

Resistance thermometer Model TR30, compact design

WIKA data sheet TE 60.30



Applications

- Machine building, plant and vessel construction
- Propulsion technology, hydraulics
- General applications

Special features

- Measuring ranges from $-50 \dots +250 \text{ }^{\circ}\text{C}$, accuracy class per DIN EN 60751
- TR30-W: integrated transmitter, programmable and able to be calibrated via software
- Electrical connection via DIN angular connector or circular connector
- Process connection and sensor tube from stainless steel
- Explosion-protected versions Ex i

Description

Resistance thermometers of this series are used as universal thermometers for the measurement of liquid and gaseous media.

They can be used for pressures up to 40 bar (special designs to 400 bar dependent on insertion length and diameter). All electrical components are protected against splashed water and are designed to withstand vibration.

The TR30 resistance thermometer consists of a sensor tube, which can be fixed into the process using a permanently-welded threaded connection or a compression fitting. A version with no process connection is also available. The electrical connection is made via a DIN angular connector or an M12 x 1 circular connector.



Resistance thermometer model TR30
Fig. left: with circular connector M12 x 1
Fig. right: with DIN angular connector

Output signal Pt100

The model TR30-P resistance thermometer is available with a direct Pt100 signal. An intrinsically safe variant can be supplied as an option.

Output signal 4 ... 20 mA

In the model TR30-W resistance thermometer, a software-programmable transmitter with a 4 ... 20 mA output signal is built in. Thus the measured temperature values can be transmitted safely and simply.

The model TR30-W resistance thermometer is available, as an option, in an intrinsically safe variant.

Output signal 0 ... 10 V

In the model TR30-V resistance thermometer, a transmitter with a fixed measuring range is built in. This variant is primarily used in machine building.

Specifications

Thermometer with direct sensor output with Pt100 output signal, model TR30-P	
Temperature range	without neck tube -50 ... +150 °C (-58 ... +302 °F) with neck tube -50 ... +250 °C (-58 ... +482 °F)
Measuring element (Measuring current: 0.1 ... 1.0 mA)	Pt100 measuring resistor
Connection method	<ul style="list-style-type: none"> ■ 2-wire ■ 3-wire ■ 4-wire
Measuring element tolerance value ¹⁾ per IEC 60751	<ul style="list-style-type: none"> ■ Class B ■ Class A ²⁾
Electrical connection	<ul style="list-style-type: none"> ■ M12 x 1, 4-pin circular connector ■ DIN angular connector form A for cables with Ø 6 ... 8 mm, cross section max. 1.5 mm²
Explosion protection (optional)	Intrinsically safe to Ex i (ATEX) gas/dust, per directive 94/9/EC Marking: II 1G Ex ia IIC T* or II 2D Ex iaD 21 T*

For detailed specifications for Pt sensors, see Technical information IN 00.17 at www.wika.com.

