THE STRONGEST LINK.

STAHL

IS1+ THE REMOTE I/O

Expect the best for all hazardous areas

LEADING THE WAY OVER 30 YEARS

For more than 30 years, explosion-protected remote I/O systems from R. STAHL have been used for a wide range of process automation applications in Zone 1 and 2, as well as in Division 1 and 2. It is here that they have proven to be the most cost-effective solution with regards to procurement and installation (CAPEX) as well as during operation (OPEX). Thanks to their large range of functions and unique flexibility, remote I/O solutions from R. STAHL are suitable for virtually all tasks relating to process technology.

- Savings in field wiring and associated project engineering.
- No need to take up valuable space in the control room with switching and distribution cabinets.
- Extensive functions for simplifying commissioning and troubleshooting incl. hot swap in Zone 1 and Division 1.
- Integrated diagnostics provide an early warning of failures and avoid system downtimes.
- Fully compatible with conventional and HART-enabled field devices.
- Continous improvements for another 30 years.

CONVENTIONAL INSTALLATION

REMOTE I/O

CONTROL ROOM

CONTROL ROOM

SAFE AREA

HAZARDOUS AREA

Ex
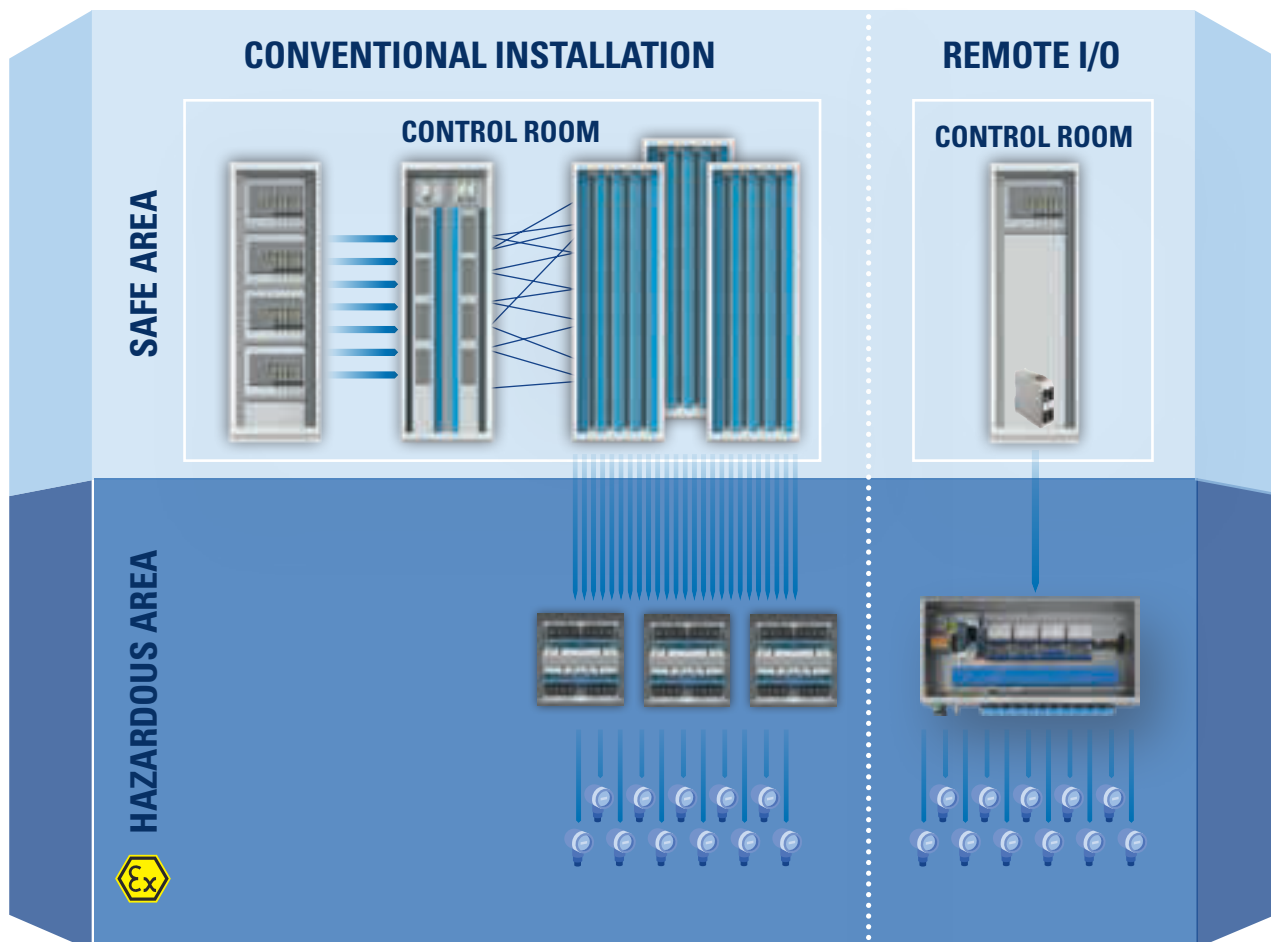
MORE INNOVATIONS BY IS1+

The IS1+ system is the latest remote I/O generation from R. STAHL. Although already the technology leader in many functionalities, there are continuous improvements and enhancements every year. Following some of our latest innovations to make your life easier:

MORE IN ZONE 1 – THE NEW CPU & POWER MODULE

- Supports up to **16 I/O modules** – twice as many as before.
- **Multi-protocol** support for PROFIBUS DP, PROFINET, EtherNet/IP, Modbus TCP and OPC UA.
- **Hot-swap** function in Zone 1 for all modules incl. CPU & Power Module *.
- **Intrinsically safe** network connectivity – 2 x 100 MBit/s Ethernet and 1 x PROFIBUS DP for highest flexibility with expansions and modifications.

*) separate service switch for Power Module required.

MORE AVAILABILITY FOR COMMUNICATION AND I/O

- Various hardware **redundancy** options – 2 x CPU, 2 x Power Module, or 2 x CPU and 2 x Power Module.
- Conformance Class B for PROFINET networks – with **S2 redundancy**, dynamic reconfiguration, shared device and more.
- Supports **ring topologies** with MRP (PROFINET) and DLR (EtherNet/IP).
- **Redundant I/O** modules for non-intrinsically safe field devices with analogue input/output and discrete output signals.

MORE FUNCTIONALITIES AND POSSIBILITIES

- Optional **OPC UA** server on board to support simple integration into the IT world.
- 2nd channel **ServiceBus** over Ethernet supports IS Wizard and Plant Asset Management with FDT/DTM and FDI (in preparation).
- Optional **IEC 61131-3** and **IEC 61499** integration for even more possibilities with IS1+.
- Integrated **WebServer** for quick diagnostics and commissioning.
- **Signal converter** modules for Zone 1 installation – up to 230 V AC / 5 A possible to be used with IS1+ I/O modules.

