TTF300
Field mounted Temperature Transmitter

Sensor error adjustment
Sensor redundancy
Sensor drift monitoring

HART, PROFIBUS, FOUNDATION Fieldbus, Pt100 (RTD), thermocouples, electrical isolation

Input
— Resistance thermometer
— Thermocouples
— Resistance-type transmitters
— Voltages, mV voltages

Input functionality
— 1 or 2 sensors
— 2 x Pt100 three-wire circuit

Output
— 4 ... 20 mA, HART
— PROFIBUS PA, profile 3.01
— FOUNDATION Fieldbus H1, ITK version 5.2

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

Continuous sensor monitoring and self-monitoring
— Supply voltage monitoring
— Wire break and corrosion monitoring in accordance with NE 89
— Extended diagnostics in accordance with NE 107

Device safety in accordance with NE 53 and NE 79

SW write protection, HW write protection

SIL2/3 in accordance with IEC 61508 (for HART)

Approvals for explosion protection
— ATEX, IECEx
— FM / CSA
— GOST (for HART)

Configuration
— LCD indicators
— DTM
— EDD

Service interface

Power and productivity
for a better world™

ABB

Contents

Field mounted Temperature Transmitter TTF300
HART, PROFIBUS, FOUNDATION Fieldbus, Pt100 (RTD), thermocouples, electrical isolation

DS/TTF300-EN

1   Specifications

1.1   Input

1.1.1   Resistance thermometers / Resistors

Resistance thermometers
Pt100 in accordance with IEC 60751, JIS C1604-89,
MIL-T-24388,
Ni in accordance with DIN 43760, Cu

Resistance measurement
0 … 500 Ω
0 … 5000 Ω

Sensor connection type
Two-, three-, four-wire circuit

Connecting cable
Maximum sensor line resistance (R_W) for each line 50 Ω
according to NE 89 (January 2009)
Three-wire circuit:
symmetrical sensor line resistances
Two-wire circuit:
compensation up to 100 Ω total line resistance

Measurement current
< 300 µA

Sensor short circuit
< 5 Ω (for resistance thermometer)

Sensor wire break

Measuring range: 0 ... 500 Ω	> 0.6 ... 10 kΩ
Measuring range: 0 ... 5 kΩ	> 5.3 ... 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 thermometers:	Short circuit and wire break
Linear resistance measurement:	Wire break

1.1.2   Thermocouples / Voltages

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

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

Connecting cable
Maximum sensor line resistance (R_W) for each 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 ... 10 kΩ
Voltage measurement	5.3 ... 10 kΩ

Input resistance
> 10 MΩ

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

Sensor error signaling

Thermocouple:	Wire break
Linear voltage measurement:	Wire break

1.1.3   Functionality

Freestyle characteristics and 32-point sampling table
Resistance measurement up to maximum 5 kΩ
Voltages up to maximum 1.1 V

Sensor error adjustment
Via Callendar van Dusen coefficients
Via table of 32 sampling points
Via single-point adjustment (offset adjustment)
Via two-point adjustment

Input functionality
1 sensor
2 sensors:
mean measurement,
differential measurement,
sensor redundancy,
sensor drift monitoring

Field mounted Temperature Transmitter TTF300
HART, PROFIBUS, FOUNDATION Fieldbus, Pt100 (RTD), thermocouples, electrical isolation

DS/TTF300-EN

1.2 Output

1.2.1 HART output

Transmission characteristics
Temperature linear
Resistance linear
Voltage linear

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

Simulation mode
3.5 ... 23.6 mA

Induced current consumption
< 3.5 mA

Maximum output current
23.6 mA

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

1.2.2 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)
IDENT_ NUMBER: 0x3470 [0x9700]

Error current signal
FDE (Fault Disconnection Electronic)

Block structure
Physical block
transducer block 1 – temperature
transducer block 2 – HMI (LCD)
transducer block 3 – extended diagnostics
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 point temp.)
analog output – optional HMI display (transducer block 2)
discrete input 1 – extended diagnostics 1 (transducer block 3)
discrete input 2 – extended diagnostics 2 (transducer block 3)
* Sensor 1, sensor 2, or difference, or mean

1.2.3 FOUNDATION Fieldbus output

Output signal
FOUNDATION Fieldbus H1 (IEC 611582-2)
Baud rate 31.25 kbit/s, ITK 5.2
FISCO-compliant (IEC 60079-27)
Device ID: 0003200125

Error current signal
FDE (Fault Disconnection Electronic)

Block structure [1])
Resource block
Transducer block 1 – temperature
Transducer block 2 – HMI (LCD)
Transducer block 3 – extended diagnostics
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 point temp.)
Analog output – optional HMI display (transducer block 2)
Discrete input 1 – extended diagnostics 1 (transducer block 3)
Discrete input 2 – extended diagnostics 2 (transducer block 3)
PID – PID controller
* Sensor 1, sensor 2, or difference, or mean

LAS (Link Active Scheduler) link master functionality

1) For the block description, block index, execution times, and block class, refer to the
   interface description.

1.3 Power supply (polarity safe)

Two-wire technology; supply power lines = signal lines

1.3.1 HART supply power

Supply voltage
Non-ignition-proof application: U_S = 11 ... 42 V DC
Ignition-proof applications: U_S = 11 ... 30 V DC

Max. permissible residual ripple for supply voltage
During communication in accordance with HART FSK
"Physical Layer" specification, version 8.1 (August 1999) Section 8.1

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

Maximum load
R_{Load} = (supply voltage – 11 V) / 0.022 A
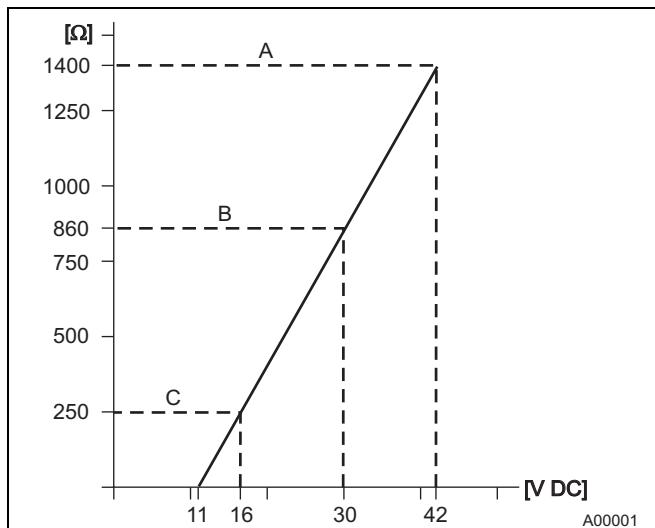
Fig. 1: Maximum load depending on supply voltage
A   TTF300
B   TTF300 In ia hazardous area design
C   HART communication resistor

Maximum power consumption
P = U_s x 0.022 A
e.g., U_s = 24 V $\rightarrow$ P_{max} = 0.528 W

1.3.2 PROFIBUS / FOUNDATION Fieldbus supply power

Supply voltage
Non-ignition-proof application: U_S = 9 ... 32 V DC
Ignition-proof applications:
U_S = 9 ... 17.5 V DC (FISCO)
U_S = 9 ... 24 V DC (Fieldbus Entity model I.S.)
Current consumption ≤ 12 mA

Field mounted Temperature Transmitter TTF300
HART, PROFIBUS, FOUNDATION Fieldbus, Pt100 (RTD), thermocouples, electrical isolation

DS/TTF300-EN

2 General information

CE marking
The TTH300 meets all requirements as regards the CE marking in accordance with the applicable guidelines.