Thermometer with transmitter and 4 ... 20 mA output signal, model TR30-W	
Temperature range	without neck tube -50 ... +150 °C (-58 ... +302 °F) with neck tube -50 ... +250 °C (-58 ... +482 °F) ³⁾
Measuring element (Measuring current: 0.5 mA)	Pt100 measuring resistor
Tolerance value of the measuring element ¹⁾ per IEC 60751	Class B
Measuring span	minimum 20 K, maximum 300 K
Basic configuration	Measuring range 0 ... 150 °C, other measuring ranges are adjustable
Analogue output	4 ... 20 mA, 2-wire
Measuring deviation per IEC 60770, 23 °C ±5 K	0.2 % (Transmitter) ⁴⁾
Linearisation	linear to temperature per IEC 60751
Linearisation error	±0.1 % ⁵⁾
Switch-on delay, electrical	< 10 ms
Current signal for fault signal	configurable in accordance with NAMUR NE43 downscale ≤ 3.6 mA upscale ≥ 21.0 mA
Sensor short-circuit	not configurable, generally NAMUR downscale ≤ 3.6 mA
Load R _A	$R_A \leq (U_B - 9 V) / 0.023 A$ with R _A in Ω and U _B in V
Effect of load	±0.05 % / 100 Ω
Power supply U _B	DC 10 ... 35 V
Max. permissible residual ripple	10 % at 24 V / maximum 300 Ω load
Power supply input	protected against reverse polarity
Power supply effect	±0.025 % / V
Electromagnetic compatibility (EMC)	2004/108/EC, DIN EN 61326 emission (group 1, class B) and interference immunity (industrial application) ⁶⁾ , and also per NAMUR NE21
Temperature units	configurable °C, °F, K
Info data	TAG No., descriptor and message can be stored in transmitter
Configuration and calibration data	permanently stored in EEPROM
Electrical connection	<ul style="list-style-type: none"> ■ M12 x 1, 4-pin circular connector ■ DIN angular connector form A for cables with Ø 6 ... 8 mm, cross section max. 1.5 mm²
Explosion protection (optional)	Intrinsically safe to Ex i (ATEX) gas/dust, per directive 94/9/EC Marking: II 1G Ex ia IIC T* or II 2D Ex iaD 21 T* Safety-related maximum values for the current loop (+ and - connections): U _i = DC 30 V C _i = 6.2 nF I _i = 120 mA L _i = 110 µH P _i = 800 mW

Readings in % refer to the measuring span

For a correct determination of the overall measuring error, both sensor and transmitter measuring deviations have to be considered.

1) For detailed information on Pt100 sensors, see Technical information IN 00.17 at www.wika.com.

2) Class accuracy A only valid in the temperature range -30 ... +150 °C (-22 ... +302 °F) or -30 ... +250 °C (-22 ... +482 °F), otherwise class B

3) The temperature transmitter should therefore be protected from temperatures over 85 °C (185 °F)

4) For measuring spans smaller than 50 K additional 0.1 K

5) ±0.2 % for measuring ranges with a lower limit less than 0 °C (32 °F)

6) Use resistance thermometers with shielded cable, and ground the shield on at least one end of the lead, if the lines are longer than 30 m or leave the building.

Thermometer with transmitter and 0 ... 10 V output signal, model TR30-V

Temperature range	without neck tube -50 ... +150 °C (-58 ... +302 °F) with neck tube -50 ... +200 °C (-58 ... +392 °F) ¹⁾ , measuring ranges are not adjustable
Measuring element	Pt100 (measuring current: 0.5 mA)
Measuring element tolerance value ²⁾ per IEC 60751	Class B
Measuring span	minimum 50 K, maximum 250 K
Basic configuration	Measuring range 0 ... 100 °C
Measuring ranges	-50 ... +50, 0 ... 50, 0 ... 80, 0 ... 100, 0 ... 120, 0 ... 150, 0 ... 200 °C
Analogue output	0 ... 10 V, 3-wire
Complete measuring deviation ³⁾	< 0.5 % of span
Power supply U _B	DC 12 ... 30 V
Max. permissible residual ripple	10 %
Electromagnetic compatibility (EMC)	2004/108/EC, EN 61326 emission (group 1, class B) and interference immunity (industrial application) ⁴⁾
Electrical connection	■ M12 x 1, 4-pin circular connector ■ DIN angular connector form A for cables with Ø 6 ... 8 mm, cross section max. 1.5 mm ²

Ambient conditions

Ambient and storage temperature	-40 ... +85 °C (-40 ... +185 °F) Model TR30-P with DIN angular connector: -40 ... +125 °C (-40 ... +257 °F)
Ingress protection	IP 67 per IEC 529 / EN 60529 for circular connector M12 x 1 IP 65 per IEC 529 / EN 60529 for DIN angular connector form A The stated ingress protection only applies when plugged in using mating connectors that have the appropriate ingress protection.
Accuracy ⁵⁾	-1 Kelvin
Response time	t ₅₀ < 5 s t ₉₀ < 10 s (for sensor diameter 6 mm)
Materials	Case and process connection: stainless steel
Vibration resistance (TR30-P, TR30-W)	■ 3 g (IEC 60751, standard) ■ 20 g (IEC 60751, special designs, up to a max. insertion length of 160 mm, no compression fittings)

