



Level



Pressure



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Temperature



Liquid  
Analysis



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Technical information

## iTEMP<sup>®</sup> TMT180

Temperature head transmitter

For resistance thermometers Pt100, settable using a PC,  
for installation in a sensor head Form B



### Application

- PC programmable (PCP) Temperature head transmitter for converting a Pt100 input signal into an scalable 4 to 20 mA analog output signal
- Input: Resistance thermometer Pt100
- Online configuration using PC with configuration kit and PC software

### Your benefits

- Universal PC programmable for Pt100 input signal
- 2 wire technology, 4 to 20 mA analog output
- High accuracy in total ambient temperature range
- Fault signal on sensor break or short circuit, presetable to NAMUR NE43
- EMC to IEC 61326, CE
- Online configuration during measurement using SETUP connector
- Customer specific measurement range setting
- GL (Germanischer Lloyd) marine approval
- Recognized component to UL 3111-1
- CSA General Purpose

## Function and system design

<b>Measurement principle</b>	Electronic measurement and conversion of Pt100 input signals in industrial temperature measurement.
<b>Measurement system</b>	The iTEMP® TMT180 temperature head transmitter is a two wire transmitter with an analog output. It has measurement input for resistance thermometer Pt100 in 2-, 3- or 4-wire connection. Setting up of the device is done using a configuration kit and the free of charge configuration software ReadWin® 2000.

## Input

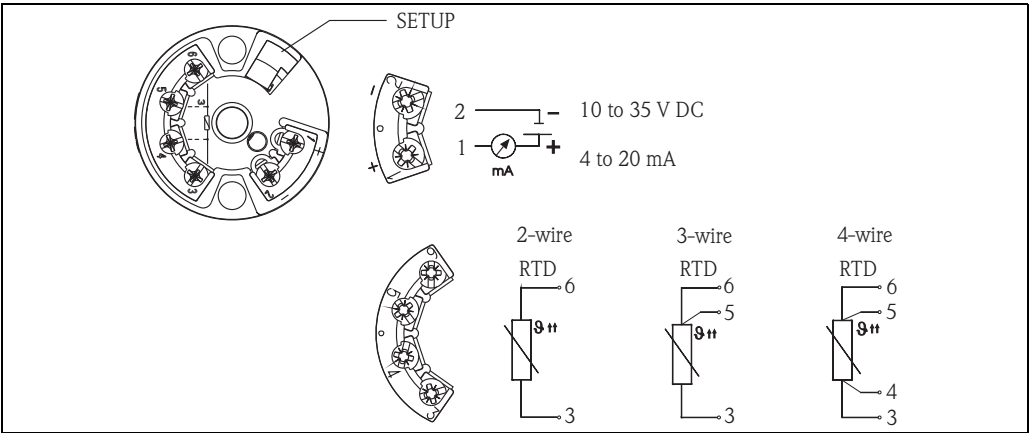
Measured variable	Temperature (temperature linear transmission behavior)		
Measurement range	Type	Measurement ranges	min. measurem. range
	Pt100 accord. to IEC 60751	-200 to +650 °C (-328 to +1202 °F)	10 K
		-50 to +250 °C (-58 to +482 °F)	10 K
-200 to +250 °C (-328 to +482 °F)		10 K	
	<div><div>■</div>Connection type: 2-, 3- or 4-wire connection cable resistance compensation possible in the 2-wire system (0 to 20 Ω)</div> <div><div>■</div>Sensor cable resistance: max. 11 Ω per cable</div> <div><div>■</div>Sensor current: ≤ 0.6 mA</div>		

## Output

<b>Output signal</b>	analog 4 to 20 mA, 20 to 4 mA
<b>Transmission behaviour</b>	temperature linear
<b>Failure information</b>	<ul style="list-style-type: none"> <li>■ Measurement range undercut: Linear drop to 3.8 mA</li> <li>■ Exceeding measurement range: Linear rise to 20.5 mA</li> <li>■ Sensor breakage; Sensor short circuit: ≤ 3.6 mA or ≥ 21.0 mA (if setting is ≥ 21.0 mA, an output signal ≥ 21.5 mA is guaranteed)</li> </ul>
<b>Load</b>	max. $(V_{\text{power supply}} - 10 \text{ V}) / 0.022 \text{ A}$ (Current output)
<b>Input current required</b>	≤ 3.5 mA
<b>Current limit</b>	≤ 23 mA
<b>Switch on delay</b>	4 s (during power up $I_a = 3.8 \text{ mA}$ )

# Power supply

## Electrical connection



Head transmitter terminal connections

Supply voltage	$U_b = 10 \text{ to } 35 \text{ V DC}$ , polarity protected
Residual ripple	Allowable ripple $U_{ss} \leq 3 \text{ V}$ at $U_b \geq 13 \text{ V}$ , $f_{\text{max.}} = 1 \text{ kHz}$

# Performance characteristics

Response time	1 s
Reference operating conditions	Calibration temperature $+25 \text{ }^\circ\text{C}$ ( $77 \text{ }^\circ\text{F}$ ) $\pm 5 \text{ K}$ ( $\pm 9 \text{ K}$ )
Maximum measured error	The accuracy data are typical values and correspond to a standard deviation of $\pm 3\sigma$ (normal distribution), i.e. 99.8% of all the measured values achieve the given values or better values. % is related to the adjusted measurement range (the value to be applied is the greater one).

