



(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 01 ATEX 2200 X

(4) Equipment: Temperature sensor, type SensyTemp MI and IS

(5) Manufacturer: ABB Automation Products GmbH

(6) Address: Borsigstr.2, 63755 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 01-21394.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN 50014:1997 + A1 + A2 EN 50020:1994 EN 1127-1:1997 EN 50284:1999

(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, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

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

Ex II 1 G EEx ia IIC T6 or II 2 G EEx ib IIC T6 or II 1/2 G EEx ib IIC T6

Zertifizierungsstelle Explosionsschutz

Braunschweig, January 17, 2002

By order:

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor



(13)

SCHEDULE

(14)

EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2200 X

(15)

Description of equipment

The thermocouples or resistive thermometers are used for temperature measurements in various applications. The temperature sensors may be used with or without isolating element (protective tube). The temperature sensors may be manufactured with diameters of 3 mm to 8 mm. For diameters of 6 mm or more 2 intrinsically safe circuits may exist in one temperature sensor. Thermocouples may be connected as follows, single thermocouple and double thermocouple. Resistive thermometers may be connected in 2-wire, 3-wire and 4-wire connection. For diameters of 6 mm or more double 2-wire and double 3-wire circuits may be connected.

Electrical data

Supply

$$U_i = 30 \text{ V}$$

$$I_i = 101 \text{ mA}$$

$$P_i = \text{see operating instructions table I through X}$$

$$L_i = 15 \text{ } \mu\text{H per meter}$$

$$C_i = 280 \text{ pF per meter}$$

(16)

Test report PTB Ex 01-21394

(17)

Special conditions for safe use

The temperature sensors may only be operated with intrinsically safe circuits of category "ia" or "ib".

When two intrinsically safe circuits are used summation of voltage or current shall be taken into consideration due to the small distances. The total voltage must not exceed 30 V and the total current must not exceed 101 mA.

Only certified measuring transducers with the maximum values specified in the operating instructions may be connected to the temperature sensors.

When two transducers with two intrinsically safe circuits are used the total values must not exceed the maximum values specified in the operating instructions.

The maximum permissible power and the maximum permissible surface temperature for the individual temperature classes shall be taken from the tables I through X of the operating instructions.

Near the terminals the ambient temperature may range from $-40 \text{ }^\circ\text{C}$ up to $+80 \text{ }^\circ\text{C}$ at a maximum.

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Temperature sensors of category 1G may only be connected to one intrinsically safe circuit of category "ia".

In combination with an isolating element or protective tube with a wall thickness of ≥ 1 mm for stainless steel or ≥ 3 mm for other steels the temperature sensors connected to intrinsically safe circuits of category "ib" may also be assigned to category 1.

Temperature sensors of category 2G may be connected to one or two intrinsically safe circuits. Two intrinsically safe circuits in 2- or 3-wire connection may be used only for diameters of 6mm or more.

When using non-metallic enclosures the material shall have a surface resistance of $< 10^9 \Omega$ according to EN 50014.

When using light metal as enclosure material the Mg-content of the alloy must not exceed 6 %.

Separately certified cable glands are usually used as entries.

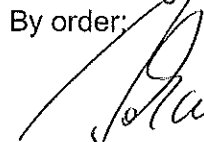
The temperature sensors shall be integrated in the local equipotential bonding system.

