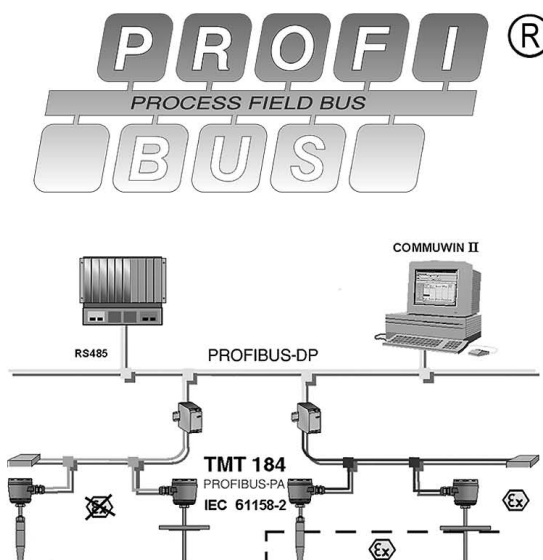


Technical information

iTEMP[®] PA TMT184

Temperature head transmitter with PROFIBUS-PA[®] interface. Supply and digital communication using PROFIBUS-PA[®], for installation in a Form B sensor head.

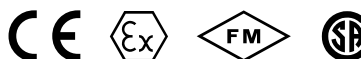


Features and benefits

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



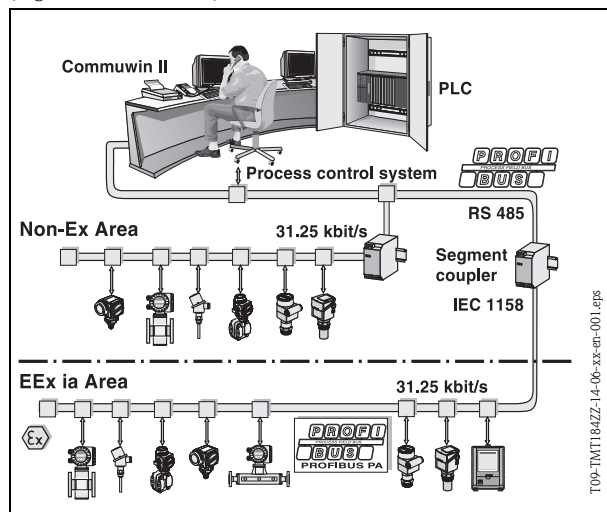
Operation and system construction

Measurement principle

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

Measurement system

The iTEMP[®] 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[®] protocol combined with a PC operating software (e.g. COMMUWIN II).



PROFIBUS-PA[®] 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[®] 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"> ■ Connection modes: 2-, 3- or 4-wire connection ■ On 2-wire connection software compensation of the cable resistance is possible (0 to 30 Ω) ■ On 3- and 4-wire connection sensor cable resistance up to max. 11 Ω per core ■ Sensor current: ≤ 0.2 mA 	

<i>Resistance transmitter</i>	Resistance (Ω)	10 to 400 Ω 10 to 2000 Ω
<i>Thermocouple (TC)</i>	B (PtRh30-PtRh6) C (W5Re-W26Re) ^I D (W3Re-W25Re) ^I E (NiCr-CuNi) J (Fe-CuNi) K (NiCr-Ni) L (Fe-CuNi) ^{II} N (NiCrSi-NiSi) R (PtRh13-Pt) S (PtRh10-Pt) T (Cu-CuNi) U (Cu-CuNi) ^{II} 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"> ■ Cold junction compensation: internal (Pt100) ■ Cold junction compensation accuracy: ± 1 K (± 1.8 °F) 	
<i>Voltage transmitter (mV)</i>	Millivolt transmitter (mV)	-10 to 75 mV

