

Instruction Manual

TW8 Resistance Thermometers for Assignment in Explosion-hazardous Areas

TW8# # # # # # # #

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EC type-examination certificate of inbuilt head transmitter

TMT181 Endress+Hauser brand

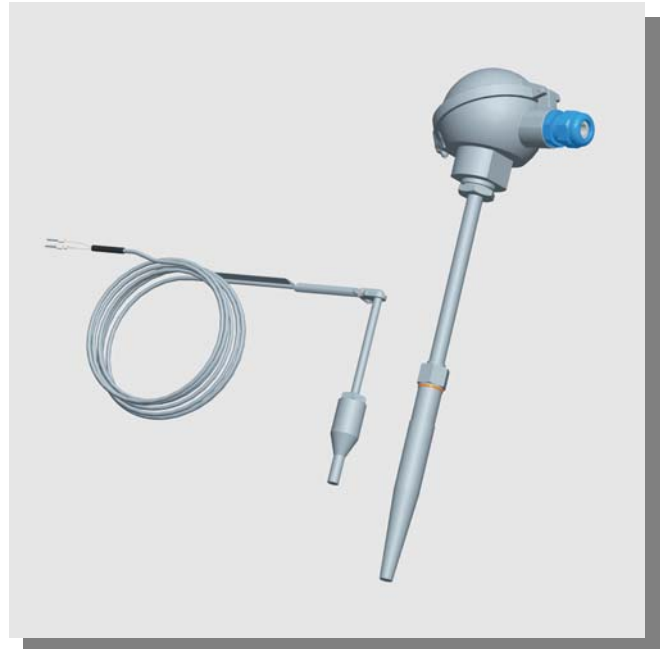
EC type-examination certificate of cable entries type 07-9534-**** Bartec brand

1. Safety Instructions

1.1. General



This manual contains detailed information about the product and instructions for its installation, operation and maintenance. Operators and other technical personnel responsible for the equipment must read this thoroughly before attempting to install or operate this equipment.



A copy of this manual must always be kept accessible at the place of work for reference by concerned personnel. The specifications relevant for usage of this instrument in explosion-hazardous areas are listed in chapter 9 in this instruction manual.

Use all resistance thermometers according to regulations only in clean and undamaged condition.

Chapter 1 (sections 1.2 through 1.7) contains general as well as specific safety instructions. Chapters 2 through 10, covering topics ranging from intended purpose of the equipment to its final disposal, also include important points relating to safety. Overlooking or ignoring any of these safety points can endanger humans and animals, and possibly cause damage to other equipment.



1.2. Personnel Qualification

Personnel responsible for installation, operation, maintenance and inspection of this product must have the qualifications, training and experience necessary to carry out such work on this type of equipment.

Qualified personnel are people who are able to judge delegated work and possible dangers due to technical education, proficiency and experiences and especially by knowledge about the relevant norms.

When working with explosion proof constructed instruments personnel needs to be educated or instructed resp. have the authorisation to work with explosion proof instruments in explosion-hazardous plants.

1.3. Risks of Disregarding Safety Instructions

Disregarding safety instructions, use of this product for purposes for which it is not intended, and/or operation of this product outside the limits specified for any of its technical parameters, can result in harm to persons, the environment, or the plant on which it is installed. Fischer Mess- und Regeltechnik GmbH will not be responsible for consequences in such circumstances.

1.4. Safety Instructions for Operators

Safety instructions for the proper use of this product must be followed. This information must be available at all times to personnel responsible for installation, operation, maintenance and inspection of this product. Adequate steps must be taken to prevent the occurrence of hazardous conditions that can be caused by electric energy and the convertible energy of the process media. Such conditions can, for example, be the result of improper electrical or process connections. Detailed information is available in relevant published norms (DIN EN, UVW in Germany; and equivalents in other countries), industrial standards such as DVWG, Ex-, GL-, VDE guidelines, as well as regulations of the local authorities (e.g., EVUs in Germany).

The instrument must be put out of action and protected against accidental use if safe operation can not be guaranteed anymore. A reason for this might be one of the following incidents:

- apparent damage of instrument
- failure of electrical function
- longer storage periods at temperatures higher than 85°C
- bad packaging during transport

Repairing is only allowed to be done by Fischer Mess- und Regeltechnik GmbH.

Before the instrument is put into operation again a professional routine test acc. to DIN EN61010, part 1 needs to be done. This inspection should necessarily be done by Fischer Mess- und Regeltechnik GmbH. Appropriate transport and professional storage of instrument are understood.

1.5. Modifications Forbidden

Modification or other technical alteration of the product is not permissible. This also applies to the use of unauthorized spare parts for repair / maintenance of the product. Any modifications to this product, if and as necessary, should be done only by Fischer Mess- und Regeltechnik GmbH.

1.6. Operational Restrictions

The operational reliability of the product is guaranteed only when used for intended purposes. The product must be selected and configured for use specifically with defined process media. The limiting values of operating parameters, as given in the product specification sheet, must never be crossed.

1.7. Safety Considerations during Installation and Maintenance

The safety instructions given in this manual, existing national regulations relating to accident prevention and the internal safety rules and procedures of the user organization regarding safety during installation, operation and servicing must all be followed meticulously.

It is the responsibility of the users to ensure that only suitably qualified and experienced technical personnel are used for installation, operation and servicing of this equipment.

1.8. Conformity of Norms

The resistance thermometers meet the demands of

- EN 50014 2002 +A1+A2 1999
- EN 50020 2002
- EN 50281-1-1 1998
- EN 50284 1999
- EN 1127-1 1997

Fischer Mess- und Regeltechnik GmbH works per quality management system acc. to DIN EN ISO 9001. It is base for correspondence to EC directive 94/9/EC appendix IV (ATEX). The resistance thermometers are developed, produced and tested state of the art and conform to relevant norms and regulations.

2. Intended Applications

Resistance thermometers of Fischer Mess- und Regeltechnik GmbH are applied as intrinsically safe equipment to measure temperature in fluids and gases as well as dusts. These thermometers consist of a protective sleeve with various process connections, a terminal head and - depending on model - an exchangeable gauge slide. All components in touch with process media are leak tested. Inside the protective sleeve Pt 100 temperature sensors acc. to DIN EN 60 751 in tolerance classes A or B in 2, 3 or 4-wire circuit are used. Models with 2 measuring circuits are possible. To transfer measurement as standard signal (e.g. 4...20mA) a transmitter can be integrated into the terminal head.

These resistance thermometers meet demands of equipment-group II categories 1/2G and 1/2D (TW85) and/or 2G and 2D (TW85 and TW89). They are suitable for usage in explosion-hazardous areas zone 1 (gas) and zone 21 (dust). The protective sleeve may extend into zone 0 resp. 20 if the wall thickness is ≥ 1 mm (separation of zones).

See chapter 9 of this instruction manual for respective thermometer-specific characteristics.

Depending on usage and measuring task the resistance thermometers can be delivered with various terminal heads. The instruments are solely to be used with provided protective sleeve.

These resistance thermometers with intrinsic safety Ex "i" are certified for electrical connection to intrinsically safe circuits category ib (for usage in zone 1 and 2; with a separative element in zone 0) as well as category ia (for usage of sensing probe in zone 0, 1 and 2).

