

TR 04-Eco, TR 04-Ex Head 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

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

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)

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

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

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

Power supply (2-wire 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

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

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: $MA = -50$ °C, $ME = 150$ °, $MS = 200$ °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 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 ²⁾ |
| 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 |

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 | | | 1000-4-2 |
| contact discharge to: 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 |

| 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 |

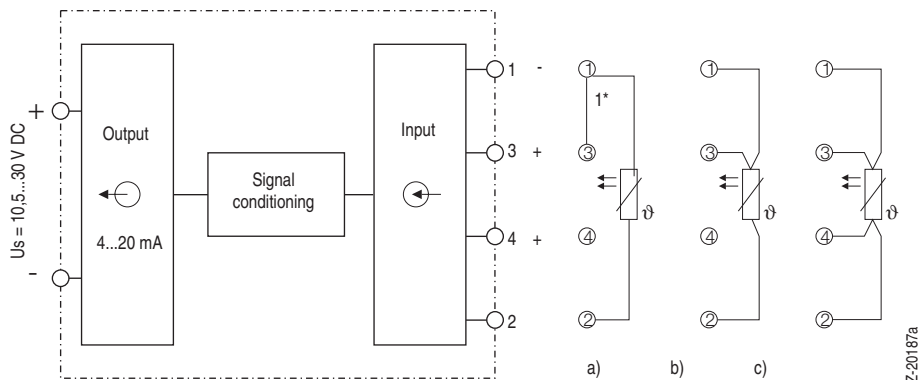
Continue see next page

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 | | | | |

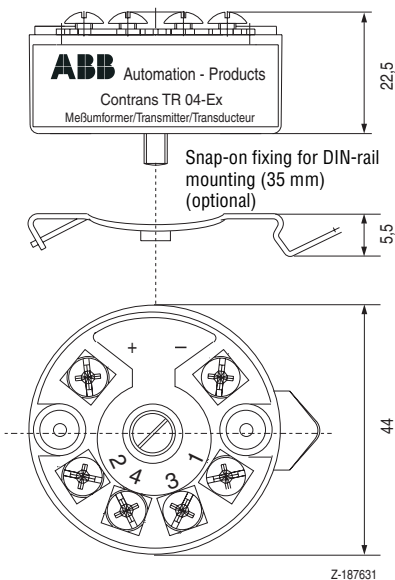
Connection diagrams



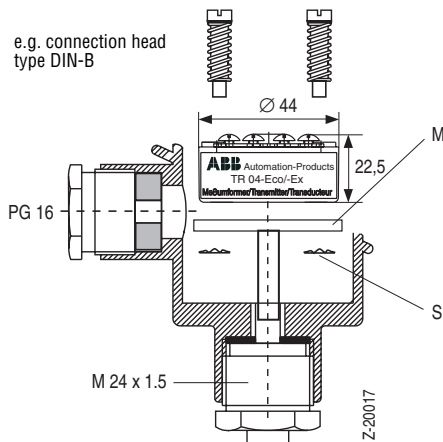
- a) Resistance thermometer, 2-wire circuit
- b) Resistance thermometer, 3-wire circuit
- c) Resistance thermometer, 4-wire circuit (optional)

1* In practice, the jumper is not directly connected to the transmitter terminals but is connected during mounting into the connection head by joining the 3-wire sensor connector cables (1) and (3) to the clamping point of the measuring module.

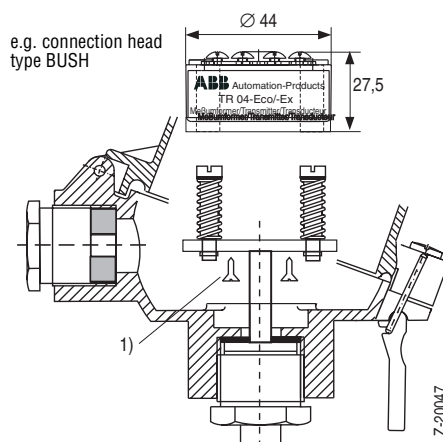
Dimensional drawings (dimensions in mm)



Transmitter standard version
(h = 22,5 mm)
for mounting on measuring module
without riveted sleeves and springs



Transmitter version
(h = 27,5 mm)
for mounting on measuring module
with riveted sleeves and springs



Mounting on measuring module: M measuring module represented 90° rotated;
S cambering to upper side
1) screws M 3 x 6

Contact us

ABB Ltd.

Process Automation

Salterbeck Trading Estate

Workington, Cumbria

CA14 5DS

UK

Phone: +44 (0)1946 830 611

Fax: +44 (0)1946 832 661

ABB Inc.

Process Automation

125 E. County Line Road

Warminster PA 18974

USA

Phone: +1 215 674 6000

Fax: +1 215 674 7183

ABB Automation Products GmbH

Process Automation

Schillerstr. 72

32425 Minden

Germany

Phone: +49 551 905-534

Fax: +49 551 905-555

www.abb.com

Note

We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB.

Copyright© 2011 ABB

All rights reserved

3KXT231101R1001