid valves, LED indicating lamps, contacts and proximity switches to the non-intrinsically safe trunk. Alternatively, the digital I/O coupler Ex e/Ex i can be used on an intrinsically safe trunk. The coupler features eight fully fledged, non-multiplexed Ex i NAMUR inputs and four digital outputs. All inputs and outputs feature open-circuit monitoring and short-circuit monitoring and are electrically isolated from the trunk. Two versions are available: in the case of the 2-wire coupler, power is supplied by the trunk. However, this is possible only on the non-intrinsically safe trunk. The 4-wire coupler is powered from an external 24V power supply. In this case, it makes no difference whether the trunk is operated in intrinsically safe or non-intrinsically safe manner.

Technical Details

- > for Foundation fieldbus H1
- > 8 NAMUR inputs, intrinsically safe
- > 2 inputs, configurable as frequency/counter input
- > 4 outputs, intrinsically safe for solenoid valves and LEDs
- > 30/15 mA
- > 13V @ 30 mA
- > open-circuit and short-circuit monitoring
- > electrical isolation between inputs, outputs and trunk
- > trunk Ex e or Ex i
- > power supply provided by trunk 17...32V or external 24V DC
- > LED indicators for all inputs and outputs (optional)

FF Function Blocks

- > DI, DO
- > MDI, MDO (multiple DI, DO)
- > AI for frequency input
- > CI for counter input
- > timer for logic functions



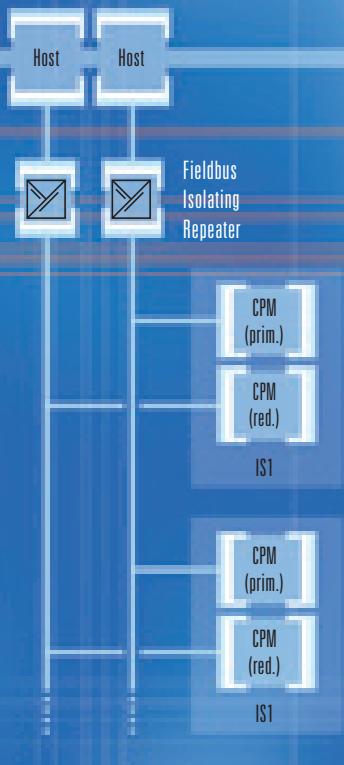
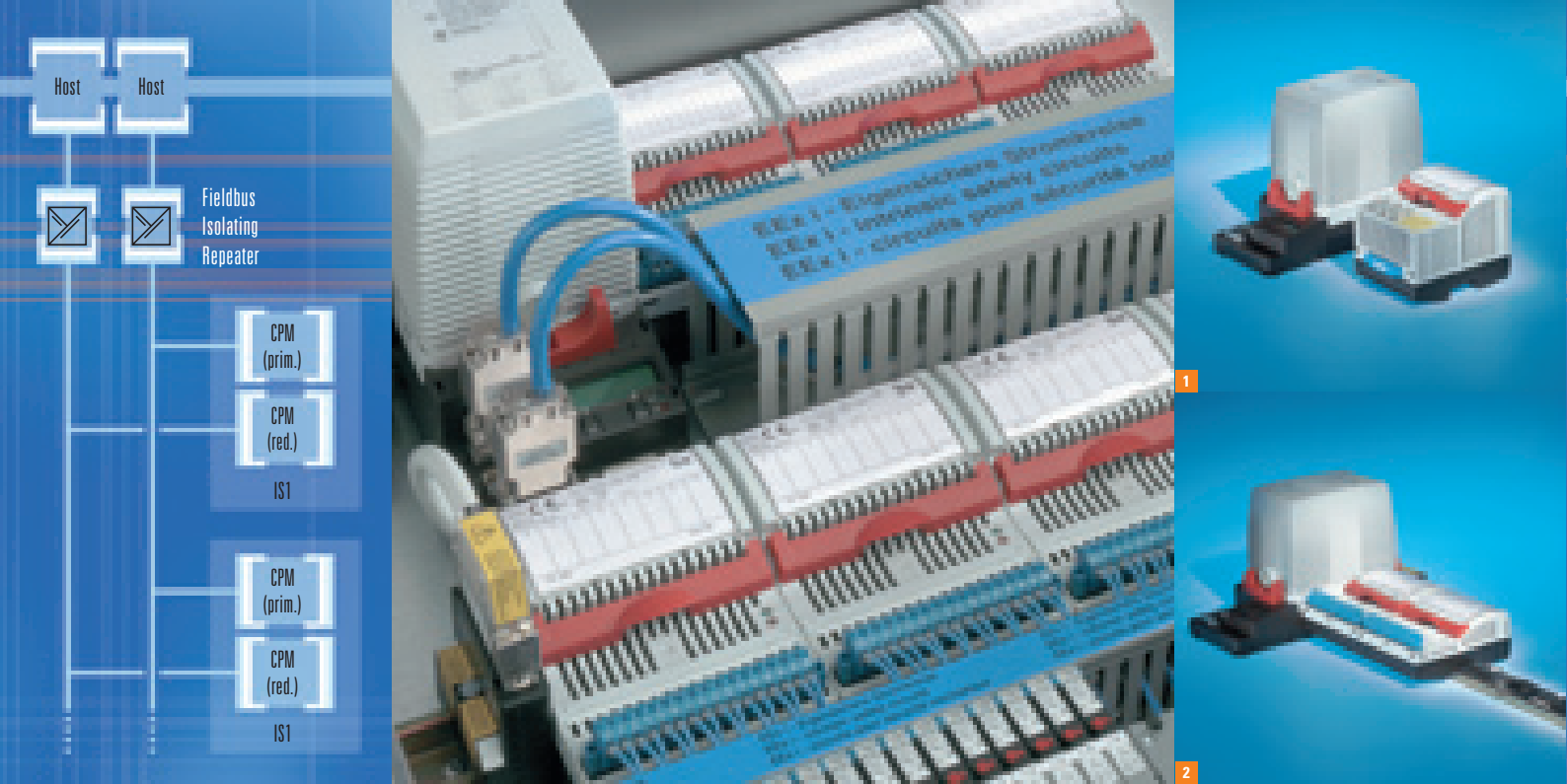
Sbus fieldbus

