ABB

S900 Remote I/O System
Intrinsic safety in the field

The S900 Remote I/O System

—
01 Example of Field
housing FH660S in
stainless steel with
complete certification
according to "ATEX".

S900 is a remote I/O family designed for application with rated hazardous areas according to ATEX. The I/O system can be safely located directly in ATEX Zone 1 and 2, which can save immense wiring cost and makes the need of barriers obsolete. It also makes life easy in production phase, as maintenance of the I/O is easy as in non-rated areas.

S900 I/O incorporates complete redundant networking capability, including redundancy in power supply, communication interface and PROFIBUS DP connection.

Main areas of application are in the chemical industry, the pharmaceutical industry and, the oil and gas industry. Throughout it's proven track record and wide temperature range and coating, the S900 I/O has been used in many areas where durable and long standing equipment is needed. Extended diagnostic functions and the use of HART®-compliant field devices in the fieldbus system reduce the maintenance effort and therefore, lead to savings throughout the service life of the plant.

The S900 I/O family is ideal for use in Process Control Systems and has proven track record with all of ABB's systems, like:
• System 800xA
• Advant Master
• AC 870P / Melody / Symphony Plus
• Freelance
and many more.

Three different versions of S900 are available, tailored to meet the needs of customers. Nevertheless, a uniform planning and engineering philosophy can be used both for the assembly of the certified S900 I/O in the various hazardous zones and for signaling.

The following S900 series are available:
• S series for applications in
  Zone 1 hazardous areas
• B series for applications in
  Zone 2 hazardous areas
• N series for applications in
  non-hazardous areas

Field housings
For field mounting and mounting in hazardous areas, the S900 needs to be located into field housings with a protection class IP54 as minimum. For such cases, standard solutions with Field Housing series can be selected in the product range (refer to price list).
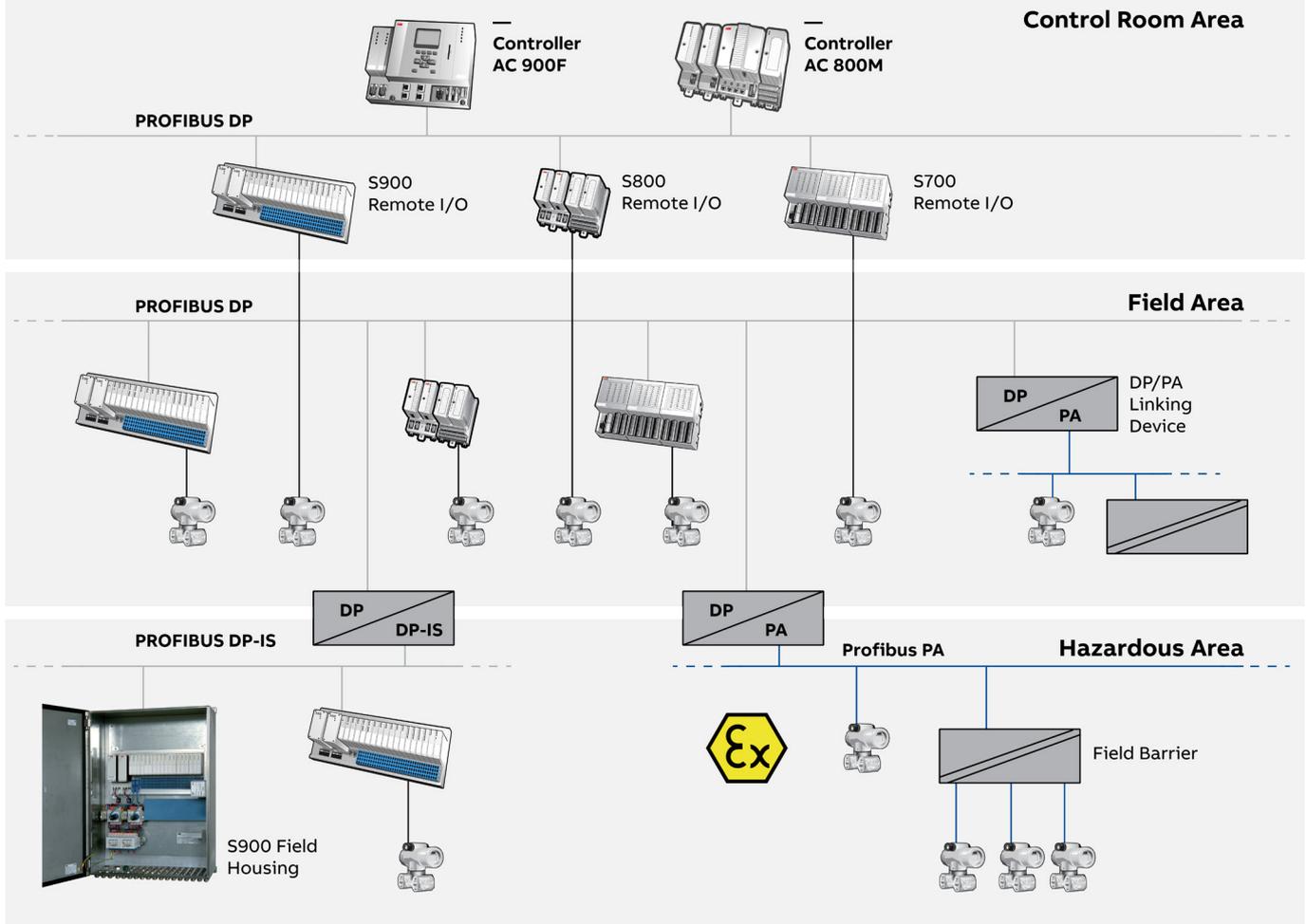
The Field Housings are designed for wall-mounting and are certified in accordance with ATEX for installation in Zone 1. They consist of stainless steel and are ready-wired. Further information is available in I/O Datasheet Catalog.

