



## Function and system design

**Measuring principle** Electronic recording and conversion of various input signals in industrial temperature measurement.

**Measuring system** The iTEMP® TMT80 temperature head transmitter is a loop-powered transmitter with analog output and a measurement input for resistance thermometers in 2-, 3-, or 4-wire connection and thermocouples. The device is set up using a configuration kit and ReadWin 2000 operating software, which is free of charge.

## Input

**Measured variable** Temperature (temperature-linear transmission behavior)

**Measuring range** The device provides different measuring ranges depending on the sensor connection and input signals:

Resistance thermometer (RTD) as per standard	Designation	Measuring range limits	Min. span
IEC 60751 ( $\alpha = 0.00385$ )	Pt100 Pt1000	-200 to +850 °C (-328 to +1 562 °F) -200 to +250 °C (-328 to +482 °F)	10 K (18 °F)
<ul style="list-style-type: none"> <li>■ Connection type: 2-, 3- or 4-wire connection</li> <li>■ With 2-wire circuit, compensation of wire resistance possible (0 to 20 <math>\Omega</math>)</li> <li>■ Cable resistance: Sensor cable resistance up to max. 11 <math>\Omega</math> per cable</li> <li>■ Sensor current: <math>\leq 0.6</math> mA</li> </ul>			

Thermocouples as per standard	Designation	Measuring range limits	Min. span
IEC 60584, Part 1	Type B (PtRh30-PtRh6) (31)	0 to +1 820 °C (+32 to +3 308 °F)	500 K
	Type K (NiCr-Ni) (36)	-200 to +1 372 °C (-328 to +2 501 °F)	50 K
	Type N (NiCrSi-NiSi) (37)	-270 to +1 300 °C (-454 to +2 372 °F)	50 K
	Type R (PtRh13-Pt) (38)	-50 to +1 768 °C (-58 to +3 214 °F)	500 K
	Type S (PtRh10-Pt) (39)	-50 to +1 768 °C (-58 to +3 214 °F)	500 K
<ul style="list-style-type: none"> <li>■ Internal cold junction (Pt100)</li> <li>■ Cold junction accuracy: <math>\pm 1</math> K</li> </ul>			

## Output

**Output signal** Analog, 4 to 20 mA

**Signal on alarm**

- Underranging:  
Linear drop to 3.8 mA
- Overranging:  
Linear rise to 20.5 mA
- Sensor breakage; sensor short-circuit <sup>1)</sup>:  
 $\leq 3.6$  mA or  $\geq 21.0$  mA (if setting is  $\geq 21.0$  mA an output current  $\geq 21.5$  mA is guaranteed)

