TTF200 Basic
Field mounted Temperature Transmitter

Excellent long term stability
Temperature linear output signal
Self-diagnostics
Universal input

Input
- Resistance thermometer (2,3,4 wire circuit)
- Thermocouples
- Resistance remote signaling unit
- Voltages, mV voltages

Output
- 4...20 mA, HART

Measured deviation
- 0.1 K

Electrical isolation (I/O)

Sensor error adjustment

Continuous sensor and self-monitoring
- Supply voltage monitoring
- Wire break monitoring in acc. with NAMUR NE 89

Unit software acc. to NE 53

EMC acc. to EN 50082-2 and NE 21

Configuration
- EDD
- DTM

Contents

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FEATURES

Model TTF200 Basic is a universal input smart temperature transmitter.

It is designed for setting, in order to meet the specific application requirement of measuring low level signals from thermocouples (THC), resistance thermometer (RTD), resistance (ohm) or e.m.f (mV) sources.

Model TTF200 Basic offers a standard communication capacity using the proven HART protocol. The instrument can be easily reconfigured by simple procedures through a standard PC equipped with a Device Type Manager (DTM) / ABB Handheld DHH805.

Transmitter assures operational security by using non-volatile memory and also handling up/down scale procedure under sensor anomalies.

Compact, rugged, lightweight, easy to install and service, ABB transmitters provide consistently reliable and stable performance under all types of process conditions, coupled with minimum maintenance requirements.

1   Specifications

1.1   Input

1.1.1   Resistance

RTD resistance thermometer
Pt100 in accordance with DIN IEC 60751, JIS C1604-81, MIL-T-24388, Ni in accordance with DIN 43760, Cu

Resistance measurement
0 .... 500Ω / 0 .... 5000Ω
Min. measuring span 5 Ω/50 Ω

Maximum line resistance (R Ω) per core
2, 3, 4 wire 7.5 Ω, 10 Ω, 50 Ω

Sensor connection type
Two-, Three-, Four-wire circuit

Connecting cable
Max. sensor line resistance (R Ω) for each line 50Ω according to NE 89 (March 2003) Three-wire circuit: symmetrical sensor line resistance
Two-wire circuit:
compensation up to 100 Ω total line resistance

Measurement current
< 300 µA

Sensor short circuit
< 5 Ω (for RTD)

Sensor wire break
Measuring range: 0 ... 500 Ω   > 0.6 … 10k Ω
Measuring range: 0 ... 5 kΩ   > 5.3 … 10k Ω

Corrosion detection in accordance with NAMUR NE 89
3-wire resistance measurement > 50 Ω
4-wire resistance measurement > 50 Ω

Sensor error signaling
RTD sensor: Short circuit and wire break
Linear resistance measurement: Wire break

Input filter
50/60 Hz

1.1.2   Thermocouples / Voltages

Types
B,E,J,K,N,R,S,T in accordance with IEC60584
U,L in accordance with DIN43710
C,D in accordance with ASTM E-988

Voltages
- 125mV ... +125 mV
- 125mV ... +1100 mV

Connecting cable
Maximum sensor line resistance (R Ω) for each wire: 1.5 kΩ, Total:3 kΩ

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

Input resistance
> 10MΩ

Internal reference point
Pt1000, DIN IEC 60751 Cl. B
(No additional jumpers necessary)

Sensor error adjustment options (sensor matching)
Via single-point adjustment (offset adjustment)
Via two-point adjustment

Sensor error signaling
Thermocouple: Wire break
Linear voltage measurement: Wire break

1.2   Output

Transmission characteristics
Temperature linear
Resistance linear
Voltage linear

Output signal
Configurable 4 ... 20 mA (standard)
Configurable 20 ... 4 mA
(NE 43 dynamic range: 3.8 ... 20.5 mA)

Simulation mode
3.5 ... 23.6 mA

Induced current consumption
< 3.5 mA

Maximum output current
23.6 mA

Configurable error current signal
Override   22 mA (20.0 ... 23.6 mA)
Underdrive   3.6 mA (3.5 ... 4.0 mA)