For further information please contact your local ABB representative or visit our web.

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Series	Assembly	Field devices / signals	Hazardous area approval
S series	In Zone 1	In Zones 2, 1, and 0 (intrinsically safe signals)	ATEX Zone 1 (Blue TU921S)
B series	In Zone 2	In Zones 2, 1, and 0 (intrinsically safe signals)	ATEX Zone 2 (Blue TU921B)
N series	In safe areas	In safe areas	No* (Black TU921N)

* Field devices mounted in Zone 1/Zone 0 can be connected to N-Series with additional IS barriers; a benefit of IS modules of S- and B-Series.

Control Room Area

Controller AC 900F
Controller AC 800M

PROFIBUS DP

S900 Remote I/O
S800 Remote I/O
S700 Remote I/O

Field Area

PROFIBUS DP

DP/PA Linking Device
DP / PA

DP / DP-IS
DP / PA

PROFIBUS DP-IS

Hazardous Area

Profibus PA

S900 Field Housing

Ex

Field Barrier

Advantages at a glance

- Designed for intrinsically safe applications in hazardous areas
- Integrated barrier function with hot pluggable modules and automatic slot addressing
- High availability due to redundancy in the power supply as well as in communication
- Minimum maintenance effort as a result of hot swap capability in rated hazardous areas, self-diagnostics, remote engineering capabilities
- Simplified project handling with pre-installed, fully certified extended safety field housings
- Easy project planning and efficient engineering

Customer benefits

- Installation close to production cell saves cabling cost
- Responsibility for explosion protection taken over by vendor (pre-mounted for installation in field housings including ATEX certification for Zone 1)
- No plant-specific documentation and engineering required
- Simplified Ex-acceptance test procedure for plants used in hazardous areas (pre-mounted field house including ATEX certification Zone 1)
- Straightforward preparation of offers

	NAMUR inputs	Binary 48 V	Binary Relay	Analog Unipolar	Temperature RTD	Temperature T/C	HART	Intrinsic safety
I/O Features S900								
Digital I/O modules								
DX910S,B,N*	✓							S,B
Digital output modules								
DO910S,B,N*								S,B
DO930N		✓						
Pulse input modules								
DP910S,B,N*			✓					S,B
Analog input modules								
AI910S,B,N*				✓				S,B
AI930S,B,N*				✓			✓	S,B
AI931S,B,N*				✓			✓	S,B
AI950S,B,N*					✓	✓		S,B
Analog output modules								
AO910S,B,N*				✓				S,B
AO920S,B,N*				✓				S,B
AO930S,B,N*				✓			✓	S,B

* For details about S900 I/O please refer to the S900 catalog, document number 3BDD010420.

The S900 building blocks

The S900 interface family is based on a passive backplane suitable for assembly in control room or for field assembly in an appropriate housing, e.g. extended Safety Fieldhousing FH660S. The passive backplane contains all terminal units for field circuits, communication and power supplies. Interface modules are plugged into the backplane in up to 16 slots. The backplane has two slots for power supply units and two slots for communication interfaces to achieve a full communication and power supply redundancy.

The interface modules have up to eight channels, while analog function modules can connect up to four channels. Therefore, up to 128 digital or 64 analog channels or any mix of both can be connected per station. In a standard cabinet layout in Non-Ex areas, about 400 to 600 channels can fit with a typical mix of I/Os.

