

Technical Information

iTEMP TMT80

Universal temperature head transmitter for
resistance thermometers and thermocouples
PC-programmable



Application

- PC programmable (PCP) temperature head transmitter for the conversion of different input signals into an analog, scalable 4 to 20 mA output signal
- For resistance thermometers (RTD) and thermocouples (TC)
- Device configuration via PC with configuration kit and PC software

Your benefits

- 2-wire power supply, analog output 4 to 20 mA
- Fault signal in the event of sensor break or sensor short circuit, adjustable as per NAMUR NE43
- Meets EMC requirements as per NAMUR NE21
- Galvanic isolation 500 V (input/output)
- Adjustment of the application-specific measuring range

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 two-wire transmitter with an analog output and a measuring input for resistance thermometers with a 2-, 3-, or 4-wire connection and thermocouples. The device is configured using a configuration kit and the free ReadWin 2000 operating software.

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"> ■ Connection type: 2-, 3- or 4-wire connection ■ With 2-wire circuit, compensation of wire resistance possible (0 to 20 Ω) ■ Cable resistance: sensor wire resistance up to max. 11 Ω per wire ■ Sensor current: ≤ 0.6 mA 			

Thermocouples as per standard	Designation	Measuring range limits	Min. span
IEC 60584, Part 1	Type B (PtRh30-PtRh6) (31)	+40 to +1 820 °C (+104 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"> ■ Internal reference junction (Pt100) ■ Reference junction accuracy: ± 1 K 			

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 ¹⁾:
 ≤ 3.6 mA or ≥ 21.0 mA (if setting is ≥ 21.0 mA an output current ≥ 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

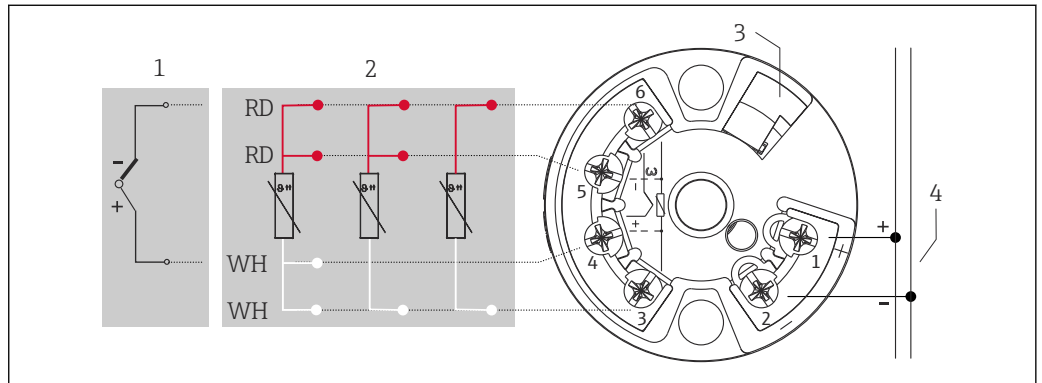
Input current required ≤ 3.5 mA

Current limit ≤ 25 mA

Switch-on delay 4 s

Power supply

Terminal assignment



A0047182

1 Transmitter mounted in the terminal head

- 1 Sensor input, TC
- 2 Sensor input, RTD and Ω: 4-, 3- and 2-wire
- 3 Display connection/CDI interface
- 4 Power supply

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

Residual ripple Permitted residual 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_{DC}
- 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
Resistance thermometer RTD	Pt100, Pt1000	0.5 K or 0.15%
Thermocouples TC	K, N S, B, R	typ. 1.0 K or 0.15 % typ. 2.0 K or 0.15 %

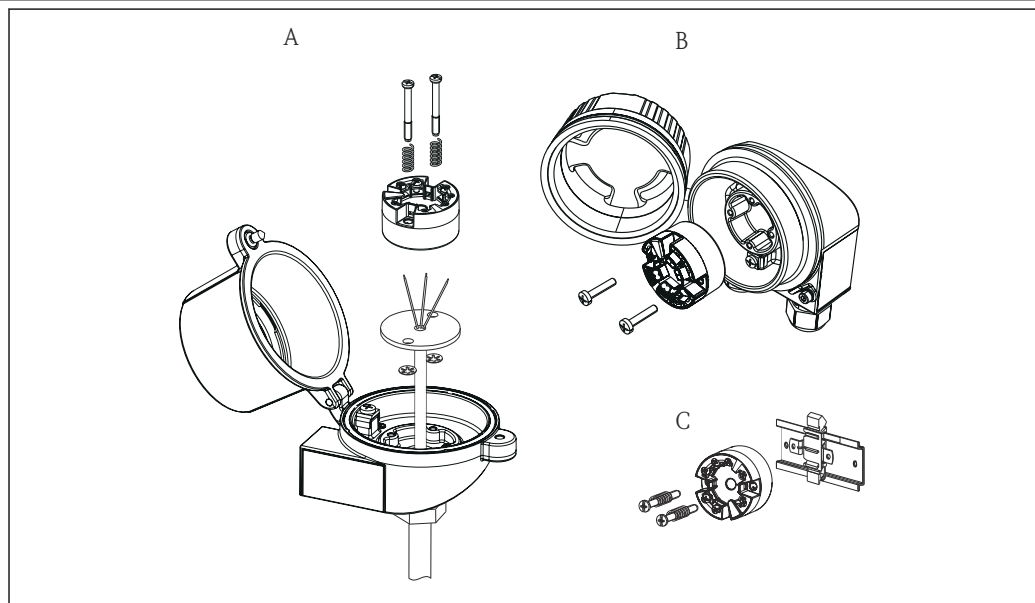
Influence of the supply voltage ≤ ±0.01%/V deviation from 24 V²⁾

