



(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 99 ATEX 2053 X

(4) Equipment: Measuring transducer type TR04-Ex and type TR104-Ex

(5) Manufacturer: Hartmann & Braun GmbH & Co.KG

(6) Address: D-63754 Alzenau

(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 99-28302.

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

EN 50014:1997

EN 50020:1994

(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 G EEx ia IIC T6

Zertifizierungsstelle Explosionsschutz

Braunschweig, May 10, 1999

By order:

(signature)

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

5 pages, correct and complete as regards content.

By order:

Dipl.-Ing. Wilkens



Braunschweig, August 04, 1999

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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.

(13)

SCHEDULE

(14)

EC-TYPE-EXAMINATION CERTIFICATE PTB 99 ATEX 2053 X

(15)

Description of equipment

The measuring transducers type TR04-Ex and type TR104-Ex with interconnection to sensors are used for the detection, amplification and transmission of measured values in intrinsically safe circuits. With the installation of maximum two measuring transducers of type TR04-Ex into a housing for cascading bar-holders the type designation of this assembly is TR104-Ex.

The assignment of temperature class and maximum permissible ambient temperature for the measuring transducers type TR 04-Ex and type TR 104-Ex is shown in the following table:

temperature class	maximum permissible ambient temperature
T6	50°C
T5	65°C
T4	85°C

Electrical data

Measuring transducer type TR 04-Ex

Supply circuit
(terminal clamps resp.
solder terminations + and -)

type of protection Intrinsic Safety EEx ia IIC/IIB resp.
EEx ib IIC/IIB
only for connection to a certified intrinsically safe circuit
Maximum values:
 $U_i = 29.4 \text{ V}$
 $I_i = 130 \text{ mA}$
 $P_i = 800 \text{ mW}$

The effective internal inductances and capacitances are negligibly small.

Measuring circuit (three-wire
connection) (terminal clamps resp.
solder terminations 1, 2 and 3)

type of protection Intrinsic Safety EEx ia IIC/IIB resp.
EEx ib IIC/IIB

Maximum values:
 $U_o = 6.8 \text{ V}$
 $I_o = 130 \text{ mA}$
 $P_o = 383 \text{ mW}$

Load current for connected intrinsically safe sensors:
 $I \leq 56.3 \text{ mA}$

effective internal capacitance: 365 nF
the effective internal inductance is negligibly small.

The maximum permissible values for the external capacitance resp. inductance are shown in the following table:

	EEx ia/ib IIC	EEx ia/ib IIB
C_o	285 nF	2.16 μ F
L_o	0.5 mH	2 mH

Measuring circuit (4-wire connection) (terminal clamps resp. solder terminations 1, 2, 3 and 4)

type of protection Intrinsic Safety EEx ia IIC/IIB resp. EEx ib IIC/IIB

Maximum values: $U_o = 6.8$ V
 $I_o = 130$ mA
 $P_o = 383$ mW

Load current for connected intrinsically safe sensors:
 $I \leq 56.3$ mA

effective internal capacitance: 415 nF
 the effective internal inductance is negligibly small.

The maximum permissible values for the external capacitance resp. inductance are shown in the following table:

	EEx ia/ib IIC	EEx ia/ib IIB
C_o	235 nF	2.11 μ F
L_o	0.5 mH	2 mH

The category of the intrinsically safe measuring circuit is determined by the category of the connected intrinsically safe supply circuit. Measuring circuit and supply circuit are electrically interconnected.

Measuring transducer type TR 104-Ex

Supply circuit(s).....
 type/variant Pt100 3L:
 (channel 1: terminals 31+ and 32-)
 (channel 2: terminals 41+ and 42-)
 type/variant Pt100 4L
 (single channel: terminals 31+ and 32-)

type of protection Intrinsic Safety EEx ia IIC/IIB resp. EEx ib IIC/IIB

only for connection to certified intrinsically safe circuits
 maximum values:

$U_i = 29.4$ V
 $I_i = 130$ mA
 $P_i = 800$ mW

The effective internal inductances and capacitances are negligibly small.

Measuring circuits.....
 type/variant Pt100 3L
 (channel 1: terminals 12 and 13 resp. 11, 12 and 13)
 (channel 2: terminals 22 and 23 resp. 21, 22 and 23)

type of protection Intrinsic Safety EEx ia IIC/IIB resp. EEx ib IIC/IIB

Maximum values per circuit: $U_o = 6.8$ V
 $I_o = 130$ mA
 $P_o = 383$ mW

SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 99 ATEX 2053 X

Load current for connected intrinsically safe sensors:

$$I \leq 56.3 \text{ mA}$$

effective internal capacitance: 365 nF

the effective internal inductance is negligibly small.