	Type	Measurem. accuracy
Resistance thermometer (RTD)	Pt100 -200 to $+650 \text{ }^\circ\text{C}$ ( $-328$ to $+1202 \text{ }^\circ\text{F}$ )	0.2 K or 0.08%
	Pt100 <sup>1</sup> -50 to $+250 \text{ }^\circ\text{C}$ ( $-58$ to $+482 \text{ }^\circ\text{F}$ )	0.1 K or 0.08%
	Pt100 <sup>1</sup> -200 to $+250 \text{ }^\circ\text{C}$ ( $-328$ to $+482 \text{ }^\circ\text{F}$ )	0.2 K or 0.08%

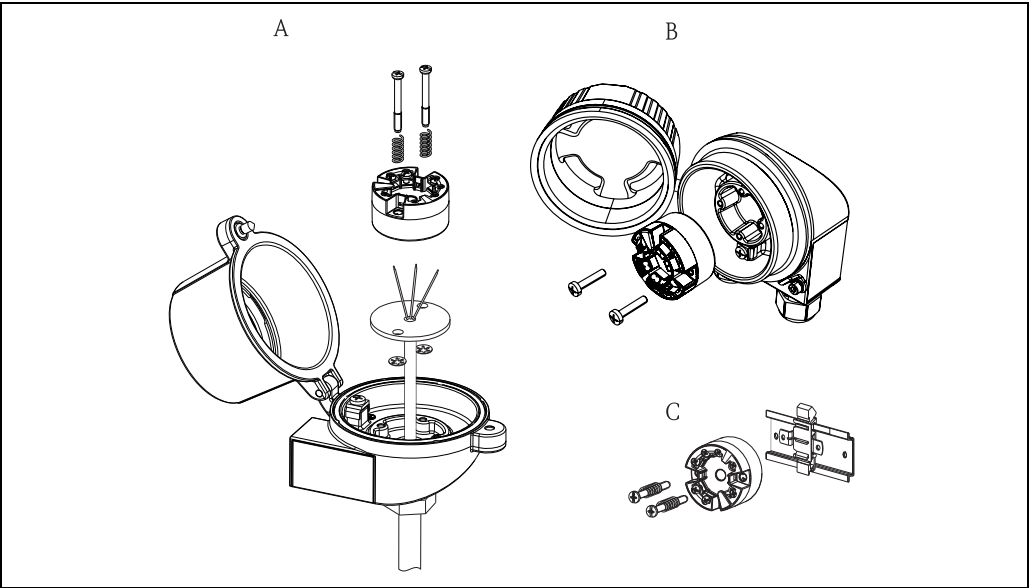
1. as option

Influence of power supply	$\leq \pm 0.01\%/V$ deviation from $24 \text{ V}$ <sup>1</sup>
Influence of ambient temperature (temperature drift)	Resistance thermometer (Pt100): $T_d = \pm (15 \text{ ppm/K} * (\text{measuring range end value} - \text{measuring range start value}) + 50 \text{ ppm/K} * \text{preset meas. range}) * \Delta \vartheta$  $\Delta \vartheta$ = Deviation of the ambient temperature according to reference condition ( $+25 \text{ }^\circ\text{C}$ ( $77 \text{ }^\circ\text{F}$ ) $\pm 5 \text{ K}$ ( $\pm 9 \text{ K}$ )).
Long term stability	$\leq 0.1 \text{ K/Year}^2$ or $\leq 0.05\%/Year$ <sup>2 3</sup>
Influence of load	$\leq \pm 0.02\%/100 \Omega$ <sup>1</sup>
	1. All data is related to a measurement end value. 2. according to reference conditions 3. % is related to the adjusted measurement range (the value to be applied is the greater one).

