Technical Description

S900 I/O Application-Guide CI920S/CI920B replaced by CI920AS/CI920AB

Products Concerned

Installed Products

Item	Article number	Item Description
CI920B V1.5.9	3BDS014112	Communication Interface for Zone 2
CI920S V1.5.9	3BDS014111	Communication Interface for Zone 1
BP910S	3KDE175831L9100	Intrinsically Safe PROFIBUS DP connector

Replaced by

Item	Article number	Item Description
CI920AB V2.1.0	3BDH000691R1	Communication Interface for Zone 2
CI920AS V2.1.0	3BDH000690R1	Communication Interface for Zone 1
BP914S	3BSE067082R1	Intrinsically Safe PROFIBUS DP connector

Reference Documents

Reference	Document number	Title
[1]	2PAA107377	S900 I/O Release Notes PROFIBUS DP Communication Interface CI920A V2.1.0
[2]	2PAA107376	S900 I/O System - CI920S / CI920B replaced by CI920AS / CI920AB
[3]	3BDD015032R0101	I/O System S900 PROFIBUS Interface CI920 V1.5.9 Release Notes
[4]	3BDD010432R0103	I/O System S900 Assembly and Installation Guide, S- and N-System with power supply SA910
[5]	3BDD010421R0303	I/O System S900 Assembly and Installation Guide, S- and N-System with power supply SA920
[6]	3BDD010421R0201	800xA – Control and I/O S900 I/O System Version 5.0 Installation Guide S- and N-System with Power Supply SA910
[7]	3BDD010421R0401	800xA – Control and I/O S900 I/O System Version 5.0 Installation Guide S- and N-System with Power Supply SA920
[8]	3BDD010432R0103	I/O System S900 Assembly and Installation Guide, B-version with power supply SA910
[9]	3BDD010432R0303	I/O System S900 Assembly and Installation Guide, B-version with power supply SA920
[10]	3BDD010432R0201	800xA – Control and I/O S900 I/O System Version 5.0 Installation Guide B-System with Power Supply SA910
[11]	3BDD010432R0401	800xA – Control and I/O S900 I/O System Version 5.0 Installation Guide B-System with Power Supply SA920
[12]	3BDD010421R0501	S900 I/O Manual Installation Guide S-N-System SA920 CI920A
[13]	3BDD010421R0503	S900 I/O Manual Installation Guide S-N-System SA920 CI920A
[14]	3BDD010432R0501	S900 I/O Manual Installation Guide B-System SA920 CI920A
[15]	3BDD010432R0503	S900 I/O Manual Installation Guide B-System SA920 CI920A

Terminology

Term	Definition
*	Used as wildcard for ‘S’ or ‘B’, suffix of S900 components item Example: CI920A* means both CI920AB and/or CI920AS Used as wildcard for ‘S’, ‘B’, ‘N’, ‘AS’ or ‘BS’ suffix of S900 components item in configuration tools as DTM, HWD, GSD
x	Used as wildcard for sub-revisions ‘0’, ‘1’, … ‘9’ Example: CI920S V 1.4.x means CI920S V 1.4.1 and /or CI920 V 1.4.2

Description

1. General

This document provides information that will help you to update the communication interface CI920* to CI920A* in existing plants as smoothly as possible.

The CI920A* is the successor of the CI920*. The previously used types CI920S and CI920B no longer have the life cycle status ‘Active’. The compatibility of the new communication interfaces CI920AS and CI920AB to the CI920S and CI920B is sufficient so that the predecessor types (CI920S/CI920B) are no longer required. If there is a need for replacement, you should therefore use the new types CI920AS or CI920AB.

Differences:

- The main difference between the new types (CI920AS/CI920AB) and the predecessor communication interfaces (CI920S/CI920B) is the PROFIBUS connection for the intrinsically safe PROFIBUS. The physical layer of the communication interfaces CI920S and CI920B had previously been designed according to manufacturer specifications in accordance with R. STAHL. The physical layer of the communication interfaces CI920AS and CI920AB now meets the standard according to PROFIBUS International Guideline RS485-IS.
- The communication interfaces CI920AS and CI920AB have been type approved according to explosion protection standards EN 60079-0:2006, EN 60079-11:2007 and EN 60079-25:2004.
- For the software design of the new communication interface CI920A* 2.1, all existing functions of the communication interface CI920* 1.5.9 with external relevance have been maintained. The existing system integrations in 800xA (HW Library, DTM), Melody (DTM) and Freelance (GSD, DTM) can therefore still be used without any changes.
- Identified bugs of the communication interface CI920* in version 1.5.9 have been fixed in the communication interface CI920A* Version 2.1. The bug fixing is described in the Release Notes 2PAA107377 [1] for the communication interface CI920A* 2.1 in the ‘Corrected Behavior’ section.

