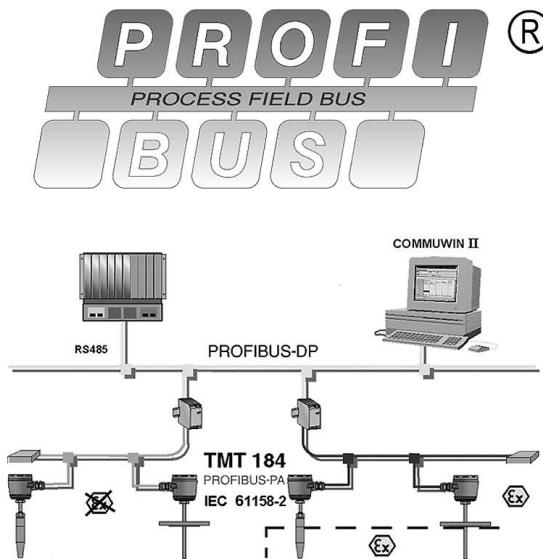


Technical information

## iTEMP<sup>®</sup> PA TMT184

Temperature head transmitter with PROFIBUS-PA<sup>®</sup> interface. Supply and digital communication using PROFIBUS-PA<sup>®</sup>, for installation in a Form B sensor head.

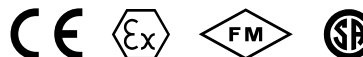


### Features and benefits

- Universally programmable for various input signals using PROFIBUS-PA<sup>®</sup>
- DIP switch for address setting
- High accuracy in the total ambient temperature range
- EMC to NAMUR NE 21, CE
- Certification:
  - ATEX Ex ia (FISCO-Model) and dust zone 22 in compliance with EN 50281-1
  - FM IS
  - CSA IS
- PROFIBUS-PA<sup>®</sup> Profile V3.0
- Galvanic isolation
- Sensor curve matching
- Customer specific address setting or expanded Setup (see Questionnaire, page 6)

### Application areas

- Applied in a PROFIBUS-PA<sup>®</sup> environment, the process industry fieldbus, an open standard to EN 50170 and IEC 61158-2
- Temperature head transmitter with PROFIBUS-PA<sup>®</sup> protocol for converting various input signals into a digital output signal
- Input:
  - Resistance thermometer (RTD)
  - Thermocouple (TC)
  - Resistance transmitter ( $\Omega$ )
  - Voltage transmitter (mV)
- Swift and easy operation, visualisation and maintenance using a PC direct from the control panel, e.g. using the COMMWIN II operating software, Field-Care, Simatic PDM or AMS.



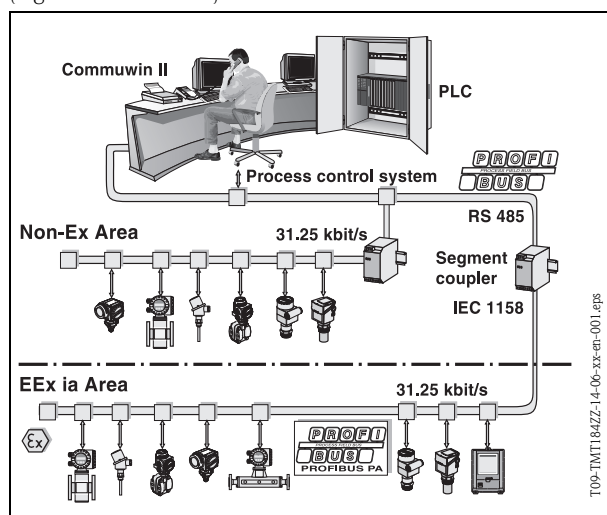
## Operation and system construction

### Measurement principle

Electronic measurement and conversion of input signals in industrial temperature measurement.

### Measurement system

The iTEMP<sup>®</sup> PA TMT184 temperature head transmitter is a 2-wire transmitter with measurement inputs for resistance thermometers and resistance transmitters in 2-, 3- or 4-wire connection, thermocouples and voltage transmitters. Applications are in the measurement and control areas for process monitoring. The TMT184 Setup is done using the PROFIBUS-PA<sup>®</sup> protocol combined with a PC operating software (e.g. COMMWIN II).



PROFIBUS-PA<sup>®</sup> is an open field bus standard in accordance with EN 50170 and IEC 61158-2, which has been specifically designed to handle the requirements of the process industry. In the simplest case a complete measurement circuit consists of a TMT184 fitted into a temperature sensor, a segment coupler, a PROFIBUS-PA<sup>®</sup> connection resistance, a PLC or a PC with an operating software.

