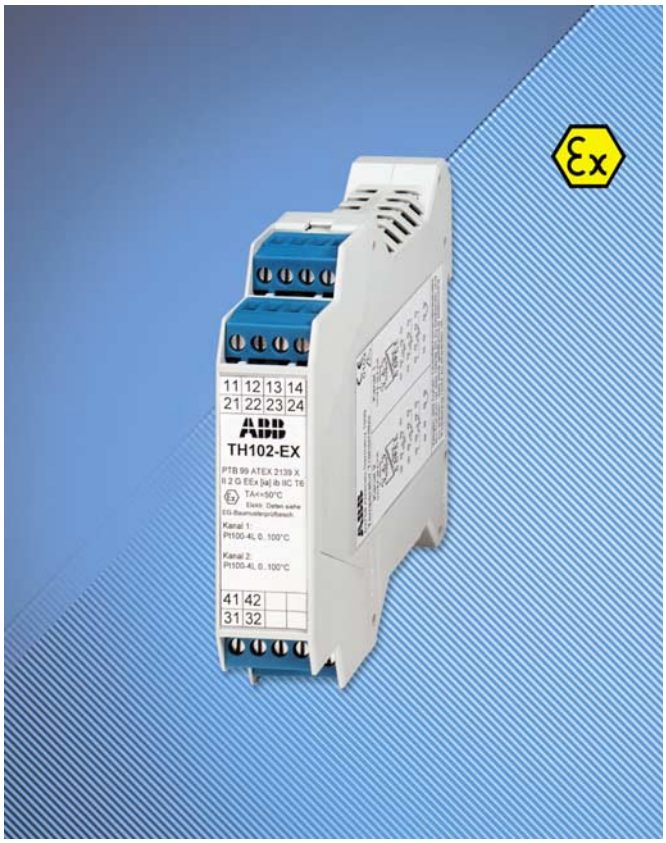
Data Sheet
10/11-8.54 EN

Rail mounted Temperature Transmitter TH102/TH102-Ex

HART programmable,
Pt 100 (RTD), thermocouples,
electrical isolation

- **Input**
  - Resistance thermometer (2, 3, 4 wire circuit)
  - Thermocouples
  - Resistance remote signalling unit (0...5000 Ω)
  - Voltages, mV (–125...+1200 mV)
- **Output**
  - 2 wire technique
  - 4...20 mA, HART signal
- **1 or 2 independent channels**
- **Electrical isolation (I/O)**
- **Measured error 0.1 K**
- **Customer-specific linearization**
  - 32 tie points
- **Continuous sensor and self-monitoring**
  - Parameter saved permanently in EEPROM
  - Monitoring of data integrety every 10 s
  - Wire break monitoring in acc. with NAMUR NE 89
- **Substitution strategy in case of error (NE 43)**
- **Approvals for explosion protection**
  - Intrinsically safe
    Ⓔx II 2 (1) G EEx [ia] ib IIC T6, mount in zone 1
    Ⓔx II 3 G EEx n A II T6, mount in zone 2
- **Input functionality (absolute, differential, average value)**
- **EMC acc. to EN 50082-2 and NE 21**
- **Parameterization**
  - Device Management Tool: SV4xx (SMART VISION)
  - Hand held terminals:
    DHH691 (691 HT), STT04, HC275, FC375
  - CoMeter (HART configurator/LC display)



HART® FIELD COMMUNICATIONS PROTOCOL

Excellent long term stability
Temperature linear output signal
Enhanced self diagnostics

Technical data

Output

Output signal (temperature linear)
4...20 mA

Residual ripple (peak-to-peak)
< 0.3 %

Current consumption
< 3.6 mA

Maximum output current
23.6 mA

Parameterizable current error signal

Underranging/underranging value	3.6...4 mA
Overranging/overranging value	20...23.6 mA
Default value (acc. to NE43)	3.6 or > 21 mA

Damping
t_{63} = 0...30 s

Input

Resistance

Resistance thermometer (IEC 751, JIS, SAMA)
n · Pt 100/Ni 100 to Pt 1000/Ni 1000; Cu
(n = 0.1, 0.2, 0.5, 1, 1.2, 2, 3...10)
Min. measuring span 15 K/50 K

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

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

Measuring current
300 µA

Sensor short-circuit
< 5 Ω (for RTD)

Sensor break (temperature/resistance measurement 2, 3, 4 wire)

Measuring range 0... 500 Ω	> 530 Ω
Measuring range 0...5000 Ω	> 5.3 kΩ

Sensor wire break monitoring in accordance with NAMUR NE 89

Sensor wire break detection	
3 wire resistance measurement	> 35 Ω
4 wire resistance measurement	> 3.7 kΩ