1.3   Power supply (polarity safe)

Two-wire circuit; power lines = signal lines
Supply voltage
Non-hazardous area with or without LCD display:
US = 11 ... 42 V DC
hazardous area applications with or without LCD display:
US = 11 ... 30 V DC

Max. Permissible residual ripple for supply voltage
During communication in accordance with HART FSK "Physical Layer" specification, version 8.1 (08/1999) Sec 8.1

Under voltage detection
$U_{Terminal-Mu}$ < 10 V results in I_a = 3.6 mA

Maximum load
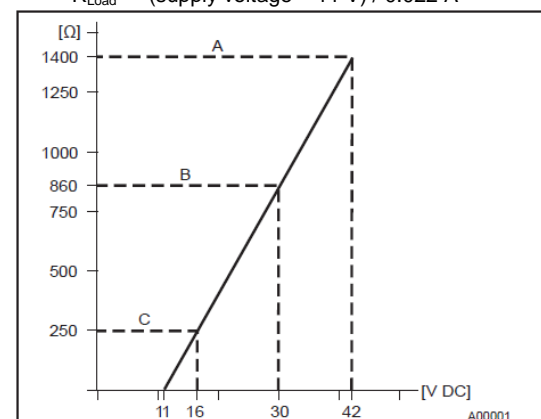$R_{Load} =$ (supply voltage – 11 V) / 0.022 A

Figure 1: Max. load depending on supply voltage

A: Safe Area
B: EExia design (hazardous area)
C: HART communication resistance

Maximum power consumption
P = Us x 0.022 A

e.g., Us = 24 V → Pmax = 0.528 W

2　General Information

Electrical isolation
　　3.5 kV DC (approx. 2.5 KV AC) 60 s, input to output
MTBF time
　　28 years at 60 °C (140 °F) ambient temperature
Input filter
　　50/60 Hz
Switch-on delay
　　< 10 s (I_a ≤ 3.6 mA during starting cycle)
Warm-up time
　　5 minutes
Ramp-up time t90
　　400 … 1000 ms
Rate updated
　　10/s, independent of sensor type and sensor circuit
Output filter
　　Digital filter 1st order: 0 … 100s

2.1　Ambient conditions

Ambient temperature
　　Standard:　　-40 ... 85 °C (-40 ... 185 °F)
　　Optional:　　-50 ... 85 °C (-58 ... 185 °F)
　　Restricted range during operation with HMI LCD display
　　and with explosion proof design
Transport/storage temperature
　　-40 ... 85 °C (-40 ... 185 °F)
Climate class
　　Cx -40 ... 85 °C (-40 ... 185 °F) at
　　5 ... 95 % relative humidity, DIN EN 60654-1
Max. permissible humidity
　　100 % relative humidity, IEC 60068-2-30
Vibration resistance
　　10 ... 2000 Hz at 5 g in acc. with IEC 60068-2-6,during
　　operation and transport
Shock
　　gn = 30 in acc. with IEC 68-2-27,during operation and
　　transport
Ingress protection
　　IP 67

2.2　Electromagnetic compatibility

Emitted interference in accordance with IEC 61326 (2006) and

Namur NE 21 (02/2004)

2.3　Interference Immunity

Interference immune in accordance with IEC 61326 (2006) and
Namur NE 21 (02/2004)
Pt100: Measuring range 0 ... 100 °C (32 ... 212 °F), span 100 K

Type of test	Testing accuracy	Influence
Burst to signal/data lines	2 kV	< 0.5 %
Static discharge • Contact plate (indirect) • Supply terminals [1] • Sensor terminals [1]	8 kV 6 kV 4 kV	no no 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 　Line to earth	0.5 kV 1 kV	No malfunction No malfunction

