

ABB MEASUREMENT & ANALYTICS | DATA SHEET

TTH200

Head-mount temperature transmitter



Measurement made easy

Temperature transmitter for HART protocol.

Suitable for all standard requirements.

Input circuit and communication

- Universal sensor input for resistance thermometers (RTD) and thermocouples
- Specific sensor linearization via Callendar-Van Dusen coefficients and with value pair table (32 points)
- Communication via 4 to 20 mA signal and HART protocol (switchable between HART 5 and HART 7)

Safety

- Global approvals for explosion protection up to Zone 0
- Functional safety SIL 2 / SIL 3 in accordance with IEC 61508
- Device versioning in accordance with NE 53
- Monitoring of the 4 to 20 mA loop current
- Wire break / corrosion monitoring in accordance with NE 89
- Device status signaling and freely configurable diagnostic categorization with diagnostic history according to NE 107

Configuration and tracking

- Support of DTM, EDD and FDI standard (FIM)
- Event monitor for logging critical events
- Configuration monitor for configuration changes
- Turnable LCD indicator for optimal readability (option)

Specification

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

Input filter

50 / 60 Hz

Switch-on delay

< 10 s ($I_a \leq 3.6$ mA during switch-on cycle)

Warm-up time

5 minutes

Rise time t_{90}

400 to 1000 ms

Measured value update

10/s, independent of sensor type and sensor circuit

Output filter

Digital filter 1st order: 0 to 100 s

Weight

- 50 g

Material

- Housing: polycarbonate
- Color: gray RAL9002
- Casting material: polyurethane (PUR), WEVO PU-417

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 stainless steel screws, including soldering tags
- Lines up to a maximum of 1.5 mm² (AWG 16)
- Connection for handheld terminal

Dimensions

Refer to **Dimensions** on page 12.

Ambient conditions

Ambient temperature

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

Transport- / Storage temperature

-50 to 85 °C (-58 to 185 °F)

Climate class in accordance with DIN EN 60654-1

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

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

100 % relative air humidity

Vibration resistance in accordance with IEC 60068-2-6

10 to 2000 Hz at 5 g, during operation and transport

Shock resistance according to IEC 60068-2-27

gn = 30, during operation and transport

IP rating

- Power supply circuit: IP 20
- Measurement current circuit: IP 00 or IP-rating of installation housing

... Specification

Electromagnetic compatibility

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

The extended requirements according to IEC EN 61326-3-2 are met from HW-Rev. 2.00.

Sensor for tests: Pt100: Measuring range 0 to 100 °C (32 to 212 °F), span 100 K.

Type of test	Testing accuracy	Effect
Burst to signal- / data lines	1 kV	< 0,5 %
	2 kV	DS*
Static discharge **		
• Air discharge	8 kV	No
• Contact discharge	6 kV	No
radiated field, IEC EN 61326-1 and NAMUR NE 21:		
80 MHz to 2.7 GHz	10 V/m	< 0,5 %
2.7 GHz to 6 GHz	3 V/m	< 0,5 %
radiated field, IEC EN 61326-3-1 (from HW-Rev. 2.00):		
80 MHz to 1 GHz	20 V/m	DS*
1.4 GHz to 2 GHz	10 V/m	DS*
2 GHz to 6 GHz	3 V/m	DS*
Coupling		
10 kHz to 80 MHz (from HW-Rev. 2.00)	10 V	< 0,5 %
150 kHz to 80 MHz (before HW-Rev. 2.00)	10 V	< 0,5 %
Surge voltage / line to ground	1 kV	B***
	2 kV	DS*

* Assessment criterion DS (Defined State) in accordance with IEC EN 61326-3-1 (from HW-Rev. 2.00)

** Air discharge (at 1 mm (0.04 in) distance) in accordance with IEC 61000-4-2

*** Assessment criterion B in accordance with IEC EN 61326-1 and NAMUR NE 21.

SIL functional safety

With conformity according to IEC 61508 for the use in safety relevant applications up to and including SIL 3 (redundant).

- In the use of one transmitter the device fulfills the requirements according to SIL 2.
- In the use of redundant handled transmitters the requirements can be fulfilled according to SIL 3.

Instructions on this can be found in the SIL-Safety Manual.

Type AS LC display



Figure 1: Type AS LCD indicator

Can only be ordered in conjunction with temperature transmitter.

CE marking

The type AS LCD indicator fulfills all requirements for CE marking in accordance with all applicable guidelines.