When connecting to intrinsically safe circuits the user needs to ensure by limiting of power output that heating of surface does not exceed max. permissible value acc. to temperature class minus safety margin! See chapter 9 of this instruction manual.

3. Product Description and Functions

3.1. Principles of Operation

For electric measurement of temperature it is common to use the temperature dependency of the metals' electric resistance. The electric resistance increases with ascending temperature. Therefore when working with (e.g.) temperature sensors of platinum a PTC (**P**ositiv **T**emperature **C**oefficient) is measured.

To use this effect for temperature measurement the metal must change its electrical resistance depending on the temperature that way it is repeatable. The characteristics of the metal may not change during operation as thus measurement errors would occur. The temperature coefficient should be as independent of temperature, pressure and chemical influences as possible.

Standardized Temperature Sensors of Platinum

Platinum is widely accepted in industrial measurement engineering as best material for resistors. Its benefits are high chemical resistance, comparatively easy processing (in particular for wire production), high purity fabrication and good repeatability of electrical characteristics. To ensure universal exchange this characteristics are defined in DIN EN 60751.

See the general instruction and maintenance manual for resistance thermometers and thermocouples and/or the respective data sheet (appendix) for data depending on temperature and marginal deviations.

4. Commissioning

- The resp. valid european and national directives for installation and operation must be followed. General accepted regulations of engineering and this instruction manual are decisive.
- Resistance thermometers of Fischer Mess- und Regeltechnik GmbH are used to measure temperature in explosion-hazardous areas in which flammable and non-flammable liquids, gases or gas/air mixtures as well as potentially explosive dusts are located. For instruments with intrinsic safety Ex "i" supply and interpretation is done via certified intrinsically safe circuits.
- The resistance thermometer is delivered with a welding protective sleeve and may not operate without. The connecting thread of the instrument needs to be screwed in completely to ensure an optimal contact of the gauge slide with the protective sleeve. Check the proper location of the seal disc.
- The resistance thermometers' feeding pipe needs to be fixed if it is attached to tanks or pipework which contain permanently or long-term explosion-hazardous gas/air mixtures or dust (zone 1, 21). The protective sleeve serves as separation of zone 0 resp. 20 if the minimum wall thickness of 1mm is exceeded. It is of steel, stainless steel etc.

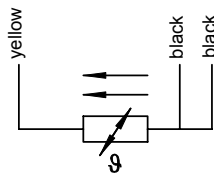
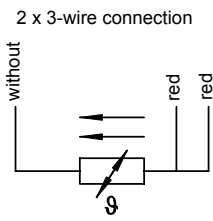
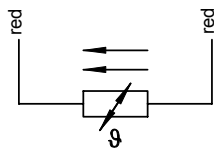
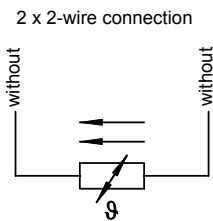
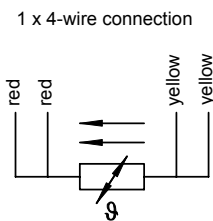
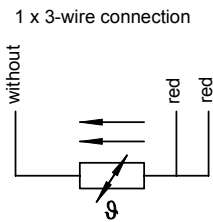
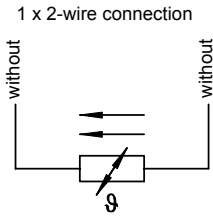


It is the sole responsibility of the plant operator and NOT of the manufacturer / supplier of equipment to classify zones!

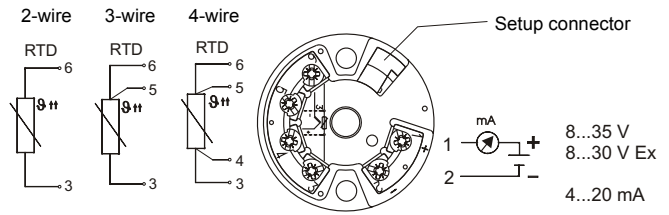
4.1. Connection Diagrams

The connection schemes are valid equally for resistance thermometers with terminal head and connection wire. See the illustration below for colour coding:

Connection Diagram TW85 with Terminal Socket:

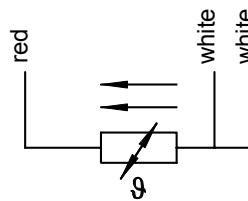


Connection Diagram TW85 with Transmitter TE4111 (Endress+Hauser Brand Type TMT181):

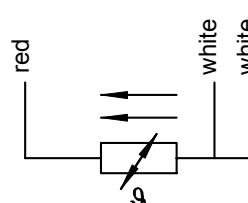


Connection Diagram Resistance Thermometer TW89:

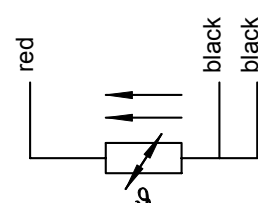
1 x 3-wire connection



2 x 3-wire connection



Wire end ferrule with white plastic



Wire end ferrule with red plastic

5. Maintenance

The instrument is inherently maintenance-free. However, to ensure reliable operation and maximize the operating life of the instrument, it is recommended that the instrument, its external electrical and process connections and external connected devices be regularly inspected, e.g.:

- Check all pressure connections for leak-tightness.
- Check the integrity of all electrical connections of the instruments.

Inspection and test schedules depend on operating and site conditions. The operating manuals of other equipment to which the instrument is connected must be read thoroughly to ensure that all of them work correctly when connected together.

6. Transport

The product must be protected against shock and vibration during transport. It must therefore be properly packed, preferably in the original factory packaging, whenever it is to be transported.

7. Service

Any defective devices or devices with missing parts should be returned to Fischer Mess- und Regeltechnik GmbH. For quick service contact our service department.



Remaining medium in and on dismantled measuring instruments may cause danger to persons, environment and equipment. Take reasonable precautions! Clean the instrument thoroughly if necessary.

8. Disposal



Protect your environment!

Use the product in accordance with relevant regulations. Please be aware of environmental consequences of disposal at the end of the product's life, and take care accordingly.

9. Specifications

Operating equipment applied in explosion-hazardous areas contain intrinsically safe circuits only. An electric circuit is intrinsically safe if during normal operation or in the case of an error caused by short-circuit no incendive spark is caused or the instruments do not heat up on surface over a defined temperature class by live wire (see EN 50020). All instruments in line need to be intrinsically safe to ensure an intrinsically safe circuit. Further it needs to be verified that by interconnecting the instruments the demands of an intrinsically safe circuit are still met. Simple interconnection of any intrinsically safe instruments does not guarantee a intrinsically safe circuit.

When using a resistance thermometer the sensor element is supplied with measurement current. This causes self-heating of the element and therefore rise of temperature on the surface of the protective sleeve and at the gauge slide within the protective sleeve. It needs to be ensured that the limit of the temperature class is not exceeded at any time.