THE BEST REMOTE I/O

SIMPLY THE BEST REMOTE I/O

With the intrinsically safe IS1+ Remote I/O, R. STAHL has set standards on which the market has been based up to the present day.

- Extension, modification, maintenance – in ongoing operation in Zone 1 and 2 or Division 1 and 2.
- Hot swap for all modules and fieldbus interface connections in Zone 1 and 2 or Division 1 and 2.
- Extensive protocol support: PROFIBUS DP, Modbus TCP + RTU, PROFINET, EtherNet/IP and OPC UA.
- Designed for high availability, supporting system redundancy, ring topologies and redundant I/O modules.
- Extended temperature range -40 °C to +75 °C.
- Cost-effective Ex e field enclosures instead of Ex d or Ex p solutions. Class I Division 1 only requires NEMA 4X enclosures.

GOOD CAN ALWAYS BE BETTER

Continuous optimisations and extensions mean increasingly effective applications:

- Mixture of I/O modules for Ex i and non-Ex i signals.
- 8-channel Zone 1 and Division 1 modules with pneumatics and for Ex d valves.
- Multifunctional I/O modules for analogue and digital signals.
- Multi-protocol CPU for Zone 1 and Zone 2 or Division 2 – communication protocol adjustable by the user.
- Extensive diagnostics acc. to NE107 incl. proactive warning by a blue LED and alarming via process bus, ServiceBus and OPC UA.

YOUR SYSTEM SOLUTIONS

FIELD STATION WITH IS1+ ETHERNET AND INTEGRATED SOLENOID VALVE ISLAND

- Installation possible in Zone 1 or Zone 2, and Division 1 or Division 2.
- Control of processes with intrinsically safe and pneumatic signals.
- IS1+ Zone 1 solenoid valve module 9478 for shortening distances when using pneumatics.
- Options for communication via EtherNet/IP, Modbus TCP or PROFINET.
- Interference-free fibre optic transmission up to Zone 1 and Division 1.

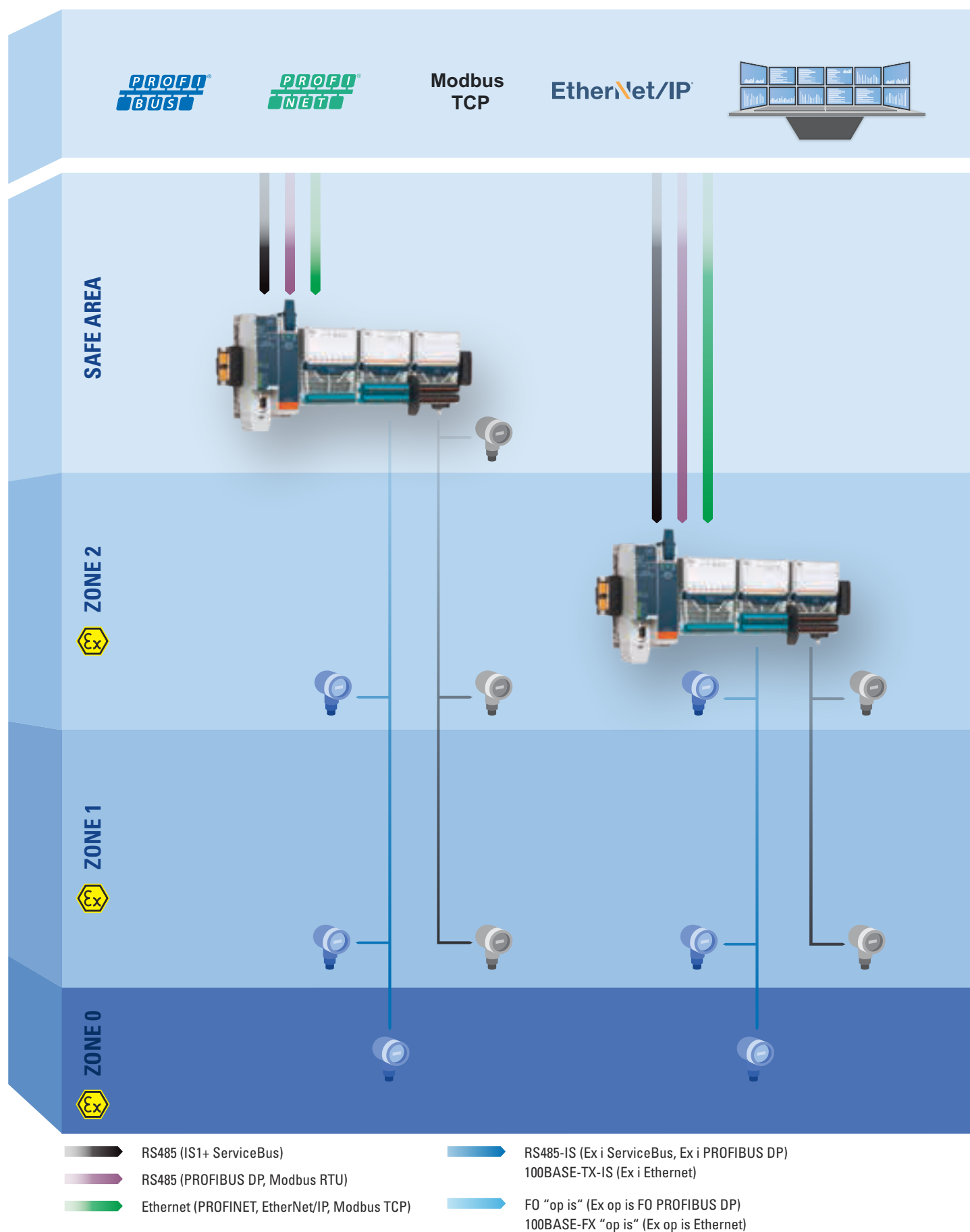### HIGHLY AVAILABLE FIELD STATION FOR OUTDOOR INSTALLATION IN A REFINERY

- Fully redundant system design with redundant PROFIBUS DP, redundant CPM assembly, redundant power supply and redundant heating.
- Integrated remote monitoring via temperature sensor and humidity sensor.
- Installed surge protection for the fieldbus cable and moulded case circuit breakers for all power supply circuits.
- Stainless-steel field enclosures with LED lighting controlled via door contact and metal cable entries for armoured cables.
- Versions for Zone 2 and for Zone 1 installations with nearly identical system design, easy to change.

COMPACT REMOTE I/O SOLUTION FOR INSTALLATION ON OFFSHORE PLATFORMS AND LNG TANKERS

- Ready for connection for Zone 1 with ATEX, IECEx and shipbuilding approvals.
- Compact cabinet design with double doors to save space when opening.
- Various sizes for up to 150 analogue or 300 digital signals.
- Optimised internal structure for special EMC requirements.
- Additional Ex i operating and display elements integrated in the front doors and operated via IS1+.
- High availability by system redundancy with primary and redundant IS1+ CPU & Power Modules.