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

2.4　Mechanical design

Dimensions
　　See section 4 "Dimensions"
Weight
　　1.2 kg. approx. (Without accessories)
Material
　　Housing: Cast aluminum alloy with baked epoxy finish
　　Color: GRAY RAL 9002
Installation conditions
　　Mounting orientation: No limitations
　　Installation options:　　Connection heads acc. to DIN 43729
　　form B
Electrical connection
　　Terminals (captive screws) incl. soldering tags
　　Cables up to a maximum of 1.5 mm² (16 AWG)
　　Connection for HART-Hand-held terminal

3　Measuring accuracy

Includes linearity deviation, reproducibility/hysteresis at 23 °C (73.4 °F) ± 5 K and 20 V supply voltage

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

Input element		Measuring range limits		Minimum span	Digital measuring accuracy (24-bit A/D converter)	D/A measuring accuracy [1] (16-bit DA)
Standard	**Sensor**					
Resistance thermometers / potentiometer						
DIN IEC 60 751	RTD Pt10　(a=0.003850) RTD Pt50　(a=0.003850) RTD Pt100　(a=0.003850) [2] RTD Pt200　(a=0.003850) RTD Pt500　(a=0.003850) RTD Pt1000　(a=0.003850)	-200 ... 850 °C -200 ... 850 °C -200 ... 850 °C -200 ... 850 °C -200 ... 850 °C -200 ... 850 °C	(-328 ... 1562 °F) (-328 ... 1562 °F) (-328 ... 1562 °F) (-328 ... 1562 °F) (-328 ... 1562 °F) (-328 ... 1562 °F)	10 °C (18 °F) 10 °C (18 °F) 10 °C (18 °F) 10 °C (18 °F) 10 °C (18 °F) 10 °C (18 °F)	± 0.80 °C (± 1.44 °F) ± 0.16 °C (± 0.29 °F) ± 0.08 °C (± 0.14 °F) ± 0.24 °C (± 0.43 °F) ± 0.16 °C (± 0.29 °F) ± 0.08 °C (± 0.14 °F)	± 0.05 % ± 0.05 % ± 0.05 % ± 0.05 % ± 0.05 % ± 0.05 %
JIS C1604-81	RTD Pt10　(a=0.003916) RTD Pt50　(a=0.003916) RTD Pt100　(a=0.003916)	-200 ... 645 °C -200 ... 645 °C -200 ... 645 °C	(-328 ... 1193 °F) (-328 ... 1193 °F) (-328 ... 1193 °F)	10 °C (18 °F) 10 °C (18 °F) 10 °C (18 °F)	± 0.80 °C (± 1.44 °F) ± 0.16 °C (± 0.29 °F) ± 0.08 °C (± 0.14 °F)	± 0.05 % ± 0.05 % ± 0.05 %
MIL-T-24388	RTD Pt10　(a=0.003920) RTD Pt50　(a=0.003920) RTD Pt100　(a=0.003920) RTD Pt200　(a=0.003920) RTD Pt1000　(a=0.003920)	-200 ... 850 °C -200 ... 850 °C -200 ... 850 °C -200 ... 850 °C -200 ... 850 °C	(-328 ... 1562 °F) (-328 ... 1562 °F) (-328 ... 1562 °F) (-328 ... 1562 °F) (-328 ... 1562 °F)	10 °C (18 °F) 10 °C (18 °F) 10 °C (18 °F) 10 °C (18 °F) 10 °C (18 °F)	± 0.80 °C (± 1.44 °F) ± 0.16 °C (± 0.29 °F) ± 0.08 °C (± 0.14 °F) ± 0.24 °C (± 0.43 °F) ± 0.08 °C (± 0.14 °F)	± 0.05 % ± 0.05 % ± 0.05 % ± 0.05 % ± 0.05 %
DIN 43760	RTD Ni50　(a=0.006180) RTD Ni100　(a=0.006180) RTD Ni120　(a=0.006180) RTD Ni1000　(a=0.006180)	-60 ..... 250 °C -60 ..... 250 °C -60 ..... 250 °C -60 ..... 250 °C	(-76 ....482 °F) (-76 ..... …482 °F) (-76 ..... …482 °F) (-76 ..... …482 °F)	10 °C (18 °F) 10 °C (18 °F) 10 °C (18 °F) 10 °C (18 °F)	± 0.16 °C (± 0.29 °F) ± 0.08 °C (± 0.14 °F) ± 0.08 °C (± 0.14 °F) ± 0.08 °C (± 0.14 °F)	± 0.05 % ± 0.05 % ± 0.05 % ± 0.05 %

