Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Nationales Metrologieinstitut

(1) EU-TYPE EXAMINATION CERTIFICATE

(Translation)

(2) Equipment or Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number:

PTB 03 ATEX 2028 **Issue: 2**

(4) Product: Remote I/O-System S900, B-model, basic system

(5) Manufacturer: ABB AB

(6) Address: 721 80 Västerås, Sweden

(7) This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential Test Report PTB Ex 22-22098.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018 **EN IEC 60079-7:2015/A1:2018**
EN IEC 60079-15:2019 **EN 60079-11:2012**

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design and construction of the specified product in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

(12) The marking of the product shall include the following:

II (2) 3 G Ex ec [ib Gb] IIC T4 Gc and II (2) 3 G Ex ec nC [ib Gb] IIC T4 Gc

Konformitätsbewertungsstelle, Sektor Explosionsschutz Braunschweig, December 2, 2022
On behalf of PTB:

Dr.-Ing. M. Thedens
Regierungsdirektor

ZSEx001e c

(13) # SCHEDULE

(14) **EU-Type Examination Certificate Number PTB 03 ATEX 2028, Issue: 2**

(15) Description of Product

The remote I/O-system, type S900 is a modular designed apparatus. The B-model is certified within the scope of this certificate as associated apparatus of category (2) 3. The basic system consists of a module rack, one or two power supply modules and one or two communication modules.

The system can be supplemented by appropriate, separately certified modules for the signal in- and output to intrinsically safe or non-intrinsically safe field circuits. The protection level of the intrinsically field circuits can be up to Ex ia.

The maximum permissible range of the ambient temperature is: -20 °C up to +60 °C.

Electrical data:

System-internal circuits
(Interconnection of the modules exclusively by associated system-specific module plug connectors and conductors or circuitries on the module rack/s).

Internal supply circuit	U_n = 20 V AC, 300 ... 314 kHz P_n = 55 W
Internal grounding circuit	for EMV purposes, connection to equipotential bonding system
Primary locking circuit	not active
Synchronisation circuits, Supply and control circuit and address encoding	for internal purposes U_n = 6 V
CAN-Bus-circuits	for internal purposes U_n = 6 V

All circuits are voltage-limited according to level of protection ib.

System-external circuits
(connection by the operator)

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2028, Issue: 2

External supply circuit (terminals L+: z24, b24, d24 L-: z28, b28, d28)	Type of protection Increased Safety Ex ec U_n = 18 ... 32 V DC P_n = 65 W in total Safety-related maximum voltage U_m = 60V
External PE circuit (terminal)	not used internally
External PA circuit (terminal)	not used internally
RS 485-fieldbus circuits (Sub-D-connectors)	Type of protection Intrinsic Safety Ex ib IIC U_o = ± 3.6 V I_o = ± 125 mA P_o = 112.5 mW Linear characteristic

The RS 485 circuit is safely electrically isolated from earth and all other circuits up to a voltage peak value of 60 V.

External RS 485 fieldbus system	Type of protection Intrinsic Safety Ex ib IIC only for connection to intrinsically safe circuits with the maximum value for each pair of terminals: U_i = ± 4.2 V and the maximum value for all pairs of terminals in total I_i = ± 4.8 A
Cables	Cable-types A or B according to EN 60079-25 with the following reactances per unit length: L'/R' ≤ 15 µH / Ω (loop resistance) C' ≤ 250 nF / km strand diameter ≥ 0.2 mm lumped inductances and capacitances in the run of the external RS 485 fieldbus system are not permitted.

Additional note

The specifications of the maximum permissible external inductances and capacitances on the field bus terminals of the stations of the external RS 485 field bus network are not applied within the framework of this system certificate.

