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

Technical Information

iTEMP® TMT82

Dual-input temperature transmitter with HART® protocol

Applications

- Temperature transmitter with 2 input channels and HART® communication for the conversion of different input signals into a scalable, analog 4 to 20 mA output signal
- The iTEMP® TMT82 stands out due to its reliability, long-term stability, high precision and advanced diagnostics (important in critical processes)
- For the highest level of safety, reliability and risk reduction
- Universal input for resistance thermometers (RTD), thermocouples (TC), resistance transmitters (Ω), voltage transmitters (mV)
- Installation in flat-face terminal head as per DIN EN 50446
- Optional installation in field housing even for use in Ex d applications
- Device design for DIN rail mounting optional

Your benefits

- Safe operation in hazardous areas
  International approvals such as
  – FM IS, NI
  – CSA IS, NI
  – ATEX, NEPSI, IECEx Ex ia, Ex nA
- Protocol extension for safe HART® transmission
- High accuracy of measuring point through sensor-transmitter matching
- Reliable operation with sensor monitoring and device hardware fault recognition
- Diagnostics information according to NAMUR NE107
- Several mounting versions and sensor connection combinations
- Rapid no-tools wiring due to optional spring terminal technology
- Write protection for device parameters

TI01010T/09/EN/15.12
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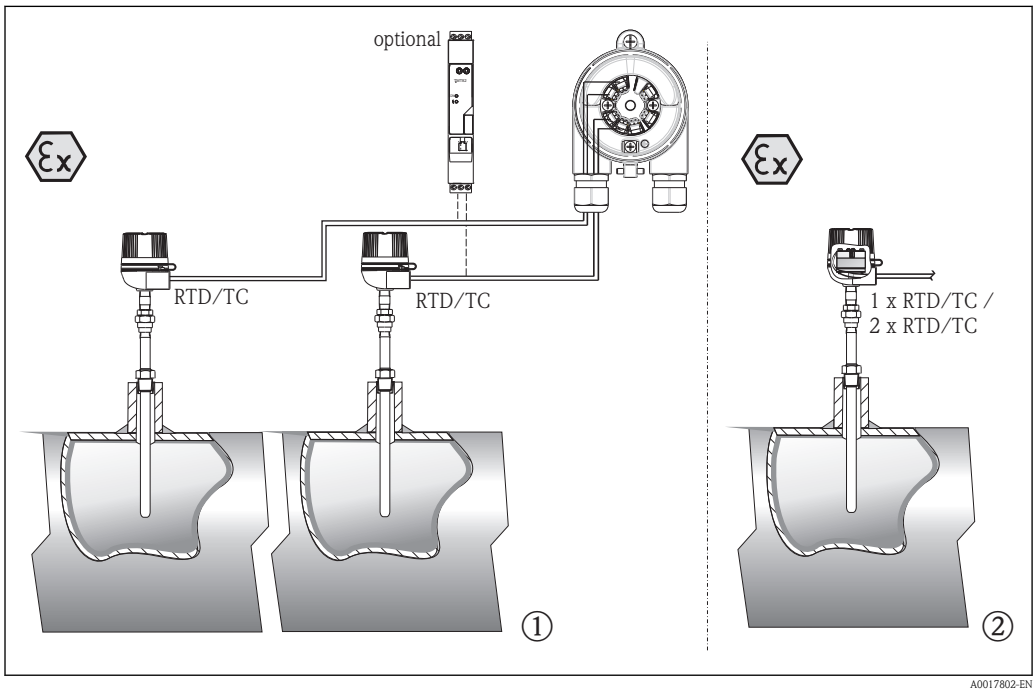
Endress+Hauser
People for Process Automation

Function and system design

Measuring principle

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

Measuring system



1 Application examples

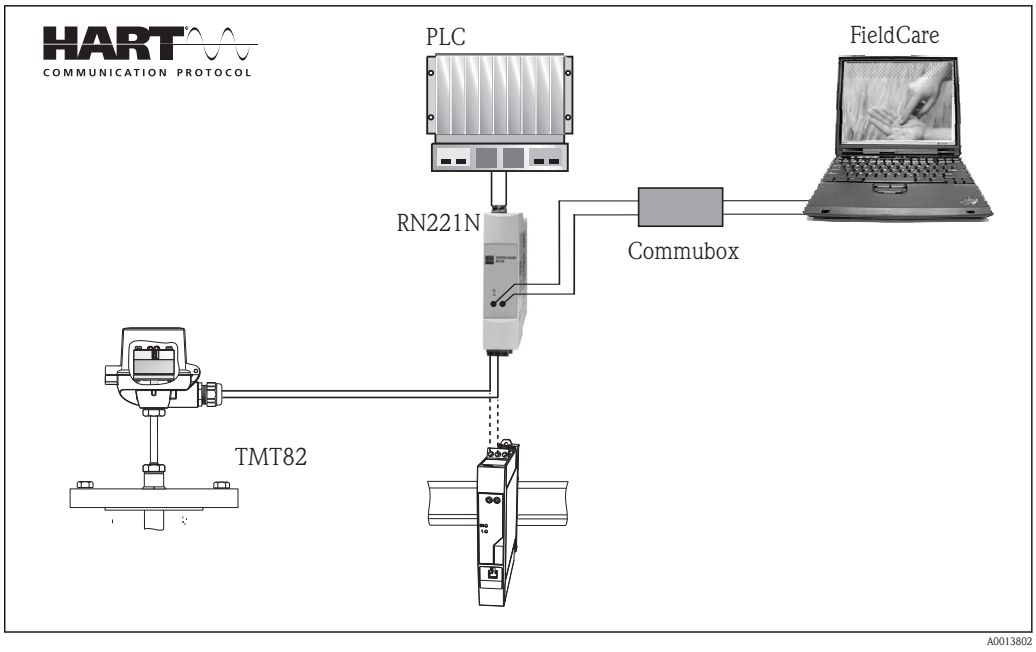
① *Two sensors with measuring input (RTD or TC) in remote installation with the following advantages: drift warning, sensor backup function and temperature-dependent sensor switching*

② *Integrated transmitter – 1 x RTD/TC or 2 x RTD/TC for redundancy*

Endress+Hauser offers a comprehensive range of industrial thermometers with resistance sensors or thermocouples.

When combined with the temperature transmitter, these components form a complete measuring point for a wide range of applications in the industrial sector.

The temperature transmitter is a 2-wire device with two measuring inputs and one analog output. The device not only transfers converted signals from resistance thermometers and thermocouples, it also transfers resistance and voltage signals using HART® communication and as a 4 to 20 mA current signal. It can be installed as an intrinsically safe apparatus in hazardous areas. It is used for instrumentation in the terminal head (flat face) as per DIN EN 50446 or as a DIN rail device for installation in the control cabinet on a TH35 mounting rail as per IEC 60715.



