

TTH300

Head-mount temperature transmitter

Temperature transmitter for all communication protocols.
ABB common operating concept.
Redundancy when two sensors are connected.

Measurement made easy



Communication / output

- 4 to 20 mA, HART protocol, rev. 5 and rev. 7 switchable
- PROFIBUS PA
- FOUNDATION Fieldbus

Input

- RTD, resistance thermometers, resistance-type remote sensor
- Thermocouples, voltages, mV voltages

Electrical isolation of input circuit and output circuit

Input functionality

- 1 or 2 sensors
- 2 x Pt100 three wire circuit

Specific linearization

- Callendar-Van Dusen coefficients
- Table of variate pairs / 32 points

Continuous sensor monitoring and self-monitoring

- Supply voltage monitoring
- Wire break and corrosion monitoring in accordance with NE 89
- Extended diagnostics in accordance with NE 107
- Sensor drift monitoring

Device safety in accordance with NE 53 and NE 79

Functional safety

- SIL 2 / SIL 3 in accordance with IEC 61508 (for HART)

Configuration

- FIM
- DTM
- EDD
- LCD display with push buttons (optional)

Global approvals for explosion protection

- ATEX, IECEX, Zone 0
- FM, CSA
- GOST, EAC Ex
- Inmetro
- NEPSI
- KOSHA

SW write protection, HW write protection

Service interface

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Specifications

CE marking

- The device fulfills all requirements for CE marking in accordance with all applicable guidelines.

Electrical isolation

- 3.5 kV DC (approx. 2.5 kV AC), 60 s, input to output

MTBF time

- 28 years at 60 °C ambient temperature

Input filter

- 50 / 60 Hz

Switch-on delay

- HART: < 10 s ($I_a \leq 3.6$ mA during switch-on cycle)
- PROFIBUS: 10 s, max. 30 s
- FOUNDATION Fieldbus: < 10 s

Warm-up time

- 5 minutes

Rise time t_{90}

- 400 ... 1000 ms

Measured value update

- 10/s with 1 sensor, 5/s with 2 sensors, depending on sensor type and sensor circuit

Output filter

- Digital filter 1st order: 0 ... 100 s

Weight

- 50 g

Material

- Housing: polycarbonate
- Color: gray RAL9002
- Sealing compound: hard sealing compound

Installation conditions

- Mounting position: no restrictions
- Installation options:
 - Connection heads in accordance with DIN 43729 form B
 - Rail mounting (35 mm) in accordance with EN 60175 by means of latching base
 - Field mount housing

Electrical connection

- Terminals with captive screws, incl. soldering tags
- Lines up to maximum 1.5 mm² (AWG 16)
- Connection for handheld terminal

Dimensions

See chapter "Dimensions" on page 13.

Ambient conditions

Ambient temperature

- Standard -40 ... 85 °C (-40 ... 185 °F)
- Optional: -50 ... 85 °C (-58 ... 185 °F)
- Restricted range during operation with LCD indicator: -20 ... 70 °C (-4 ... 158 °F)
- Restricted range during operation with explosion-proof design: see corresponding certificate

Transport- / storage temperature

- -50 ... 85 °C (-58 ... 185 °F)

Climate class in accordance with DIN EN 60654-1

- Cx -40 ... 85 °C (-40 ... 185 °F) at 5 ... 95 % relative humidity

Max. permissible humidity in accordance with IEC 60068-2-30

- 100 % relative humidity

Vibration resistance in accordance with IEC 60068-2-6

- 10 ... 2000 Hz at 5 g, during operation and transport

Shock resistance in accordance with IEC 68-2-27

- $g_n = 30$, during operation and transport

IP rating

- Power supply circuit: IP20
- Measurement circuit: IP00 or IP rating of installation housing

Electromagnetic compatibility

Emitted interference in accordance with IEC EN 61326 and Namur NE 21 .

Interference immune in accordance with IEC 61326 and Namur NE 21.

Pt100: measuring range 0 ... 100 °C (32 ... 212 °F), span 100 K

Type of test	Testing accuracy	Effect
Burst to signal- / data lines	2 kV	< 0,5 %
Static discharge		
— Contact plate (indirect)	8 kV	NO
— Supply terminals ¹⁾	6 kV	NO
— Sensor terminals ¹⁾	4 kV	NO
Radiated field		
80 MHz ... 2 GHz	10 V/m	< 0,5 %
Coupling		
150 kHz ... 80 MHz	10 V	< 0,5 %
Surge		
between the supply lines	0,5 kV	No malfunction
Line to ground	1 kV	

1) Air discharge (at 1 mm (0.04 inch) distance)

SIL functional safety

Conforms with IEC 61508 as regards use in safety related applications, up to and including SIL 3 (redundant). While using the transmitter, the device fulfills the requirements in accordance with SIL 2. While using two redundant transmitters, the device fulfills the requirements in accordance with SIL 3. Applicable only for HART variant.

Type A and type AS LCD indicators

The LCD display type AS has a display function; the LCD display type A allows additional configuration functions to be carried out. Both LCD displays can only be ordered in conjunction with temperature transmitter.

CE marking

- The type A and type AS LCD display fulfill all requirements for CE marking in accordance with all applicable guidelines.

Properties

Transmitter-controlled graphic (alphanumeric) LCD display

- Character height, mode-dependent
- Sign, 4 digits, 2 decimal places
- Bar graph display
- Rotatable in 12 increments of 30°

Display options

- Sensor 1 process value
- Sensor 2 process value
- Electronics- / ambient temperature
- Output value
- Output %

Display diagnostic information related to transmitter and sensor status

Specifications

Temperature range

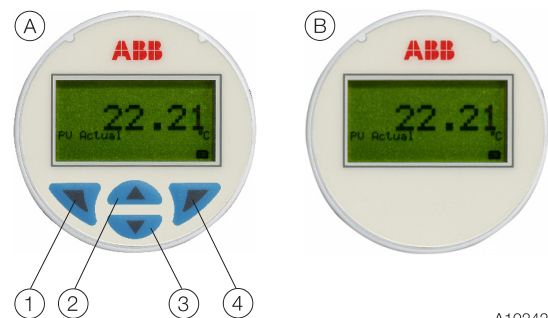
- -20 ... 70 °C (-4 ... 158 °F)

Restricted display function (contrast, reaction time) in the temperature ranges:

- -50 ... -20 °C (-58 ... -4 °F)
- or
- 70 ... 85 °C (158 ... 185 °F)

Humidity

- 0 ... 100 %, condensation permitted



A10242

Fig. 1: (A) LCD display type A (B) LCD display type AS
 ① Leave / Abort ② Backwards ③ Forwards ④ Select

