Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

iTEMP® TMT80

Universal temperature head transmitter for resistance thermometers and thermocouples PC programmable

Application
- PC programmable (PCP) temperature head transmitter for converting various input signals into a scalable 4 to 20 mA analog output signal
- Suitable for resistance thermometer (RTD) and thermocouple (TC)
- Device configuration using PC with configuration kit and PC software ReadWin® 2000

Benefits at a glance
- 2-wire technology, 4 to 20 mA analog output
- Fault signal on sensor break or short circuit, presettable to NAMUR NE43
- Meets the EMC requirements as per NAMUR NE21
- Galvanic isolation 500 V (input/output)
- Application specific measuring range setting

CE

TI153R/09/en
71113685

Endress+Hauser
People for Process Automation

Function and system design

Measuring principle

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

Measuring system

The temperature head transmitter iTEMP® TMT80 is a two wire transmitter with analog output. It has a measurement input for resistance thermometers (RTD) in 2-, 3-, or 4-wire connection and thermocouples. 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)

Measuring range

The transmitter records different measuring ranges depending on the sensor connection and input signals:

Type of input	Designation	Measuring range limits	min. measuring span
Resistance thermometer (RTD) according to IEC 60751 (α = 0,00385)	Pt100 Pt1000	-200 to 850 °C (-328 to 1562 °F) -200 to 250 °C (-328 to 482 °F)	10 K (18 °F) 10 K (18 °F)
	■ Connection type: 2-wire, 3-wire or 4-wire connection ■ For 2-wire circuit, compensation for wire resistance possible (0 to 20 Ω) ■ Sensor cable resistance max. 11 Ω per cable ■ Sensor current: ≤ 0.6 mA		
Thermocouples (TC) according to IEC 60584 part 1	B (PtRh30-PtRh6) K (NiCr-Ni) N (NiCrSi-NiSi) R (PtRh13-Pt) S (PtRh10-Pt)	0 to +1820 °C (32 to 3308 °F) -270 to +1372 °C (-454 to 2501 °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)	500 K (900 °F) 50 K (90 °F) 50 K (90 °F) 500 K (900 °F) 500 K (900 °F)
	■ Internal cold junction (Pt100) ■ Cold junction accuracy: ± 1 K (1.8 °F)		

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 break; sensor short circuit[1]:
- ≤ 3.6 mA or ≥ 21.0 mA (if setting is ≥ 21.0 mA, an output signal ≥ 21.5 mA is guaranteed)

Load

max. ($V_{Power\ supply}$ - 8 V) / 0.025 A (current output)

Linearization / transmission behavior

Temperature linear

Galvanic isolation

U = 500 V AC (input/output)

Min. current consumption

≤ 3.5 mA

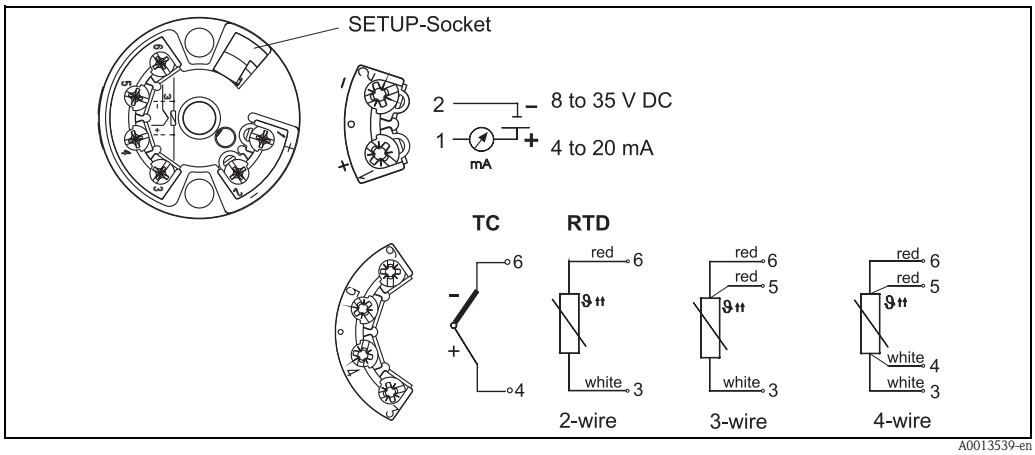
1. Not for thermocouple

Current limit ≤ 25 mA

Switch-on delay 4 s (during power up $I_a \approx 3.8$ mA)

Power supply

Electrical connection



Terminal assignment of temperature transmitter

Supply voltage U_b = 8 to 35 V DC, polarity protected

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 ± 5 K (77 °F ± 9 °F)
- Supply voltage: 24 V DC
- 4-wire circuit for resistance adjustment

