

TR 04-Eco / TR 04-Ex

Head mounted
Temperature transmitters,
analog, Pt 100 (RTD),
fixed measuring ranges

10/11-8.14 EN



■ Input

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



■ Output

- 2-wire method
- 4...20 mA

■ Digital, low drift processing of measuring values

■ Error signalization at sensor break and sensor short-circuit

■ Approvals for explosion protection

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

■ EMC acc. to EN 50082-2

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, $I_a \geq 22 \text{ mA}$ (standard)

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

Underranging, $I_a \leq 3 \text{ mA}$ (optionally) $R_{\text{Break}} < 2 \text{ k}\Omega$

Sensor short-circuit monitoring, underranging $I_a \leq 3 \text{ mA}$ $R_{\text{short-circ.}} \leq MA(\Omega) - MS(\Omega)/16$

Power supply (2-wire methode)

Supply voltage (protected against wrong polarity) $U_s = 10.5...30 \text{ V DC}$

for explosion protection application, max. $U_i = ...29.4 \text{ V DC}$

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 2 g acc. to DIN IEC 68 part. 2-6

Long-term stability < 0.1 %/year

Environment conditions

Ambient temperature range -40...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 55 g

Housing (material) Polycarbonat

Color (Epoxy) black/blue (Ex version)

Terminals 2.5 mm², screw terminals
(stainless steel screws)

¹⁾ Percentage related to span $MS = ME - MA$
 $MA =$ Lower range value, $ME =$ Upper range value

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: $MA = -50 \text{ °C}$, $ME = 150 \text{ °C}$, $MS = 200 \text{ °C}$
Balancing error 0.2 K (0.1 %)

Explosion protection

Intrinsically safety

Zone 1  II 2 G 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 i_a	Input i_a
Max. voltage	$U_i = 29.4 \text{ V}$	$U_o = 6.8 \text{ V}$
Short-circuit current	$I_i = 130 \text{ mA}$	$I_o = 130 \text{ mA}^{2)}$
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	$C_o = 235 \text{ nF}$

²⁾ Load current for connected intrinsically safe primary element < 1.5 mA

Zone 2  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

Canadian Standards Association and Factory Mutual

(in preparation)

Intrinsically Safe

FM/CSA Class I, Div.1/Div.2, Group A, B, C, D T6
Class II, Div.1/Div.2, Group E, F, G T6
Class III T6

FM Class I, Zone 0, AEx ia IIC T6
CSA Class I, Zone 0, Ex ia IIC T6

Non-incendive

FM/CSA Class I, Div.2, Group A, B, C, D, T6
Class II, Div.1/Div. 2, Group E, F, G, T6
Class III T6

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

Ordering information						
						Catalog No
TR 04-Eco / TR 04-Ex						V11531-
TR04-Eco (without explosion protection)						1
Type of protection: intrinsically safe						
TR04-Ex ATEX II 2 G EEx ia IIC T6 Zone 1						5
TR04-Ex FM IS Class I, Div 1, Groups A, B, C, D T6 alternatively Class I, Zone 0, Group IIC T6						7
in preparation CSA IS Class I Zone 0, Group IIC T6						
TR04-Ex N ATEX II 3 G EEx n A II T6 Zone 2						N
TR04-Ex N FM Class I, Div. 2, Group A,B,C,D, T6 nonincendive Class II, Div. 2, Group F,G, T6 Class III T6						M
Configuration						
Module (h=22,5mm)						3
Module (h = 22.5 mm) with sensor connecting line						1
Module (h = 22.5 mm) with snap-on fixing						4
Module (h=27,5mm) for mounting on measuring module						Z
Module built into with sensor connecting line:						
BUZH head						R
BUSH head						P
BUKH head						M
BUKH-Ex head cover						N
Raised B head						L
B head (complete head with raised cover)						K
BBKH head						S
AUZH head						V
AUSH head						U
AGL head ¹⁾						X
AGLHD head ¹⁾ with analog display						W
AGLHD head ¹⁾ with digital display						D
Module built into field housing: ²⁾						
Aluminium field housing 80 x 75 x 57 mm, IP 65; 2 x PG 11						A
Polyester field housing 75 x 80 x 55, IP 65; 2 x PG 11						9
Aluminium field housing 80 x 175 x 57 mm, IP 65; 1 x PG 11; 1 x PG 13.5; with separate terminal block						F
Polyester field housing 75 x 190 x 55, IP 65; 1 x PG 11; 1 x PG 13.5; with separate terminal block						E
Type of sensor / characteristic / sensor break identification						
Pt 100 (acc. to IEC 751 / ITS 90), direct action characteristic (4...20 mA) at sensor break overranging ≥ 22 mA						1