The maximum permissible values for the external capacitance resp. inductance are shown in the following table:

	EEx ia/ib IIC	EEx ia/ib IIB
C_o	285 nF	2.16 μ F
L_o	0.5 mH	2 mH

Measuring circuit..... type of protection Intrinsic Safety EEx ia IIC/IIB resp.
 type/variant Pt100 4L EEx ib IIC/IIB
 (single channel:
 terminals 11, 12, 13 and 14)

Maximum values:

$$U_o = 6.8 \text{ V}$$

$$I_o = 130 \text{ mA}$$

$$P_o = 383 \text{ mW}$$

Load current for connected intrinsically safe sensors:

$$I \leq 56.3 \text{ mA}$$

effective internal capacitance: 415 nF

the effective internal inductance is negligibly small.

The maximum permissible values for the external capacitance resp. inductance are shown in the following table:

	EEx ia/ib IIC	EEx ia/ib IIB
C_o	235 nF	2.11 μ F
L_o	0.5 mH	2 mH

The category of the intrinsically safe measuring circuit is determined by the category of the connected intrinsically safe supply circuit. Measuring circuit and supply circuit are electrically interconnected.

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(17) Special conditions for safe use

1. The connection facilities of the measuring transducer type TR 04-Ex shall be installed in such a way that at least the degree of protection IP 20 according to IEC-publication 60529:1989 is met.
2. The minimum permissible ambient temperature for the measuring transducer type TR 04-Ex is $-40 \text{ }^\circ\text{C}$.

3. The minimum permissible ambient temperature for the measuring transducer type TR 104-Ex is $-20\text{ }^{\circ}\text{C}$.
4. To avoid inadmissible electrostatic charging of the plastic housing of the measuring transducer TR 104-Ex a warning label has to point to this danger.

(18) Essential health and safety requirements

Met by standards

Zertifizierungsstelle Explosionsschutz
By order:

Braunschweig, May 10, 1999

(signature)

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

1st SUPPLEMENT

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

to EC-TYPE-EXAMINATION CERTIFICATE PTB 99 ATEX 2053 X

(Translation)

Equipment: Measuring transducer, types TR 04-Ex and TR 104-Ex

Marking:  II 2 G EEx ia IIC T6

Manufacturer: ABB Automation Products GmbH

Address: Borsigstraße 2
D-63754 Alzenau, Germany

Description of supplements and modifications

The measuring transducers TR 04-Ex and TR 104-Ex have been modified and will in future be manufactured and operated as specified in the test documents for test report PTB Ex 02-20195.

For measuring transducer TR 04-Ex, the modifications concern the marking.

For measuring transducer TH 104-Ex, the modifications concern the internal configuration, the cascading rail housing, the "electrical data", as well as the marking.

EC type-examination certificate PTB 99 ATEX 2053 X is extended to additionally include measuring transducer TR 204-Ex (measuring transducer TR 04-Ex in the field housing) and measuring transducer TR 204-Ex with indicator.

The marking for measuring transducers TR 04-Ex, TR 104-Ex and TR 204-Ex will in future be as follows:

 II 2 (1) G EEx ia IIC T6

For measuring transducer TR 204-Ex with indicator the marking is as follows:

 II 2 (1) G EEx ia IIC T4

The "electrical data" for measuring transducer TR 204-Ex and TR 204-Ex with indicator are added as new items.

Electrical data

Measuring transducer, types TR 04-Ex, TR 204-Ex and TR 204-Ex with indicator

Supply circuit..... type of protection Intrinsic Safety EEx ia IIC/IIB or
(terminals or EEx ib IIC/IIB
solder terminations + and -)

for connection to a certified intrinsically safe circuit only

Max. values:

$$U_i = 29.4 \text{ V}$$

$$I_i = 130 \text{ mA}$$

$$P_i = 800 \text{ mW}$$

for types TR 04-Ex and TR 204-Ex:

$$C_i \approx 0$$

$$L_i \approx 0$$

for type TR 204-Ex with indicator:

$$C_i = 13 \text{ nF}$$

$$L_i = 220 \text{ }\mu\text{H}$$

Measuring circuit (three-wire connection) ... type of protection Intrinsic Safety EEx ia IIC/IIB or
(terminals or EEx ib IIC/IIB
solder terminations 1, 2 & 3)