Properties

Transmitter-controlled graphic (alphanumeric) LCD display without configuration function

- Character height, mode-dependent
- Sign, 4 digits, 2 decimal places
- Turnable in 12 increments of 30° each

Display options

- Process value sensor
- Bargraph
- Output %

Display diagnostic information related to transmitter and sensor status

HART devices from SW-Rev. 3.00 (corresponds to HW-Rev. 2.00 and higher)

- Display of either one or two process values
- Extended diagnosis: error display in plain text with possible shutdown measures. Display of multiple simultaneous diagnoses.

Specification

Temperature range

- -20 to 70 °C (-4 to 158 °F)

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

- -40 to -20 °C (-40 to -4 °F)
- or
- 70 to 85 °C (158 to 185 °F)

Humidity

- 0 to 100 %, condensation permitted

Input - resistance thermometer / resistances

Resistance thermometer

- Pt100 in accordance with IEC 60751, JIS C1604, MIL-T-24388
- Ni in accordance with DIN 43760
- Cu in accordance with recommendation OIML R 84

Resistance measurement

- 0 to 500 Ω
- 0 to 5000 Ω

Sensor connection type

Two-, three-, four-wire circuit

Connection lead

- Maximum sensor line resistance per line 50 Ω 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 thermometer)

Sensor wire break

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

Detection of sensor wire break in accordance with NE 89 in all lines

Sensor error signaling

- Resistance thermometer:
Sensor short circuit and sensor wire break
- 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 in accordance with IEC 60584 / ASTM E988
- D in accordance with ASTM E988

Voltages

- -125 to 125 mV
- -125 to 1100 mV

Connection lead

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

Detection of sensor wire break in accordance with NE 89 in all lines

Input resistance

> 10 M Ω

Internal reference junction Pt1000, IEC 60751 Cl. B

(no additional jumpers necessary)

Sensor error signaling

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

Functionality input

Freestyle characteristic / 32-points-sampling point table

- Resistance measurement up to a maximum of 5 k Ω
- Voltages up to maximum 1.1 V

Sensor error adjustment

- Through Callendar-Van Dusen coefficients
- Through value table, 32 support points
- Through single-point adjustment (offset adjustment)
- Through two-point adjustment

... Specification

Output

Transmission characteristics

- Temperature linear
- Resistance linear
- Voltage linear

Output signal

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

Simulation mode

3.5 to 23.6 mA

Induced current consumption

< 3,5 mA

Maximum output current

23.6 mA

Configurable error current signal

Note

Regardless of the alarm setting (underrange or overrange), a high alarm or low alarm is always generated for some internal device errors (e.g. hardware errors). More detailed information can be found in the SIL Safety Manual.

Before SW-Rev. 3.00

Note

The default factory setting for the error current signal is high alarm 22 mA.

- Overrange / high alarm 22 mA (20.0 to 23.6 mA)
- Underrange / low alarm 3.6 mA (3.5 to 4.0 mA)

From SW-Rev. 3.00

Note

The default factory setting for the error current signal is low alarm 3.5 mA, in accordance with NAMUR recommendations NE 93, NE 107 and NE 131.

- Overrange / high alarm 22 mA (20.0 to 23.6 mA)
- Underrange / low alarm 3.5 mA (3.5 to 4.0 mA)

Power supply

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

Note

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

Input terminal voltage

Non-Ex application:

$$U_S = 11 \text{ to } 42 \text{ V DC}$$

Ex applications:

$$U_S = 11 \text{ to } 30 \text{ V DC}$$

Maximum permissible residual ripple for input terminal voltage

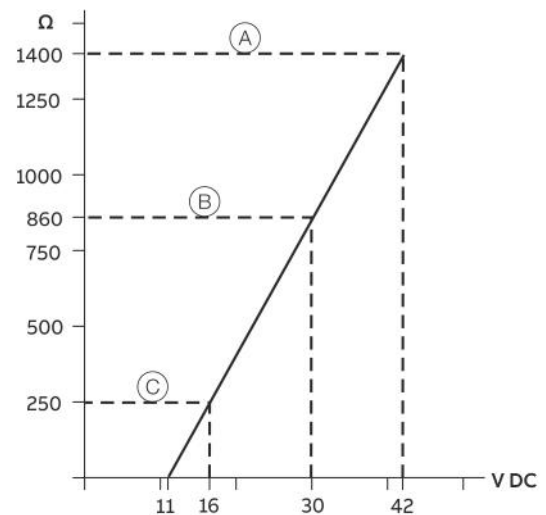
During communication, this is in accordance with the HART® FSK 'Physical Layer' specification.

Undervoltage detection on the transmitter

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

Maximum load

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



(A) TTH200

(B) TTH200 in Ex-applications

(C) HART® communication resistance (R_B)

Figure 2: Maximum load depending on input terminal voltage

Maximum power

- $P = U_S \times 0.022 \text{ A}$
- Example: $U_S = 24 \text{ V} \rightarrow P_{\text{max}} = 0.528 \text{ W}$

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).