The heating of surface is defined by the construction of the temperature sensor, by environmental conditions (thermic connection to the measured medium) and by power supply. The self-heating performance of the thermometer needs to be distinguished into operation in zones with explosion-hazardous gas on the one hand and zones with explosion-hazardous dust on the other hand for a diffusion of gas into the borehole for the protective sleeve may not be prevented. The self-heating performance is defined by protective sleeve constants S_D (dust) and S_G (gas) [K/W]. The resp. constant indicates the heating of surface compared to the ambient temperature depending on power supply during resting air. The protective sleeve constant S_D characterises the heating on the surface of the protective sleeve. The protective sleeve constant S_G characterises the heating at the gauge slide within the protective sleeve. The protective sleeve constants are determined by Fischer Mess- und Regeltechnik GmbH and appear in the resp. data sheet and label of the instrument. The plant operator needs to ascertain if the thermometer is suitable for the desired purpose and the connected equipment in the respective application.

The following diagram indicates exemplarily the self-heating performance of the sensor's surface of a resistance thermometer depending on power supply and the temperature within the sensor. (The heating performance is independent of the type of protection!)

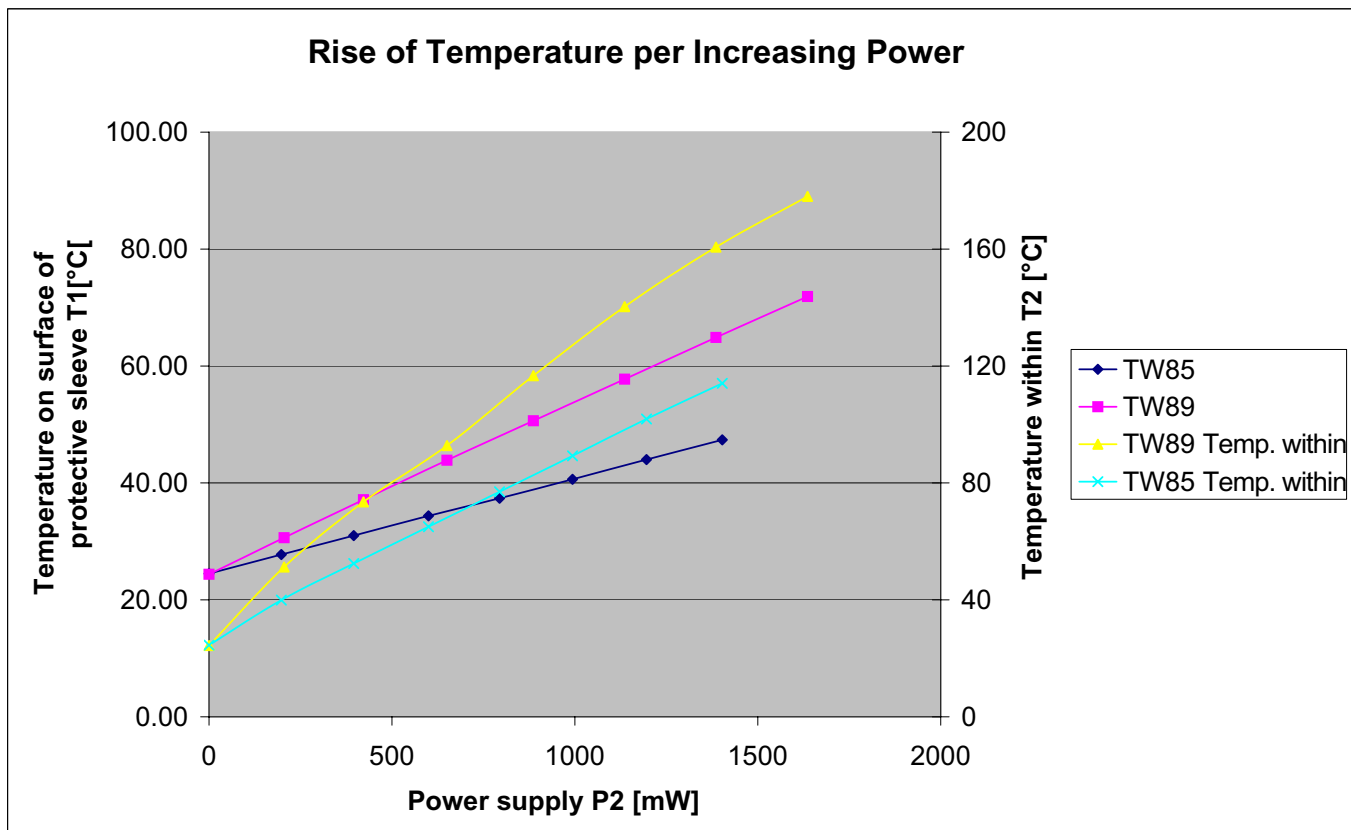


Figure: Self-heating performance of a resistance thermometer Pt100 type

9.1. Specifications depending on Application

9.1.1. Weld in Resistance Thermometer Type TW85# without Transmitter

Supply circuit

Type of protection intrinsic safety EEx ia IIC only applicable to certified intrinsically safe circuits.

Limit values : $U_i = 30 \text{ V}$

$I_i = 400 \text{ mA}$

Maximum allowable power P_i depends on the required temperature class and the max. medium temperature T_S . It may be determined acc. to the following details (see below). The inner capacity and inductivity are negligible small.

Max. ambient temperature at terminal head: +65°C

Determination of maximum allowable power P_i for areas in which **explosive air/dust mixtures, vapours or mists** may occur and which therefore require electrical equipment **category 1**.

Maximum allowable temperature of medium: $T_S = + 60 \text{ °C}$

$$P_i = \frac{T_K}{S_G}$$

- P_i Maximum allowable power of certified intrinsically safe circuit
 ($P_i = P_{i1} + P_{i2}$ applies to models with 2 x Pt100/2-wire resp. 2 x Pt100/3-wire
 P_{i1} = Maximum allowable power of 1st independent intrinsically safe circuit
 P_{i2} = Maximum allowable power of 2nd independent intrinsically safe circuit)
- S_G Protective sleeve constant (gas)
- T_K See the following table for maximum allowable surface temperature depending on temperature class:

Temperature class	Maximum allowable surface temperature
T1	+ 292 °C
T2	+ 172 °C
T3	+ 96 °C
T4	+ 44 °C
T5	+ 16 °C
T6	+ 4 °C

Determination of maximum allowable power P_i and maximum allowable medium temperature T_S for areas in which **explosion-hazardous air/dust mixtures, vapours or mists** may occur and which therefore require electrical equipment **category 2**.

$$P_i = \frac{(T_K - T_S)}{S_G} \text{ resp. } T_S = T_K - P_i \cdot S_G$$

- P_i Maximum allowable power of certified intrinsically safe circuit
($P_i = P_{i1} + P_{i2}$ applies to models with 2 x Pt100/2-wire resp. 2 x Pt100/3-wire
 P_{i1} = Maximum allowable power of 1st independent intrinsically safe circuit
 P_{i2} = Maximum allowable power of 2nd independent intrinsically safe circuit)
- T_S Maximum allowable medium temperature
- S_G Protective sleeve constant (gas)
- T_K See the following table for maximum allowable surface temperature depending on temperature class:

Temperature class	Maximum allowable surface temperature
T1	+ 440 °C
T2	+ 290 °C
T3	+ 195 °C
T4	+ 130 °C
T5	+ 95 °C
T6	+ 80 °C

