

Original: German

 Translation  
 Type Test Certificate  
 49/11-38 Ex

# Physikalisch-Technische Bundesanstalt



## CERTIFICATE OF CONFORMITY

PTB Nr. Ex- 84/2123 X

This certificate is issued for the electrical apparatus

Temperature Transmitter

Type TEU 3.5-Ex

manufactured and submitted for certification by

 Hartmann & Braun AG  
 D-6000 Frankfurt

This electrical apparatus and any acceptable variation thereto is specified in the Annex to this Certificate.

The Physikalisch-Technische Bundesanstalt (PTB), approved certification body in accordance with Article 14 of the Council Directive of the European Communities of 18 December 1975 (76/117/EEC), confirms that the apparatus has been found to comply with the harmonized European Standards

### Electrical apparatus for potentially explosive atmospheres

 EN 50 014-1977 / VDE 0171 Part 1/5.78 General Requirements  
 EN 50 020-1977 / VDE 0171 Part 7/5.78 Intrinsic Safety "i"

after having successfully met the examination and test requirements which are recorded in a confidential Test Report.

The apparatus marking shall include the following code

[EEx ib] IIC and [EEx ia] IIC respectively

The manufacturer has the responsibility to ensure that the apparatus bearing the marking conforms to the specification laid down in the Annex to this Certificate and has satisfied the prescribed routine verifications and tests.

This apparatus may be marked with the Distinctive Community Mark shown above and specified in Annex II to the Council Directive of 5 February 1979 (79/196/EEC).

For and on behalf of PTB

Braunschweig, Oct. 18, 1984

(Signature)

(Dr.-Ing. Johannsmeyer)

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 Test certificates without signature and official stamp are not valid.

No alteration may be made to copies of this test certificate.

Extracts or changes may be made only with the permission of the Physikalisch-Technische Bundesanstalt, Bundesallee 100, Postfach 3345, D-3300 Braunschweig.

49/11-38 Ex

## ANNEX

## to Certificate of Conformity PTB No. Ex-84/2123 X

The temperature transmitter type TEU 3.5-Ex.. serves for transmitting electric signals from the intrinsically safe input current circuit into the nonintrinsically safe or intrinsically safe output current circuit. The apparatus has been designed as 19" plug-in card. Adaptation to the various input variables is effected by means of exchangeable measuring range boxes and measuring circuit options.

Maximum admissible ambient temperature is +70°C.

Designs

TEU 315-Ex..	with measuring amplifier 1 mV
TEU 325-Ex..	with measuring amplifier 5 mV or 20 mV
TEU 3.5-Ex.A	with input current circuit of protection type intrinsic safety EEx ia IIC
TEU 3.5-Ex.B	with input current circuit of protection type intrinsic safety EEx ib IIC
TEU 3.5-Ex.C	with input and output current circuit of pro- tection type intrinsic safety EEx ib IIC

Electric dataPlug contacts

		<u>form C</u>	<u>form D</u>
Power supply.....	D.C. voltage 15 V, up to 2.3 W	c26, a32	d26, z32
	D.C. voltage 24 V, up to 3.1 W	c26, a32	d26, z32
	A.C. voltage 110/127/220 V, up to 3.4 W	c28, a30	d28, z30
	D.C. and A.C. voltage 24 V, up to 3.1 W	c26, a32 or c28, a30	d26, z32 or d28, z30
Relay output or break signal contact with NO contact....	breaking capacity 220 V A.C., 0.045 A cos phi $\geq$ 0.7 or 220 V D.C., 0.5 A, 10 W, L/R $\leq$ 50 ms	c20, a20	d20, z20

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or with type TEU 3.5-Ex .B and type tEU 3.5-Ex.C optionally with changeover contact	breaking capacity 28 V D.C., 0.15 A	c18, a20 c20	d18, z20 d20
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transistor output.....	breaking capacity 30 V D.C., 0.1 A	c20, a20	d20, z20
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reference loop.....	up to 220 V, up to 1 A	c22, a22	d22, z22
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test jacks "outp." resp. "OUT"  
resp.  $\rightarrow 0$ .....up to 20mA, up to 10 V  
(optionally with type TEU 3.5-  
Ex.A and type TEU 3.5-Ex.B)

test jacks "inp." resp. "IN"  
resp.  $\rightarrow 0$ .....  
(optionally with type TEU 3.5-  
Ex.B and type TEU 3.5-Ex.C)

Only for short-time connection of ungrounded  
test equipment without own voltage supply or  
certified test equipment (observe test certi-  
ficate).

