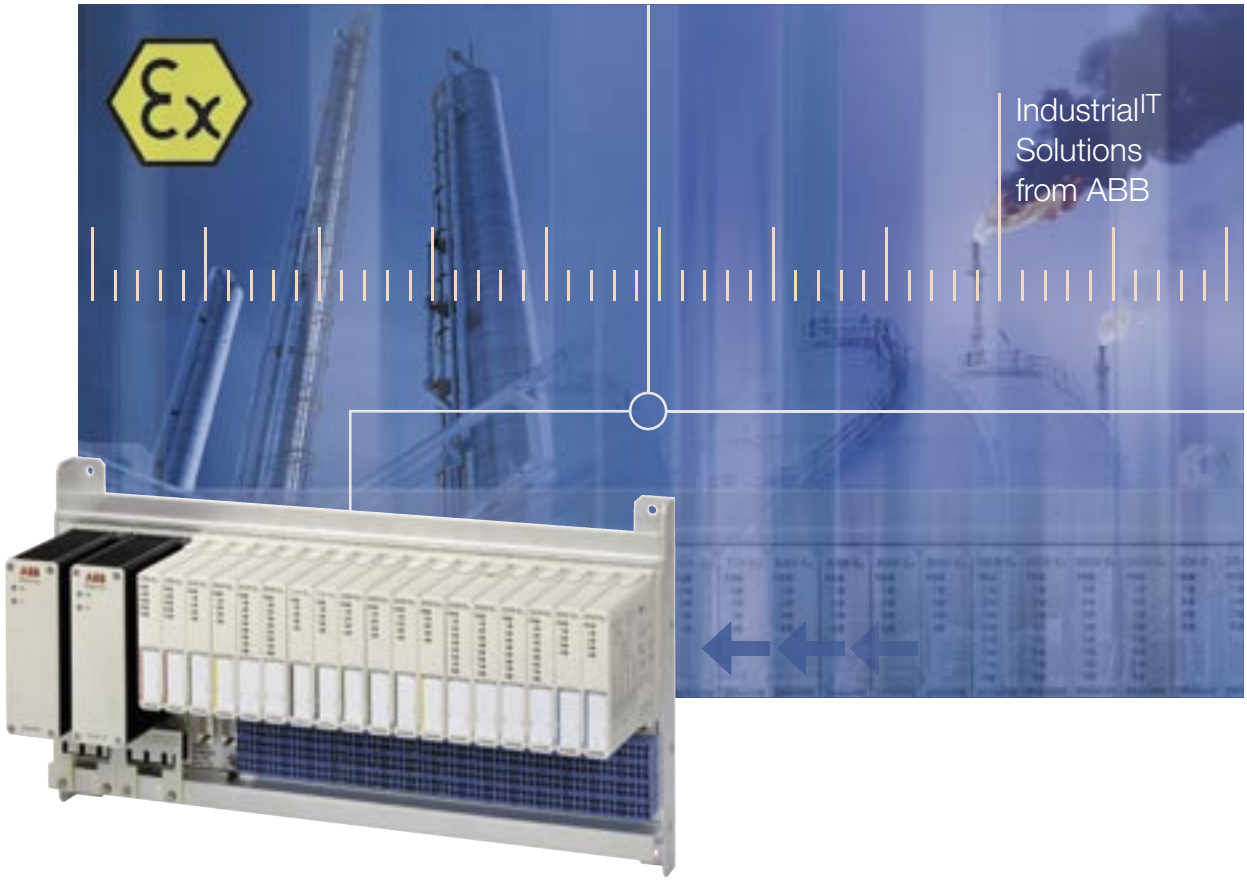
S900 Remote I/O System

Intrinsic safety in the field



S900 is a remote I/O system for applications in hazardous and non-hazardous areas that communicates with higher-level controllers using PROFIBUS. Amongst other things, S900 is suitable for applications in the chemicals industry, the pharmaceuticals industry, and the oil and gas industry. Thanks to the fact that the I/O system is installed directly in the field, the costs for marshalling and wiring are reduced. 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 module in the 800xA system is a redundant, cost-effective remote I/O system for the following control systems:

- System 800xA
- Advant Master
- AC 870P / Melody
- Freelance 800F

and many more.