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

MTBF time
28 years at 60 °C ambient temperature

Input filter
50 / 60 Hz

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

Warm-up time
5 minutes

Ramp-up time t90
400 … 1000 ms

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

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

2.1 Ambient conditions

Ambient temperature
Standard: -40 … 85 °C (-40 … 185 °F)
Optional: -50 … 85 °C (-58 … 185 °F)
Restricted range with hazardous area design

Transport / storage temperature
-50 … 85 °C (-58 … 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

Degrees of protection
IP 66 and IP 67; NEMA 4X, ENCL 4X

2.2 SIL functional safety

Conforms with IEC 61508 as regards use in safety-related applications, up to and including SIL 2/3.
Only applies to the HART version.

2.3 ElectroMagnetic Compatibility

Emitted interference in accordance with IEC 61326 (2005) and Namur NE 21 (08/2007)

2.4 Interference immunity

Interference-immune in accordance with IEC 61326 (2005) and Namur NE 21 (08/2007)

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)	8 kV	No
• Supply terminals [1]	6 kV	No
• Sensor terminals [1]	4 kV	No
Radiated field 80 MHz ... 2 GHz	10 V/m	< 0.5 %
Coupling 150 kHz … 80 MHz	10 V	< 0.5 %
Surge:		
between the supply lines	0.5 kV	No malfunction
Line to ground	1 kV	No malfunction

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

2.5 Mechanical design

Dimensions
See Section 5, "Dimensions"

Weight
1.25 kg (2.76 lb)

Material
Housing: die-cast aluminum, epoxy-coated
Color: gray RAL 9002
Stainless steel

Installation conditions
Installation position: no limitations

Electrical connection
Thread (selectable) 2 x M20 x 1.5 / 2 x 1/2" NPT / 2 x 3/4" NPT (via reducing piece),
ground screw external 6 mm^2, M5 internal 2 x 2.5 mm^2,
M4 connection terminals for lines up to maximum of 2.5 mm^2 and handheld terminal interface
Cable gland 2 x M20 1.5:
maximum cable outer diameter 5 ... 9 mm (0.2 ... 0.35 inch), temperature range in acc. with data sheet of the cable gland used
- For non-ignition-proof and non-incendive polyamide, gray
- For intrinsically safe design and intrinsic safety polyamide, blue
Metal cable gland:
dust-ignition proof, flameproof enclosure, explosion proof, maximum cable outer diameter 6 ... 7.5 mm (0.24 ... 0.3 inch), temperature range: -20 ... 85 °C (-4 ... 185 °F)

Lightning protection
For cable gland M20 x 1.5
(see data sheet 10/63-6.15)
Non-ignition-proof: model NGV220-NO
Intrinsically safe: model NGV220-EX

2.6 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 thermometer / Resistor							
DIN IEC 60 751	Pt10 (a=0.003850)	-200 ... 850 °C	(-328 ... 1562 °F)	10 °C (18 °F)	± 0.80 °C	(± 1.44 °F)	± 0.05 %
	Pt50 (a=0.003850)	-200 ... 850 °C	(-328 ... 1562 °F)	10 °C (18 °F)	± 0.16 °C	(± 0.29 °F)	± 0.05 %
	Pt100 (a=0.003850) [2]	**-200 ... 850 °C**	**(-328 ... 1562 °F)**	10 °C (18 °F)	± 0.08 °C	(± 0.14 °F)	± 0.05 %
	Pt200 (a=0.003850)	-200 ... 850 °C	(-328 ... 1562 °F)	10 °C (18 °F)	± 0.24 °C	(± 0.43 °F)	± 0.05 %
	Pt500 (a=0.003850)	-200 ... 850 °C	(-328 ... 1562 °F)	10 °C (18 °F)	± 0.16 °C	(± 0.29 °F)	± 0.05 %
	Pt1000 (a=0.003850)	-200 ... 850 °C	(-328 ... 1562 °F)	10 °C (18 °F)	± 0.08 °C	(± 0.14 °F)	± 0.05 %
JIS C1604-89	Pt10 (a=0.003916)	-200 ... 645 °C	(-328 ... 1193 °F)	10 °C (18 °F)	± 0.80 °C	(± 1.44 °F)	± 0.05 %
	Pt50 (a=0.003916)	-200 ... 645 °C	(-328 ... 1193 °F)	10 °C (18 °F)	± 0.16 °C	(± 0.29 °F)	± 0.05 %
	Pt100 (a=0.003916)	-200 ... 645 °C	(-328 ... 1193 °F)	10 °C (18 °F)	± 0.08 °C	(± 0.14 °F)	± 0.05 %
MIL-T-24388	Pt10 (a=0,003920)	-200 ... 850 °C	(-328 ... 1562 °F)	10 °C (18 °F)	± 0,80 °C	(± 1,44 °F)	± 0,05 %
	Pt50 (a=0,003920)	-200 ... 850 °C	(-328 ... 1562 °F)	10 °C (18 °F)	± 0,16 °C	(± 0,29 °F)	± 0,05 %
	Pt100 (a=0,003920)	-200 ... 850 °C	(-328 ... 1562 °F)	10 °C (18 °F)	± 0,08 °C	(± 0,14 °F)	± 0,05 %
	Pt200 (a=0,003920)	-200 ... 850 °C	(-328 ... 1562 °F)	10 °C (18 °F)	± 0,24 °C	(± 0,43 °F)	± 0,05 %
	Pt500 (a=0,003920)	-200 ... 850 °C	(-328 ... 1562 °F)	10 °C (18 °F)	± 0,16 °C	(± 0,29 °F)	± 0,05 %
	Pt1000 (a=0,003920)	-200 ... 850 °C	(-328 ... 1562 °F)	10 °C (18 °F)	± 0,08 °C	(± 0,14 °F)	± 0,05 %
DIN 43760	Ni50 (a=0.006180)	-60 ... 250 °C	(-76 ... 482 °F)	10 °C (18 °F)	± 0.16 °C	(± 0.29 °F)	± 0.05 %
	Ni100 (a=0.006180)	-60 ... 250 °C	(-76 ... 482 °F)	10 °C (18 °F)	± 0.08 °C	(± 0.14 °F)	± 0.05 %
	Ni120 (a=0.006180)	-60 ... 250 °C	(-76 ... 482 °F)	10 °C (18 °F)	± 0.08 °C	(± 0.14 °F)	± 0.05 %
	Ni1000 (a=0.006180)	-60 ... 250 °C	(-76 ... 482 °F)	10 °C (18 °F)	± 0.08 °C	(± 0.14 °F)	± 0.05 %
	Cu10 (a=0.004270)	-50 ... 200 °C	(-58 ... 392 °F)	10 °C (18 °F)	± 0.80 °C	(± 1.44 °F)	± 0.05 %
	Cu100 (a=0.004270)	-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 model
3) Include the internal reference point error for digital measuring accuracy: Pt1000. DIN IEC 60751 Cl. B
4) Without reference junction error

2.7 Operating influences

The percentages refer to the configured measuring span.

