ABB MEASUREMENT & ANALYTICS | DATA SHEET

TTH300
Head-mount temperature transmitter
Measurement made easy
Temperature transmitter for all communications protocols.
Redundancy thanks to two inputs

Reliable temperature measurement for highest demands
- High accuracy, reliability and durability
- Specific sensor linearization via Callendar-Van Dusen coefficients and with value pair table (32 points)
- Approved for custody transfer measurements by MID certificate in accordance with Measuring Instruments Directive guideline 2014/32/EU
- Suited for ambient temperatures from −50 °C (−58 °F)

Input circuit and communication
- Two universal sensor inputs for resistance thermometers (e.g. 2 × Pt100 in three-wire circuit) and thermocouples
- 4 to 20 mA, HART®, PROFIBUS PA®, FOUNDATION Fieldbus®

Safety
- Global approvals for explosion protection up to Zone 0
- Functional safety SIL 2 / SIL 3 in accordance with IEC 61508 (HART)
- Device versioning in accordance with NE 53
- Continuous monitoring of supply voltage
- Wire break / corrosion monitoring in accordance with NE 89
- Extended diagnosis in accordance with NE 107 sensor drift monitoring

Configuration
- In accordance with FDT / DTM, EDD or FDI Standard (FIM)
- Turnable LCD indicator with operating buttons
## 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

### MTBF (Mean Time Between Failures)
190 years at 40 °C (104 °F) mean ambient temperature

### Input filter
50 / 60 Hz

### Switch-on delay
- HART: < 10 s (Ia ≤ 3.6 mA during switch-on cycle)
- PROFIBUS: 10 s, max. 30 s
- FOUNDATION Fieldbus: < 10 s

### Warm-up time
5 minutes

### Rise time t90
400 to 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 1 order: 0 to 100 s

### Weight
50 g

### Material
- Housing: polycarbonate
- Color: gray RAL9002
- Encapsulation resin: 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
See chapter Dimensions on page 17.

### Ambient conditions

#### Ambient temperature
- Standard: −40 to 85 °C (−40 to 185 °F)
- Optional: −50 to 85 °C (−58 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 in accordance with IEC 68-2-27
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 in accordance with IEC EN 61326 and Namur NE 21.

Interference-resistant in accordance with IEC 61326 and Namur NE 21.
Pt100: measuring range 0 to 100 °C (32 to 212 °F), span 100 K

<table>
<thead>
<tr>
<th>Type of test</th>
<th>Testing accuracy</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burst to signal- / data lines</td>
<td>2 kV</td>
<td>&lt; 0.5 %</td>
</tr>
<tr>
<td>Static discharge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Contact plate (indirect)</td>
<td>8 kV</td>
<td>No</td>
</tr>
<tr>
<td>• Supply terminals*</td>
<td>6 kV</td>
<td>No</td>
</tr>
<tr>
<td>• Sensor terminals*</td>
<td>4 kV</td>
<td>No</td>
</tr>
<tr>
<td>Radiated field</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80 MHz to 2 GHz</td>
<td>10 V/m</td>
<td>&lt; 0.5 %</td>
</tr>
<tr>
<td>Coupling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150 kHz to 80 MHz</td>
<td>10 V</td>
<td>&lt; 0.5 %</td>
</tr>
<tr>
<td>Surge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>between the supply lines</td>
<td>0.5 kV</td>
<td>No malfunction</td>
</tr>
<tr>
<td>Line to ground</td>
<td>1 kV</td>
<td></td>
</tr>
</tbody>
</table>

*Burst to signal- / data lines

SIL functional safety

Only for devices with HART communication.
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 A and type AS LCD indicators

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

CE-Marking

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

Properties

Transmitter-controlled graphic (alphanumeric) LCD indicator
• Character height, mode-dependent
• Sign, 4 digits, 2 decimal places
• Bargraph display
• Turnable in 12 increments of 30° each

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
Specification
Temperature range
−20 to 70 °C (−4 to 158 °F)

Restricted display function (contrast, reaction time) in the temperature ranges:
• −50 to −20 °C (−58 to −4 °F)
or
• 70 to 85 °C (158 to 185 °F)

Humidity
0 to 100 %, condensation permitted

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 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 μA

Sensor short circuit
< 5 Ω (for resistance thermometer)

Sensor wire break
• Measuring range: 0 to 500 Ω > 0.6 to 10 kΩ
• Measuring range: 0 to 5 Ω > 5.3 to 10 kΩ

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 break
• Linear resistance measurement:
  Sensor wire break
… Specification

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 to 125 mV
- −125 to 1100 mV

Connection lead
- Maximum sensor line resistance: per line 1.5 kΩ, total 3 kΩ

Sensor wire break monitoring in accordance with NE 89
- Pulsed with 1 µA outside measurement interval
- Thermocouple measurement 5.3 to 10 kΩ
- Voltage measurement 5.3 to 10 kΩ

Input resistance
> 10 MΩ

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

HART® 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
- Overrange 22 mA (20.0 to 23.6 mA)
- Underrange 3.6 mA (3.5 to 4.0 mA)

Functionality input

Freestyle characteristic / 32-points-sampling point table
- Resistance measurement up to a maximum of 5 kΩ
- 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

Input functionality
- 1 Sensor
- 2 Sensors:
  - mean measurement,
  - differential measurement,
  - sensor redundancy,
  - Sensor drift monitoring
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 Value*)
• 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 – extended diagnosis 1 (Transducer Block 3)
• Discrete Input 2 – extended diagnosis 2 (Transducer Block 3)

* 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 structure*
• 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 Value**)
• Analog Input 4 – SECONDARY_VALUE (reference junction temperature)
• Analog Output – optional HMI display (Transducer Block 2)
• Discrete Input 1 – extended diagnosis 1 (Transducer Block 3)
• Discrete Input 2 – extended diagnosis 2 (Transducer Block 3)
• PID – PID controller

LAS (Link Active Scheduler) link master functionality

* For the block description, block index, execution times, and block class, refer to the interface description
** Sensor 1, Sensor 2 or difference or mean
… Specification

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.

