Miniature resistance thermometer
For sanitary applications
Model TR21-B, for orbital welding

3-A® 74-03

Applications

- Sanitary applications
- Food industry
- Beverage industry
- Bio and pharmaceutical industry, production of active ingredients

Special features

- Sensor can be calibrated without having to open the process or disconnect the electrical connections
- Simple and fast connection using an M12 plug connector
- Output signal: Pt100 or 4 … 20 mA via PC-programmable transmitter
- Wetted parts made of stainless steel 1.4435
- Self-draining and dead-space minimised

Resistance thermometer model TR21-B with flow-through housing

Description

The model TR21-B resistance thermometer is used for temperature measurement in sanitary applications. These thermometers are equipped with thermowells, the process connections of which meet the stringent requirements for hygienic measuring points in terms of materials and design.

For an integration into the process the thermowell is directly fitted into a pipeline by means of orbital welding. The connection ends are smooth and prepared for orbital welding.

For easy calibration or maintenance, the sensor is removable without having to open the process. Thus hygiene risks can be minimised and downtimes can be reduced.

The spring-loading, integrated into the union nut, guarantees the contact between the sensor tip and the bottom of the thermowell and thus ensures a short response time and lasting high accuracy.

Data sheets showing similar products:
Thermowells for sanitary applications; model TW22; see data sheet TW 95.22
Resistance thermometer, with flange connection; model TR22-A; see data sheet TE 60.22
Resistance thermometer, for orbital welding; model TR22-B; see data sheet TE 60.23
Miniature resistance thermometer, with flange connection; model TR21-A; see data sheet TE 60.26
Miniature resistance thermometer, with welded flange connection; model TR21-C; see data sheet TE 60.28

Specifications

Output signal Pt100	
Temperature range	Measuring range -50 ... +150 °C, -50 ... +250 °C
Measuring element	Pt100 (measuring current: 0.1 ... 1.0 mA) standard measuring resistor Pt100 (measuring current: 0.1 ... 1.0 mA) face-sensitive measuring resistor 1)
Connection method	3-wire 4-wire
Sensor tolerance value 2) per DIN EN 60751	Class B Class A Class AA

Output signal 4 ... 20 mA	
Temperature range	Measuring range -50 ... +150 °C, -50 ... +250 °C 3)
Measuring element	Pt100 (measuring current: 0.5 mA) standard measuring resistor Pt100 (measuring current: 0.5 mA) face-sensitive measuring resistor 1)
Connection method	3-wire
Sensor tolerance value 2) 4) per DIN EN 60751	Class B Class A Class AA
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 DIN EN 60770, 23 °C ±5 K	0.2 % (transmitter) 4)
Linearisation	linear to temperature per DIN EN 60751
Linearisation error	±0.1 % 5)
Switch-on delay, electrical	< 10 ms
Signalling of sensor burnout	configurable: NAMUR downscale < 3.6 mA (typically 3 mA) NAMUR upscale > 21.0 mA (typically 23 mA)
Sensor short-circuit	not configurable, generally NAMUR downscale < 3.6 mA (typically 3 mA)
Load R_A	$R_A \leq (U_B - 10\ V) / 0.023\ A$ with R_A in Ω and U_B in V
Effect of load	± 0.05 % / 100 Ω
Power supply	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/EG, EN 61326 Emission (Group 1, Class B) and Immunity (industrial locations) 6)
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	M12 x 1, 4-pin circular connector

Ambient conditions	
Ambient and storage temperature	-40 … +85 °C
Ingress protection	IP 68 7) / IP 69K per IEC 529 / EN 60529 The stated ingress protection only applies when plugged-in using line connectors that have the appropriate ingress protection.
Accuracy 8)	-1 Kelvin
Response time 9)	t_{50} < 3.2 s t_{90} < 7.3 s
Materials	Case and union nut: stainless steel 1.4571 (316Ti) Spring: stainless steel 1.4310 Measuring insert: stainless steel 1.4571 (316Ti)