Sensor tube

Materials	Stainless steel 1.4571 (316Ti)
Process connection (welded / compression fitting) Thread per DIN 3852, form A	■ G ¼ B (not for sensor diameter 8 mm) ■ G ⅝ B ■ G ½ B ■ ¼ NPT (not for sensor diameter 8 mm) ■ ½ NPT ■ without
Sensor insertion lengths	25, 50, 75, 100, 120, 150, 200, 300, 400 or 500 mm (other insertion lengths possible; ask for delivery times)
Sensor diameter	■ 3 mm (only for insertion length 25 mm) ^{6) 7)} ■ 6 mm (insertion lengths 50 ... 500 mm) ■ 6 mm, tapered to 3 mm (insertion lengths 50 ... 500 mm) ⁶⁾ ■ 8 mm (insertion lengths 50 ... 500 mm)

Readings in % refer to the measuring span

For a correct determination of the overall measuring error, both sensor and transmitter measuring deviations have to be considered.

1) The temperature transmitter should therefore be protected from temperatures over 85 °C (185 °F)

2) For detailed information on Pt100 sensors, see Technical information IN 00.17 at www.wika.com.

3) For measuring spans smaller than 50 K additional 0.1 K

4) Use resistance thermometers with shielded cable, and ground the shield on at least one end of the lead, if the lines are longer than 30 m or leave the building.

5) Measured at 100 °C (212 °F)

6) Not possible with an output signal of 0 ... 10 V

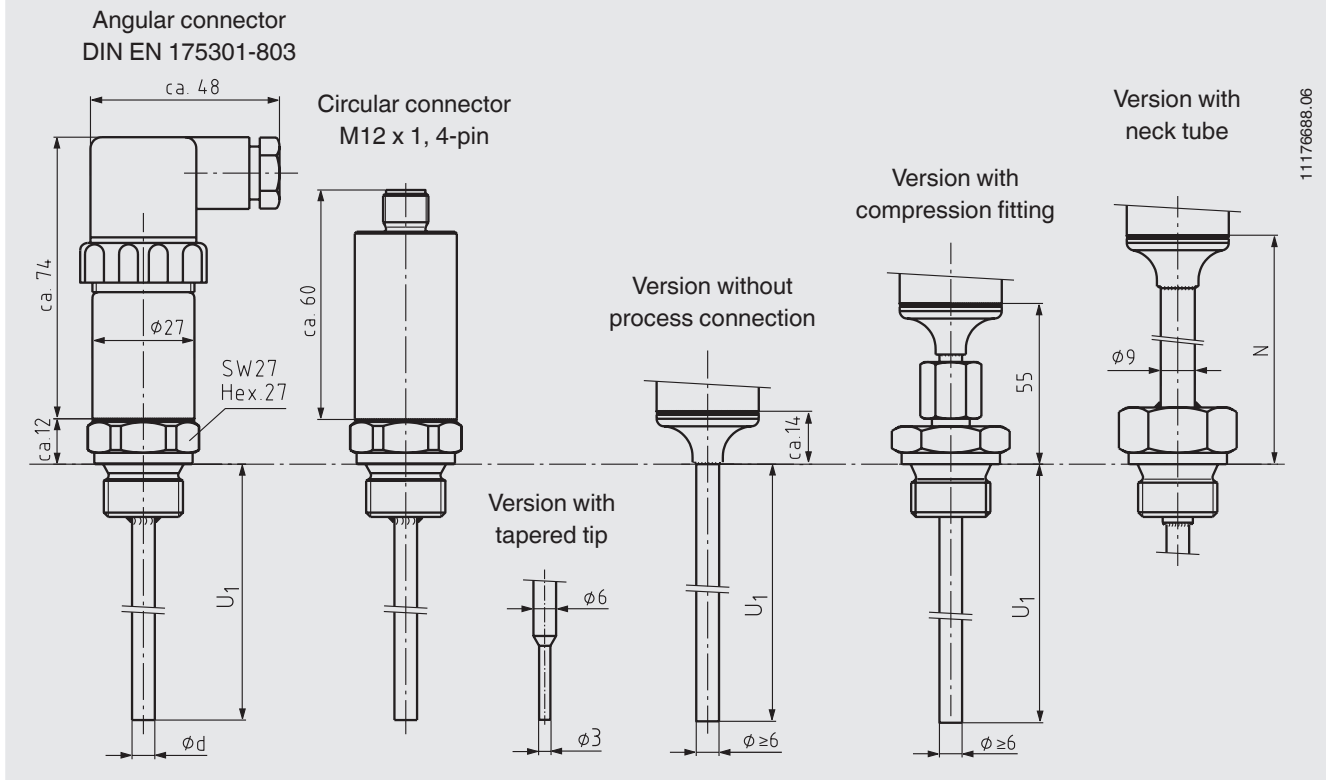
7) The use of a compression fitting is excluded.