fieldbus power supply

The R. STAHL fieldbus power supply serves both as an infeed for the DC power supply for powering the field devices and for impedance adaptation to the trunk. Several bus segments are decoupled by electrical isolation between the 24 V DC power supply and the trunk. This is important primarily in the case of faults occurring. The terminating resistor required for the host end is fitted. Power supply and trunk are monitored for undervoltage and an error is signalled with a volt-free contact. Up to five fieldbus power supplies, with up to ten channels, can be easily interconnected. In this case, the power is looped through from one carrier to the next and the fault signalling contacts are connected in series. The fieldbus power supply is mounted on DIN rails in Zone 2, Division 2 or in the safe area.

Technical Details

- > 2 channels or 1 channel with redundancy
- > redundant 24 V DC power input
- > trunk power supply with 25 V/0-350 mA
- > fault signalling contact
- > LEDs for power and output (trunk)
- > fitted terminating resistor
- > Fieldbus Foundation listed (tested to FF 831)



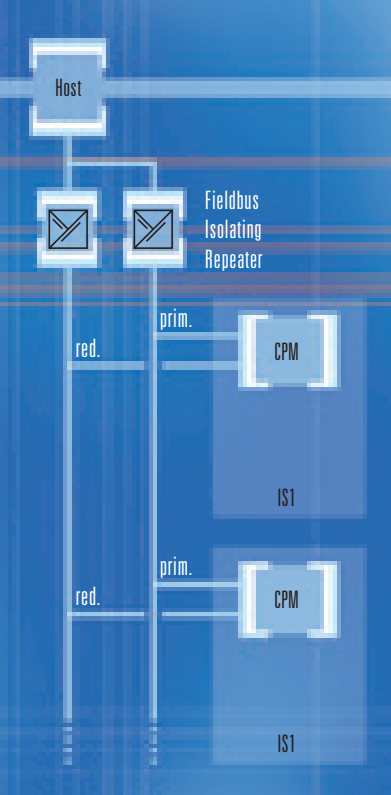
IS1 remote I/O

the market leader



R. STAHL has already marketed the second generation of an explosion protected Remote I/O System: the IS1. It features a simple structure, unique flexibility and tremendous efficiency and economy, and these aspects make it the most popular Remote I/O