Data Sheet DS/TTR200-EN Rev. B

TTR200
Rail mounted Temperature Transmitter

HART, Pt100 (RTD), Thermocouples, Electrical isolation

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

Output
— 4 ... 20 mA, HART

Measurement deviation
— 0.1 K

Sensor error adjustment

Continuous sensor monitoring and self-monitoring
— Two function LEDs
— Supply voltage monitoring
— Wire break and corrosion monitoring in accordance with NE 89

Device safety in accordance with NE 53

SIL2 acc. to IEC 61508

Approvals for explosion protection
— ATEX, IECEx, Zone 0
— FM / CSA

Configuration
— DTM
— EDD

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Contents

1 Specifications

1.1 Input

1.1.1 Resistance thermometers/Resistors

Resistance thermometer
Pt100 in accordance with IEC 60751, JIS C1604-81, 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

1.2 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)

1.3 Power supply (polarity safe)

Two-wire technology; power lines = signal lines

Supply voltage
Non ignition-proof application: U_S = 11 ... 42 V DC
Ex 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

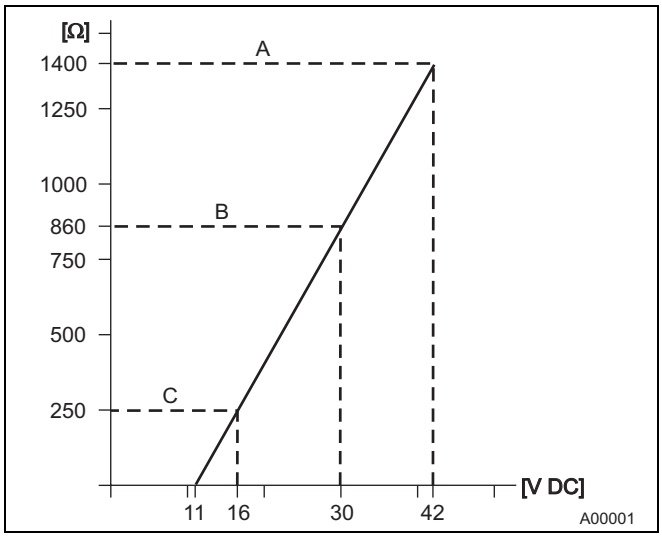


Fig. 1: Max. load depending on supply voltage
A TTR200
B TTR200 In ia hazardous area design
C HART communication resistor

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

2 General information

CE Marking
The TTR200 meets all requirements for the CE mark in accordance with IEC 61326 (2006)

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
< 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 ... 100 s

2.1 Ambient conditions

Ambient temperature
Standard: -40 … 85 °C (-40 … 185 °F)
Restricted range with hazardous area 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, IEC 60068-2-6,
during operation and transport

Shock
gn = 30, IEC 68-2-27,
during operation and transport

Ingress protection
IP 20 or IP class of the bay

2.2 ElectroMagnetic Compatibility

Emitted interference in accordance with IEC EN 61326 (2006) and Namur NE 21 (February 2004)

2.3 Interference immunity

Interference-immune in accordance with IEC 61326 (2006) and Namur NE 21 (August 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) • 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 ground	 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 5, "Dimensions"

Weight
180 g

Material
Housing: polycarbonate
Color: Gray RAL 9002
Sealing compound: Hard sealing compound

Installation conditions
Installation position: No limitations
Installation options: 35 mm rail mounting acc. to EN 60175

Electrical connection
Terminals (captive screws) with screw connections, plug-in
Lines up to max. 2.5 mm^2 (AWG 14)

2.5 SIL functional safety

Conforms with IEC 61508 as regards use in safety-related applications, up to and including SIL 2.