I. To ASTM E988

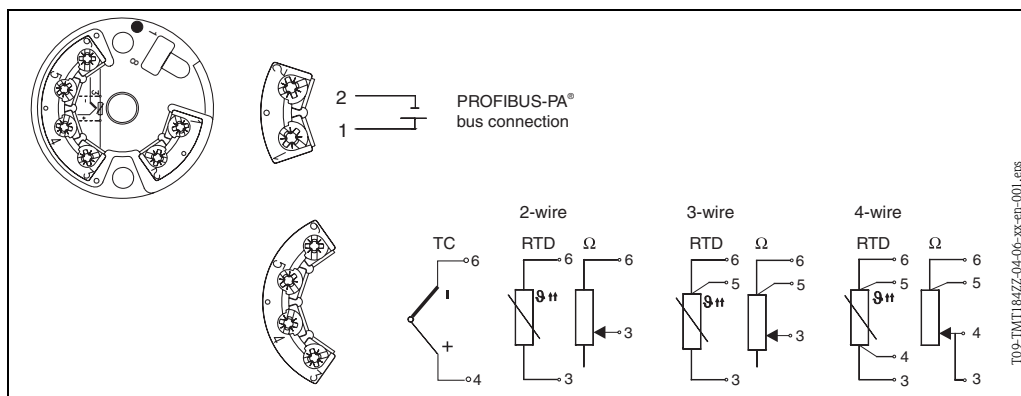
II. To DIN 43710

Output values

Output signal	Physical data transmission (Physical Layer Type): Fieldbus interface in accordance to IEC 61158-2
Failure signal	Status message according to the PROFIBUS-PA [®] Profile V3.0 specification
Galvanic isolation	2 kV AC
Filter	Digital filter 1 st degree: 0 to 100 s
Current consumption	10 mA \pm 1 mA
Error current	0 mA
Switch on delay	~ 10 s
Data transmission speed	31.25 kBit/s, voltage mode
Signal code	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: $+25\text{ °C} \pm 5\text{ K}$ ($+77 \pm 9\text{ °F}$)

Maximum measured error

	Type	Measurement accuracy
Resistance thermometer RTD	Pt100, Ni100 Pt500, Ni500 Pt1000, Ni1000	0.15 K 0.5 K 0.3 K
Thermocouple TC	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
Resistance transmitter (Ω)	$\pm 0.1\ \Omega$ $\pm 1.5\ \Omega$ or 0.12%	10 to 400 Ω 10 to 2000 Ω
Voltage transmitter (mV)	$\pm 20\ \mu\text{V}$	-10 to 75 mV

Influence of ambient temperature (temperature drift)

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

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

Long term stability

$\leq 0.1\text{K/year}^1$

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

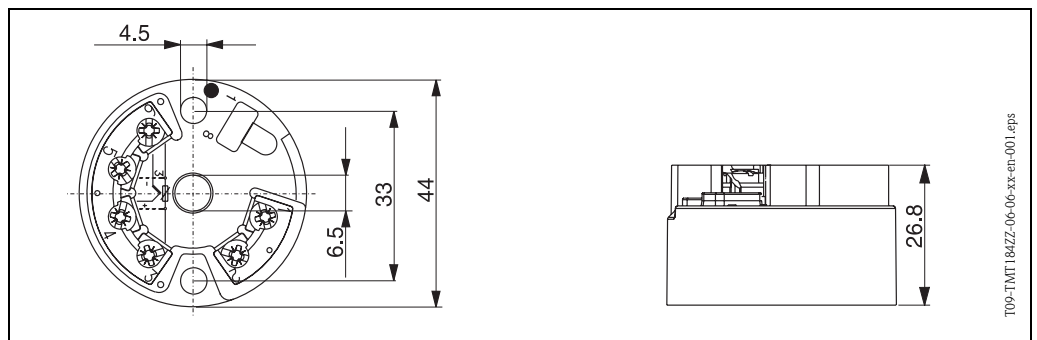
- Installation angle:
No limitations
- Installation area:
Connection head according to DIN 43 729 Form B; Field housing TAF 10

Application conditions (ambient conditions)

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

Mechanical construction

Dimensions



Head transmitter dimensions in mm

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

Display and operating system

Remote operation Operation via PROFIBUS-PA® using a suitable configuration or operating software.

Certification

Ex-certification Details regarding the availability of the Ex versions (ATEX, FM, CSA, etc.) can be obtained from your local E+H sales organisation. All relevant data for hazardous area protection can be found in separate Ex documentation, which can be requested separately.

CE mark The measurement system complies with the legal requirements laid out within the EU regulations. Endress+Hauser acknowledges successful testing of the unit by adding the CE mark.