**Load** Max.  $(V_{\text{power supply}} - 8 \text{ V}) / 0.025 \text{ A}$  (Current output)

**Transmission behavior** Temperature linear

**Galvanic isolation**  $U = 500 \text{ V}_{\text{AC}}$  (input/output)

1) Not for thermocouples

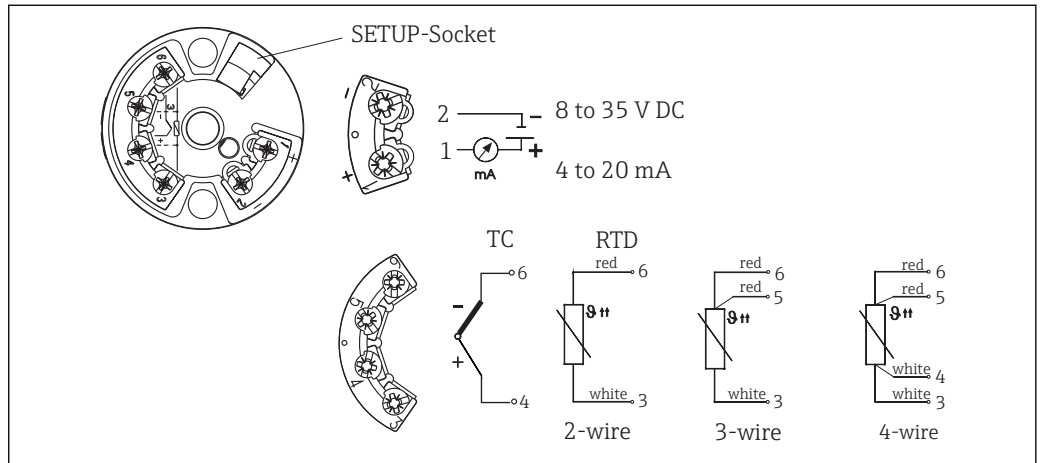
**Input current required** ≤ 3.5 mA

**Current limit** ≤ 25 mA

**Switch-on delay** 4 s

## Power supply

### Terminal assignment



1 Terminal assignment of temperature transmitter

**Supply voltage**  $U_b = 8$  to 35 V, reverse polarity protection

**Residual ripple** Permitted ripple  $U_{ss} \leq 3$  V at  $U_b \geq 15$  V,  $f_{max.} = 1$  kHz

## Performance characteristics

**Response time** 1 s

- Reference operating conditions**
- Calibration temperature: +25 °C (+77 °F) ± 5 K (9 °F)
  - Supply voltage: 24 V<sub>DC</sub>
  - 4-wire circuit for resistance adjustment

**Maximum measured error** The data relating to the measured error are typical values and correspond to a standard deviation of ± 3σ (normal distribution), i.e. 99.8% of all measured values achieve the specified values or better values. Percentage values refer to the set span. The larger value applies.

	Designation	Accuracy
<b>Resistance thermometer RTD</b>	Pt100, Pt1000	0.5 K or 0.15%
<b>Thermocouples TC</b>	K, N S, B, R	typ. 1.0 K or 0.15 % typ. 2.0 K or 0.15 %

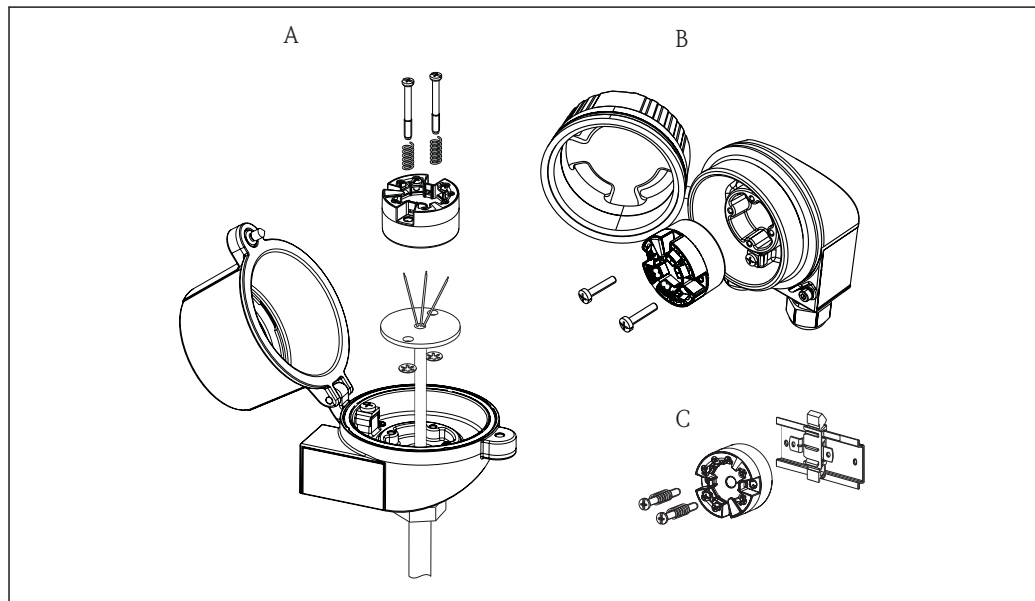
**Influence of the supply voltage** ≤ ±0.01%/V deviation from 24 V<sup>2)</sup>

2) All data is related to a full scale value

<b>Long-term drift</b>	$\leq 0.1 \text{ K/Year}^3$ or $\leq 0.05\%/Year^4$
<b>Influence of ambient temperature</b>	<ul style="list-style-type: none"> <li>■ Resistance thermometer (RTD):  <math>T_d = \pm [(15 \text{ ppm/K} * (\text{Upper range value} - \text{Lower range value})) + (50 \text{ ppm/K} * \text{Set measuring range})] * \Delta T</math>            Example of Pt100 resistance thermometer:  <math>T_d = \pm [(15 \text{ ppm/K} * (850 \text{ }^\circ\text{C} + 200 \text{ }^\circ\text{C})) + (50 \text{ ppm/K} * 100 \text{ }^\circ\text{C})] * 10 \text{ K} = \pm 0.21 \text{ K}</math>            Upper range value: 850 °C, Lower range value: -200 °C, Measuring range (4 to 20 mA) configured = 0 to +100 °C, Temperature deviation <math>\Delta T = 10 \text{ K}</math></li> <li>■ Thermocouple (TC):  <math>T_d = \pm [(50 \text{ ppm/K} * (\text{Upper range value} - \text{Lower range value})) + (50 \text{ ppm/K} * \text{Set measuring range})] * \Delta T</math></li> </ul> <p><math>\Delta T</math> = Deviation in ambient temperature from reference operating condition (+25 °C (+77 °F) <math>\pm</math> 5 K (9 °F)).</p>
<b>Influence of load</b>	$\leq \pm 0.02\%/100 \Omega^5$
<b>Comparison point</b>	Pt100, as per DIN IEC 60751 Class B (internal cold junction for thermocouples TC)