Note:

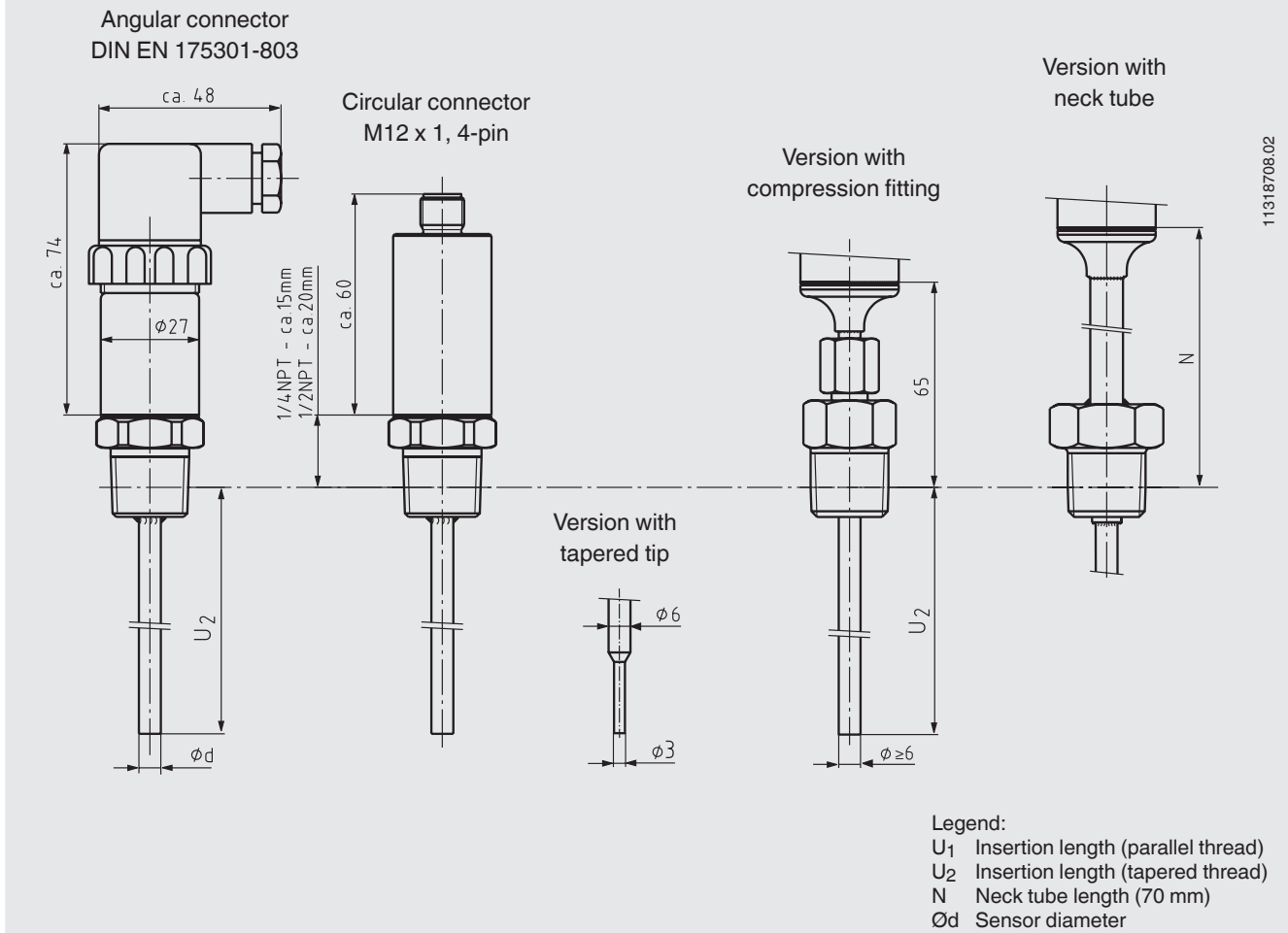
The resistance thermometers of the series TR30 are designed for direct installation into the process. Using it in an additional thermowell makes no sense.