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 small design of the face-sensitive measuring resistors leads to reduced heat dissipation with short insertion lengths.
   Available for temperature range -50…+150 °C in Classes A and B.
   Face-sensitive measuring resistors are generally used for thermowell insertion lengths smaller than 11 mm.
2) For detailed specifications for Pt100 sensors, see Technical Information IN 00.17 at www.wika.com
3) The temperature transmitter should therefore be protected from temperatures over 85 °C
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
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
7) 1 MWs/ 24 h
8) measured at 100 °C
9) Measurement in accordance with DIN EN 60751

Thermowell model TW61	
Design	■ Flow-through housing ■ Angular housing
Nominal width of tube	cf. table of dimensions
Neck tube length M	The neck tube length M is adjust to the length A of 60 mm. further length to user specifications
Surface finish	Standard: R_a < 0.8 µm Optional: R_a < 0.8 µm electropolished, R_a < 0.4 µm, R_a < 0.4 µm electropolished
Materials	Stainless steel 1.4435
Connection to the thermometer	G 3/8 "
Thermowell diameter	cf. table of dimensions
Pressure ratings	cf. table of dimensions
Pipe lengths TL and L_1, thermowell insertion length U_1	cf. table of dimensions

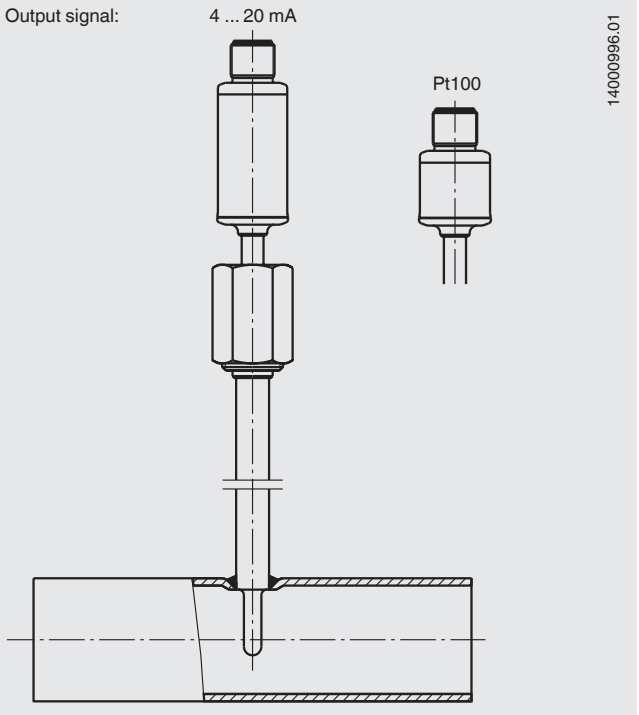
Available documentation/certification

- 2.2 Test certificate
- 3.1 Acceptance test certificate
- DKD certificate
- Hygiene certificates

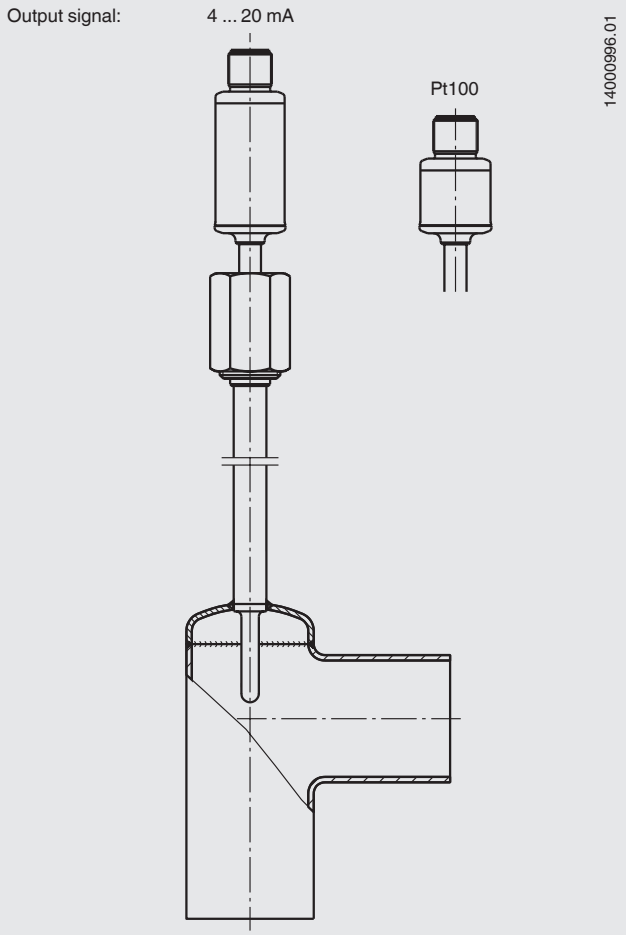
Certificate	Flow-through housing	Angular housing
3-A (74-03)	yes	yes, from DIN 11866 series A: DN 65 DIN 11866 series B: DN 76.1 DIN 11866 series C: DN 2.5 "