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Configuration function

- Sensor configuration for standard sensors
- Measuring range
- Behavior in the event of a fault (HART)
- Software write protection for configuration data
- Device address for HART and PROFIBUS PA

Input - resistance thermometer / resistances

Resistance thermometer

- Pt100 according to IEC 60751, JIS C1604, MIL-T-24388
- Ni according to DIN 43760
- Cu according to recommendation OIML R 84

Resistance measurement

- 0 ... 500 Ω
- 0 ... 5000 Ω

Sensor connection type

- Two-, Three-, Four wire-circuits

Connection lead

- Maximum sensor line resistance:
of 50 Ω per line in accordance with NE 89
- Three-wire circuit:
Symmetrical sensor line resistances
- Two-wire circuit:
Compensation up to 100 Ω total lead resistance

Measurement current < 300 μ A

Sensor short circuit < 5 Ω (for resistance thermometers)

Sensor wire break

- Measuring range: 0 ... 500 Ω > 0.6 ... 10 k Ω
- Measuring range: 0 ... 5 k Ω > 5.3 ... 10 k Ω

Corrosion detection in accordance with NE 89

- Three-wire resistance measurement > 50 Ω
- Four-wire resistance measurement > 50 Ω

Sensor error signaling

- Resistance thermometer: Sensor short circuit and sensor wire breakage
- Linear resistance measurement: Sensor wire break

Input - thermocouples / voltages

Types

- B, E, J, K, N, R, S, T in accordance with IEC 60584
- U, L in accordance with DIN 43710
- C, D in accordance with ASTM E-988

Voltages

- -125 ... 125 mV
- -125 ... 1100 mV

Supply line

- Maximum sensor line resistance
1.5 k Ω per wire, 3 k Ω in total

Sensor wire break monitoring in accordance with NE 89

- Pulsed with 1 μ A outside measurement interval
- Thermocouple measurement 5.3 ... 10 k Ω
- Voltage measurement 5.3 ... 10 k Ω

Input resistance > 10 M Ω

Internal reference junction Pt1000, IEC 60751 Cl. B (no additional jumpers necessary)

Sensor error signaling

- Thermocouple: wire break
- Linear voltage measurement: wire break

Functionality input

Free style characteristic curve / 32-point -sampling point table

- Resistance measurement up to max. 5 k Ω
- Voltages up to max. 1.1 V

Sensor error adjustment

- Via Callendar-Van Dusen coefficients
- Via value table of 32 reference points
- Via single-point adjustment (offset adjustment)
- Via two-point adjustment

Input functionality

- 1 sensor
- 2 sensors:
mean measurement,
differential measurement,
sensor redundancy,
Sensor drift monitoring

HART output

Transmission behavior

- Temperature linear
- Resistance linear
- Voltage linear

Output signal

- Configurable 4 ... 20 mA (standard)
- Configurable 20 ... 4 mA
(Dynamic range: 3.8 ... 20.5 mA in accordance with NE 43)

Simulation mode 3.5 ... 23.6 mA

Induced current consumption < 3.5 mA

Maximum output current 23.6 mA

Configurable error current signal

- Overrange 22 mA (20.0 ... 23.6 mA)
- Underrange 3.6 mA (3.5 ... 4.0 mA)

PROFIBUS PA output

Output signal

- PROFIBUS – MBP (IEC 61158-2)
- Baud rate 31.25 kbit/s
- PA profile 3.01
- FISCO compliant (IEC 60079-27)
- ID number: 0x3470 [0x9700]

Error current signal

- FDE (Fault Disconnection Electronic)

Block structure

- Physical Block
- Transducer Block 1 – temperature
- Transducer Block 2 – HMI (LCD indicator)
- Transducer Block 3 – enhanced diagnosis
- Analog Input 1 – Primary Value (Calculated Value¹⁾)
- Analog Input 2 – SECONDARY VALUE_1 (sensor 1)
- Analog Input 3 – SECONDARY VALUE_2 (sensor 2)
- Analog Input 4 – SECONDARY VALUE_3 (reference junction temperature)
- Analog Output – optional HMI display (Transducer Block 2)
- Discrete Input 1 – enhanced diagnosis 1 (Transducer Block 3)
- Discrete Input 2 – enhanced diagnosis 2 (Transducer Block 3)

1) Sensor 1, sensor 2 or difference or mean

FOUNDATION Fieldbus output

Output signal

- FOUNDATION Fieldbus H1 (IEC 611582-2)
- Baud rate 31.25 kbit/s, ITK 5.x
- FISCO compliant (IEC 60079-27)
- Device ID: 000320001F...

Error current signal

- FDE (Fault Disconnection Electronic)

Block structure¹⁾

- Resource Block
- Transducer Block 1 – temperature
- Transducer Block 2 – HMI (LCD indicator)
- Transducer Block 3 – enhanced diagnosis
- Analog Input 1 – PRIMARY_VALUE_1 (sensor 1)
- Analog Input 2 – PRIMARY_VALUE_2 (sensor 2)
- Analog Input 3 – PRIMARY_VALUE_3 (calculated value²⁾)
- Analog Input 4 – SECONDARY_VALUE (reference junction temp.)
- Analog Output – optional HMI display (Transducer Block 2)
- Discrete Input 1 – enhanced diagnosis 1 (Transducer Block 3)
- Discrete Input 2 – enhanced diagnosis 2 (Transducer Block 3)
- PID – PID controller

LAS (Link Active Scheduler) link master functionality

1) For the block description, block index, execution times, and block class, refer to the interface description
2) Sensor 1, sensor 2 or difference or mean

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Power supply

Two-wire technology, polarity safe; power supply lines = signal lines

i NOTICE

Following calculations apply for standard applications. This should be taken into consideration when working with a higher maximum current.

Power supply - HART

Input terminal voltage

- Non-Ex application:
 $U_S = 11 \dots 42 \text{ V DC}$
- Ex applications:
 $U_S = 11 \dots 30 \text{ V DC}$

Max. permissible residual ripple for input terminal voltage

- During communication in accordance with HART FSK "Physical Layer" specification.

Undervoltage detection on the transmitter

- If the terminal voltage on the transmitter falls below a value of 10 V, this may lead to an output current of $I_a \leq 3.6 \text{ mA}$.