Maximum measured error The accuracy data are typical values and correspond to a standard deviation of ± 3σ (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	Measurement accuracy
Resistance thermometer RTD	Pt100, Pt1000	0.5 K (0.9 °F) or 0.15%
Thermocouple TC	K, N S, B, R	typ. 1.0 K (1.8 °F) or 0.15% typ. 2.0 K (3.6 °F) or 0.15%

Influence of power supply ≤ ± 0.01%/V deviation from 24 V[1]

1. All data is related to a measurement end value

Influence of ambient temperature (temperature drift)

- Resistance thermometer (RTD):
  $T_d = \pm[(15\ ppm/K * (Measuring\ range\ end\ value - measuring\ range\ start\ value)) + (50\ ppm/K * preset\ measuring\ range)] * \Delta\vartheta$
  Example RTD thermometer Pt100:
  $T_d = \pm[(15\ ppm/K * (850\ °C + 200\ °C)) + (50\ ppm/K * 100\ °C)] * 10\ K = \pm 0.21\ K$
  Measuring range end value: 850 °C, measuring range start value: -200 °C, measuring range (4...20 mA) preset = 0...+100 °C, ambient temperature deviation $\Delta\vartheta = 10$ K

- Thermocouple (TC):
  $T_d = \pm[(50\ ppm/K * (Measurement\ range\ end\ value - measurement\ range\ start\ value)) + (50\ ppm/K * preset\ measurement\ range)] * \Delta\vartheta$

$\Delta\vartheta$ = Deviation of the ambient temperature according to the reference condition +25 °C ± 5 K (77 °F ± 9 °F).

Long term stability

≤ 0.1K/year (≤ 0.18 °F/year) or ≤ 0.05%/year[1] [2]

Influence of load

≤ ±0.02%/100 Ω[1]

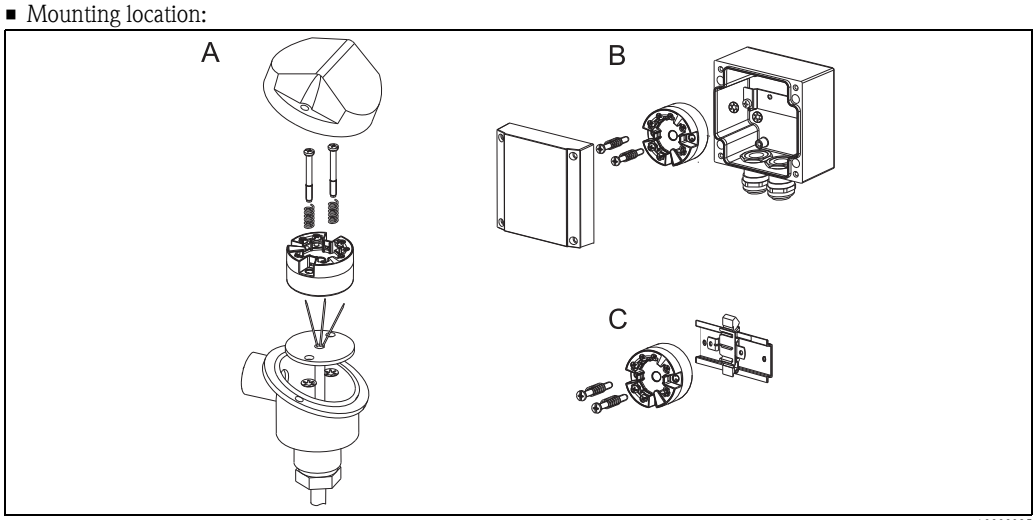
Influence of cold junction

Pt100, according to DIN IEC 60751 Class B (internal reference junction for thermocouples TC)

Installation conditions

Installation instructions

- Mounting location:



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A: Terminal head as per DIN 43 729 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 restrictions

Environment conditions

Ambient temperature

–40 to +85 °C (-40 to 185 °F)

Storage temperature

-40 to +100 °C (-40 to 212 °F)

Climate class

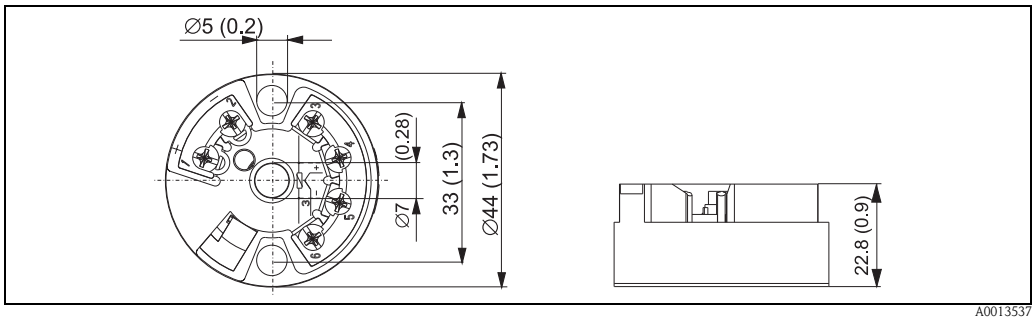
According to IEC 60654-1, Class C

1. According to reference conditions
2. % is related to the adjusted measurement range. The value to be applied is the greater one.