Dimensions in mm

Process connection with parallel threads (or without process connection)



Process connection with tapered threads

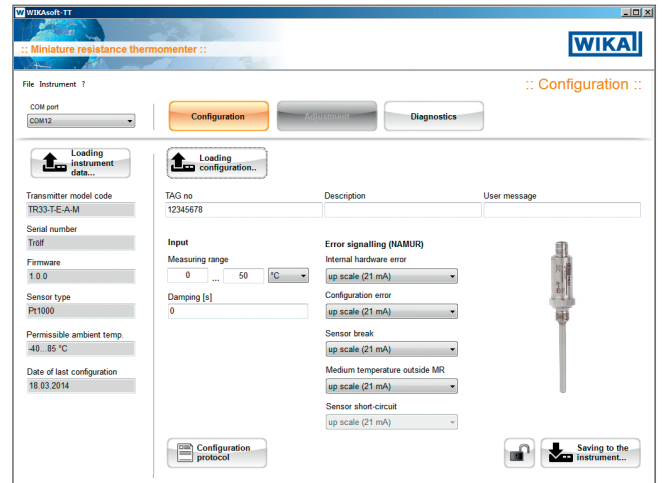


Explosion protection (option)

Model TR30-P and TR30-W resistance thermometers are available with an EC-type examination certificate for the ignition protection type “intrinsic safety” Ex i. These instruments comply with the requirements of 94/9/EC (ATEX) directive for gas and dust.

The classification/suitability of the instrument for the respective category can be seen on the EC-type examination certificate and in the operating instructions.