2. Compatibility with existing systems

2.1.1 Hardware compatibility with existing systems

The following installations of the intrinsically safe PROFIBUS segment can be found in existing plants:

	Start of bus (master side)	S900 at center of bus		S900 at end of bus	
Installation type	PROFIBUS isolating repeater/ coupler	PROFIBUS connector	S900 communication interface	PROFIBUS connector	S900 communication interface
1	BI912S	BP910S (bus termination: off)	CI920S or CI910B	BP910S (bus termination: on)	CI920S or CI910B
2	BI913S				
3	BI914S				
4	BI933S				
5	BI934S				

The existing installation types can be converted as follows using the new CI920AS or CI920AB.

2.1.2 Communication interface update without updating the physical layer

Only the S900 communication interfaces are replaced (highlighted grey), the network components are not changed. The intrinsically safe physical layer according to manufacturer specification in accordance with R. STAHL remains unchanged.

	Start of bus (master side)	S900 at center of bus		S900 at end of bus	
Installation type	PROFIBUS isolating repeater/ coupler	PROFIBUS connector	S900 communication interface	PROFIBUS connector	S900 communication interface
1	BI912S	BP910S (bus termination: off)	**CI920AS or CI910AB**	BP910S (bus termination: on)	**CI920AS or CI910AB**
2	BI913S				
3	BI914S				
4	BI933S				
5	BI934S				

When converted during operation, it is possible to temporarily use a mixed configuration consisting of CI920* and CI920A* on the same intrinsically safe bus segment.

2.1.3 Communication interface update and physical layer update according to PROFIBUS International Guideline RS485-IS

Both S900 communication interfaces and network components are replaced. Figure 1 shows the PROFIBUS configuration according to PROFIBUS International Guideline RS485-IS for S900 after updating.

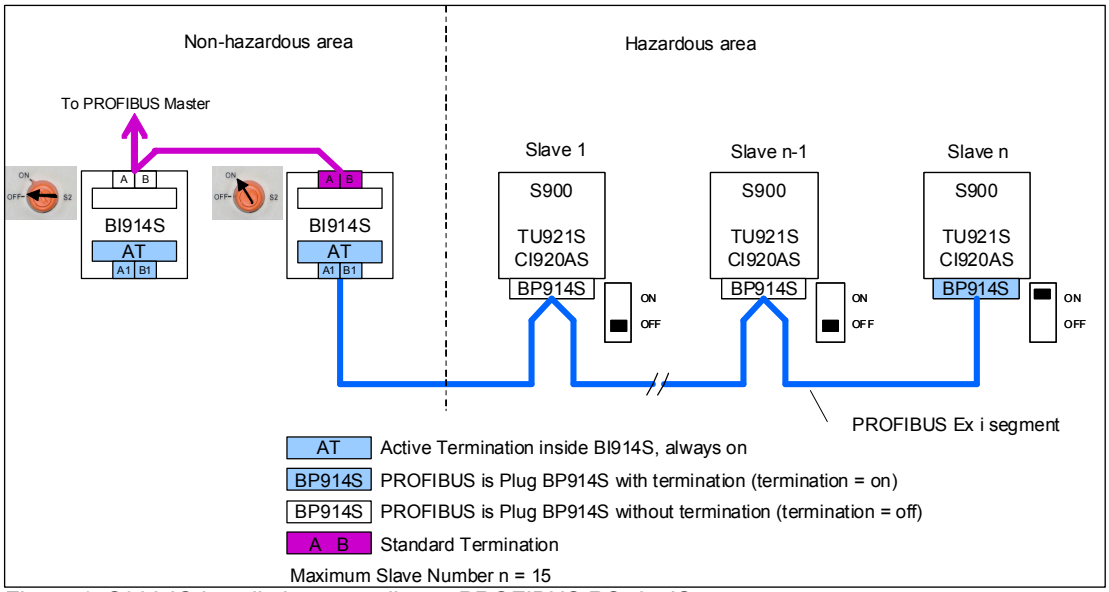


Figure 1: S900 IO installation according to PROFIBUS RS485-IS

The previous communication interfaces CI920S or CI920B may under no circumstances be operated in combination with the new intrinsically safe PROFIBUS connector BP914S (Siemens 6ES7972-0DA60-0XA0). This would violate the explosion protection. If termination is activated, this may also cause destruction of the communication interface.