The maximum admissible external inductance and  
capacitance are:

$$L_a \text{ arbitrarily}$$

$$C_a \leq 10 \text{ nF}$$

Output current circuit

a) with type TEU 3.5-Ex.A and type TEU 3.5-Ex.B....	up to 20 mA, up to 15 V plug contacts	a14, c14, a16, c16 (form C)
		z14, d14, z16, d16 (form F)
b) with type TEU 3.5-Ex.C....	of protection type intrinsic safety EEx ib IIC plug contacts	a14, c14, a16, c16 (form C)
	resp.	z14, d14, z16, d16 (form F)

for connection of passive intrinsically safe  
current circuits

The effective internal inductance and effective  
internal capacitance are negligibly small.

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maximum values of transmitter:

$$U \leq 10 \text{ V}$$

$$I \leq 50 \text{ mA}$$

$$P \leq 0.5 \text{ W}$$

max. admissible external inductance 2 mH

max. admissible external capacitance 350 nF

input current circuit....

of protection type intrinsic safety

EEx ia IIC or EEx ib IIC

plug contacts

a2, c2, a4, c4, (form C)  
a6, c6, a8, c8resp. z2, d2, z4, d4, (form F)  
z6, d6, z8, d8

- a) Resistance measuring circuits 371, 372, 373, 374, 378, 391 with and without measuring circuit options "4-wire impedance transformer with break monitor", "4-wire impedance transformer" and "2 and 3-wire break monitor" with and without break signal contact;  
for connection of passive transmitters

The effective internal inductance is negligibly small  
and effective internal capacitance  $\leq 5 \text{ nF}$ .

Maximum values of transmitters:

$$U \leq 19.5 \text{ V}$$

$$I \leq 72 \text{ mA}$$

$$P \leq 0.4 \text{ W}$$

EEx ia:

maximum admissible external inductance 1 mH

maximum admissible external capacitance 82 nF

EEx ib:

maximum admissible external inductance 5.5 mH

maximum admissible external capacitance 190 nF

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- b) Measuring circuit 395 for strain gauge measurement, only with measuring circuit option "strain gauge supply"; for connection of passive transmitters.

The effective internal inductance is negligibly small and effective internal capacitance  $\leq 4$  nF.

Maximum values of transmitter:

$$U \leq 19.5 \text{ V}$$

$$I \leq 100 \text{ mA}$$

$$P \leq 0.6 \text{ W}$$

EEx ia:

maximum admissible external inductance 1 mH

maximum admissible external capacitance 66 nF

EEx ib:

maximum admissible external inductance 2.9 mH

maximum admissible external capacitance 191 nF

- c) mV and thermocouple measuring circuits 351, 352, 353 with and without measuring circuit option "2 and 3-wire break monitor" as thermocouple break monitor with and without break signal contact and speed measuring circuit 365, only without measuring circuit option; for connection of active transmitters

The effective internal inductance is negligibly small and effective internal capacitance  $\leq 5$  nF.

Maximum values of transmitter:

$$U \leq 19.5 \text{ V}$$

$$I \leq 40 \text{ mA}$$

$$P \leq 0.2 \text{ W}$$

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The maximum admissible inductance and capacitance depend as follows on the connected intrinsically safe current circuit:

connected intrinsically safe current circuit - max. values			maximum admissible external inductance and capacitance			
U	I	P	EEx ia		EEx ib	
			L <sub>a</sub>	C <sub>a</sub>	L <sub>a</sub>	C <sub>a</sub>
1,2 V	50 mA	0,04 W	1 mH	84 nF	3,4 mH	159 nF
1,2 V	100 mA	0,1 W	1 mH	80 nF	1,4 mH	159 nF
3 V	100 mA	0,25 W	1 mH	51 nF	1,4 mH	121 nF
6,7 V	100 mA	0,32 W	1 mH	29 nF	1,4 mH	73 nF
9 V	60 mA	0,32 W	2 mH	18 nF	2,9 mH	52 nF
10 V	45 mA	0,32 W	2 mH	15 nF	3,9 mH	46 nF

- d) Voltage and current measuring circuits 355, 381, 382 only without measuring circuit option; for connection of active transmitters.