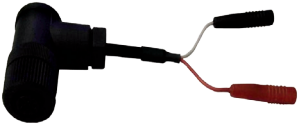
Configuration software WIKAsoft-TT



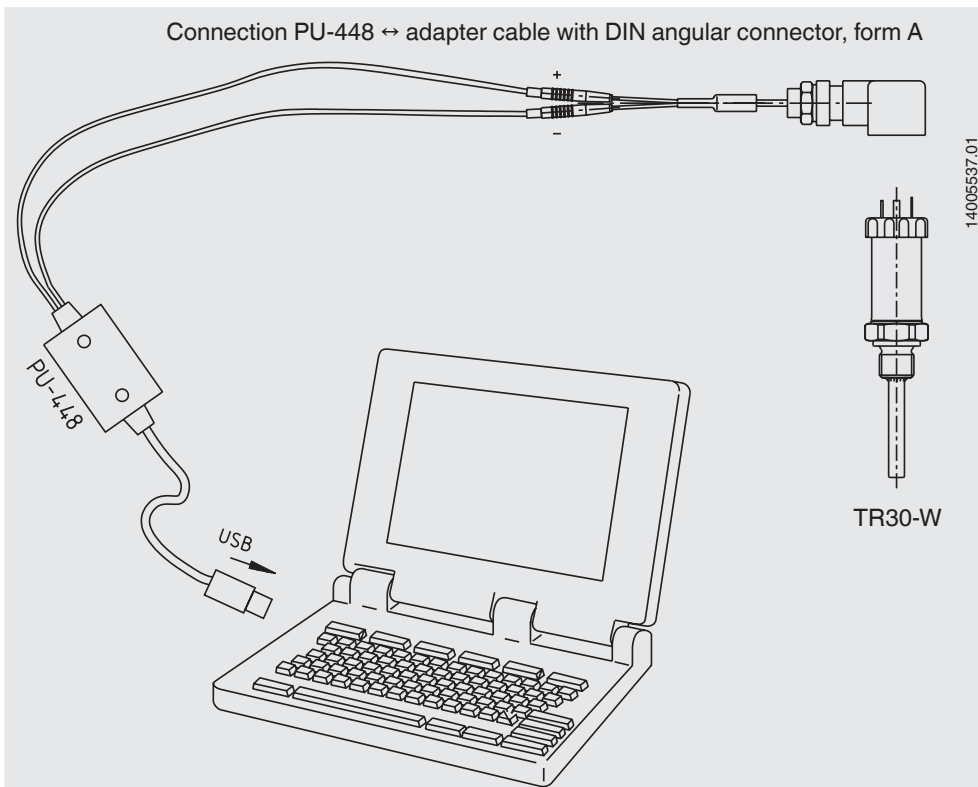
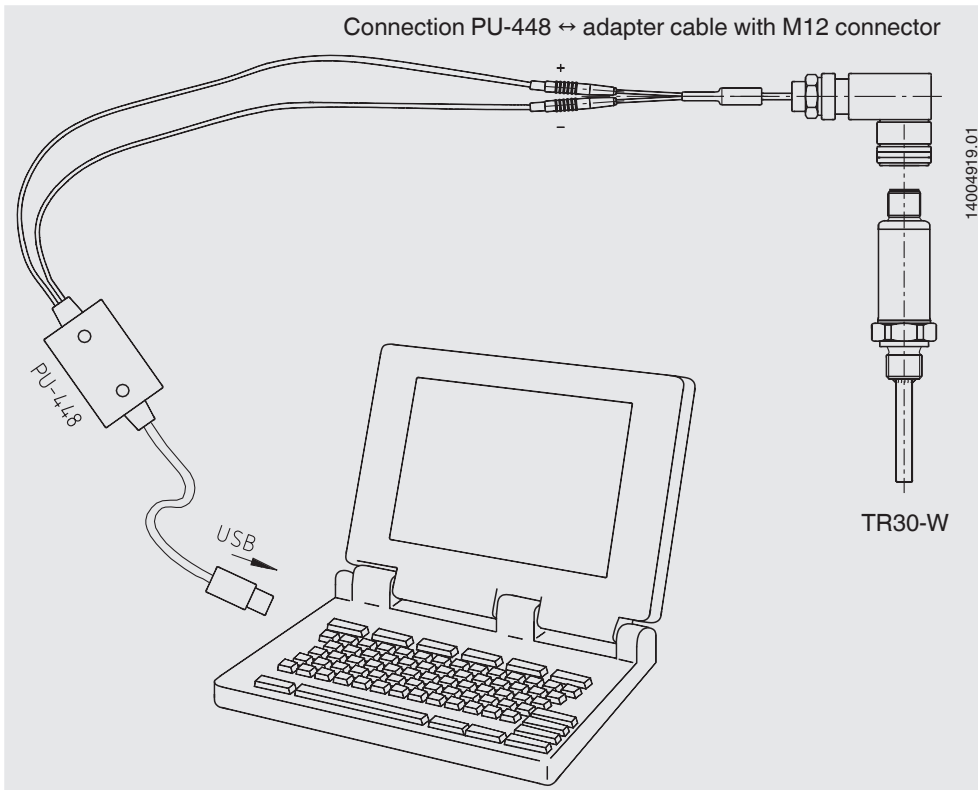
Configuration software (multilingual) as a download from www.wika.com