Input filter
50/60 Hz

Thermocouples

Types
B, E, J, K, L, N, R, S, T, U

Voltages
-125 mV...+ 125 mV
-125 mV...+1200 mV

Minimum measuring span
2 mV/50 mV

Sensor wire break monitoring in accordance with NAMUR NE 89
Pulsed with 1 µA outside of the measuring interval
Monitoring disconnectible

Thermocouple measurement	> 5 kΩ
Voltage measurement	> 5 kΩ

Input filter
50/60 Hz

Internal reference junction
Pt 100, via software switchable (no jumper necessary)

Input element		Measuring range	Min. measuring span
Standard	**Sensor**		
IEC 584-1	Thermocouple type B	250...+1820 °C (+482...+3308 °F)	235 °C (423 °F)
	Thermocouple type E	–250...+1000 °C (–418...+1832 °F)	30 °C (54 °F)
	Thermocouple type J	–210...+1200 °C (–346...+2192 °F)	37 °C (67 °F)
	Thermocouple type K	–250...+1372 °C (–418...+2502 °F)	54 °C (98 °F)
	Thermocouple type R	– 50...+1768 °C (– 58...+3215 °F)	171 °C (308 °F)
	Thermocouple type S	– 50...+1768 °C (– 58...+3215 °F)	193 °C (348 °F)
	Thermocouple type T	–200...+ 400 °C (–328...+ 752 °F)	50 °C (90 °F)
	Thermocouple type N	–200...+1350 °C (–328...+2462 °F)	60 °C (108 °F)
DIN 43710	Thermocouple type L	–200...+ 900 °C (– 76...+ 482 °F)	36 °C (65 °F)
	Thermocouple type U	–200...+ 600 °C (–328...+1112 °F)	40 °C (72 °F)
IEC 751; JIS; SAMA[1)] 2, 3 and 4 wire	Resistance thermometer Pt 100	–200...+ 850 °C (–328...+1562 °F)	15 °C (28 °F)
	Resistance thermometer Pt 1000	–200...+ 850 °C (–328...+1562 °F)	50 °C (90 °F)
DIN 43760 2, 3 and 4 wire	Resistance thermometer Ni 100	– 60...+ 250 °C (– 76...+ 482 °F)	8 °C (15 °F)
	Resistance thermometer Ni 500	– 60...+ 250 °C (– 76...+ 482 °F)	15 °C (28 °F)
Resistance	Ω	0...500 Ω/0...5000 Ω	5 Ω/50 Ω
Voltage	mV	–125 mV...+ 125 mV	2 mV
		–125 mV...+1200 mV	50 mV

[1)] IEC 751 a = 0.00385, JIS a = 0.003916, SAMA a = 0.003902

Power supply (poling protected)

Supply voltage

Non-Ex-application	U_s = 8.5...30 V DC
For Ex-Application, max.	U_i = 8.5...29.4 V DC

2 wire methode: power supply wires = signal wires

Influence of supply voltage

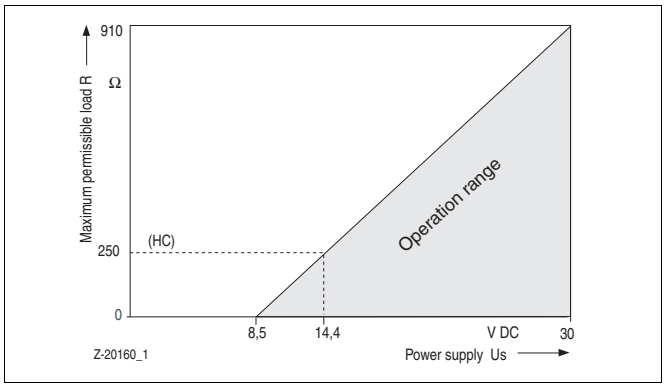
< 0.05 %/10 V

maximum residual ripple

≤ 1 % U_S (< 500 Hz)

Maximum load

$$R(\text{k}\Omega) = \frac{(U_{\text{smax}} - U_{\text{smin}})}{23.6}$$



General characteristics

Output signal refreshment rate

Pt 100	0.4 s (Input signal change < 0.25 K/s)
Thermocouples	0.2 s (Input signal change < 2.5 K/s)

Vibration resistance

Vibration in operation	2g acc. to DIN IEC 68T.2-6
Resistance to shock	acc. to DIN IEC 68T.2-27

Electrical isolation (I/O)

1.5 kV AC (60 s)