The effective internal inductance is negligibly small and effective internal capacitance  $\leq 4$  nF.

Maximum values of transmitter:

$$U \leq 19.5 \text{ V}$$

$$I \leq 30 \text{ mA}$$

$$P \leq 0.15 \text{ W}$$

The maximum admissible external inductance and capacitance as follows depend on the connected intrinsically safe current circuit:

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connected intrinsically safe current circuit, max. values			max. admissible external inductance and capacitance			
U	I	P	EEx ia		EEx Ib	
			L <sub>a</sub>	C <sub>a</sub>	L <sub>a</sub>	C <sub>a</sub>
1,2 V	50 mA	0,06 W	1 mH	89 nF	4,4 mH	160 nF
1,2 V	100 mA	0,12 W	1 mH	86 nF	1,6 mH	160 nF
5 V	100 mA	0,35 W	1 mH	39 nF	1,6 mH	91 nF
10 V	55 mA	0,35 W	2 mH	18 nF	3,9 mH	47 nF
12 V	42 mA	0,35 W	2 mH	13 nF	5,5 mH	39 nF

For a rated voltage with a peak value of up to 375 V the intrinsically safe input current circuit is galvanically separated from the power supply circuit and the other nonintrinsically safe current circuits.

In the case of the temperature transmitter type TEU 3.5-Ex.C the intrinsically safe output current circuit, for a rated voltage with a peak value of up to 375 V is galvanically separated from the power supply circuit and the other nonintrinsically safe current circuits and galvanically connected with the intrinsically safe input current circuit.

#### Special conditions

1. The temperature transmitter must be set up outside the area of hazardous atmosphere.
2. The temperature transmitter must be set up in a way as to at least comply with type of protection IP 20 according to IEC publication 144.
3. In the case of temperature transmitter type TEU 3.5-Ex.C the intrinsically safe input current circuit and the intrinsically safe output current circuit outside the instrument must be entirely set up ungrounded and galvanically separated from each other inside and outside the hazardous area.
4. In the case of the temperature transmitter type TEU 3.5-Ex.A, only those maximum admissible external inductances and capacitances listed for category "ia" may be used in the intrinsically safe input current circuit.
5. Test jacks "input" resp. "IN" resp. →0 must only be used for short-time connection of ungrounded test equipment without own voltage supply or for connection of certified test equipment (observe test certificate). The intrinsically safe current circuit of the certified test instrument must not exceed a maximum current of 1 mA and must be ungrounded.