Accessories

Configuration set

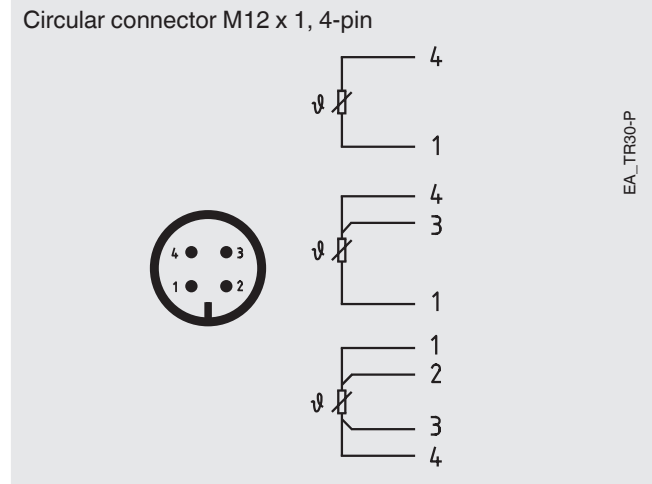
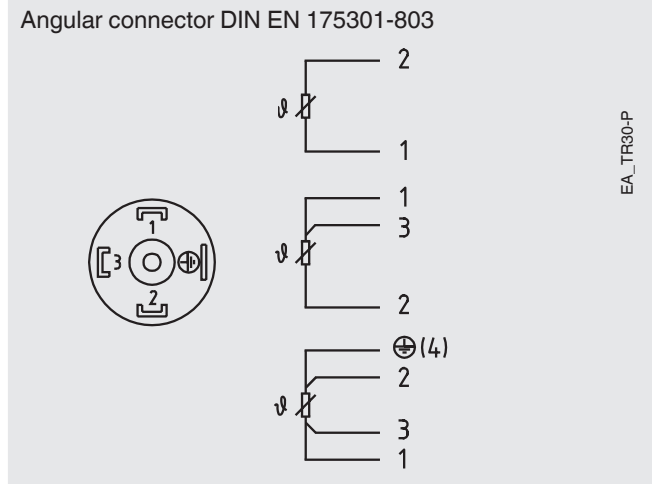
Model	Special features	Order no.
Programming unit Model PU-448 	<ul style="list-style-type: none"> ■ Easy to use ■ LED status displays ■ Compact design ■ No further power supply is needed for either the programming unit or for the transmitter 	11606304
Adapter cable M12 to PU-448 	Adapter cable for the connection of model TR30-W resistance thermometer to the model PU-448 programming unit	14003193
Adapter cable DIN angular connector to PU-448	Adapter cable of the DIN angular connector for the connection of a model TR30-W resistance thermometer to the model PU-448 programming unit	14005324