System for explosion hazard areas. System planning is impressively simple using only three basic components (Figures 1 and 2). Any requirement can be met flexibly with IS1, regardless of whether the application requires only a few signals or very many signals or whether it necessitates installation in Zone 1, Zone 2 or in the control room. The intrinsically safe system structure with Ex i fieldbus, using either copper wires or fibre-optic cables, allows the system to be serviced and repaired even in hazardous areas. The system may be provided with a redundant structure if availability requirements are stringent. Multi-channel modules and convenient commissioning and servicing tools mean that IS1 from R. STAHL is the perfectly economical solution. The international approvals allow use of the system worldwide.

- Special Aspects**
- > installation in Zone 1, Zone 2, Zone 21, Zone 22, Division 1 or Division 2
 - > intrinsically safe fieldbus: Profibus DP V1 HART, Modbus RTU
 - > fieldbus with either copper wires or fibre-optic cables
 - > intrinsically safe inputs and outputs Ex ia or Ex e
 - > hot-swapping of all modules
 - > optional ServiceBus for commissioning, troubleshooting and HART communication
 - > full HART support
 - > easy mounting on DIN rails
 - > BusRail with integrated data/address and power bus for extremely easy project planning

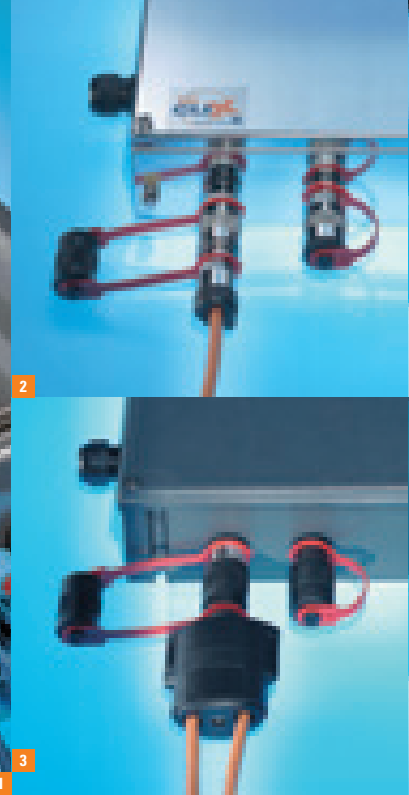
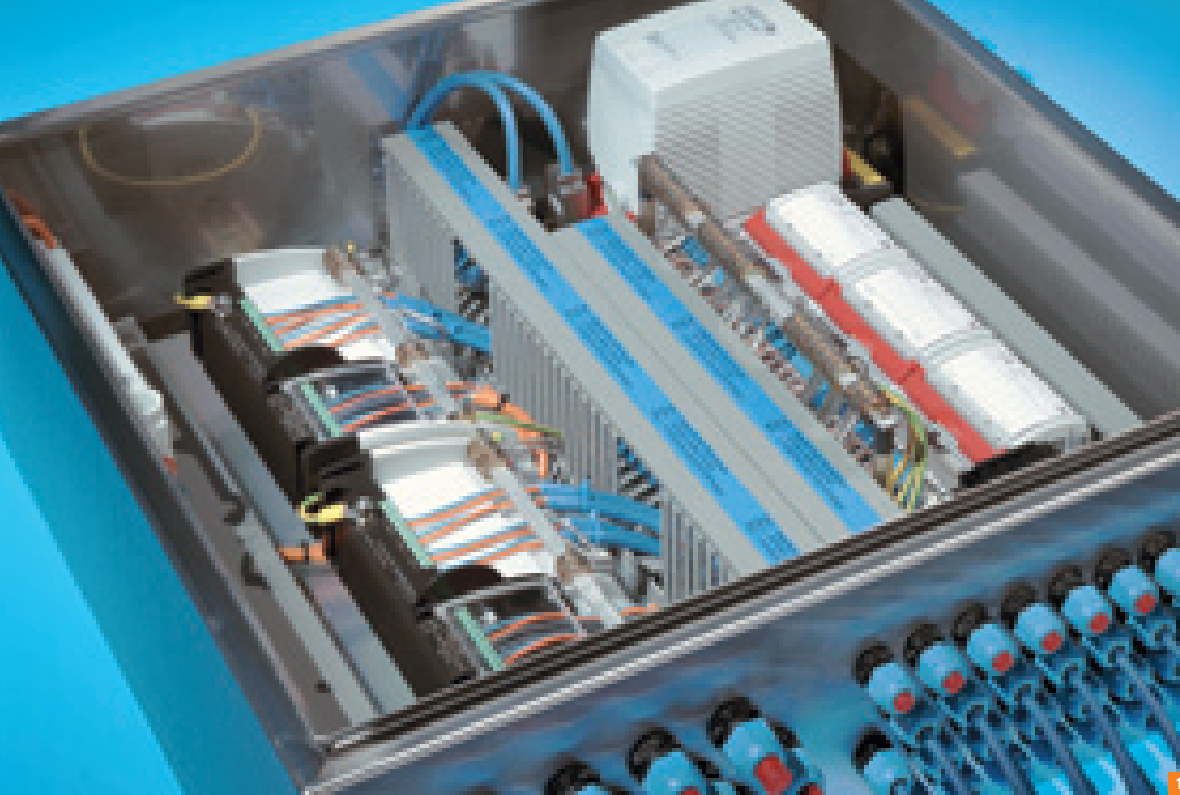