Depending on the installation type used, not only the communication interfaces and PROFIBUS-IS connectors have to be replaced. It has to be ensured that the PROFIBUS isolating repeater/ coupler supports the new physical layer according to PROFIBUS International Guideline RS485-IS. Therefore the components highlighted grey in the table must be installed.

	Start of bus (master side)	S900 at center of bus		S900 at end of bus	
Installation type	PROFIBUS isolating repeater/ coupler	PROFIBUS connector	S900 communication interface	PROFIBUS connector	S900 communication interface
1	**BI914S**	**BP914S** (bus termination: off)	**CI920AS or CI910AB**	**BP914S** (bus termination: on)	**CI920AS or CI910AB**
2	**BI914S**				
3	BI914S				
4	**BI934S**				
5	BI934S				

The network components should not be replaced during operation. All S900 stations connected to the intrinsically safe bus segment should be switched off.

2.1.4 Communication interface update and physical layer update according to PROFIBUS International Guideline RS485-IS during operation

Network components can only be replaced during operation if:

- A redundant PROFIBUS network,
- Redundant S900 communication interfaces and
- Redundancy mode 1 (ABB redundancy)

are used.

A seamless update during normal operation is only possible from CI920* V1.5.9 to CI920A* V2.1. Installations using older versions of communication interfaces such as CI920* V1.4.1 or V1.4.2 cannot be converted seamlessly, in such cases the relevant plant segment should be shut down. If invalid measured values are tolerated during redundancy switch over from the old (CI920* V1.4.2) to the new (CI920A* V2.1) communication interface, conversion is possible without disconnection.

Conversion must be made taking utmost care and according to the procedure described below.

(1) Check the firmware version of the communication interfaces. All ‘old’ communication interfaces CI920* must correspond to version 1.5.9, if a seamless update is required.

(2) Check the availability of redundancy. All slaves of the active and passive PROFIBUS line of the master must be available. No such diagnostic message must be pending.

(3) Disconnect the PROFIBUS connector of one line (preferably line B or 2) from the master. Slaves that have been active on this PROFIBUS line are now switched over to the redundant intact PROFIBUS line.

(4) Uninstall / disconnect passive communication interfaces CI920* of all S900 stations of the affected segment. The passive communication interface can be identified by a not lighted PB LED.

(5) Switch off the PROFIBUS network of the passive line by cutting off the power supply for PROFIBUS isolating repeaters (e.g.: BI913S).

(6) Replace PROFIBUS connector BP910S of passive line with PROFIBUS connector BP914S. Configure the termination according to the position in the intrinsically safe segment (see Figure 1). Plug the connection again to the Termination Unit (TU921*) and fix the screws.

(7) Replace the PROFIBUS isolating repeater:

- Replace BI912S or BI913S with BI914S
- Replace BI933S with BI934S.

When replacing the BI912S and BI913S with BI914S, observe the bus termination on the non-intrinsically safe PROFIBUS segment (master side):

- BI912S -> BI914S with switch S2 = off
- BI913S -> BI914S with switch S2 = on.

The baud rate at the BI914S must be configured using switch S1. The baud rate setting will only be effective after power on.

(8) Plug in the passive communication interfaces CI920A* of all S900 stations.

(9) Power up the PROFIBUS network components of the passive line (BI914S or BI934S).

(10) Connect / insert the PROFIBUS connector of the passive line at master. The passive line has now been completely converted to the physical layer according to the PROFIBUS International Guideline RS485-IS.

(11) Check the redundancy availability:

The passive communication interface CI920AS V2.1 is pre-initialized by the active communication interfaces CI920S V1.5.9 (does not apply for older communication interface versions CI920* with FW 1.4.x). After a few seconds up to a maximum of 120 seconds, the diagnostic messages in the master must have disappeared. The system must be free of diagnostic messages in terms of redundancy.

