

# Operating instructions

for the  
Dust – Ex APPLICATION

## TFE Temperature Probe

Manufactured by

**Albert Balzer AG Rotax CH 4143 Dornach**

**Electrical appliance for use in areas  
containing combustible dust  
II C-3 D T    °C**

**\*\*:** The maximum surface temperature of the housing of this appliance as shown on the type plate

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## 1 General description

TFE temperature probes and measuring devices are for determining the temperature of a medium as per Directives 94/9/EC (ATEX 100a). They consist of sheathed resistance thermometers or thermo-electric couples as per the model codes and as needs arise, the sheathed measuring element is enclosed within a protective pipe.

The TFE temperature probes are specified for connecting to a category "ia" intrinsically safe electrical circuit. They are designed for use in explosive dust/air mixtures.

When being used as a partitioning device, the connecting flange must conform to the IP67 standard.

### Designation

**Rotax /Type\* C € 0032  II 1...2 D T\*\*° C PTB 01 ATEX 2206 X Connected loads\*\*\* IP65 or**


**Rotax /Type\* C € 0032  II 3...2 D T\*\*° C PTB 01 ATEX 2206 X Connected loads\*\*\* IP54**

\* see type coding

\*\* \_\_ device-specific maximum surface temperature of the housing

\*\*\* The connected loads are displayed as per the corresponding specifications ("Maximum electrical values see above"). In the event that there is too little space, "Connected loads see certification" will be displayed.

Designation as per Directives 94/9/EC:

 II 1...3 D

### TFE Model Code

#### TFE a b c d nos.

a = Process connection as per parts list / delivery note

b = Protective tube – material as per parts list / delivery note

c = Measuring element – type as per parts list delivery note

d = Housing type as per parts list / delivery note (incl. type of connection)

No. = Serial number as per following code:

Capital letter A means year 2001, B means 2002, etc. up to T meaning 2020 and then starting again with A for 2021. There are consecutively running serial numbers for each year.

s = explosion protection in a dusty atmosphere

**Remarks:** A designation with a consecutive identification number as a model code is only accepted provided that the delivery documents display the required model code. These consecutive identification numbers are also kept on file by the manufacturer.

## 2. Correct operation

Category:  II 1...3 D

Group: IID

### 2a Thermal design

#### Ambient temperature

The ambient temperature is limited by the design of the connections and the joint sealing compound that is utilised.

The maximum ambient temperature is 80 °C for the low-temperature version and 210°C for the high-temperature version.

The high-temperature version is for use when the temperature probe is to measure materials at temperatures of  $\geq 150$  °C.

When using measuring transducers attention should be paid to their working temperature.

#### Maximum surface temperature of the housing

The maximum surface temperature of the housing is given on the probe.  
This corresponds

to the inherent heat of the appliance at room temperature. The temperature of the material must be accordingly taken into account.

**2. b Highest level of electrical PT resistance-application:**

$U_i = 30 \text{ V DC}$ ,  $I_i = 100 \text{ mA}$ ,  $P_i = 0.1 - 0.75 \text{ W}$   
(according to the temperature class)  
 $L_i = 0.015 \text{ mH/m}$      $C_i = 280 \text{ pF/m}$  (input lead)

**2. c Electrical maximum level thermo-element - application:**  $U_0 < 0.1 \text{ V DC}$ ,  $I_0 = 24 \text{ mA}$ ,  $P_i < 1 \text{ W}$   
 $L_0 = 60 \text{ mH}$ ,  $C_0 = 0.1 \text{ mF}$  (external figures)

When connecting to active, intrinsically safe equipment, the rules for the interconnection of intrinsically safe electrical circuits are to be observed.

### 3. Installation

When carrying out the installation, the general requirements for the development, selection and erection of electrical installations in areas with explosive gas atmospheres are to be observed (e.g. EN 60079-14). The equipment is to be electrostatically ( $R < 1 \text{ Mohm}$ ) connected to the local equipotential bonding.

Type TFE temperature probes are to be installed in this way in any applications, in which aluminium is used, so that the production of sparks caused by any impacting and frictional processes between aluminium and steel is prevented (except for: stainless steel, if the existence of rust particles can be eliminated).

When being used as a partitioning device, the connecting flange must meet the IP67 standard.