# Installation conditions

Installation instructions

■ Mounting location:



A: Terminal head as per DIN EN 50446 form B, direct installation onto insert with cable entry (middle hole 7 mm / 0.28")

B: Separated from process in field housing

C: With DIN rail clip on top-hat rail as per IEC 60715 (TH35)

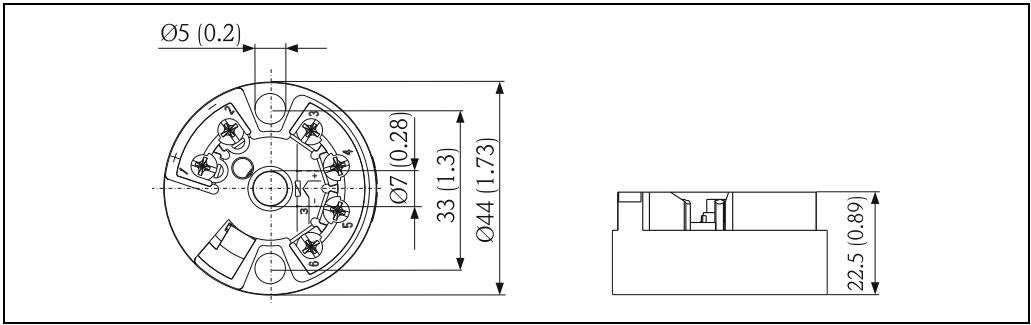
■ Orientation: No restriction

# Environment

Ambient temperature range	−40 to +85 °C (−40 to 185 °F)
Storage temperature range	−40 to +100 °C (−40 to 212 °F)
Climate class	according to IEC 60 654-1, Class C
Humidity	■ Condensation as per IEC 60 068-2-33 permitted ■ Max. rel. humidity: 95% as per IEC 60068-2-30
Degree of protection	IP 00. In the installed state, it depends on the terminal head or field housing used.
Shock and vibration resistance	4g / 2 to 150 Hz according to IEC 60 068-2-6
Electromagnetic compatibility (EMC)	Interference immunity and interference emission according to IEC 613261 and NAMUR NE21

# Mechanical construction

## Design, dimensions



Dimensions of the head transmitter in mm (in)

A0016380

Weight	approx. 40 g (1.41 oz)
Material	<ul style="list-style-type: none"><li>■ Housing: Polycarbonate (PC), complies with UL94 HB flammability standard (HB: horizontal burning test)</li><li>■ Terminals: Nickel-plated brass and gold-plated contact</li><li>■ Potting: WEVO PU 403 FP / FL, according to UL94 V0 flammability standard (V0: vertical burning test)</li></ul>
Terminals	Screw terminals, wires up to max. 1.75 mm <sup>2</sup> (AWG 16) – secure screws or 1.5 mm <sup>2</sup> (AWG 16) with wire end ferrules

# Human interface

## Operation via PC

Configuration via PC setup software ReadWin® 2000:

Menu	Configurable parameters
Standard settings	Connection mode (2-, 3- or 4-wire connection) Units (°C/°F) Measurement ranges
Expanded settings	Compensation resistance (0 to 20 Ω) on 2-wire connection Fault condition reaction Output (analog standard/inverse) Filter (0 to 60 s) Offset (-9.9 to +9.9 K) Measurement point identification/TAG
Service functions	Simulation (on/off)

# Certificates and approvals

CE mark	The measurement system fulfills the requirements demanded by the EU regulations. Endress+Hauser acknowledges successful unit testing by adding the CE mark.
UL	Recognized component to UL3111-1
CSA	CSA GP (General Purpose)
GL	Marine approval (Germanischer Lloyd)
Other standards and guidelines	<ul style="list-style-type: none"><li>■ IEC 60529: Degrees of protection through housing (IP code)</li><li>■ IEC 61010: Safety requirements for electrical measurement, control and laboratory instrumentation</li><li>■ IEC 61326: Electromagnetic compatibility (EMC requirements)</li><li>■ NAMUR: International user association of automation technology in process industries (<a href="http://www.namur.de">www.namur.de</a>)</li></ul>

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## Ordering information

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Detailed ordering information is available from the following sources:

- In the **Product Configurator** on the Endress+Hauser website: [www.endress.com](http://www.endress.com) → Select country → Instruments → Select device → Product page function: Configure this product
- From your Endress+Hauser Sales Center: [www.endress.com/worldwide](http://www.endress.com/worldwide)



### **Product Configurator - the tool for individual product configuration:**

- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

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## Accessories

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- Head transmitter installation set: (4 screws, 6 springs, 10 circlips),  
**Order-Code:** 51001112
- Adapter for DIN rail mounting, DIN rail clip according to IEC 60715  
**Order-Code:** 51000856

### **Configuration kits for PC programmable transmitters**

Operating software ReadWin<sup>®</sup> 2000 and PC-interface cable, 4-pin with USB-plug;

**Order-Code:** TXU10-AA

The operating software ReadWin<sup>®</sup> 2000 can be downloaded free of charge from the Internet from the following address:

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

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## Documentation

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Brief operating manual iTEMP<sup>®</sup> TMT180 (KA00118R/09/a3)



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