The LEDs at communication interfaces of an S900 must indicate the following status:

LED	**CI920* 1.5.9 (Active - Line A or 1)**	**CI920A* 2.1 (Passive - Line B or 2)**
PW	green	green
CA	yellow	yellow
PB	yellow	yellow
RD	yellow	off
FD	off	off

If this is not the case, the errors must be investigated and removed before the next step can be taken. The following checks should be performed to indicate the error:

- Power supply of the BI914S (power LED must light up)
- Setting of bus termination at BI914S
- Setting of baud rate at BI914S (also for BI934S)
- Setting of bus terminations at PROFIBUS connector BI914S of S900
- Connection of data lines AB
- Support of shields in PPROFIBUS connector and in PROFIBUS isolating repeater.
- Firmware of active communication interfaces CI920* 1.5.9

(12) Set new Communication Interfaces CI920A* as active one by consecutively unplugging the active communication interfaces. This consecutively activates the new communication interfaces CI920A*.

Attention:
Do not proceed to the next step before all active communication interfaces have been unplugged.

(13) Repeat steps (3) to (11) for the other PROFIBUS line (now passive line A or 1).

2.2 Software compatibility with existing systems with communication interfaces CI920* FW 1.5.9

The communication interfaces CI920A* FW 2.1 are compatible with the communication interfaces CI920* FW 1.5.9.

Existing systems that are operated with communication interfaces CI920* FW 1.5.9 can also be operated with CI920A* communication interfaces. The new CI920A* communication interfaces can be used like the predecessor version CI920* 1.5.9.

2.2.1 800xA Systems

The CI920A* communication interfaces can be used in the following environments:

- AC800M
- Freelance 800F
- AC870P/Melody

Using the following S900 integration components:

- S900IoCI854HwLib 1-1-2
- S900IoCI854HwLib 2-0-0
- ABB DTM S900-DP 2.9.5 (XP)
- ABB DTM S900-DP 3.0.0 (Win7)
- S900 GSD file 1.2.0 for the parameterization mode 1
- S900 GSD file 1.2.1 for the parameterization mode 1
- S900 GSD file 1.4.1 for the parameterization mode 2
- S900 GSD file 1.4.2 for the parameterization mode 2

The components permitted for use in a 800xA System are defined in the compatibility list of the relevant system version.

Since the new communication interfaces CI920A* 2.1 have not been tested in all existing 800xA Systems and versions, it is recommended to perform appropriate regression tests before updating.

2.2.2 Non 800xA Systems

2.2.2.1 GSD file

The following S900 integration components are recommended for non 800xA systems:

- S900 GSD file 1.2.0 for the parameterization mode 1
- S900 GSD file 1.2.1 for the parameterization mode 1

3. Compatibility of existing systems with communication interfaces CI920* FW 1.4.x

The communication interfaces CI920A* FW 2.1 can also be used to replace the communication interfaces CI920* FW 1.4.1 or CI920* 1.4.2. You should power down and de-energize the relevant S900 station (TU921*) for the time of the communication interface replacement. A seamless replacement cannot be guaranteed when using the intermediate step via CI920* 1.5.9 (CI920* 1.4.x -> CI920* 1.5.9 -> CI920A* 2.1).

In addition to the already described differences (chapter 1) and modified behavior (chapter 2.2.2.3) of CI920A* FW2.1 and CI920* FW1.5.9, also observe the functional differences of the communication interfaces CI920* FW1.5.9 and CI920* FW1.4.x according to Release Notes BDD015032R0101 [3].

4. Interconnection at the intrinsically safe fieldbus system RS485

Two types of fieldbus installations are differentiated for the interconnection of the communication interfaces CI920AS and CI290AB on an intrinsically safe fieldbus system:

(1) Manufacturer-specific, intrinsically safe fieldbus system RS485 previously used for S900 (acc. to R. STAHL)

(2) Intrinsically safe fieldbus system RS485-IS according to PROFIBUS int. Guideline

4.1 Manufacturer-specific, intrinsically safe fieldbus system RS485 previously used for S900 (acc. to R. STAHL)

For an existing fieldbus system, the CI920AS or CI920AB are interconnected as replacement for CI920S or CI920B.

