

TR 104 / TR 104-Ex

Rail mounted
temperature transmitters,
analog, Pt 100 (RTD),
fixed measuring ranges

10/11-8.48 EN



■ Input

- Resistance thermometer (2- and 3-wire circuit)
- optionally 4-wire circuit

■ Output

- 2-wire technique
- 4...20 mA

■ 1 or 2 independent channels

■ Digital, low drift processing of measuring values

■ Error signalization at sensor break and sensor short-circuit

■ Approvals for explosion protection

- intrinsically safe Ex II 2 G EEx ia IIC T6, mount in zone 1
- Ex II 3 G EEx n A II T6, mount in zone 2

■ EMC acc. to EN 50082-2

■ 5 years warranty

ABB

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 cf. ordering information
 min. span 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)

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

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

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

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

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

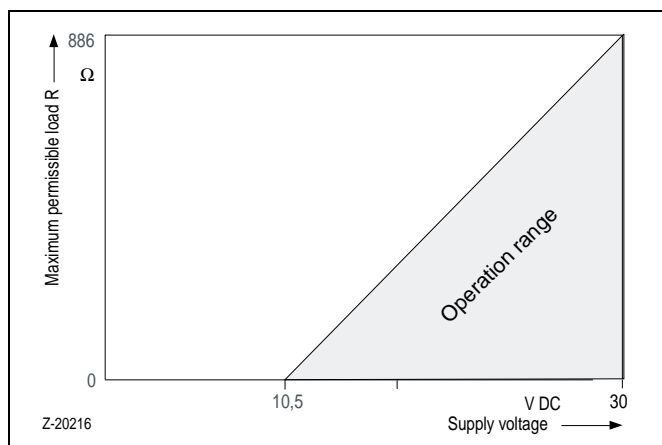
MA = Lower range value
 ME = Upper range value
 MS = Measuring span
 Percentage related to span MS

Power supply (2-wires method)

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

$$R(k\Omega) = \frac{(U_{smax} - U_{smin})}{22}$$



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 %
 (100 % humidity with isolated terminals only)
 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 mm², screw terminals

Characteristics at rated conditions¹⁾

(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								
TR 104 / TR 104-Ex			V11515-		1st chan.		2nd chan.				
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							
		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 Ranges¹											
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

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	$U_i = 29.4 \text{ V}$	$U_o = 6.8 \text{ V}$
Short-circuit current	$I_i = 130 \text{ mA}$	$I_o = 130 \text{ mA}^3)$
Max. power	$P_i = 0.8 \text{ W}$	$P_o = 383 \text{ mW}$
Internal inductance	neglectable	$L_o = 0.5 \text{ mH}$
Internal capacitance	neglectable	$C_o = 235 \text{ nF}$

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

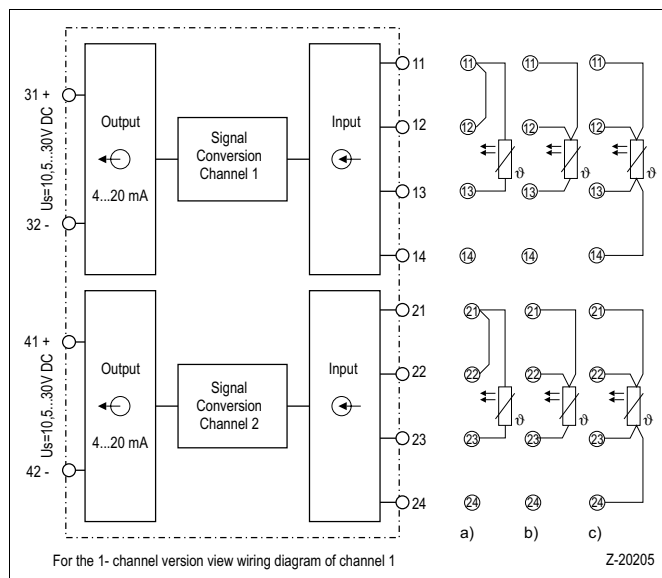
< 50 °C/65 °C/85 °C

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: contact plate	8 kV	< 1.0 %	1000-4-2
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)

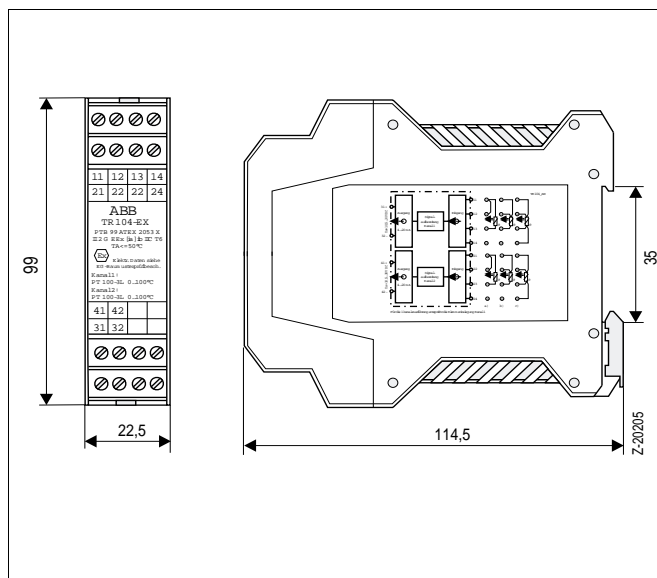


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