DATA SHEET

ABB Ability™ Symphony® Plus

SD Series IEC 60870-5-104 plant network

ABB Ability™ Symphony® Plus systems with IEC 60870-5-104 plant network communications deliver total plant automation solutions with an open platform architecture.

Highlights

ABB Ability™ Symphony® Plus total automation solutions for the energy and process industries improve productivity, increase energy and water efficiency , enhance operational security and safety, reduce environmental impact and lower costs of ownership. With the addition of IEC 60870-5-104 (IEC 104) for primary plant network communications, Symphony Plus embraces an open platform architecture that allows for easy integration and meaningful peer-to-peer exchange between best-in-class control, I/O, field devices and equipment, HMIs, substations, SCADA systems etc. from ABB and 3rd parties.

Specifically, the IEC 104 plant network is used with SD Series SPC700 control-based systems. Using IEC 104 enables 3rd party control, communication and I/O hardware; as well as 3rd party HMI and other software applications to be directly connected into the Symphony Plus system without requiring gateways or protocol adapters.

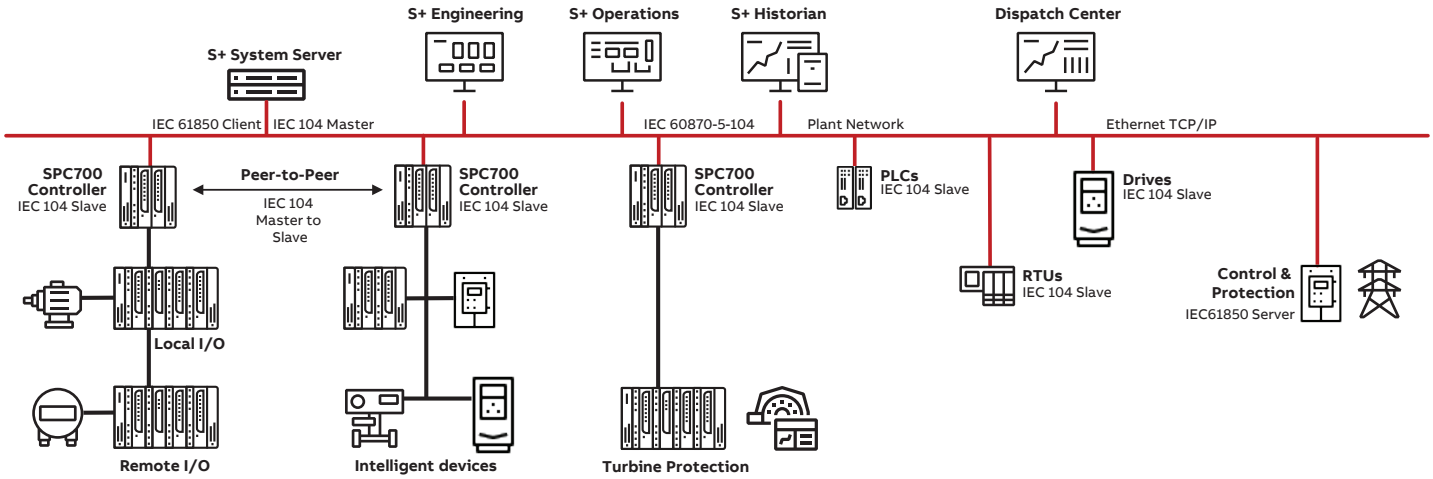
IEC 60870 is a series of international standards that apply “telecontrol equipment and systems” for the monitoring and control of geography widespread processes.

The IEC 60870-5 series of standards focus on communication and interoperability of telecontrol equipment. IEC 60870-5-104 combines the application layer of IEC 60870-5-101 with the transport functions of TCP/IP. IEC 104 is based on a Master (Client) / Slave (Server) architecture. IEC 104 is an open standard protocol that enables control and monitoring equipment from ABB and 3rd party vendors to communicate over a common control network.

In this truly open system architecture, SD Series SPC700 controllers and intelligent devices use the plant network to communicate with S+ Operations HMI and any 3rd party HMI, engineering or applications that support IEC 104. SPC700 controllers and intelligent devices can also use the plant network to communicate horizontally (peer-to-peer) using IEC 104. (Figure 1).