Power supply – HART®

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 complies 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
\[
R_B = \frac{\text{supply voltage} - 11 \text{ V}}{0.022 \text{ A}}
\]

Power supply – PROFIBUS® / FOUNDATION Fieldbus®

Input terminal voltage
- Non-Ex application:
  \[ U_S = 9 \text{ to } 32 \text{ V DC} \]
- Ex-applications:
  \[ U_S = 9 \text{ to } 17.5 \text{ V DC (FISCO)} \]
  \[ U_S = 9 \text{ to } 24 \text{ V DC (Fieldbus Entity model I.S.)} \]

Current consumption
\( \leq 12 \text{ mA} \)

Maximum power
\[
P = U_S \times 0.022 \text{ A}
\]
E. G.: \( U_S = 24 \text{ V} \Rightarrow P_{\text{max}} = 0.528 \text{ W} \)
**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.

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Measuring range limit</th>
<th>Minimum span</th>
<th>Measuring accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN IEC 60751</td>
<td>-200 to 850 °C (-328 to 1562 °F)</td>
<td>10 °C (18 °F)</td>
<td>±0.80 °C (±1.44 °F) ±0.05 %</td>
</tr>
<tr>
<td>Pt10 (a=0.003850)</td>
<td></td>
<td></td>
<td>±0.16 °C (±0.29 °F) ±0.05 %</td>
</tr>
<tr>
<td>Pt50 (a=0.003850)</td>
<td></td>
<td></td>
<td>±0.08 °C (±0.14 °F) ±0.05 %</td>
</tr>
<tr>
<td>Pt100 (a=0.003850)**</td>
<td></td>
<td></td>
<td>±0.24 °C (±0.43 °F) ±0.05 %</td>
</tr>
<tr>
<td>Pt200 (a=0.003850)</td>
<td></td>
<td></td>
<td>±0.16 °C (±0.29 °F) ±0.05 %</td>
</tr>
<tr>
<td>Pt500 (a=0.003850)</td>
<td></td>
<td></td>
<td>±0.08 °C (±0.14 °F) ±0.05 %</td>
</tr>
<tr>
<td>Pt1000 (a=0.003850)</td>
<td></td>
<td></td>
<td>±0.08 °C (±0.14 °F) ±0.05 %</td>
</tr>
<tr>
<td>JIS C1604</td>
<td>-200 to 645 °C (-328 to 1193 °F)</td>
<td>10 °C (18 °F)</td>
<td>±0.80 °C (±1.44 °F) ±0.05 %</td>
</tr>
<tr>
<td>Pt10 (a=0.003916)</td>
<td></td>
<td></td>
<td>±0.16 °C (±0.29 °F) ±0.05 %</td>
</tr>
<tr>
<td>Pt50 (a=0.003916)</td>
<td></td>
<td></td>
<td>±0.08 °C (±0.14 °F) ±0.05 %</td>
</tr>
<tr>
<td>Pt100 (a=0.003916)</td>
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<td></td>
<td>±0.08 °C (±0.14 °F) ±0.05 %</td>
</tr>
<tr>
<td>MIL-T-24388</td>
<td>-200 to 850 °C (-328 to 1562 °F)</td>
<td>10 °C (18 °F)</td>
<td>±0.80 °C (±1.44 °F) ±0.05 %</td>
</tr>
<tr>
<td>Pt10 (a=0.003920)</td>
<td></td>
<td></td>
<td>±0.16 °C (±0.29 °F) ±0.05 %</td>
</tr>
<tr>
<td>Pt50 (a=0.003920)</td>
<td></td>
<td></td>
<td>±0.08 °C (±0.14 °F) ±0.05 %</td>
</tr>
<tr>
<td>Pt100 (a=0.003920)</td>
<td></td>
<td></td>
<td>±0.08 °C (±0.14 °F) ±0.05 %</td>
</tr>
<tr>
<td>Pt200 (a=0.003920)</td>
<td></td>
<td></td>
<td>±0.24 °C (±0.43 °F) ±0.05 %</td>
</tr>
<tr>
<td>Pt1000 (a=0.003920)</td>
<td></td>
<td></td>
<td>±0.08 °C (±0.14 °F) ±0.05 %</td>
</tr>
<tr>
<td>DIN 43760</td>
<td>-60 to 250 °C (-76 to 482 °F)</td>
<td>10 °C (18 °F)</td>
<td>±0.16 °C (±0.29 °F) ±0.05 %</td>
</tr>
<tr>
<td>Ni50 (a=0.006180)</td>
<td></td>
<td></td>
<td>±0.08 °C (±0.14 °F) ±0.05 %</td>
</tr>
<tr>
<td>Ni100 (a=0.006180)</td>
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<td></td>
<td>±0.08 °C (±0.14 °F) ±0.05 %</td>
</tr>
<tr>
<td>Ni20 (a=0.006180)</td>
<td></td>
<td></td>
<td>±0.05 %</td>
</tr>
<tr>
<td>Ni1000 (a=0.006180)</td>
<td></td>
<td></td>
<td>±0.05 %</td>
</tr>
<tr>
<td>OIML R 84</td>
<td>-50 to 200 °C (-58 to 392 °F)</td>
<td>10 °C (18 °F)</td>
<td>±0.80 °C (±1.44 °F) ±0.05 %</td>
</tr>
<tr>
<td>Cu10 (a=0.004270)</td>
<td></td>
<td></td>
<td>±0.08 °C (±0.14 °F) ±0.05 %</td>
</tr>
<tr>
<td>Cu100 (a=0.004270)</td>
<td></td>
<td></td>
<td>±0.08 °C (±0.14 °F) ±0.05 %</td>
</tr>
</tbody>
</table>

* Percentages refer to the configured measuring span, omitted for PROFIBUS PA® and FOUNDATION Fieldbus®