THE LANDSCAPE OF IS1+

SAFE AREA

ZONE 2

ZONE 1

ZONE 0

	RS485 (IS1+ ServiceBus)		RS485-IS (Ex i ServiceBus, Ex i PROFIBUS DP) 100BASE-TX-IS (Ex i Ethernet)
	RS485 (PROFIBUS DP, Modbus RTU)		
	Ethernet (PROFINET, EtherNet/IP, Modbus TCP)		FO "op is" (Ex op is FO PROFIBUS DP) 100BASE-FX "op is" (Ex op is Ethernet)

HART COMMUNICATION PROTOCOL

FDT

OPC UA

Fieldbus isolating repeater Ex i
PROFIBUS DP, Modbus RTU.

Fibre optic isolating repeater "op is"
PROFIBUS DP, Modbus RTU.

Media Converter FX "op is" /
100BASE-TX-IS
Fibre optics to intrinsically safe
Ethernet.

Zone 1 or 2 CPU & Power Module
PROFIBUS DP, PROFINET, EtherNet/IP,
Modbus TCP.

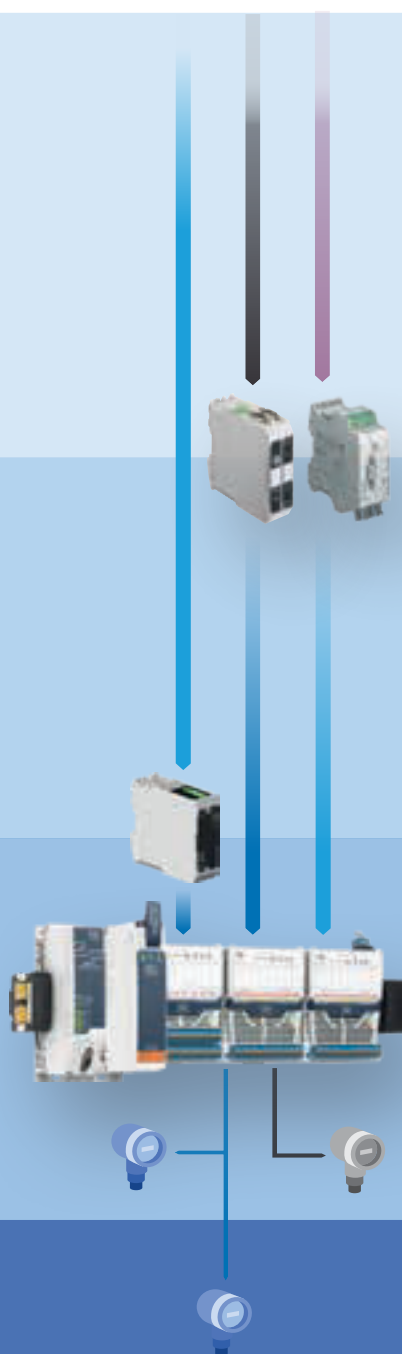Zone 1 or 2 I/O modules for
Ex i field devices.

Zone 2 I/O modules for
non-Ex i field devices.

Zone 1 I/O modules for
non-Ex i field devices
(pneumatics, relay).

Division 1 CPU & Power Module
PROFINET, EtherNet/IP, Modbus TCP.

Ex i analogue/digital field signals

Non-Ex i analogue/digital field signals

YOUR BENEFITS AT A GLANCE

ATEX   *IECEx*   *cFMus*   *EAC*

IS1+ BASED ON GLOBAL STANDARDS.

Can be combined with other products and technologies regardless of the manufacturer and process control system.

IS1+ SUPPORTS PROFIBUS DP, PROFINET, MODBUS TCP/RTU AND ETHERNET/IP.

Flexible and easy to use in virtually any automation system.
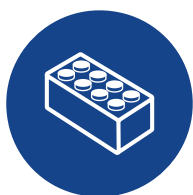
IS1+ INCREASES THE AVAILABILITY OF YOUR PLANT.

Supporting several redundancy concepts and ring topologies, IS1+ is the solution for all critical applications

IS1+ FACILITATES INSTALLATION AND MAINTENANCE.

By effectively combining types of protection, there is no need for the "d" and "p" enclosure – all components in Zone 1 and 2 or Division 1 and 2 are hot-swappable.

IS1+ IS EASY TO PLAN AND QUICK TO INSTALL.

System design without special planning tools, three components are sufficient: CPU & Power Module, BusRail, I/O modules.

IS1+ IS UNIQUELY ROBUST AND DURABLE.

Specially developed and built for harsh field use in hazardous areas – typical service life of 15 years or longer.
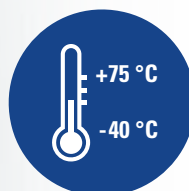
INMETRO   PESO   KTL   CCC

IS1+ INNOVATION WITH OVER 30 YEARS OF EXPERIENCE.

IS1+ is our third generation of remote I/O. With our experienced system specialists we will find solutions for virtually all requirements.

IS1+ IS DESIGNED AND BUILT FOR EXTREME ENVIRONMENTS.

+75 °C
-40 °C

Can be used both horizontally and vertically for temperatures from -40 °C to +75 °C. Also perfect for use on offshore platforms and LNG tankers.

IS1+ IS CONTINUOUSLY BEING EXTENDED AND OPTIMISED.

As a result of our continuous further development, the system is becoming increasingly varied – but is always downward compatible.

IS1+ EASILY INTEGRATES INTO YOUR PLANT ASSET MANAGEMENT.

With enhanced intelligent diagnostics, IS1+ allows simple integration into predictive maintenance concepts.

IS1+ OFFERS SIGNIFICANT COST SAVINGS COMPARED WITH OTHER SOLUTIONS.

Multifunctionality and new functions mean savings of up to 50% compared to conventional installations.

REMOTE I/O IS1+ IN DETAIL

**PROFI BUS**® **PROFI NET**® **Modbus TCP** **EtherNet/IP**®

Integrated power supply
simplex or redundant for Ex i supply of 16 I/O modules in Zone 1 and 2.

Increased availability
with CPU & Power Module or system redundancy and ring structures.

Free protocol selection
via rotary switch and multi-protocol CPU.

Plant asset management
and engineering via separate ServiceBus, Ethernet network and process bus.

Intrinsically safe communication
via PROFIBUS and Ethernet over copper cables or optical fibres in Zone 1.