Some of the special features are:

- **Flexibility** for a large number of different applications: assembly in various hazardous areas or standard non-hazardous areas, as well as various variants and solutions
- **Good price/performance ratio** as external barriers for the field circuits have been removed and costs are cut in terms of cabling, installation, hardware, and maintenance
- **High availability** due to redundancy

- **Simplified maintenance** due to auto diagnostics and the provision of diagnostic data via the fieldbus as well as signaling through LEDs at the S900 station itself
- **Easy configuration** either using FDT/DTM or by means of GSD files, allowing connection to practically all process control systems
- **Easy handling** thanks to the hot-swap capability of all components during operation

Description of the S900 system

S900 provides input and output modules needed for intrinsically safe connection of field signals. In S900 modules, the field signals are digitized and electrically isolated then made available via PROFIBUS DP for the N-System or PROFIBUS DP-IS for the S-/B-System.

Higher-level process control systems, programmable logic controls, or SCADA systems use this intrinsically safe fieldbus to communicate with the communication interface. One and the same fieldbus network is used for the configuration of the individual S900 stations, the cyclical data exchange, all acyclic services, and communication with HART field devices.

When it comes to installation and maintenance, all input/output modules can be replaced easily and quickly as the modules and the optionally redundant communication interfaces of systems placed in Zone 1 can be removed and plugged in while operation is running, without affecting the communication of the remaining modules. Integrated, encapsulated disconnection mechanisms also allow the power supply units to be exchanged without switching off the power.

As a result of its rugged, space-saving design, combined with protection against environmental influences, the S900 remote I/O system is the solution of choice for direct, cost-saving on-site deployment in Zone 1 or 2 hazardous areas as well as in non-hazardous areas.

Integration into the control system

The S900 remote I/O can be configured and parameterized directly from the engineering tool integrated into the process control system. The configuration can be carried out using DTM interface or using GSD files.

S900 Remote I/O is highly integrated in ABB's Process Control Systems. For Freelance, you have the option to either use DTMs or GSD based template technology. For System 800xA/ AC 800M controller, Hardware Definition file exists. This allows for easy engineering of the components as well as parameterizing connect HART field devices.

Commissioning:
- Configuring the module types (which module in which slot and if HART secondary variables should be read out cyclically)
- Setting all module parameters (0/4..20mA; behavior in the event of an error, etc.)
- Automatically describing the I/O data (channels) to facilitate the connection to the function chart
- Monitoring and simulating the I/O data to support commissioning
- Passing the configuration data to the master's download mechanism

Operation:
- Displaying all system specific, module specific, and channel specific S900 diagnostic information so that errors can be pinpointed effectively
- Displaying the diagnostic information of HART devices

Maintenance:
- Possible to identify the components, e.g. displaying hardware and software versions or batch numbers

No external signal conditioning or marshalling necessary

S900 offers a large number of different input and output modules:
- Input modules both with and without integrated galvanic isolated barrier function. When used in hazardous areas, no additional barriers are needed. Input modules with a direct temperature signal input for 3-wire/4-wire resistance thermometers.
- Thermocouples with internal reference junction compensation.
- NAMUR inputs and outputs for binary contacts
- Output modules for directly controlling positioners, actuators, and solenoid drivers or for controlling valves, LEDs, and relays.

S900 makes it possible to connect 2-wire field devices directly.

Substantial savings can be achieved during installation thanks to the fact that the need for separate marshalling, provision of power, and fuse systems is eliminated.

Using the HART technology

The S900 I/O remote system enables you to benefit from the advantages and functions of any intelligent HART field devices you already have installed.
- Can be configured and parameterized using the fieldbus
- Cyclical scanning of secondary variables such as the feedback from positioners
- Reduced wiring effort and less hardware thanks to multivariable HART devices
- Support for HART status and diagnosis
- Access to maintenance functions of the HART field device
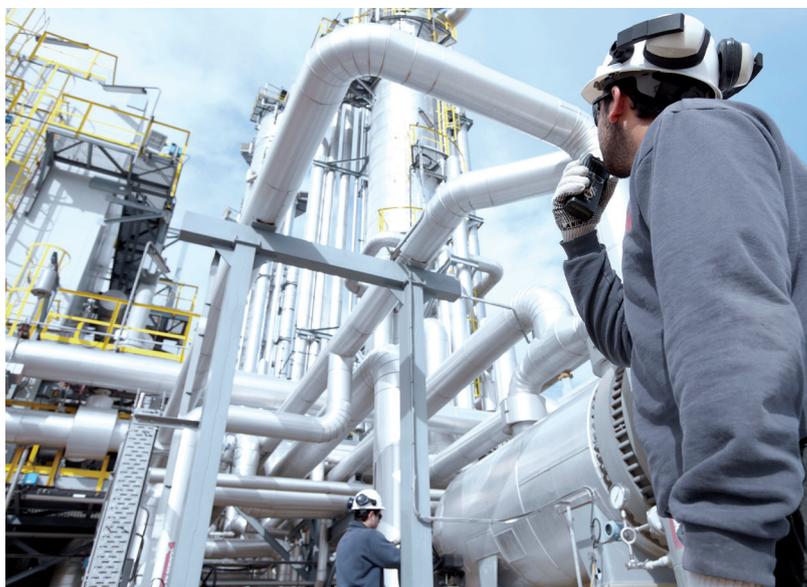
The S900 Remote I/O System