Influence of supply voltage / load: within the specified limits for the voltage / load, the total influence is less than 0.001 % per volt

Normal-mode rejection: > 65 dB at 50 / 60 Hz,

Common-mode rejection: > 120 dB at 50 / 60 Hz

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

Sensor		Influence of ambient temperature per 1 °C (1.8 °F) deviation from 23 °C (73.4 °F) for digital measurement	Influence of ambient temperature [1] [2] per 1 °C (1.8 °F) deviation from 23 °C (73.4 °F) for D/A converter
Resistance thermometer for two-, three-, four-wire circuits			
Pt10	IEC, JIS, MIL	± 0,04 °C (± 0,072 °F)	± 0,003 %
Pt50	IEC, JIS, MIL	± 0,008 °C (± 0,014 °F)	± 0,003 %
Pt100	IEC, JIS, MIL	± 0,004 °C (± 0,007 °F)	± 0,003 %
Pt200	IEC, MIL	± 0,02 °C (± 0,036 °F)	± 0,003 %
Pt500	IEC, MIL	± 0,008 °C (± 0,014 °F)	± 0,003 %
Pt1000	IEC, MIL	± 0,004 °C (± 0,007 °F)	± 0,003 %
Ni50	DIN 43760	± 0,008 °C (± 0,014 °F)	± 0,003 %
Ni100	DIN 43760	± 0,004 °C (± 0,007 °F)	± 0,003 %
Ni120	DIN 43760	± 0,003 °C (± 0,005 °F)	± 0,003 %
Ni1000	DIN 43760	± 0,004 °C (± 0,007 °F)	± 0,003 %
Cu10		± 0,04 °C (± 0,072 °F)	± 0,003 %
Cu100		± 0,004 °C (± 0,007 °F)	± 0,003 %
Resistance measurement 0 ... 500 Ω		± 0,002 Ω	± 0,003 %
0 ... 5000 Ω		± 0,02 Ω	± 0,003 %
Thermocouple, for all defined types		$\pm [(0{,}001\ \% \times (ME[mV] / MS[mv]) + (100\ \% \times (0{,}009\ °C / MS\ [°C]))]$ [3]	± 0,003 %
Voltage measurement -125 ... 125 mV		± 1,5 µV	± 0,003 %
-125 ... 1100 mV		± 15 µV	± 0,003 %

1) Percentages refer to the configured measuring span of the analog output signal
2) Influence of the D/A converter omitted for PROFIBUS PA and FOUNDATION Fieldbus H1
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 down to -50 °C (-58 °F), the causal variables are doubled in the range between -50 ... -40 °C (-58 ... -40 °F).

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3   Communication

3.1   Configuration parameters

Measurement type

Sensor type, connection type
Error signaling
Measuring range
General information, e.g., TAG number
Damping
Warning and alarm limits
Signal simulation of output
For additional information, see Section 9, "Order form
configuration"

Write protection

Software and hardware write protection

Diagnostic information in accordance with NE 107

Standard:
Sensor error (wire break or short circuit)
Device error
Over / under alarm limits
Over / under measuring range
Simulation active
Advanced:
Sensor redundancy / sensor backup active (in case sensor fails)
with configurable analog alarm pulse signaling
Drift monitoring with configurable alarm pulse signaling
Sensor / sensor supply line corrosion
Supply voltage undershoot
Drag indicator for sensor 1, sensor 2, and ambient temperature
Ambient temperature overshoot
Ambient temperature undershoot
Operating hours counter

3.2   HART

The device is listed with the HART Communication Foundation.

* If necessary
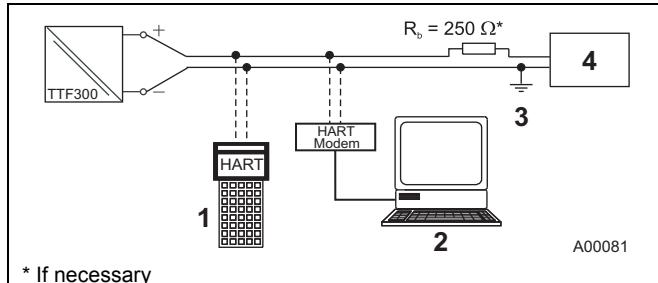
Fig. 2:   Example for HART interface connection

1   Handheld terminal
2   FDT / DTM technology
3   Ground connection (optional)
4   Power unit (process interface)

Manufacturer ID:	0x1A
Device ID:	0x0A
Profile:	HART 5.1
Configuration:	Directly on the device
	DTM
	EDD
Transmission signal:	BELL Standard 202

Operating modes

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

Configuration options and tools

Driver-independent:
LCD indicators with configuration function
Driver-dependent:
Device management / asset management tools
DTM technology – via TTX300 DTM driver
EDD - via TTX300 EDD driver

Diagnostic signaling

Overdrive / underdrive in accordance with NE 43
HART diagnostics

Field mounted Temperature Transmitter TTF300
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DS/TTF300-EN

3.3 PROFIBUS PA

The interface conforms to profile 3.01 (PROFIBUS standard, EN 50170, DIN 1924 [PRO91]).
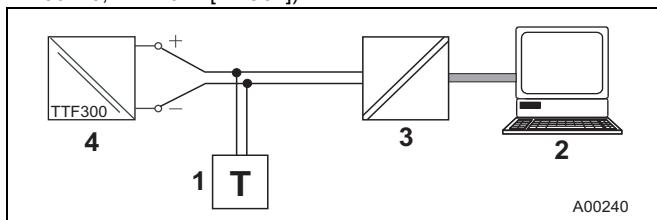
Fig. 3:   Example for PROFIBUS PA interface connection

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

Manufacturer ID:	0x1A
IDENT_NUMBER:	0x3470 [0x9700]
Profile:	PA 3.01
Configuration:	Directly on the device
	DTM
	EDD
	GSD
Transmission signal:	IEC 61158-2

Voltage / current consumption

Average current consumption: 12 mA
In the event of an error, the integrated FDE (= Fault Disconnection Electronic) function integrated in the device ensures that the current consumption can rise to a maximum of 20 mA.

3.4 FOUNDATION Fieldbus
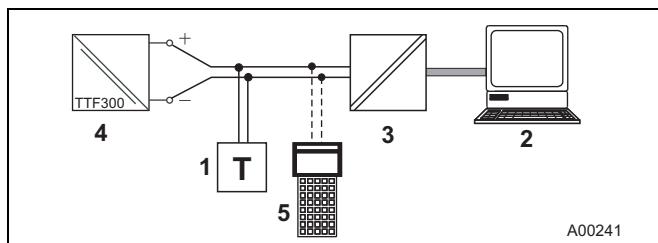
Fig. 4:   Example for FOUNDATION Fieldbus interface connection

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

DEVICE ID:	000320001F...
ITK:	5.2
Configuration:	Directly on the device
	EDD
Transmission signal:	IEC 61158-2

Voltage / current consumption

Average current consumption: 12 mA
In the event of an error, the integrated FDE (= Fault Disconnection Electronic) function integrated in the device ensures that the current consumption can rise to a maximum of 20 mA.