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

Sensor	Measurement range limits	Minimum span	Measuring accuracy		
			Input (24-bit AD-converter)	Analog output* (16-Bit D / A-converter)	
Resistance thermometer / resistor					
DIN IEC 60751	Pt10 (a=0.003850)	-200 to 850 °C (-328 to 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)**			±0.08 °C (±0.14 °F)	±0.05%
	Pt200 (a=0.003850)			±0.40 °C (±0.72 °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 to 645 °C (-328 to 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 to 850 °C (-328 to 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)			±0.40 °C (±0.72 °F)	±0.05%
	Pt1000 (a=0.003920)			±0.08 °C (±0.14 °F)	±0.05%
DIN 43760	Ni50 (a=0.006180)	-60 to 250 °C (-76 to 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 to 200 °C (-58 to 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 to 500 Ω	4 Ω	±32 m Ω	±0.05%
		0 to 5000 Ω	40 Ω	±320 m Ω	±0.05%

* Percentages refer to the configured measuring span

** Standard Version

... Specification

Sensor		Measurement range limits	Minimum span	Measuring accuracy	
				Input* (24-bit AD-converter)	Analog output** (16-Bit D / A-converter)
Thermocouples*** / voltages					
IEC 60584	Type K (Ni10Cr-Ni5)	-200 to 1372 °C (-328 to 2502 °F)	50 °C (90 °F)	±0.35 °C (±0.63 °F)	±0.05%
	Type J (Fe-Cu45Ni)	-210 to 1200 °C (-346 to 2192 °F)			±0.05%
	Type N (Ni14CrSi-NiSi)	-200 to 1300 °C (-328 to 2372 °F)			±0.05%
	Type T (Cu-Cu45Ni)	-200 to 400 °C (-328 to 752 °F)			±0.05%
	Type E (Ni10Cr-Cu45Ni)	-200 to 1000 °C (-328 to 1832 °F)			±0.05%
	Type R (Pt13Rh-Pt)	-50 to 1768 °C (-58 to 3215 °F)	100 °C (180 °F)	±0.95 °C (±1.71 °F)	±0.05%
	Type S (Pt10Rh-Pt)			±1.15 °C (±2.07 °F)	±0.05%
	Type B (Pt30Rh-Pt6Rh)	250 to 1820 °C (482 to 3308 °F)		±1.05 °C (±1.89 °F)	±0.05%
DIN 43710	Type L (Fe-CuNi)	-200 to 900 °C (-328 to 1652 °F)	50 °C (90 °F)	±0.35 °C (±0.63 °F)	±0.05%
	Type U (Cu-CuNi)	-200 to 600 °C (-328 to 1112 °F)			±0.05%
IEC 60584 / ASTM E988	Type C	0 to 2315 °C (32 to 4200 °F)	100 °C (180 °F)	±1.35 °C (±2.43 °F)	±0.05%
ASTM E988	Type D				±0.05%
	Voltage measurement	-125 to 125 mV	2 mV	±12 µV	±0.05%
		-125 to 1100 mV	20 mV	±120 µV	±0.05%

* Due to the physical properties of thermocouples, the accuracy of temperature measurement decreases at low temperatures and may then be outside the specified accuracy range at the input. The specified accuracy applies to

Type K: >-60 °C, type J: >-140 °C, type N: >250 °C, type T: >-40 °C, type E: >-150 °C,
 Type R: >860 °C (400 to 860 °C: ±1.15 °C), type S: >650 °C (250 to 650 °C: ±1.36 °C),
 Type B: >1440 °C (500 to <1000 °C: ±2.4 °C, 1000 to 1440 °C: ±1.32 °C)
 Type L: >-140 °C (≤ -140 °C: ±0.41 °C), type U: >-40 °C (≤ -40 °C: ±0.63 °C),
 Type C and type D: no restriction

Type K: > -76 °F, Type J: > -220 °F, Type N: > 482 °F, Type T: > -40 °F, Type E: > -238 °F,
 Type R: > 1580 °F (752 to 1580 °F: ±2.07 °F), Type S: > 1202 °F (482 to 1202 °F: ±2.45 °F),
 Type B: > 2624 °F (932 to < 1832 °F: ±4.32 °F, 1832 to 2624 °F: ±2.38 °F)
 Type L: > -220 °F (≤ -220 °F: ±0.74 °F), Type U: > -40 °F (≤ -40 °F: ±1.13 °F),