Three different versions of S900 are available, tailored precisely 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

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
B series	in Zone 2	in Zones 2, 1, and 0 (intrinsically safe signals)	ATEX Zone 2
N series	in safe areas	in safe areas	no

The following overall engineering solutions for hazardous-area applications are available:

- **Field housing** – for wall-mounting in the case of installation in Zone1 with a system approval fully certified in accordance with ATEX. The stainless steel field housing is ready-wired and prepared for wall-mounting. In addition, screen rails or terminals can be mounted. Together with the field housing, this brings the following advantages:

  > Complete design, heat compensation, and documentation by ABB
  > Elimination of additional marshalling units
  > Thanks to the S900 modules, no external barriers are needed for the field circuits
  > Simplified acceptance of the plant with regard to hazardous areas

- **CB220 compact box** – consistent further development of the S900 remote I/O in compact form with up to 4 I/O modules for decentralized use. This variant is suitable, for example, for use in applications such as temperature multiplexers and solenoid controls. The CB220 compact box additionally offers the following advantages:

  > Compact design
  > Easy field assembly
  > Decentralized assembly makes it possible to cut down on wiring

The S900 components

The S900 components are based on a passive backplane suitable for assembly in the control room or for field assembly in an appropriate housing. The passive backplane contains all terminal units for field circuits, communication, and the power supply. The function modules are plugged into the backplane in the slots. The redundant backplane has two slots for power supply units, two slots for the bus couplers, and 16 slots for the various function modules. The digital function modules have up to 8 channels, while the analog function modules are designed with up to 4 channels. Using a redundant backplane, therefore, up to 128 digital or 64 analog channels can be connected per station.

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** because external barriers for the field circuits have been removed and costs are cut in terms of cabling, installation, hardware, and maintenance
- **High availability** thanks to redundancy
- **Simplified maintenance** thanks to autodiagnostics 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 the input/output modules needed for the intrinsically safe connection of the field signals. In the S900 modules, the field signals are digitized and electrically isolated then made available using an internal bus. A bus coupler converts these signals to comply with the standardized Profibus DP V1 fieldbus protocol.

Higher-level process control systems, programmable logic controls, or SCADA systems use this fieldbus, which is also intrinsically safe, to communicate with the bus coupler. 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 exchanged speedily as the modules and the optionally redundant bus couplers can be exchanged in all S900 series during operation. Integrated, encapsulated disconnection mechanisms also allow the power supply units to be exchanged without switching off the power supply.

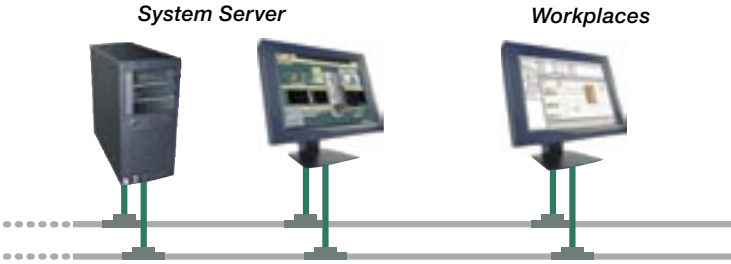
As a result of its rugged, space-saving design, combined with protection against environmental influences, the S900 remote I/O system is the solution of choice for direct, cost-saving on-site deployment in Zone 1 or 2 hazardous areas as well as in non-hazardous areas.

The S900 DTM helps you to use the S900 in all phases – from commissioning to maintenance – with the performance of the modern DTM technology going far beyond simply setting the S900 parameters.

Integration into the control system

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

In addition to the control system's engineering tool, an independent device management tool such as DSV4 (SMART VISION) can also be used for commissioning, diagnosis, and maintenance. In addition, the HART field devices can be configured and parameterized.



Efficient engineering with FDT/DTM

The Device Type Manager (DTM) has a detailed knowledge of the functionality and parameters of the various function modules and the bus coupler. In addition to module configuration, the DTM can also be used to force (simulate) the inputs/outputs as well as to display the diagnostic messages. Thanks to the standardized FDT/DTM interface, the DTM is easy to integrate into the process control system's engineering tool. The DTM belongs to the device, not the control system, which means that, after you have learnt how to operate it once, you can do so in the same way in any other environment. The entire configuration and the parameters are loaded into the S900 stations automatically when the bus network is started up or when the hardware is changed, making the product a real „plug and play" system. Configuration data and parameters can be visualized and updated using the DTM. Data is archived in the central database of the engineering tool. This ensures that the data is consistent throughout the system, reducing the time required for commissioning and trouble-shooting.