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	RTD Cu10 (a=0.004270)	-50 ..... 200 °C	(-58 ... …392 °F)	10 °C (18 °F)	± 0.80 °C (± 1.44 °F)	± 0.05 %
	RTD Cu100 (a=0.004270)	-50 ..... 200 °C	(-58 ... …392 °F)	10 °C (18 °F)	± 0.08 °C (± 0.14 °F)	± 0.05 %
	Resistance measurement	0 … 500 Ω		4 Ω	± 32 mΩ	± 0.05 %
	Resistance measurement	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)	50 °C (90 °F)	± 0.35 °C (± 0.63 °F)	± 0.05 %
	Type N (Ni14CrSi-NiSi)	-270 ... 1300 °C	(-454 ... 2372 °F)	50 °C (90 °F)	± 0.35 °C (± 0.63 °F)	± 0.05 %
	Type T (Cu-Cu45Ni)	-270 ... ..400 °C	(-454 ... ..752 °F)	50 °C (90 °F)	± 0.35 °C (± 0.63 °F)	± 0.05 %
	Type E (Ni10Cr-Cu45Ni)	-270 ... 1000 °C	(-454 ... 1832 °F)	50 °C (90 °F)	± 0.35 °C (± 0.63 °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)	-50 ... 1768 °C	(-58 ... 3215 °F)	100 °C (180 °F)	± 0.95 °C (± 1.71 °F)	± 0.05 %
	Type B (Pt30Rh-Pt6Rh)	-0 ... …1820 °C	(32 ... …3308 °F)	100 °C (180 °F)	± 0.95 °C (± 1.71 °F)	± 0.05 %
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)	50 °C (90 °F)	± 0.35 °C (± 0.63 °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 ... …2315 °C	(32 ... …4200 °F)	100 °C (180 °F)	± 1.35 °C (± 2.43 °F)	± 0.05 %
	Voltage Measurement	-125 ... 125 mV		2 mV	± 12 µV	± 0.05 %
	Voltage Measurement	-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
2) Standard sensor type
3) Include the internal reference junction error for digital accuracy: Pt1000, DIN IEC 60751 Cl. B
4) Without reference junction error