HART COMMUNICATION PROTOCOL

FDT
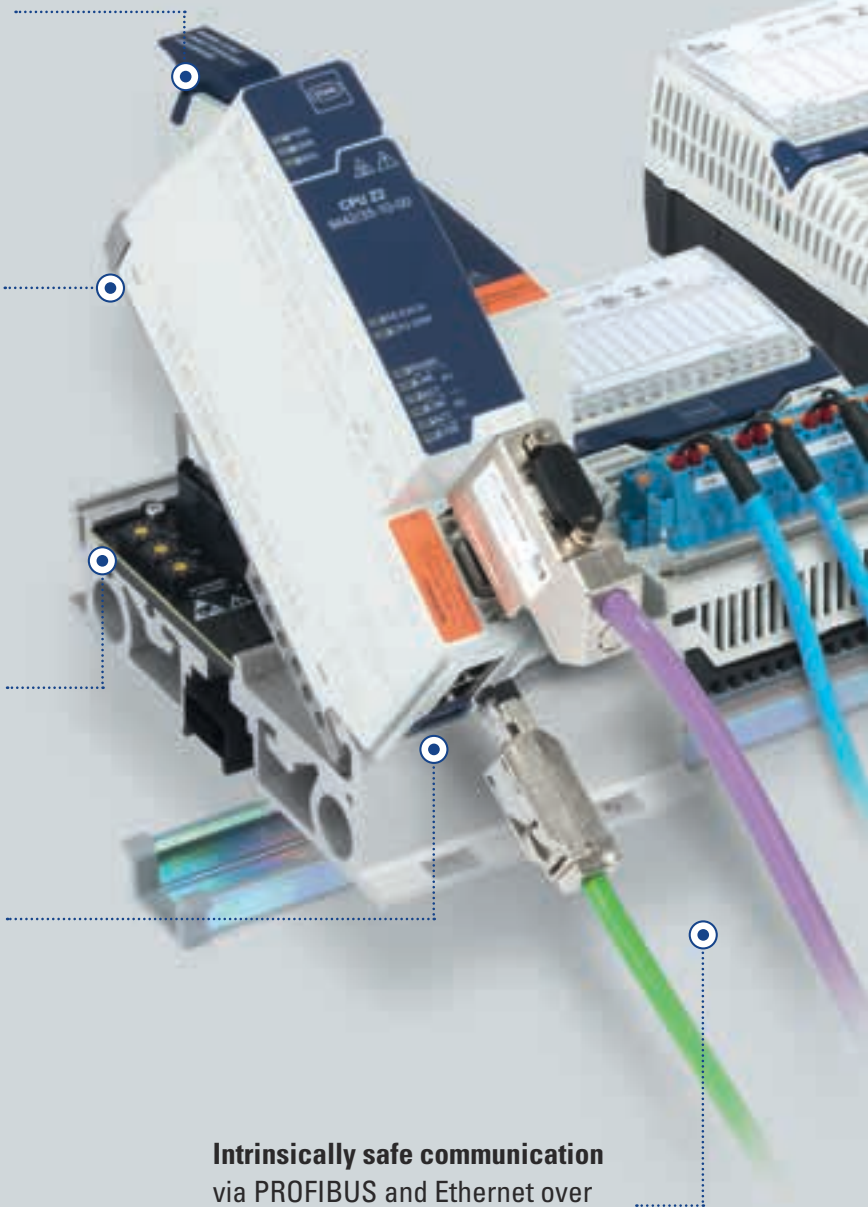
OPC UA

4-, 8- and 16-channel modules
for Ex i and non-Ex i signals, digital
outputs with SIL2 and pneumatics.

Extensive integrated diagnostics
for signal errors or maintenance
requirements with LED indicators
and alarms.

Ex i and non-Ex i signals
can be mixed on the BusRail and
are hot-swappable in Zone 1 and 2,
or Division 1 and 2.

Robust BusRail installation
with internal Ex i system bus for power
supply and data transmission.

Detachable terminals
for field signals in screw-type and
spring terminals, with lock.
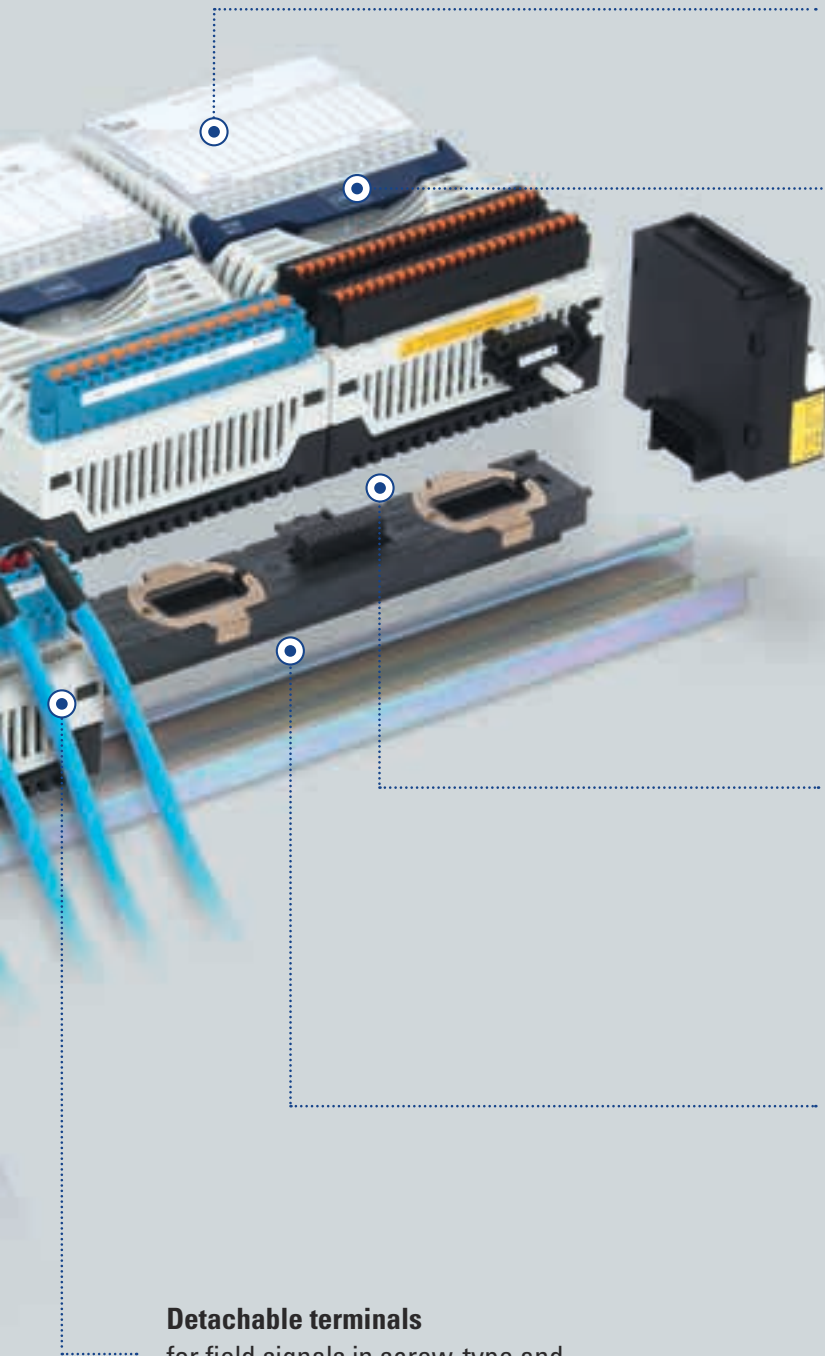
IS1+ MEETS OT MEETS IT