2 Device architecture for HART® communication

Standard diagnostic functions

- Cable open-circuit, short-circuit of sensor wires
- Incorrect wiring
- Internal device errors
- Overrange/underrange detection
- Ambient temperature out-of-range detection

Corrosion detection as per NAMUR NE89

Corrosion of the sensor connection cables can cause incorrect measured value readings. The transmitter offers the possibility of detecting any corrosion of the thermocouples and resistance thermometers with 4-wire connection before a measured value is corrupted. The transmitter prevents incorrect measured values from being exported and can issue a warning via the HART® protocol if conductor resistance values exceed plausible limits.

Low voltage detection

The low voltage detection function prevents the device from continuously transmitting an incorrect analog output value (caused by an incorrect or damaged power supply system or a damaged signal cable). If the supply voltage drops below the required value, the analog output value drops to < 3.6 mA for approx. 5 seconds. The device then tries to output the normal analog output value again. If the supply voltage is still too low, this process is repeated cyclically.

2-channel functions

These functions increase the reliability and availability of the process values:
- Sensor backup switches to the second sensor if the primary sensor fails
- Drift warning or alarm if the deviation between sensor 1 and sensor 2 is less than or greater than a predefined limit value
- Temperature-dependent switching between sensors which are used in different measuring ranges
- Mean value or differential measurement from two sensors
- Mean value measurement with sensor redundancy

Input

Measured variable

Temperature (temperature-linear transmission behavior), resistance and voltage.

Type of input

Two independent sensors can be connected. The measuring inputs are not galvanically isolated from each other.

Type of input	Designation	Measuring range limits		Min. span
Resistance thermometer (RTD) as per IEC 60751:2008 (α = 0.003851)	Pt100 Pt200 Pt500 Pt1000	–200 to +850 °C (–328 to +1 562 °F) –200 to +850 °C (–328 to +1 562 °F) –200 to +500 °C (–328 to +932 °F) –200 to +250 °C (–328 to +482 °F)		10 K
as per JIS C1604:1984 (α = 0.003916)	Pt100	–200 to +510 °C (–328 to +950 °F)		10 K
as per DIN 43760 IPTS-68 (α = 0.006180)	Ni100 Ni120	–60 to +250 °C (–76 to +482 °F) –60 to +250 °C (–76 to +482 °F)		10 K
as per GOST 6651-94 (α = 0.003910) (for Cu: α = 0.004280)	Pt100 Pt50 Cu50	–200 to +850 °C (–328 to +1 562 °F) –185 to +1 100 °C (–301 to +2 012 °F) –175 to +200 °C (–283 to +392 °F)		10 K
as per OIML R84: 2003 and GOST 6651-94 (α = 0.006170) (for Cu: α = 0.004260)	Cu50 Ni100 Ni120	–50 to +200 °C (–58 to +392 °F) –60 to +180 °C (–76 to +356 °F) –60 to +180 °C (–76 to +356 °F)		10 K
as per OIML R84: 2003 (α = 0.004280)	Cu50	–180 to +200 °C (–292 to +392 °F)		10 K
	Pt100 (Callendar van Dusen) Nickel polynomial Copper polynomial	The measuring range limits are specified by entering the limit values that depend on the coefficients A to C and R0.		10 K
	■ Type of connection: 2-wire, 3-wire or 4-wire connection, sensor current: ≤ 0.3 mA ■ With 2-wire circuit, compensation of wire resistance possible (0 to 30 Ω) ■ With 3-wire and 4-wire connection, sensor wire resistance up to max. 50 Ω per wire			
Resistance transmitter	Resistance Ω	10 to 400 Ω 10 to 2 000 Ω		10 Ω 100 Ω
Thermocouples (TC) to IEC 584 part 1			Recommended temperature range:	
	Type B (PtRh30-PtRh6)	+40 to +1 820 °C (+104 to +3 308 °F)	+100 to +1 500 °C (+212 to +2 732 °F)	50 K
	Type E (NiCr-CuNi)	–270 to +1 000 °C (–454 to +1 832 °F)	0 to +750 °C (+32 to +1 382 °F)	50 K
	Type J (Fe-CuNi)	–210 to +1 200 °C (–346 to +2 192 °F)	+20 to +700 °C (+68 to +1 292 °F)	50 K
	Type K (NiCr-Ni)	–270 to +1 372 °C (–454 to +2 501 °F)	0 to +1 100 °C (+32 to +2 012 °F)	50 K
	Type N (NiCrSi-NiSi)	–270 to +1 300 °C (–454 to +2 372 °F)	0 to +1 100 °C (+32 to +2 012 °F)	50 K
	Type R (PtRh13-Pt)	–50 to +1 768 °C (–58 to +3 214 °F)	0 to +1 400 °C (+32 to +2 552 °F)	50 K
	Type S (PtRh10-Pt)	–50 to +1 768 °C (–58 to +3 214 °F)	0 to +1 400 °C (+32 to +2 552 °F)	50 K
	Type T (Cu-CuNi)	–260 to +400 °C (–436 to +752 °F)	–185 to +350 °C (–301 to +662 °F)	50 K
As per ASTM E988	Type C (W5Re-W26Re)	0 to +2 315 °C (+32 to +4 199 °F)	0 to +2 000 °C (+32 to +3 632 °F)	50 K
	Type D (W3Re-W25Re)	0 to +2 315 °C (+32 to +4 199 °F)	0 to +2 000 °C (+32 to +3 632 °F)	
to DIN 43710	Type L (Fe-CuNi)	–200 to +900 °C (–328 to +1 652 °F)	0 to +750 °C (+32 to +1 382 °F)	50 K
	Type U (Cu-CuNi)	–200 to +600 °C (–328 to +1 112 °F)	–185 to +400 °C (–301 to +752 °F)	
	■ Internal cold junction (Pt100) ■ External cold junction: configurable value –40 to +85 °C (–40 to +185 °F) ■ Max. sensor resistance k10 kΩ (if sensor resistance is greater than 10 kΩ, an error message as per NAMUR NE89 is output)			
Voltage transmitter (mV)	Millivolt transmitter (mV)	–20 to 100 mV		5 mV

The following connection combinations are possible when both sensor inputs are assigned:

		Sensor input 1			
		RTD or resistance transmitter, 2-wire	**RTD or resistance transmitter, 3-wire**	**RTD or resistance transmitter, 4-wire**	**Thermocouple (TC), voltage transmitter**
Sensor input 2	**RTD or resistance transmitter, 2-wire**	✓	✓	-	✓
	RTD or resistance transmitter, 3-wire	✓	✓	-	✓
	RTD or resistance transmitter, 4-wire	-	-	-	-
	Thermocouple (TC), voltage transmitter	✓	✓	✓	✓

Output

Output signal

Analog output	4 to 20 mA, 20 to 4 mA (can be inverted)
Signal encoding	FSK ±0.5 mA via current signal
Data transmission rate	1200 baud
Galvanic isolation	U = 2 kV AC (input/output)

Failure information

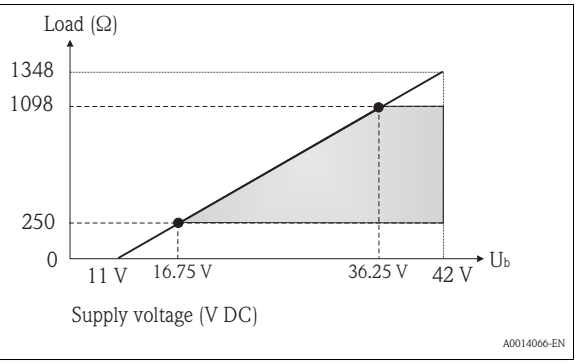
Failure information as per NAMUR NE43:

Failure information is created if the measuring information is missing or not valid. A complete list of all the errors occurring in the measuring system is created.