(18) Essential health and safety requirements

covered by the standards mentioned above

Zertifizierungsstelle Explosionsschutz

By order:


Dr.-Ing. U. Johannsmeyer
Regierungsdirektor



Braunschweig, January 17, 2002


1. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2200 X

(Translation)

Equipment: Temperature sensors, types Sensy Temp MI and IS

Marking:  II 1 G EEx ia IIC T6 or II 2 G EEx ib IIC T6 or II 1/2 G EEx ib IIC T6

Manufacturer: ABB Automation Products GmbH

Address: Borsigstr.2
63755 Alzenau, Germany

Description of supplements and modifications

In the future the temperature sensors, types Sensy Temp MI and IS may also be operated with the following electrical data:

Supply $U_i = 25 \text{ V}$
 $I_i = 158 \text{ mA}$
 $P_i = \text{cf. operating instructions, tables I through X}$
 $L_i = 15 \mu\text{H per meter}$
 $C_i = 280 \text{ pF per meter}$

$U_i = 20 \text{ V}$
 $I_i = 309 \text{ mA}$
 $P_i = \text{cf. operating instructions, tables I through X}$
 $L_i = 15 \mu\text{H per meter}$
 $C_i = 280 \text{ pF per meter}$

The temperature sensors of category 2 may also be operated according to the documents listed in the test report.

Test report: PTB Ex 05-25135

Zertifizierungsstelle Explosionsschutz

Braunschweig, June 16, 2005

By order:

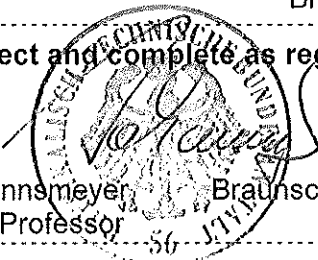
(signature)

Dr.-Ing. U. Johannsmeyer
Direktor und Professor

1 page, correct and complete as regards content.

By order:

Dr.-Ing. Johannsmeyer, Braunschweig, February 8, 2007
Direktor und Professor



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2. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2200 X

(Translation)

Equipment: Temperature sensors, types TSP..

Marking:  II 1 G EEx ia IIC T6 or II 2 G EEx ib IIC T6 or
II 1/2 G EEx ib IIC T6

Manufacturer: ABB Automation Products GmbH

Address: Borsigstr.2, 63755 Alzenau, Germany

Description of supplements and modifications

In the future the temperature sensors, types TSP.. (formerly types SensyTemp MI and IS) may also be manufactured according to the test documents listed in the test report.

The modifications concern the internal and external construction.

The temperature sensors of category 2 with a diameter of 3 mm may be designed with 2 x Pt100 (wire-wound measuring resistor) or a double thermocouple. For diameters of 4.5 mm single or double thermocouples can be assembled. For sensor diameters of 6 mm 4-wire circuitries designed as wire-wound or sheet measuring resistance as well as double thermocouples may be installed twice.

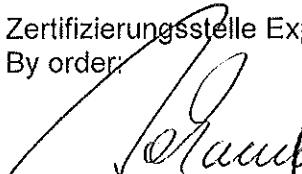
The type series of the connection heads is supplemented by further variants.

The special conditions, the electrical data and all other specifications apply without changes also for this 2. supplement.

Test report: PTB Ex 06-25345

Zertifizierungsstelle Explosionsschutz

By order:


Dr.-Ing. U. Johannsmeyer
Direktor und Professor



Braunschweig, December 18, 2006

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3. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2200 X

(Translation)

Equipment: Temperature sensor, type TS...

Marking:  I 1 G Ex ia IIC T6 Ga or II 2 G Ex ib IIC T6 Gb or
II 1/2 G Ex ib IIC T6 Ga/Gb

Manufacturer: ABB Automation Products GmbH

Address: Schillerstrasse 72, D-32425 Minden, Germany

Description of supplements and modifications

In the future the temperature sensors are also listed under the type designation TS... and they may be manufactured according to the test documents listed in the test report.

Constructional modifications concern the internal and external design.