Total accuracy = digital measuring accuracy [°C (°F)] + (D/A measuring accuracy [%] x I conf. measuring span [°C (°F)] I /100%)
(refer to block diagram Fig. 2)
Reference junction error (Cold junction compensation error as per PT100, DIN IEC 60751 Cl.B)
Example 1:
Pt100 (IEC 60751), conf. measuring range 0 ... 100 °C (32 ... 212 °F), conf. measuring span = measuring end - measuring start =100 °C (212 °F)
    Digital measuring accuracy: ± 0.08 °C (± 0.14 °F)
    D/A – measuring accuracy: ± 0.05 % x (100 °C (180 °F) / 100 %) = ± 0.05 °C (± 0.09 °F)
    Total accuracy: Digital accuracy + D/A accuracy; ± 0.08 °C (± 0.14 °F) + (± 0.05 °C (± 0.09 °F)) = ± 0.13 °C (± 0.23 °F)
Example 2:
Thermocouple type K, conf. measuring range 0 ... 1000 °C (32 ... 1832 °F), conf. measuring span = measuring end – measuring start = 1000 °C (1800 °F)
    Digital measuring accuracy: ± 0.35 °C (± 0.63 °F)
    D/A – measuring accuracy: ± 0.05 % x (1000 °C (1800 °F) / 100 %) = ± 0.50 °C (± 0.9 °F)
    Total accuracy [4]:   Digital accuracy + D/A accuracy; ± 0.35 °C (± 0.63 °F) + (± 0.50 °C (± 0.9 °F)) = ± 0.85 °C (± 1.53 °F)
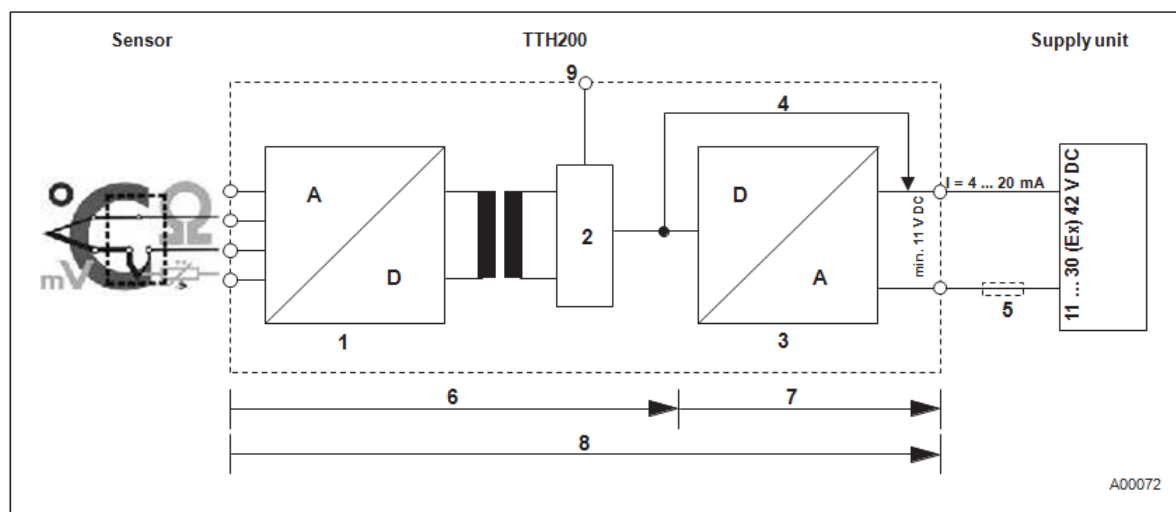
3.1 Block Diagram

Figure 2

1	24-bit A/D converter	6	Digital measuring accuracy
2	Microcontroller	7	D/A measuring accuracy
3	16-bit D/A converter	8	Overall measuring accuracy
4	HART signal	9	HMI LCD display interface for type AS
5	Load		(not suitable for HMI LCD display type A)

3.2   Operating influences

The percentages refer to the configured measuring span.

Supply voltage influence / load influence: within the specified limits 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 influence: based on 23 °C (73.4 °F) for ambient temperature range -40 ... 85 °C (-40 ... 185 °F) 4)

Sensor	Ambient temperature influence for 1 °C (1.8 °F) deviation to 23 °C (73.4 °F) for digital measurement	Ambient temperature influence [1)2)] for 1°C (1.8 °F) deviation to 23 °C (73.4 °F) for D/A converter
Two-, Three-, Four-wire circuit		
RTD Pt10 IEC, JIS, MIL	± 0.04 °C (± 0.072 °F)	± 0.003 %
RTD Pt50 IEC, JIS, MIL	± 0.008 °C (± 0.014 °F)	± 0.003 %
RTD Pt100 IEC, JIS, MIL	± 0.004 °C (± 0.007 °F)	± 0.003 %
RTD Pt200 IEC, MIL	± 0.02 °C (± 0.036 °F)	± 0.003 %
RTD Pt1000 IEC, MIL	± 0.004 °C (± 0.007 °F)	± 0.003 %
RTD Ni50 DIN 43760	± 0.008 °C (± 0.014 °F)	± 0.003 %
RTD Ni100 DIN 43760	± 0.004 °C (± 0.007 °F)	± 0.003 %
RTD Ni120 DIN 43760	± 0.003 °C (± 0.005 °F)	± 0.003 %
RTD Ni1000 DIN 43760	± 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 % x (ME[mV] / MS[mV]) + (100 % x (0,009 °C / MS [°C])] 2)	± 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) Effect on DA converter
3) ME = voltage value of the thermocouple at the end of the measuring range in accordance with the standard
    MA = voltage value of the thermocouple at the start of the measuring range in accordance with the standard
    MS = voltage value of the thermocouple over the measuring span in accordance with the standard. MS = (ME - MA)
4) In the case of the option to expand the ambient temperature range up to -50 °C (-58 °F), the causal variables are doubled in the range between -50 ... -40 °C (-58 ... -40 °F).