Long-term drift

≤ 0.02 % per annum (ambient temperature < 60 °C)
≤ 0.05 % per annum (ambient temperature < 85 °C)

Environment conditions

Ambient temperature range

-40...85 °C

Transport and storage temperature

-40...100 °C

Relative humidity

< 100 %

Condensation

Permitted

Mechanical construction

Dimensions

Confer dimensional drawing

Weight

250 g

Housing material

Polyamid
Light grey (RAL 9002)

Type of protection

IP 20 (DIN 40050)

Class of protection

2 (IEC 348)

Class of combustibility

V2 to V0 acc. to UL 94

Electrical connection

Terminals, pluggable

2.5 mm^2, screw terminals

Characteristics at rated conditions

According to IEC 770 (related to 25 °C)[1)]

Digital measured error

Pt 100	± 0.1 K
Thermocouples	± 20 µV
Linear resistance 500 Ω/5000 Ω	± 40 mΩ/200 mΩ
Linear voltage 120 mV/1200 mV	± 20 µV/50 µV

D/A measured error

± 0.05 % of measuring span

Additional influence of the internal reference junction

Pt 100 DIN IEC 751 Kl. B

Influences

Influence of ambient temperature acc. to IEC 68-2-2

Pt 100/resistance measurement[2)]

$$< (0.05\ \% + \frac{\text{ME}\ (\Omega)}{\text{MS}\ (\Omega)} \times 0.008\ \%) / 10\ \text{K}$$

Thermocouple/mV[3)]

$$< (0.05\ \% + \frac{\text{ME}\ (\text{mV})}{\text{MS}\ (\text{mV})} \times 0.01\ \% + \frac{0.14\ \text{K}}{\text{MS}\ (\text{K})} \times 100\ \%) / 10\ \text{K}$$

Percentage related to measuring span MS = ME – MA
MA = lower range value, ME = upper range value

[1)] Percentage related to set measuring span
Specified values corresponds to 3 σ (Gaussian normal distribution)
[2)] Pt 100 (0...400 °C): Influence of ambient temperature
< (0.05 % + 0.013 %)/10 K = 0.063 %/10 K
[3)] Type K (0...1000 °C): Influence of ambient temperature
< (0.05 % + 0.01 % + 0.014 %)/10 K = 0.074 %/10 K

Explosion protection

Intrinsically safe

Zone 1

Marking	Ⓔx II 2 (1) G EEx [ia] ib IIC T6
EC-Type-Examination certificate	PTB 99 ATEX 2139 X
Temperature class T6/T5/T4	50 °C/65 °C/85 °C
GOST, INMETRO (Brazil)	

Supply circuit	Output [ib]	Input [ia]
Max. voltage	U_i = 29.4 V	U_o = 5.6 V
Short-circuit current	I_i = 130 mA	I_o = 1.5 mA[4]
Max. power	P_i = 0.8 W	P_o = 20 mW
Internal inductance	L_i = 220 µH	L_o = 1 mH
Internal capacitance	C_i = 15 nF	C_o = 1.55 µF

Zone 2

Marking	Ⓔx II 3 G EEx n A II T6
Conformity statement	PTB 99 ATEX 2216 X
Temperature class T6/T5/T4	50 °C/65 °C/85 °C

[4] See 1. supplement PTB 99 ATEX 2139 X

Electromagnetic compatibility (EMC)

Pt 100: measuring range 0...100 °C, span 100 K

Type of test	Degree	Influence	IEC
Burst to signal/ data lines	3 kV	< 0.1 %	1000-4-4
Static discharge			1000-4-2
Contact plate (indirect)	8 kV	no influence	
Terminals for supply[5]	6 kV	no influence	
Terminals for sensors[5]	4 kV	no influence	
Radiated field 80 MHz...1 GHz	10 V/m	< 1.0 %	1000-4-3
Coupling 150 kHz - 80 MHz	10 V	< 1.0 %	1000-4-6
Surge:			1000-4-5
asymmetrisch	1 kV	< 1 %	
symmetrisch	0.5 kV	< 1 %	

According to NAMUR NE 21 recommendation.

In case of an input signal change > 0.25 K/s for Pt100 or > 2.5 K/s for thermocouples a measured value plausibility check is performed.