** Percentages refer to the configured measuring span

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

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 influence:

Based on 23 °C (73.4 °F) for ambient temperature range -40 to 85 °C (-40 to 185 °F)

Sensor		Ambient temperature effect per 1 °C (1.8 °F) deviation from 23 °C (73.4 °F)	
		Input* (24-bit A / D converter)	Analog output** (16 bit 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 to 500 Ω	±0.002 Ω	± 0.003%
	0 to 5000 Ω	±0.02 Ω	± 0.003%
Thermocouple, for all defined types			
		± [(0.001% × (ME[mV] / MS[mV]) + (100% × (0.009 °C / MS [°C]))]**	± 0.003%
Voltage measurement			
	-125 to 125 mV	±1.5 μV	± 0.003%
	-125 to 1100 mV	±15 μV	± 0.003%

* Typical values

** Percentages refer to the configured measuring span of the analog output signal

*** Percentages refer to the configured measuring span

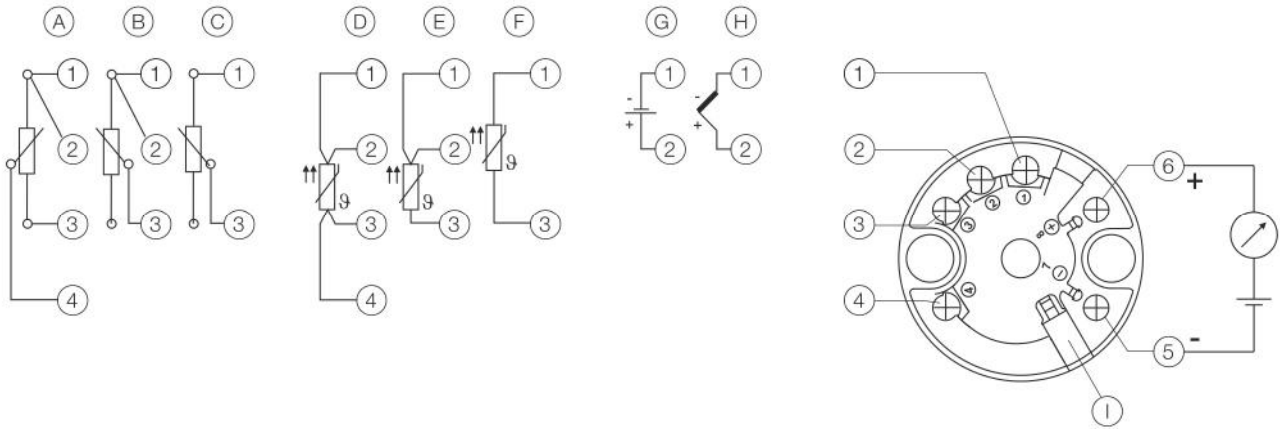
ME = voltage value of the thermocouple at the upper range value in accordance with the standard

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)

Electrical connections

Terminal assignment



- (A) Potentiometer, four-wire circuit
- (B) Potentiometer, three-wire circuit
- (C) Potentiometer, two-wire circuit
- (D) RTD, four-wire circuit
- (E) RTD, three-wire circuit
- (F) RTD, two-wire circuit

- (G) Voltage measurement
- (H) Thermocouple
- (I) Interface for type AS LCD indicator
- (1) to (4) Sensor connection (of measuring inset)
- (5) to (6) 4 to 20 mA HART

Figure 3: TTH200 connections

Communication

Configuration parameters

Measurement type

- Sensor type, connection type
- Error signaling
- Measuring range
- General information, e.g. TAG number
- Damping
- Output signal simulation

For details, see **Order form configuration** on page 18.

Write protection

Software write protection

Diagnostic information in accordance with NE 107

- Sensor error signalling (wire break or short-circuit)
- Device error
- Limit value up- / down-scaled
- Upper range up- / down-scaled
- Simulation active

HART® Communication

The device is listed with the FieldComm Group.