Maximum load

- $R_B = (\text{supply voltage} - 11 \text{ V}) / 0.022 \text{ A}$

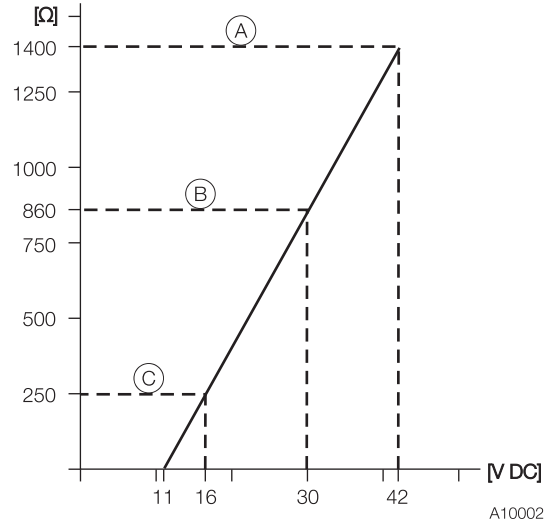


Fig. 2: Maximum load depending on input terminal voltage

(A) TTH300 (B) TTH300 in Ex ia design (C) HART communication resistance

Maximum power consumption

- $P = U_S \times 0.022 \text{ A}$
- e. g. $U_S = 24 \text{ V} \rightarrow P_{\max} = 0.528 \text{ W}$

Power supply - PROFIBUS / FOUNDATION Fieldbus

Input terminal voltage

- Non-Ex application:
 $U_S = 9 \dots 32 \text{ V DC}$
- Ex applications:
 $U_S = 9 \dots 17.5 \text{ V DC (FISCO)}$
 $U_S = 9 \dots 24 \text{ V DC (Fieldbus Entity model I.S.)}$

Current consumption $\leq 12 \text{ mA}$

Measuring accuracy

Includes Linearity error, repeatability / hysteresis at 23 °C (73.4 °F) ± 5 K and 20 V supply voltage.

Information on measuring accuracy corresponds to 3 σ (Gaussian distribution).

Sensor		Measuring range limits	Minimum span	Digital measuring accuracy (24-Bit AD-converter)	D / A measuring accuracy ¹⁾ (16-Bit D / A)
Resistance thermometer/resistor					
DIN IEC 60751	Pt10 (a=0.003850)	-200 ... 850 °C (-328 ... 1562 °F)	10 °C (18 °F)	± 0.80 °C (± 1.44 °F)	± 0.05 %
	Pt50 (a=0.003850)			± 0.16 °C (± 0.29 °F)	± 0.05 %
	Pt100 (a=0.003850) ²⁾			± 0.08 °C (± 0.14 °F)	± 0.05 %
	Pt200 (a=0.003850)			± 0.24 °C (± 0.43 °F)	± 0.05 %
	Pt500 (a=0.003850)			± 0.16 °C (± 0.29 °F)	± 0.05 %
	Pt1000 (a=0.003850)			± 0.08 °C (± 0.14 °F)	± 0.05 %
JIS C1604	Pt10 (a=0.003916)	-200 ... 645 °C (-328 ... 1193 °F)	10 °C (18 °F)	± 0.80 °C (± 1.44 °F)	± 0.05 %
	Pt50 (a=0.003916)			± 0.16 °C (± 0.29 °F)	± 0.05 %
	Pt100 (a=0.003916)			± 0.08 °C (± 0.14 °F)	± 0.05 %
MIL-T-24388	Pt10 (a=0.003920)	-200 ... 850 °C (-328 ... 1562 °F)	10 °C (18 °F)	± 0.80 °C (± 1.44 °F)	± 0.05 %
	Pt50 (a=0.003920)			± 0.16 °C (± 0.29 °F)	± 0.05 %
	Pt100 (a=0.003920)			± 0.08 °C (± 0.14 °F)	± 0.05 %
	Pt200 (a=0.003920)			± 0.24 °C (± 0.43 °F)	± 0.05 %
	Pt1000 (a=0.003920)			± 0.08 °C (± 0.14 °F)	± 0.05 %
DIN 43760	Ni50 (a=0.006180)	-60 ... 250 °C (-76 ... 482 °F)	10 °C (18 °F)	± 0.16 °C (± 0.29 °F)	± 0.05 %
	Ni100 (a=0.006180)			± 0.08 °C (± 0.14 °F)	± 0.05 %
	Ni120 (a=0.006180)				± 0.05 %
	Ni1000 (a=0.006180)				± 0.05 %
OIML R 84	Cu10 (a=0.004270)	-50 ... 200 °C (-58 ... 392 °F)	10 °C (18 °F)	± 0.80 °C (± 1.44 °F)	± 0.05 %
	Cu100 (a=0.004270)			± 0.08 °C (± 0.14 °F)	± 0.05 %
	Resistance measurement	0 ... 500 Ω	4 Ω	± 32 mΩ	± 0.05 %
		0 ... 5000 Ω	40 Ω	± 320 mΩ	± 0.05 %
Thermocouples ³⁾ /voltages					
IEC 60584	Type K (Ni10Cr-Ni5)	-270 ... 1372 °C (-454 ... 2502 °F)	50 °C (90 °F)	± 0.35 °C (± 0.63 °F)	± 0.05 %
	Type J (Fe-Cu45Ni)	-210 ... 1200 °C (-346 ... 2192 °F)			± 0.05 %
	Type N (Ni14CrSi-NiSi)	-270 ... 1300 °C (-454 ... 2372 °F)			± 0.05 %
	Type T (Cu-Cu45Ni)	-270 ... 400 °C (-454 ... 752 °F)			± 0.05 %
	Type E (Ni10Cr-Cu45Ni)	-270 ... 1000 °C (-454 ... 1832 °F)			± 0.05 %
	Type R (Pt13Rh-Pt)	-50 ... 1768 °C (-58 ... 3215 °F)	100 °C (180 °F)	± 0.95 °C (± 1.71 °F)	± 0.05 %
	Type S (Pt10Rh-Pt)				± 0.05 %
	Type B (Pt30Rh-Pt6Rh)				-0 ... 1820 °C (32 ... 3308 °F)
DIN 43710	Type L (Fe-CuNi)	-200 ... 900 °C (-328 ... 1652 °F)	50 °C (90 °F)	± 0.35 °C (± 0.63 °F)	± 0.05 %
	Type U (Cu-CuNi)	-200 ... 600 °C (-328 ... 1112 °F)			± 0.05 %
ASTM E 988	Type C	-0 ... 2315 °C (32 ... 4200 °F)	100 °C (180 °F)	± 1.35 °C (± 2.43 °F)	± 0.05 %
	Type D				± 0.05 %
	Voltage measurement	-125 ... 125 mV	2 mV	± 12 μV	± 0.05 %
		-125 ... 1100 mV	20 mV	± 120 μV	± 0.05 %

Long-term drift: ± 0.05 °C (± 0.09 °F) or ± 0.05 %¹⁾ per year; the larger value applies.