** Standard Version
### Specification

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Measuring range limit</th>
<th>Minimum span</th>
<th>Measuring accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input</strong> (24-bit AD-converter)</td>
<td><strong>Analog output</strong> (16-Bit D / A-converter)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermocouples** / voltages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEC 60584</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type K (Ni10Cr-Ni5)</td>
<td>270 to 1372 °C (-454 to 2502 °F)</td>
<td>50 °C (90 °F)</td>
<td>±0,35 °C (±0.63 °F)</td>
</tr>
<tr>
<td>Type J (Fe-Cu45Ni)</td>
<td>210 to 1200 °C (-346 to 2192 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type N (Ni14CrSi-Ni5)</td>
<td>270 to 1300 °C (-454 to 2372 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type T (Cu-Cu45Ni)</td>
<td>270 to 400 °C (-454 to 752 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type E (Ni10Cr-Cu45Ni)</td>
<td>270 to 1000 °C (-454 to 1832 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type R (Pt13Rh-Pt)</td>
<td>-50 to 1768 °C (-58 to 3215 °F)</td>
<td>100 °C (180 °F)</td>
<td>±0,95 °C (±1.71 °F)</td>
</tr>
<tr>
<td>Type S (Pt10Rh-Pt)</td>
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<td></td>
</tr>
<tr>
<td>Type B (Pt30Rh-Pt6Rh)</td>
<td>-0 to 1820 °C (32 to 3308 °F)</td>
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<td></td>
</tr>
<tr>
<td>DIN 43710</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type L (Fe-CuNi)</td>
<td>-200 to 900 °C (-328 to 1652 °F)</td>
<td>50 °C (90 °F)</td>
<td>±0,35 °C (±0.63 °F)</td>
</tr>
<tr>
<td>Type U (Cu-CuNi)</td>
<td>-200 to 600 °C (-328 to 1112 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASTM E 988</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type C</td>
<td>-0 to 2315 °C (32 to 4200 °F)</td>
<td>100 °C (180 °F)</td>
<td>±1,35 °C (±2.43 °F)</td>
</tr>
<tr>
<td>Type D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage measurement</td>
<td>-125 to 125 mV</td>
<td>2 mV</td>
<td>±12 µV</td>
</tr>
<tr>
<td></td>
<td>-125 to 1100 mV</td>
<td>20 mV</td>
<td>±120 µV</td>
</tr>
</tbody>
</table>

* Percentages refer to the configured measuring span, omitted for PROFIBUS PA® and FOUNDATION Fieldbus®

** 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 V_{DC}

**Ambient temperature effect:**

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

#### Sensor

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Ambient temperature effect per 1 °C (1.8 °F) deviation from 23 °C (73.4 °F)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resistance thermometer for two-, three- and four-wire circuits</strong></td>
<td>Input (24-bit AD-converter)</td>
</tr>
<tr>
<td>IEC, JIS, MIL</td>
<td>Pt10: ±0.04 °C (±0.072 °F) ±0.003 %</td>
</tr>
<tr>
<td></td>
<td>Pt50: ±0.008 °C (±0.014 °F) ±0.003 %</td>
</tr>
<tr>
<td></td>
<td>Pt100: ±0.004 °C (±0.007 °F) ±0.003 %</td>
</tr>
<tr>
<td>IEC, MIL</td>
<td>Pt200: ±0.02 °C (±0.036 °F) ±0.003 %</td>
</tr>
<tr>
<td></td>
<td>Pt500: ±0.008 °C (±0.014 °F) ±0.003 %</td>
</tr>
<tr>
<td></td>
<td>Pt1000: ±0.004 °C (±0.007 °F) ±0.003 %</td>
</tr>
<tr>
<td>DIN 43760</td>
<td>Ni50: ±0.008 °C (±0.014 °F) ±0.003 %</td>
</tr>
<tr>
<td></td>
<td>Ni100: ±0.004 °C (±0.007 °F) ±0.003 %</td>
</tr>
<tr>
<td></td>
<td>Ni20: ±0.003 °C (±0.005 °F) ±0.003 %</td>
</tr>
<tr>
<td></td>
<td>Ni100: ±0.004 °C (±0.007 °F) ±0.003 %</td>
</tr>
<tr>
<td>OIML R 84</td>
<td>Cu10: ±0.04 °C (±0.072 °F) ±0.003 %</td>
</tr>
</tbody>
</table>

**Resistance measurement**

<table>
<thead>
<tr>
<th>Resistance Range</th>
<th>Input (24-bit AD-converter)</th>
<th>Analog output (16-bit DA-converter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 500 Ω</td>
<td>±0.002 Ω ±0.003 %</td>
<td>±0.02 Ω ±0.003 %</td>
</tr>
<tr>
<td>0 to 5000 Ω</td>
<td>±0.02 Ω ±0.003 %</td>
<td>±0.02 Ω ±0.003 %</td>
</tr>
</tbody>
</table>

**Thermocouple, for all defined types**

\[ \pm [(0.001 \% \times (ME[mV] / MS[mV]) + (100 \% \times (0.009 °C / MS[^{°}C]))) ±0.003 \%] \]

<table>
<thead>
<tr>
<th>Voltage measurement</th>
<th>Input (24-bit AD-converter)</th>
<th>Analog output (16-bit DA-converter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>−125 to 125 mV</td>
<td>±1.5 µV ±0.003 %</td>
<td>±1.5 µV ±0.003 %</td>
</tr>
<tr>
<td>−125 to 1100 mV</td>
<td>±15 µV ±0.003 %</td>
<td>±15 µV ±0.003 %</td>
</tr>
</tbody>
</table>

1 Per centages 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 to −40 °C (−58 to −40 °F)
Electrical connections

Pin assignment

Resistance thermometers (RTD) / resistors (potentiometer)

A Potentiometer, four-wire circuit
B Potentiometer, three-wire circuit
C Potentiometer, two-wire circuit
D 2 × RTD, three-wire circuit*
E 2 × RTD, two-wire circuit*
F RTD, four-wire circuit
G RTD, three-wire circuit
H RTD, two-wire circuit
I Sensor 1
J Sensor 2*
K Interface for LCD indicators and service
1 – 6 Sensor connection (of measuring inset)
7 – 8 4 to 20 mA HART®, PROFIBUS PA®, FOUNDATION Fieldbus®

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

Figure 3: Terminal assignment resistance thermometers (RTD) / resistors (potentiometer)
Thermocouples / voltages and resistance thermometer (RTD) / thermocouple combinations