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						
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 C1604-81	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, IEC 60751 Cl. B
4) Without reference point error

2.7 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)

Sensor		**Influence of ambient temperature per 1 °C (1.8 °F) deviation to 23 °C (73.4 °F) for digital measurement**	**Influence of ambient temperature [1) 2)] per 1 °C (1.8 °F) deviation to 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		± [(0,001 % x (ME[mV] / MS[mv]) + (100 % x (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) 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)

3 Communication

3.1 Configuration parameters

Measurement type
- Sensor type, connection type
- Error signaling
- Measurement range
- General information, e.g., TAG number
- Damping
- Signal simulation of output
- For additional information, see Section 8, "Order form configuration"

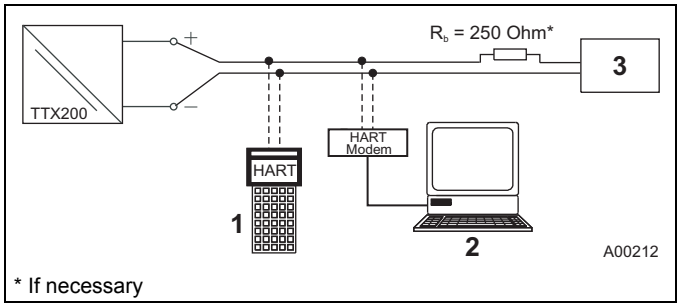
Write protection
- Software write protection

Diagnostic information in accordance with NE 107
- 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

3.2 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 Power unit (process interface)

Manufacturer ID:	0x1A
Device ID:	0x0A
Profile:	HART 5.1
Configuration:	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
- 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

4 Electrical connections

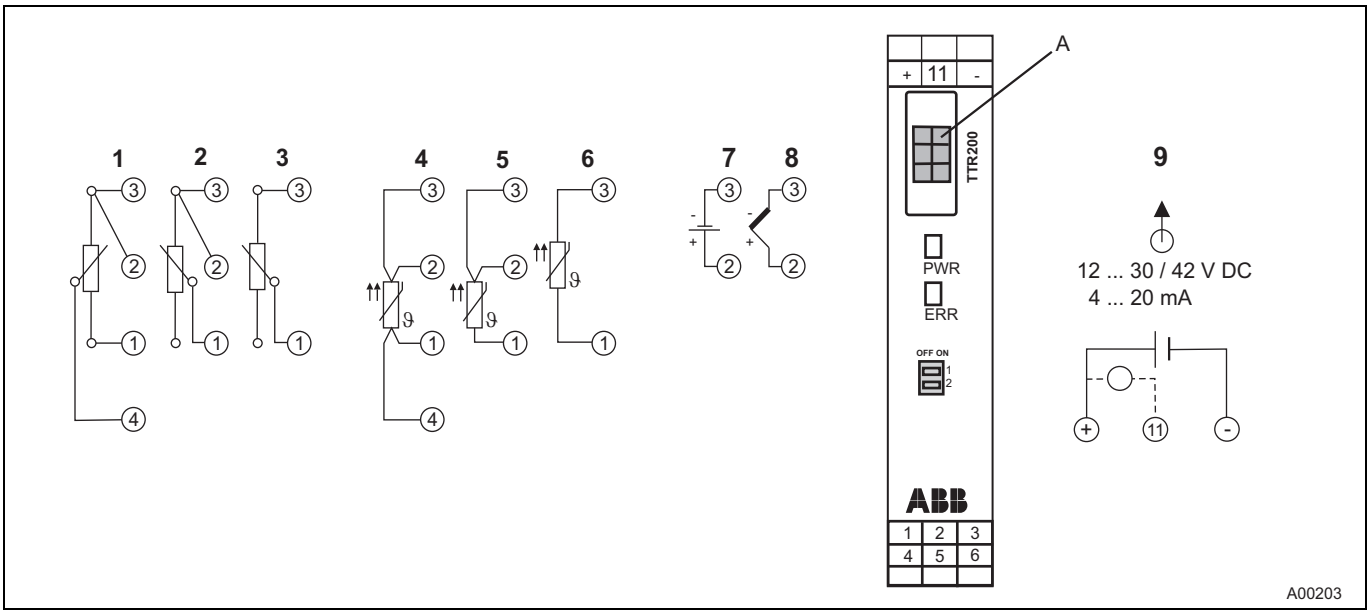


Fig. 3

1 Potentiometer, four-wire circuit
2 Potentiometer, three-wire circuit
3 Potentiometer, two-wire circuit
4 RTD, four-wire circuit
5 RTD, three-wire circuit
6 RTD, two-wire circuit
7 Voltage measurement
8 Thermocouple
9 Terminal 11: Measurement of 4 … 20 mA output current without opening / interrupting the current loop
A: no function