Underranging	Linear drop from 4.0 to 3.8 mA
Overranging	Linear increase from 20.0 to 20.5 mA
Failure, e.g. sensor breakage, sensor short-circuit	≤ 3.6 mA ("low") or ≥ 21 mA ("high"), can be selected The "high" alarm setting can be set between 21.5 mA and 23 mA, thus providing the flexibility needed to meet the requirements of various control systems.

Load

$R_{b\,max.} = (U_{b\,max.} - 11\ V) / 0.023\ A$ (current output)



Linearization/transmission behavior

Temperature-linear, resistance-linear, voltage-linear

Network frequency filter

50/60 Hz

Filter

1st order digital filter: 0 to 120 s

Protocol-specific data

HART® version	6
Device address in multi-drop mode	Software setting addresses 0 to 63
Device description files (DD)	Information and files are available free of charge at: www.endress.com www.hartcomm.org
Load (communication resistor)	min.250 Ω

Write protection for device parameters

- Hardware: Write protection on optional display using DIP switch
- Software: Write protection using password

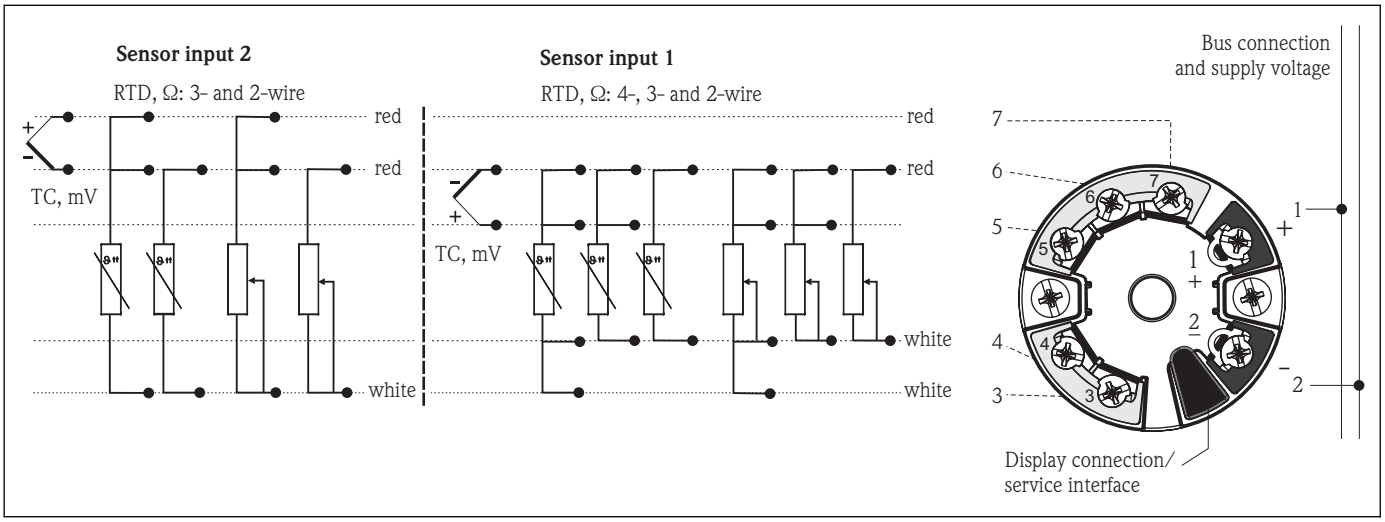
Switch-on delay

10 s, during switch-on delay $I_a \leq 3.8$ mA

Power supply

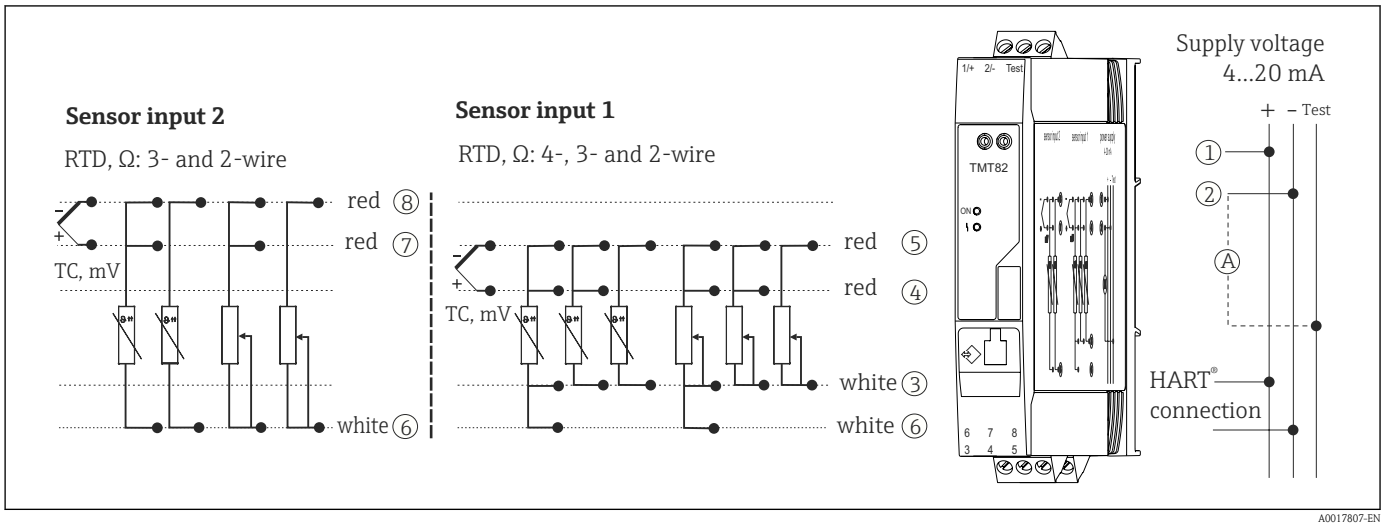
Electrical connection

Head transmitter



3 Assignment of terminal connections for head transmitter

DIN rail device



4 Assignment of terminal connections for DIN rail device

A To check the output current, an amperemeter (DC measurement) can be connected between the "Test" and "-" terminals.