Determination of surface temperature T_K depending on supply power P_i and maximum medium temperature T_S for areas in which **explosive atmospheres** may occur, **caused by air/dust mixtures**.

$$T_K = T_S + P_i \cdot S_D$$

- T_K Surface temperature
- T_S Maximum medium temperature
- P_i Maximum power of certified intrinsically safe circuit
($P_i = P_{i1} + P_{i2}$ applies to models with 2 x Pt100/2-wire resp. 2 x Pt100/3-wire
 P_{i1} = Maximum power of 1st independent intrinsically safe circuit
 P_{i2} = Maximum power of 2nd independent intrinsically safe circuit)
- S_D Protective sleeve constant (dust)

9.1.2. Weld in Resistance Thermometer Type TW85# with Transmitter TE4111

If a transmitter is applied into the terminal head its permissible application limits need to be followed too. The transmitter is built in air tight into the terminal head. Ambient temperature, heat contribution of measured medium via protection sleeve, self-heating of the transmitter causing surface heating all cause rising of temperature in the terminal head.

The specifications of the EC-type-examination certificate and instruction manual of the applied transmitter are to be followed and observed.

Supply circuit
(clamps 1 and 2
on transmitter)

Type of protection intrinsic safety EEx ia IIC
only applicable to certified intrinsically safe circuits.

Limit values: $U_i = 30 \text{ V}$

$I_i = 100 \text{ mA}$

$P_i = 750 \text{ mW}$

The inner capacity and inductivity are negligible small.

The max. medium temperature T_S may be determined acc. to the following details (see below).

See EC-type-examination certificate or the transmitter's instruction manual for specifications of the transmitter's sensor and the setup circuit if required.

Supply circuit and sensor circuit are to be understood safety related as galvanically connected. Technically they are galvanically isolated.

Temperature class	Max. ambient temperature at terminal head
T6	+37°C
T5	+52°C
T4...T1	+65°C

Operation with transmitter for areas in which **explosive air/gas mixtures, vapours or mist may occur** and which therefore require electrical equipment **category 1**.

Maximum allowable medium temperature: $T_S = + 60 \text{ °C}$

Determination of the maximum allowable medium temperature T_S for areas in which **explosive air/gas mixtures, vapours of mist may occur** and which therefore require electrical equipment **category 2**.

$$T_S = T_K - P_i \cdot S_G$$

- P_i Maximum power output of transmitter: $P_i = P_o = 11 \text{ mW}$
- S_G Protective sleeve constant (gas)

- T_K See the following table for maximum allowable surface temperature depending on temperature class:

Temperature class	Maximum allowable surface temperatures
T1	+440°C
T2	+290°C
T3	+195°C
T4	+130°C
T5	+95°C
T6	+80°C

Determination of surface temperature T_K depending on supply power P_i and maximum medium temperature T_S for areas in which **explosive atmospheres** may occur **caused by air/dust mixtures**.

$$T_K = T_S + P_i \cdot S_D$$

- T_K Surface temperature
- T_S Maximum medium temperature
- P_i Maximum power output of transmitter: $P_i = P_o = 11 \text{ mW}$
- S_D Protective sleeve constant (dust)

9.1.3. Weld in Resistance Thermometer Type TW89#

Supply circuit
(wiring loom)

Type of protection intrinsic safety EEx ia IIC
only applicable to certified intrinsically safe circuits.

Limit values: $U_i = 30 \text{ V}$

$$I_i = 400 \text{ mA}$$

Maximum allowable power P_i depends on required temperature class and maximum medium temperature T_S and may be determined acc. to the following details (see below).

$C_i = 15 \text{ nF}$

$L_i = 17 \text{ }\mu\text{H}$

Max. ambient temperature at wiring +250 °C

Determination of maximum allowable power P_i and maximum allowable medium temperature T_S for areas in which **explosive air/gas mixtures, vapours or mists** may occur.

$$P_i = \frac{(T_K - T_S)}{S_G} \text{ resp. } T_S = T_K - P_i \cdot S_G$$

- P_i Maximum allowable power of certified intrinsically safe circuit
($P_i = P_{i1} + P_{i2}$ applies to models with 2 x Pt100/2-wire resp. 2 x Pt100/3-wire
 P_{i1} = Maximum power of 1st independent intrinsically safe circuit
 P_{i2} = Maximum power of 2nd independent intrinsically safe circuit)
- T_S Maximum allowable medium temperature

- S_G Protective sleeve constant (gas)
- T_K See the following table for maximum allowable surface temperature depending on temperature class:

Temperature class	Maximum allowable surface temperature
T1	440°C
T2	290°C
T3	195°C
T4	130°C
T5	95°C
T6	80°C

Determining surface temperature T_K depending on power supply and maximum medium temperature for areas in which **explosive atmospheres occur caused by air/dust mixtures**.

$$T_K = T_S + P_i \cdot S_D$$

- T_K Surface temperature
- T_S Maximum medium temperature
- P_i Maximale Leistung des bescheinigten eigensicheren Stromkreises
 ($P_i = P_{i1} + P_{i2}$ applies to models with 2 x Pt100/2-wire resp. 2 x Pt100/3-wire
 P_{i1} = Maximum power of 1st independent intrinsically safe circuit
 P_{i2} = Maximum power of 2nd independent intrinsically safe circuit)
- S_D Protective sleeve constant (dust)

For application in explosion-hazardous areas caused by dust take the following temperature data into account:

Applies to all zones:

The equipment's surface temperature may not rise that high that raised dust or accumulated dust on equipment may be ignited. This is achieved by the following terms for the resp. conditions:

Without dust accumulation

The surface temperature may not pass 2/3 ignition temperature in °C of resp. dust/air mixture.

With dust accumulation

The surface temperature on surfaces on which a dangerous accumulation of flammable dust may not be prevented may not pass the ignition temperature of the resp. dust minus 75K. If the layer thickness exceeds 5 mm the surface temperature needs to be reduced again.

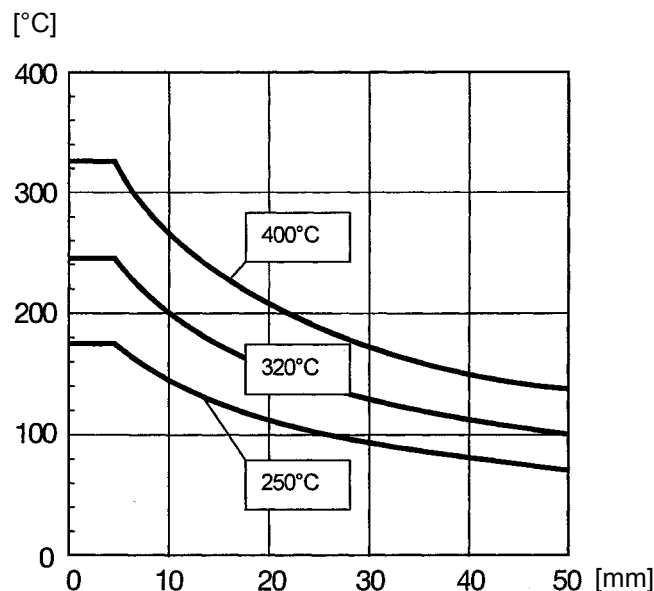
If raised and accumulated dust appear in combination the lower determined temperature value is decisive.