- **A** 2 x voltage measurement*
- **B** 1 x voltage measurement
- **C** 2 x thermocouple*
- **D** 1 x thermocouple
- **E** 1 x RTD, four-wire circuit and 1 x thermocouple*
- **F** 1 x RTD, three-wire circuit and 1 x thermocouple*
- **G** 1 x RTD, two-wire circuit and 1 x thermocouple*
- **H** Sensor 1
- **I** Sensor 2*
- **J** Interface for LCD indicators and service
- **1 – 6** Sensor connection (of measuring inset)
- **7 – 8** 4 to 20 mA HART®, PROFIBUS PA®, FOUNDATION Fieldbus®

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

Figure 4  Terminal assignment thermocouples / voltages and resistance thermometer (RTD) / thermocouple combinations
Communication

Configuration parameters

Measurement type
- Sensor type, connection type
- Error signaling
- Measuring range
- General information, e.g. TAG number
- Damping
- Warning and alarm thresholds
- Output signal simulation
- For details, see Order form configuration on page 24.

Write protection
Software write protection

Diagnostic information in accordance with NE 107

Standard:
- Sensor error signalling (wire break or short-circuit)
- Device error
- Limit value up- / down-scaled
- Upper range up- / down-scaled
- 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 connection lead corrosion
- Supply voltage down-scaled
- Drag indicator for Sensor 1, Sensor 2 and ambient temperature
- Ambient temperature up-scaled
- Ambient temperature down-scaled
- Operating hours counter

HART® Communication

The device is listed with the FieldComm Group.

![HART® Connection Diagram]

Manufacturer ID 0x1A
Device ID
- HART 5: 0x000B,
- HART 7: 0x1A0B

Profile
- HART 5.1 (can be switched to HART 7)
Configuration
- On device using LCD indicator
- DTM, EDD, FDI (FIM)

Transmission signal
- BELL Standard 202

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

Configuration options / tools

Driver-independent:
- HMI LCD indicator with configuration function

Driver-dependent:
- Device management / Asset management tools
- FDT technology – via TTX300-DTM driver (Asset Vision Basic / DAT200)
- EDD – via TTX300 EDD driver (Handheld terminal, Field Information Manager / FIM)
- FDI technology – via TTX300 package (Field Information Manager / FIM)

Diagnosis notice
- Overrange- / underrange in accordance with NE 43
- HART diagnosis
PROFIBUS PA® Communication

The interface complies with Profile 3.01 (Standard PROFIBUS®, EN 50170, DIN 1924 [PRO91]).

Figure 6: Example for PROFIBUS PA® connection

| Manufacturer ID | 0x1A |
| ID number       | 0x3470 (0x9700) |
| Profile         | PA 3.01 |
| Configuration   | On device using LCD indicator |

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 makes sure that the current consumption cannot exceed a maximum of 20 mA.

FOUNDATION Fieldbus® Communication

Figure 7: Example for FOUNDATION Fieldbus® connection

| Device ID          | 000320001F... |
| Configuration      | On device using LCD indicator |
| 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 makes sure that the current consumption cannot exceed a maximum of 20 mA.
—

**MID Certification**

**TTH300 with MID Certification**

The temperature transmitter TTH300 is certified by an MID Parts Certificate in accordance with the Measuring Instruments Directive 2014/32/EU (MID) and the standard WELMEC 7.2. The device with the appropriate configuration is therefore approved for ‘Custody Transfer’-measurements (fiscal metering). The MID certification emphasizes the high accuracy, reliability and durability of the TTH300.

**Note**

This chapter provides basic information on the MID-certified transmitter TTH300. Before commissioning the device, full information should be consulted in the supplied MID documents (Parts Certificate and associated ‘Description’). Any generally applicable statements on the transmitter TTH300, especially pertaining to explosion protection and device safety, remain unaffected.

**General**

Devices with MID certification have their own EU declaration of conformity. In addition to the declaration, the ‘Parts Certificate’ and the associated ‘Description’ are enclosed with the device.

It is compulsory and imperative that the described areas of application, requirements and restrictions are complied with for the intended use of the device!

The requirements of explosion protection and functional safety (SIL) remain unaffected by the MID certification.

The number of the partial certificate (TC11002) of the notified body NMi Certin B.V. and the checksum (0x46c9) of the certified SW revision 01.03.00 are printed on the name plate of the device.

**Areas of application, conditions and requirements**

The temperature transmitter TTH300 with MID certification for custody transfer measurements is especially suited for measurement and control systems in the oil and gas industry. In addition to gas, any liquids except for water are permitted for measurement.

The MID certification refers to a special configuration of the transmitter. This must not be modified! An extract of the conditions and requirements stated in the certificate follows below:

- Communication protocol: HART 5, HART 7
- HW revision: 1.07
- SW revision: 01.03.00 with checksum 0x46c9
- The checksum of the software (firmware) is printed on the name plate of the device
- On sensor Pt100 in a four-wire circuit
- Permissible measuring range: \(-50 \text{ to } 150 \, ^\circ\text{C} \, (\sim 58 \text{ to } 302 \, ^\circ\text{F})\)
- Ambient temperature range without LCD indicator: \(-40 \text{ to } 85 \, ^\circ\text{C} \, (\sim 40 \text{ to } 185 \, ^\circ\text{F})\)

**Note**

- Based on the MID certificate, an operation of the TTH300 with the connected LCD indicator is not permitted.
- The MID certification can generally be combined with all certifications of explosion protection. The ambient temperature and measuring range named in the corresponding explosion protection certificate, however, limit the ranges permitted in the MID certificate.