IS1 remote I/O

latest developments

Many additions and enhancements have made R. STAHL's Remote I/O IS1 even better and more effective in recent years. The intrinsically safe Profibus DP fieldbus interface is now also available in accordance with PNO Standard RS485-IS. An automatic baud rate detection and repeater function has been introduced with the new Fieldbus Isolating Repeater (Figure 4). This provides line redundancy as a second redundancy option. New digital output modules (Figure 3) integrate non-intrinsically safe solenoid valves in the case of applications in Zone 1 and Zone 2. IS1 stations can be powered either with 24 V DC or with 90...250 V AC. HART integration has also been adapted optimally to the various systems. In the case of communication via Profibus DP V1 HART, HART management systems are connected via communication DTM or communication EDD. The HART side variables are also transmitted in the cyclic data exchange. The system has been classified SIL 1 for safety-related applications in accordance with IEC 61508 and a Plant-STOP function has been integrated with SIL 2.

- | Special Aspects |
|--|
| > Dust Ex approval for Zone 21 and Zone 22 |
| > SIL 1 in accordance with IEC 61508; Plant-STOP with SIL 2 |
| > DNV approval for ships, including open-deck installation |
| > Profibus/Modbus interface in accordance with RS 485-IS |
| > FDT/DTM and EDD available for HART |
| > DP V1 HART with Emerson AMS via Ethernet Profibus interface |
| > digital outputs for non-intrinsically safe solenoid valves |
| > power supply either DC or AC |
| > extended parameter set for individual channel configuration of the I/O modules |
| > line redundancy or full redundancy available |