INTEGRATED WEBSERVER

The perfect and easy-to-handle tool for commissioning support and remote access. No software needs to be installed on your PC, a standard internet browser is sufficient. The integrated WebServer from CPU 9442 offers a lot of helpful information like:

- Overview on the installed modules per system.
- Listing of operating mode for each module incl. number of used I/O data.
- Comparison between "configured" module vs. "installed" module.
- Integer and physical value of I/O data from each single channel and diagnostics status.
- Value and unit of HART data from connected field devices.
- History of events like alarms and warning messages.
- Network settings and firmware updates (password protected).
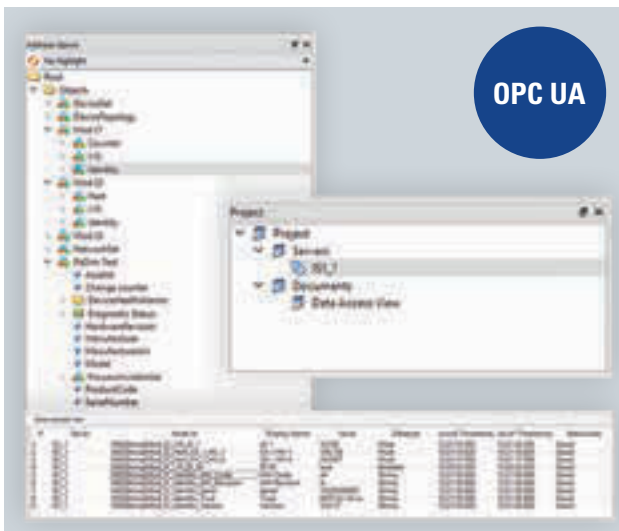
OPC UA SUPPORT

Besides the usual industrial communication protocols, WebServer, FDT/DTM and ServiceBus, the IS1+ Remote I/O also offers an optional OPC UA support.

With this, all the diagnostics information from the IS1+ system and the connected field devices can be transferred into the IT world, to aggregation servers or cloud storage.

This makes IS1+ and connected field devices also ready for the NAMUR Open Architecture (NOA) and PA-DIM (Process Automation Device Information Model).

READY FOR MODULAR AUTOMATION AND MORE

It is now possible to use IS1+ with additional software on board. With programming tools based on IEC 61131-3 or IEC 61499, IS1+ can be used for many additional applications and modular auto-mation concepts with MTP as well. This makes our remote I/O even more powerful and allows for numerous OEM applications.

Currently, IS1+ has been tested to support runtime systems from CODESYS (CODESYS Group), straton (Ing. Punzenberger COPA-DATA GmbH) and UniversalAutomation.org. Just ask us for more details and to discuss your application

IS1+ ALWAYS THE RIGHT SOLUTION FOR ANY AUTOMATION SYSTEM

Selection of previously implemented couplings

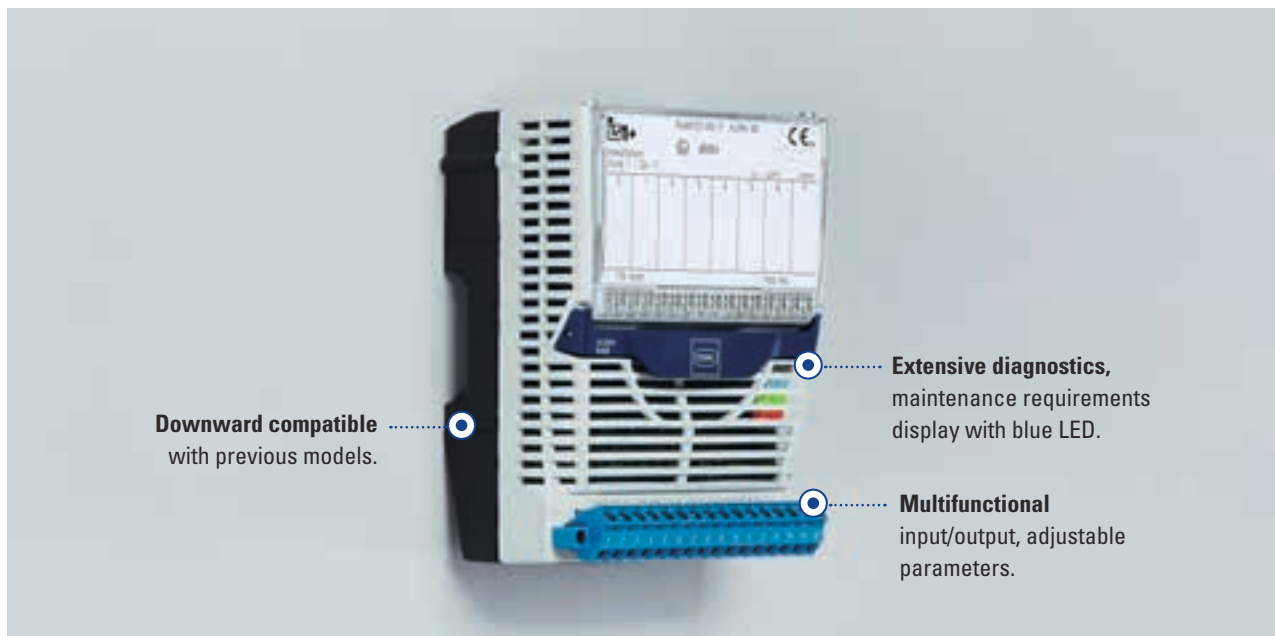|		PROFIBUS	Modbus RTU	PROFINET	Modbus TCP	EtherNet/IP	PLANT ASSET MANAGEMENT
ABB	Sattline	✔					
	Freelance	✔					✔ (FTD)
	Symphony	✔					✔ (FTD)
	800xA	✔		✔			✔ (FDI *)
azbil	Harmonas DEO		✔				
Emerson	DeltaV	✔	✔	✔	✔	✔	✔ (AMS DRIVER)
Honeywell	Experion C200	✔					
	Experion C300	✔	✔	✔			✔ (FTD)
Kongsberg Maritime	K-Chief 600		✔				
	K-Chief 700	✔	✔				
Mitsubishi	MELSEC-Q	✔			✔		
Rockwell	SLC500	✔					✔ (FTD)
	ControlLogix	✔			✔	✔	✔ (FTD)
	CompactLogix					✔	✔ (FTD)
Schneider Electric	M580	✔			✔	✔	
	M340	✔	✔		✔	✔	
	EcoStruxure	✔			✔		✔ (FTD)
Siemens	S7 / PCS7	✔	✔	✔			✔ (EDD)
	PCS neo	✔		✔			
Yokogawa	Centum CS	✔	✔				
	Centum VP	✔	✔	✔	✔		✔ (FTD)
Others	PACTware, Fieldcare						✔
	Other FDT frames						✔ (FTD)
	PC, Cloud etc						✔ (OPCUA)
	FDI Hosts						✔ (FDI*)

* in preparation

THE MULTIFUNCTIONAL I/O LEVEL

Downward compatible with previous models.