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Test documents

signed on

signed on

1. Description (29 sheets) 18.07.1984

2. Drawing No.

6-9161 X 1 (2)	18.07.1984,	6-9161 X 52 (4)	06.01.1984
6-9161 X 2 (3)	18.07.1984,	6-9161 X 53 (3)	06.01.1984
6-9161 X 3 (3)	18.07.1984,	6-9161 X 54 (3)	18.07.1984
6-9161 X 4 (2)	18.07.1984,	6-9161 X 55 (4)	06.01.1984
6-9161 X 6 (2)	18.07.1984,	6-9161 X 56 (4)	06.01.1984
6-9161 X 8 (2)	18.07.1984,	6-9161 X 59 (3)	06.01.1984
6-9161 X 9 (2)	18.07.1984,	6-9161 X 60 (3)	18.07.1984
6-9161 X 10 (3)	18.07.1984,	6-9161 X 61 (4)	06.01.1984
6-9161 X 14 (3)	18.07.1984,	6-9161 X 62 (3)	06.01.1984
6-9161 X 15 (4)	06.01.1984,	6-9161 X 63 (3)	18.07.1984
6-9161 X 16 (3)	16.03.1984,	6-9161 X 64 (4)	06.01.1984
6-9161 X 17 (3)	18.07.1984,	6-9161 X 65 (4)	06.01.1984
6-9161 X 18 (4)	18.07.1984,	6-9161 X 66 (3)	06.01.1984
6-9161 X 19 (4)	06.01.1984,	6-9161 X 67 (3)	18.07.1984
6-9161 X 20 (3)	06.01.1984,	6-9161 X 68 (4)	06.01.1984
6-9161 X 21 (4)	06.01.1984,	6-9161 X 69 (3)	18.07.1984
6-9161 X 22 (4)	06.01.1984,	6-9161 X 70 (4)	18.07.1984
6-9161 X 23 (3)	06.01.1984,	6-9161 X 71 (3)	18.07.1984
6-9161 X 24 (3)	06.01.1984,	6-9161 X 72 (4)	06.01.1984
6-9161 X 25 (4)	06.01.1984,	6-9161 X 73 (3)	06.01.1984
6-9161 X 26 (3)	06.01.1984,	6-9161 X 77 (3)	18.07.1984
6-9161 X 27 (4)	06.01.1984,	6-9161 X 78 (4)	06.01.1984
6-9161 X 28 (4)	06.01.1984,	6-9161 X 79 (3)	06.01.1984
6-9161 X 29 (3)	06.01.1984	6-9161 X 80 (3)	18.07.1984
6-9161 X 30 (3)	16.03.1984	6-9161 X 81 (4)	06.01.1984
6-9161 X 31 (3)	18.07.1984	6-9161 X 82 (3)	06.01.1984
6-9161 X 32 (4)	06.01.1984	6-9161 X 83 (3)	18.07.1984
6-9161 X 33 (4)	06.01.1984	6-9161 X 84 (3)	06.01.1984
6-9161 X 34 (3)	18.07.1984	6-9161 X 85 (3)	18.07.1984
6-9161 X 35 (3)	06.01.1984	6-9161 X 87 (3)	06.01.1984
6-9161 X 36 (4)	06.01.1984	6-9161 X 88 (3)	18.07.1984
6-9161 X 37 (4)	06.01.1984	6-9161 X 89 (4)	06.01.1984
6-9161 X 38 (3)	18.07.1984	6-9161 X 90 (3)	06.01.1984
6-9161 X 39 (3)	18.07.1984	6-9161 X 93 (4)	18.07.1984
6-9161 X 40 (4)	18.07.1984	6-9161 X 94 (3)	06.01.1984
6-9161 X 41 (4)	18.07.1984	6-9161 X 95 (3)	30.08.1984
6-9161 X 42 (3)	18.07.1984	6-9161 X 96 (4)	24.07.1984
6-9161 X 43 (3)	06.01.1984	6-9161 X 97 (3)	24.07.1984
6-9161 X 44 (4)	06.01.1984	6-9161 X 98 (3)	16.03.1984
6-9161 X 45 (3)	06.01.1984	6-9161 X 99 (3)	18.07.1984
6-9161 X 46 (3)	18.07.1984	6-9161 X 100 (4)	18.07.1984
6-9161 X 47 (4)	18.07.1984	6-9161 X 101 (4)	18.07.1984
6-9161 X 48 (4)	18.07.1984	6-9161 X 102 (3)	18.07.1984
6-9161 X 51 (3)	18.07.1984		

3. Test sample

For and on behalf of PTB

Braunschweig, October 18, 1984

(Dr. Ing. Johannsmeyer)



**1st Supplement****to Certificate of Conformity PTB No. Ex-84/2123 X**

of Messrs. Hartmann & Braun AG  
D-6000 Frankfurt

1. Temperature transmitter type TEU 3.5-Ex.C must be manufactured only without modules relay output, transistor output and break signal contact.
2. Temperature transmitter type TEU 3.5-Ex.. may be manufactured optionally with surface mounting case according to drawing stated below.
3. Printed circuit board "voltage limitation power supply" is designed optionally according to drawing No. 6-4922X12(4).
4. Para 2) of "Special conditions" of Annex to Certificate of Conformity is completed as follows:
  - 2.1 IP-20 protection is ensured if the temperature transmitter has been housed in a case according to drawing No. 6-4922X1(2). Cover plate and caps shown in this drawing may be omitted if type of protection IP 20 is ensured by a different measure.
  - 2.2 With case design having tab connectors the connection lines have to be provided with insulation sheaths of index No. 0 454 848.5 according to drawing No. 6-4922X14(4). Unused tab connectors have to be covered with adapter plugs 6.3 and insulation sheaths of the mentioned index number. Insulation sheaths may be omitted if type of protection IP 20 is ensured by a different measure.