1) Percentages refer to the configured measuring span, omitted for PROFIBUS and FOUNDATION Fieldbus

2) Standard model

3) For digital measurement accuracy, the internal reference junction error must be added: Pt1000, DIN IEC 60751 Cl. B

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Operating influence

The percentages refer to the configured measuring span.

Input terminal voltage effect / load effect: within the specified limit values for the voltage / load, the total influence is less than 0.001% per volt.

Common-mode interference: no influence up to 100 V_{eff} (50 Hz) or 50 VDC

Ambient temperature effect: based on 23 °C (73.4 °F) for an ambient temperature range of -40 ... 85 °C (-40 ... 185 °F)⁴⁾

Sensor		Ambient temperature effect per 1 °C (1.8 °F) deviation from 23 °C (73.4 °F) for digital measured value	Ambient temperature effect ^{1) 2)} per 1 °C (1.8 °F) deviation from 23 °C (73.4 °F) for DA-converter
Resistance thermometer for two-, three- and four-wire circuits			
IEC, JIS, MIL	Pt10	± 0.04 °C (± 0.072 °F)	± 0.003 %
	Pt50	± 0.008 °C (± 0.014 °F)	± 0.003 %
	Pt100	± 0.004 °C (± 0.007 °F)	± 0.003 %
IEC, MIL	Pt200	± 0.02 °C (± 0.036 °F)	± 0.003 %
	Pt500	± 0.008 °C (± 0.014 °F)	± 0.003 %
	Pt1000	± 0.004 °C (± 0.007 °F)	± 0.003 %
DIN 43760	Ni50	± 0.008 °C (± 0.014 °F)	± 0.003 %
	Ni100	± 0.004 °C (± 0.007 °F)	± 0.003 %
	Ni120	± 0.003 °C (± 0.005 °F)	± 0.003 %
	Ni1000	± 0.004 °C (± 0.007 °F)	± 0.003 %
OIML R 84	Cu10	± 0.04 °C (± 0.072 °F)	± 0.003 %
	Cu100	± 0.004 °C (± 0.007 °F)	± 0.003 %
Resistance measurement			
	0 ... 500 Ω	± 0.002 Ω	± 0.003 %
	0 ... 5000 Ω	± 0.02 Ω	± 0.003 %
Thermocouple, for all defined types		± [(0.001 % × (ME[mV] / MS[mv]) + (100 % × (0.009 °C / MS [°C])) ³⁾	± 0.003 %
Voltage measurement			
	-125 ... 125 mV	± 1.5 μV	± 0.003 %
	-125 ... 1100 mV	± 15 μV	± 0.003 %

1) Percentages refer to the configured measuring span of the analog output signal

2) Influence of DA-converter omitted for PROFIBUS PA and FOUNDATION Fieldbus

3) ME = voltage value of the thermocouple at the upper range value in accordance with the standard

MA = voltage value of the thermocouple at the lower range value in accordance with the standard

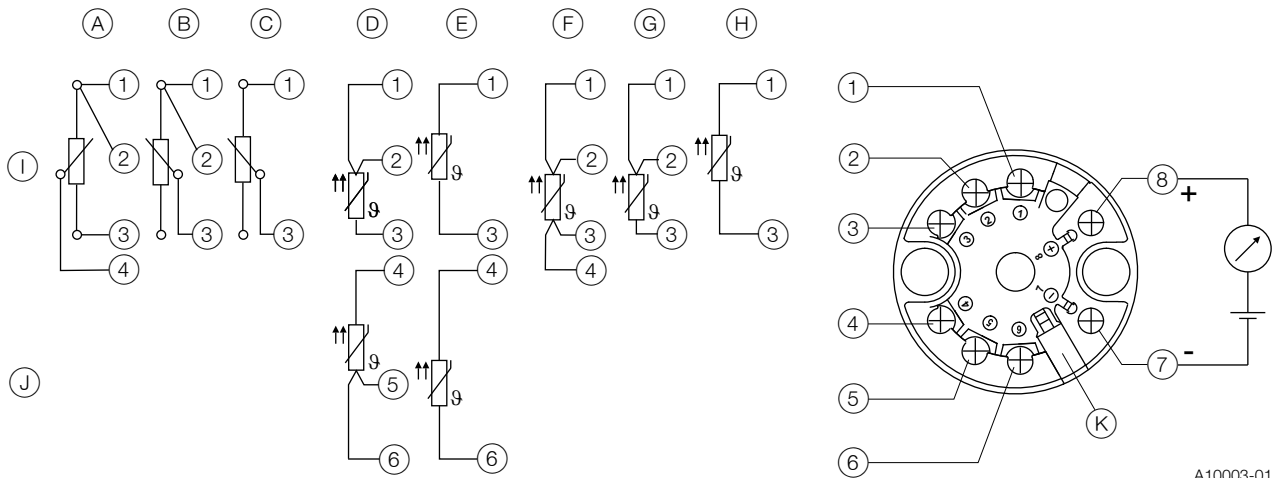
MS = voltage value of the thermocouple over the measuring span in accordance with the standard. MS = (ME - MA)

4) If the optional extended ambient temperature range down to -50 °C (-58 °F) applies, the causal variables are doubled in the range between -50 ... -40 °C (-58 ... -40 °F)

Electrical connections

Pin assignment

Resistance thermometers (RTD) / resistors (potentiometers)