Max. values:

$$U_o = 6.8 \text{ V}$$

$$I_o = 130 \text{ mA}$$

$$P_o = 383 \text{ mW}$$

Load current for connected intrinsically safe transducers:

$$I \leq 56.3 \text{ mA}$$

$$C_i = 365 \text{ nF}$$

$$L_i \approx 0$$

The max. permissible external inductance and capacitance are shown in the table below:

	EEx	IIC	IIB
ia/ib			
C_o		285 nF	2.16 μF
L_o		0.5 mH	2 mH

Measuring circuit (four-wire connection) type of protection Intrinsic Safety EEx ia IIC/IIB or
(terminals or EEx ib IIC/IIB
solder terminations 1, 2, 3 & 4)

Max. values:

$$U_o = 6.8 \text{ V}$$

$$I_o = 130 \text{ mA}$$

$$P_o = 383 \text{ mW}$$

Load current for connected intrinsically safe transducers:

$$I \leq 56.3 \text{ mA}$$

$$C_i = 415 \text{ nF}$$

$$L_i \approx 0$$

The max. permissible external inductance and capacitance are shown in the table below:

	EEx ia/ib IIC	EEx ia/ib IIB
C_o	235 nF	2.11 μ F
L_o	0.5 mH	2 mH

The category of the intrinsically safe measuring circuit is determined by the category of the connected intrinsically safe supply circuit. The measuring circuit is electrically connected with the supply circuit.

Measuring transducer, type TR 104-Ex

Supply circuit/s type of protection Intrinsic Safety EEx ia IIC/IIB or
EEx ib IIC/IIB

(channel 1: terminals 31+ & 32-)
(channel 2: terminals 41+ & 42-)

only for connection to certified intrinsically safe circuits

Max. values:

$U_i = 29.4$ V
 $I_i = 130$ mA
 $P_i = 800$ mW
 $C_i \approx 0$
 $L_i \approx 0$

Measuring circuits type of protection Intrinsic Safety EEx ia IIC/IIB or
EEx ib IIC/IIB

type/version Pt100 3L
(channel 1: terminals 11, 12 & 13)
(channel 2: terminals 21, 22 & 23)

Max. values for each circuit:

$U_o = 6.8$ V
 $I_o = 130$ mA
 $P_o = 383$ mW

Load current for connected intrinsically safe transducers:

$I \leq 56.3$ mA
 $C_i = 373$ nF
 $L_i \approx 0$

The max. permissible external inductance and capacitance are shown in the table below:

	EEx ia/ib IIC	EEx ia/ib IIB
C_o	277 nF	2.15 μ F
L_o	0.5 mH	2 mH

Measuring circuit..... type of protection Intrinsic Safety EEx ia IIC/IIB or
EEx ib IIC/IIB

type/version Pt100 4L
(channel 1: terminals 11, 12, 13 & 14)
(channel 2: terminals 21, 22, 23 & 24)

Max. values:

$U_o = 6.8$ V
 $I_o = 130$ mA
 $P_o = 383$ mW

Load current for connected intrinsically safe transducers:

$$I \leq 56.3 \text{ mA}$$

$$C_i = 427 \text{ nF}$$

$$L_i \approx 0$$

The max. permissible external inductance and capacitance are shown in the table below:

	EEx ia/ib IIC	EEx ia/ib IIB
C_o	223 nF	2 μ F
L_o	0.5 mH	2 mH

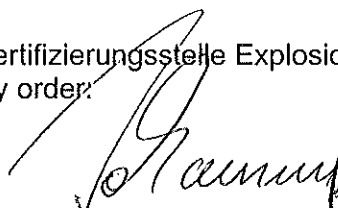
The category of the intrinsically safe measuring circuit is determined by the category of the connected intrinsically safe supply circuit. The measuring circuit is electrically connected with the supply circuit.

The two channels of measuring transducer TR 104-Ex are electrically isolated from each other up to a peak value of the total voltages of 60 V.

Test report: PTB Ex 02-20195

Zertifizierungsstelle Explosionsschutz

By order:



Dr.-Ing. U. Johannsmeyer
Regierungsdirektor



Braunschweig, February 26, 2002