Equipment of the basic system
(module rack, power supply units, communication modules)

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2028, Issue: 2

Module rack (Termination Unit) type TU921B
(carries the system-internal circuits mentioned above and all external terminals for connection by the operator)

For installation of up to: 2 power supply units
2 communication modules and
16 I/O-modules with intrinsically safe field circuits

The basic system can be supplemented by the I/O-modules with intrinsically safe circuits specified in PTB 03 ATEX 2078. For electrical data, reference is made to the certificate or the operating instructions manual.

Power supply module type SA920B
(generates internal supply circuits from the external supply circuits and forms the active source for all further internal circuits)

Communication module type CI920AB type of construction CIPBA-Ex
(interconnects external and internal communication circuits)

Changes with respect to previous editions

- The type of protection changes to Ex ec nC (module SA920B)
- The construction of the enclosure has changed
- The manufacturer's address has changed

(16) Test Report PTB Ex 22-22098

(17) Specific conditions of use

(18) Essential health and safety requirements

Met by compliance with the aforementioned standards.

Konformitätsbewertungsstelle Sektor Explosionsschutz
On behalf of PTB:

Dr.-Ing. M. Thedens
Regierungsdirektor

Braunschweig, December 2, 2022

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
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(1) # EU-TYPE EXAMINATION CERTIFICATE

(Translation)

(2) Equipment or Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number:

PTB 03 ATEX 2078 **Issue: 01**

(4) Product: Remote I/O-System, type S900, B-model

(5) Manufacturer: ABB AB, Control Technologies

(6) Address: Tvärleden 2, B357 , 721 59 Västerås, Sweden

(7) This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential Test Report PTB Ex 20-28191.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018, EN 60079-7:2015, EN 60079-11:2012

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design and construction of the specified product in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

(12) The marking of the product shall include the following:

II (1) 3 G Ex ec [ia Ga] IIC T4 Gc and II (1D) 3 G Ex ec [ia IIIC Da] IIC T4 Gc

Konformitätsbewertungsstelle, Sektor Explosionsschutz Braunschweig, June 4, 2020
On behalf of PTB:

Dr.-Ing. F. Lienesch
Direktor und Professor

ZSEx001e c

(13) # SCHEDULE

(14) **EU-Type Examination Certificate Number PTB 03 ATEX 2078 , Issue: 01**

(15) Description of Product

The modules mentioned below are associated apparatus and, as B-version, part of the remote I/O-system, type S900. They are mounted side by side on the system module rack and they are intended for the electrical interconnection of the field circuits and the system-internal circuits.

Note: The effective internal capacitance C_i and inductance L_i need to be considered with the installation unless they are explicitly considered with the specifications of the maximum permissible external capacitance C_o and inductance L_o.

The maximum permissible range of the ambient temperature is: -20 °C up to +60 °C.

Electrical data of system-internal circuits

(Connection of the modules exclusively by a system-specific plug-connector designed to type of protection Increased Safety "ec")

Internal supply circuit	U_n = 20 V AC, 300 ... 314 kHz Safety-related maximum voltage U_m = 20 V differentially or U_m = 30 V to ground
CAN-bus-circuits	U_n = 6 V, for internal purposes Safety-related maximum voltage U_m = 10 V differentially & to ground
Address encoding	U_n = 6 V, only for connection to passive floating circuits with electrical isolation from ground according to a maximum voltage of U_m = 30 V

The safety-related maximum voltages of all system-internal input circuits shall be voltage-limited at least according to category ib.

The supply circuit is safely electrically isolated from ground and – up to a peak value of the nominal voltage of 30 V – from the intrinsically safe field circuits.