#### 4 a Fitting

- Possible increases in temperature due to heating feed pipes or heat accumulation are to be avoided.
- Only separately certified wiring screws of a suitable safety type are to be used. The instructions on the fixing of wiring screws are to be observed.
- Ensure you use suitable sealing materials.
- Ensure you use flanges with the correct screws and safety washers and seals. Be sure also to observe the permitted torque levels.
- When being used as a partition device, the connecting flange must conform to the IP67 standard.
- If the need arises, use the equipotential bonding conductor in the event that a safe contact via metal flange screws or connecting threads is not guaranteed.

The equipment is to be electrostatically ( $R < 1 \text{ Mohm}$ ) connected to the local equipotential bonding.

- Lay cables/wiring in a safe manner as required (with protection against tension / twisting / mechanical damage)
- Observe the rules for making connections for 2 / 3 / 4 –

phase systems for resistance thermometers i.e. when making connections of the thermo-elements.

- Only use prototype-tested measuring elements. When doing this, ensure you observe the corresponding installation guidelines.

The safety devices (e.g. connection head) for the electrical connections must as a minimum meet:

- The IP 65 standard with category 1 and 2 appliances.
- The IP 54 standard with category 3 appliances.

#### 4b Disassembly

Remove the cover only when the appliance is de-energised.

Observe the operational maintenance schedules in line with the operating situation.

### 5 Initial start-up

Prior to the initial start-up, the correct assembly and sealing of both mechanical and electrical components is to be checked as per the installation instructions.

## 6 Maintenance / trouble-shooting

TFE temperature probes are to be made part of the normal maintenance schedule for electrical equipment. When this work is being carried out, a careful check should be made for any damage to the housing, wiring, wiring screw connections and - if applicable - the equipotential bonding conductor.

In the event of any defects, the equipment should be immediately taken out of service.

Repairs to damaged or worn-out components may only be carried out by the manufacturer.

Explanations of the type coding							
Process connection (MC = Model – code, key-position a)							
MC	Description	MC	Description	MC	Description	MC	Description
O	Without	A	Flange	B	Screwed plug		
C	Clamping screw connection	D	Bayonet				
Process connection (MC = Model – code, key-position b) (Covering material: 1.4571)							
MC	Protective pipe made of	MC	Protective pipe made of	MC	Protective pipe made of	MC	Protective pipe made of
A	1.4435	B	1.4404	C	1.4401	D	1.4571
E	1.4539	F	1.4541	G	1.4301	H	1.4762
I	1.4841	J	2.4816	K	1.1003	L	ST 37
M	St37K	N	Alloy C4	O	2.4856	P	1.4305
Q =	1.7335	R	1.5415	S	1.4713	T	2.4617
U	Tantalum	V	2.4602				
Measuring elements (MC = Model – code, key-position c)							
MC	Description	MC	Description	MC	Description	MC	Description
A	PT 100 Resistance	B	2K2L Thermo-element NiCr-Ni	C	2D2A Thermo-element Fe-CuNi		
D	Metallic-film resistor						
Measuring elements (MC = Model – code, key-position d)							
MC	Description	MC	Description	MC	Description	MC	Description
A	BUKH, polyamide, PB 13.5 , IP66	B	B, AL,PG16,IP66	C	BBK, plastic, PG16, IP 54		
D-G	BUZ(H), BUS(H), AI, PG16, IP66	H-L	A, AUZ(H),AUS(H), AI,PG16,IP54				

**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 01 ATEX 2206 X**



(4) Equipment: Temperature sensors, types TFE

(5) Manufacturer: Albert Balzer AG Rotax

(6) Address: 4143 Dornach, Switzerland

(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 01-21121.

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

**II 1 G EEx ia IIC T1 ... T6**

Zertifizierungsstelle Explosionsschutz  
By order:

Braunschweig, January 30, 2002

(signature)

In the absence of Dr.-Ing. U. Johannsmeyer  
Regierungsdirektor

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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.

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**Braunschweig und Berlin**



(13) **SCHEDULE**  
 (14) **EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2206 X**

(15) Description of equipment

The temperature sensors, types TFE are used for the determination of a medium temperature. Resistance thermometers or thermo-couples are employed as measuring elements. The temperature sensors are applied as category-1 or category-2 equipment.

For relationship between maximum permissible medium temperature, temperature class, sensor type and supplied power for application as category-1 or category-2 equipment, reference is made to the table given in the operating instructions.