How to order

Questionnaire

Questionnaire Endress+Hauser iTEMP temperature transmitter Customer specific setup / Kundenspezifische Einstellung			
Standard setup / Standardeinstellung			
Sensor	TC	<input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E <input type="checkbox"/> J <input type="checkbox"/> K <input type="checkbox"/> L <input type="checkbox"/> N <input type="checkbox"/> R <input type="checkbox"/> S <input type="checkbox"/> T <input type="checkbox"/> U	
	RTD	<input type="checkbox"/> Pt100 <input type="checkbox"/> Pt500 <input type="checkbox"/> Pt1000 <input type="checkbox"/> Ni100 <input type="checkbox"/> Ni500 <input type="checkbox"/> Ni1000 <input type="checkbox"/> 2 wire <input type="checkbox"/> 3 wire <input type="checkbox"/> 4 wire	
Unit / Einheit		<input type="checkbox"/> °C <input type="checkbox"/> °F	
Range / Messbereich <small>(not / nicht PROFIBUS-PA)</small>	Low scale Anfang	<input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/> . <input style="width: 40px;" type="text"/>	Bitte beachten! Messbereich und min. Spanne (s. Techn. Daten) Note! Range and min. span (s. Techn. data)
	High scale Ende	<input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/> . <input style="width: 40px;" type="text"/>	
Bus address / Busadresse <small>(only / nur PROFIBUS-PA)</small>		<input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/>	[0...126]
Expanded setup / Erweiterte Einstellung			
Reference junction / Vergleichsstelle	<input type="checkbox"/> intern <input type="checkbox"/> extern	<input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/>	[0...80°C; 32...176°F] <small>(only / nur TC)</small>
Compensation wire resistance / Kompensation Leitungswiderstand		<input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/>	[0...20 Ohm] <small>(only / nur RTD 2 wire)</small> [0...30 Ohm] <small>(only / nur HART, PA RTD 2 wire)</small>
Failure mode / Fehlverhalten	<input type="checkbox"/> ≤ 3.6 mA <input type="checkbox"/> ≥ 21.0 mA		<small>(not / nicht PROFIBUS-PA)</small>
Output / Ausgang	<input type="checkbox"/> 4...20 mA <input type="checkbox"/> 20...4 mA		<small>(not / nicht PROFIBUS-PA)</small>
Filter		<input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/> <input style="width: 40px;" type="text"/>	[0, 1, 2, ..., 8s] <small>(only / nur PCP)</small> [0, 1, 2, ..., 100s]
Offset		<input style="width: 40px;" type="text"/> . <input style="width: 40px;" type="text"/>	[-9.9... 0...+9.9K]
TAG	PCP	<input style="width: 100px;" type="text"/>	
	HART	<small>(HART: 8 char. TAG + 16 char. Descriptor , PROFIBUS-PA: 32 char.)</small>	
	PROFIBUS-PA	<input style="width: 100px;" type="text"/>	
Endress+Hauser			
<small>People for Process Automation</small>			

Order structure

Head transmitter iTEMP® PA TMT184			
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.			
Certification			
A			Version for non hazardous areas
B			ATEX II 1G EEx ia IIC T4/T5/T6
C			FM IS, Class I, Div. 1+2, Group A, B, C, D
D			CSA IS, Class I, Div. 1+2, Group A, B, C, D
E			ATEX II 3G EEx nA IIC T4/T5/T6
F			ATEX II 3D
G			ATEX II 1G EEx ia IIC T6, II3D
H			ATEX II 3G EEx nA IIC T6, II3D
Configuration transmitter connection			
A			Standard factory configuration 3-wire
3			RTD (3-wire)
4			RTD (4-wire)
2			RTD (2-wire)
1			Thermocouple (TC)
Configuration temperature sensor			
A			Standard factory configuration Pt100
1			Pt100
2			Ni100
3			Pt500
4			Ni500
5			Pt1000
6			Ni1000
7			Resistance transmitter 10 to 400 Ohm
8			Resistance transmitter 10 to 2000 Ohm
B			Type B
C			Type C
D			Type D
E			Type E
J			Type J
K			Type K
L			Type L
N			Type N
R			Type R
S			Type S
T			Type T
U			Type U
V			Voltage transmitter -10 to 75 mV
Configuration			
A			Standard factory setup [Pt100/3-wire/addr. 126]
B			Customer specific sensor type and bus address
C			Customer specific expanded settings TC (see questionnaire)
D			Customer specific expanded settings RTD (see questionnaire)
Model			
A			DIP switch (bus address)
C			DIP switch (bus address) + Works calibration certificate, 6 test points
E			DIP switch (bus address), replacement TMD 834
TMT184-			← Order-Code

Accessories

Installation accessories are contained in the delivery contents.

Further documentation

- Brochure "Temperature measurement" (FA006T/09/en)
- Competence Brochure "PROFIBUS Process automation with digital fieldbus technology" (CP005S/04/en)
- Operating Instructions iTEMP[®] 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

⇒ Products ⇒ Products, Services, Solutions ⇒ Solutions ⇒ System Integration ⇒ PROFIBUS

Subject to modification

International Head Quarter

Endress+Hauser
GmbH+Co. KG
Instruments International
Colmarer Str. 6
79576 Weil am Rhein
Germany

Tel. +49 76 21 9 75 02
Fax +49 76 21 9 75 34 5
www.endress.com
info@ii.endress.com

Endress+Hauser 
People for Process Automation