Note:

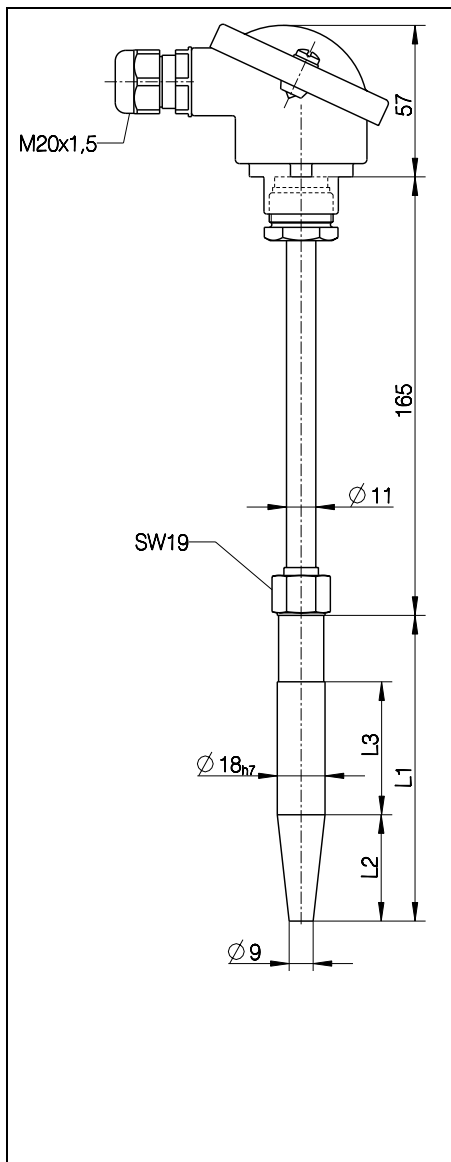
The outer surface of equipment applies as surface, see EN 50281-1-1 and -2.

It is the sole responsibility of the plant operator to determine the ignition resp. flammable temperature of the resp. dust or dust/air mixture!!

Reduction of Maximum Allowable Surface Temperature with Increasing Layer Thickness of Dust Accumulation



9.2. Specifications TW85



Weld in Resistance Thermometer TW85

like configuration D DIN 43767, for high pressure and flow forces

Measuring element: Gauge slide acc. to DIN 43762
 Insertion tube stainless steel 1.4571
 Resistance 1 or 2 Pt100 acc. to DIN EN 60751

Protective sleeve: SD1/SD2/SD7 like DIN 46763 form D
 Materials: 1.4571 (X6CrNiMoTi17122)
 1.0460 (C22.8)

chart 1	Type protective sleeve		
	SD1	SD2	SD7
L1 [mm]	140	200	115
L2 [mm]	65	125	40
L3 [mm]	50	50	50

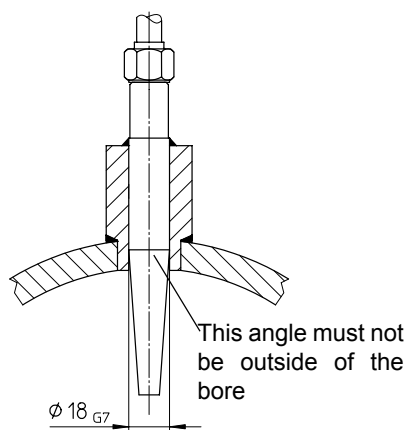
Insertion tube: Mechanical force like diagram 1 (for C22.8 max. pressure 250 bar, max. 450°C)
 Ø 11mm; 165mm long
 Material 1.4571

Connection: Terminal head type BUZ IP65 EN 60529 diecasted Al
 Terminal head type BUZH IP65 EN 60529 diecasted Al
 Max. ambient temperature at terminal head 65°C (please follow instruction manual chapter 9)

Max. media temperature : 450°C (please follow instruction manual chapter 9)*

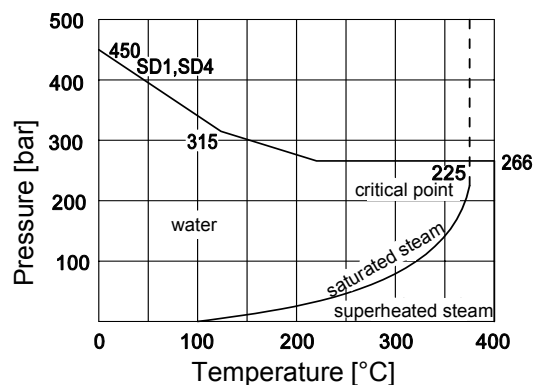
Characteristics for certified intrinsically safe circuit:
 Application **without** transmitter in terminal head
 $P_i \leq 750\text{mW}$ $U_i \leq 30\text{V}$ $I_i \leq 400\text{mA}$ $C_i = 0$ $L_i = 0$
 Application **with** transmitter in terminal head
 $P_i \leq 750\text{mW}$ $U_i \leq 30\text{V}$ $I_i \leq 100\text{mA}$ $C_i = 0$ $L_i = 0$
 (for additional data see appendix of instruction manual)
 Protective sleeve constants $S_D = 17 \text{ K/W}$ / $S_G = 78 \text{ K/W}$

Mounting Instruction



Mechanical and Thermal Forces of the Protective Sleeves Type SD Like DIN 43763

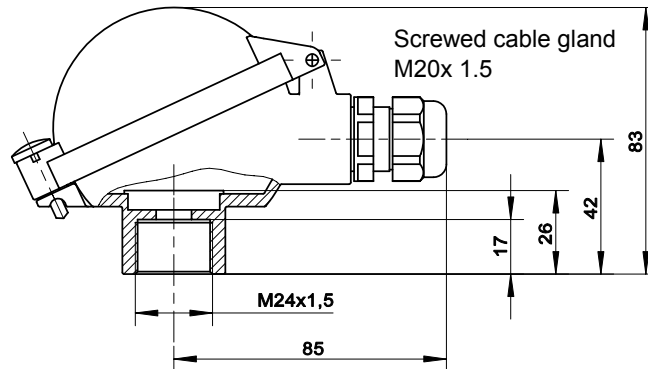
Diagram 1
 Material 1.4571 (X6CrNiMoTi17122)
 Permissible flow rate : air, superheated steam 60m/s; water 5m/s



Terminal Heads (all units in mm unless otherwise stated)