Overview of the combination options

Flow-through housing

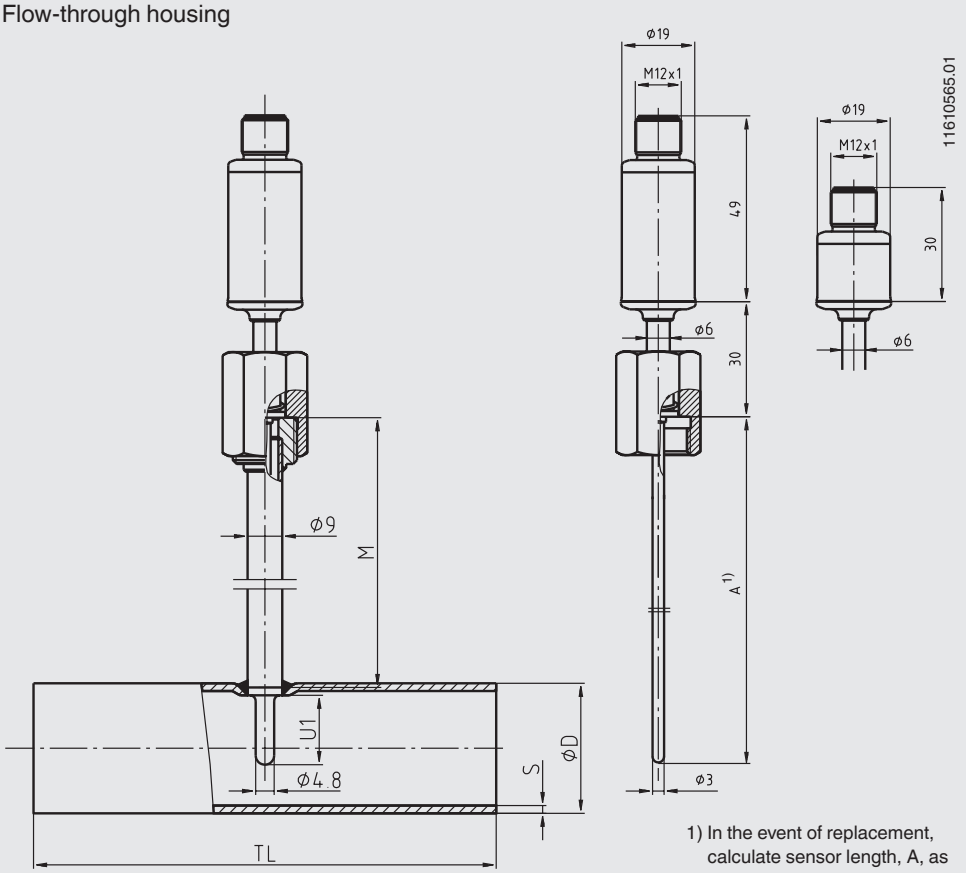


Angular housing



Dimensions of the process connections in mm (model TW61 thermowells)

Flow-through housing



1) In the event of replacement, calculate sensor length, A, as follows:
$A_{TR21\text{-}B} = U_1 + M + 3$ mm