Electrical data

**Resistance thermometer**

Sensor circuit                      type of protection Intrinsic Safety EEx ia IIC  
    only for connection to a certified intrinsically safe circuit

Maximum values:

$U_i = 30 \text{ V DC}$

$I_i = 100 \text{ mA}$

$P_i = 0.1 \dots 0.75 \text{ W}$  according to table (cf. operating instructions)

Reactances per unit length of the incoming line:

$L_i = 15 \text{ } \mu\text{H/m}$

$C_i = 280 \text{ pF/m}$

**Thermo-couple**

Sensor circuit                      type of protection Intrinsic Safety EEx ia IIC

Maximum values:

$U_o = 0.1 \text{ V DC}$

$I_o = 24 \text{ mA}$

$L_i$  negligibly low

$C_i$  negligibly low

When the thermo-couple is connected to an active intrinsically safe circuit, the rules for the interconnection of intrinsically safe circuits are to be considered:

$P_i = 1 \text{ W}$

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**Physikalisch-Technische Bundesanstalt****Braunschweig und Berlin****SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2206 X**(16) Test report PTB Ex 01-21121(17) Special conditions for safe use

1. For the application as category-1 equipment the temperature sensors, types TFE of such designs for which the material aluminium is used, shall be installed as such that the generation of sparks due to impact or friction between aluminium and steel (with the exception of stainless steel if the existence of rust particles can be excluded) is not possible.
2. For the application as category-1 or -1/2 equipment the temperature sensors, types TFE shall be connected electrostatically (contact resistance  $\leq 1\text{M}\Omega$ ) to the equipotential bonding system (e.g. using the ground terminal clamp).
3. For relationship between maximum permissible medium temperature, temperature class, sensor type and supplied power for application as category-1 or category-2 equipment, reference is made to the table given in the operating instructions.

(18) Essential health and safety requirements

met by compliance with the standards mentioned above

Zertifizierungsstelle Explosionsschutz  
By order:

Braunschweig, January 30, 2002

(signature)

In the absence of Dr.-Ing. U. Johannsmeyer  
Regierungsdirektor**3 pages, correct and complete as regards content.**

By order:

Dr.-Ing. U. Gerlach  
Oberregierungssekretär

Braunschweig, August 03, 2006



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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.

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**Braunschweig und Berlin**



### 3. SUPPLEMENT

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

**to EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2206 X**  
**(Translation)**

Equipment: Temperature sensors, types TFE

Marking: II 1 G EEx ia IIC T1 ... T6

Manufacturer: Albert Balzer AG Rotax

Address: 4143 Dornach, Switzerland

#### Description of supplements and modifications

In the future the temperature sensors, types TFE may also be manufactured and operated according to the test documents listed in the test report. The modifications concern the application of the temperature sensors in hazardous areas due to combustible dust/air-mixtures and which require equipment of category 1, 2 or 3. Therefore the marking of the equipment changes as follows:

II 1 D T\*\*\* °C IP65 or II 2 D T\*\*\* °C IP65 or II 3 D T\*\*\* °C IP54

The appropriate temperature according to the following table shall be pasted at the place marked with \*\*\*:

power	≤ 0,1 W	0,1 W	0,25 W	0,5 W	0,75 W
sensor type	marking temperature				
Ø 3 mm, Pt100	*)	56	79	111	139
Ø 6 mm, Pt100	*)	47	56	72	86
Ø 6 mm, 2 x Pt100	*)	55	75	104	131
Ø 3 mm, thermo-couple	*)	42	43	47	50
Ø 6 mm, thermo-couple	*)	41	42	44	48

\*) to be determined by extrapolation using the values of the columns for 0,1 W and 0,25 W

The "Special conditions" are supplemented by clause 5.

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**Physikalisch-Technische Bundesanstalt****Braunschweig und Berlin****3. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2206 X**Special conditions:

5. For the application in hazardous areas due to combustible dust the marking shall include the appropriate temperature according to the table given in the operating instructions.

All further special conditions and specifications of the EC-type examination certificate as well as the 1<sup>st</sup> and 2<sup>nd</sup> supplement apply without changes.

Test report: PTB Ex 04-24263

Zertifizierungsstelle Explosionsschutz  
By order:

Braunschweig, October 15, 2004

  
Dr.-Ing. U. Gerlach  
Regierungsrat



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