**Note**

The HW write protection on the device should be activated after installation and configuration. The housing cover should be secured and the device housing sealed using the supplied seal.
Dimensions

Figure 8: Dimensions in mm (in)

1 Interface for LCD indicator

2 Latching base for 35 mm (1.38 in) rail mount in accordance with EN 60175
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 TTH300-E1H
Type Examination Test Certificate PTB 05 ATEX 2017 X
II 1 G Ex ia IIC T6 Ga
II 2 (1) G Ex [ia IIC Ga] ib IIC T6 Gb
II 2 G (1D) Ex [ia IIC Da] ib IIC T6 Gb

Model TTH300-E1P and TTH300-E1F
Type Examination Test Certificate PTB 09 ATEX 2016 X
II 1 G Ex ia IIC T6 Ga
II 2 (1) G Ex [ia IIC Ga] ib IIC T6 Gb
II 2 G (1D) Ex [ia IIC Da] ib IIC T6 Gb

Non-sparking ATEX
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
Model TTH300-H1P and TTH300-H1F
IECEx certificate of conformity IECEx PTB 11.0108X
Ex ia IIC T6...T1 Ga
Ex [ia IIC Ga] ib IIC T6...T1 Gb
Ex [ia IIC 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 Ga

Non-sparking ATEX
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...T1 Ga
Ex [ia IIC Ga] ib IIC T6...T1 Gb
Ex [ia IIC Da] ib IIC T6...T1 Gb
Temperature data

Transmitter
ATEX/IECEx intrinsic safety, non-sparking ATEX

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Device category 1 use</td>
</tr>
<tr>
<td>T6</td>
<td>−50 to 44 °C</td>
</tr>
<tr>
<td></td>
<td>(−58 to 111.2 °F)</td>
</tr>
<tr>
<td>T5</td>
<td>−50 to 56 °C</td>
</tr>
<tr>
<td></td>
<td>(−58 to 132.8 °F)</td>
</tr>
<tr>
<td>T4-T1</td>
<td>−50 to 60 °C</td>
</tr>
<tr>
<td></td>
<td>(−58 to 140.0 °F)</td>
</tr>
</tbody>
</table>

LCD indicator
ATEX/IECEx intrinsic safety, non-sparking ATEX

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Device category 1 use</td>
</tr>
<tr>
<td>T6</td>
<td>−40 to 44 °C</td>
</tr>
<tr>
<td></td>
<td>(−40 to 111.2 °F)</td>
</tr>
<tr>
<td>T5</td>
<td>−40 to 56 °C</td>
</tr>
<tr>
<td></td>
<td>(−40 to 132.8 °F)</td>
</tr>
<tr>
<td>T4-T1</td>
<td>−40 to 60 °C</td>
</tr>
<tr>
<td></td>
<td>(−40 to 140 °F)</td>
</tr>
</tbody>
</table>

Electrical data

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

<table>
<thead>
<tr>
<th>Power supply circuit*</th>
<th>TTH300-E1H</th>
<th>TTH300-E1P/-H1P</th>
<th>TTH300-H1H</th>
<th>TTH300-E1F/-H1F</th>
</tr>
</thead>
<tbody>
<tr>
<td>FISCO*</td>
<td>ENTITY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. voltage</td>
<td>$U_i = 30$ V</td>
<td>$U_i \leq 17.5$ V</td>
<td>$U_i \leq 24.0$ V</td>
<td></td>
</tr>
<tr>
<td>Short-circuit current</td>
<td>$I_s = 130$ mA</td>
<td>$I_s \leq 183$ mA**</td>
<td>$I_s \leq 250$ mA</td>
<td></td>
</tr>
<tr>
<td>Max. power</td>
<td>$P_s = 0.8$ W</td>
<td>$P_s \leq 2.56$ W**</td>
<td>$P_s \leq 1.2$ W</td>
<td></td>
</tr>
<tr>
<td>Internal inductance</td>
<td>$L_i = 0.5$ mH</td>
<td>$L_i \leq 10$ μH</td>
<td>$L_i \leq 10$ μH</td>
<td></td>
</tr>
<tr>
<td>Internal capacitance</td>
<td>$C_i = 0.57$ nF***</td>
<td>$C_i \leq 5$ nF</td>
<td>$C_i \leq 5$ nF</td>
<td></td>
</tr>
</tbody>
</table>

* FISCO in accordance with 60079-27
** If B FISCO: $I_s \leq 380$ mA, $P_s \leq 5.32$ W
*** Only applies for HART variants. From HW Rev. 1.07, previously 5 nF

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

Measurement current circuit

<table>
<thead>
<tr>
<th>Resistance thermometers, resistors</th>
<th>Thermocouples, voltages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. voltage $U_o = 6.5$ V</td>
<td>$U_o = 1.2$ V</td>
</tr>
<tr>
<td>Short-circuit current $I_o = 25$ mA</td>
<td>$I_o = 50$ mA</td>
</tr>
<tr>
<td>Max. power $P_o = 38$ mW</td>
<td>$P_o = 60$ mW</td>
</tr>
<tr>
<td>Internal inductance $L_i = 0$ mH</td>
<td>$L_i = 0$ mH</td>
</tr>
<tr>
<td>Internal capacitance $C_i = 49$ nF</td>
<td>$C_i = 49$ nF</td>
</tr>
<tr>
<td>Maximum permissible external inductance $L_o = 5$ mH</td>
<td>$L_o = 5$ mH</td>
</tr>
<tr>
<td>Maximum permissible external capacitance $C_o = 1.55$ μF</td>
<td>$C_o = 1.05$ μF</td>
</tr>
</tbody>
</table>

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

LCD indicator interface

| Max. voltage $U_o = 6.2$ V |
| Short-circuit current $I_o = 65.2$ mA |
| Max. power $P_o = 101$ mW |
| Internal inductance $L_i = 0$ mH |
| Internal capacitance $C_i = 0$ nF |
| Maximum permissible external inductance $L_o = 5$ mH |
| Maximum permissible external capacitance $C_o = 1.4$ μF |

LCD indicator
Intrinsic safety type of protection Ex ia IIC

Supply circuit

| Max. voltage $U_i = 9$ V |
| Short-circuit current $I_s = 65.2$ mA |
| Max. power $P_i = 101$ mW |
| Internal inductance $L_i = 0$ mH |
| Internal capacitance $C_i = 0$ nF |
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](http://www.abb.com/temperature)).
- Depending on the design, a specific marking in accordance with FM or CSA applies.