For relationship between previous and new type designation reference is made to the table:

	Previous type designation	New type designation
MI T	Mantel-Thermoelement (sheathed thermocouple)	TSC... Temperature Sensor Cable
MI R	Mantel-Widerstandsthermometer (sheathed resistance thermometer)	TSC... Temperature Sensor Cable
IS T	Thermoelement Messeinsatz (thermocouple measuring insert)	TSA... Temperature Sensor Accessory
IS R	Widerstands-Messeinsatz (resistance measuring insert)	TSA... Temperature Sensor Accessory
WT..	Schutzrohr verschweißt (protective tube, welded)	TSP... Temperature Sensor Process
TW..	Schutzrohr gebohrt (protective tube, drilled)	TSP... Temperature Sensor Process
ET..	Schutzrohrmontage (protective tube installation)	TSP... / TSC...
MP..	Stufen-Temperaturfühler (step-temperature sensor)	TSM... Temperature Sensor Multipoint
HY..	Hygiene-Temperaturfühler (hygiene temperature sensor)	TSS... Temperature Sensor Sanitary
BE..	Lagerfühler (bearing sensor)	TSP... / TSC...

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EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Electrical data

Supplyonly for connection to a certified intrinsically safe circuit of type of protection Ex ia IIC or Ex ib IIC

Maximum values:

- $U_i = 30 \text{ V}$
- $I_i = 101 \text{ mA}$
- $L_i = 15 \text{ } \mu\text{H/m}$
- $C_i = 280 \text{ pF/m}$
- or
- $U_i = 25 \text{ V}$
- $I_i = 158 \text{ mA}$
- $L_i = 15 \text{ } \mu\text{H/m}$
- $C_i = 280 \text{ pF/m}$
- or
- $U_i = 20 \text{ V}$
- $I_i = 309 \text{ mA}$
- $L_i = 15 \text{ } \mu\text{H/m}$
- $C_i = 280 \text{ pF/m}$

The special conditions are adapted as follows:

All possible combinations of operation modes and mounting methods of the temperature sensors of type series TS... shall be listed in the operating instructions manual.

Temperature sensors of category 1 G shall provide only one intrinsically safe circuit and shall be connected only to intrinsically safe circuits of protection level "ia".

When the temperature sensors are connected to an intrinsically safe circuit of protection level "ib" the application as category 1 G equipment is only permissible if the temperature sensors are mounted into a protective tube or if separating elements are used. In this case the minimum wall thickness is $\geq 1 \text{ mm}$ for stainless steels and $\geq 3 \text{ mm}$ for other steels.

Temperature sensors of category 2 G with a minimum diameter of 3 mm may be designed with Pt 100 in 2-, 3- or 4-wire connection, wire-wound measuring resistance or sheet measuring resistance or as single or double thermocouple. Wire-wound measuring resistances may also be installed as double 2-wire or double 3-wire circuitry. Sensors having a minimum diameter of 6 mm may also be operated in double 4-wire connection using wire-wound or sheet measuring resistances or double thermocouples.

When double sensors are connected to two intrinsically safe circuits the summation of voltage or current respectively shall be taken into consideration due to small clearances. For permissible maximum values in case of voltage- or current-summation, reference is made to the pairs of values specified in the electrical data.

Near the terminals the permissible range of the ambient temperature is $-40 \text{ }^\circ\text{C}$ up to $+80 \text{ }^\circ\text{C}$.

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

3. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2200 X

Enclosures made of non-metallic materials shall provide a surface resistance of $< 10^9$ Ohm according to EN 60079-11.

The alloy of light-metal enclosures shall not contain more than 7.5 % Mg by mass.

Only cable glands for which an EC-type examination certificate is available shall be used as cable entry elements.

The temperature sensors shall be included in the local equipotential bonding system.

Applied standards

EN 60079-0:2009

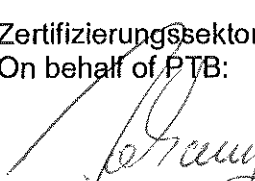
EN 60079-11:2007

EN 60079-26:2007

Assessment and test report:

PTB Ex 11-21122

Zertifizierungssektor Explosionschutz
On behalf of PTB:


Dr.-Ing. U. Johannsmeyer
Direktor und Professor



Braunschweig, September 9, 2011