Field mounted Temperature Transmitter TTF300
HART, PROFIBUS, FOUNDATION Fieldbus, Pt100 (RTD), thermocouples, electrical isolation

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4   Electrical connections

Resistance thermometers (RTD) / resistors (potentiometers)
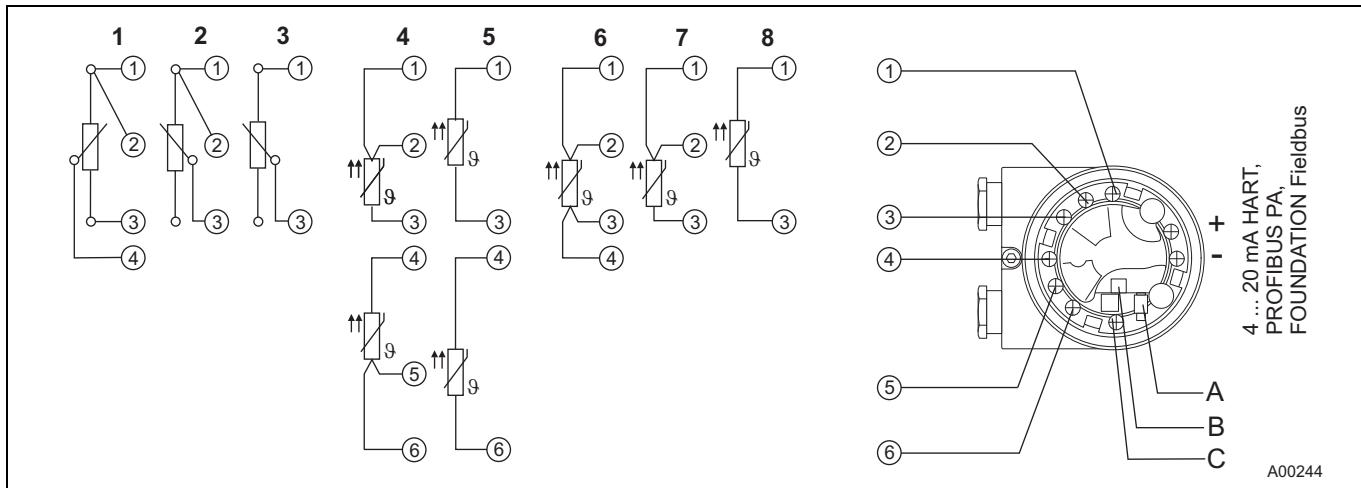
Fig. 5

|			
A	Interface for LCD indicators and service	1	Potentiometer, four-wire circuit
B	DIP switch 1: on, hardware write protection is enabled DIP switch 2: no function	2	Potentiometer, three-wire circuit
		3	Potentiometer, two-wire circuit
		4	2 x RTD, three-wire circuit [1]
C	Ground terminals for sensor and supply- / signal-cable shield connection		

5	2 x RTD, two-wire circuit [1]
6	RTD, four-wire circuit
7	RTD, three-wire circuit
8	RTD, two-wire circuit

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

Thermocouples / voltages and resistance thermometer (RTD) / thermocouple combinations
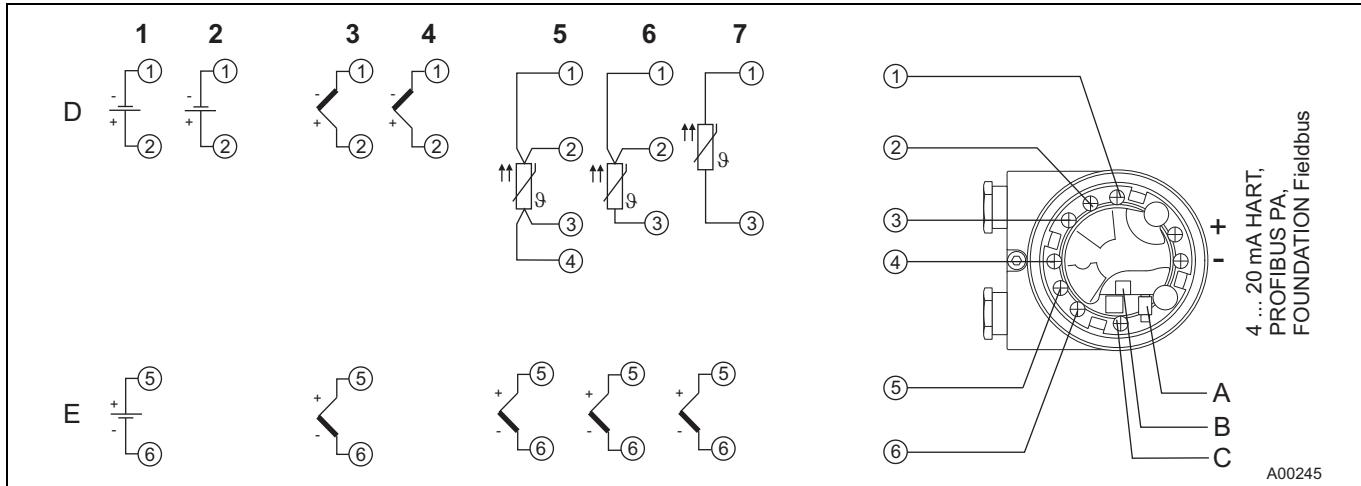
Fig. 6

A	Interface for LCD indicators and service	1	2 x voltage measurement [1]
B	DIP switch 1: on, hardware write protection is enabled DIP switch 2: no function	2	1 x voltage measurement
		3	2 x thermocouple [1]
		4	1 x thermocouple
C	Ground terminals for sensor and supply- / signal-cable shield connection		
D	Sensor 1		
E	Sensor 2		

5	1 x RTD, four-wire circuit, and thermocouple [1]
6	1 x RTD, three-wire circuit, and thermocouple [1]
7	1 x RTD, two-wire circuit, and thermocouple [1]

[1] Sensor backup / redundancy, sensor drift monitoring, mean measurement or differential temperature measurement

Field mounted Temperature Transmitter TTF300
HART, PROFIBUS, FOUNDATION Fieldbus, Pt100 (RTD), thermocouples, electrical isolation