### Ex marking

**Transmitter**

**FM Intrinsically Safe**

<table>
<thead>
<tr>
<th>Model</th>
<th>Control Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTH300-L1H</td>
<td>SAP_214829</td>
</tr>
<tr>
<td>TTH300-L1P</td>
<td>TTH300-L1P (15)</td>
</tr>
<tr>
<td>TTH300-L1F</td>
<td>TTH300-L1F (15)</td>
</tr>
</tbody>
</table>

- Class I, Div. 1 + 2, Groups A, B, C, D
- Class I, Zone 0, AEx ia IIC T6

**FM Non-Incendive**

<table>
<thead>
<tr>
<th>Model</th>
<th>Control Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTH300-L2H</td>
<td>214831 (Non-Incendive)</td>
</tr>
<tr>
<td>TTH300-L2P</td>
<td>TTH300-L2P (NI_PS)</td>
</tr>
<tr>
<td>TTH300-L2F</td>
<td>TTH300-L2F (NI_AA)</td>
</tr>
</tbody>
</table>

- Class I, Div. 2, Groups A, B, C, D

**CSA Intrinsically Safe**

<table>
<thead>
<tr>
<th>Model</th>
<th>Control Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTH300-R1H</td>
<td>SAP_214826</td>
</tr>
<tr>
<td>TTH300-R1P</td>
<td>TTH300-R1P (15)</td>
</tr>
<tr>
<td>TTH300-R1F</td>
<td>TTH300-R1F (15)</td>
</tr>
</tbody>
</table>

- Class I, Div. 1 + 2, Groups A, B, C, D
- Class I, Zone 0, Ex ia Group IIC T6

### LCD indicator

**FM Intrinsically Safe**

<table>
<thead>
<tr>
<th>Model</th>
<th>Control Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTH300-L1H</td>
<td>SAP_214748</td>
</tr>
<tr>
<td>TTH300-L1P</td>
<td>TTH300-L2P (NI_PS)</td>
</tr>
<tr>
<td>TTH300-L1F</td>
<td>TTH300-L2F (NI_AA)</td>
</tr>
</tbody>
</table>

- U / V_{max} = 9 V, I / I_{max} < 65.2 mA, P_{i} = 101 mW, C_{i} = 0.4 μF, L_{i} = 0

**FM Non-Incendive**

<table>
<thead>
<tr>
<th>Model</th>
<th>Control Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTH300-L2H</td>
<td>SAP_214751</td>
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<tr>
<td>TTH300-L2P</td>
<td>TTH300-L2F (NI_PS)</td>
</tr>
<tr>
<td>TTH300-L2F</td>
<td>TTH300-L2F (NI_AA)</td>
</tr>
</tbody>
</table>

- U / V_{max} = 9 V, I / I_{max} < 65.2 mA, P_{i} = 101 mW, C_{i} = 0.4 μF, L_{i} = 0

**CSA Intrinsically Safe**

<table>
<thead>
<tr>
<th>Model</th>
<th>Control Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTH300-R1H</td>
<td>SAP_214749</td>
</tr>
<tr>
<td>TTH300-R1P</td>
<td>TTH300-R1P (15)</td>
</tr>
<tr>
<td>TTH300-R1F</td>
<td>TTH300-R1F (15)</td>
</tr>
</tbody>
</table>

- U / V_{max} = 9 V, I / I_{max} < 65.2 mA, P_{i} = 101 mW, C_{i} < 0.4 μF, L_{i} = 0

**CSA Non-Incendive**

<table>
<thead>
<tr>
<th>Model</th>
<th>Control Drawing</th>
</tr>
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<tbody>
<tr>
<td>TTH300-R2H</td>
<td>SAP_214886 (Non-Incendive)</td>
</tr>
<tr>
<td>TTH300-R2P</td>
<td>TTH300-R2P (NI_PS)</td>
</tr>
<tr>
<td>TTH300-R2F</td>
<td>TTH300-R2F (NI_AA)</td>
</tr>
</tbody>
</table>

- Temp. Ident: T6 T_{amb} 56 °C, T4 T_{wet} 85 °C
- Temp. Ident: T6 T_{amb} 60 °C, T4 T_{wet} 85 °C
## Ordering Information

### TTH300

<table>
<thead>
<tr>
<th>Base model</th>
<th>TTH300</th>
<th>XX</th>
<th>X</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTH300 Head Mounted Temperature Transmitter, Pt100 (RTD), thermocouples, electrical isolation</td>
<td>TTH300</td>
<td>XX</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

### Explosion Protection

- Without explosion protection: Y0
- IECEx Intrinsic Safety type of protection: Zone 0: Zone 0: Ex ia IIC T6 Ga, Zone 1 (0): Ex [ia IIC Ga] ib IIC T6 Gb, Zone 1 (20): Zone 1 (20): Ex [ia IIC Da] ib IIC T6 Gb E2
- FM Intrinsic Safety (IS): Class I, Div. 1+2, Groups A, B, C, D, Class I, Zone 0, Ex ia IIC T6 FM Non-incendive (NI): Class I, Div. 2, Groups A, B, C, D oder Class I Zone 2 Group IIC T6 L1
- CSA Intrinsic Safety (IS): Class I, Div. 1+2, Groups A, B, C, D, Class I, Zone 0, Ex ia IIC CSA Non-incendive (NI): Class I, Div. 2, Groups A, B, C, D R1
- 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 IIC Da] IIC T6...T4 Gb C1
- 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 BF*
- Customer-specific configuration with report, including user curve BG