Commissioning:

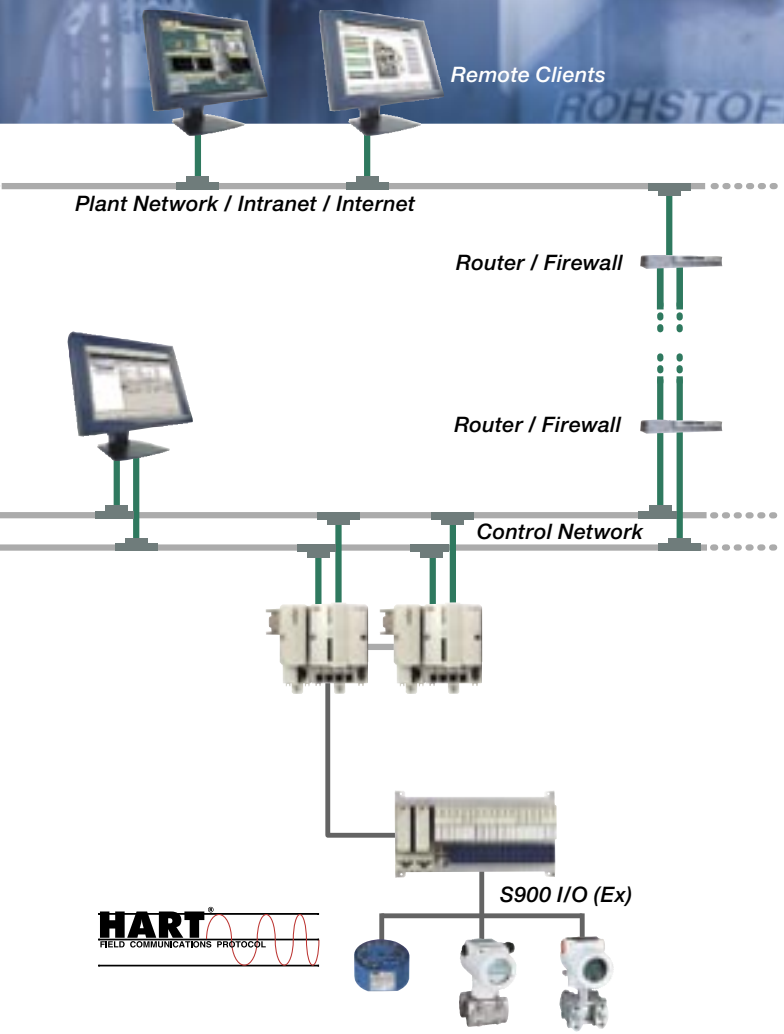
- Configuring the module types (which module is in which slot)
- Setting all module parameters (0/4..20mA; behavior in the event of an error, etc.)
- Automatically describing the I/O data (channels) to facilitate the connection to the function chart
- Commissioning the subordinate HART level using the integrated HART routing function
- 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 relating to lower-level 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 transmitter powering or with a direct temperature signal input for 3-wire/4-wire resistance thermometers and thermocouples with internal reference junction compensation as well as 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 two-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
- Utmost precision because the primary variables are read digitally
- 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

Advantages at a glance

S900 is a cost-cutting, bus-compatible remote I/O system for the 800xA system, AC 870P / Melody, Freelance 800F, Advant Master, or practically any other process control system.

- High availability thanks to redundancy in the power supply as well as fieldbus communication
- Designed for intrinsically safe applications in hazardous areas
- Easy step-by-step expansion with hot-pluggable modules and automatic slot addressing
- Minimum maintenance effort thanks to enhanced diagnostics, self-monitoring
- Easy project planning and efficient engineering
- High degree of flexibility because the system can be integrated into practically any process control system
- Up to 128 binary or 64 analog field devices can be connected per S900 station.