ISO pipes, or DIN 11866 series B

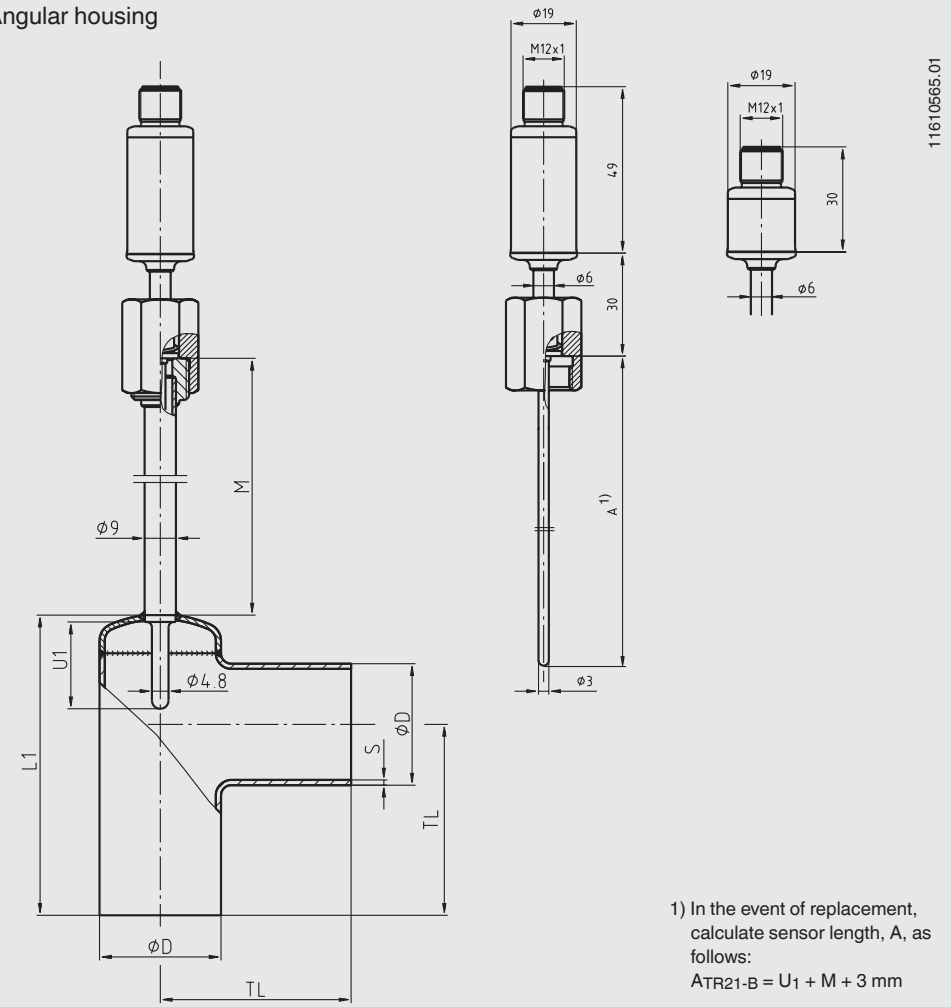
Nominal width of tube OD	Nominal pressure in bar	Pipe outer diameter Ø D	Pipe wall thickness s	Pipe length TL	Thermowell insertion length U1	Neck tube length M
17.2	25	17.2	1.6	68	9	48
21.3	25	21.3	1.6	72	11	46
26.9	25	26.9	1.6	110	11	46
42.4	25	42.4	2.0	130	18	39

Further nominal pipe widths such as versions to DIN 11866 series A/metric and DIN 11866 series C/ASME BPE on request.

Hygienic design

The patented hygienic design of the TW61 flow-through housing enables dead-space minimised, invasive temperature measurement and, through self-draining, a flexible mounting position.