01. Communication interface CI920AS/B/N
- Fieldbus protocol PROFIBUS DP V1
- HART over PROFIBUS
- Line or media redundancy via two coupling modules
- Electrical isolation between field bus, power
- Diagnosis, configuration and parameterization via PROFIBUS

02. Digital I/O modules DX910S/B/N
- Input for dry contacts or proximity switches (NAMUR)
- Output for low power intrinsically safe valves
- Short and break detection
- Electrical isolation between input / bus and input / power
- Common return for all inputs / outputs
- Configurable as a mixture of inputs and outputs
- 8 I/O channel

03. Solenoid driver DO910S/B/N
- Output for intrinsically safe valves or alarms
- Integrated driving power
- Short and break detection
- Electrical isolation between output / bus and output / power
- Electrical isolation channel to channel
- 4 channels

04. Relay output DO930N
- Relay output for higher switching power
- Output configurable as NO or NC contact
- Electrical isolation between output / bus and output / power
- Electrical isolation channel to channel
- Configurable as 4 x changeover contact
- Configurable as 6 x NO contact

05. Frequency input DP910S/B/N
- Frequency input for dry contacts or proximity switches
- Short and break detection
- Electrical isolation between input / bus and input / power
- Frequency measurement or counting applications
- 2 Function blocks
- Reset via fieldbus or control input
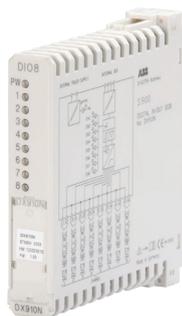- Status outputs / Direction recognition

06. Analog input AI910S/B/N
- Power supply for 4...20 mA loop powered 2-wire transmitters
- Short and break detection
- Electrical isolation between input / bus and input / power
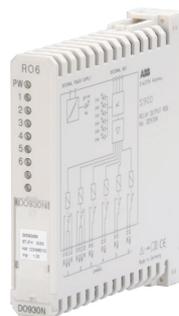- Common return for all inputs
- 4 channels

01   02   03   04   05   06

07. Analog input, HART, AI930S/B/N
- Power supply for 4...20 mA loop powered 2-wire transmitters
- Short and break detection
- Electrical isolation between input / bus and input / power
- Common return for all inputs
- 4 channels
- Cyclic secondary HART variables
- Transmission of HART frames via the fieldbus

08. Analog input, HART, pass., AI931S/B/N
- Passive inputs for 0/4...20 mA
- Short and break detection
- Electrical isolation between input/bus and input/power
- Common return for all inputs
- 4 channels
- Cyclic secondary HART variables
- Transmission of HART frames via the fieldbus

09. Temperature input AI950S/B/N
- Pt 100, Pt 1000, Ni 100, 0...3 kOhm in 2-/3-/4-wire connection
- Thermocouple Type B, E, J, K, L, N, R, S, T , U , mV
- Internal or external cold junction compensation
- Short and break detection
- Electrical isolation between input/bus and input/power
- Electrical isolation channel to channel
- 4 channels

10. Analog output AO910S/B/N
- Output signal 0/4...20 mA for actuators
- Short and break detection
- Electrical isolation between output / bus and output / power
- Output with common ground
- 4 channels

11. Analog output, isolated AO920S/B/N
- Output signal 0/4...20 mA for actuators
- Short and break detection
- Electrical isolation between output / bus and output / power
- Electrical isolation channel to channel
- 4 channels

12. Analog output, HART, AO930S/B/N
- Output signal 0/4...20 mA for actuators
- Short and break detection
- Electrical isolation between output / bus and output / power
- Output with common ground
- 4 channels
- Cyclic secondary HART variables
- Transmission of HART frames via the fieldbus

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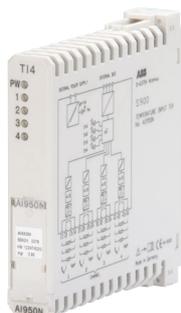**https://new.abb.com/control-systems/system-800xa/800xa-dcs/hardware-controllers-io/s900-i-o**
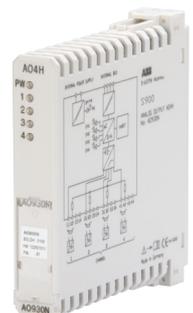
07   08   09   10   11   12

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