- PWR / green LED: Supply voltage display
- ERR / red LED: sensor, sensor lead & unit fault signaling
- DIP switch 1: on -> Hardware write protection is enabled
- DIP switch 2: no function

5 Dimensions

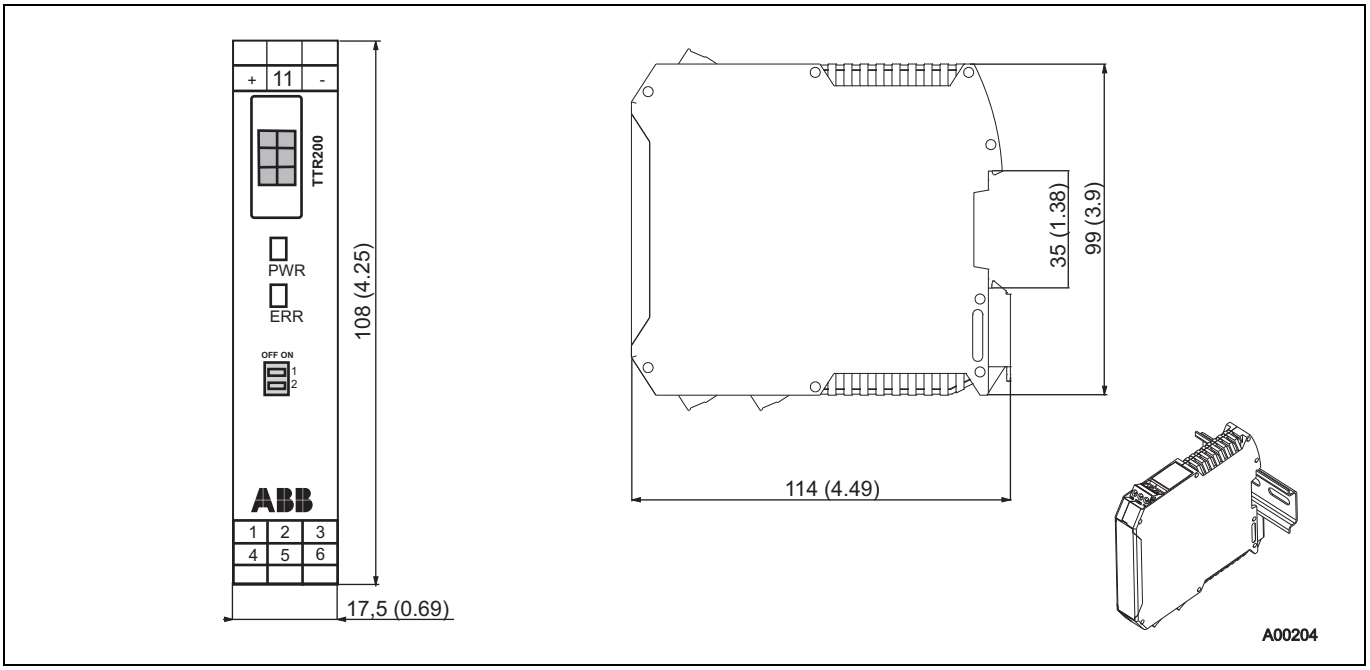


Fig. 4: Dimensions in mm (inch)