The maximum number of transmitters that can be connected per bus segment is determined by the transmitter consumption, the maximum power of the segment coupler as well as the required bus length.

Normally:

- max. 9 TMT184 in an EEx ia explosion hazardous area per bus segment.
- max. 32 TMT184 in a non explosion hazardous area per bus segment.

More detailed information for detailed project planning can be found in the operating manual BA034S/04/en. See »Further documentation« on page 8.

## Input values

### Measurement value

Temperature (linear temperature transmission), resistance and voltage

### Measurement range

The transmitter measures various measurement ranges dependent on sensor connection and input signal.

### Type of input

	Type	Measurement range
<i>Resistance thermometer (RTD)</i>	Pt100	-200 to 850 °C (-328 to 1562 °F)
	Pt500	-200 to 250 °C (-328 to 482 °F)
	Pt1000 to IEC 751	-200 to 250 °C (-328 to 482 °F)
	Ni100	-60 to 250 °C (-76 to 482 °F)
	Ni500	-60 to 150 °C (-76 to 302 °F)
	Ni1000 to DIN 43760	-60 to 150 °C (-76 to 302 °F)
	<ul style="list-style-type: none"> <li>■ Connection modes: 2-, 3- or 4-wire connection</li> <li>■ On 2-wire connection software compensation of the cable resistance is possible (0 to 30 Ω)</li> <li>■ On 3- and 4-wire connection sensor cable resistance up to max. 11 Ω per core</li> <li>■ Sensor current: ≤ 0.2 mA</li> </ul>	

<i>Resistance transmitter</i>	Resistance ( $\Omega$ )	10 to 400 $\Omega$ 10 to 2000 $\Omega$
<i>Thermocouple (TC)</i>	B (PtRh30-PtRh6) C (W5Re-W26Re) <sup>I</sup> D (W3Re-W25Re) <sup>I</sup> E (NiCr-CuNi) J (Fe-CuNi) K (NiCr-Ni) L (Fe-CuNi) <sup>II</sup> N (NiCrSi-NiSi) R (PtRh13-Pt) S (PtRh10-Pt) T (Cu-CuNi) U (Cu-CuNi) <sup>II</sup> to IEC 584 Part 1	0 to +1820 °C (32 to 3308 °F) 0 to +2320 °C (32 to 4208 °F) 0 to +2495 °C (32 to 4523 °F) -270 to +1000 °C (-454 to 1832 °F) -210 to +1200 °C (-346 to 2192 °F) -270 to +1372 °C (-454 to 2501 °F) -200 to +900 °C (-328 to 1652 °F) -270 to +1300 °C (-454 to 2372 °F) -50 to +1768 °C (-58 to 3214 °F) -50 to +1768 °C (-58 to 3214 °F) -270 to +400 °C (-454 to 752 °F) -200 to +600 °C (-328 to 1112 °F)
	<ul style="list-style-type: none"> <li>■ Cold junction compensation: internal (Pt100)</li> <li>■ Cold junction compensation accuracy: <math>\pm 1</math> K (<math>\pm 1.8</math> °F)</li> </ul>	
<i>Voltage transmitter (mV)</i>	Millivolt transmitter (mV)	-10 to 75 mV