To operate the device via the HART® protocol (terminals 1 and 2), a minimum load of 250 Ω is required in the signal circuit.

Supply voltage

Values for non-hazardous areas, protected against polarity reversal:
- Head transmitter
  - 11 V ≤ Vcc ≤ 42 V (standard)
  - I: < 22.5 mA
- DIN rail device
  - 12 V ≤ Vcc ≤ 42 V (standard)
  - I: < 22.5 mA

Values for hazardous areas, see Ex documentation (→ 18).

Current consumption

- 3.6 to 23 mA
- Minimum current consumption 3.5 mA, multidrop mode 4 mA
- Current limit ≤ 23 mA

Residual ripple

Permanent residual ripple U_{ss} ≤ 3 V at U_b ≥ 13.5 V, $f_{max.}$ = 1 kHz

Accuracy

Response time

The measured value update depends on the type of sensor and connection method and moves within the following ranges:

Resistance thermometer (RTD)	0.9 to 1.2 s (depends on the connection method 2/3/4-wire)
Thermocouples (TC)	0.7 s
Reference temperature	0.5 s

When recording step responses, it must be taken into account that the times for the measurement of the second channel and the internal reference measuring point are added to the specified times where applicable.

Reference 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 data concerning the various measured errors are typical values and correspond to a standard deviation of ±3 σ (normal distribution), i.e. 99.8 % of all the measured values achieve the given values or better values.

	Designation/measuring range	Accuracy	
		digitally [1]	D/A [2]
Resistance thermometer (RTD)	Pt100, Ni100, Ni120	0.1 °C (0.18 °F)	0.03 %
	Pt500	0.3 °C (0.54 °F)	0.03 %
	Cu50, Pt50, Pt1000	0.2 °C (0.36 °F)	0.03 %
	Pt200	1.0 °C (1.8 °F)	0.03 %
Thermocouples (TC)	Type: K, J, T, E, L, U	0.25 °C (0.45 °F)	0.03 %
	Type: N, C, D	0.5 °C (0.9 °F)	0.03 %
	Type: S, B, R	1.0 °C (1.8 °F)	0.03 %
Resistance transmitters (Ω)	10 to 400 Ω	±0.04 Ω	0.03 %
	10 to 2000 Ω	±0.8 Ω	0.03 %
Voltage transmitter (mV)	–20 to 100 mV	±10 µV	0.03 %

1) using HART® transmitted measured value
2) % refers to the set span. Accuracy of current output = digital + D/A accuracy

Physical input measuring range of sensors	
10 to 400 Ω	Cu50, Cu100, polynomial RTD, Pt50, Pt100, Ni100, Ni120
10 to 2000 Ω	Pt200, Pt500, Pt1000
–20 to 100 mV	Thermocouples type: B, C, D, E, J, K, L, N, R, S, T, U

Sensor adjustment

Sensor transmitter matching

RTD sensors are one of the most linear temperature measuring elements. Nevertheless, the output must be linearized. To significantly improve temperature measurement accuracy, the device allows the use of two methods:

- Callendar-Van-Dusen coefficients (Pt100 resistance thermometer)
  The Callendar-Van-Dusen equation is described as:
  $R_T = R_0[1+AT+BT^2+C(T-100)T^3]$

  The coefficients A, B and C are used to match the sensor (platinum) and transmitter in order to improve the accuracy of the measuring system. The coefficients for a standard sensor are specified in IEC 751. If no standard sensor is available or if greater accuracy is required, the coefficients for each sensor can be determined specifically with the aid of sensor calibration.

- Linearization for copper/nickel resistance thermometers (RTD)
  The polynomial equation for copper/nickel is as follows:
  $R_T = R_0(1+AT+BT^2)$

  The coefficients A and B are used for the linearization of nickel or copper resistance thermometers (RTD). The exact values of the coefficients derive from the calibration data and are specific to each sensor. The sensor-specific coefficients are then sent to the transmitter.

Sensor transmitter matching using one of the methods explained above significantly improves the temperature measurement accuracy of the entire system. This is because the transmitter uses the specific data pertaining to the connected sensor to calculate the measured temperature, instead of using the standardized sensor curve data.

1-point adjustment (offset)

Shifts the sensor value

2-point adjustment (sensor trimming)

Correction (slope and offset) of the measured sensor value at transmitter input

Current output adjustment

Correction of the 4 or 20 mA current output value

Non-repeatability

Input	Reproducibility
10 to 400 Ω	±15 mΩ
10 to 2 000 Ω	±100 ppm * Measured value
–20 to 100 mV	±4 µV
Output (4 to 20 mA)	
≤ 2 µA	

Influence of the supply voltage

≤ ±0.0025%/V, with reference to the span

Long-term stability

≤ 0.1 °C/year (≤ 0.18 °F/year) or ≤ 0.05 %/year

Data under reference operating conditions. % refers to the set span. The larger value is valid.

Influence of ambient temperature (temperature drift)

Total temperature drift = input temperature drift + output temperature drift

Impact on accuracy when ambient temperature changes by 1 K (1.8 °F):	
Input10 to 400Ω	Typ. 0.001 % of the measured value, min. 1 mΩ
Input10 to 2 000 Ω	Typ. 0.001 % of the measured value, min. 10 mΩ
Input–20 to 100 mV	Typ. 0.001 % of the measured value, min. 0.2 µV
Output4 to 20 mA	Typ. 0.0015 % of the span

Typical sensitivity of resistance thermometers:		
Pt: 0.00385 * R_{nom}/K	Cu: 0.0043 * R_{nom}/K	Ni: 0.00617 * R_{nom}/K
Example Pt100: 0.00385 * 100 Ω/K = 0.385 Ω/K		

Typical sensitivity of thermocouples:					
Type B: 9 µV/K at 1 000 °C (1 832 °F)	Type C: 18 µV/K at 1 000 °C (1 832 °F)	Type D: 20 µV/K at 1 000 °C (1 832 °F)	Type E: 81 µV/K at 500 °C (932 °F)	Type J: 56 µV/K at 500 °C (932 °F)	Type K: 43 µV/K at 500 °C (932 °F)
Type L: 60 µV/K at 500 °C (932 °F)	Type N: 38 µV/K at 500 °C (932 °F)	Type R: 13 µV/K at 1 000 °C (1 832 °F)	Type S: 11 µV/K at 1 000 °C (1 832 °F)	Type T: 46 µV/K at 100 °C (212 °F)	Type U: 70 µV/K at 500 °C (932 °F)

Example of calculating the measured error with ambient temperature drift:

Input temperature drift $\Delta\vartheta$ = 10 K (18 °F), Pt100, measuring range 0 to 100 °C (32 to 212 °F). Maximum process temperature: 100 °C (212 °F)

Measured resistance value: 138.5 Ω (IEC 60751) at maximum process temperature

Typical temperature drift in Ω: (0.001 % of 138.5 Ω) * 10 = 0.01385 Ω

Conversion to Kelvin: 0.01385 Ω / 0.385 Ω/K = 0.04 K (0.072 °F)

Output temperature drift:

- 0.0015 % of span * 10
- 0.0015 % * 100 K * 10 = 0.015 K

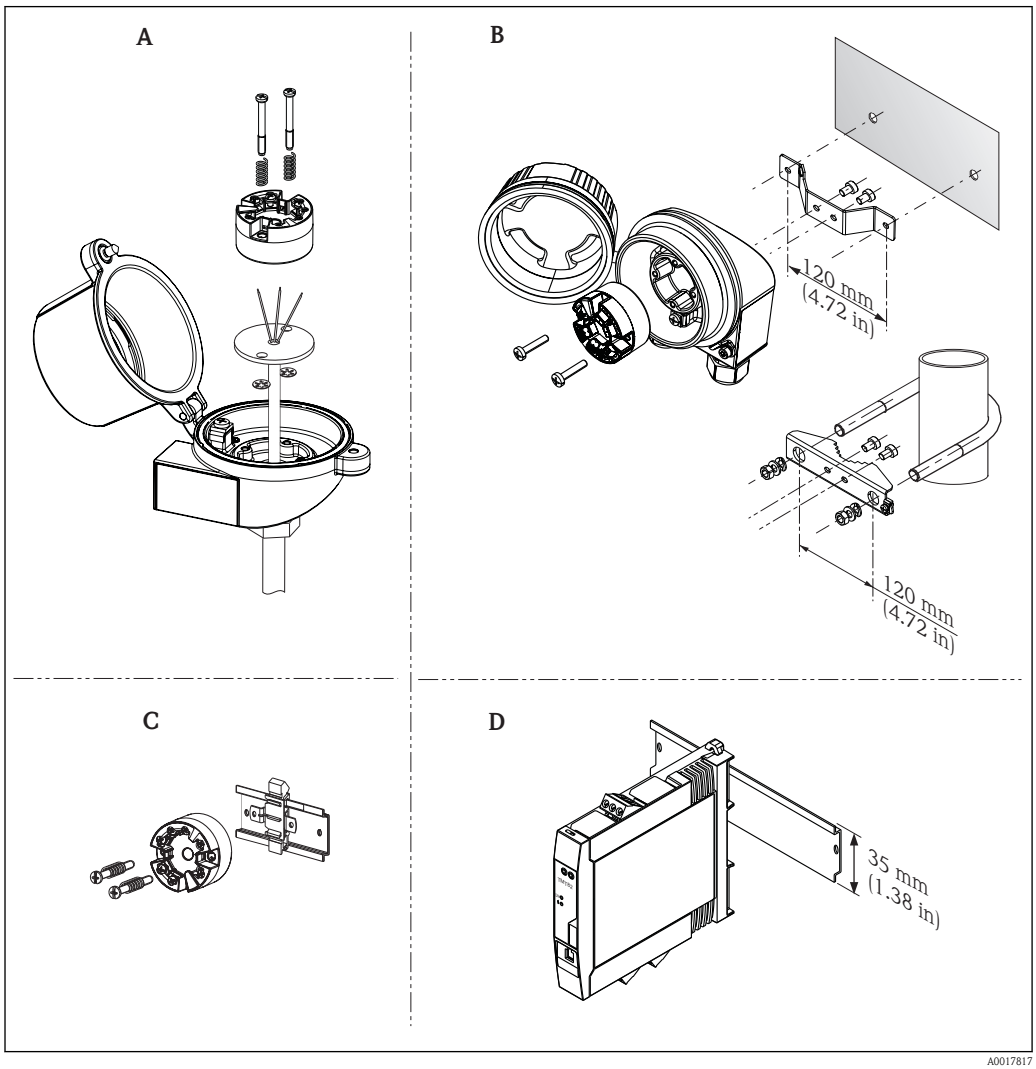
Total temperature drift = 0.04 K + 0.015 K = 0.055 K (current output)

Influence of the reference junction (internal cold junction)

Pt100 DIN IEC 60751 Cl. B (internal cold junction with thermocouples TC)

Installation conditions

Installation instructions



5 Installation options for transmitter

A Terminal head, flat face as per DIN EN 50446, direct installation onto insert with cable entry (middle hole 7 mm (0.28 in))
B Separated from process in field housing, wall or pipe mounting
C With clip on DIN rail as per IEC 60715 (TH35)
D DIN rail device for mounting on a TH35 mounting rail as per IEC 60715

Orientation: No restrictions

Environment

Ambient temperature	–40 to +85 °C (–40 to +185 °F), for hazardous areas see Ex documentation (→ 18)
Storage temperature	■ Head transmitter: –50 to +100 °C (–58 to +212 °F) ■ DIN rail device: –40 to +100 °C (–40 to +212 °F)
Altitude	Up to 4000 m (4374.5 yards) above mean sea level as per IEC 61010-1, CAN/CSA C22.2 No. 61010-1
Climate class	As per IEC 60654-1, Class C

Humidity

- Condensation permitted as per IEC 60 068-2-33
- Max. rel. humidity: 95% as per IEC 60068-2-30

Degree of protection

- With screw terminals: IP 20. In the installed state, it depends on the terminal head or field housing used.
- With spring terminals: IP 30
- When installing in field housing TA30A, TA30D or TA30H: IP 66/67 (NEMA Type 4x encl.)
- DIN rail device: IP 20

Shock and vibration resistance

- Head transmitter: 25 to 100 Hz for 4g (increased vibration stress), as per GL guideline, section 2, issue 3B, paragraph 9. Vibration and IEC 60068-2-27 and IEC 60068-2-6
- DIN rail device: 25 to 100 Hz for "0.7g" (increased vibration stress), as per GL guideline, section 2, issue 3B, paragraph 9. Vibration and IEC 60068-2-27 and IEC 60068-2-6

Electromagnetic compatibility (EMC)

CE compliance

Electromagnetic compatibility in accordance with all the relevant requirements of the EN 61326 series and NAMUR Recommendation EMC (NE21). For details refer to the Declaration of Conformity. All tests were passed both with and without ongoing digital HART® communication.

ESD (electrostatic discharge)	EN/IEC 61000-4-2		6 kV cont., 8 kV air
Electromagnetic fields	EN/IEC 61000-4-3	0.08 to 2.7 GHz	10 V/m
Burst (fast transients)	EN/IEC 61000-4-4		2 kV
Surge (surge voltage)	EN/IEC 61000-4-5		0.5 kV sym. 1 kV assym.
Conducted RF	EN/IEC 61000-4-6	0.01 to 80 MHz	10 V

Measuring category

Measuring category II as per IEC 61010-1. The measuring category is provided for measuring on power circuits that are directly connected electrically with the low-voltage network.