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Fig. 3

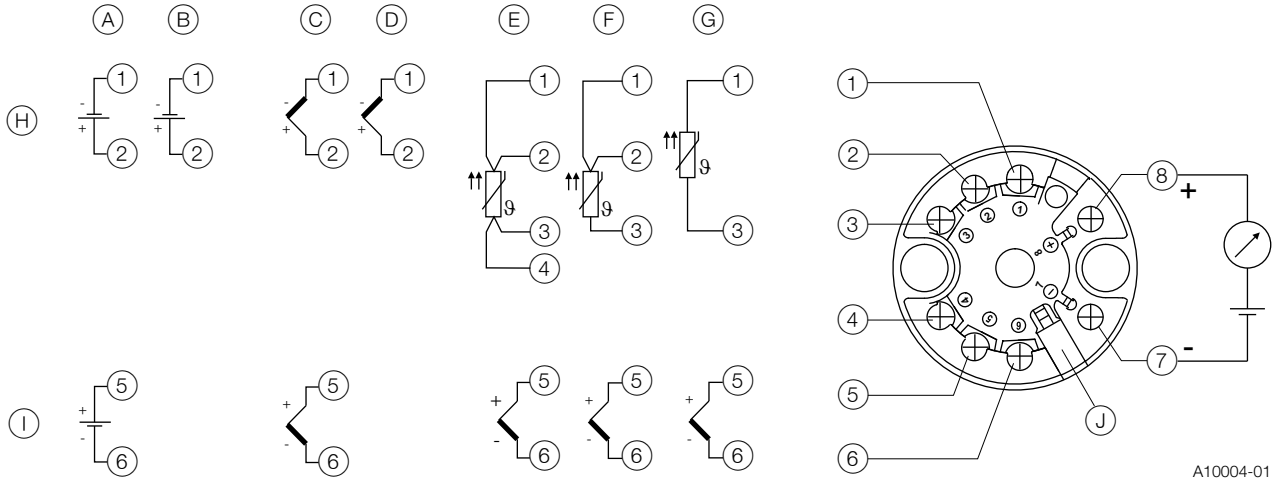
- (A) Potentiometer, four-wire circuit (B) Potentiometer, three-wire circuit (C) Potentiometer, two-wire circuit (D) 2 x RTD, three-wire circuit¹⁾
 (E) 2 x RTD, two-wire¹⁾ (F) RTD, four-wire circuit (G) RTD, three-wire circuit (H) RTD, two-wire circuit (I) Sensor 1 (J) Sensor 2¹⁾
 (K) LCD indicator-interface
 (1) – (6) Sensor connection (from measuring inset) (7) – (8) 4 ... 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus

1) Sensor backup / sensor redundancy, sensor drift monitoring, mean measurement, or differential measurement

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Thermocouples / voltages and resistance thermometer (RTD) / thermocouple combinations



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Fig. 4
 (A) 2 x voltage meter¹⁾ (B) 1 x voltage meter (C) 2 x Thermoelement¹⁾ (D) 1 x Thermoelement (E) 1 x RTD, four--wire circuit and 1 x Thermoelement¹⁾ (F) 1 x RTD, three--wire circuit and 1 x Thermoelement¹⁾ (G) 1 x RTD, two--wire circuit and 1 x Thermoelement¹⁾
 (H) Sensor 1 (I) Sensor 2¹⁾ (J) LCD indicator-interface
 (1) - (6) Sensor connection (from measuring inset) (7) - (8) 4 ... 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus

1) Sensor backup / sensor redundancy, sensor drift monitoring, mean measurement, or differential measurement

Communication

Configuration parameters

Measurement type

- Sensor type, connection type
- Error signaling
- Measuring range
- General information, e.g. TAG number
- Damping
- Warning and alarm limits
- Output signal simulation
- Details "Order form configuration" on page 20

Write protection

- Software write protection

Diagnostic information in accordance with NE 107

Standard:

- Sensor error signaling (wire break or short circuit)
- Device error
- Over / under limit values
- Over / under measuring range
- Simulation active

Advanced:

- Sensor redundancy / sensor backup active (in case sensor fails) with configurable analog alarm pulse signaling
- Drift monitoring with configurable alarm pulse signaling
- Sensor / sensor line corrosion
- Supply voltage undershoot
- Drag indicator for sensor 1, sensor 2 and ambient temperature
- Over ambient temperature
- Under ambient temperature
- Operating hours counter

HART

The device is listed with the FieldComm Group.

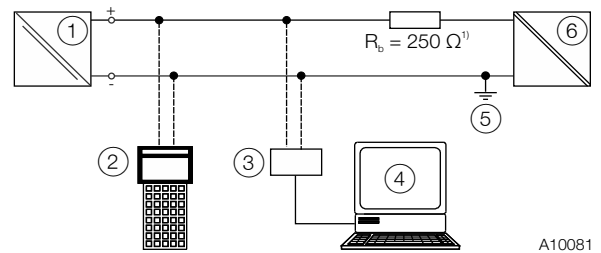


Fig. 5: Example for HART interface connection

① Transmitter ② Handheld Terminal ③ HART-Modem ④ FDT / DTM Technology ⑤ Grounding (optional) ⑥ Power supply unit (Process Interface)

1) If required

Manufacturer ID	0x1A
Device ID	0x0A
Profile	HART 5.1 (can be switched to HART 7)
Configuration	On device using LCD display DTM EDD
Transmission signal	BELL Standard 202

Operating modes

- Point-to-point communication mode – standard (general address 0)
- Multidrop mode (addressing 1 ... 15)
- Burst mode

Configuration options and tools

Driver-independent:

- HMI LCD display with configuration function

Driver-dependent:

- Device management / asset management tools
- FDT / DTM technology – via TTX300 DTM driver
- EDD - via TTX300 EDD driver

Diagnostic message

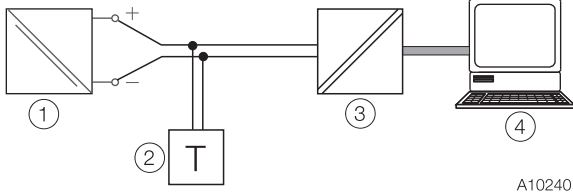
- Overrange / underrange in accordance with NE 43
- HART diagnosis

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PROFIBUS PA

The interface conforms to profile 3.01 (PROFIBUS standard, EN 50170, DIN 1924 [PRO91]).



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Fig. 6: Example for PROFIBUS PA interface connection

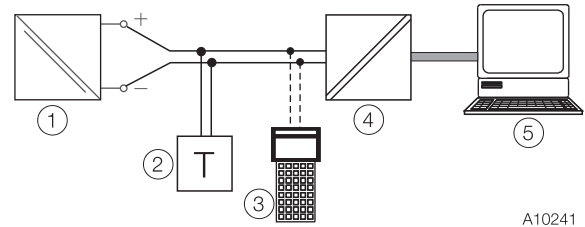
- ① Transmitter ② Bus termination ③ Segment coupler
④ PC / DCS

Manufacturer ID	0x1A
ID number	0x3470 [0x9700]
Profile	PA 3.01
Configuration	On device using LCD display DTM EDD GSD
Transmission signal	IEC 61158-2

Voltage / current consumption

- Mean current consumption: 12 mA.
In the event of an error, the FDE function (=Fault Disconnection Electronic) integrated in the device ensures that the current consumption cannot exceed a maximum of 20 mA.

FOUNDATION Fieldbus



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Fig. 7: Example for FOUNDATION Fieldbus connection

- ① Transmitter ② Bus termination ③ Handheld terminal
④ Linking Device ⑤ PC / DCS

Device ID	000320001F...
ITK	5.x
Configuration	On device using LCD EDD
Transmission signal	IEC 61158-2

Voltage / current consumption

- Mean current consumption: 12 mA.
In the event of an error, the FDE function (=Fault Disconnection Electronic) integrated in the device ensures that the current consumption cannot exceed a maximum of 20 mA.