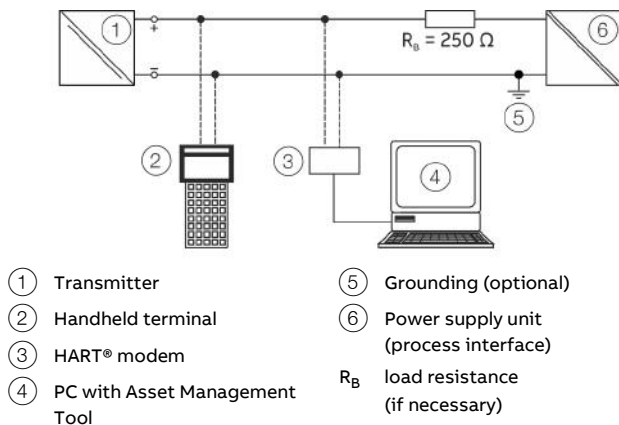


Figure 4: Example for HART connection

Manufacturer-ID	0x1A
Device Type ID	HART 5: 0x000D HART 7: 0x1A0D
Profile	From SW-Rev. 3.00 (corresponds to HW-Rev. 2.00 and higher): HART 5.9 and HART 7.6, switchable via <ul style="list-style-type: none"> • Tools • HART commands Default, if nothing else ordered: HART 7.6.
	SW-Rev. 1.00.06 to 2.01: HART 5.1, previously HART 5
Configuration	DTM, EDD, FDI (FIM)
Transmission signal	BELL Standard 202

Operating modes

- Point-to-point communication mode – standard (general address 0)
- HART 5: Multidrop mode (addressing 1 to 15)
- HART 7: Addressing 0 to 63, independent of current loop mode
- Burst Mode

Configuration options / Tools

- Device management / Asset management tools
- FDT Technology – via TTX200-DTM driver (Asset Vision Basic / DAT200)
- EDD – via TTX200 EDD driver (handheld terminal, Field Information Manager / FIM)
- FDI Technology – via TTX200 Package (Field Information Manager / FIM)

Diagnosis notice

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

Extended from SW-Rev. 3.00

- Device status signaling according to NE 107
- Freely configurable diagnostic categorization with diagnosis history according to NE 107

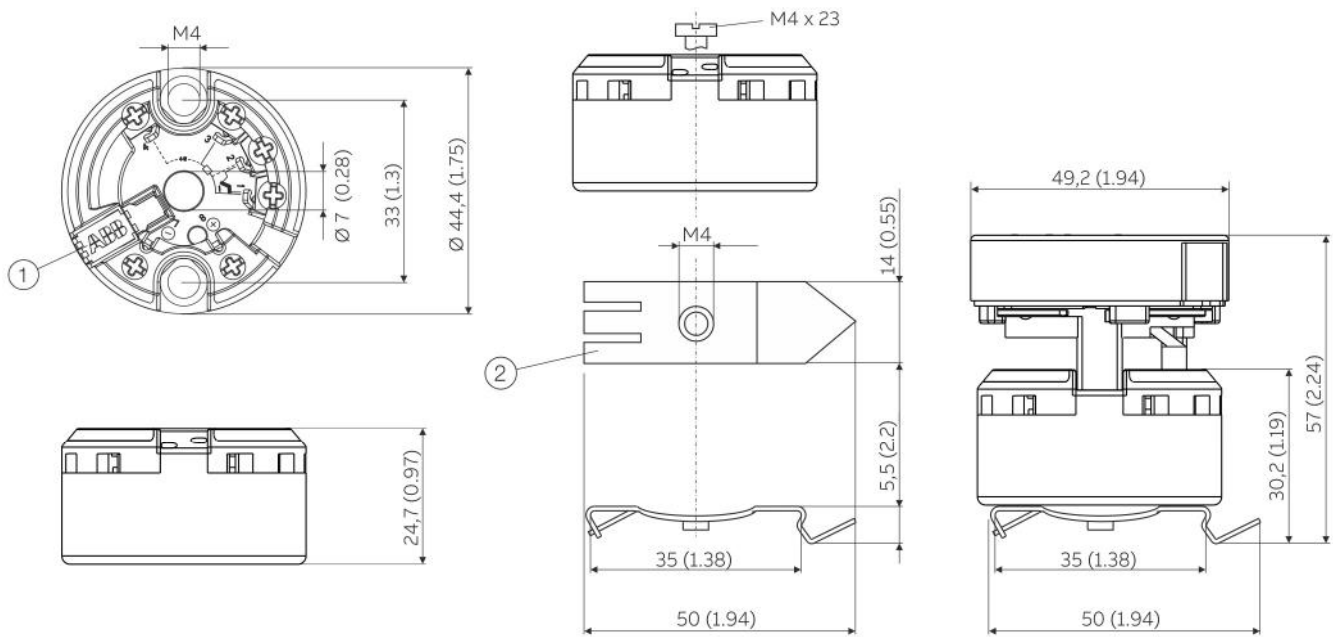
Tracking of events and configuration changes, from SW-Rev. 3.00

The HART® device stores information on critical events and configuration changes.