Symphony Plus IEC 104 plant network solutions require the following system hardware and software revisions:

- SD Series SPC700 Symphony Process Controller Firmware version E_1 or later
- S+ Engineering software version 2.3 or later
- S+ Operations software version 3.3 or later



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01 Symphony Plus SD Series IEC 104 plant network functional overview

Data tables

The following tables provide a summary of characteristic properties of the Symphony Plus IEC 104 plant network system. Since such a system is comprised of standard Symphony Plus components (like SPC700 or S+ Operations), only the properties related to the IEC 104 plant network are provided. Additionally for the complete list of properties for the SD Series SPC700 controller and S+ Operations HMI, please refer to their respective product data sheets for details (SD Series SPC700: 8VZZ001853T0001 and S+ Operations: 8VZZ001064T0001).

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Table 1. System data

Property	Characteristic/Value
Max. number of redundancy groups	75 per S+ Operations server
Max. number of redundant connections per controller	2
Max. data points in system	150,000 per S+ Operations server

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Table 2. HMI data (based on S+ Operations)

Property	Characteristic/Value
Capacity/Performance	
Max. number of tags (overall)	Up to 512,000 per server
Max. no. of IEC 104 tags (client/server)	50,000
Max. no. of IEC 104 tags (serverless)	5,000
Event/Message processing	1,000 changes/s
Alarm handling	S+ Operations Soft Alarm limits apply
Redudancy	
Server (Operations)	Up to 4x redundant servers
Network (Operations)	PRP (IEC 62439-3:2016)
Server/Network (Plant)	see above in System and Control layer tables
Communication (IEC 104)	
Max. number of devices per server	150 (non-redundant), 75 (redundant)
Max. number of tags per device	2,000
Max. number of signals per device	depends on tag types used

Table 3. Control layer data (based on SD Series SPC700 controller)

Property	Characteristic/Value
Control programming	Up to 10,000 Function Blocks
Supported communication protocols	IEC 104 as master and slave, Modbus TCP, DNP3.0 (via SCI200), IEC61850 (via CI850)
Device function	Controller Station (master) and/or Controlled Station (slave)
Data collection integrity [2]	Maximum signals buffered: 1,024 events per data type (Binary, Analog, Bit-string) Note: S+ Operations will back-fill buffered events into Historian
Time synchronization	SNTPv3 protocol based (RFC 1769)
Data types	
Monitoring direction	Single point information with time tag (M_SP_TB_1) Double point information with time tag (M_DP_TB_1) Measured value, short floating-point number with time tag (M_ME_TF_1) Bit-string of 32 bit with time tag (M_BO_TB_1)
Controlling direction	Single command (C_SC_NA_1) Double point command (C_DC_NA_1) Set-point Command, short floating-point number (C_SE_NC_1) Bit-string 32 bit command (C_BO_NA_1) Interrogation command (C_IC_NA_1)
Redundancy	
Module level	Bumpless fail-over (SD series standard)
Network level [1, 2]	Standard IEC 104 redundancy with configurable Ethernet connection timeouts
Network fail-over time	Max. 40 seconds depending on system size (node count) and complexity
Max. number of redundancy groups	16 as Controlling Station (master) 8 as Controlled Station (slave)
Maximum number of redundant connections	2 Physical connection, 8 Logical connections as a slave 2 Physical connection, 16 Logical connections as a master
Closed loop performance	Up to 1,000 I/O ≤ 250ms (I/O mix: 70% Digital, 20% Analog)
Event message support	Event Messages with quality and time stamp
Event message support - as slave	Sustained rate of up to 50 events/second Burst of 2,000 events /sec to 1 Master Burst of 150 events/ sec with up to 8 Masters
Event message support - as master	200 events/second with up to 16 slaves
Maximum number of data points	Up to 2,000 points when configured as a IEC 104 Slave Up to 500 points when configured as a IEC 104 Master
Transmission time	Cyclic data transmission (time configurable per segment) Spontaneous transmission (analog is configurable to maximize bandwidth)
Sequence of Event (SOE) transmission[3]	Support SOE transmission (1 ms resolution) from controller to S+ Operations through IEC104 file transfer method
Store and forward	Events are stored in the controller during network fail over and forwarded to the HMI when communication is restored to avoid data loss. Maximum 2000 events can be stored in a circular buffer for each data type.

[1] IEC104 network redundancy does not support bumpless

[2] SPC700 communication buffers up to 2,000 messages of each data type during loss of network communications

[3] SOE transfer to 3rd party system is not supported

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Note:
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