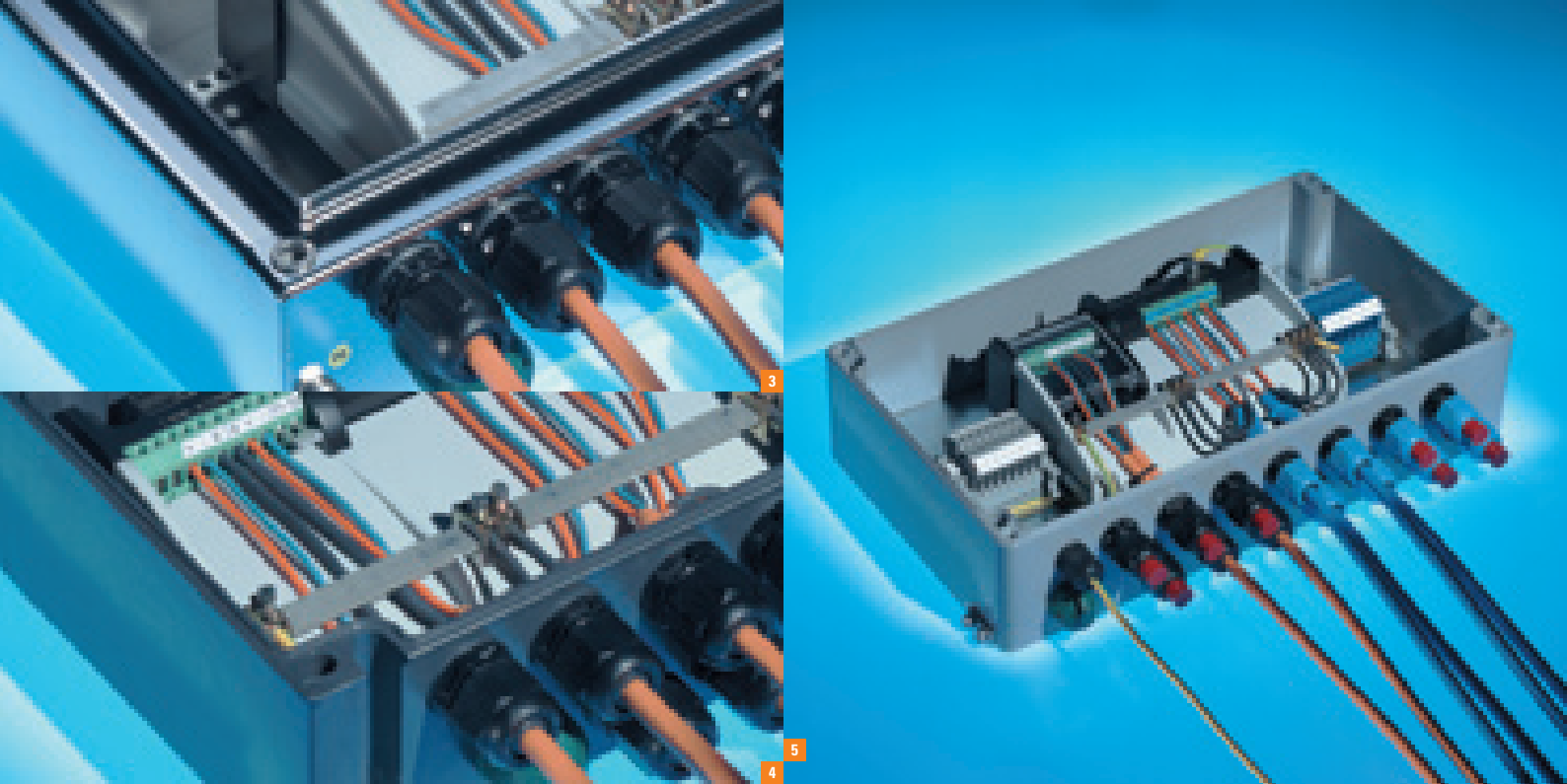
fieldbus engineering

the logical consequence

Today, differing applications and diverse customer requirements lead to simultaneous use of several fieldbuses. In addition, mechanical concepts matched to the tasks and ambient conditions are required. R. STAHL, together with its customers, plans selection of the components, bus systems and field-compliant housings. This means that we are able to supply the optimum all-in solution for the interface between field devices and automation system: for conventional sensors and actuators, for HART field devices and for fieldbus devices, and for any combination of them. Figure 1 shows a typical Zone 1 field station by way of example. The Remote I/O System IS1 of R. STAHL is fitted for cost-cutting connection of all conventional sensors/actuators. Unrestricted communication with HART devices is also possible. The IS1 system offers several options for this. Corresponding couplers connected via the fieldbus directly to the automation system are fitted for connection of field devices, H1 or PA. This means one field station for all applications.