[5] Air discharge (at 1 mm distance)

Communication/parameterization

Hand held terminal HHT
DHH691 (691 HT), STT04, HC275, FC375

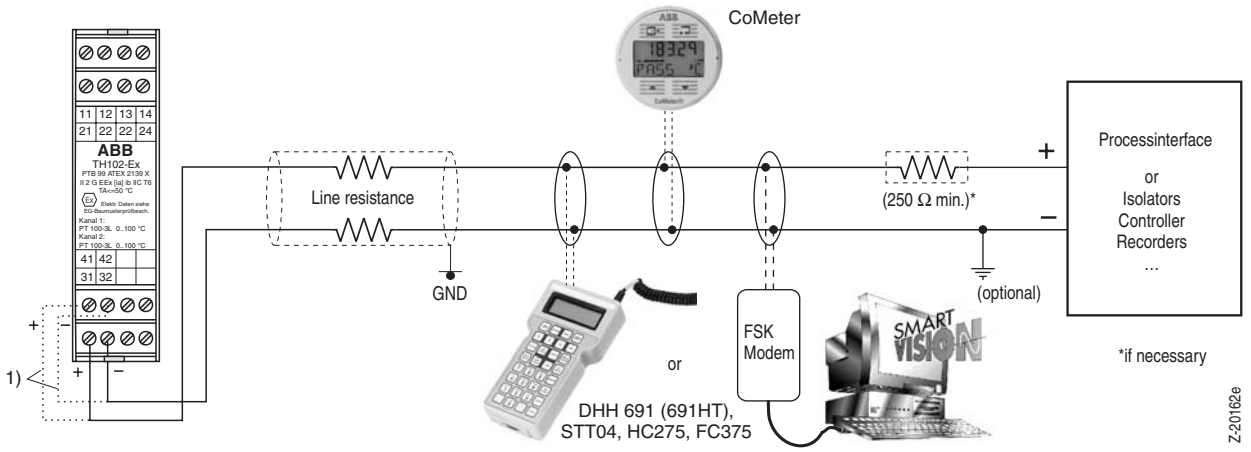
CoMeter
Hart conigurator and LC display

Device Management Tool
DSV4xx (SMART VISION)

FDT/DTM technology

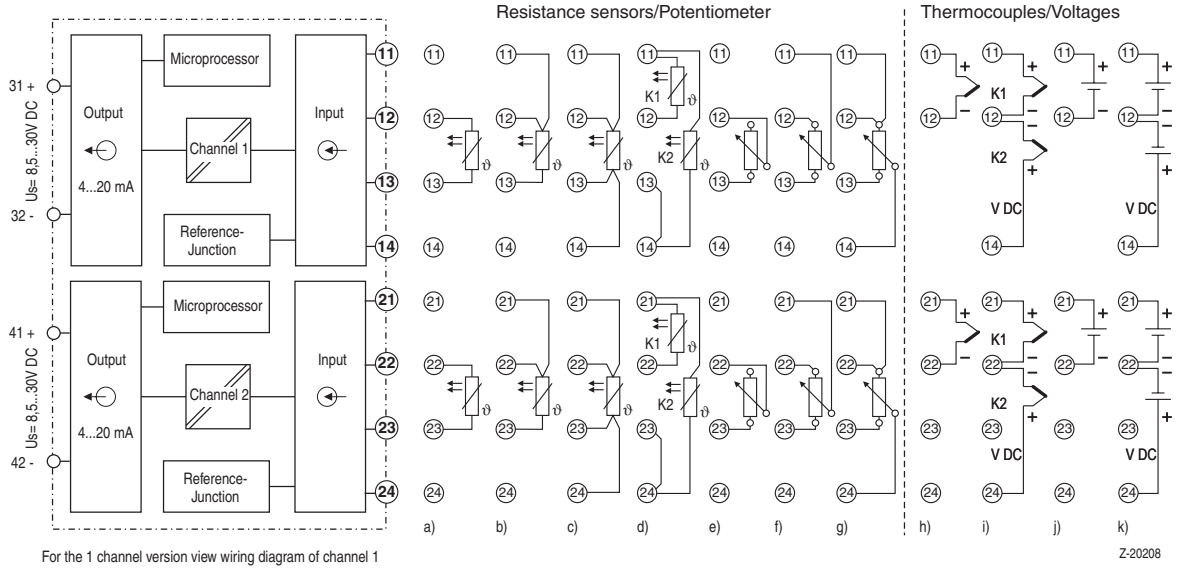
Software connection
AMS (from version 5 without additional drivers)

Parameter
Sensor type, error signalling, measuring range, general characteristics (i. e. TAG number), damping, signal simulation of output



1) 2-channel version: programming channel 2 (terminals 41 and 42)

Connection diagram



For the 1 channel version view wiring diagram of channel 1

a) Resistance thermometer, 2 wire circuit
b) Resistance thermometer, 3 wire circuit
c) Resistance thermometer, 4 wire circuit
d) Double resistance thermometer, 2 wire circuit (average value or differential temperature measurement)