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2078 , Issue: 01

Electrical data of the system-external field circuits of the modules:

(Connection of the field circuits by terminal blocks assigned to the respective modules on the module rack)

Digital in/out, type DIO8-B, No. DX910B and
Frequency input type FI2-B, No. DP910B

Field circuits

Terminals:

Channel 1: 11,12
Channel 2: 13,14
Channel 3: 21,22
Channel 4: 23,24
Channel 5: 31,32
Channel 6: 33,34
Channel 7: 41,42
Channel 8: 43,44

Type of protection Intrinsic Safety Ex ia IIC / IIB / IIIC

Maximum values per channel:

U_o = 9.6 V
I_o = 44 mA
P_o = 106 mW

Characteristic: linear

C_i = negligibly low
L_i = negligibly low

Maximum values for commonly occurring external reactances L_o and C_o

L_o (mH)	IIC	IIB / IIIC
	C_o (µF)	C_o (µF)
2	0.9	5.1
1	1.1	6.1
0.5	1.3	7.3
0.2	1.7	8.6

The intrinsically safe field circuits are safely electrically isolated from ground and – up to a peak value of the nominal voltage of 30 V – from the intrinsically safe signal circuit (CAN-BUS). They are electrically interconnected by the address encoding.

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2078 , Issue: 01

Digital output, type DO4-B, No. DO910B

Field circuits

Type of protection Intrinsic Safety Ex ia IIC/IIB/IIIC

Terminals:

Channel 1: 11,12
Channel 2: 21,22
Channel 3: 31,32
Channel 4: 41,42

Maximum values per channel:

U_o = 25 V
I_o = 80 mA
P_o = 750 mW

Characteristic: angular

U_e = 18.2 V angle voltage
I_e = 41.2 mA angle current

C_i = negligibly low
L_i = negligibly low

Maximum values for commonly occurring external reactances L_o and C_o

L_o (mH)	IIC	IIB / IIIC
	C_o (nF)	C_o (nF)
2	-	350
1	-	410
0.5	-	500
0.2	-	660
0.1	110	820

Terminals:

Channel 1: 13,14
Channel 2: 23,24
Channel 3: 33,34
Channel 4: 43,44

Maximum values per channel:

U_o = 19 V
I_o = 100 mA
P_o = 710 mW

Kennlinie: angular

U_e = 13 V angle voltage
I_e = 53.4 mA angle current

C_i = negligibly low
L_i = negligibly low

Maximum values for commonly occurring external reactances L_o and C_o

L_o (mH)	IIC	IIB / IIIC
	C_o (nF)	C_o (nF)
2	-	1000
1	130	1000
0.5	140	1000
0.2	170	1100

The functional blocks of the module are safely electrically isolated from ground and – up to a peak value of the nominal voltage of 60 V – from each other.

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2078 , Issue: 01

Analog output, type AO4I-B, No. AO920B

Field circuits — Type of protection Intrinsic Safety Ex ia IIC / IIB / IIIC

Terminals:

Channel 1: 11, 12
Channel 2: 21, 22
Channel 3: 31, 32
Channel 4: 41, 42

Maximum values per channel:

U_q = 25.5 V
U_o = 18.9 V
I_o = 80 mA
P_o = 510 mW

Characteristic: trapezoidal

C_i = 25 nF
L_i = negligibly low

Maximum values for commonly occurring external reactances L_o and C_o

L_o (mH)	IIC	IIB / IIIC
	C_o (µF)	C_o (µF)
2	0.10	1
0.5	0.12	1
0.2	0.15	1.17

The intrinsically safe field circuits are safely electrically isolated from ground and – up to a peak value of the nominal voltage of 60 V – from each other.

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2078 , Issue: 01

Analog output, type AO4-B, No. AO910B and type AO4H-B, No. AO930B

Field circuits

Terminals:

Channel 1: 11, 12
Channel 2: 21, 22
Channel 3: 31, 32
Channel 4: 41, 42

Type of protection Intrinsic Safety Ex ia IIC / IIB / IIIC
or Ex ib IIC / IIB / IIIC

Maximum values per channel:

U_o = 22.1 V
I_o = 93 mA
P_o = 640 mW

Output characteristic: trapezoidal with

U_Q = 27.54V
R = 298 Ω

C_i = 1.1 nF
L_i = 0.22mH

Maximum values for commonly occurring external reactances L_o and C_o . The effective internal reactances L_i und C_i have already been considered. (acc. to: ISpark 6.2)

Type of protection	Ex ia and Ex ib	
Group	**IIC**	**IIB / IIIC**
L_o	0.5 mH	2 mH
C_o	65 nF	270 nF

The intrinsically safe field circuits are safely electrically from the intrinsically safe internal signal circuit (CAN-BUS) up to a peak value of the nominal voltage of 30 V.