Example 1:
Pt100 configured measuring range 0 ... 100 °C (32 ... 212 °F), (measuring span 100 °C (180 °F)), ambient temperature 33 °C (91.4 °F)
Dev. from standard temperature: 33 « 23 °C (91.4 « 73.4 °F) (reference temperature) = 10 °C (18 °F)
    Effect of ambient temperature on digital measurement:
        10 °C x ± 0.004 °C / °C = ± 0.04 °C   (18 °F x ± 0.007 °F / 1.8 °F = ± 0.07 °F)
    Effect of ambient temperature on D/A converter:
        10 °C x (± 0.003 % / °C) x (100 °C / 100 %) = ± 0.03 °C   (18 °F x (± 0.003 % / 1.8 °F) x (180 °F / 100 %) = ± 0.054 °F)

Example 2:
TC type K configured measuring range 0 ... 1000 °C (32 ... 1832 °F), (measuring span 1000 °C (1800 °F)), ambient temperature 33 °C (91.4 °F)
Measuring start 0 °C (32 °F) corresponds to 0.0 mV; measuring end = 1000 °C (1832 °F) corresponds to 41.6 mV; measuring span = 1000 °C (1800 °F) or 41.6 mV
Dev. from standard temperature: 33 « 23 °C (91.4 « 73.4 °F) (reference temperature) = 10 °C (18 °F)

    Effect of ambient temperature on digital measurement:
        10 °C x [(± 0.001 % x 41.6 mV / 41.6 mV) + (100 % x ± 0.009 °C / 1000 °C)] x (1000 °C / 100 %)] / °C = ± 0.19 °C
        (18 °F x [(± 0.001 % x 41.6 mV / 41.6 mV) + (100 % x ± 0.016 °F / 1800 °F)] x (1800 °F / 100 %)] / 1.8 °F = ± 0.34 °F)

    Effect of ambient temperature on D/A converter:
        10 °C x [± 0.003 % x 1000 °C / 100 %] / °C = ± 0.3 °C   (18 °F x [± 0.003 % x 1800 °F / 100 %] / 1.8 °F = ± 0.54 °F)

Worst case total error analysis

Max. possible total error = SQR [(digital measuring accuracy)^2 + (D/A measuring accuracy)^2 + (digital value temp. influence)^2 + (D/A temp.influence)^2]

Example 1:
Pt100, 0 ... 100 °C (32 ... 212 °F) at 33 °C (91.4 °F)
    Ambient temperature = $\sqrt{(0.08°C)^2 + (0.05°C)^2 + (0.04°C)^2 + (0.03°C)^2} = 0.10°$ C $\sqrt{(0.14°F)^2 + (0.09°F)^2 + (0.07°F)^2 + (0.05°F)^2} = 0.18°$ F

Example 2:
Thermocouple type K, 0 ... 1000 °C (32 ... 1832 °F) at 33 °C (91.4 °F)
    Ambient temperature = $\sqrt{(0.35°C)^2 + (0.50°C)^2 + (0.19°C)^2 + (0.3°C)^2} = 0.70°$ C $\sqrt{(0.63°F)^2 + (0.90°F)^2 + (0.34°F)^2 + (0.54°F)^2} = 1.27°$ F
    (without reference junction error)

ABB

3 Communication

3.3 Configuration parameters

Measurement type
Sensor type, connection type
Error signaling
Measurement range
General information, e.g., TAG number
Damping
Signal simulation of output