The information can be output via tools:

- Event monitor for logging critical events
- Configuration monitor for configuration changes

Dimensions



- ① Interface for Type AS LCD indicator (not suited for type A LCD indicator)
- ② Latching base for 35 mm (1.38 in) rail mount in accordance with EN 60175

Figure 5: Dimensions in mm (in)

Use in potentially explosive atmospheres in accordance with ATEX and IECEx

Note

- 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 TTH200-E1

To HW-Rev. 1.15:

Type Examination Test Certificate PTB 05 ATEX 2017 X

From HW Rev. 02.00.00:

Type Examination Test Certificate PTB 20 ATEX 2008 X

II 1 G Ex ia IIC T6...T1 Ga

II 2 (1) G Ex [ja IIC Ga] ib IIC T6...T1 Gb

II 2 G (1D) Ex [ja IIIC Da] ib IIC T6...T1 Gb

ATEX non-sparking and increased safety

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 TTH200-E2

Declaration of conformity

II 3 G Ex nA IIC T6...T1 Gc

II 3 G Ex ec IIC T6...T1 Gc

IECEx intrinsic safety

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

Model TTH200-H1

To HW-Rev. 1.15:

IECEx certificate of conformity IECEx PTB 09.0014X

From HW Rev. 02.00.00:

IECEx certificate of conformity IECEx PTB 20.0035X

Ex ia IIC T6...T1 Ga

Ex [ja IIC Ga] ib IIC T6...T1 Gb

Ex [ja IIIC Da] ib IIC T6...T1 Gb

LCD indicator

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...T1 Ga

ATEX non-sparking and increased safety

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 T6...T1 Gc

II 3 G Ex ec IIC T6...T1 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...T1 Ga

Temperature data

Transmitter

ATEX / IECEx intrinsic safety, ATEX non-sparking and increased safety

Temperature class	Permissible ambient temperature range
T6	-40 to 56 °C (-40 to 132.8 °F)
T4-T1	-40 to 85 °C (-40 to 185.0 °F)

LCD indicator

ATEX / IECEx intrinsic safety, ATEX non-sparking and increased safety

Temperature class	Permissible ambient temperature range
T6	-40 to 56 °C (-40 to 132.8 °F)
T4-T1	-40 to 85 °C (-40 to 185 °F)

... Use in potentially explosive atmospheres in accordance with ATEX and IECEx

Electrical data

Transmitter

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

	Supply circuit
Max. voltage	$U_i = 30 \text{ V}$
Short-circuit current	$I_i = 130 \text{ mA}$
Max. power	$P_i = 0.8 \text{ W}$
Internal inductance	$L_i = 160 \mu\text{H}^*$
Internal capacitance	$C_i = 0.57 \text{ nF}^{**}$

* From HW-Rev. 1.12, previously $L_i = 0.5 \text{ mH}$.

** From HW-Rev. 1.07, previously $C_i = 5 \text{ nF}$.

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	$I_o = 17.8 \text{ mA}^*$	$I_o = 50 \text{ mA}$
Max. power	$P_o = 29 \text{ mW}^{**}$	$P_o = 60 \text{ mW}$
Internal inductance	$L_i \approx 0 \text{ mH}$ (negligible)	$L_i \approx 0 \text{ mH}$ (negligible)
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	$C_o = 1.55 \mu\text{F}$	$C_o = 1.05 \mu\text{F}$

* From HW-Rev. 1.12, previously $I_o = 25 \text{ mA}$.

** From HW-Rev. 1.12, previously $P_o = 38 \text{ mW}$.

*** HW-Rev. 1.12 to 1.15: $C_i = 118 \text{ nF}$.

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	$L_i \approx 0 \text{ mH}$ (negligible)
Internal capacitance	$C_i \approx 0 \text{ nF}$ (negligible)
Maximum permissible external inductance	$L_o = 5 \text{ mH}$
Maximum permissible external capacitance	$C_o = 1.4 \mu\text{F}$

LCD indicator

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	$L_i \approx 0 \text{ mH}$ (negligible)
Internal capacitance	$C_i \approx 0 \text{ nF}$ (negligible)

Use in potentially explosive atmospheres in accordance with FM and CSA

Note

- 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 TTH200-L1

To HW-Rev. 1.15:	
Control Drawing	TTH200-L1H (I.S.)
As of HW-Rev 02.00.00:	
Control Drawing	See attached information
Class I, Div. 1 + 2, Groups A, B, C, D	
Class I, Zone 0, AEx ia IIC T6	

FM Non-Incendive

Model TTH200-L2

To HW-Rev. 1.15:	
Control Drawing	TTH200-L2H (N.I.)
As of HW-Rev 02.00.00:	
Control Drawing	See attached information
Class I, Div. 2, Groups A, B, C, D	