DS/TTF300-EN
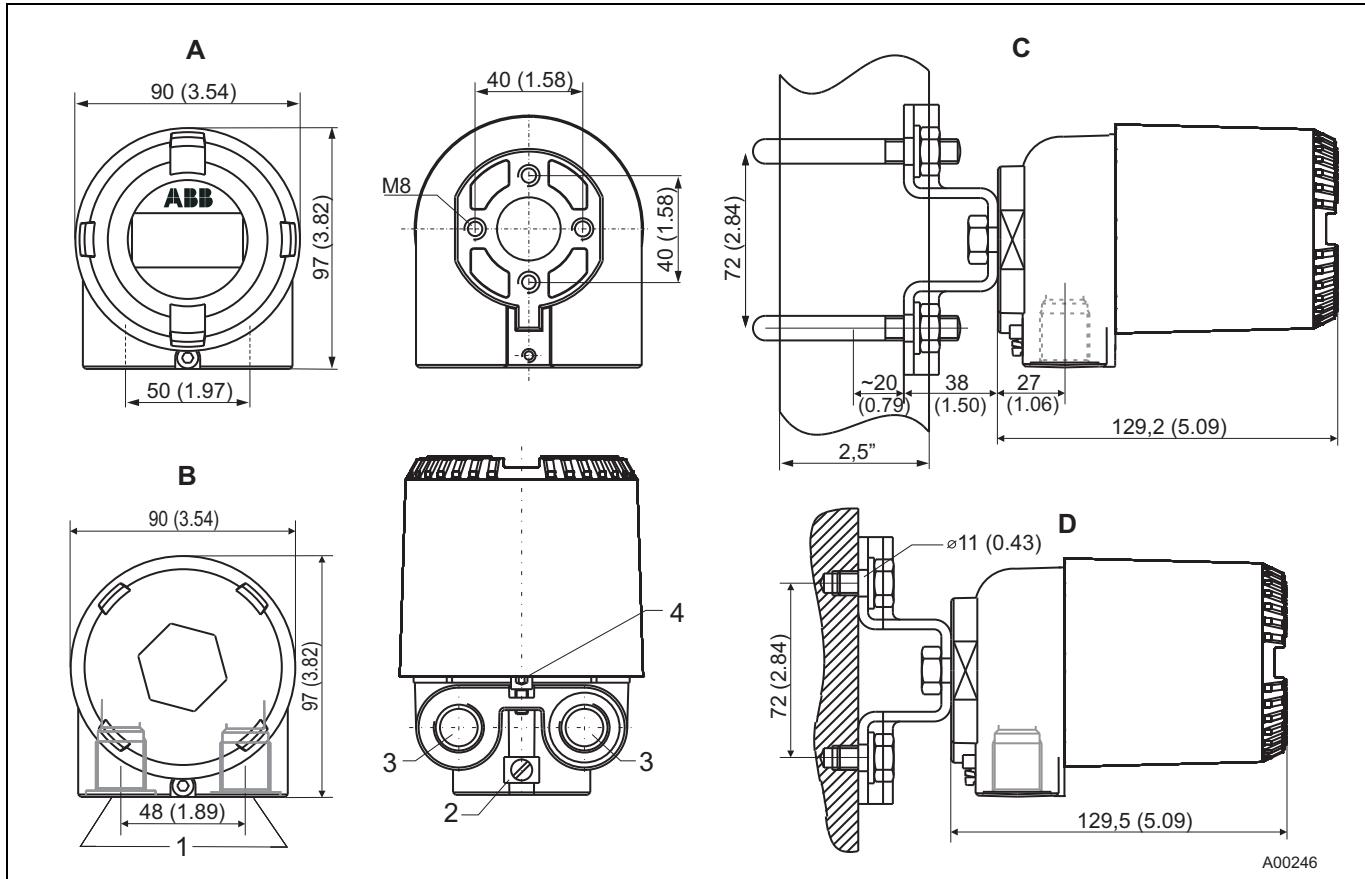
5   Dimensions

Fig. 7:   Dimensions in mm (inch)

A   Housing with display window in cover
B   Closed housing
C   Pipe installation
D   Wall mount, 4-hole wall attachment, ∅ 11 mm (0.43 inch),
     quadratically arranged, at distance of 72 mm (2.84 inch)

1   Electrical connections
2   Equipotential bonding screw M5
3   Thread M20 x 1.5 or 1/2" NPT
4   Lock screw

Field mounted Temperature Transmitter TTF300
HART, PROFIBUS, FOUNDATION Fieldbus, Pt100 (RTD), thermocouples, electrical isolation

DS/TTF300-EN

6 Ordering information

|	Version number	1 – 6	7	8	9	10	11	12	13	XX
			Main order number							Add. order no.
TTF300 Field Mounted Temperature Transmitter, Pt100 (RTD), Thermocouples, Electrical Isolation		**TTF300**	**X**	**X**	X	X	X	X	X	XX
Explosion Protection										
Without explosion protection			**Y**	**0**						
ATEX Intrinsic Safety type of protection: Zone 0: II 1 G Ex ia IIC T6, Zone 1 (0): II 2 (1) G Ex [ia] ib IIC T6, Zone 1 (20): II 2 G (1D) Ex [iaD] ib IIC T6			E	1						
ATEX Non-sparking type of protection: Zone 2 / Zone 22: II 3 G Ex nA II T6 and II 3 D IP 65 T 135 °C (Not for application in hybrid mixtures)	1)		E	5						
ATEX Dust Explosion Protection: Zone 20: II 1 D IP 65 T 135 °C			D	1						
ATEX Dust Explosion Protection and Intrinsic Safety: Zone 0 / Zone 20: II 1 G Ex iA IIC T6 and II 1 D IP 65 T 135 °C (Not for application in hybrid mixtures)	1)		D	2						
ATEX Flameproof type of protection: Zone 1: II 2 G Ex d IIC T6			E	3						
ATEX Flameproof and Intrinsic Safety type of protection: Zone 1 / Zone 0: II 2 G Ex d IIC T6 and II 1 G Ex ia IIC T6			E	4						
IECEx Intrinsic Safety type of protection: Zone 0: Ex ia IIC T6, Zone 1 (0): Ex [ia] ib IIC T6, Zone 1 (20): Ex [iaD] ib IIC T6			H	1						
FM Intrinsic Safety (IS): Class I, Div. 1+2, Groups A, B, C, D, Class II, E, F, G, Class III, Class I, Zone 0, AEx ia IIC T6			L	1						
FM Non-incendive (NI): Class I, Div. 2, Groups A, B, C, D, Class II, E, F, G, Class III			L	2						
FM Explosionproof (XP): XP, NI, DIP, Class I, II, III, Div. 1+2, Groups A-G, factory sealed			L	3						
FM Explosionproof (XP) and Intrinsic Safety (IS): XP, NI, DIP, Class I, II, III, Div. 1+2, Groups A-G, factory sealed and IS, Class I, Div. 1+2, Groups A, B, C, D, Class II, E, F, G, Class III, Class I, Zone 0, AEx ia IIC T6			L	7						
CSA Intrinsic Safety (IS): Class I, Div. 1+2, Groups A, B, C, D, Class II, E, F, G, Class III			R	1						
CSA Non-incendive (NI): Class I, Div. 2, Groups A, B, C, D, Class II, E, F, G, Class III			R	2						
CSA Explosionproof (XP): XP, NI, DIP, Class I, II, III, Div. 1+2, Groups A-G, factory sealed			R	3						
CSA Explosionproof (XP) and Intrinsic Safety (IS): XP, NI, DIP, Class I, II, III, Div. 1+2, Groups A-G, factory sealed and IS, Class I, Div. 1+2, Groups A, B, C, D, Class II, E, F, G, Class III			R	7						
Russia - metrological approval	2)		G	1						
Russia - metrological approval and GOST Ex i	2)		G	2						
Russia - metrological approval and GOST Ex d	2)		G	7						
Russia - metrological approval and GOST Ex i and Ex d	2)		G	8						
Kazakhstan - metrological approval	2)		G	3						
Kazakhstan - metrological approval and GOST Ex i	2)		G	4						
Kazakhstan - metrological approval and GOST Ex d	2)		M	1						
Kazakhstan - metrological approval and GOST Ex i and Ex d	2)		M	2						
Ukraine - metrological approval	2)		G	5						
Ukraine - metrological approval and GOST Ex i	2)		G	6						
Ukraine - metrological approval and GOST Ex d	2)		G	9						
Ukraine - metrological approval and GOST Ex i and Ex d	2)		M	3						
Belarus - metrological approval	2)		M	5						
Belarus - metrological approval and GOST Ex i	2)		M	6						
Belarus - metrological approval and GOST Ex d	2)		M	7						
Belarus - metrological approval and GOST Ex i and Ex d	2)		M	8						