Technical Details

- 1** Example of a field station for Zone 1 with Remote I/O and field device couplers for H1
- 2** Explosion protected miniCLIX connectors, e.g. for non-intrinsically safe spurs
- 3** Explosion protected miniCLIX Y-adapter, e.g. for a non-intrinsically safe trunk
- 4** Field device coupler in the standard stainless steel enclosure V4A (SS 316)
- 5** Field device coupler in the standard polyester enclosure (glass fibre reinforced)
- 6** Field device coupler in the aluminium enclosure (painted)



R. STAHL supplies all-in system solutions. It has available an extremely wide variety of housing sizes and various materials for this. The R. STAHL field device couplers are available in a compact standard housing made of fibreglass-reinforced polyester, sheet steel, aluminium or stainless steel. Customised combinations are also implemented with our extensive range of housings, also made of the above-listed materials. The housings are supplied with plastic or metal glands for the cable connections and can be combined with an extensive range of accessories, such as breather glands, windows, earthing modules and shielding buses etc. The explosion protected miniCLIX connectors are used to allow maintenance work to be performed on non-intrinsically safe circuits in Zone 1 and Zone 2. For example, non-intrinsically safe, flameproof-encapsulated field devices Ex d can be connected to the spur of the field device coupler Ex e/Ex e with miniCLIX. Of course, the miniCLIX connectors are also used on the non-intrinsically safe trunk. There is a miniCLIX Y-adapter with which the incoming and outgoing trunk are connected to the field device coupler specifically for this application. This allows safe isolation of the coupler from the system if necessary. This technology is particularly suitable for connection of package units which can be installed at their intended location with miniCLIX very quickly, easily and with no faults.