CSA Intrinsically Safe

Model TTH200-R1

To HW-Rev. 1.15:	
Control Drawing	TTH200-R1H (I.S.)
As of HW-Rev 02.00.00:	
Control Drawing	See attached information
Class I, Div. 1 + 2, Groups A, B, C, D	
Class I, Zone 0, Ex ia IIC T6	

CSA Non-Incendive

Model TTH200-R2

To HW-Rev. 1.15:	TTH200-R2H (1) (N.I.)
Control Drawing	TTH200-R2H (2, no conduit) (N.I.)
As of HW-Rev 02.00.00:	
Control Drawing	See attached information
Class I, Div. 2, Groups A, B, C, D	

LCD indicator

FM Intrinsically Safe

Control Drawing	SAP_214 748
I.S. Class I Div 1 and Div 2, Group: A, B, C, D or	
I.S. Class I Zone 0 AEx ia IIC T*	
$U_i / V_{max} = 9 \text{ V}, I_i / I_{max} < 65.2 \text{ mA}, P_i = 101 \text{ mW}, C_i = 0.4 \mu\text{F}, L_i = 0$	

FM Non-Incendive

Control Drawing	SAP_214 751
N.I. Class I Div 2, Group: A, B, C, D oder Ex nL IIC T**, 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
I.S. Class I Div 1 and Div 2; Group: A, B, C, D or	
I.S. Zone 0 Ex ia IIC T*	
$U_i / V_{max} = 9 \text{ V}, I_i / I_{max} < 65.2 \text{ mA}, P_i = 101 \text{ mW}, C_i < 0.4 \mu\text{F}, L_i = 0$	

CSA Non-Incendive

Control Drawing	SAP_214 750
N.I. Class I Div 2, Group: A, B, C, D oder Ex nL IIC T**, Class I Zone 2	
$U_i / V_{max} = 9 \text{ V}, I_i / I_{max} < 65.2 \text{ mA}, P_i = 101 \text{ mW}, C_i < 0.4 \mu\text{F}, L_i = 0$	
* Temp. Ident: T6 T _{amb} 56 °C, T4 T _{amb} 85 °C	
** Temp. Ident: T6 T _{amb} 60 °C, T4 T _{amb} 85 °C	

Ordering Information

TTH200

Base model	TTH200	XX	X	XX
TTH200 Head Mounted Temperature Transmitter, HART, 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...T1 Ga, Zone 1 (0): II 2 (1) G Ex [ia IIC Ga] ib IIC T6...T1 Gb, Zone 1 (20): II 2 G (1D) Ex [ia IIC Da] ib IIC T6...T1 Gb		E1		
ATEX Non-sparking and increased safety type of protection: Zone 2: II 3 G Ex nA IIC T6...T1 Gc, II 3 G Ex ec IIC T6...T1 Gc		E2		
IECEx Intrinsic Safety type of protection: Zone 0: Ex ia IIC T6...T1 Ga, Zone 1 (0): Ex [ia IIC Ga] ib IIC T6...T1 Gb, Zone 1 (20): Ex [ia IIC Da] ib IIC T6...T1 Gb		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 or Class I Zone 2 Group IIC T6		L2		
CSA Intrinsic Safety (IS): Class I, Div. 1+2, Groups A, B, C, D, Class I, Zone 0, Ex ia IIC T6		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		
NEPSI Intrinsic Safety type of protection: Ex ia IIC T6 Ga		S1		
Communication Protocol				
HART, programmable, output signal 4 to 20 mA			H	
Configuration				
Standard configuration				BS
Customer-specific configuration, except user curve				BF*
Customer-specific configuration, with user curve				BG

* E.g. set measuring range, TAG no.

Additional ordering information TTH200

	XX	XX	XXX	XX	XX	XX	XX
Declarations and Certificates							
SIL2 - Declaration of Conformity	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				
Field Housing							
Aluminium field housing 80 x 75 x 57 mm, IP 65, including 2 pieces M16 cable glands				H1**			
Polyester field housing 75 x 80 x 55 mm, IP 65, including 2 pieces M16 cable glands				H2**			
Polycarbonate field housing 80 x 82 x 55 mm, IP 65, including 2 pieces M16 cable glands				H3**			
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				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				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				H8**			
Display Options							
LCD indicator type AS					D3		
Mounting Options							
Snap-on fixing set for 35 mm rail acc. EN 60175 (incl. fixing screws)							SF
Documentation Language							
German							M1
English							M5
Chinese							M6
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

