Data Sheet 10/11-8.48-EN Rev. A

TR 104, TR 104-Ex
Rail mounted Temperature Transmitters

Analog, Pt 100 (RTD), fixed measuring ranges

Input
— Resistance thermometer (two-wire and three-wire circuit)
— Optionally four-wire circuit

Output
— Two-wire technology
— 4 ... 20 mA

1 or 2 independent channels

Digital, low drift processing of measuring values

Error signalization at sensor wire break and sensor short-circuit

Approvals for explosion protection
— Intrinsic safety II 2 G EEx ia IIC T6, zone 1
II 3 G EEx n A II T6, zone 2

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Technical data

Output

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

Output current, max.	28 mA
Underranging	2.5...< 3mA
Overranging	22 < ...26 mA

Input

Resistance

Resistance thermometer	Pt 100 (IEC 751) –200 °C...850 °C
Measuring ranges min. span	cf. ordering information 40 K
Sensor lead resistance (max.)	100 Ω (3-wire, 4-wire)
Sensor lead influence > 100 Ω	< 0.1 %/10 Ω (3-wire, 4-wire)
Sensor lead influence	additionally to Pt 100 (2-wire)
Pt 100-measuring current	0.8 mA

Sensor break monitoring
Overranging, $I_a \geq 22$ mA (standard)

$$R_{\text{Break}} > ME(\Omega) + MS(\Omega)/8$$

Underranging, $I_a \leq 3$ mA (optionally)

$$R_{\text{Break}} < 2\ \text{k}\Omega$$

Sensor short-circuit monitoring, underranging $I_a \leq 3$ mA

$$R_{short-circuit} \leq MA(\Omega) - MS(\Omega)/16$$

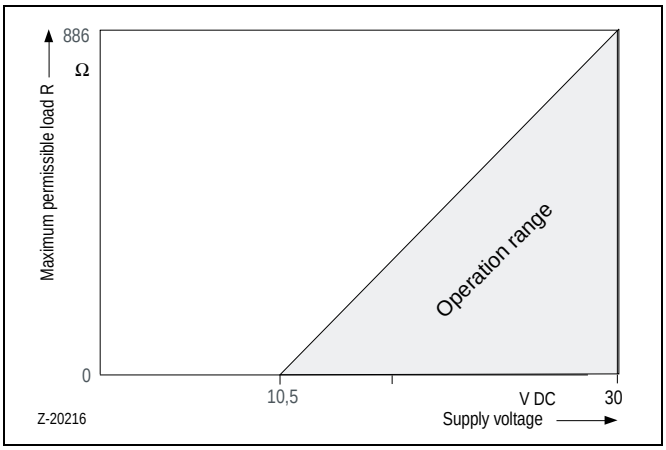
MA = Lower range value
ME = Upper range value
MS = Measuring span
Percentage related to span MS

Power supply (2-wires methode)

Supply voltage (protected against wrong polarity)	U_s = 10.5...30 V DC
for explosion protection application, max.	U_i = ...29.4 V DC
Influence of supply voltage	< 0.05 %/10 V
max. residual ripple	< 1 % (peak-to-peak)

Maximum Load

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



General characteristics

Response time	2, 3-wire	< 1.5 s
	4-wire	< 10 ms
Vibration resistance Vibration in operation		2g acc. to DIN IEC 68 part. 2-6
Long-term stability		< 0.1 %/year

Environment conditions

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

Mechanic design

Dimensions	cf. dimensional diagram
Weight	200 g
Housing (material)	Polyamid
Degree of protection	IP 20 (DIN 40050)
Class of protection	2 (IEC 348)
Degree of fire protection	V0 acc. to UL 94
Overvoltages category	II
Color (Epoxy)	light grey (RAL 9002)

Electrical connections

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 .....

Balancing error	
Spans > 100 °C	< 0.1 %
Spans <100 °C	< 0.15 K
Linearity error	< 0.10 %

Influences

Ambient temperature influences	< 0.1 % / 10 K or < 0.1 K / 10 K (whichever value is greater)

Example:
MA = –50 °C, ME = 150 °, MS = 200 °C
Balancing error 0.2 K (0.1 %)

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

Ordering information

			Catalog No		1st chan.			2nd chan.						
TR 104 / TR 104-Ex			**V11515-**											
Without explosion protection	**TR 104**	1 channel		1										
		2 channels		3										
With explosion protection	**TR 104-Ex**													
Zone 1														
ATEX: II 2 G EEx ia IIC T6		1 channel		5										
ATEX: II 2 G EEx ia IIC T6		2 channels		A										
With explosion protection	**TR 104-Ex N**													
Zone 2 / Type N														
ATEX: II 3 G EEx n A II T6		1 channel		N										
ATEX: II 3 G EEx n A II T6		2 channels		M										
Measuring Ranges[1]														
Standard	-30... 60 °C				0			0						
	-20... 40 °C				1			1						
	0... 40 °C				2			2						
	0... 60 °C				3			3						
	0...100 °C				4			4						
	0...120 °C				5			5						
	0...150 °C				6			6						
	0...200 °C				7			7						
	0...250 °C				8			8						
	0...300 °C				9			9						
	0...400 °C				A			A						
	0...600 °C				B			B						
	Standard meas. range °F				F			F						
Special measuring ranges °C : ..... to ..... (span > 40 °K)		1st channel			C									
		2nd channel						C						
Special measuring ranges °F: ..... to ..... (span > 72 °F)		1st channel			Y									
		2nd channel						Y						
Sensor circuit														
2-wire						2			2					
3-wire						3			3					
optional:	4-wire circuit	1st channel				4								
	4-wire circuit	2nd channel							4					
Sensor break identification														
overranging ≥ 22 mA [1] (ex stock version)							A			A				
underranging ≤ 3 mA 1)		1st channel					Z							
underranging ≤ 3 mA [1]		2nd channel								Z				
Calibration certificate														
without		1-channel						0	0	0	0			
without		2-channel									0			
Two-point		1-channel						0	0	0	1			
Two-point		2-channel									A			
9-point		1-channel						0	0	0	2			
9-point		2-channel									B			