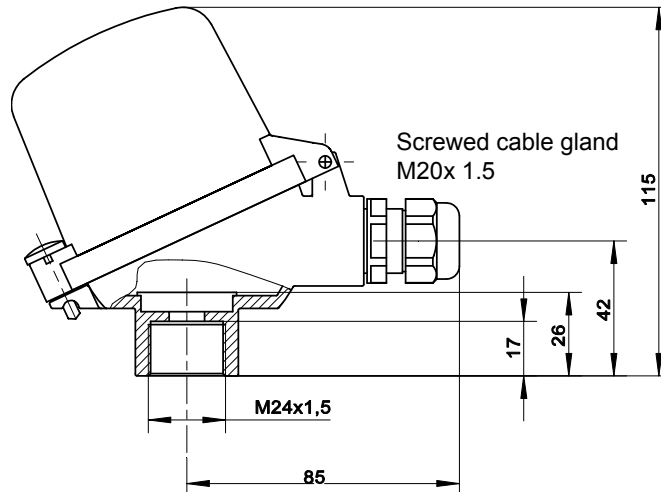
Terminal Head Type BUZ

Material: diecasted aluminium (varnished)
Protection class: IP65 EN60529



Terminal Head Type BUZH

Material: diecasted aluminium (varnished)
Protection class: IP65 EN60529



9.3. Ordering Code TW85

Weld in Resistance Thermometer		TW85							
						0			
Type		↑	↑	↑	↑	↑			↑
Gauge slide with 1xPt100/2-wire.....>	A								
Gauge slide with 1xPt100/3-wire.....>	B								
Gauge slide with 1xPt100/4-wire.....>	C								
Gauge slide with 2xPt100/2-wire.....>	D								
Gauge slide with 2xPt100/3-wire.....>	E								
Terminal Head									
Type BUZH.....>	4								
Type BUZ.....>	5								
Protective Sleeve According to Chart									
SD1.....>	1								
SD2.....>	2								
SD7.....>	7								
Material									
1.4571 (X6CrNiMoTi7122).....>	3								
1.0460 (C22.8).....>	4								
Output									
Resistance output on terminal.....>	K								
Subsequent only possible with "gauge slide with 1xPT100" with 2-wire transmitter 4-20 mA.....>	L								
Measuring Range Transmitter (°C)									
Without transmitter in terminal head.....>	0	0							
- 50 - 0.....>	1	0							
- 50 - +50.....>	2	0							
0 - 50.....>	3	0							
0 - 100.....>	4	0							
0 - 150.....>	5	0							
0 - 200.....>	6	0							
0 - 300.....>	7	0							
0 - 400.....>	8	0							

Other ranges on request.

9.4. Specifications TW89

Weld in Resistance Thermometer TW89

For medium pressure and flow forces

Measuring element:

Insertion tube stainless steel 1.4571

Resistance 1 or 2 Pt100 acc. to DIN EN 60751

Protective sleeve:

Materials: stainless steel 1.4571 (X6CrNiMoTi17122)
1.0460 (C22.8)

Mechanical force up to 25 bar

Perm. flow rate:

Air / gas, superheated steam 20m/s

Water 2 m/s

Max. temperature, media:

400°C

Max. temperature, ambient (on wire):

250°C

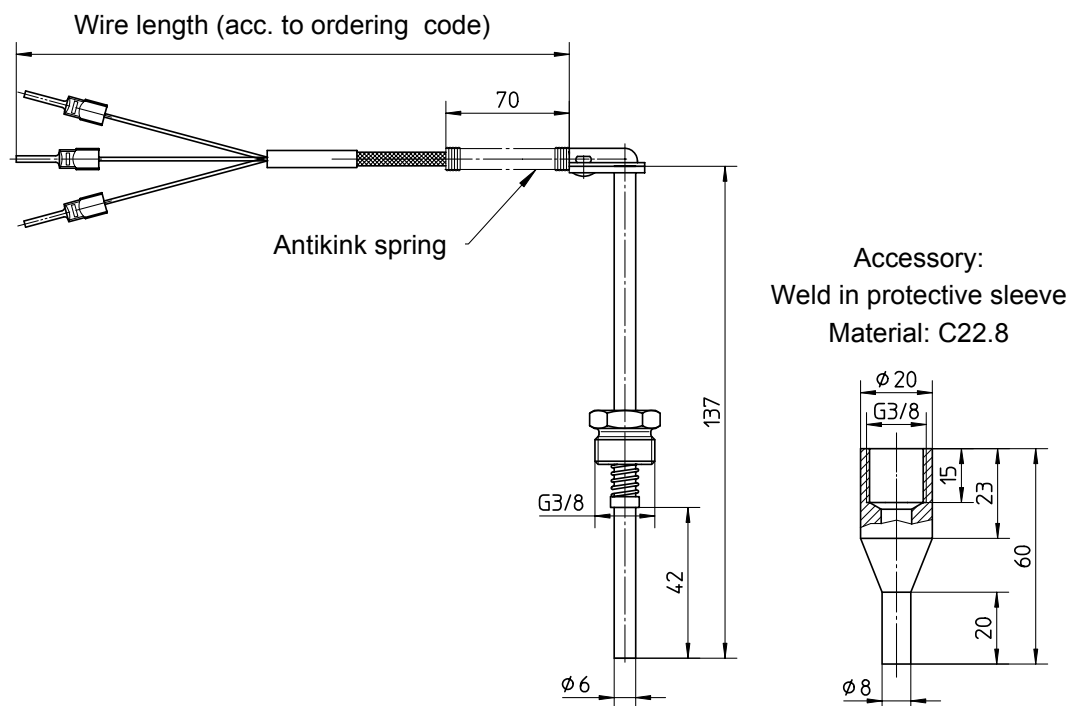
Characteristics for certified
intrinsically safe circuit:

$P_i \leq 750\text{mW}$ $U_i \leq 30\text{V}$ $I_i \leq 400\text{mA}$ $C_i = 15\text{ nF}$ $L_i = 17\mu\text{H}$

(C and L in worst case: 10m wire 2 x Pt100 / 3-wire)

Protective sleeve constants $S_D = S_G = 131\text{ K/W}$

Dimensions (all units in mm unless otherwise stated)



9.5. Ordering Code TW89

Weld in Resistance Thermometer		TW89		8	9		A	0	G	
Type										
Gauge slide with 1xPt100/3-wire.....>	B									
Gauge silde with 2xPt100/3-wire.....>	E									
Model										
With direct wire connection.....>	8									
Nominal Length										
Preset by protective sleeve.....>	9									
Materials										
Stainless steel 1.4571.....>	3									
1.0460 (C22.8).....>	4									
Output										
Resistance (free wire end).....>	A 0									
Wire Type										
Glass fibre wire with PTFE-isolated single conductors and stainless steel wire mesh.....>	G									
Wire Length										
1.0m.....>	1									
2.0m.....>	2									
3.0m.....>	3									
5.0m.....>	4									
6.0m.....>	5									
10.0m.....>	6									
Other lengths on request (max.10m).....>	9									

10. Declaration of Conformity



Zertifiziert nach: DIN EN ISO 9001:2000
Zertifizierungsnr.: 08 100 1999

EG-Konformitätserklärung

Wir erklären in alleiniger Verantwortung, dass nachstehend genannte Produkte

Declaration of Conformity

We declare under our sole responsibility that the products mentioned below

Fischer-Typen / Fischer-models
Datenblätter-Bedienungsanleitung / data sheets-operating instructions
Widerstandsthermometer / Resistance Thermometer
TW8...
DB_BA_D_TW8...

gemäß gültigem Datenblatt die Anforderungen der

specified by the actual data sheet complies with the regulations of the

Explosionsschutzrichtlinie 94/9/EG

Guideline for explosion protection 94/9/EC

erfüllen.