Degree of contamination

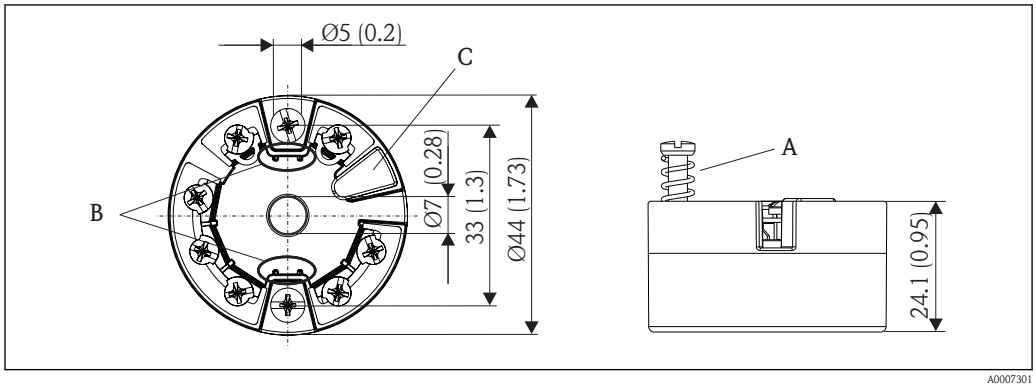
Pollution degree 2 as per IEC 61010-1.

Mechanical construction

Design, dimensions

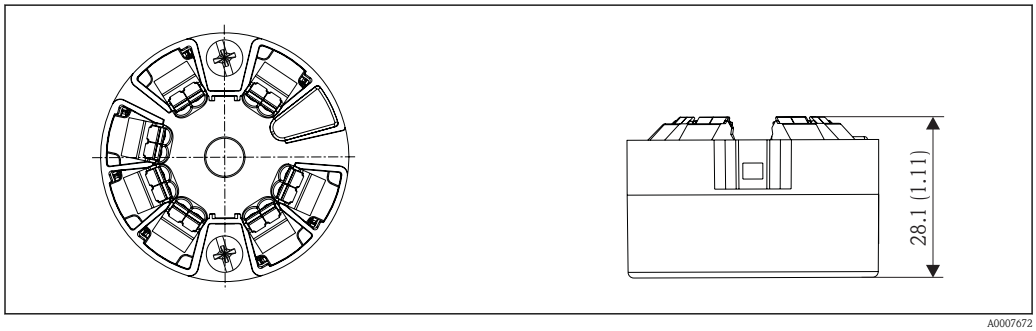
Dimensions in mm (in)

Head transmitter



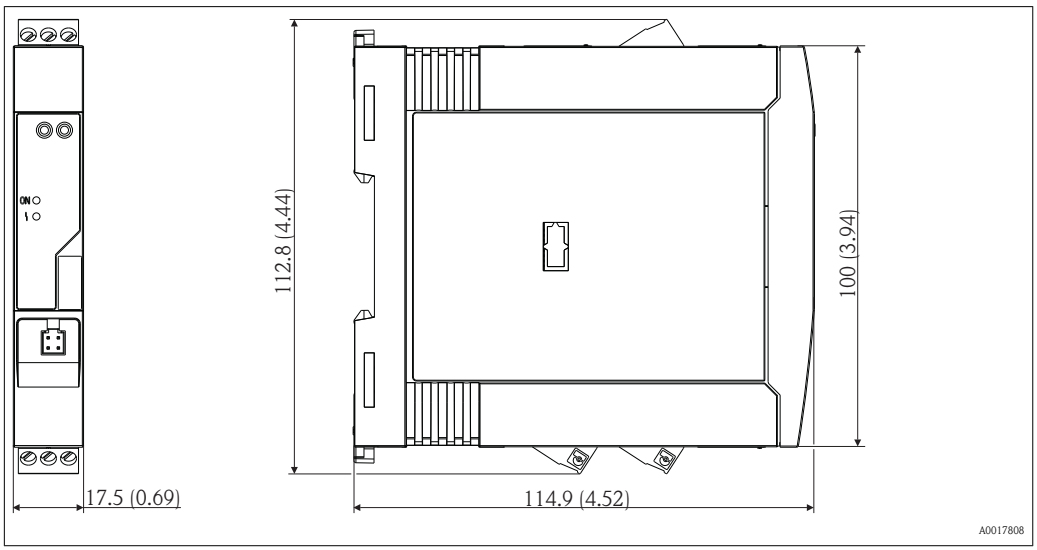
6 *Version with screw terminals*

A Spring travel L ≥ 5 mm (not for US - M4 securing screws)
B Fasteners for attachable measured value display
C Interface for contacting the measured value display



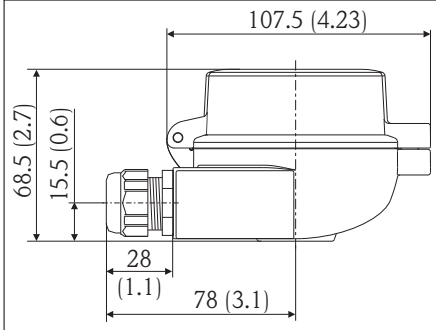
7 *Version with spring terminals. The dimensions are identical to the version with screw terminals, apart from the housing height.*