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 61326 and NAMUR NE21
Humidity	■ Condensation as per IEC 60 068-2-33 permitted ■ Max. rel. humidity: 95% as per IEC 60068-2-30

Mechanical construction

Design, dimensions



Dimensions in mm (in)

Weight	40 g (2.11 oz)
Material	■ Housing: Polycarbonate (PC), complies with UL94 HB flammability standard (HB: horizontal burning test) Terminals: Nickel-plated brass and gold-plated contact ■ Potting: WEVO PU 403 FP / FL, according to UL94 V0 flammability standard (V0: vertical burning test)
Terminals	Screw terminals, wires up to max. 1.75 mm² (16 AWG) - secure screws or 1.5 mm² (16 AWG) with wire end ferrules

Human interface

Operation via PC

Configuration via PC setup software ReadWin® 2000:

Menu	Configurable parameters
Standard settings	■ Sensor type ■ Connection (2-, 3- or 4-wire connection) ■ Units: °C, °F ■ Measurements range limits (depends on selected sensor type) ■ Compensation resistance (0 to 20 Ω) on RTD 2-wire connection ■ Fault condition reaction: ≤ 3.6 mA or ≥ 21.0 mA; (for configuration ≥ 21.0 mA an output signal ≥ 21.5 mA is guaranteed) ■ Zero point, offset: -9.9 to +9.9 K / -18 to +18 °F)

Certificates and approvals

CE-Mark

The device meets the legal requirements of the EC directives. Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.

Other standards and guidelines

- IEC 60529: Degrees of protection through housing (IP code)
- IEC 61010: Safety requirements for electrical measurement, control and laboratory instrumentation
- IEC 61326: Electromagnetic compatibility (EMC requirements)
- NAMUR: International user association of automation technology in process industries (www.namur.de)

Ordering information

Product structure

This information provides an overview of the order options available. The information is not exhaustive, however, and may not be fully up to date. **More detailed** information is available from your local Endress+Hauser representative.

TMT80	**iTEMP® TMT80** PC-programmable temperature transmitter; Application: RTD, TC; 2-wire 4-20 mA, galvanic isolation; Fault reaction: NAMUR NE43; Mounting: terminal head form B according to DIN EN 50446 Factory setup: Pt100, 3-wire, 0...100 °C, sensor type/connection optional selectable

	Approval	
	AA	Non-hazardous area

TMT80-	**AA**	⇐ **Order code** (part 1)

Additional selection (as option - no selection or multiple selection is possible)

	Adjustment Sensor type	
	C1	Pt100, -200...850 °C, min. span 10 K, IEC60751, measuring range to be specified
	C2	Pt1000, -200...250 °C, min. span 10 K, IEC60751, measuring range to be specified
	CA	Type B, 0...1820 °C, min. span 500 K, IEC60584, measuring range to be specified
	CB	Type K, -200...1370 °C, min. span 50 K, IEC60584, measuring range to be specified
	CC	Type N, -270...1300 °C, min. span 50 K, IEC60584, measuring range to be specified
	CD	Type R, -50...1768 °C, min. span 500 K, IEC60584, measuring range to be specified
	CE	Type S, -50...1768 °C, min. span 500 K, IEC60584, measuring range to be specified
	Connection	
	D2	RTD 2-wire
	D3	RTD 3-wire
	D4	RTD 4-wire
	Calibration	
	FA	Works calibration certificate 6-point
	Test, certificate	
	KH	Configuration report
	Marking	
	Z2	Tagging (TAG), on device
	Z3	Commissioning label, paper

TMT80-	**AA**	+						⇐ **Order code, complete** (part 1 + additional selection as option)

Accessories

- 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
- Field housing TAF10 for Endress+Hauser head transmitter, aluminum, IP 66
  Order-Code: TAF10

Configuration kits for PC programmable transmitters

- FXA291 Commubox: PC-interface cable with 4-pin USB-plug;
  Order-Code: 51516983
- TXU10-AA: Setup-program ReadWin® 2000 and PC-interface cable with 4-pin USB-plug;
  Order-Code: TXU10-AA

The operating software ReadWin® 2000 can be downloaded free of charge from the Internet from the following address:
www.endress.com/readwin

Documentation

Operating Instructions "iTEMP® TMT80" (BA292R/09/a3)

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