6 Ordering information

	Version number	Main order number 1 - 6	7	8	9	10	11	Add. order no. XX
TTR200 rail-mounted temperature transmitter, HART, Pt100 (RTD), thermocouples, electrical isolation		**TTR200**	**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: II 3 G Ex nA II T6			E	2				
IECEx 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			H	1				
FM Intrinsic safety (IS): Class I, Div. 1+2, Groups A, B, C, D, Class I, Zone 0, AEx ia IIC T6, Non-incendive (NI): Class I, Div. 2, Groups A, B, C, D			L	6				
CSA Intrinsic safety (IS): Class I, Div. 1+2, Groups A, B, C, D, Non-incendive (NI): Class I, Div. 2, Groups A, B, C, D			R	6				
Kazakhstan - metrological approval			G	3				
Kazakhstan - metrological approval and GOST Ex i			G	4				
Ukraine - metrological approval			G	5				
Ukraine - metrological approval and GOST Ex i			G	6				
Belarus - metrological approval			M	5				
Belarus - metrological approval and GOST Ex i			M	6				
Communication protocol								
HART					**H**			
Configuration								
Standard configuration						**B**	**S**	
Customer-specific configuration with report, no spec. user characteristics			1)			B	F	
Calibration certificates								
5-point factory calibration certificate								EM
Acceptance test certificate 3.1 to EN 10204 for 5-point calibration								EP
Certificates								
SIL2 declaration of conformity								CS
Certificate of compliance 2.1 to EN 10204 for order conformity								C4
Acceptance test certificate 3.1 to EN 10204 for visual and functional checks								C6
Customer-specific designs								
(Please provide)								Z9
Language of documentation								
German								M1
English								M5
Western Europe/Scandinavia language package (languages: DE, EN, DA, ES, FR, IT, NL, PT, FI, SV)								MW
Eastern Europe language package (languages: DE, EL, CS, ET, LV, LT, HU, PL, SK, SL, RO, BG)								ME

1) E.g., customer-specific measuring range, TAG no.

6.1 Documentation available for ordering

Description	Order number
TTR200 documentation on CD-ROM	3KXT241001R0800
TTR200 commissioning instructions, English	3KXT241001R4401
TTR200 commissioning instructions, German	3KXT241001R4403
TTR200 commissioning instructions, Western Europe / Scandinavia language package	3KXT241001R4493
TTR200 commissioning instructions, Eastern Europe language package	3KXT241001R4494

7 Ex relevant specifications

The TTR200 complies with the requirements of ATEX Directive 94/9/EC.

7.1 TTR200-E1, Intrinsic Safety ATEX

Explosion protection

Approved for use in Zone 0 and 1

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])

EC type-examination test certificate PTB 05 ATEX 2017 X

7.2 TTR200-H1, Intrinsic Safety IECEx

Designation

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

IECEx certificate of conformity IECEx PTB 09.0014X

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)

Type of protection intrinsic safety Ex ia IIC (Part 1)

	Supply circuit
Max. voltage	U_i = 30 V
Short circuit current	I_i = 130 mA
Max. power	P_i = 0.8 W
Internal inductance	L_i = 0.5 mH
Internal capacitance	C_i = 5 nF

Type of protection intrinsic safety Ex ia IIC (Part 2); thermocouples, voltages

	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

7.4 TTR200-E2, Non-Sparking ATEX

Explosion protection

Approved for use in Zone 2

Designation

II 3 G Ex nA II T6

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 TTR200-L6, intrinsically safe FM

Class I, Div. 1 + 2, Groups A, B, C, D
Class I, Zone 0, AEx ia IIC T6
Control drawing: TTR200-L6H (I.S.)

7.6 TTR200-L6, non-incendive FM

Class I, Div. 2, Groups A, B, C, D
Control drawing: TTR200-L6H (N.I.)

7.7 TTR200-R6, intrinsically safe CSA

Class I, Div. 1 + 2, Groups A, B, C, D
Class I, Zone 0, Ex ia Group IIC T6
Control drawing: TTR200-R6H (I.S.)

7.8 TTR200-R6, non-incendive CSA

Class I, Div. 2, Groups A, B, C, D
Control drawing: TTR200-R6H (N.I.)

8 Order form configuration

Data relating to customer-specific configuration

Configuration		**Selection**
IEC 60 751	Resistance thermometer	☐ Pt10 ☐ Pt50 ☐ **Pt100** (standard) ☐ Pt200 ☐ Pt500 ☐ Pt1000
JIS C1604-81		☐ 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 ☐ .....Ω
Reference point (for thermocouples only)		☐ Internal (for standard thermocouples except type B) ☐ None (type B) ☐ External/temperature: ..... °C
Measurement 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		☐ ..... (max. 8 characters)
TAG number		☐ ..... (max. 8 characters)
Software write protection		☐ **Off** (standard) ☐ On

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