Extensive diagnostics, maintenance requirements display with blue LED.

Multifunctional input/output, adjustable parameters.

Communications modules for Zone 1 and Zone 2 or Division 1 and 2

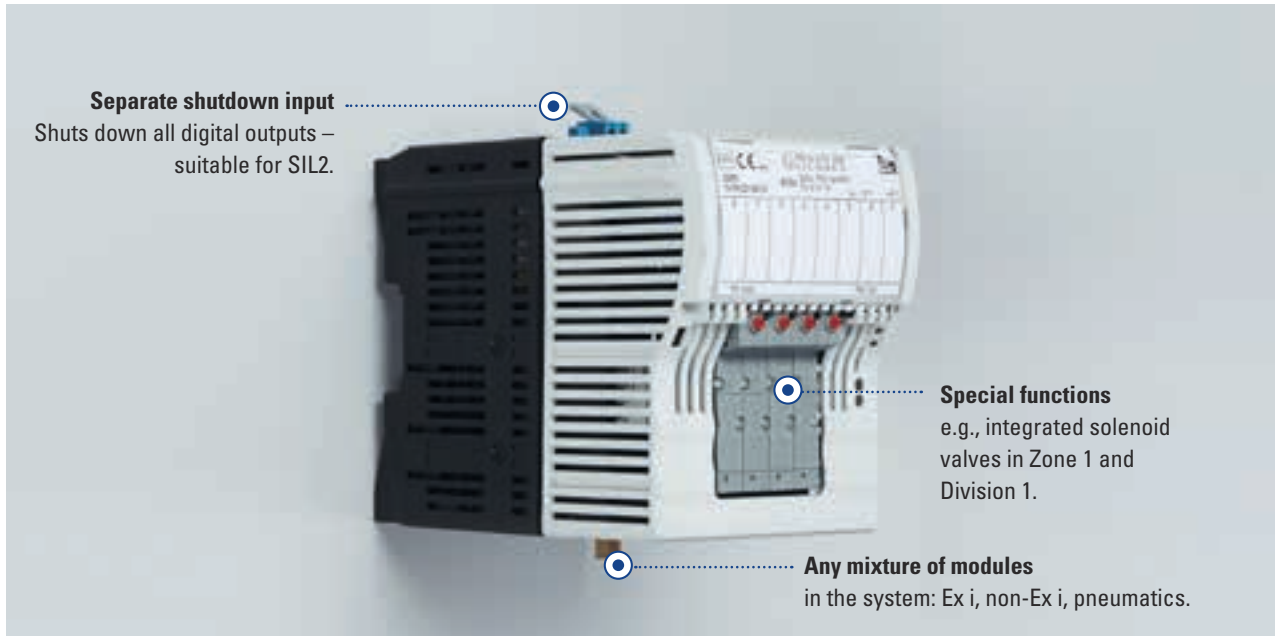| Protocols	Installation	Max. no. of I/O modules	Power supply		Type series
PROFIBUS DP or Modbus RTU	Zone 1 / Div. 1	8	24 V DC *)	120/230 V AC	9440/22
Modbus TCP or EtherNet/IP or PROFINET	Zone 1 *) / Div. 1	8	24 V DC		9441/12
PROFIBUS DP, PROFINET, EtherNet/IP and Modbus TCP	Zone 2 / Div. 2	16	24 V DC		9442/35
PROFIBUS DP, PROFINET, EtherNet/IP and Modbus TCP	Zone 1	16	24 V DC		9442/32

Zone 2 and Division 2 I/O modules, Ex i signals

Function	Channels	Application	Type series
Analogue Universal Module HART	8	Analogue inputs/outputs: 0/4 … 20 mA with HART	9468/33-08-10
Temperature Input Module	8	Resistance thermometers (2-, 3-,4-wire), THCs, potentiometers, joysticks	9482/33-08-10
Digital Input Output Module	16	Digital inputs/outputs: Contacts, proximity switches, low-power solenoid valves	9470/33-16-10
Digital Output Module	8	Solenoid valves 12.6 V/30 mA	9475/33-08-50
Digital Output Module	8	Solenoid valves 17.5 V/30 mA	9475/33-08-60

Zone 2 and Division 2 I/O modules, non-Ex i signals

Function	Channels	Application	Type series
Universal Module HART	8	Analogue and digital Ex ec inputs/outputs: 0/4 … 20 mA with HART, pnp contacts, digital output 24 V/0.5 A; SIL2 output shutdown	9469/35-08-12
Digital Input Output Module NAMUR	16	Digital Ex ec inputs/outputs: Contacts, (pnp) proximity switches, low-power solenoid valves	9471/35-16-11
Digital Output Module 24 V	16	Digital Ex ec inputs/outputs: Contacts, (pnp) proximity switches, 24 V/0.5 A solenoid valves; SIL2 output shutdown	9472/35-16-12
Digital Output Module Relais	8	Integrated NO relay contacts Ex ec for loads up to 250 V AC/2 A	9477/15-08-12

* not for new projects

Separate shutdown input ·········
Shuts down all digital outputs –
suitable for SIL2.

Special functions
e.g., integrated solenoid
valves in Zone 1 and
Division 1.

Any mixture of modules
in the system: Ex i, non-Ex i, pneumatics.

Zone 1 and Division 1 I/O modules, Ex i signals

Function	Channels	Application	Type series
Analogue Universal Module HART	8	Analogue inputs/outputs: 0/4 … 20 mA with HART	9468/32-08-10
Temperature Input Module	8	Resistance thermometers (2-, 3-, 4-wire), THCs, potentiometers, joysticks	9482/32-08-11
Digital Input Output Module	16	Digital inputs/outputs: Contacts, proximity switches, low-power solenoid valves	9470/32-16-10
Digital Output Module	4	Solenoid valves 11.3 V/40 mA; SIL2 output shutdown	9475/32-04-12
Digital Output Module	4	Solenoid valves 12.3 V/75 mA; SIL2 output shutdown	9475/32-04-22
Digital Output Module	4	Hydraulic valves 12.3 V/75 mA; SIL2 output shutdown	9475/32-04-72
Digital Output Module	8	Solenoid valves 12.6 V/30 mA; SIL2 output shutdown	9475/32-08-52
Digital Output Module	8	Solenoid valves 17.5 V/20 mA; SIL2 output shutdown	9475/32-08-62