Field mounted Temperature Transmitter TTF300
HART, PROFIBUS, FOUNDATION Fieldbus, Pt100 (RTD), thermocouples, electrical isolation

DS/TTF300-EN

	Version number	1 – 6	7	8	9	10	11	12	13	XX
TTF300 Field Mounted Temperature Transmitter, Pt100 (RTD), Thermocouples, Electrical Isolation		**TTF300**	X	X	X	X	X	X	X	**XX**
Housing / Indicators										
Single-chamber housing (aluminum) / Without indicators					A					
Single-chamber housing (stainless steel) / Without indicators					B					
Single-chamber housing (aluminum) / with LCD indicator HMI					C					
Single-chamber housing (stainless steel) / with LCD indicator HMI					D					
Cable Entry										
Thread 2 x M20 x 1.5						3) **1**				
Thread 2 x 1/2 in. NPT						**2**				
Thread 2 x 3/4 in. NPT						4) **3**				
Cable gland 2 x M20 x 1.5						5) **4**				
Communication Protocol										
HART							**H**			
PROFIBUS PA							**P**			
FOUNDATION Fieldbus							**F**			
Configuration										
Standard configuration								**B**	**S**	
Customer-specific configuration with report, except user curve							6)	**B**	**F**	
Customer-specific configuration with report, including user curve								**B**	**G**	
Certificates										
SIL2 - declaration of conformity									2)	**CS**
Declaration of compliance with the order 2.1 acc. EN 10204										**C4**
Inspection certificate 3.1 acc. EN 10204 for visual and functional test										**C6**
Calibration Certificates										
With 5-point factory certificate										**EM**
Inspection certificate 3.1 acc. EN 10204 for 5-point calibration										**EP**
Mounting Bracket										
Wall mounting / 2 in. pipe mounting bracket (stainless steel)										**K2**
Cable Entry Options										
Cable screw connection 2 x 1/2 in. NPT									7)	**U5**
Expanded Ambient Temperature Range										
-50 ... 85 °C (-58 ... 185 °F)									8)	**SE**
Device Identification Plate										
Stainless steel										**T0**
Additional Tag Plate										
Stainless steel										**I1**
Customer-specific Versions										
(Please provide details)										**Z9**
Language of Documentation										
German										**M1**
English										**M5**
Language package Western Europe / Scandinavia (Languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)										**MW**
Language package Eastern Europe (Languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)										**ME**

1) According EN 60079-0 and EN 61241-0, the application in hybrid mixtures (concomitance of potentially explosive dust and gas) is currently not allowed
2) Only available with Communication Protocol code H (HART)
3) Not available with Explosion Protection code L1, L2, L3, L7, R1, R2, R3, R7, D1, D2
4) Only available with Housing / Indicators code A, C
5) Not available with Explosion Protection code L3, L7, R3, R7, G7, G8, G9, M1, M2, M3, M7, M8
6) E.g., set measuring range, TAG no.
7) Only available with cable entry code 2
8) Not available with Explosion Protection code L1, L2, L3, L7, R1, R2, R3, R7, D1, D2, E3, E4, G7, G8, G9, M1, M2, M3, M7, M8

Field mounted Temperature Transmitter TTF300
HART, PROFIBUS, FOUNDATION Fieldbus, Pt100 (RTD), thermocouples, electrical isolation

DS/TTF300-EN

6.1 Documentation available for ordering

Description	Order number
TTF300 Documentation CD-ROM	3KXT221001R0800
TTF300 Commissioning Instructions, English	3KXT221001R4401
TTF300 Commissioning Instructions, German	3KXT221001R4403
TTF300 Commissioning Instructions, Language package Western Europe / Scandinavia	3KXT221001R4493
TTF300 Commissioning Instructions, Language package Eastern Europe	3KXT221001R4494

7 Ex relevant specifications

7.1 TTF300-E1X, intrinsic safety ATEX

Explosion protection
Approved for use in Zone 0, 1, and 2
Designation
II 1G Ex ia IIC T6 (Zone 0)
II 2(1)G Ex [ia] ib IIC T6 (Zone 1 [0])
II 2G(1D) Ex [iaD] ib IIC T6 (Zone 1 [20])

TTF300-E1H:
EC type-examination test certificate PTB 05 ATEX 2017 X
TTF300-E1P / E1F:
EC type-examination test certificate PTB 09 ATEX 2016 X

7.2 TTF300-H1X, intrinsic safety IECEx

Designation
Ex ia IIC T6
Ex [ia] ib IIC T6
Ex [iaD] ib IIC T6

TTF300-H1H:
IECEx certificate of conformity IECEx PTB 09.0014X
TTF300-H1P / H1F:
IECEx certificate of conformity

7.3 Safety specifications for Intrinsic Safety ATEX / IECEx

Temperature table

Temperature class	Permissible ambient temperature range	
	Device category 1 use	Device category 2 use
T6	-50 … 44 °C (-58 ... 111,2 °F)	-50 … 56 °C (-58 ... 132,8 °F)
T5	-50 … 56 °C (-58 ... 132,8 °F)	-50 … 71 °C (-58 ... 159,8 °F)
T4, T3, T2, T1	-50 … 60 °C (-58 ... 140,0 °F)	-50 … 85 °C (-58 ... 185,0 °F)

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

	TTF300-E1H TTF300-H1H Supply circuit	TTF300-E1P / -H1P TTF300-E1F / -H1F Supply circuit [1]	
		FISCO	ENTITY
Max. voltage	U_i = 30 V	$U_i \leq 17.5$ V	$U_i \leq 24.0$ V
Short-circuit current	I_i = 130 mA	$I_i \leq 183$ mA [2]	$I_i \leq 250$ mA
Max. power	P_i = 0.8 W	$P_i \leq 2.56$ W [2]	$P_i \leq 1.2$ W
Internal inductance	L_i = 0.5 mH	$L_i \leq 10$ µH	$L_i \leq 10$ µH
Internal capacitance	C_i = 5 nF	$C_i \leq 5$ nF	$C_i \leq 5$ nF

1) FISCO in accordance with IEC 60079-27
2) II B FISCO: $I_i \leq 380$ mA, $P_i \leq 5.32$ W

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

	Measurement current circuit: resistance thermometers, resistors	Measurement current circuit: thermocouples, voltages
Max. voltage	U_o = 6.5 V	U_o = 1.2 V
Short-circuit current	I_o = 25 mA	I_o = 50 mA
Max. power	P_o = 38 mW	P_o = 60 mW
Internal inductance	L_i = 0 mH	L_i = 0 mH
Internal capacitance	C_i = 49 nF	C_i = 49 nF
Maximum permissible external inductance	L_o = 5 mH	L_o = 5 mH
Maximum permissible external capacitance	C_o = 1.55 µF	C_o = 1.05 µF

Intrinsic safety Ex ia IIC type of protection (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