Connecting PU-448 programming unit

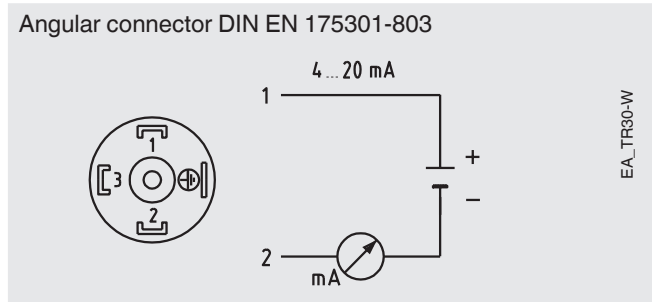


Electrical connection

■ Output signal Pt100, model TR30-P

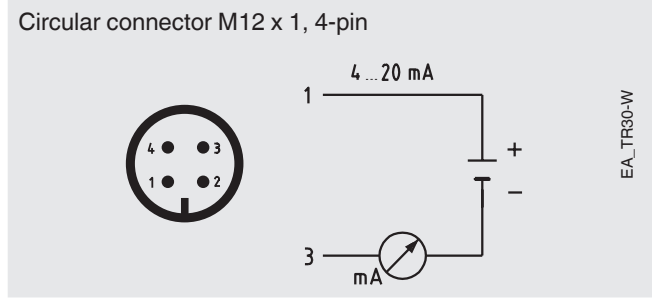
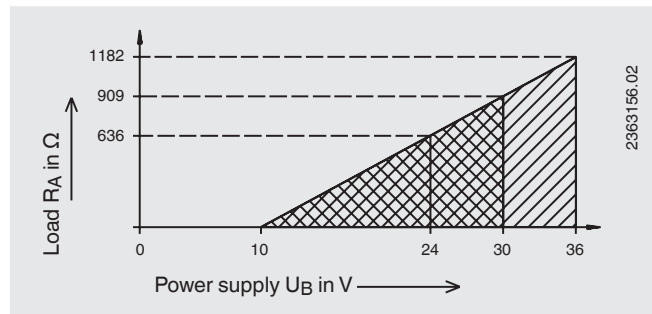


■ Output signal 4 ... 20 mA, model TR30-W

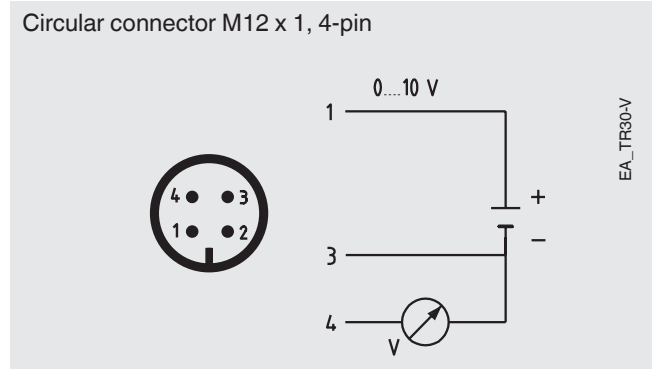
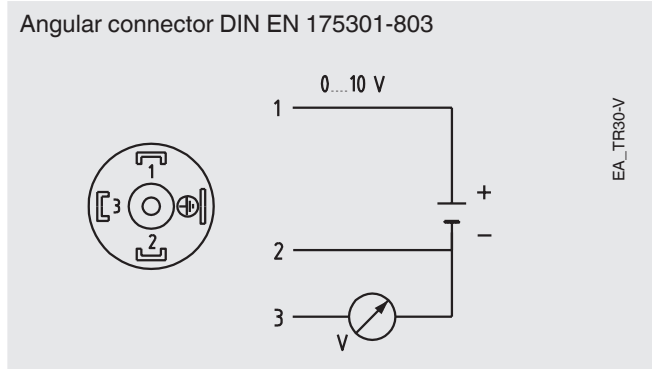


Load diagram for model TR30-W

The permissible load depends on the loop supply voltage.



■ Output signal 0 ... 10 V, model TR30-V



CE conformity

EMC directive ¹⁾

2004/108/EC, EN 61326 emission (group 1, class B) and interference immunity (industrial application)

ATEX directive (option)

94/9/EC

1) Only for built-in transmitter

Approvals (option)

- **NEPSI**, ignition protection type “i” - intrinsic safety, ignition protection type “iD” - dust protection through intrinsic safety, China
- **EAC**, import certificate, ignition protection type “i” - intrinsic safety, ignition protection type “iD” - dust protection through intrinsic safety, customs union Russia/Belarus/Kazakhstan
- **GOST**, metrology/measurement technology, Russia
- **DNV**, ships, shipbuilding (e.g. offshore), International

Location classes:

Model	Temperature	Humidity	Vibration	EMC	Enclosure
TR30-P	D	B	B	-	C
TR30-W	D	B	B	A/B ²⁾	C

2) EMC class B when supplied from a dedicated DC 24 V power supply,
EMC class A when supplied directly from the ship's distribution board

Certificates (option)

- 2.2 test report
- 3.1 inspection certificate
- DKD/DAkkS calibration certificate

Approvals and certificates, see website

Ordering information

Model / Output signal / Explosion protection / Mechanical tests / Electrical connection / Neck tube / Process connection / Measuring element / Connection method / Temperature range / Transmitter initial value / Transmitter end value / Sensor diameter / Sensor insertion length / Certificates / Options

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