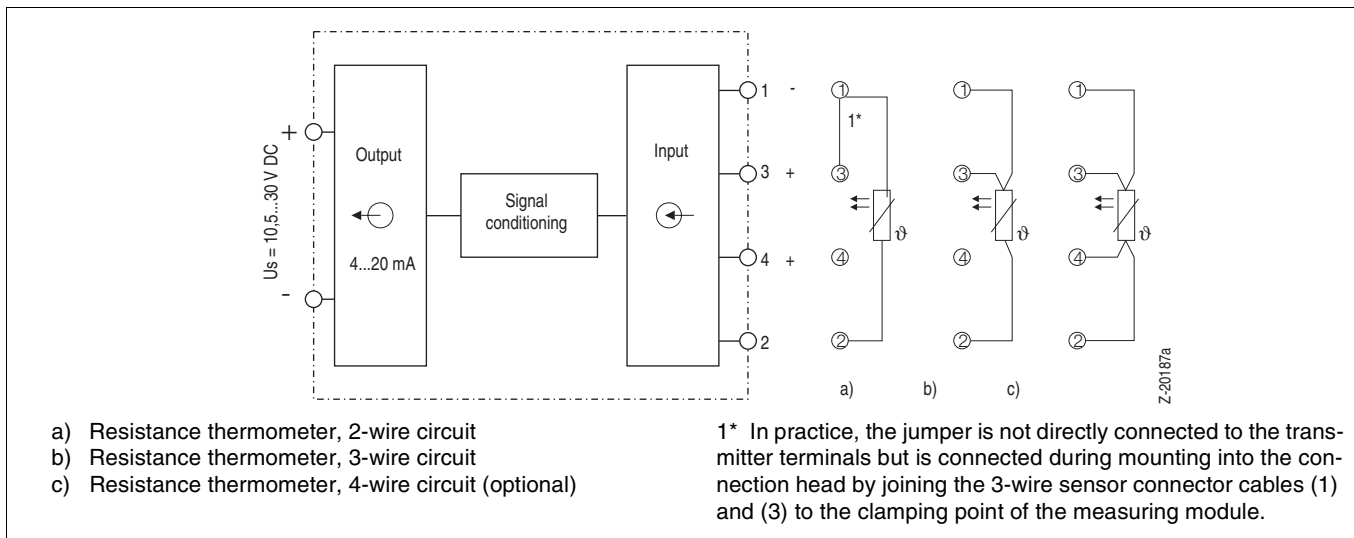
Continue see next page

¹⁾ Standard: Aluminium, metal-cable-screw-connection M20x1,5 EEx e or EEx d;
 protective pipe connection M24x1,5 (optional M20x1,5; 1/2" NPT; 3/4" NPT)

²⁾ Other field housings with several transmitters or specially for pipe mounting on request

Continue Ordering information										
						Catalog No				
TR 04-Eco / TR 04-Ex						V11531-				
Measuring ranges	-30... 60 °C					0				
Standard measuring ranges	-20... 40 °C					1				
	0... 40 °C					2				
	0... 60 °C					3				
	0...100 °C					4				
	0...120 °C					5				
	0...150 °C					6				
	0...200 °C					7				
	0...250 °C					8				
	0...300 °C					9				
	0...400 °C					A				
	0...600 °C					B				
		Standard meas. range °F					F			
	Special measuring ranges	°C: to°C (span ≥ 40 K)					X			
°F: to°F (span ≥ 72 °F)						Y				
Sensor circuit	2-wire					2				
	3-wire					3				
	optional: 4-wire					4				
Calibration certificate	without					0				
	two-point					1				
	nine-point					2				