[1] later can not be modified

TR 104 / TR 104-Ex
Rail mounted temperature transmitters, analog

10/11-8.48 EN

Technical data

Explosion protection

Intrinsically safety

Zone 1 ⟨Ex⟩ II 2G EEx ia IIC T6

EC certificate PTB 99 ATEX 2053 X

Temperature class T6/T5/T4 < 50 °C/65 °C/85 °C

Supply circuit	Output ia	Input ia
Max. voltage	U_i = 29.4 V	U_o = 6.8 V
Short-circuit current	I_i = 130 mA	I_o = 130 mA[3)]
Max. power	P_i = 0.8 W	P_o = 383 mW
Internal inductance	neglectable	L_o = 0.5 mH
Internal capacitance	neglectable	C_o = 235 nF

3) Load current for connected intrinsically safe primary element < 1.5 mA

Zone 2 ⟨Ex⟩ II 3 G EEx n A II T6

Conformity declaration PTB 99 ATEX 2215 X

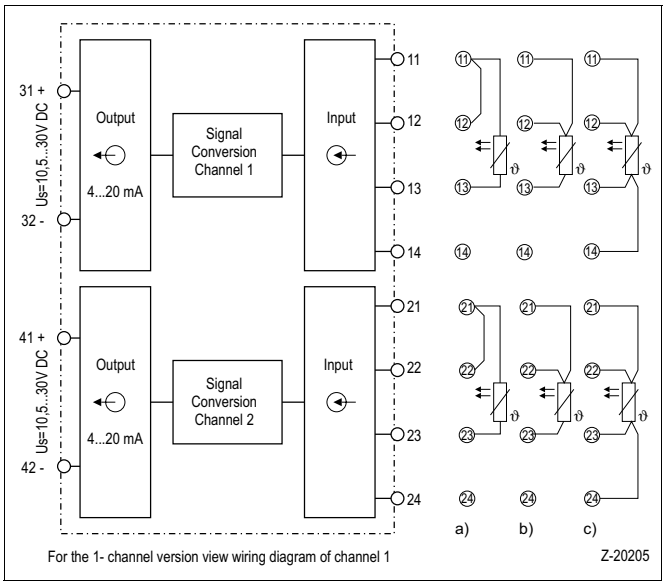
Temperature class T6/T5/T4 < 50 °C/65 °C/85 °C

Electromagnetic compatibility (EMC)

Pt 100: measuring range 0...100 °C, span 100 K, 3-wire
acc. to NAMUR NE 21 recommendation

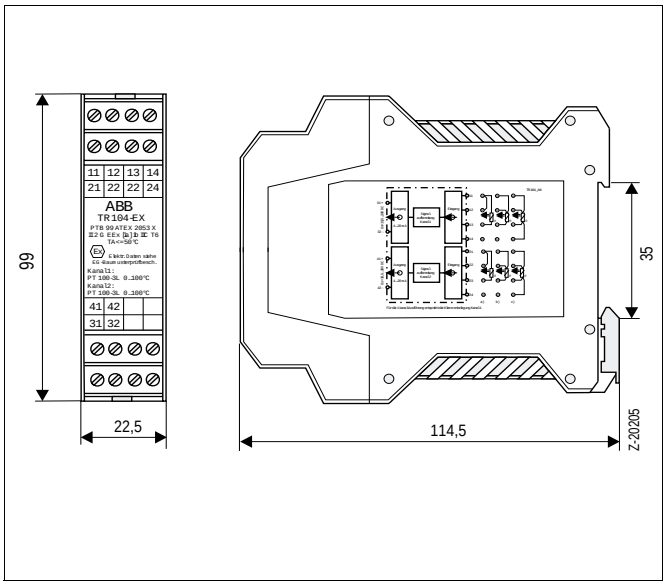
Type of test	Degree	Influence	IEC
burst to signal/ data lines	2 kV	< 0.5 %	1000-4-4
static discharge contact discharge to:			1000-4-2
contact plate	8 kV	< 1.0 %	
terminals for supply	6 kV	< 1.0 %	
terminals for sensors	6 kV	< 1.0 %	
radiated field 80 MHz...1 GHz	10 V/m	< 1.0 %	1000-4-3
coupling 150 kHz - 80 MHz	10 V	< 1.0 %	1000-4-6

Connection diagrams



a) Resistance thermometer, 2-wire circuit
b) Resistance thermometer, 3-wire circuit
c) Resistance thermometer, 4-wire circuit (optionally)

Dimensional drawings (dimensions in mm)



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