Potentiometer: 0...500 Ω or 0...5000 Ω

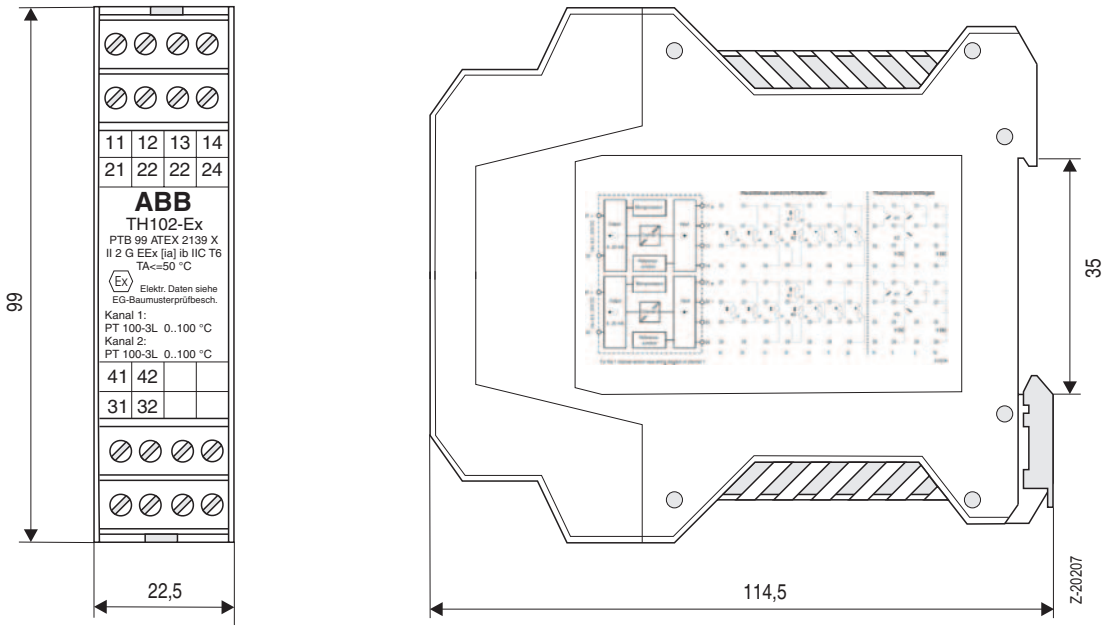
e) Potentiometer input, 2 wire circuit
f) Potentiometer input, 3 wire circuit
g) Potentiometer input, 4 wire circuit

f) Thermocouple
g) Double thermocouple (average value or differential temperature measurement)

Voltages: -125 mV...+125 mV or -125 mV...+1200 mV

h) Voltage measurement
i) 2-fold voltage measurement (average value or differential temperature measurement)

Dimensional diagram (Dimensions in mm)



Ordering information

			Catalog No.					
TH102/TH102-Ex			**V11517-**					
Without Explosion protection:								
TH102	1-channel		1					
TH102	2-channel		3					
With Explosion protection		**Zone 1**						
TH102-Ex	1-channel	ATEX: II 2 (1) G EEx [ia]ib IIC T6	5					
TH102-Ex	2-channel	ATEX: II 2 (1) G EEx [ia]ib IIC T6	2					
		Zone 2 / type N						
TH102-Ex N	1-channel	ATEX: II 3 G EEx n A II T6	N					
TH102-Ex N	2-channel	ATEX: II 3 G EEx n A II T6	M					
Programming								
1-channel								
Factory standard parameter				0				
Pt 100, 0...100 °C, 4 wire circut, damping off, direct action characteristic overranging at sensor or device error (≤ 22 mA)								
Customer-specific parameter setting, one-channel version				1				
2-channel								
Factory standard parameter				2				
Pt 100, 0...100 °C, 4 wire circuit, damping off, direct action characteristic overranging at sensor or device error (≤ 22 mA)								
Customer-specific parameter setting, two-channel version				3				
Calibration certificates								
without					0			
1-channel	2 point				1			
1-channel	9 point				2			
2-channels	2 point				A			
2-channels	9 point				B			
Certificates								
without						0		
SIL2 - Declaration of conformity						2		

Accessories

	Catalog No.		
ABB FSK modem [EEx ib] IIC (parameter setting in the installation)	see Data Sheet 10/63-6.71 EN		
Device Management Tool DSV4xx (SMART VISION)	see Data Sheet 10/63-1.20 EN		

Note:
For a local programming on the desk the universal FSK programming set can be used as Hardware
(see Data Sheet 10/63-6.71 EN: ordering information)

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