	Start of bus (master side)	S900 at center of bus		S900 at end of bus	
Installation type	PROFIBUS isolating repeater/ coupler	PROFIBUS connector	S900 communication interface	PROFIBUS connector	S900 communication interface
1	BI912S	BP910S (bus termination: off)	CI920S, CI920B, **CI920AS, CI920AB**	BP910S (bus termination: on)	CI920S, CI920B, **CI920AS, CI920AB**
2	BI913S				
3	BI914S				
4	BI933S				
5	BI934S				

The existing fieldbus installations have thus been built up according to one of the following Manual Installation Guides: [4], [5], [6], [7], [8], [9], [10] or [11]. The interconnection of the intrinsically safe fieldbus system performed according to the indicated chapter: ‘Intrinsically Safe Fieldbus System’.

The electrical connection data of the new communication interfaces CI920AS/CI920AB (ATEX ...) and of the installed communication interfaces CI920S/CI920B (ATEX …) are comparable. It is therefore not mandatorily necessary to once more calculate the interconnection in case the

fieldbus installation has not been changed and if this is not demanded by the plant installation rules. You should, however, update the documentation to the latest status.

4.1.1 Applicable ATEX certificates and electrical data

The following tables point out the applicable ATEX certifications (up to 2012-11) and the different electrical data according to ATEX.

Applicable ATEX certifications for Zone 1			
	Installed	Replaced by	Remarks
Communication Interface for Zone 1	CI920S	CI920AS	-
CE-TYPE-EXAMINATION Certificate	PTB 00 ATEX 2001 21st March 2001 1. Supplement 29th October 2001	PTB 11 ATEX 2001 7th December 2011	-

Applicable ATEX certifications for Zone 2			
Communication Interface for Zone 2	CI920B	CI920AB	-
CE-TYPE-EXAMINATION Certificate	PTB 03 ATEX 2028 27th October 2003 1. Supplement 27th May 2008	PTB 03 ATEX 2028 27th October 2003 1. Supplement 27th May 2008 2. Supplement 22nd May 2012	-
Conformity Statement	PTB 03 ATEX 2029 27th October 2003 1. Supplement 27th May 2008	PTB 03 ATEX 2029 27th October 2003 1. Supplement 27th May 2008 2. Supplement 22nd May 2012	-

Electrical data according to ATEX certifications (Zone 1 and Zone 2)			
	Installed	Replaced by	Remarks
RS485 Fieldbus	RS485 Fieldbus EEx ib IIC/IIB Uo = 3.72 V Io = ±157 mA Po = 146 mW Linear characteristic Ui = ±4,2 V	RS485-IS Fieldbus Ex ib IIC Uo = 3,6 V Io = 125 mA Po = 112,5 mW Linear characteristic Ui = 4,2 V	The values of the new component are the same or better regarding the explosion protection interconnection. The values of the RS485-IS (CI920AS / CI920AB) already include the BP914S in case of termination on.
External RS485 Fieldbus	EEx ib IIC/IIB Ui = ±4,2 V Ii = ±2,66 A	Ex ib IIC Ui = 4,2 V Ii = 4,8 A	The values of the new component are the same or better regarding the explosion protection interconnection.
Cables	Cable Type A resp. B to EN 50039 L'/R' ≤ 15 µH/Ω (loop resistance) C' ≤ 250 nF Strand diameter ≥ 0,2 mm	Cable Type A resp. B to EN 600079-25 L'/R' ≤ 15 µH/Ω (loop resistance) C' ≤ 250 nF Litz wire diameter ≥ 0,2 mm	The values of the new component are the same or better regarding the explosion protection interconnection.

4.2 Intrinsically safe fieldbus system RS485-IS according to PROFIBUS International Guideline

The fieldbus system uses the following components:

	Start of bus (master side)	S900 at center of bus		S900 at end of bus	
Installation type	PROFIBUS isolating repeater/ coupler	PROFIBUS connector	S900 communication interface	PROFIBUS connector	S900 communication interface
3	**BI914S**	**BP914S**	**CI920AS, CI910AB**	**BP914S**	**CI920AS, CI910AB**
5	**BI934S**				

The fieldbus system setup corresponds to a new installation. The procedure for the interconnection is described in the current Manual Installation Guide for the respective S900 system in the following documents: [12], [13], 14] or [15] in chapter: 'Intrinsically Safe Fieldbus System'.

For the update of the intrinsically safe fieldbus installations, the interconnections have to be repeated and documented according to the installation guides listed above.