Zone 1 and Division 1 I/O modules, non-Ex i / pneumatic signals

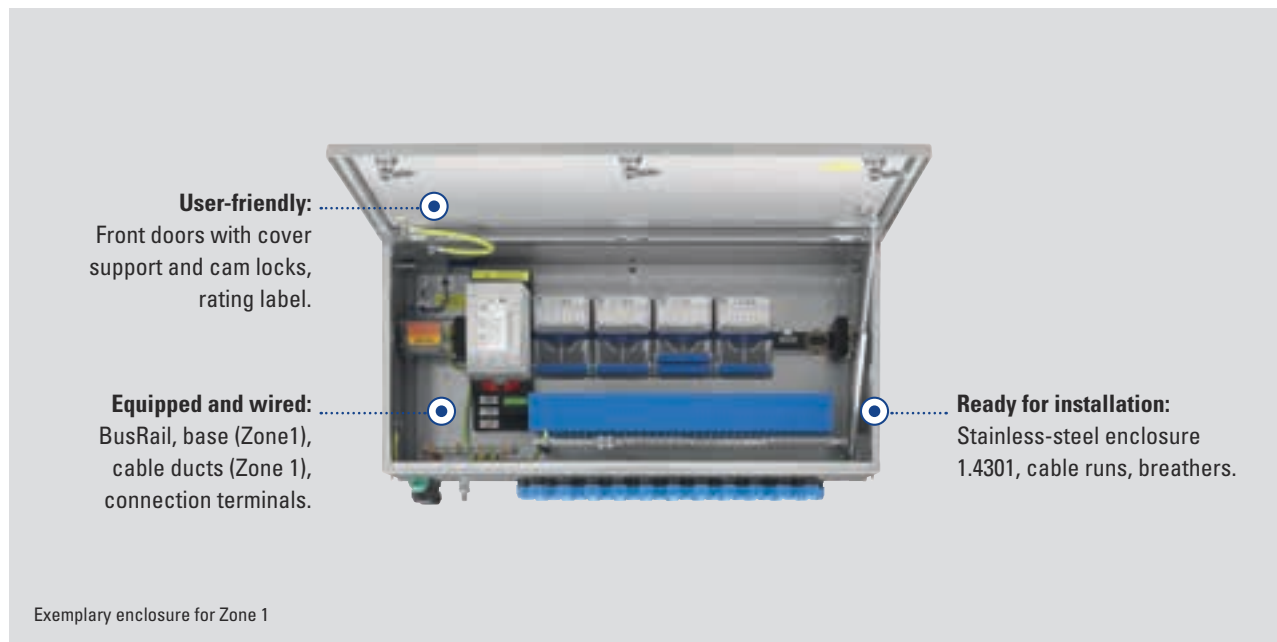| Function	Channels	Application	Type series
Digital Output Module Valve	8	Pneumatic control of valves via 3/2-way solenoid valves with 2.5 … 7 bar; SIL2 output shutdown	9478/22-08-51
Digital Output Module Relais	6	Integrated relay contacts for loads up to 250 V AC/2 A	9477/12-06-12
Digital Output Module Relais	8	Integrated relay contacts for loads up to 60 V AC/2 A	9477/12-08-12

Zone 1 signal converter modules for non-Ex i signals

Function	Channels	Application	Type series
mA-Isolating Repeater	1	For 4-wire transmitters, Ex i or Ex e connection to 9468 modules, incl. HART	9164/13
Electronic Relay	1	Switching of Ex e load, max. 253 VAC, 5 A with 9475 modules	9174
Relay Module	1	Switching of Ex e or Ex i load, max. 253 VAC, 125 VDC / 2 A with 9475 modules	9177

THE STANDARD
FOR ZONE 1 AND 2 OR DIVISION 2

**STANDARD ENCLOSURES FOR IS1+
– READY TO USE, SHORT DELIVERY TIMES**

IS1+ Remote I/O offers great flexibility for a wide range of intended purposes. We have designed a series of STANDARD field enclosures based on many years of experience with customer-specific system solutions. These field enclosures are available from stock with short delivery times and already meet most requirements in the standard version. For even greater flexibility, in the STANDARD+ version, we provide the option of performing adaptations and modifications in a very short time period.

- Preconfigured field enclosures for installation in Zone 1 or Zone 2 and Division 2.
- Prepared for installation of IS1+ for up to 120 analogue or 240 digital signals.
- Version according to EN 61439, no additional acceptances or certificates required.
- Various options available, e.g., heating, inspection window, fibre optic.

User-friendly: Front doors with cover support and cam locks, rating label.

Equipped and wired: BusRail, base (Zone1), cable ducts (Zone 1), connection terminals.

Ready for installation: Stainless-steel enclosure 1.4301, cable runs, breathers.

Exemplary enclosure for Zone 1

Field enclosures for Zone 1 and Zone 2 or Division 2					
Zone 2 Enclosures (similar to representation for Zone 1 – see above)					
Max. Signals Zone 1	40 analogue / 80 digital	64 analogue / 128 digital	56 analogue / 112 digital	64 analogue / 128 digital	112 analogue / 224 digital
Max. Signals Zone 2	40 analogue / 80 digital	72 analogue / 144 digital	56 analogue / 112 digital	88 analogue / 176 digital	120 analogue / 240 digital
Enclosure Sizes	400 x 750 x 300 mm	400 x 1300 x 300 mm	600 x 600 x 230 mm	760 x 760 x 300 mm	800 x 1000 x 300 mm

IS1+ IN USE EVERYWHERE BY EVERYBODY

EXAMPLES FOR IS1+ END USER AND OEM INSTALLATIONS:

IS1+ is used all over in the world in many different applications and under the most diverse climatic conditions. Thanks to our loyal customer base, IS1+ is the remote I/O system with the largest installed base in Zone 1.

- **Oil&Gas Upstream:**
  British Petrol, Maersk, Statoil, Shell
- **Oil&Gas Downstream:**
  Petronas, MOL Group, ADCO
- **Basic Chemicals:**
  BASF, DOW, sabic, LyondellBasell
- **Pharma & Fine Chemicals:**
  GSK, Evonik, Clariant, Sanofi, Novo Nordisk, Pfizer
- **Maritime:**
  BW Group, Qatargas, Mitsui O.S.K. Lines
- **OEM/Machine building:**
  NOV, Herrenknecht, LEWA

Photo: Eisenmann

PAINTING FACTORY IN ACCORDANCE WITH NEC
IS1+ in Division 1 with communication via PROFINET and explosion-protected "op is" fibre optic.

IS1+ FOR USE ON FPSO
Typical installation on a floating conveyor system, located near Rio de Janeiro.

ETHERNET AND REMOTE I/O
One of the world's first installations with Ethernet in Zone 1 and redundancy is in Germany.

REMOTE I/O AT HIGH TEMPERATURES
IS1+ can be used without active cooling thanks to the extended temperature range from -40 °C to +75 °C.

REMOTE I/O FOR USE ON LNG TANKERS
IS1+ is a highly space-saving and lightweight solution which is certified in accordance with most shipping standards.

REMOTE I/O AND FIELDBUS
In a pharma plant in India, signals are transmitted both via remote I/O and PROFIBUS DP as well as via fieldbus couplers and FF H1.

HIGH AVAILABILITY

IS1+ ENSURES HIGHLY AVAILABLE PLANTS

Besides the very robust system design and the increased lifetime of all components, IS1+ features several options to increase the availability of your installations. The multi-protocol CPU supports most of the network redundancy mechanisms from the various fieldbus and Ethernet protocols incl. ring topologies. The system can be equipped with redundant CPU, redundant Power Modules and both. In addition, redundant I/O modules for non-intrinsically safe field devices are available as well.