Die Produkte wurden entsprechend den Normen

The instruments has been tested in compliance with the norms

EN 50014 : 2002 +A1 +A2 : 1999
EN 50020 : 2002
EN 50281-1 : 1998
EN 50284 : 1999

EN 50014 : 2002 +A1 +A2 : 1999
EN 50020 : 2002
EN 50281-1 : 1998
EN 50284 : 1999

geprüft.

Die EG-Baumusterprüfung wurde unter

The EC-type test has been carried out in compliance with

TÜV 05 ATEX 2938 X

erstellt.

Kennzeichnung

Marking:

II 1/2G EEx ia IIC T6 für TW85
II 1/2D IP65 Tx °C

II 2G EEx ia IIC T6 für TW89
II 2D IP65 Tx °C

Benannte Stelle für die QS-Überwachung

Named authority for the quality control

TÜV NORD CERT GmbH & Co.KG

gekennzeichnet mit:

marked with:

CE 0032

Bad Salzufen, 07.03.2005
(Ort, Datum / place, date)

(rechtsverb. Unterschrift / authorized signature)

Fischer Mess- & Regeltechnik GmbH
Bielefelder Strasse 37a
D-32107 Bad Salzufen
USt-IdNr.: DE 124602659
Steuer-Nr.: 313/5729/0559

Fon: +49 (0) 52 22-9740
Fax: +49 (0) 52 22-71 70

Web: www.fischer.ag
eMail: info@klaus-fischer.de

Sparkasse Lemgo
BLZ 482 501 10
Konto-Nr.: 11 841
BIC: WELADED1LEM
IBAN: DE90482501100000011841

Postbank Hannover
BLZ 250 100 30
Konto-Nr.: 0201 830 307
BIC: PBNKDEFF
IBAN: DE 98 2501 0030 0201 8303 07

Sitz/reg. office: Bad Salzufen
Amtsgericht Lemgo HRB 226
Geschäftsführer/ Manag. Dir.:
Günter B. Gödde

Appendix 1: Type-examination certificate of inbuilt head transmitter TMT181 Endress+Hauser brand



Prüf- und Zertifizierungsstelle

ZELM Ex



(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:

ZELM 99 ATEX 0019 X

(4) Equipment: **Headtransmitter iTEMP Type TMT 181 resp. Type TMT 187 resp. Type TMT 188**

(5) Manufacturer: **Endress + Hauser Wetzler GmbH + Co. KG.**

(6) Address: **Obere Wank 1, D-87484 Nesselwang**

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Prüf- und Zertifizierungsstelle ZELM Ex, notified body No. 0820 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 ZELM Ex 0449919026.

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

EN 50 014: 1997

EN 50 020: 1994
En 1127-1: 1997

EN50 284: 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 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 1 G EEx ia IIC T6

Zertifizierungsstelle ZELM Ex

Braunschweig, March 30, 2000

Dipl.-Ing. Harald Zelm



Sheet 1/3

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

Prüf- und Zertifizierungsstelle ZELM Ex • Siekgraben 56 • D-38124 Braunschweig



Prüf- und Zertifizierungsstelle

ZELM Ex



SCHEDULE

(13)

(14) **EC-TYPE-EXAMINATION CERTIFICATE ZELM 99 ATEX 0019 X**

(15) Description of equipment

The headtransmitter is used for the measurement and signal conversion of resistance thermometers, thermocouples, resistance-type sensors and voltage sensors in a 4...20 mA current loop. The current input loop and signal output are freely scalable via an interface. The measured value registration occurs by the way of A/D conversion. The registered data are evaluated via a D/A converter as a measurement signal in the 4...20 mA current loop. The available galvanical isolation is a function isolation between sensor circuit and supply circuit.

Different versions of the headtransmitter iTEMP Type TMT 181 resp. Type TMT 187 resp. Type TMT 188 do not concern the explosion protection and the electrical data.

The headtransmitter shall be used in the hazardous location. The headtransmitter is to be installed, so that the degree of protection IP 20 for the connectors is guaranteed in accordance with EN 60529.

The temperature ranges depending on the temperature class are to be taken from the following table.

Lower ambient temperature limit	Upper ambient temperature limit	temperature class
-40 °C	+55 °C	T 6
-40 °C	+70 °C	T 5
-40 °C	+85 °C	T 4

Electrical data

Supply circuit
[terminals 1(+) and 2 (-)]

type of protection Intrinsic Safety EEx ia IIC
for connection to an intrinsically safe circuit with the following maximum values:

$$\begin{aligned} U_i &= 30 \text{ V} \\ I_i &= 100 \text{ mA} \\ P_i &= 750 \text{ mW} \end{aligned}$$

effective internal capacitance and effective internal inductance are negligibly small.

Setup circuit

only for a short-time connection of a standard personal computer via the configuration set Type TMT 181 A to suitable connections.
maximum r.m.s a.c. or d.c. voltage $U_m = 253 \text{ V}$.

Sheet 2/3

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

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Prüf- und Zertifizierungsstelle

ZELM Ex



Schedule to EC-TYPE-EXAMINATION CERTIFICATE ZELM 99 ATEX 0019 X

Sensor circuit
(terminals 3, 4, 5 and 6)

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

maximum values:

$$\begin{aligned} U_o &= 9,6 \text{ V} \\ I_o &= 4,5 \text{ mA} \\ P_o &= 11 \text{ mW} \end{aligned}$$

(linear output characteristic)

IIC resp. IIB

effective internal inductance: 4,5 mH 8,5 mH
effective internal capacitance: 709 nF 1300 nF

The supply circuit and the sensor circuit are to be considered in a combined manner to be galvanic with each other. The technical function of isolation remains.

(16) Report No.

ZELM Ex 0449919026

(17) Special conditions for safe use

The configuration via the setup circuit is only permitted in nonhazardous locations. In this case, none of the connections may be laid into the hazardous location.

The headtransmitter is to be installed, so that the degree of protection IP 20 for the connectors is guaranteed in accordance with EN 60529.

The headtransmitter is to be installed in such a way, that no electrostatic charge is possible.

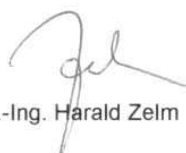
The instruction manual has to be observed, in particular with regard to the consideration of lesser ambient temperatures during the application in accordance with category 1.

(18) Essential Health and Safety Requirements

met by standards

Zertifizierungsstelle ZELM Ex

Braunschweig, March 30, 2000


Dipl.-Ing. Harald Zelm



Sheet 3/3

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

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**Prüf- und Zertifizierungsstelle****ZELM Ex**

1. Supplement

(Supplement according to EC-Directive 94/9 Annex III letter 6)

to EC-type-examination Certificate

ZELM 99 ATEX 0019 X

(Translation)

Equipment: Headtransmitter iTEMP Type TMT 181 resp. Type TMT 187
resp. Type TMT 188

Manufacturer: Endress + Hauser Wetzer GmbH + Co.KG

Address: Obere Wank 1, D-87484 Nesselwang

Description of supplement

Only the headtransmitter may be manufactured in future in accordance with the test documents listed in the test report ZELM Ex 0290019054. Therefore the old version of the headtransmitter is not more manufactured for avoidance of the confusion of the electrical data.