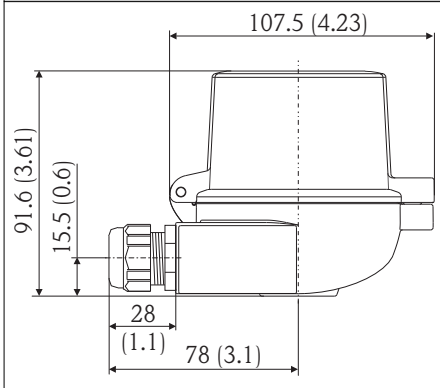
DIN rail transmitter

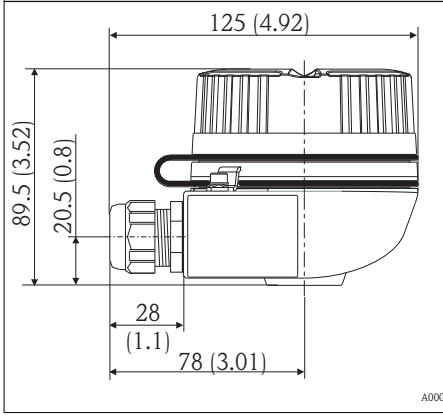


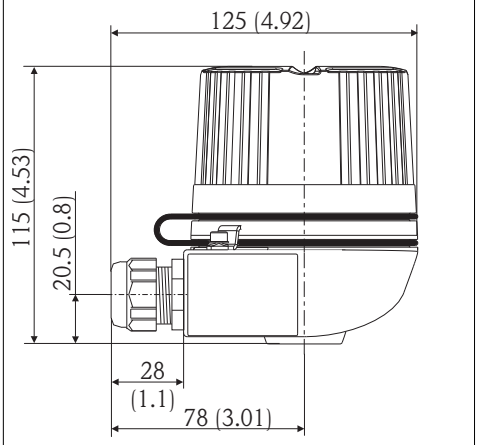
Field housings

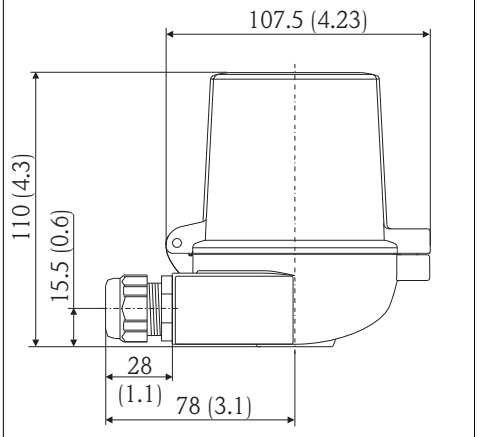
All terminal heads have an internal shape and size in accordance with DIN EN 50446, flat face and a thermometer connection of M24x1.5. Cable glands as shown in figures: M20x1.5.

TA30A	Specification
	■ Two cable entries ■ Temperature: –50 to +150 °C (–58 to +302 °F) without cable gland ■ Material: aluminum, polyester powder coated Seals: silicone ■ Cable entry incl. glands: ½"NPT and M20x1.5 ■ Head color: blue RAL 5012 ■ Cap color: gray RAL 7035 ■ Weight: 330 g (11.64 oz)

TA30A with display window in cover	Specification
	■ Two cable entries ■ Temperature: –50 to +150 °C (–58 to +302 °F) without cable gland ■ Material: aluminum, polyester powder coated Seals: silicone ■ Cable entry incl. glands: ½"NPT und M20x1.5 ■ Head color: blue RAL 5012 ■ Cap color: gray RAL 7035 ■ Weight: 420 g (14.81 oz)

TA30H	Specification
	■ Flameproof (XP) version, explosion-protected, captive screw cap, with two cable entries ■ Temperature: –50 to +150 °C (–58 to +302 °F) for rubber seal without cable gland (observe max. permitted temperature of the cable gland!) ■ Material: aluminum; polyester powder coated ■ Cable entry glands: ½"NPT, M20x1.5 ■ Head color: blue RAL 5012 ■ Cap color: gray RAL 7035 ■ Weight: 640 g (22.6 oz)

TA30H with display window in cover	Specification
	■ Flameproof (XP) version, explosion-protected, captive screw cap, with two cable entries ■ Temperature: –50 to +150 °C (–58 to +302 °F) for rubber seal without cable gland (observe max. permitted temperature of the cable gland!) ■ Material: aluminum; polyester powder coated ■ Cable entry glands: ½"NPT, M20x1.5 ■ Head color: blue RAL 5012 ■ Cap color: gray RAL 7035 ■ Weight: 860 g (30.33 oz)

TA30D	Specification
	■ Two cable entries ■ Temperature: –50 to +150 °C (–58 to +302 °F) without cable gland ■ Material: aluminum, polyester powder coated Seals: silicone ■ Cable entry incl. glands: ½"NPT, M20x1.5 ■ Two head transmitters can be mounted. In the standard version, one transmitter is mounted in the terminal head cover and an additional terminal block is installed directly on the insert. ■ Head color: blue RAL 5012 ■ Cap color: gray RAL 7035 ■ Weight: 390 g (13.75 oz)

Maximum ambient temperature for cable glands	
Type	**Temperature range**
Cable gland polyamide ½" NPT, M20x1.5 (non-Ex)	–40 to +100 °C (–40 to 212 °F)
Cable gland polyamide M20x1.5 (for dust ignition-proof area)	–20 to +95 °C (–4 to 203 °F)
Cable gland brass ½" NPT, M20x1.5 (for dust ignition-proof area)	–20 to +130 °C (–4 to +266 °F)

Weight

- Head transmitter: approx. 40 to 50 g (1.4 to 1.8 oz)
- Field housing: see specifications
- DIN rail transmitter: approx. 100 g (3.53 oz)

Material

All materials used are RoHS-compliant.

- Housing: polycarbonate (PC), complies with UL94, V-2 UL recognized
- Terminals:
  - Screw terminals: nickel-plated brass and gold-plated contact
  - Spring terminals (head transmitter): tin-plated brass, contact spring 1.4310, 301 (AISI)
- Potting (head transmitter): WEVO PU 403 FP / FL

Field housing: see specifications

Terminals

Choice of screw or spring terminals for sensor and fieldbus wires:

	Terminals version	Wire version	Conductor cross-section
Head transmitter / DIN rail transmitter	**Screw terminals**	Rigid or flexible	≤ 2.5 mm² (14 AWG)
Head transmitter	**Spring terminals** Stripped length = min. 10 mm (0.39 in)	Rigid or flexible	0.2 to 1.5 mm² (24 to 16 AWG)
		Flexible with wire-end ferrules without plastic ferrule	0.25 to 1.5 mm² (24 to 16 AWG)
		Flexible with wire-end ferrules with plastic ferrule	0.25 to 0.75 mm² (24 to 18 AWG)

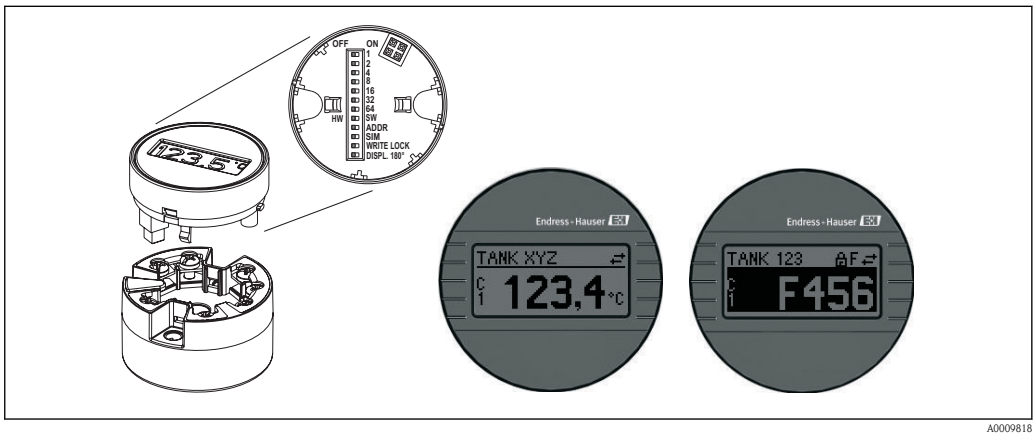
No ferrules have to be used when connecting flexible wires to spring terminals.