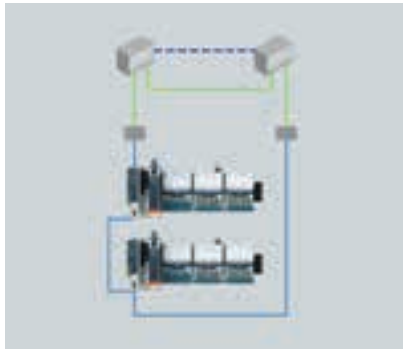Redundant CPU

Redundant Power Module

Redundant Headend

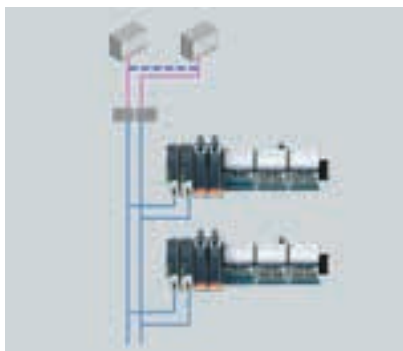## NETWORK REDUNDANCIES

PROFINET S2

PROFINET S2 + MRP, EtherNet/IP + DLR

PROFIBUS DP SR
Modbus TCP Line + CPU
EtherNet/IP Line + CPU
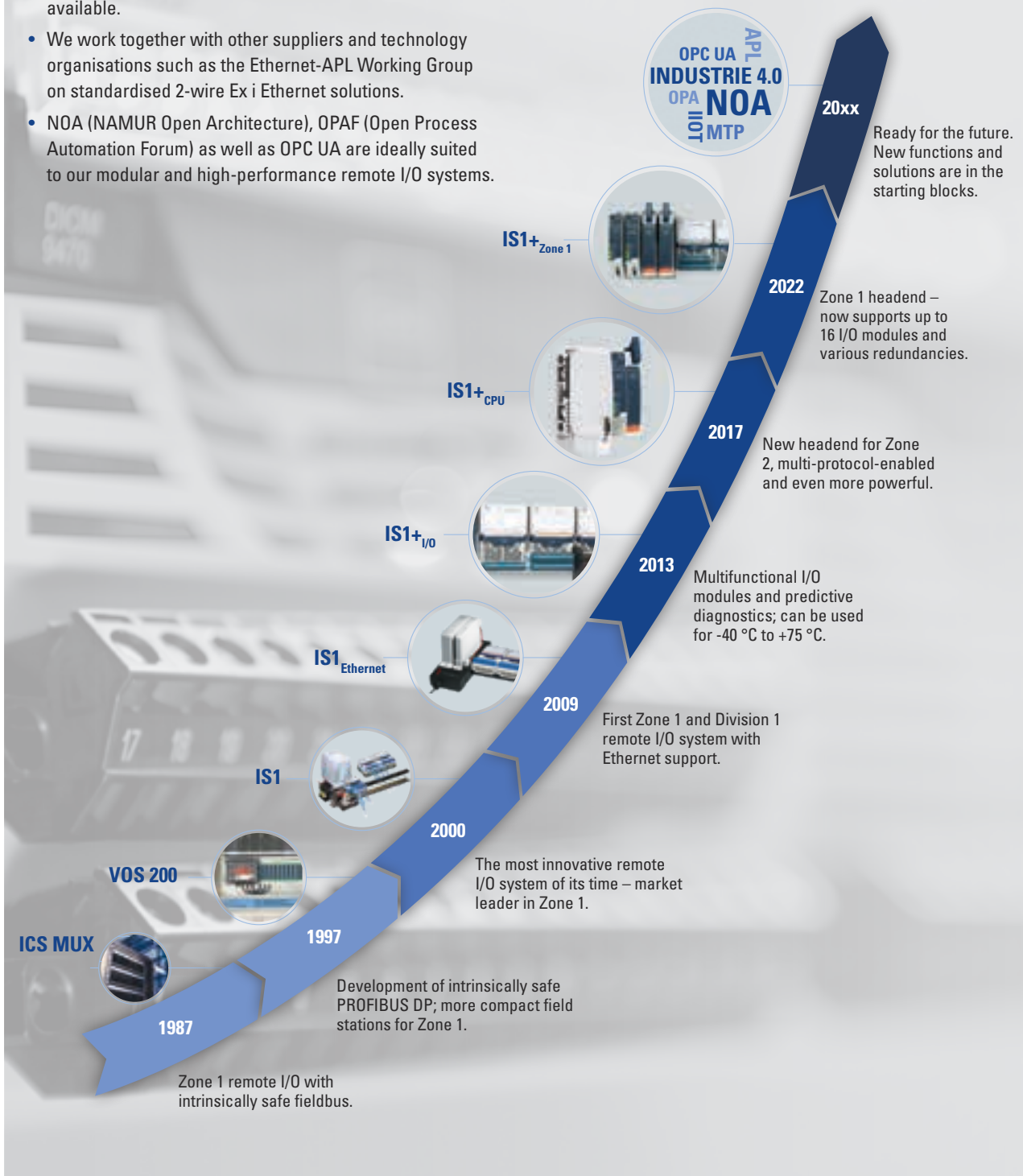

PROFIBUS DP FR

I/O MODULE REDUNDANCY

Example of PROFIBUS DP redundancy with I/O module redundancy in combination with termination board 9491/T1. High availability by system redundancy with primary and redundant IS1+ CPU & Power Modules.

THE EVOLUTION OF REMOTE I/O

Nothing is more resistant than change – this still applies today and, in particular, to process automation. Remote I/O is playing an important role in this:

- Ethernet is becoming increasingly established for communication in the field – with IS1+, solutions for Zone 1 with intrinsically safe and optical interfaces are already available.

- We work together with other suppliers and technology organisations such as the Ethernet-APL Working Group on standardised 2-wire Ex i Ethernet solutions.

- NOA (NAMUR Open Architecture), OPAF (Open Process Automation Forum) as well as OPC UA are ideally suited to our modular and high-performance remote I/O systems.

OPC UA
APL
INDUSTRIE 4.0
OPA NOA
IIOT MTP

20xx
Ready for the future. New functions and solutions are in the starting blocks.

IS1+Zone 1

2022
Zone 1 headend – now supports up to 16 I/O modules and various redundancies.

IS1+CPU

2017
New headend for Zone 2, multi-protocol-enabled and even more powerful.

IS1+I/O

2013
Multifunctional I/O modules and predictive diagnostics; can be used for -40 °C to +75 °C.

IS1 Ethernet

2009
First Zone 1 and Division 1 remote I/O system with Ethernet support.

IS1

2000
The most innovative remote I/O system of its time – market leader in Zone 1.

VOS 200

1997
Development of intrinsically safe PROFIBUS DP; more compact field stations for Zone 1.

ICS MUX

1987
Zone 1 remote I/O with intrinsically safe fieldbus.

STAHL

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