Field mounted Temperature Transmitter TTF300
HART, PROFIBUS, FOUNDATION Fieldbus, Pt100 (RTD), thermocouples, electrical isolation

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7.4 TTF300-E5X, non-sparking + dust explosion protection ATEX

Explosion protection
Approved for use in Zone 2 and Zone 22
Designation
II 3G Ex nA II T6
II 3 D IP 65 T 135 °C

ABB manufacturer's declaration in accordance with ATEX Directive

Temperature table

Temperature class	Device category 3 use
T6	-50 … 56 °C (-58 ... 132,8 °F)
T5	-50 … 71 °C (-58 ... 159,8 °F)
T4	-50 … 85 °C (-58 ... 185,0 °F)

7.5 TTF300-D1X, dust explosion protection ATEX

Explosion protection
Approved for use in Zone 20
Designation
II 1D Ex tD A20 IP66 T135°C

EC type-examination test certificate BVS 06 ATEX E 029

7.6 TTF300-D2X, dust explosion protection + intrinsic safety ATEX

Explosion protection
Approved for use in Zone 20 and Zone 0
Designation
II 1D Ex tD A20 P66 T135°C
II 1G Ex ia IIC T6

EC type-examination test certificate BVS 06 ATEX E 029
EC type-examination test certificate PTB 05 ATEX 2017 X
EC type-examination test certificate PTB 05 ATEX 2016 X

7.7 TTF300-E3X, flameproof enclosure ATEX

Explosion protection
Approved for use in Zone 1
Designation
II 2G Ex d IIC T6

EC type-examination test certificate PTB 99 ATEX 1144

7.8 TTF300-E4X, flameproof enclosure + intrinsic safety ATEX

Explosion protection
Approved for use in Zone 1
Designation
II 2G Ex d IIC T6
II 1G Ex ia IIC T6

EC type-examination test certificate PTB 99 ATEX 1144
EC type-examination test certificate PTB 05 ATEX 2017 X
EC type-examination test certificate PTB 05 ATEX 2016 X

7.9 TTF300-L1X, intrinsically safe FM

Class I, Div. 1 + 2, Groups A, B, C, D
Class I, Zone 0, AEx ia IIC
TTF300-L1H: Control Drawing: SAP_214832
TTF300-L1P: Control Drawing: TTF300-L1..P (IS)
TTF300-L1F: Control Drawing: TTF300-L1..F (IS)

7.10 TTF300-L2X, non-incendive FM

Class I, Div. 2, Groups A, B, C, D
Class I Zone 2 Group IIC T6
TTF300-L2H:
Control Drawing: SAP_214828
Control Drawing: SAP_214830
TTF300-L2P:
Control Drawing: TTF300-L2..P (NI_PS), TTF300-L2..P (NI_AA)
TTF300-L2F:
Control Drawing: TTF300-L2..F (NI_PS), TTF300-L2..F (NI_AA)

7.11 TTF300-L3X, explosion proof FM

XP,NI, DIP Class I, II, III, Div. 1 + 2, Groups A-G, factory sealed

7.12 TTF300-L7X, explosion proof + intrinsically safe FM

XP, NI, DIP Class I, II, III, Div. 1 + 2, Groups A-G, factory sealed
Class I, Div. 1 + 2, Groups A, B, C, D
Class I, Zone 0, AEx ia IIC T6
TTF300-L1H: Control Drawing: SAP_214832
TTF300-L1P: Control Drawing: TTF300-L1..P (IS)
TTF300-L1F: Control Drawing: TTF300-L1..F (IS)

7.13 TTF300-R1X, intrinsically safe CSA

Class I, Div. 1 + 2, Groups A, B, C, D
Class I, Zone 0, Ex ia IIC
TTF300-R1H: Control Drawing: SAP_214825
TTF300-R1P: Control Drawing: TTF300-R1..P (IS)
TTF300-R1F: Control Drawing: TTF300-R1..F (IS)

7.14 TTF300-R2X, non-incendive CSA

Class I, Div. 2, Groups A, B, C, D
TTF300-R2H:
Control Drawing: SAP_214827
Control Drawing: SAP_214895
TTF300-R2P:
Control Drawing: TTF300-R2..P (NI_PS), TTF300-R2..P (NI_AA)
TTF300-R2F:
Control Drawing: TTF300-R2..F (NI_PS), TTF300-R2..F (NI_AA)

7.15 TTF300-R3X, explosion proof CSA

XP,NI, DIP Class I, II, III, Div. 1 + 2, Groups A-G, factory sealed

7.16 TTF300-R7X, explosion proof + intrinsically safe CSA

XP,NI, DIP Class I, II, III, Div. 1 + 2, Groups A-G, factory sealed
Class I, Div. 1 + 2, Groups A, B, C, D
Class I, Zone 0, Ex ia Group IIC T6
TTF300-R1H: Control Drawing: SAP_214825
TTF300-R1P: Control Drawing: TTF300-R1..P (IS)
TTF300-R1F: Control Drawing: TTF300-R1..F (IS)

Field mounted Temperature Transmitter TTF300
HART, PROFIBUS, FOUNDATION Fieldbus, Pt100 (RTD), thermocouples, electrical isolation

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8 Type B LCD

CE marking

The type B LCD indicator meets all requirements as regards the CE marking in accordance with IEC 61326 (2005).

8.1 Features

Transmitter-controlled graphic (alphanumeric) LCD indicator

Character height, mode-dependent
Sign, 4 digits, 2 decimal places
Bar graph display

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

8.2 Specifications

Temperature range

-20 … 70 °C (-4 … 158 °F)
Restricted display function (contrast, reaction time) in the temperature ranges:
-50 … -20 °C (-58 … -4 °F)
and
70 … 85 °C (158 … 185 °F)

Humidity

0 … 100 %, condensation permitted
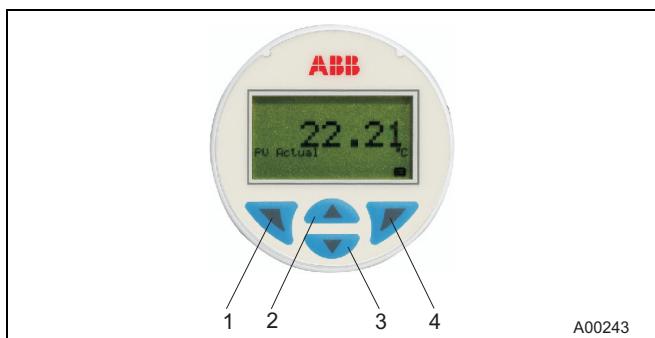
Fig. 8:   Type B LCD indicator

1   Exit / Cancel   3   Scroll forward
2   Scroll back   4   Select

8.3 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

8.4 Ex relevant specifications

8.4.1 Intrinsic safety ATEX

Explosion protection

Approved for use in Zone 0

Designation

II 1G Ex ia IIC T6

EC type-examination test certificate PTB 05 ATEX 2079 X

8.4.2 Intrinsic safety IECEx

Explosion protection

Approved for use in Zone 0

Designation

Ex ia IIC T6

IECEx certificate of conformity IECEx PTB

8.4.3 Safety specifications for intrinsic safety ATEX / IECEx

Temperature table

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

Protection type intrinsic safety Ex ia IIC

	Supply circuit
Max. voltage	U_i = 9 V
Short circuit current	I_i = 65.2 mA
Max. power	P_i = 101 W
Internal inductance	L_i = 0 mH
Internal capacitance	C_i = 0 nF