* E.g. set measuring range, TAG no.
### Ordering Information

**Additional ordering information TTH300**

<table>
<thead>
<tr>
<th>Additional ordering information</th>
<th>XX</th>
<th>XX</th>
<th>XXX</th>
<th>XX</th>
<th>XX</th>
<th>XX</th>
<th>XX</th>
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</thead>
<tbody>
<tr>
<td><strong>Declarations and Certificates</strong></td>
<td></td>
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<tr>
<td>SIL2 · Declaration of Conformity</td>
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<tr>
<td>Declaration of compliance according EN 10204-2.1, with the order</td>
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<tr>
<td>Inspection certificate according EN 10204-3.1, visual, dimensional and functional test</td>
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<td>MID Parts Certificate for Custody Transfer</td>
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<td><strong>Calibration Certificates</strong></td>
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<td>With 5-point factory certificate</td>
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<td>Inspection certificate according EN 10204-3.1, 5-point calibration</td>
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<td><strong>Handling of Certificates</strong></td>
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<td>Send via e-mail</td>
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</tr>
<tr>
<td>Send via mail</td>
<td>GHP</td>
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<tr>
<td>Send via mail express</td>
<td>GHD</td>
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<tr>
<td>Send with instrument</td>
<td>GHA</td>
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<tr>
<td>Only archived</td>
<td>GHS</td>
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<tr>
<td><strong>Extended Ambient Temperature Range</strong></td>
<td>−50 to 85 °C (−58 to 185 °F)</td>
<td>SE</td>
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<tr>
<td><strong>Field Housing</strong></td>
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</tr>
<tr>
<td>Aluminium field housing 80 × 75 × 57 mm, IP 65, including 2 pieces M16 cable glands</td>
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<tr>
<td>Polyester field housing 75 × 80 × 55 mm, IP 65, including 2 pieces M16 cable glands</td>
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<td>Polycarbonate field housing 80 × 82 × 55 mm, IP 65, including 2 pieces M16 cable glands</td>
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<tr>
<td>Aluminium field housing 175 × 80 × 57 mm without separate terminal block, IP 65, including 2 pieces M16 and 1 piece M20 cable glands</td>
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<tr>
<td>Polyester field housing 190 × 75 × 55 mm with separate terminal block, IP 65, including 2 pieces M16 and 1 piece M20 cable glands</td>
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<tr>
<td>Polyester field housing 190 × 75 × 55 mm without separate terminal block, IP 65, including 2 pieces M16 and 1 piece M20 cable glands</td>
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<tr>
<td><strong>Display Options</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Prepared for display</td>
<td>D1</td>
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<tr>
<td>Not prepared for display</td>
<td>D2</td>
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<td>LCD indicator type A5</td>
<td>D3</td>
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<td>Configurable LCD indicator type A</td>
<td>D4</td>
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</tr>
<tr>
<td><strong>Mounting Options</strong></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Snap-on fixing set for 35 mm rail acc. EN 60175 (incl. fixing screws)</td>
<td>SF</td>
<td></td>
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</tbody>
</table>

* Only available with Communication Protocol code H (HART)

** Not available with Explosion Protection
### Additional ordering information TTH300

#### Documentation Language

<table>
<thead>
<tr>
<th>Language</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>German</td>
<td>M1</td>
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<tr>
<td>English</td>
<td>M5</td>
</tr>
<tr>
<td>Language package Western Europe / Scandinavia (Languages: DA, ES, FR, IT, NL, PT, FI, SV)</td>
<td>MW</td>
</tr>
<tr>
<td>Language package Eastern Europe (Languages: EL, CS, ET, LV, LT, HU, HR, PL, SK, SL, RO, BG)</td>
<td>ME</td>
</tr>
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</table>

#### Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTH Snap-on fixing set (packing unit 10 pieces), for 35 mm rail acc. EN 60175 (incl. fixing screws)</td>
<td>3KXT091230L0001</td>
</tr>
<tr>
<td>TTH Snap-on fixing set (packing unit 1 piece), for 35 mm rail acc. EN 60175 (incl. fixing screws)</td>
<td>3KXT091230L0002</td>
</tr>
<tr>
<td>TTH300 Commissioning Instruction, German</td>
<td>3KXT231001R4403</td>
</tr>
<tr>
<td>TTH300 Commissioning Instruction, English</td>
<td>3KXT231001R4401</td>
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<tr>
<td>TTH300 Commissioning Instruction, Language package Western Europe / Scandinavia</td>
<td>3KXT231001R4493</td>
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<td>TTH300 Commissioning Instruction, Language package Eastern Europe</td>
<td>3KXT231001R4494</td>
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## Order form configuration

### HART device design

<table>
<thead>
<tr>
<th>Customer-specific configuration</th>
<th>Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of sensors</td>
<td>1 sensor (standard)</td>
</tr>
<tr>
<td>Measurement type</td>
<td>Sensor redundancy / sensor backup</td>
</tr>
<tr>
<td>(for 2-sensor selection only)</td>
<td>Sensor drift monitoring ___°C / K sensor drift differential ___s time limit for drift overshoot</td>
</tr>
<tr>
<td></td>
<td>Differential measurement: zero point where Ia = 4 mA</td>
</tr>
<tr>
<td></td>
<td>Differential measurement: zero point where Ia = 12 mA</td>
</tr>
<tr>
<td></td>
<td>Average measurement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IEC 60751</th>
<th>Resistance thermometer</th>
</tr>
</thead>
<tbody>
<tr>
<td>JIS C1604</td>
<td></td>
</tr>
<tr>
<td>MIL-T-24388</td>
<td></td>
</tr>
<tr>
<td>DIN 43760</td>
<td></td>
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<tr>
<td>OIML R 84</td>
<td></td>
</tr>
<tr>
<td>IEC 60584</td>
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</tr>
<tr>
<td>DIN 43710</td>
<td></td>
</tr>
<tr>
<td>ASTM E-988</td>
<td></td>
</tr>
<tr>
<td>Voltage measurement</td>
<td>-125 to 125 mV</td>
</tr>
<tr>
<td>Sensor circuit</td>
<td>Two-wire</td>
</tr>
<tr>
<td>(for resistance thermometer and resistance measurement only)</td>
<td>Sensor 1: __Ω</td>
</tr>
<tr>
<td>Reference junction</td>
<td>Internal (for standard thermocouple, except type B)</td>
</tr>
<tr>
<td>(for thermocouples only)</td>
<td>External / temperature: ___°C</td>
</tr>
<tr>
<td>Measuring range</td>
<td>Lower range value: ___________ (standard: 0)</td>
</tr>
<tr>
<td></td>
<td>Upper range value: ___________ (standard: 100)</td>
</tr>
<tr>
<td>Unit</td>
<td>Celsius (default)</td>
</tr>
<tr>
<td>Characteristic behavior</td>
<td>rising 4 to 20 mA (standard)</td>
</tr>
<tr>
<td>Output behavior for error</td>
<td>Overrange / 22 mA (standard)</td>
</tr>
<tr>
<td>Output damping (T_{d3})</td>
<td>Off (standard)</td>
</tr>
<tr>
<td>Sensor number</td>
<td>Sensor 1: ___________</td>
</tr>
<tr>
<td>Resistor value at 0 °C / R_o</td>
<td>Sensor 1: R_o: ___________</td>
</tr>
<tr>
<td>Callendar-Van Dusen coefficient A</td>
<td>A: ___________</td>
</tr>
<tr>
<td>Callendar-Van Dusen coefficient B</td>
<td>B: ___________</td>
</tr>
<tr>
<td>Callendar-Van Dusen coefficient C</td>
<td>C: ___________</td>
</tr>
<tr>
<td>User characteristics based on linearization table</td>
<td>Based on attached table of variate pairs</td>
</tr>
<tr>
<td>TAG number</td>
<td>___________ (maximum 8 characters)</td>
</tr>
<tr>
<td>HART revision</td>
<td>HART5 (standard)</td>
</tr>
<tr>
<td>Software write protection</td>
<td>Off (standard)</td>
</tr>
<tr>
<td>‘Maintenance required’ alarm pulse or continuous signaling in accordance with NE 107</td>
<td>Off (standard) pulse width ___s (0.5 to 59.5 s increment 0.5 s)</td>
</tr>
</tbody>
</table>
### PROFIBUS PA / FOUNDATION Fieldbus device design