S900 function modules

PROFIBUS – bus coupler

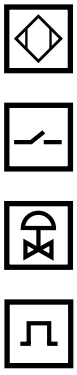
- For 64 analog and 128 digital input/output channels
- Communication via Profibus DP-V1
- Redundant instrumentation
- Hot-swap capability
- Integrated automatic diagnostic functions
- Consistent support of the HART functions
- Can be configured directly from the process control system ***as well as*** using a configuration tool via acyclic services

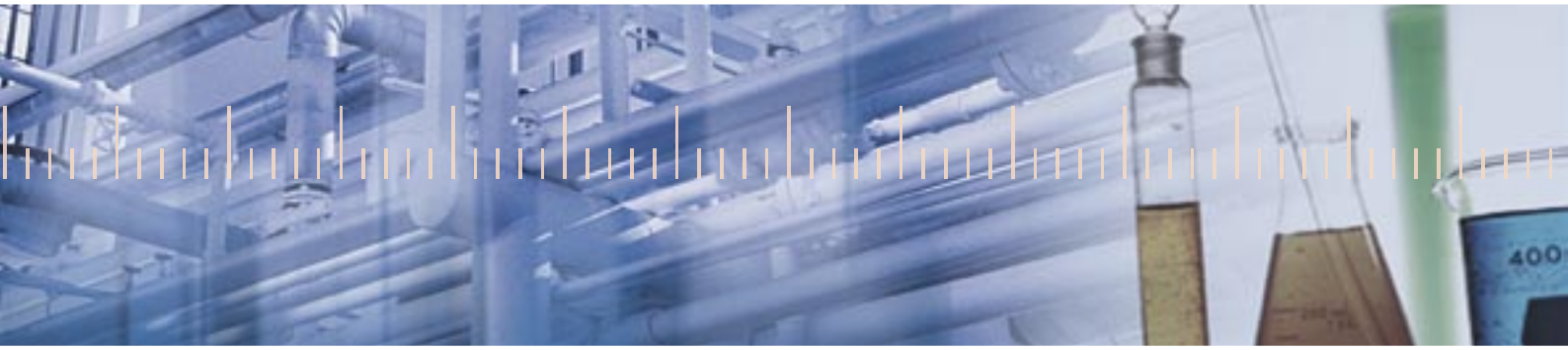
Solenoid driver

- 4 digital outputs
- Outputs for intrinsically safe valves and alarm function
- Short-circuit and line-break detection
- LED for operation status and malfunction

Digital input/output module

- 8 digital inputs/outputs
- Inputs for relay contacts
- Inputs for initiators in accordance with NAMUR
- Outputs for intrinsically safe low-power solenoid valves
- Configurable as input/output channel as required
- Short-circuit and line-break detection
- LED for operation status and malfunction





Analog input module

- 4 analog 0/4..20 mA inputs
- Different modules for active and passive functions
- Consistent support of the HART functions
- LED for line break and short-circuit

Analog output module

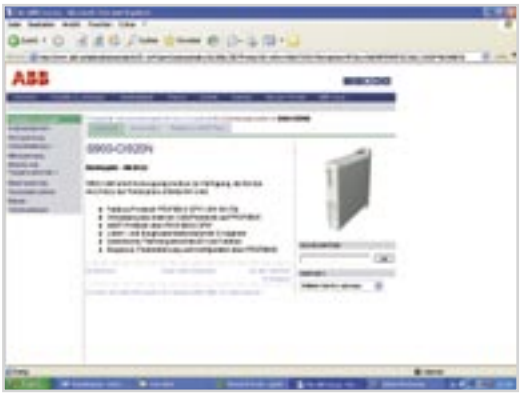
- 4 analog 0/4..20 mA outputs
- Outputs for positioners or actuators
- Consistent support of the HART functions
- LED for line break and short-circuit

Transmitter module

- 4 temperature sensor inputs
- 3-wire or 4-wire resistance thermometer
- Thermocouple types B, E, J, K, L, N, R, S, T
- Internal reference junction compensation
- Inputs can be combined as required
- Short-circuit, line-break, and sensor-break detection

See S900 catalog (3BDD010420R0103) for other function modules.

The latest information about ABB can be found on the Internet at http:// www.abb.com



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