** Not available with Explosion Protection

Accessories	Order no.
TTH latching base set (packaging unit: 10 pcs.), for 35 mm rail in acc. with EN 60175 (incl. mounting screws)	3KXT091230L0001
TTH latching base set (packaging unit: 1 pcs.), for 35 mm rail in acc. with EN 60175 (incl. mounting screws)	3KXT091230L0002
TTH200 commissioning instructions, English	3KXT231002R4401
TTH200 commissioning instructions, German	3KXT231002R4403
TTH200 commissioning instructions, Western Europe / Scandinavia language package	3KXT231002R4493
TTH200 commissioning instructions, Eastern Europe language package	3KXT231002R4494

Order form configuration

Data relating to customer-specific configuration

Configuration	Selection
IEC 60751 JIS C1604 MIL-T-24388 DIN 43760 OIML R 84	Resistance thermometer <input type="checkbox"/> Pt10 <input type="checkbox"/> Pt50 <input type="checkbox"/> Pt100 (Standard) <input type="checkbox"/> Pt200 <input type="checkbox"/> Pt500 <input type="checkbox"/> Pt1000 <input type="checkbox"/> Pt10 <input type="checkbox"/> Pt50 <input type="checkbox"/> Pt100 <input type="checkbox"/> Pt10 <input type="checkbox"/> Pt50 <input type="checkbox"/> Pt100 <input type="checkbox"/> Pt200 <input type="checkbox"/> Pt1000 <input type="checkbox"/> Ni50 <input type="checkbox"/> Ni100 <input type="checkbox"/> Ni120 <input type="checkbox"/> Ni1000 <input type="checkbox"/> Cu10 <input type="checkbox"/> Cu100
	Resistance measurement <input type="checkbox"/> 0 to 500 Ω <input type="checkbox"/> 0 to 5000 Ω
IEC 60584 DIN 43710 IEC 60584 / ASTM E-988 ASTM E-988	Thermocouple <input type="checkbox"/> Type K <input type="checkbox"/> Type J <input type="checkbox"/> Type N <input type="checkbox"/> Type R <input type="checkbox"/> Type S <input type="checkbox"/> Type T <input type="checkbox"/> Type E <input type="checkbox"/> Type B <input type="checkbox"/> Type L <input type="checkbox"/> Type U <input type="checkbox"/> Type C <input type="checkbox"/> Type D
	Voltage measurement <input type="checkbox"/> -125 to 125 mV <input type="checkbox"/> -125 to 1100 mV
Sensor circuit (for resistance thermometer and resistance measurement only)	<input type="checkbox"/> Two-wire <input type="checkbox"/> Three-wire (standard) <input type="checkbox"/> Four-wire Two-wire circuit: Compensation of sensor-wire resistance max. 100 Ω <input type="checkbox"/> ___ Ω
Reference junction (for thermocouples only)	<input type="checkbox"/> Internal (for standard thermocouple, except type B) <input type="checkbox"/> None (type B) <input type="checkbox"/> External / temperature: ___ $^{\circ}\text{C}$
Meas. range	<input type="checkbox"/> Start of measuring range: _____ (default: 0) <input type="checkbox"/> End of measuring range: _____ (default: 100)
Unit	<input type="checkbox"/> Celsius (default) <input type="checkbox"/> Fahrenheit <input type="checkbox"/> Rankine <input type="checkbox"/> Kelvin
Characteristic behavior	<input type="checkbox"/> rising 4 to 20 mA (standard) <input type="checkbox"/> falling 20 to 4 mA
Output behavior for error Before SW-Rev. 3.00: From SW-Rev. 3.00:	<input type="checkbox"/> Overrange / high alarm 22 mA (default) <input type="checkbox"/> Underrange / low alarm 3.6 mA <input type="checkbox"/> Underrange / low alarm 3.5 mA (default) <input type="checkbox"/> Overrange / high alarm 22 mA
Output damping (T_{63})	<input type="checkbox"/> Off (standard) <input type="checkbox"/> ___ seconds (1 to 100 s)
Resistor value at 0 $^{\circ}\text{C}$ / R_0 Callendar-Van Dusen coefficient A Callendar-Van Dusen coefficient B Callendar-Van Dusen coefficient C (optional, for resistance thermometers only)	R_0 : _____ A: _____ B: _____ C: _____
User characteristics based on linearization table	<input type="checkbox"/> Based on attached table of variate pairs
TAG number	<input type="checkbox"/> _____ (maximum 8 characters)
HART revision, from SW-Rev. 3.00	<input type="checkbox"/> HART 5 <input type="checkbox"/> HART 7 (default)
Software write protection	<input type="checkbox"/> Off (standard) <input type="checkbox"/> On



Trademarks

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Sales



Service



ABB Measurement & Analytics

For your local ABB contact, visit:

www.abb.com/contacts

For more product information, visit:

www.abb.com/temperature

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