TS 102 / TS 102-Ex

Rail mounted temperature transmitters, programmable, Pt 100 (RTD), thermocouples, electrical isolation

10/11-8.50 EN

- **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, digital signal
- **Electrical isolation (I/O)**
- **1 oder 2 independent channels**
- **Digital low drift processing of measurement values**
- **Customer specific linearization**
- **Continuous sensor and self-monitoring**
  - Parameter saved permanently in EEPROM
  - Monitoring of data integrety every 10 s
- **Substitution strategy in case of error (NE43)**
- **Approvals for explosion protection**
  - intrinsically safe EEx [ia] ib IIC T6, mount in zone 1
    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, CE conformable**
- **Parameterization**
  - PC software application SMART VISION or
  - Parasoft
- **5 years warranty**

Technical data

Output

Output signal (temperature linear)	4...20 mA
Residual ripple (peak-to-peak)	< 0.2 %
Current consumption	< 3.5 mA
Max. output current	22 mA
Parameterizable current error signal	
Underranging	3.5 mA
Overranging	22 mA
Manual value	3.5...22 mA
Damping	t_{63} = 0...30 s

Input

Resistance (temperature linear)

Resistance thermometer	Pt 100, Pt 200...Pt 1000 Ni 100, Ni 500
min. span	20 K (15 K)
Resistance	0...500 Ω/0...5000 Ω
min. span	5 Ω/50 Ω
Measuring current	300 µA
Sensor short-circuit	< 5 Ω (for RTD)
Sensor break	> 1.5 MΩ
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
Min. span	2 mV/50 mV
Sensor monitoring current	70 nA
Input filter	50/60 Hz
Internal reference junction	Pt 100, via software switchable (no jumper necessary)

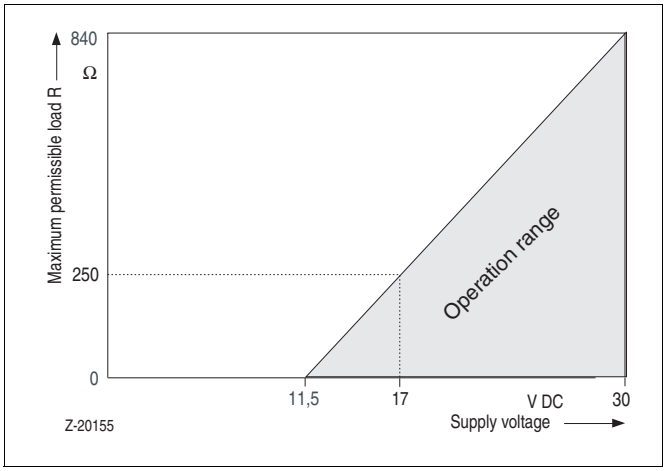
Power supply (at transmitter terminals/poling protected)

(2 wire methode: power supply wires = signal wires))

Supply voltage for explosion protection application	U_s = 11.5...30 V DC U_i = 11.5...29.4 V DC
Influence of supply voltage	< 0.05 %/10 V
Max. residual ripple	≤ 1 % U_S (< 500 Hz)

Maximum load

$$R(k\Omega) = \frac{(Usmax - Usmin)}{22}$$



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[1)] 2, 3 and 4 wire	Resistance thermometer Pt 100	–200...+ 850 °C (–328...+1562 °F)	20°C	(36 °F)
	Resistance thermometer Pt 1000	–200...+ 850 °C (–328...+1562 °F)	15 °C	(27 °F)
DIN 43760[2)] 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	(27 °F)
Resistance	Ω	0...500 Ω / 0...5000 Ω	5 Ω / 50 Ω	
Voltage	mV	–125 mV...+125 mV –125 mV...+1200 mV	2 mV 50 mV	

[1)] IEC 751 a = 0.00385; [2)]Edison Curve No. 7

Technical data

General characteristics

Output signal refreshment rate	
Pt100	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	2 g acc. to DIN IEC 68 part 2-6
Electrical isolation (I/O)	1.5 kV AC (60 s)
Long-term stability	≤ 0.1 % p.a.