Another "special condition" is added:

6. If the instrument is set up without surface mounting case a partition will have to be provided between the intrinsically safe and nonintrinsically safe current circuits so that the minimum distance between the connections will be 50 mm (measurement in fathoms).

The other "special conditions" remain unchanged.

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Test documents

signed on

1. Description (2 sheets)		) 18.04.1985
2. Drawing No.	6-4922 X 1 (2)	)
	6-4922 X 2 (3)	)
	6-4922 X 3 (3)	)
	6-4922 X 4 (3)	)
	6-4922 X 5 (3)	) 20.12.1984
	6-4922 X 6 (3)	)
	6-4922 X 7 (3)	)
	6-4922 X 8 (3)	)
	6-4922 X 9 (3)	)
	6-4922 X 10(3)	)
	6-4922 X 12(4)	)
	6-4922 X 13(4)	) 09.05.1985
	6-4922 X 14(4)	) 20.06.1985

For and on behalf of PTB

Braunschweig, July 8, 1985

(Dr.-Ing. Johannsmeyer)

**[EEx ib]** IIC and **[EEx ia]** IIC respectively

## 2nd Supplement

to Certificate of Conformity PTB No. Ex-84/2123 X

of Messrs. Hartmann & Braun AG  
D-6000 Frankfurt

In future, temperature transmitter type TEU 3.5-Ex.. may also be manufactured according to the test documents listed below.

The modifications concern the internal structure.

Electric data for the power supply in future will read:

	connections in the case of connectors	
	Form C	Form F
power supply/D.C. voltage		
24 V (18...33 V)	c26(+), a32(-)	d26(+), z32(-)
A.C. voltage		
24 V (+10 %, -15 %)	c28(L1), a30(N)	d28(L1), z30(N)
A.C. voltage		
110/127 V (+10%, -15%)	c28(L1), a30(N)	d28(L1), z30(N)
A.C. voltage		
220 V (+11 %, -15 %)	c28(L1), a30(N)	d28(L1), z30(N)
protective conductor connection	c12	d12

The remaining data remain unchanged.

Test documents

signed on

1. Description (10 sheets)	01.07.1988
2. Drawing No.	
6-9161 X 110 (1)	02.02.1988
6-9161 X 111 (1)	02.02.1988
6-9161 X 112 (1)	02.02.1988
6-9161 X 113 (2)	01.07.1988
6-9161 X 114 (2)	02.02.1988
6-9161 X 115 (2)	02.02.1988
6-9161 X 116 (2)	02.02.1988
6-9161 X 117 (3)	27.04.1988
6-9161 X 118 (4)	02.02.1988
6-9161 X 119 (4)	02.02.1988
6-9161 X 120 (3)	02.02.1988
6-9161 X 121 (3)	01.07.1988
6-9161 X 122 (3)	02.02.1988
6-9161 X 123 (4)	02.02.1988
6-9161 X 124 (4)	02.02.1988

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Drawing No.	6-9161 X 125 (4)	02.02.1988
	6-9161 X 126 (3)	27.04.1988
	6-9161 X 127 (3)	01.07.1988
	6-9161 X 128 (4)	02.02.1988
	6-9161 X 129 (4)	02.02.1988

3. Test sample

For and on behalf of PTB


Braunschweig, Sept. 1, 1988

Dr. Ing. Johannsmeyer  
Regierungsrat z.A.

[EEx ib] IIC and [EEx ia] IIC respectively

This translation is in conformance with the original text.

Frankfurt am Main, 17.11.1989

  
(DR.-ING. GÖLDNER)  
SACHVERSTÄNDIGER  
nach ElexV § 15  
(Abs. 1 Nr. 3 u. Satz 2)

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Printed in the Fed. Rep. of Germany (03.04)

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