Dimensions

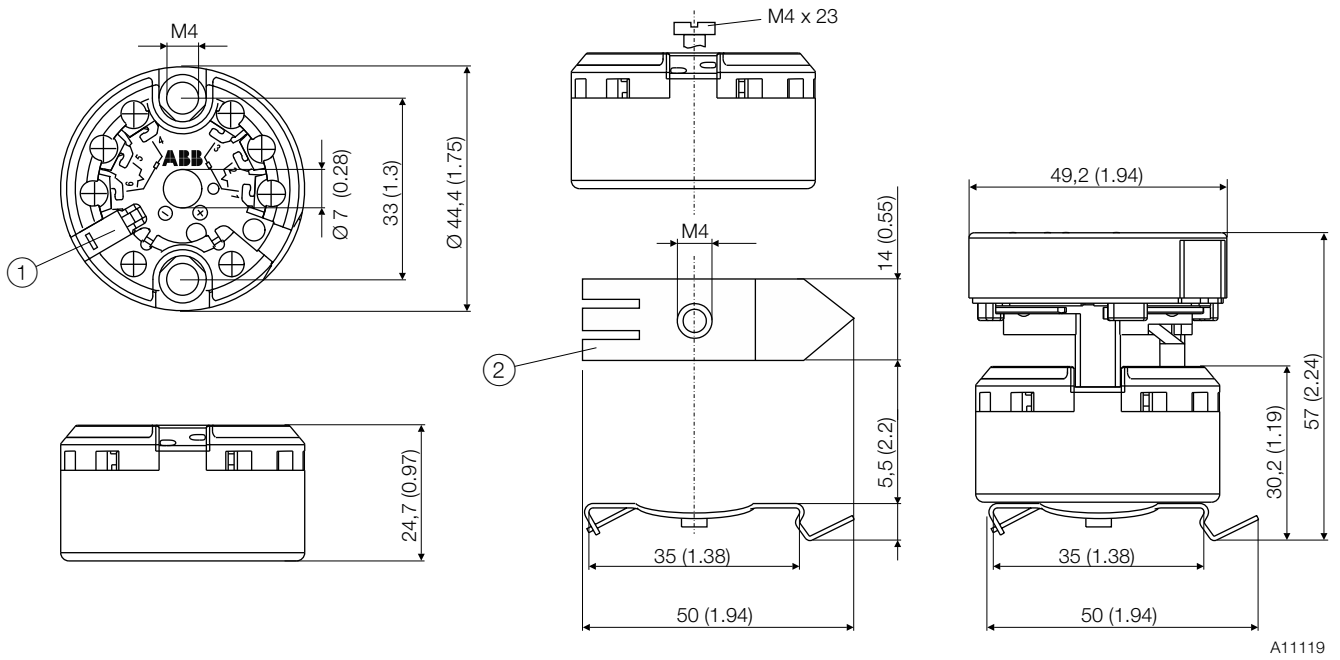


Fig. 8: Dimensions in mm / inch

① Interface for LCD display ② Latching base for 35 mm (1.38 inch) Rail mounting in accordance with EN 60175

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Use in potentially explosive atmospheres according to ATEX and IECEx

i NOTICE

- Further information on the approval of devices for use in potentially explosive atmospheres can be found in the explosion protection test certificates (at www.abb.com/temperature).
- Depending on the design, a specific marking in accordance with ATEX or IECEx applies.

Ex-marking Transmitter

ATEX intrinsic safety

The device fulfills the requirements of Directive 2014/34/EU in case of corresponding purchase orders and is approved for use in Zone 0, 1 and 2.

Model TTH300-E1H

Type examination certificate	PTB 05 ATEX 2017 X
II 1 G Ex ia IIC T6 Ga	
II 2 (1) G Ex [ia] ib IIC T6 Gb (Ga)	
II 2 G (1D) Ex [iaD] ib IIC T6 Gb (Da)	

Model TTH300-E1P and TTH300-E1F

Type examination certificate	PTB 09 ATEX 2016 X
II 1G Ex ia IIC T6	
II 2(1)G Ex [ia] ib IIC T6	
II 2G(1D) Ex [iaD] ib IIC T6	

ATEX Non-sparking

The device fulfills the requirements of Directive 2014/34/EU in case of corresponding purchase orders and is approved for use in Zone 2.

Model TTH300-E2X

Declaration of conformity	
II 3 G Ex nA IIC T1-T6 Gc	

IECEx intrinsic safety

Approved for use in Zone 0, 1, and 2.

Model TTH300-H1H

IECEx certificate of conformity	IECEx PTB 09.0014X
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Model TTH300-H1P and TTH300-H1F

IECEx certificate of conformity	IECEx PTB 11.0108X
Ex ia IIC T6	
Ex [ia] ib IIC T6	
Ex [iaD] ib IIC T6	

LCD indicators

ATEX intrinsic safety

The device fulfills the requirements of Directive 2014/34/EU in case of corresponding purchase orders and is approved for use in Zone 0, 1 and 2.

Type Examination Test Certificate:	PTB 05 ATEX 2079 X
II 1G Ex ia IIC T6 Ga	

ATEX Non-sparking

The device fulfills the requirements of Directive 2014/34/EU in case of corresponding purchase orders and is approved for use in Zone 2.

Declaration of conformity	
II 3 G Ex nA IIC T1-T6 Gc	

IECEx intrinsic safety

Approved for use in Zone 0, 1, and 2.