Human interface

Display and operating elements

Head transmitter

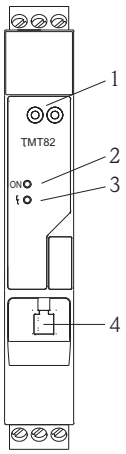
The head transmitter has no display or operating elements. There is the option of using the attachable measured value display TID10 together with the head transmitter. The display provides information on the current measured value and the measuring point identification. In the event of a fault in the measurement chain, this will be displayed in inverse color showing the channel ident and error number. DIP switches can be found on the rear of the display. These enable hardware settings to be made e.g. write protection.



8 Attachable measured value display TID10

If the head transmitter is installed in a field housing and used with a display, an enclosure with a glass window in the cover must be used.

DIN rail device



9 DIN rail device TMT82

1:	HART® communication jacks (2 mm) for commissioning and configuration	
2:	Power LED	An illuminated green LED indicates that the voltage supply is correct
3:	Status LED	Off: no diagnostic message
		Red illuminated: Category F diagnostic message
		Red flashing: Category C, S or M diagnostic message
4:	Service interface	For connecting a configuration tool

Remote operation

The configuration of HART® functions and of device-specific parameters takes place via HART® communication or the service interface of the device. There are special configuration tools from different manufacturers available for this purpose. For more information, contact your Endress+Hauser sales representative.

Certificates and approvals

CE mark

The measuring system meets the legal requirements of the EC guidelines. The manufacturer confirms that the device conforms to all relevant guidelines by affixing the CE mark.

Ex approval

Information about currently available Ex versions (ATEX, FM, CSA, etc.) can be supplied by your E+H Sales Center on request. All explosion protection data are given in separate documentation which is available upon request.

Equipment safety UL

Equipment safety as per UL61010-1, 2nd Edition

CSA GP

CAN/CSA-C22.2 No. 61010-1, 2nd Edition

HART® communication

The temperature transmitter is registered by HART® Communication. The device meets the requirements of the HART® Communication Protocol Specifications, April 2001, Revision 6.0.

Ordering information

Detailed ordering information is available from the following sources:
- In the Product Configurator on the Endress+Hauser website: www.endress.com → Select country → Instruments → Select device → Product page function: Configure this product
- From your Endress+Hauser Sales Center: 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

Accessories

Accessories included in the scope of delivery:
- Multilingual Brief Operating Instructions as hard copy
- Operating Instructions on CD-ROM
- ATEX supplementary documentation ATEX: ATEX Safety instructions (XA), **C**ontrol **D**rawings (CD)
- Mounting material for head transmitter

Optional accessories

Accessories	Order number or documentation code
Display unit TID10 for Endress+Hauser head transmitter iTEMP® TMT8x, attachable	TID10-...
TID10 service cable; connecting cable for service interface, 40 cm	71086650
Field housing TA30x for Endress+Hauser head transmitter	TA30x-...
Adapter for DIN rail mounting, clip as per IEC 60715 (TH35)	51000856
Standard - DIN mounting set (2 screws + springs, 4 securing disks and 1 display connector cover)	71044061
US - M4 Mounting screws (2 M4 screws and 1 display connector cover)	71044062
Stainless steel wall mounting bracket Stainless steel pipe mounting bracket	71123339 71123342

Communication-specific accessories

Accessories	Description
Commubox FXA195 HART	For intrinsically safe HART® communication with FieldCare via the USB interface. For details, see Technical Information TI404F/00
Commubox FXA191 HART	For intrinsically safe HART® communication with FieldCare via the RS232C interface. For details, see Technical Information TI237F/00
Commubox FXA291	Connects Endress+Hauser field devices with a CDI interface (= Endress+Hauser Common Data Interface) and the USB port of a computer or laptop. For details, see Technical Information TI405C/07
WirelessHART adapter	Is used for the wireless connection of field devices. The WirelessHART® adapter can be easily integrated into field devices and existing infrastructures, offers data protection and transmission safety and can be operated in parallel with other wireless networks. For details, see Operating Instructions BA061S/04
Fieldgate FXA320	Gateway for accessing connected 4-20 mA measuring devices via a web browser. For details, see Technical Information TI025S/04
Fieldgate FXA520	Gateway for accessing connected HART® measuring devices via a web browser. For details, see Technical Information TI025S/04

System components and data manager

Accessories	Description
Graphic Data Manager Memograph M	The Memograph M graphic data manager provides information on all the relevant process variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a SD card or USB stick. For details, see Technical Information TI133R/09
Paperless recorder Ecograph T	Multi-channel data recording system with LC color graphic display (120 mm / 4,7" screen size), galvanically isolated universal inputs (U, I, TC, RTD), digital input, transmitter power supply, limit relay, communication interfaces (USB, Ethernet, RS232/485), Internal flash memory and compact flash card. For details, see Technical Information TI115R/09
RN221N	Active barrier with power supply for safe separation of 4 to 20 mA standard signal circuits. Offers bidirectional HART® transmission. For details, see Technical Information TI073R/09
RNS221	Supply unit for powering two 2-wire measuring devices solely in the non-Ex area. Bidirectional communication is possible via the HART® communication jacks. For details, see Technical Information TI081R/09
RB223	One- or two-channel, loop-powered barrier for safe separation of 4 to 20 mA standard signal circuits. Bidirectional communication is possible via the HART communication jacks. For details, see Technical Information TI132R/09
RIA14, RIA16	Loop-powered field indicator for 4 to 20 mA circuit, RIA14 in flameproof metal enclosure For details, see Technical Information TI143R/09 and TI144R/09
RIA15	Process display, digital loop-powered display for 4 to 20 mA circuit, panel mounting For details, see Technical Information TI01043K/09

Documentation

- Operating Instructions 'iTEMP® TMT82' (BA01028T/09/en) on CD-ROM and hard copy of associated Brief Operating Instructions 'iTEMP® TMT82' (KA01095T/09/en)
- ATEX supplementary documentation:
  ATEX II 1G Ex ia IIC: XA00102T/09/a3
  ATEX II2G Ex d IIC: XA01007T/09/a3 (transmitter in field housing)
  ATEX II2(1)G Ex ia IIC: XA01012T/09/a3 (transmitter in field housing)

Instruments International

Endress+Hauser
Instruments International AG
Kaegenstrasse 2
4153 Reinach
Switzerland

Tel.+41 61 715 81 00
Fax+41 61 715 25 00
www.endress.com
info@ii.endress.com

Endress+Hauser

People for Process Automation

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