I. To ASTM E988

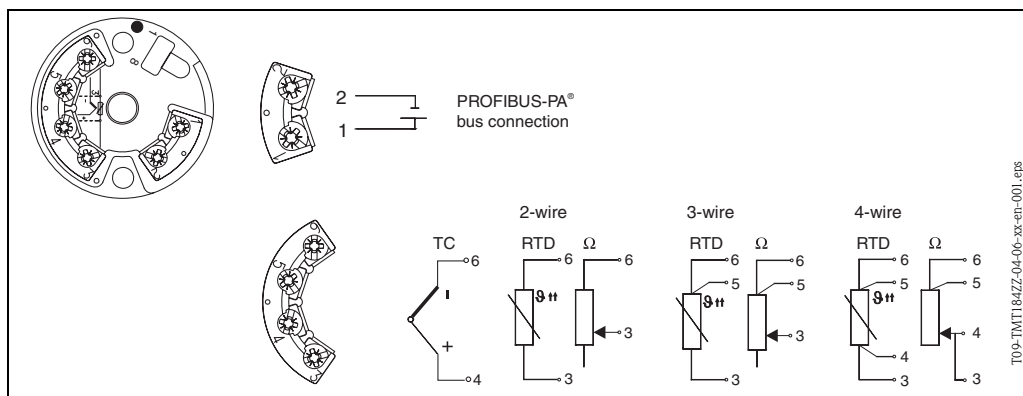
II. To DIN 43710

## Output values

<b>Output signal</b>	Physical data transmission (Physical Layer Type): Fieldbus interface in accordance to IEC 61158-2
<b>Failure signal</b>	Status message according to the PROFIBUS-PA <sup>®</sup> Profile V3.0 specification
<b>Galvanic isolation</b>	2 kV AC
<b>Filter</b>	Digital filter 1 <sup>st</sup> degree: 0 to 100 s
<b>Current consumption</b>	10 mA $\pm$ 1 mA
<b>Error current</b>	0 mA
<b>Switch on delay</b>	~ 10 s
<b>Data transmission speed</b>	31.25 kBit/s, voltage mode
<b>Signal code</b>	Manchester II

## Auxiliary energy

### Electrical connection



Head transmitter terminal layout

### Power supply

$U_b = 9$  to  $30$  V DC non Ex area, polarity protected  
 $U_b = 9$  to  $17.5$  V DC Ex area, polarity protected

## Accuracy

### Response time

1 s

### Reference conditions

Calibration temperature:  $+25$  °C  $\pm$  5 K ( $+77$   $\pm$  9 °F)

### Maximum measured error

	Type	Measurement accuracy
<b>Resistance thermometer RTD</b>	Pt100, Ni100 Pt500, Ni500 Pt1000, Ni1000	0.15 K 0.5 K 0.3 K
<b>Thermocouple TC</b>	K, J, T, E, L, U N, C, D S, B, R	typ. 0.5 K typ. 1.0 K typ. 2.0 K

	Measurement accuracy	Measurement range
<b>Resistance transmitter (<math>\Omega</math>)</b>	$\pm 0.1$ $\Omega$ $\pm 1.5$ $\Omega$ or 0.12%	10 to 400 $\Omega$ 10 to 2000 $\Omega$
<b>Voltage transmitter (mV)</b>	$\pm 20$ $\mu$ V	-10 to 75 mV

### Influence of ambient temperature (temperature drift)

Resistance thermometer (RTD):  
 $T_d = \pm 15$  ppm/K \* max. measurement range \*  $\Delta \vartheta$   
 Resistance thermometer Pt100:  
 $T_d = \pm 15$  ppm/K \* (measurement range end value +200) \*  $\Delta \vartheta$   
 Thermocouple (TC):  
 $T_d = \pm 50$  ppm/K \* max. measurement range \*  $\Delta \vartheta$

$\Delta \vartheta$  = Deviation of ambient temperature from the reference conditions.

### Long term stability

$\leq 0.1$ K/year<sup>1</sup>

1. Under reference conditions

**Influence of reference junction** Pt100 DIN IEC 751 Kl. B (internal reference junction for thermocouples TC)

## Application conditions (installation conditions)

**Installation hints**

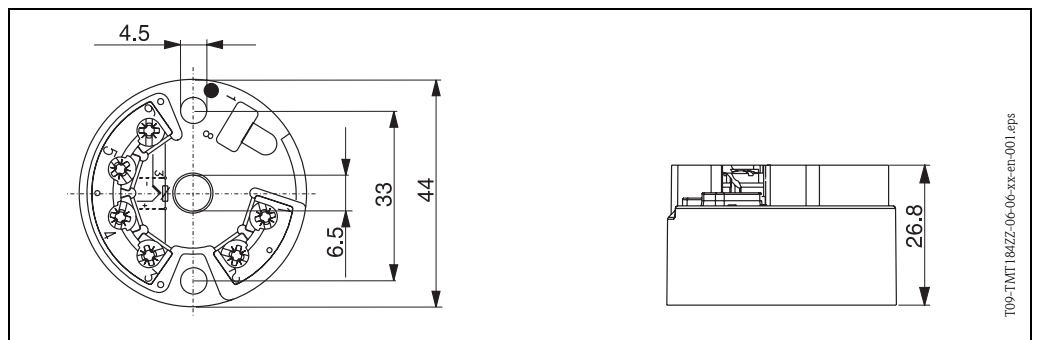
- Installation angle:  
No limitations
- Installation area:  
Connection head according to DIN 43 729 Form B; Field housing TAF 10