## Installation

### Mounting location



- A Terminal head in accordance with DIN EN 43 729 flat face, direct installation on insert with cable entry (center hole 7 mm (0.28 in))
- B Separate from process in field housing
- C With clip on DIN rail as per IEC 60715 (TH35)

### Orientation

No restrictions

## Environment

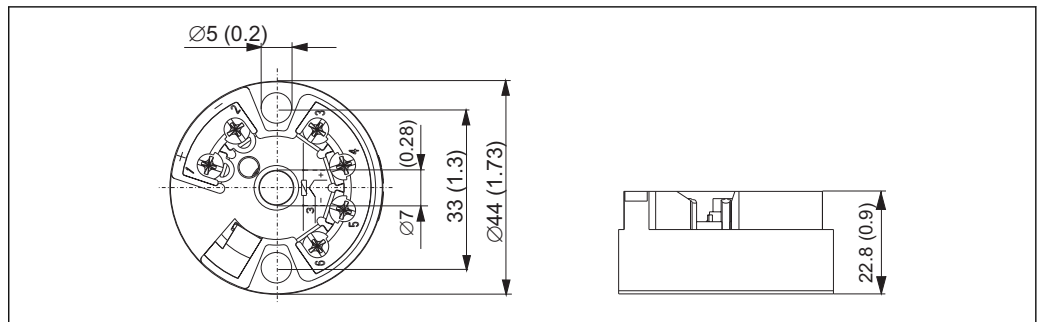
**Ambient temperature range** -40 to +85 °C (-40 to +185 °F)

- 3) Under reference operating conditions
- 4) % is related to the set span. The larger value is valid.
- 5) Under reference operating conditions

<b>Storage temperature</b>	-40 to +100 °C (-40 to +212 °F)
<b>Humidity</b>	<ul style="list-style-type: none"> <li>■ Condensation as per IEC 60 068-2-33:</li> <li>■ Max. rel. humidity: 95% as per IEC 60068-2-30</li> </ul>
<b>Climate class</b>	As per IEC 60 654-1, Class C
<b>Degree of protection</b>	IP 00. Depends on the terminal head or field housing when installed.
<b>Shock and vibration resistance</b>	4 g / 2 to 150 Hz as per IEC 60 068-2-6
<b>Electromagnetic compatibility (EMC)</b>	<p><b>CE compliance</b></p> <p>Electromagnetic compatibility in accordance with all the relevant requirements of the IEC/EN 61326 series and NAMUR Recommendation EMC (NE21). For details, refer to the Declaration of Conformity.</p> <p>Maximum measured error &lt;1% of measuring range.</p> <p>Interference immunity as per IEC/EN 61326 series, industrial requirements</p> <p>Interference emission as per IEC/EN 61326 series, Class B equipment</p>

## Mechanical construction

### Design, dimensions



2 Dimensions of the head transmitter in mm (in)

<b>Weight</b>	Approx. 40 g (1.41 oz)
<b>Materials</b>	<ul style="list-style-type: none"> <li>■ Housing: Polycarbonate (PC), complies with UL94 HB flammability standard (HB: Horizontal Burning Test). Terminals: Nickel-plated brass and gold-plated contact</li> <li>■ Potting: WEVO PU 403 FP/FL, approved in accordance with UL94 VO flammability standard (VO: Vertical Burning Test)</li> </ul>
<b>Terminals</b>	Screw terminals, wires up to max. 1.75 mm <sup>2</sup> (15 AWG) (secure screws) or 1.5 mm <sup>2</sup> (16 AWG) with wire end ferrules