All channels of the field circuits are electrically interconnected via ground.

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2078 , Issue: 01

Temperature input, type TI4-B, No. AI950B

Measuring circuits

Terminals:

Channel 1: 11 to 14
Channel 2: 21 to 24
Channel 3: 31 to 34
Channel 4: 41 to 44

Type of protection Intrinsic Safety Ex ia IIC / IIB / IIIC

Maximum values per channel:

U_o = 5.5 V
I_o = 25 mA
P_o = 35 mW

Characteristic: linear

C_i = 60 nF
L_i = negligibly low

Maximum values for commonly occurring external reactances L_o and C_o (acc. to: Ispark)

L_o (mH)	IIC	IIB / IIIC
	C_o (µF)	C_o (µF)
2	2.6	15
1	2.9	17
0.5	3.6	21
0.2	4.5	27

Maximum values for each sensor for the connection of field circuits to active sensors:

U_o = 1.2 V
I_o = 50 mA
P_o = 60 mW

C_i = negligibly low
L_i = negligibly low

Maximum values for commonly occurring external reactances L_o and C_o for the connection of one channel to one sensor (acc. to: Ispark)

L_o (mH)	IIC	IIB / IIIC
	C_o (µF)	C_o (µF)
2	1.6	9.8
1	1.9	12
0.5	2.3	14
0.2	3.0	19

The intrinsically safe measuring circuits are safely electrically isolated from ground and – up to a peak value of the nominal voltage of 30 V – from each other and from the intrinsically safe signal circuit (CAN-BUS) and the address encoding.

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2078 , Issue: 01

Analog input, type AI4H-B, No. AI930B and type AI4-B, No. AI910B for passive sensors

Measuring transducer-supply circuit

Type of protection Intrinsic Safety Ex ia IIC / IIB / IIIC
or Ex ib IIC / IIB / IIIC
only for connection to passive circuits

Terminals:

Channel 1: +11, -12
Channel 2: +21, -22
Channel 3: +31, -32
Channel 4: +41, -42

Maximum values per channel:

U_o = 22.1 V
I_o = 93 mA
P_o = 640 mW

Output characteristic: trapezoidal with

U_Q = 27.54 V
R = 298 Ω

C_i = 1.1 nF
L_i = 0.22 mH

Maximum values for commonly occurring external reactances L_o and C_o (acc. to: Ispark 6.2)

Type of protection	Ex ia and Ex ib		
Group	**IIC**		**IIB / IIIC**
L_o	0,5 mH	0,98 mH	2,0 mH
C_o	65 nF	62 nF	270 nF

The field circuits are safely electrically isolated from the internal circuits up to a peak value of the nominal voltage of 30 V. They are electrically interconnected via ground.

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2078 , Issue: 01

Analog input, type AI4H-B, No. AI931B for active sensors

Input circuits

Type of protection Intrinsic Safety Ex ia IIC / IIB / IIIC
or Ex ib IIC / IIB / IIIC

Terminals:

Channel 1: +13, -14
Channel 2: +23, -24
Channel 3: +33, -34
Channel 4: +43, -44

Maximum values per channel:

U_o = 7.2 V
I_o = 16 mA
P_o = 29 mW

Output characteristic: linear

C_i = 1.1 nF
L_i = 0.11 mH

The four channels of the input circuits are electrically interconnected via ground.

For the connection to **active sensors with linear output characteristic** the following maximum permissible values for the external capacitance C_o and external inductance L_o apply. The effective internal reactances L_i und C_i have already been considered.