IECEx certificate of conformity	IECEx PTB 12.0028X
Ex ia IIC T6	

Temperature data

Transmitter

ATEX/IECEX intrinsic safety, non-sparking ATEX

Temperature class	Permissible ambient temperature range	
	Device category 1 use	Device category 2 / 3 use
T6	-50 ... 44 °C (-58 ... 111.2 °F)	-50 ... 56 °C (-58 ... 132.8 °F)
T5	-50 ... 56 °C (-58 ... 132.8 °F)	-50 ... 71 °C (-58 ... 159.8 °F)
T4-T1	-50 ... 60 °C (-58 ... 140.0 °F)	-50 ... 85 °C (-58 ... 185.0 °F)

LCD indicators

ATEX/IECEX intrinsic safety, non-sparking ATEX

Temperature class	Permissible ambient temperature range	
	Device category 1 use	Device category 2 / 3 use
T6	-40 ... 44 °C (-40 ... 111.2 °F)	-40 ... 56 °C (-40 ... 132.8 °F)
T5	-40 ... 56 °C (-40 ... 132.8 °F)	-40 ... 71 °C (-40 ... 159.8 °F)
T4-T1	-40 ... 60 °C (-40 ... 140 °F)	-40 ... 85 °C (-40 ... 185 °F)

Electrical data

Transmitter

Intrinsic safety type of protection Ex ia IIC (part 1)

	TTH300-E1H TTH300-H1H Supply circuit	TTH300-E1P/-H1P TTH300-E1F/-H1F Supply circuit ¹⁾	
		FISCO	ENTITY
Max. voltage	$U_i = 30 \text{ V}$	$U_i \leq 17.5 \text{ V}$	$U_i \leq 24.0 \text{ V}$
Short-circuit current	$I_i = 130 \text{ mA}$	$I_i \leq 183 \text{ mA}^{2)}$	$I_i \leq 250 \text{ mA}$
Max. power	$P_i = 0.8 \text{ W}$	$P_i \leq 2.56 \text{ W}^{2)}$	$P_i \leq 1.2 \text{ W}$
Internal inductance	$L_i = 0.5 \text{ mH}$	$L_i \leq 10 \mu\text{H}$	$L_i \leq 10 \mu\text{H}$
Internal capacitance	$C_i = 0.57 \text{ nF}^{3)}$	$C_i \leq 5 \text{ nF}$	$C_i \leq 5 \text{ nF}$

1) FISCO in accordance with 60079-27

2) II B FISCO: $I_i \leq 380 \text{ mA}$, $P_i \leq 5.32 \text{ W}$

3) Only applies to HART variants. From HW rev. 1.07, previously 5 nF

Intrinsic safety type of protection Ex ia IIC (part 2)

	Measurement circuit: resistance thermometer, resistances	Measurement circuit: thermocouples, voltages
Max. voltage	$U_o = 6.5 \text{ V}$	$U_o = 1.2 \text{ V}$
Short-circuit current	$I_o = 25 \text{ mA}$	$I_o = 50 \text{ mA}$
Max. power	$P_o = 38 \text{ mW}$	$P_o = 60 \text{ mW}$
Internal inductance	$L_i = 0 \text{ mH}$	$L_i = 0 \text{ mH}$
Internal capacitance	$C_i = 49 \text{ nF}$	$C_i = 49 \text{ nF}$
Maximum permissible external inductance	$L_o = 5 \text{ mH}$	$L_o = 5 \text{ mH}$
Maximum permissible external capacitance	$C_o = 1.55 \mu\text{F}$	$C_o = 1.05 \mu\text{F}$

Intrinsic safety type of protection Ex ia IIC (part 3)

	LCD indicator interface
Max. voltage	$U_o = 6.2 \text{ V}$
Short-circuit current	$I_o = 65.2 \text{ mA}$
Max. power	$P_o = 101 \text{ mW}$
Internal inductance	$L_i = 0 \text{ mH}$
Internal capacitance	$C_i = 0 \text{ nF}$
Maximum permissible external inductance	$L_o = 5 \text{ mH}$
Maximum permissible external capacitance	$C_o = 1.4 \mu\text{F}$

LCD indicators

Intrinsic safety type of protection Ex ia IIC

Supply circuit	
Max. voltage	$U_i = 9 \text{ V}$
Short-circuit current	$I_i = 65.2 \text{ mA}$
Max. power	$P_i = 101 \text{ mW}$
Internal inductance	$L_i = 0 \text{ mH}$
Internal capacitance	$C_i = 0 \text{ nF}$

TTH300

Head-mount temperature transmitter

Use in potentially explosive atmospheres in accordance with FM and CSA

i NOTICE

- Further information on the approval of devices for use in potentially explosive atmospheres can be found in the explosion protection test certificates (at www.abb.com/temperature).
- Depending on the design, a specific marking in accordance with FM or CSA applies.

Ex-marking Transmitter

FM Intrinsically Safe

Model TTH300-L1H

Control Drawing	SAP_214829
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Model TTH300-L1P

Control Drawing	TTH300-L1P (IS)
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Model TTH300-L1F

Control Drawing	TTH300-L1F (IS)
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Class I, Div. 1 + 2, Groups A, B, C, D

Class I, Zone 0, AEx ia IIC T6

FM Non-Incendive

Model TTH300-L2H

Control Drawing	214831 (Non-Incendive)
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Model TTH300-L2P

Control Drawing	TTH300-L2P (NI_PS) TTH300-L2P (NI_AA)
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Model TTH300-L2F

Control Drawing	TTH300-L2F (NI_PS) TTH300-L2F (NI_AA)
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Class I, Div. 2, Groups A, B, C, D

CSA Intrinsically Safe

Model TTH300-R1H

Control Drawing	214826
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Model TTH300-R1P

Control Drawing	TTH300-R1P (IS)
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Model TTH300-R1F

Control Drawing	TTH300-R1F (IS)
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Class I, Div. 1 + 2, Groups A, B, C, D

Class I, Zone 0, Ex ia Group IIC T6

CSA Non-Incendive

Model TTH300-R2H

Control Drawing	SAP_214824 (Non-Incendive) SAP_214896 (Non-Incendive)
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Model TTH300-R2P

Control Drawing	TTH300-R2P (NI_PS) TTH300-R2P (NI_AA)
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Model TTH300-R2F

Control Drawing	TTH300-R2F (NI_PS) TTH300-R2F (NI_AA)
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Class I, Div. 2, Groups A, B, C, D

LCD indicators

FM Intrinsically Safe

Control Drawing	SAP_214 748
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I.S. Class I Div 1 and Div 2, Group: A, B, C, D or

I.S. Class I Zone 0 AEx ia IIC T¹⁾

$U_i / V_{max} = 9 \text{ V}$, $I_i / I_{max} < 65.2 \text{ mA}$, $P_i = 101 \text{ mW}$, $C_i = 0.4 \mu\text{F}$, $L_i = 0$

FM Non-Incendive

Control Drawing	SAP_214 751
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N.I. Class I Div 2, Group: A, B, C, D or Ex nL IIC T²⁾, Class I Zone 2

$U_i / V_{max} = 9 \text{ V}$, $I_i / I_{max} < 65.2 \text{ mA}$, $P_i = 101 \text{ mW}$, $C_i = 0.4 \mu\text{F}$, $L_i = 0$

CSA Intrinsically Safe

Control Drawing	SAP_214 749
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I.S. Class I Div 1 and Div 2; Group: A, B, C, D or