8.4.4   Intrinsically Safe FM

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*
Temp. Ident: T6 T_{amb} 56 °C, T4 T_{amb} 85 °C
U_i / V_{max} = 9V, I_i / I_{max} < 65.2 mA, P_i = 101 mW
C_i = 0.4 µF; L_i = 0
Control Drawing: SAP_214 748

8.4.5   Non-Incendive FM

N.I. Class I Div 2, Group: A, B, C, D or
Ex nL IIC T*, Class I Zone 2
Temp. Ident: T6 T_{amb} 60 °C, T4 T_{amb} 85 °C
U_i / V_{max} = 9V, I_i / I_{max} < 65.2 mA, P_i = 101 mW
C_i = 0.4 µF; L_i = 0
Control Drawing: SAP_214 751

8.4.6   Intrinsically Safe CSA

I.S. Class I Div 1 and Div 2; Group: A, B, C, D or
I.S Zone 0 Ex ia IIC T*
*Temp. Ident T6 T_{amb} 56 C, T4 T_{amb} 85 °C
U_i / V_{max} = 9V, I_i / I_{max} < 65,2 mA; P_i = 101 mW
C_i < 0,4 $F_µ$, L_i = 0
Control Drawing: SAP_214 749

8.4.7   Non-Incendive CSA

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

Field mounted Temperature Transmitter TTF300
HART, PROFIBUS, FOUNDATION Fieldbus, Pt100 (RTD), thermocouples, electrical isolation

DS/TTF300-EN

9 Order form configuration

9.1 HART device design: Data relating to customer-specific configuration

Configuration		Selection
Number of sensors		☐ **1 senso**r (standard) ☐ 2 sensors
Measurement type (for 2-sensor selection only)		☐ Redundancy / sensor backup ☐ Sensor drift monitoring .....°C / K Sensor drift differential ....s time limit for drift overshoot ☐ Differential measurement ☐ Mean measurement
IEC 60751	Resistance thermometer	☐ Pt10 ☐ Pt50 ☐ **Pt100** (standard) ☐ Pt200 ☐ Pt500 ☐ Pt1000
JIS C1604-89		☐ Pt10 ☐ Pt50 ☐ Pt100
MIL-T-24388		☐ Pt10 ☐ Pt50 ☐ Pt100 ☐ Pt200 ☐ Pt500 ☐ Pt1000
DIN 43760		☐ Ni50 ☐ Ni100 ☐ Ni120 ☐ Ni1000
Cu		☐ Cu10 ☐ Cu100
	Resistance measurement	☐ 0 … 500 Ω ☐ 0 … 5000 Ω
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	☐ -125 … 125 mV ☐ -125 … 1100 mV
Sensor circuit (for resistance thermometer and resistance measurement only)		☐ Two-wire ☐ **Three-wire** (standard) ☐ Four-wire Two-wire circuit: Compensation of sensor line resistance max. 100 Ω ☐ Sensor 1: .... Ω ☐ Sensor 2: .... Ω
Reference point (for thermocouples only)		☐ Internal (for standard thermocouples except type B) ☐ None (type B) ☐ External / temperature: .... °C
Measuring range		☐ Measuring start: .... (Standard: **0**) ☐ Measuring end: .... (Standard: **100**)
Unit		☐ **Celsius** (standard) ☐ Fahrenheit ☐ Rankine ☐ Kelvin
Characteristic behavior		☐ **Rising 4 ... 20 mA** (standard) ☐ Falling 20 ... 4 mA
Output behavior for error		☐ **Override / 22 mA** (standard) ☐ Underdrive / 3.6 mA
Output attenuation (T_{63})		☐ **Off** (standard) ☐ .... seconds (1 … 100 s)
Sensor number		☐ Sensor 1................ ☐ Sensor 2................

Resistor value at 0 °C / R$_o$
Callendar-Van Dusen coefficient A
Callendar-Van Dusen coefficient B
Callendar-Van Dusen coefficient C
(optional, for resistance thermometers only)
		Sensor 1: R$_o$: .... Sensor 2: R$_o$: ....
		        A: …......... A: ….........
		        B: …......... B: ….........
		        C: …......... C: …..........

User characteristics based on linearization table		☐ Based on attached table of variate pairs
TAG number		☐ ....
Software write protection		☐ **Off** (standard) ☐ On
"Maintenance required" alarm pulse or continuous signaling in accordance with NE 107		☐ **Off** (standard) pulse width ......s (0.5 .... 59.5 s increment 0.5 s) ☐ Continuous signal

Field mounted Temperature Transmitter TTF300
HART, PROFIBUS, FOUNDATION Fieldbus, Pt100 (RTD), thermocouples, electrical isolation

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9.2   PROFIBUS PA / FOUNDATION Fieldbus device design

Configuration		Selection
Number of sensors		☐ **1 senso**r (standard) ☐ 2 sensors
Measurement type (for 2-sensor selection only)		☐ Sensor redundancy / sensor backup ☐ Sensor drift monitoring .....°C / K sensor drift differential ....s time limit for drift overshoot ☐ Differential measurement ☐ Mean measurement
IEC 60751	Resistance thermometer	☐ Pt10 ☐ Pt50 ☐ **Pt100** (standard) ☐ Pt200 ☐ Pt500 ☐ Pt1000
JIS C1604-89		☐ Pt10 ☐ Pt50 ☐ Pt100
MIL-T-24388		☐ Pt10 ☐ Pt50 ☐ Pt100 ☐ Pt200 ☐ Pt500 ☐ Pt1000
DIN 43760		☐ Ni50 ☐ Ni100 ☐ Ni120 ☐ Ni1000
Cu		☐ Cu10 ☐ Cu100
	Resistance measurement	☐ 0 … 500 Ω ☐ 0 … 5000 Ω
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	☐ -125 … 125 mV ☐ -125 … 1100 mV
Sensor circuit (for resistance thermometer and resistance measurement only)		☐ Two-wire ☐ **Three-wire** (standard) ☐ Four-wire Two-wire circuit: compensation of sensor line resistance max. 100 Ω ☐ Sensor 1: .... Ω ☐ Sensor 2: .... Ω
Reference point (for thermocouples only)		☐ Internal (for standard thermocouples except type B) ☐ None (type B) ☐ External / temperature: .... °C
Unit		☐ **Celsius** (standard) ☐ Fahrenheit ☐ Rankine ☐ Kelvin

Resistor value at 0 °C / R_o
Callendar-Van Dusen coefficient A
Callendar-Van Dusen coefficient B
Callendar-Van Dusen coefficient C
(optional, for resistance thermometers only)
		Sensor 1: R_o: .... Sensor 2: R_o: ....
		         A: ….......... A: …..........
		         B: ….......... B: …..........
		         C: ….......... C: …..........

IDENT_number (PROFIBUS)		☐ Device-specific 0x3470 (standard) ☐ Profile 0x9700 (1 AI block)
Bus address PROFIBUS PA		☐ PA: 0 ... 125 ☐ Standard PA: 126
TAG number		☐ ....
Software write protection		☐ **Off** (standard) ☐ On

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