Maximum values for active sensors (linear output characteristic)		Ex ia IIC and Ex ib IIC		Ex ia IIB / IIIC and Ex ib IIB / IIIC	
U_i	I_i	L_o	C_o	L_o	C_o
2 V	100 mA	1.89 mH	958 nF	9.8 mH	3.79 µF
5 V	100 mA	1.89 mH	548 nF	9.8 mH	2.09 µF
10 V	100 mA	1.89 mH	288 nF	9.8 mH	1.09 µF
15 V	100 mA	0.89 mH	108 nF	9.8 mH	630 nF
16.5 V	100 mA	0.89 mH	87.9 nF	9.8 mH	508 nF
20 V	100 mA	0.89 mH	61.9 nF	9.8 mH	318 nF
22 V	100 mA	0.89 mH	52.9 nF	9.8 mH	248 nF
25 V	100 mA	0.89 mH	43.9 nF	9.0 mH	178 nF
28 V	100 mA	0.44 mH	42.9 nF		
30 V	100 mA			4.89 mH	138 nF

For the connection to **active sensors with trapezoidal output characteristic** the following maximum permissible values for the external capacitance C_o and external inductance L_o apply. The effective internal reactances L_i und C_i have already been considered.

Maximum values for active sensors (trapezoidal output characteristic)		Ex ia IIC and Ex ib IIC		Ex ia IIB / IIIC and Ex ib IIB / IIIC	
U_i	I_i	L_o	C_o	L_o	C_o
22 V	93 mA	0.39 mH	63.9 nF	1.89 mH	268 nF

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2078 , Issue: 01

For the connection to **active sensors with rectangular or trapezoidal output characteristic** the following maximum permissible values for the external capacitance C_o and external inductance L_o apply. The effective internal reactances L_i und C_i have already been considered.

Maximum values for active sensors (rectangular or trapezoidal output characteristic)		Ex ia IIC and Ex ib IIC / IIIC		Ex ia IIB and Ex ib IIB / IIIC	
U_i	I_i	L_o	C_o	L_o	C_o
2 V	100 mA	1.89 mH	958 nF	4.89 mH	4.3 µF
5 V	100 mA	1.89 mH	518 nF	4.89 mH	2.4 µF
10 V	90 mA	0.89 mH	288 nF	4.89 mH	1.2 µF
15 V	56 mA	0.89 mH	86 nF	4.89 mH	608 nF
16.5 V	49 mA	0.89 mH	64 nF	4.89 mH	468 nF
20 V	35 mA	0.89 mH	57 nF	4.89 mH	288 nF
16.5 V	97 mA	-	-	1.89 mH	398 nF
20 V	80 mA	-	-	0.89 mH	318 nF
22 V	65 mA	-	-	0.89 mH	298 nF
25 V	50 mA	-	-	0.89 mH	278 nF

Änderungen in Bezug auf vorherige Ausgaben

- Supplementation of the documentation by an updated description
- Revision of the electrical data
- Withdrawal of the Digital Input Module DI92.B (model DI4.-Ex)
- Verification of compliance with the specified state of standards.
- Supplementation of the documentation by updated drawings of the module inscriptions.
- Change of the manufacturer name

(16) Test Report PTB Ex20-28191

(17) Specific conditions of use

None

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2078 , Issue: 01

(18) Essential health and safety requirements

Met by compliance with the aforementioned standards.

According to Article 41 of Directive 2014/34/EU, EC-type examination certificates which have been issued according to Directive 94/9/EC prior to the date of coming into force of Directive 2014/34/EU (April 20, 2016) may be considered as if they were issued already in compliance with Directive 2014/34/EU. By permission of the European Commission supplements to such EC-type examination certificates and new issues of such certificates may continue to hold the original certificate number issued before April 20, 2016.

Konformitätsbewertungsstelle, Sektor Explosionsschutz
On behalf of PTB:

Braunschweig, June 4, 2020

Dr.-Ing. F. Lienesch
Direktor und Professor