## Application conditions (ambient conditions)

<b>Ambient temperature</b>	-40 to +85 °C (-40 to +185 °F) (for hazardous areas see Ex certification)
<b>Storage temperature</b>	-40 to +100 °C (-40 to + 212 °F)
<b>Climatic class</b>	according to EN 60 654-1, Class C
<b>Condensation</b>	allowable
<b>Ingress protection</b>	IP 00, IP 66 installed
<b>Impact and vibration protection</b>	4g / 2 to 150 Hz to IEC 60 068-2-6
<b>Electromagnetic compatibility (EMC)</b>	Interference immunity and emission according to EN 61 326-1 (IEC 1326) and NAMUR NE 21

## Mechanical construction

### Dimensions



Head transmitter dimensions in mm

<b>Weight</b>	approx. 50 g
<b>Materials</b>	Transmitter housing: PC Potting material: PUR
<b>Terminals</b>	Cable up to max. 1.75 mm <sup>2</sup> (secured screws)



## Order structure

<b>Head transmitter iTEMP® PA TMT184</b>			
Universally settable for resistance thermometer, thermocouple, resistance and voltage transmitter; power supply and communication using two wire technology according to IEC 61158-2. PROFIBUS-PA® Profile V3.0; current consumption max. 11 mA; Output block for PROFIBUS-PA® display; for installation in Form B connection head according to DIN 43729.			
<b>Certification</b>			
<b>A</b>			Version for non hazardous areas
<b>B</b>			ATEX II 1G EEx ia IIC T4/T5/T6
<b>C</b>			FM IS, Class I, Div. 1+2, Group A, B, C, D
<b>D</b>			CSA IS, Class I, Div. 1+2, Group A, B, C, D
<b>E</b>			ATEX II 3G EEx nA IIC T4/T5/T6
<b>F</b>			ATEX II 3D
<b>G</b>			ATEX II 1G EEx ia IIC T6, II3D
<b>H</b>			ATEX II 3G EEx nA IIC T6, II3D
<b>Configuration transmitter connection</b>			
<b>A</b>			Standard factory configuration 3-wire
<b>3</b>			RTD (3-wire)
<b>4</b>			RTD (4-wire)
<b>2</b>			RTD (2-wire)
<b>1</b>			Thermocouple (TC)
<b>Configuration temperature sensor</b>			
<b>A</b>			Standard factory configuration Pt100
<b>1</b>			Pt100
<b>2</b>			Ni100
<b>3</b>			Pt500
<b>4</b>			Ni500
<b>5</b>			Pt1000
<b>6</b>			Ni1000
<b>7</b>			Resistance transmitter 10 to 400 Ohm
<b>8</b>			Resistance transmitter 10 to 2000 Ohm
<b>B</b>			Type B
<b>C</b>			Type C
<b>D</b>			Type D
<b>E</b>			Type E
<b>J</b>			Type J
<b>K</b>			Type K
<b>L</b>			Type L
<b>N</b>			Type N
<b>R</b>			Type R
<b>S</b>			Type S
<b>T</b>			Type T
<b>U</b>			Type U
<b>V</b>			Voltage transmitter -10 to 75 mV
<b>Configuration</b>			
<b>A</b>			Standard factory setup [Pt100/3-wire/addr. 126]
<b>B</b>			Customer specific sensor type and bus address
<b>C</b>			Customer specific expanded settings TC (see questionnaire)
<b>D</b>			Customer specific expanded settings RTD (see questionnaire)
<b>Model</b>			
<b>A</b>			DIP switch (bus address)
<b>C</b>			DIP switch (bus address) + Works calibration certificate, 6 test points
<b>E</b>			DIP switch (bus address), replacement TMD 834
<b>TMT184-</b>			← <b>Order-Code</b>

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## Accessories

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Installation accessories are contained in the delivery contents.

## Further documentation

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- Brochure "Temperature measurement" (FA006T/09/en)
- Competence Brochure "PROFIBUS Process automation with digital fieldbus technology" (CP005S/04/en)
- Operating Instructions iTEMP<sup>®</sup> PA TMT184 (BA115R/09/a3)
- Ex additional documentation:
  - ATEX II 1G: XA 008R/09/a3,
  - ATEX II 3G: XA 012R/09/a3,
  - ATEX II 3D: XA 028R/09/a3,
  - FM, CSA, etc.
- Operating Instructions 'Guidelines for planning and commissioning PROFIBUS DP/PA' (BA034S/04/en)

On the Internet: [www.endress.com](http://www.endress.com)

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Subject to modification

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