Environment conditions

Ambient temperature range	(–40)-20...85 °C
Transport and storage temperature	–40...100 °C
Relative humidity	< 100 %
(100 % humidity with isolated terminals only)	
Condensation	permitted

Mechanical construction

Dimensions	cf. dimensional drawing
Weight	250 g
Housing material	Polyamid
Class of combustibility	V0 acc. to UL 94
Type of protection	IP 20 DIN 40050)
Class of protection	2 (IEC 348)
Overvoltages catagory	II
Color (Epoxy)	light grey (RAL 9002)
Electrical connection	
Terminals, pluggable	2.5 mm^2, screw terminals

Characteristics at rated conditions[1)]

(acc. to IEC 770, related to 25 °C)

Measuring error incl. characteristic deviation	
Pt 100/resistance measurement	< 0.2 % or < 0.2 K/< 80 mΩ Wichever value is greater
Thermocouple/mV	< 0.2 % or < 10 µV Wichever value is greater
Additional influence of the internal reference junction	Pt 100 DIN IEC 751 Cl. B

Influences

Influence effect of temperature

Pt 100/resistance measurement[2)]

$$< (0.08\ \% + \frac{\text{ME}\ (\Omega)}{\text{MS}\ (\Omega)} \times 0.008\ \%) / 10\text{K}$$

Thermocouple/mV[3)]

$$< (0.08\ \% + \frac{\text{ME (mV)}}{\text{MS (mV)}} \times 0.01\ \% + \frac{0.014\ \text{K}}{\text{MS (K)}} \times 100\ \%) / 10\ \text{K}$$

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

1) Percentage related to set measuring span
2) Pt 100 (0...400 °C): Effect of temperature influence < (0.08 % + 0.013 %)/10 K = 0.093 %/10 K
3) Type K (0...1000 °C): Effect of temperature influence < (0.08 % + 0.01 % + 0.014 %)/10 K = 0.104 %/10 K

Explosion protection

Intrinsically safe

Zone 1	⟨Ex⟩ EEx [ia] ib IIC T6
EC certificate	PTB No. Ex-97.D.2221
Temperature class T6/T5/T4	< 50 °C/65 °C/85 °C

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 = 145 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	⟨Ex⟩ II 3 G EEx n A II T6
Conformity declaration	PTB 99 ATEX 2123 X
Temperature class T6/T5/T4	< 50 °C/65 °C/85 °C

Electromagnetic compatibility (EMC)

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

Type of test	Degree	Influence	IEC
burst to signal/ data lines	2 kV	< 0.5 %	1000-4-4
static discharge contact discharge to:			1000-4-2
contact plate	8 kV	< 1.0 %	
terminals for supply	6 kV	< 1.0 %	
terminals for sensors	3.75kV	< 1.0 %	
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

Acc. 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.