Diagnostic information
Sensor error (wire break or short circuit)
Device error
Over/under alarm limits
Over/under measuring range
Simulation activated

Diagnostic signaling
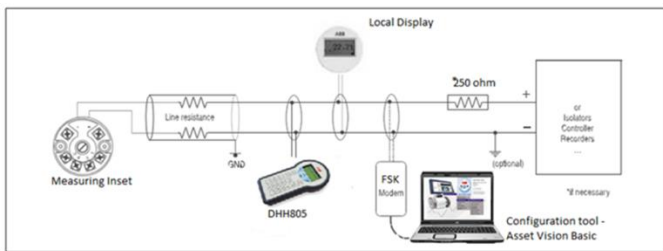Over/underdrive in accordance with NE 43
HART diagnostics

3.4 HART

Figure 3

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

Configuration options and tools
Device management/asset management tools
FDT/DTM technology – via TTX200 DTM driver
EDD - via TTX200 EDD driver

Diagnostic signaling
Over/underdrive in accordance with NE 43
HART diagnostics

Handheld terminal
DHH805, HHT475 (Compiled EDD)

Device Management Tool
Asset Vision Basic, Device Type Manager (DTM)

4 Display

4.1 Features

Type AS LC display, transmitter-controlled without configuration function

Figure 4

Sign, 4-digits, 2 decimal places
Process data for sensors
Bar display
Output%
Display diagnostic information related to transmitter and sensor status

CE Marking
The type AS LC display meets all requirements for the CE mark in accordance with IEC 61326 (2006)
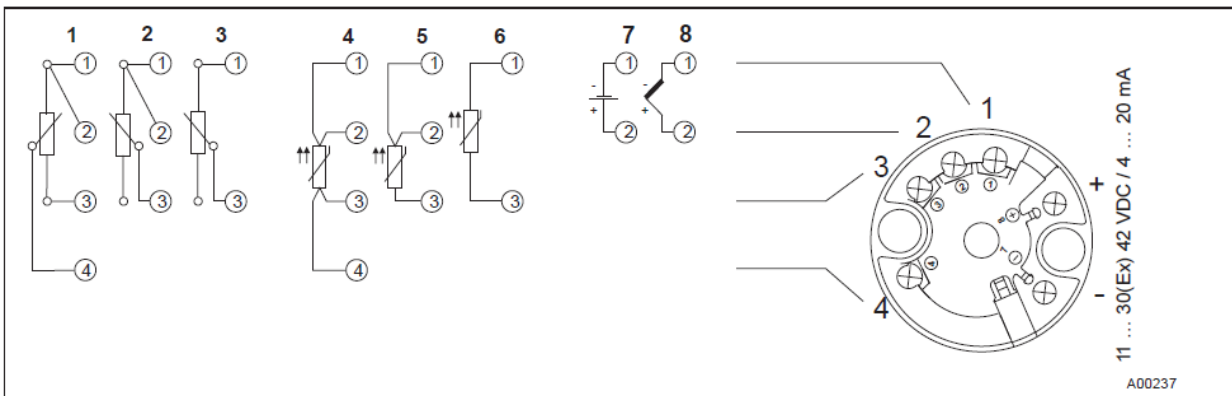
5 Electrical Connections