Connection diagrams



Dimensional drawings (dimensions in mm)

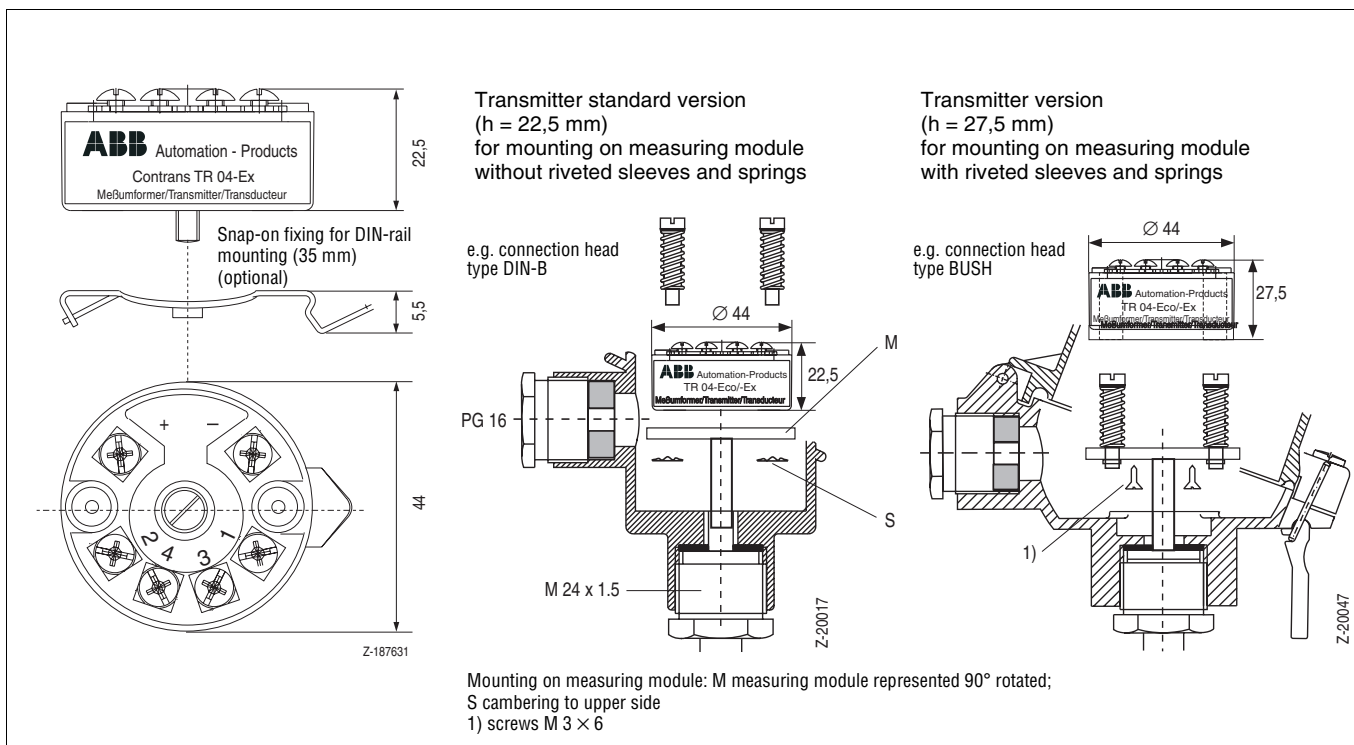




ABB Automation Products GmbH

Borsigstrasse 2
D-63755 Alzenau
Phone +49(0)60 23 92 - 0
Fax +49(0)60 23 92 - 33 00
<http://www.abb.com>

Subject to technical changes.
Printed in the Fed. Rep. of Germany
10/11-8.14-EN Rev. A 09.2008