## Operability

### Remote operation

Configuration using PC operating program ReadWin 2000

Menu	Configurable parameters
Standard settings	<ul style="list-style-type: none"> <li>▪ Options for sensor type</li> <li>▪ Connection type (2-, 3- or 4-wire connection)</li> <li>▪ Options for measuring unit: °C, °F</li> <li>▪ Measuring range limits (dependent on sensor type selected)</li> <li>▪ Compensation of wire resistance (0 to 20 Ω for RTD 2-wire circuit)</li> <li>▪ Failsafe mode: ≤ 3.6 mA or ≥21.0 mA; (if setting ≥ 21.0 mA, an output current of ≥21.5 mA is guaranteed)</li> <li>▪ Zero point, offset: -9.9 to +9.9 K</li> </ul>

## Certificates and approvals

### CE mark

The measuring system meets the legal requirements of the applicable EC guidelines. These are listed in the corresponding EC Declaration of Conformity together with the standards applied. The manufacturer confirms successful testing of the device by affixing to it the CE mark.

### Other standards and guidelines

- IEC 60529: Degrees of protection provided by enclosures (IP code)
- IEC/EN 61010: Safety requirements for electrical equipment for measurement, control and laboratory use
- NAMUR: International user association of automation technology in process industries ([www.namur.de](http://www.namur.de)).

## Accessories

### Device-specific accessories

- Mounting kit for head transmitter (4 screws, 6 springs, 10 fuses)  
**Order code: 51001112**
- Adapter for top-hat rail mounting, DIN rail clip according to IEC 60715  
**Order code: 51000856**
- Field housing TAF10 for Endress+Hauser head transmitter, aluminum, IP 66  
**Order code: TAF10**

### Communication-specific accessories

- FXA291 Commubox: PC interface cable, USB, with 4-pin connector;  
**Order code: 51516983**
- TXU10-AA: ReadWin® 2000 setup program and PC interface cable, USB, with 4-pin connector;  
**Order code: TXU10-AA**

ReadWin® 2000 can also be downloaded free of charge from the following website:  
[www.endress.com/readwin](http://www.endress.com/readwin)

### Service-specific accessories

Accessories	Description
Applicator	<p>Software for selecting and sizing Endress+Hauser measuring devices:</p> <ul style="list-style-type: none"> <li>▪ Calculation of all the necessary data for identifying the optimum measuring device: e.g. pressure loss, accuracy or process connections.</li> <li>▪ Graphic illustration of the calculation results</li> </ul> <p>Administration, documentation and access to all project-related data and parameters over the entire life cycle of a project.</p> <p>Applicator is available:</p> <ul style="list-style-type: none"> <li>▪ Via the Internet: <a href="https://portal.endress.com/webapp/applicator">https://portal.endress.com/webapp/applicator</a></li> <li>▪ On CD-ROM for local PC installation.</li> </ul>

Configurator	<p>Product Configurator - the tool for individual product configuration</p> <ul style="list-style-type: none"> <li>▪ Up-to-the-minute configuration data</li> <li>▪ Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language</li> <li>▪ Automatic verification of exclusion criteria</li> <li>▪ Automatic creation of the order code and its breakdown in PDF or Excel output format</li> <li>▪ Ability to order directly in the Endress+Hauser Online Shop</li> </ul> <p>The Configurator is available on the Endress+Hauser website: <a href="http://www.endress.com">www.endress.com</a> -&gt; Click "Corporate" -&gt; Select your country -&gt; Click "Products" -&gt; Select the product using the filters and the search field -&gt; Open the product page -&gt; The "Configure" button to the right of the product image opens the Product Configurator.</p>
W@M	<p>Life cycle management for your plant</p> <p>W@M supports you with a wide range of software applications over the entire process: from planning and procurement, to the installation, commissioning and operation of the measuring devices. All the relevant device information, such as the device status, spare parts and device-specific documentation, is available for every device over the entire life cycle.</p> <p>The application already contains the data of your Endress+Hauser device. Endress+Hauser also takes care of maintaining and updating the data records.</p> <p>W@M is available:</p> <ul style="list-style-type: none"> <li>▪ Via the Internet: <a href="http://www.endress.com/lifecyclemanagement">www.endress.com/lifecyclemanagement</a></li> <li>▪ On CD-ROM for local PC installation.</li> </ul>

## Supplementary documentation

Operating Instructions iTEMP TMT80 (BA00292R/09)

[www.addresses.endress.com](http://www.addresses.endress.com)

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