Figure 5

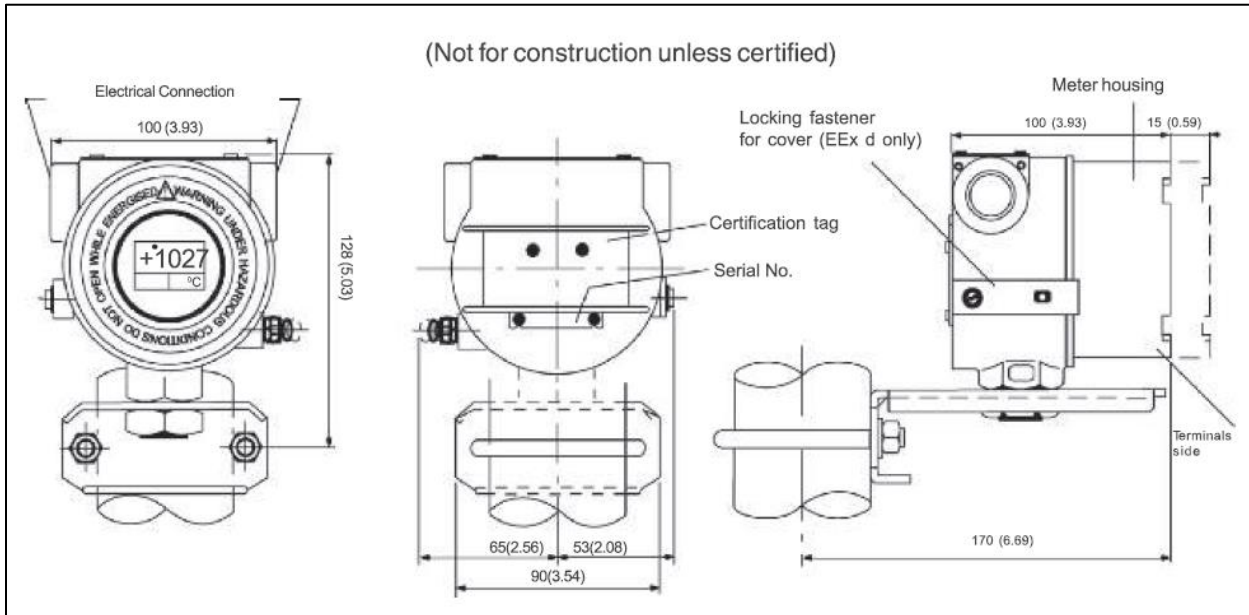|		
1 Potentiometer, Four-wire circuit	4 RTD, Four-wire circuit	7 Voltage Measurement
2 Potentiometer, Three-wire circuit	5 RTD, Three-wire circuit	8 Thermocouple
3 Potentiometer, Two-wire circuit	6 RTD, Two-wire circuit	

6 Dimensions

Figure 6

7 Ordering information

	Version No.	Main Order no							Add. Order no
	1…6	7	8	9	10	11	12 13		x x
TTF200 Field Mounted HART Programmable Temperature Transmitter, Pt100(RTD) [1], Thermocouples [1]	TTF200	X	X	X	X	X	X X		X X
Version									
Basic		0							
Type of Input									
Single input temperature transmitter			Y						
Electrical Certification									
General Purpose				1					
CIMFR Flameproof **				2					
Zone 1: Ex d Group IIC T6									
CIMFR Intrisincally Safe **				3					
Zone 1: Ex i Group IIC T6									
CCOE Flameproof **				4					
Zone 1: Ex d Group IIC T6									
CCOE Intrisincally Safe **				5					
Zone 1: Ex i Group IIC T6									
CIMFR Flameproof and Intrinsic Safety kind of protection **				6					
Zone 1: Ex d Group IIC T6									
Zone 1: Ex i Group IIC T6									
CCOE Flameproof and Intrinsic Safety kind of protection **				7					
Zone 1: Ex d Group IIC T6									
Zone 1: Ex i Group IIC T6									
Housing									
Aluminium Alloy 1/2" NPT					A				
Display									
None						0			
Display without keypad [2]						1			
Configuration									
Standard with temperature units deg.C [3]							B 1		
Standard with temperature units deg.F [4]							B 2		
Custom Configuration [5]							B 3		
Mounting Bracket									
Carbon Steel									K 1
Calibration Certificate									
For Transmitter Only									C 1

Notes

** Applied/in process for certification/approvals

[1] Refer section 3

[2] Refer section 4

[3] Standard Range 0 - 100 degrees, display in $^{\circ}C$

[4] Standard Range 0 - 100 degrees, display in $^{\circ}F$

[5] Customized range as per requirement, display in $^{\circ}C$ or $^{\circ}F$

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