2) All data is related to a full scale value

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

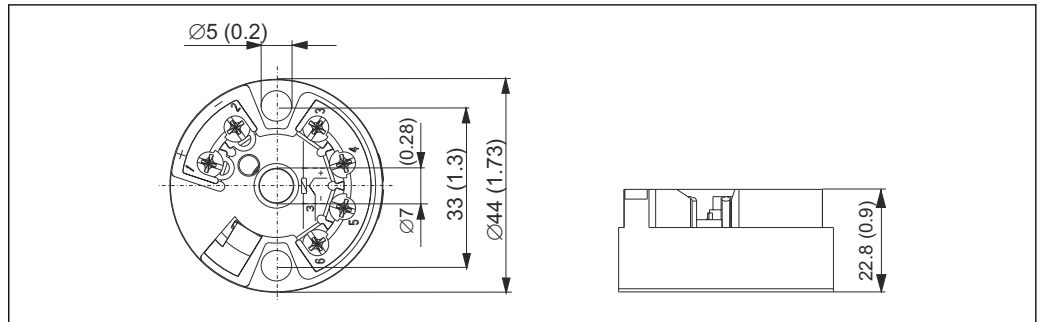
Ambient temperature range -40 to +85 °C (-40 to +185 °F)

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

Storage temperature	-40 to +100 °C (-40 to +212 °F)
Humidity	<ul style="list-style-type: none"> ■ Condensation as per IEC 60 068-2-33: ■ Max. rel. humidity: 95% as per IEC 60068-2-30
Climate class	As per IEC 60 654-1, Class C
Degree of protection	IP 00. Depends on the terminal head or field housing when installed.
Shock and vibration resistance	4 g / 2 to 150 Hz as per IEC 60 068-2-6
Electromagnetic compatibility (EMC)	<p>CE compliance</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 <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)

Weight	Approx. 40 g (1.41 oz)
Materials	<ul style="list-style-type: none"> ■ Housing: Polycarbonate (PC), complies with UL94 HB flammability standard (HB: Horizontal Burning Test). Terminals: nickel-plated brass and gold-plated or tin-plated contacts. ■ Potting: WEVO PU 403 FP/FL, approved in accordance with UL94 VO flammability standard (VO: Vertical Burning Test)
Terminals	Screw terminals, wires up to max. 1.75 mm ² (15 AWG) (secure screws) or 1.5 mm ² (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"> ▪ Options for sensor type ▪ Connection type (2-, 3- or 4-wire connection) ▪ Options for measuring unit: °C, °F ▪ Measuring range limits (dependent on sensor type selected) ▪ Compensation of wire resistance (0 to 20 Ω for RTD 2-wire circuit) ▪ Failsafe mode: ≤ 3.6 mA or ≥21.0 mA; (if setting ≥ 21.0 mA, an output current of ≥21.5 mA is guaranteed) ▪ Zero point, offset: -9.9 to +9.9 K

Certificates and approvals

Current certificates and approvals for the product are available via the Product Configurator at www.endress.com.

1. Select the product using the filters and search field.
2. Open the product page.

The **Configuration** button opens the Product Configurator.

Accessories

Device-specific accessories

- Mounting kit for head transmitter (4 screws, 6 springs, 10 fuses)
Order code: 51001112
- Adapter for DIN rail mounting, DIN rail clip according to IEC 60715
Order code.: 71528231
- 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 plug;
Order code: 51516983
- TXU10-AA: ReadWin 2000 setup program and PC interface cable, USB, with 4-pin plug;
Order code: TXU10-...

ReadWin 2000 can also be downloaded directly from the Internet for free at the following address:
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"> ▪ Calculation of all the necessary data for identifying the optimum measuring device: e.g. pressure loss, accuracy or process connections. ▪ Graphic illustration of the calculation results <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"> ▪ Via the Internet: https://portal.endress.com/webapp/applicator ▪ On CD-ROM for local PC installation.

Configurator	<p>Product Configurator - the tool for individual product configuration</p> <ul style="list-style-type: none">▪ 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 <p>The Configurator is available on the Endress+Hauser website: www.endress.com -> Click "Corporate" -> Select country -> Click "Products" -> Select the product using the filters and search field -> Open product page -> 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 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">▪ Via the Internet: www.endress.com/lifecyclemanagement▪ On CD-ROM for local PC installation.

Supplementary documentation

Operating Instructions iTEMP TMT80 (BA00292R)



www.addresses.endress.com