4) Load current for connected transmitter [ia] < 1.5 mA

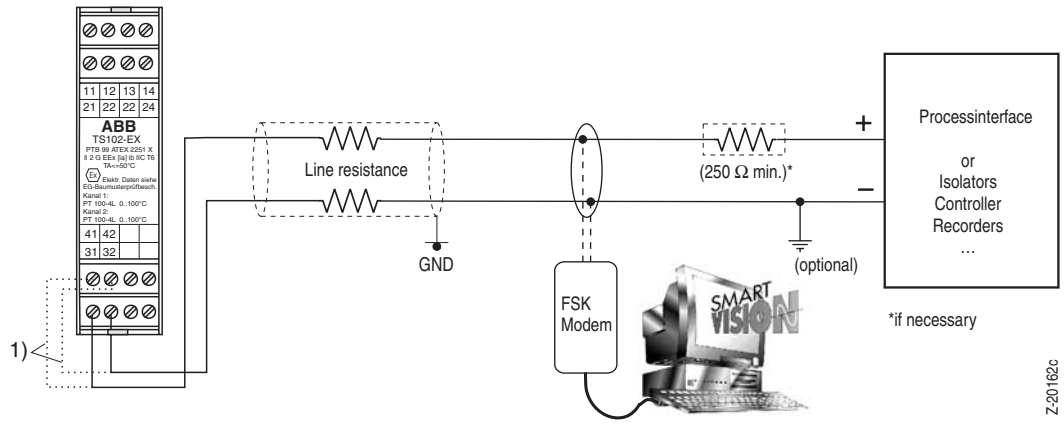
Communication/parameterization

Parameter

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

Software-Tools

SMART VISION or Parasoft



Software SMART VISION or Parasoft

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

Ordering information

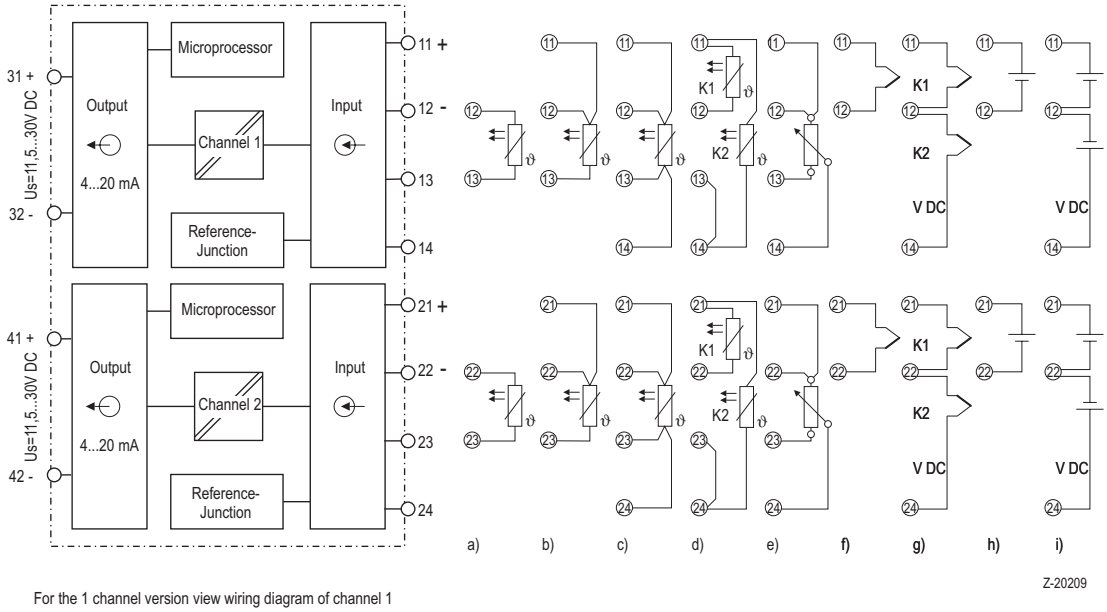
		Catalog No				
TS 102 / TS 102-Ex		**V11516-**				
Without Explosion protection:						
TS 102	1-channel		1			
TS 102	2-channel		3			
With Explosion protection						
Zone 1	CENELEC: PTB EEx [ia]ib IIC T6					
TS 102-Ex	1-channel		5			
TS 102-Ex	2-channel		A			
Zone 2 / type N	CENELEC: ATEX II 3 G EEx n A II T6					
TS 102-Ex N	1-channel		N			
TS 102-Ex N	2-channel		M			
Programming						
1-channel						
Factory standard parameter				0		
Pt 100, 0...100 °C, 4-wire circuit, damping off, direct action characteristic						
overranging at sensor or device error (≤ 23,5 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 (≤ 23,5 mA)						
Customer-specific parameter setting, two-channel version				3		
Calibration certificates						
without					0	
1-channel	2-point				1	
1-channel	9-point				2	
2-channel	2-point				A	
2-channel	9-point				B	

Accessories

	Catalog No		
ABB FSK modem [EEx ib] IIC (parameter setting in the installation)	see Data Sheet 10/63-6.71 EN		
TS 02/TS 102/TS 202 Programming software "Parasoft", 2 pcs. 3.5" disks	7957781		
SMART VISION Software	see Data Sheet 10/63-1.20 EN		

Notice: **To local programming of the TS 102 can used the universal FSK programming set.**
(See Data Sheet 10/63-6.71 EN)

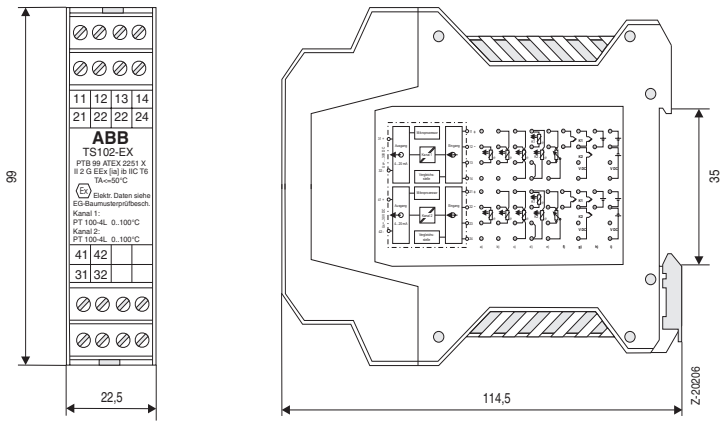
Connection diagrams



For the 1 channel version view wiring diagram of channel 1

a) Resistance thermomer, 2 wire circuit
b) Resistance thermomer, 3 wire circuit
c) Resistance thermomer, 4 wire circuit
d) Double resistance thermometer, 2 wire circuit (optionally)
e) Potentiometer input (4 wire circuit)
f) Thermocouple
g) Double thermocouple
h) Voltage measurement (optionally)
i) Double voltage measurement (optionally)

Dimensional diagram (dimensions in mm)



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