

# Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



## (1) **EC-TYPE-EXAMINATION CERTIFICATE** (Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**



(3) EC-type-examination Certificate Number:

**PTB 00 ATEX 2156 U**

(4) Equipment: Termination Unit Typ TU 16R-Ex, TU 8R-Ex und TU 4R-Ex

(5) Manufacturer: ABB Automation Products GmbH

(6) Address: D 63754 Alzenau, Germany

(7) This equipment and any acceptable variation thereto are 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 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 00-20374.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:  
EN 50 014 :1997+A1+A2      EN 50 019:1994      EN 50 020:1994

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design and construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.

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



**II 2 (1) G EEx e ib [ia] IIC T4**

Zertifizierungsstelle Explosionsschutz  
By order:

Braunschweig,

Dr.-Ing. U. Johannsmeyer  
Oberregierungsrat

sheet 1/6

(13) **S C H E D U L E**

(14) **EC-TYPE-EXAMINATION CERTIFICATE PTB 00 ATEX 2156 U**

(15) Description of equipment

The Termination Unit Type TU ...-Ex forms together with the backplane a platform for accommodating all components of the explosion-proof S900 Remote I/O Fieldbus System. The Termination Unit must not be used outside the S900 System. The power supplies approved for the S900 System must be used to power the communication interfaces (gateways) and modules.

A system description valid for all system components is part of the Termination Unit's test documentation. The system description specifies the basic conditions for the connection and operation of all S900 system components in the hazardous area.

The Termination Unit Type TU ..-Ex consists of a backplane (8-layer multilayer board), the actual termination unit made up of an extruded aluminum profile, and the appropriate connector plugs and terminals. It is used for accommodating a maximum of two communication interfaces, two power supplies and up to 16 I/O modules. Up to 128 digital inputs/output or 64 analog inputs/outputs or a mixture of both can be connected to the Termination Unit. The Termination Unit is considered as a purely passive device, since it has no electrical components except for the connector plugs and terminals and two termination resistors.

On the backplane, effects like sparking, short-circuits and inadmissible temperatures are avoided by limiting the power (Ex i), observing the specified safety gaps and strip conductor cross-sections (Ex i and Ex e), and sealing the "Ex e" current circuits. As a result, the power supplies, communication interfaces and modules of the S900 System can be removed or plugged in under power.

The Termination Unit consists of an extruded aluminum profile with guide rails, onto which the backplane is set. Lateral mounting brackets are used to mount the Termination Unit in the housing. In factory, a copper ribbon cable with a 4 mm<sup>2</sup> CSA is connected to the extruded profile and the backplane to establish a potential equalization bonding between these parts. The extruded profile is mounted to the metal housing using the four appropriate screws.

Since the housing is not subject to the approval test, the Termination Unit Typ TU ...-Ex (and all accommodated S900 modules) must be installed in the appropriate housing meeting the safety requirements (at least protection class IP 54 to EN 60529)

Type of protection of the Termination-Unit : II 2 (1) G EEx e ib [ia] IIC T4

Permissible ambient temperature range : -20°C ... +70°C

Using modules with a lower permissible ambient temperature will reduce the ambient temperature range specified above accordingly.

# Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 00 ATEX 2156 U

## Electrical specifications

### 1. Power supply circuit (mains supply):

$$V_m = 250 \text{ V}$$

Connector terminals for 1<sup>st</sup> power supply:

L (+)	1.1 and	1.2
N (-)	1.3 and	1.4
PE	1.5 and	1.6

Connector terminals for 2<sup>nd</sup> power supply (if present):

L (+)	2.1 and	2.2
N (-)	2.3 and	2.4
PE	2.5 and	2.6

With type of protection "Increased safety" EEx e IIC

$$V_{in} \leq 250 \text{ V (AC / DC)}$$

$$I_{in} \leq 11 \text{ A (AC / DC)}$$

$$P_{in} \leq 100 \text{ W (AC / DC)}$$

For detailed electrical specifications please refer to the EC Type Approval Certificate for the power supplies of the S900 System, e.g. Type PS 24-Ex with PTB No. 00 ATEX 2199.

### 2. Slot for power supply:

No external connection possible.

To be used for power supplies approved for the S900 System, only, e.g. Type PS 24-Ex with PTB No. 00 ATEX 2199

### 3. Slot for communication interface

To be used for communication interfaces approved for the S900 System, only, e.g. Type CIPB-Ex with PTB No. 00 ATEX 2201

#### External connection (fieldbus connection)

Type of protection "Intrinsic safety" EEx ib IIC

#### D-Sub connector plug PB1 (X17) or (for a second communication interface) PB2 (X18):

PB1 (X17) pin 8 : data line A and PB1 (X17) pin 3 : data line B, or

PB2 (X18) pin 8 : data line A and PB2 (X18) pin 3 : data line B

Fieldbus connections (external fieldbus current circuits):

The electrical specification and all other intrinsically safe load values for the external fieldbus current circuits and for the supply voltage are specified in the Type Acceptance Certificate of the respective communication interfaces, e.g. Type CIPB-Ex with PTB No. 00 ATEX 2201.

# Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

## SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 00 ATEX 2156 U

### 4. Slots for the modules 1 to 16

To be used for modules approved for the S900 System, only, e.g. Type AI4H-Ex with PTB No. 00 ATEX 2058 X

#### External connection

Type of protection "Intrinsic safety " EEx ia IIC

4 connection terminals per channel under each module, with the following assignment:

Terminals 11, 12, 13, 14 channel 1

Terminals 21, 22, 23, 24 channel 2

Terminals 31, 32, 33, 34 channel 3

Terminals 41, 42, 43, 44 channel 4

The labels 1- 16 on the backplane indicate the assignment of the modules to the individual terminals.

The intrinsically safe load values for the modules approved for the system are specified in their EC Type Acceptance Certificates.

### 5. CAN bus

(Only active in the backplane of the S900 System)

The bus is exclusively used for the internal communication between the communication interfaces and the modules. External connection is not possible.

(16) Test report PTB Ex PTB Ex 00-20374

(17) Special conditions for safe use

None

(18) Essential health and safety requirements

Covered by the appropriate standards and regulations

(19) Special instructions for the production and operation

#### a) System

The Termination Unit Typ TU... is a part of the explosion-proof S900 Remote I/O Fieldbus System and may only be used together with the approved components of this system.

#### b) Field housing and ambient temperature

When the Termination Unit is to be used in hazardous areas, it must be installed either in factory or on site in an appropriate field housing approved for this purpose, and following the instructions in the operating manual. An Ex "e" type housing meeting the requirements of EN 50014, EN 50019 and EN 50020 must be used as the field housing.

The relationship between the field housing size, the power conversion inside the housing and the permissible ambient temperature specified in the operating manual must be considered.

sheet 4/6

# Physikalisch-Technische Bundesanstalt

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## SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 00 ATEX 2156 U

When using modules with a lower permissible ambient temperature, the permissible ambient temperature range is reduced.

### c) Internal CAN bus

When the modules are mounted in the Termination Unit, the maximum values for the internal inductance and capacitance are met, as the maximum permissible values per module are defined. The maximum permissible total values (see annotation) are even met when all possible modules (18) are present, since the following maximum values are observed for each module:

Maximum permissible internal capacitance per module	:	$C_i \leq 2.2 \mu\text{F}$
Maximum permissible internal inductance per module	:	$L_i \approx 0$

*Annotation:* To ensure the type of protection "Intrinsic safety", the following maximum total internal inductance and capacitance of all modules and communication interfaces on the internal CAN bus of the system must be observed (see system description):

Permissible total internal capacitance:	$\Sigma C_i \leq 40 \mu\text{F}$
Permissible total internal inductance:	$\Sigma L_i < 1 \mu\text{H}$

### d) Fieldbus connections (e.g. Profibus)

All electrical specifications are defined in the relevant CE Type Acceptance Certificate for the communication interface, e.g. CIPB-Ex with PTB No. 00 ATEX 2201. This is also valid for the possible connection of all intrinsically safe fieldbus current circuits.

The connection is made via approved connector plugs in accordance with the EC Type Acceptance Certificate, e.g. Type BP 910S to CIPB-Ex with PTB No. 00 ATEX 2201.

The fieldbus current circuit (connection via D-Sub connector) must be the only electrical connection of the bus stations, even in case of errors or under consideration of earth. Concentrated inductances and capacitances in the fieldbus current circuits are not permissible.

### e) Field current circuits (module connections)

When connection several field current circuits, which is possible, the regulations applicable for the connection of non-linear and linear intrinsically safe current circuits must be observed.

### f) Connector terminals for power supply

In factory, the warning label

"Do not open under power !"

must be attached to the IP30 cover protecting the power terminals .

### g) Mounting outside the hazardous area

When using a non-intrinsically safe fieldbus instead of an intrinsically safe one, the approved communication interface must be provided with a safe electrical isolation between the non-intrinsically safe and the intrinsically safe current circuits for  $V_m \geq 40 \text{ V}$  . Protection class IP-20 is achieved with all modules installed due to the design of the modules, the communication

# Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

## SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 00 ATEX 2156 U

interfaces and the power supplies. If not all modules are installed, the appropriate measures (e.g. use of dummy module cartridges) must be taken to ensure IP-20 protection.

Zertifizierungsstelle Explosionsschutz  
By order:

Braunschweig,

Dr.-Ing. U. Johannsmeyer  
Regierungsdirektor