<table>
<thead>
<tr>
<th>Customer-specific configuration</th>
<th>Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of sensors</strong></td>
<td>☐ 1 sensor (standard) ☐ 2 sensors</td>
</tr>
<tr>
<td><strong>Measurement type</strong></td>
<td>☐ Sensor redundancy / sensor backup</td>
</tr>
<tr>
<td>(for 2-sensor selection only)</td>
<td>☐ Sensor drift monitoring ____°C / K sensor drift differential ____s time limit for drift overshoot</td>
</tr>
<tr>
<td></td>
<td>☐ Differential measurement: zero point where Ia = 4 mA</td>
</tr>
<tr>
<td></td>
<td>☐ Differential measurement: zero point where Ia = 12 mA</td>
</tr>
<tr>
<td></td>
<td>☐ Average measurement</td>
</tr>
</tbody>
</table>

**IEC 60751**
- Resistance thermometer
  - ☐ Pt10
  - ☐ Pt150
  - ☐ Pt100 (Standard)
  - ☐ Pt200
  - ☐ Pt500
  - ☐ Pt1000

**JIS C1604**
- ☐ Pt10
- ☐ Pt50
- ☐ Pt100

**MIL-T-24388**
- ☐ Pt10
- ☐ Pt50
- ☐ Pt100
- ☐ Pt200
- ☐ Pt1000

**DIN 43760**
- ☐ Ni50
- ☐ Ni100
- ☐ Ni200
- ☐ Ni1000

**OIML R 84**
- ☐ Cu10
- ☐ Cu100

**IEC 60584**
- Thermocouple
  - ☐ Type K
  - ☐ Type J
  - ☐ Type N
  - ☐ Type R
  - ☐ Type S
  - ☐ Type T
  - ☐ Type E
  - ☐ Type B

**DIN 43710**
- ☐ Type L
- ☐ Type U

**ASTM E-988**
- ☐ Type C
- ☐ Type D

**Voltage measurement**
- ☐ 0 to 500 Ω
- ☐ 0 to 5000 Ω

**Sensor circuit**
- ☐ Two-wire
- ☐ Three-wire (standard)
- ☐ Four-wire

**Reference junction**
- ☐ Internal (for standard thermocouple, except type B)
- ☐ None (type B)

**Reference junction**
- ☐ External / temperature: ____°C

**Unit**
- ☐ Celsius (default)
- ☐ Fahrenheit
- ☐ Rankine
- ☐ Kelvin

**Resistor value at 0 °C / R₀**
- ☐ Sensor 1: R₀: ___________
- ☐ Sensor 2: R₀: ___________

**Callendar-Van Dusen coefficient A**
- A: ___________
- A: ___________

**Callendar-Van Dusen coefficient B**
- B: ___________
- B: ___________

**Callendar-Van Dusen coefficient C**
- C: ___________
- C: ___________

**IDENT_number (PROFIBUS)**
- ☐ device-specific 0x3470 (standard)
- ☐ profile 0x9700 (1 AI Block)

**Bus address PROFIBUS PA**
- ☐ PA: 0 to 125
- ☐ Standard PA: 126

**TAG number**
- ☐ ________________ (maximum 16 characters)

**Software write protection**
- ☐ Off (standard)
- ☐ On
Trademarks

HART is a registered trademark of FieldComm Group, Austin, Texas, USA
PROFIBUS and PROFIBUS PA are registered trademarks of PROFIBUS &
PROFINET International (PI)
FOUNDATION Fieldbus is a registered trademark of FieldComm Group,
Austin, Texas, USA.
Measurement made easy
Temperature transmitter for all communications protocols.
Redundancy thanks to two inputs
Reliable temperature measurement for highest demands
• High accuracy, reliability and durability
• Specific sensor linearization via Callendar-Van Dusen coefficients and with value pair table (32 points)
• Approved for custody transfer measurements by MID certificate in accordance with Measuring Instruments Directive guideline 2014/32/EU
• Suited for ambient temperatures from $-50 \, ^\circ C$ ($-58 \, ^\circ F$)

Input circuit and communication
• Two universal sensor inputs for resistance thermometers (e.g. 2 × Pt100 in three-wire circuit) and thermocouples
• 4 to 20 mA, HART®, PROFIBUS PA®, FOUNDATION Fieldbus®

Safety
• Global approvals for explosion protection up to Zone 0
• Functional safety SIL 2 / SIL 3 in accordance with IEC 61508 (HART)
• Device versioning in accordance with NE 53
• Continuous monitoring of supply voltage
• Wire break / corrosion monitoring in accordance with NE 89
• Extended diagnosis in accordance with NE 107 sensor drift monitoring

Configuration
• In accordance with FDT / DTM, EDD or FDI Standard (FIM)
• Turnable LCD indicator with operating buttons