I.S. Zone 0 Ex ia IIC T¹⁾

$U_i / V_{max} = 9 \text{ V}$, $I_i / I_{max} < 65.2 \text{ mA}$, $P_i = 101 \text{ mW}$, $C_i < 0.4 \mu\text{F}$, $L_i = 0$

CSA Non-Incendive

Control Drawing	SAP_214 750
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N.I. Class I Div 2, Group: A, B, C, D oder Ex nL IIC T²⁾, Class I Zone 2

$U_i / V_{max} = 9 \text{ V}$, $I_i / I_{max} < 65.2 \text{ mA}$, $P_i = 101 \text{ mW}$, $C_i < 0.4 \mu\text{F}$, $L_i = 0$

1) Temp. Ident: T6 T_{amb} 56 °C, T4 T_{amb} 85 °C

2) Temp. Ident: T6 T_{amb} 60 °C, T4 T_{amb} 85 °C

Ordering Information

Ordering information TTH300

Base model	TTH300	XX	X	X
TTH300 Head Mounted Temperature Transmitter, Pt100 (RTD), thermocouples, electrical isolation				
Explosion Protection				
Without explosion protection		Y0		
ATEX Intrinsic Safety type of protection: Zone 0: II 1 G Ex ia IIC T6, Zone 1 (0): II 2 (1) G Ex [ia] ib IIC T6, Zone 1 (20): II 2 G (1D) Ex [iaD] ib IIC T6		E1		
ATEX Non-sparking type of protection: Zone 2: II 3 G Ex nA T6		E2		
IECEx Intrinsic Safety type of protection: Zone 0: Ex ia IIC T6, Zone 1 (0): Ex [ia] ib IIC T6, Zone 1 (20): Ex [iaD] ib IIC T6		H1		
FM Intrinsic Safety (IS): Class I, Div. 1+2, Groups A, B, C, D, Class I, Zone 0, AEx ia IIC T6		L1		
FM Non-incendive (NI): Class I, Div. 2, Groups A, B, C, D		L2		
CSA Intrinsic Safety (IS): Class I, Div. 1+2, Groups A, B, C, D		R1		
CSA Non-incendive (NI): Class I, Div. 2, Groups A, B, C, D		R2		
GOST Russia - metrological approval		G1		
GOST Russia - metrological approval and EAC-Ex, Ex i - Zone 0		P2		
GOST Kazakhstan - metrological approval		G3		
GOST Kazakhstan - metrological approval and EAC-Ex, Ex i - Zone 0		T2		
GOST Belarus - metrological approval		M5		
GOST Belarus - metrological approval and EAC-Ex, Ex i - Zone 0		U2		
Inmetro Ex ia IIC T6...T4 Ga, Ex ib [ia Ga] IIC T6...T4 Gb Exib [ia IIIC Da] IIC T6...T4 Gb		C1		
NEPSI Ex ia IIC T6		S1		
KOSHA Ex ia IIC T6		S5		
Communication Protocol				
HART			H	
PROFIBUS PA			P	
FOUNDATION fieldbus			F	
Configuration				
Standard configuration				BS
Customer-specific configuration with report, except user curve			1)	BF
Customer-specific configuration with report, including user curve				BG

TTH300

Head-mount temperature transmitter

Additional ordering information TTH300

	XX	XX	XXX	XX	XX	XX	XX	XX
Certificates								
SIL2 - Declaration of Conformity	2)	CS						
Declaration of compliance according EN 10204-2.1, with the order		C4						
Inspection certificate according EN 10204-3.1, visual, dimensional and functional test		C6						
Calibration Certificates								
With 5-point factory certificate							EM	
Inspection certificate according EN 10204-3.1, 5-point calibration							EP	
Handling of Certificates								
Send via e-mail							GHE	
Send via mail							GHP	
Send via mail express							GHD	
Send with instrument							GHA	
Only archived							GHS	
Extended Ambient Temperature Range								
-50 ... 85 °C (-58 ... 185 °F)				3)	SE			
Field Housing								
Aluminium field housing 80 x 75 x 57 mm, IP 65, including 2 pieces M16 cable glands						4)	H1	
Polyester field housing 75 x 80 x 55 mm, IP 65, including 2 pieces M16 cable glands						4)	H2	
Polycarbonate field housing 80 x 82 x 55 mm, IP 65, including 2 pieces M16 cable glands						4)	H3	
Aluminium field housing 175 x 80 x 57 mm with separate terminal block, IP 65, including 1 piece M16 and 2 pieces M20 cable glands						4)	H5	
Aluminium field housing 175 x 80 x 57 mm without separate terminal block, IP 65, including 1 piece M16 and 2 pieces M20 cable glands						4)	H6	
Polyester field housing 190 x 75 x 55 mm with separate terminal block, IP 65, including 1 piece M16 and 2 pieces M20 cable glands						4)	H7	
Polyester field housing 190 x 75 x 55 mm without separate terminal block, IP 65, including 1 piece M16 and 2 pieces M20 cable glands						4)	H8	
Display Options								
Prepared for display								D1
Not prepared for display								D2
LCD indicator type AS								D3
Configurable LCD indicator type A								D4
Mounting Options								
Snap-on fixing set for 35 mm rail acc. EN 60175 (incl. fixing screws)								SF
Customer-specific Versions								
(Please specify)								

Additional ordering information TTH300		XX
Documentation Language		
German		M1
English		M5
Language package Western Europe / Scandinavia (Languages: DA, ES, FR, IT, NL, PT, FI, SV)		MW
Language package Eastern Europe (Languages: EL, CS, ET, LV, LT, HU, HR, PL, SK, SL, RO, BG)		ME

- 1) E.g. set measuring range, TAG no.
- 2) Only available with Communication Protocol code H (HART)
- 3) Not available with Explosion Protection code L1, L2, R1, R2 and not available with PROFIBUS PA or FOUNDATION Fieldbus Codes P, F
- 4) Not available with Explosion Protection

Accessories	Order code
TTH Snap-on fixing set (packing unit 10 pieces), for 35 mm rail acc. EN 60175 (incl. fixing screws)	3KXT091230L0001
TTH Snap-on fixing set (packing unit 1 piece), for 35 mm rail acc. EN 60175 (incl. fixing screws)	3KXT091230L0002
TTH300 Commissioning Instruction, German	3KXT231001R4403
TTH300 Commissioning Instruction, English	3KXT231001R4401
TTH300 Commissioning Instruction, Language package Western Europe / Scandinavia	3KXT231001R4493
TTH300 Commissioning Instruction, Language package Eastern Europe	3KXT231001R4494

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Notes

Notes

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Service