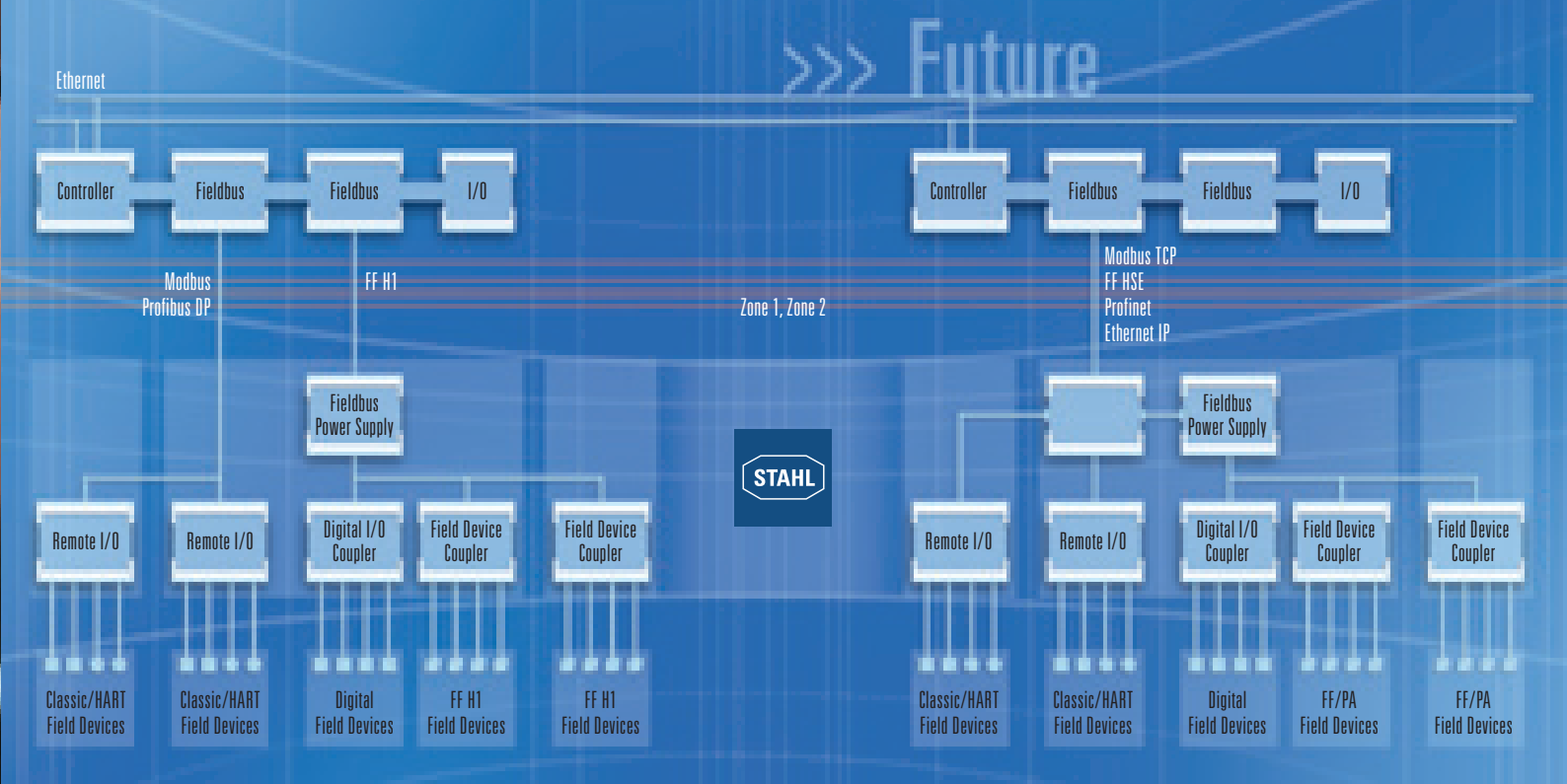
competence

engineering support service

The range of services of R. STAHL covers the sectors of project planning, products, systems and the related advisory services and customer services. Our innovative, international approach is based on the needs of our customers. Our know-how and our competence are deployed wherever the safety of man and machine are at stake and wherever processes need to be operated smoothly. For fieldbus and Remote I/O engineering specifically, this means project planning and engineering, installation and assembly on site from individual components through customised housings and control cabinets to complex fieldbus solutions. Commissioning, function testing, tests and documentation of the installation on the basis of the most recent Directives and Standards are a matter of course. Your staff are familiarised with the systems and trained in the specialist fields by experienced specialists at our seminars. Our Hotline means that you are connected to R. STAHL virtually around the clock. Our servicing staff can help you either directly on the phone or personally on-site. We like being there for you, so talk to us.

R. STAHL advisory and customer services for fieldbus and Remote I/O

- > project planning of fieldbus and Remote I/O installations
- > project planning and production of customised field housings and control cabinets
- > intrinsic safety verification
- > functional inspection of bus installations (H1, RS 485)
- > tests and documentation for GAMP and FDA
- > seminars
- > after-sales support, hotline



progress

looking to the future

Sophisticated Remote I/O systems such as IS1 from R. STAHL are recognised state-of-the-art, not only for extension or modernisation of installations but also for entirely new production plants. All conventional sensors and actuators can be connected. Diverse options are available for communication with HART field devices. Even today, Remote I/O Systems are combined mechanically with field device couplers communicating via Foundation Fieldbus H1 or Profibus PA. Large central or small distributed field stations with Remote I/O Systems and/or field device couplers can currently be implemented in virtually any required mechanical configuration. The future course is set and further innovative steps are to follow. Ethernet will, in some cases, replace today's fieldbuses (Profibus DP and Controlnet etc.) and facilitate integration of various generations of field device. Field-orientated stations for connection of a wide variety of sensors and actuators will communicate via Ethernet with the higher-level automation systems. Certain application protocols are already available for this today. Additional protocols have been proposed for standardisation or are currently at the development stage. The modular automation system with open interfaces is one step nearer and, regardless of the particular technology for which our customers opt, R. STAHL will provide efficient, economical solutions.



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