The different versions and the marking remain unchanged.

Further the ambient temperature range remains unchanged, in particular with regard to the consideration of lesser ambient temperatures during the application in accordance with category 1.

Only the following data are valid for the future.

Data resp. measures for the explosion protection

Electrical data

Supply circuit type of protection Intrinsic Safety EEx ia IIC
[terminals 1(+) and 2 (-)] for connection to an intrinsically safe circuit with the following maximum values:

$$\begin{aligned}U_i &= 30 \text{ V} \\I_i &= 100 \text{ mA} \\P_i &= 750 \text{ mW}\end{aligned}$$

effective internal capacitance and effective internal inductance are negligibly small.

Sheet 1 / 2

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

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Prüf- und Zertifizierungsstelle

ZELM Ex



**SCHEDULE TO THE 1. SUPPLEMENT OF THE EC-TYPE-EXAMINATION CERTIFICATE
ZELM 99 ATEX 0019 X**

Setup circuit	only for a short-time connection of a standard personal computer via the configuration set Type TMT 181 A to suitable connections. maximum r.m.s a.c. or d.c. voltage $U_m = 253 \text{ V}$.												
Sensor circuit (terminals 3, 4, 5 and 6)	type of protection Intrinsic Safety EEx ia IIC resp. EEx ia IIB maximum values: <table border="0" style="margin-left: 20px;"> <tr> <td>$U_o = 8,2 \text{ V}$</td> </tr> <tr> <td>$I_o = 4,6 \text{ mA}$</td> </tr> <tr> <td>$P_o = 9,35 \text{ mW}$</td> </tr> </table> (linear output characteristic)	$U_o = 8,2 \text{ V}$	$I_o = 4,6 \text{ mA}$	$P_o = 9,35 \text{ mW}$									
$U_o = 8,2 \text{ V}$													
$I_o = 4,6 \text{ mA}$													
$P_o = 9,35 \text{ mW}$													
	<table border="0"> <tr> <td></td> <td style="text-align: center;">IIC</td> <td style="text-align: center;">resp.</td> <td style="text-align: center;">IIB</td> </tr> <tr> <td>effective external inductance:</td> <td style="text-align: center;">4,5 mH</td> <td></td> <td style="text-align: center;">8,5 mH</td> </tr> <tr> <td>effective external capacitance:</td> <td style="text-align: center;">974 nF</td> <td></td> <td style="text-align: center;">1900 nF</td> </tr> </table>		IIC	resp.	IIB	effective external inductance:	4,5 mH		8,5 mH	effective external capacitance:	974 nF		1900 nF
	IIC	resp.	IIB										
effective external inductance:	4,5 mH		8,5 mH										
effective external capacitance:	974 nF		1900 nF										

The supply circuit and the sensor circuit are to be considered in a combined manner to be galvanic with each other. The technical function of isolation remains.

Report No.

ZELM Ex 0290019054


Special conditions for safe use

The special conditions in accordance with EC-type-examination Certificate ZELM 99 ATEX 0019 X are maintained.

Essential Health and Safety Requirements

met by standards

Zertifizierungsstelle ZELM Ex


Dipl.-Ing. Harald Zelm



Braunschweig, October 6, 2000

Sheet 2 / 2

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

Prüf- und Zertifizierungsstelle ZELM Ex • Siekgraben 56 • D-38124 Braunschweig

**Prüf- und Zertifizierungsstelle****ZELM Ex**

2. Supplement

(Supplement according to EC-Directive 94/9 Annex III letter 6)

to EC-type-examination Certificate**ZELM 99 ATEX 0019 X**

(Translation)

Equipment: Headtransmitter iTEMP Type TMT 181 resp. Type TMT 187
resp. Type TMT 188

Manufacturer: Endress + Hauser Wetzer GmbH + Co.KG

Address: Obere Wank 1, D-87484 Nesselwang

Description of supplement

The 2. Supplement to the EC-type-examination Certificate was necessary concerning the change of the circuit design due to additional EMC capacitances.

The headtransmitter may be manufactured in future in accordance with the test documents listed in the test report ZELM Ex 0050117085 only. Therefore the old version of the headtransmitter is not more manufactured.

The electrical data, the different versions and the marking remain unchanged.

Further the ambient temperature range remains unchanged, in particular with regard to the consideration of lesser ambient temperatures during the application in accordance with category 1G.

Report No.

ZELM Ex 0050117085

Special conditions for safe use

The special conditions in accordance with EC-type-examination Certificate ZELM 99 ATEX 0019 X are maintained.

Essential Health and Safety Requirements

met by standards

Zertifizierungsstelle **ZELM Ex**

Braunschweig, May 25, 2001


Dipl.-Ing. Harald Zelm

Sheet 1 / 1

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

Prüf- und Zertifizierungsstelle ZELM Ex • Siekgraben 56 • D-38124 Braunschweig

Appendix 2: EC type-examination certificate of cable entries type 07-9534-** Bartec brand**



Translation

EC-Type Examination Certificate

- (1)
- (2) **- Directive 94/9/EC -
Equipment and protective systems intended for use
in potentially explosive atmospheres**
- (3) **DMT 02 ATEX E 180 X**
- (4) **Equipment: Cable entries type 07-9534-******
- (5) **Manufacturer: BARTEC GmbH**
- (6) **Address: D 97980 Bad Mergentheim**
- (7) The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this type examination certificate.
- (8) The certification body of Deutsche Montan Technologie GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council 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 test and assessment report BVS PP 02.2101 EG.
- (9) The Essential Health and Safety Requirements are assured by compliance with:

EN 50014:1997+A1-A2	General requirements
EN 50019:2000	Increased safety
EN 50281-1-1:1998	Dust explosion protection
- (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 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 2GD EEx e II IP 68

Deutsche Montan Technologie GmbH

Essen, dated 07. October 2002

Signed:

DMT-Certification body

Signed:

Head of special services unit



(13) Appendix to

(14) **EC-Type Examination Certificate**

DMT 02 ATEX E 180 X

- (15) 15.1 Subject and type
Cable entries type 07-9534-****

The * will be replaced by digits to describe the colour, the thread dimensions and the accompanying diameter range of the cable.

15.2 Description

The cable entries are designed for the installation at electrical apparatus type of protection "increased safety" (EEx e II) and serve for the installation of fixed cables. The cable entries are also intended for the use in combustible dust atmospheres.

15.3 Parameters

Permitted temperature range of the cable entries -20 °C to +95 °C

The ambient temperature range of electrical apparatus is normally limited to $-20\text{ °C} \leq T_a \leq +40\text{ °C}$. The ambient temperature range can be exceeded for the use of these cable entries as long as the permitted temperature range of -20 °C to $+95\text{ °C}$ of the cable entries is taken into account.

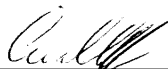
- (16) Test and assessment report
BVS PP 02.2101 EG as of 07.10.2002
- (17) Special conditions for safe use
The cable entries shall only be used for fixed installations.

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

45307 Essen, 07.10.2002
BVS-Ld/Mi A 20000368

Deutsche Montan Technologie GmbH


DMT-Certification body


Head of special services unit