Angular housing



1) In the event of replacement, calculate sensor length, A, as follows:
$A_{TR21\text{-}B} = U_1 + M + 3$ mm

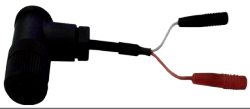
ISO pipes, or DIN 11866 series B

Nominal width of tube OD	Nominal pressure in bar Ø D x s	Pipe outer diameter Ø D	Pipe wall thickness s	Pipe length TL	Pipe length L1	Thermowell insertion length U1	Neck tube length M
17.2	25	17.2	1.6	34	55	16	41
21.3	25	21.3	1.6	36	58	18	39
26.9	25	26.9	1.6	55	81	30	27
42.4	25	42.4	2.0	65	102	30	27

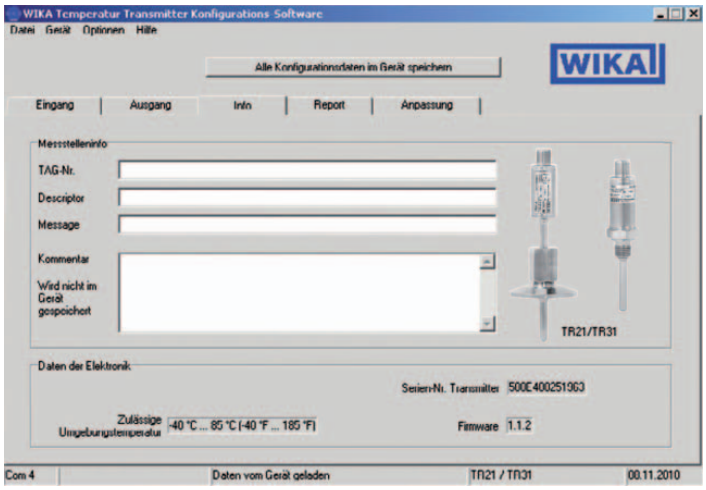
Further nominal pipe widths such as versions to DIN 11866 series A/metric and DIN 11866 series C/ASME BPE on request.

Accessories

Configuration set

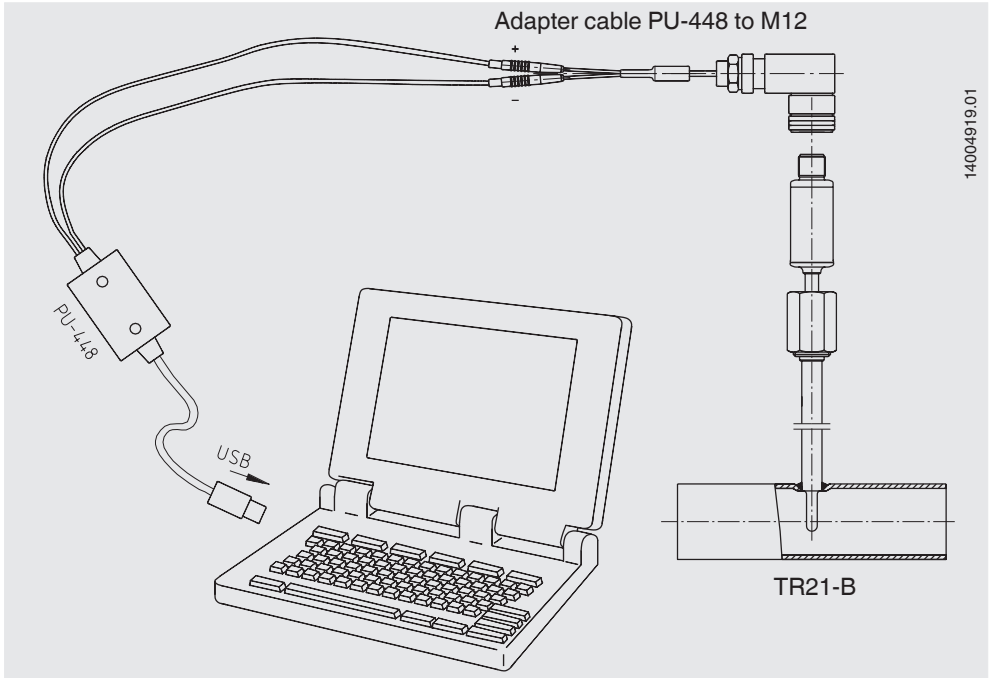
Model	Special features	Order No.
Programming unit Model PU-448 	■ Easy to use ■ LED statusdisplay ■ Compact design ■ Now no further power supply is needed for either the programming unit or for the transmitter ■ Measuring the loop current of the model T24 transmitter and the model TR21, TR30 and TR31 resistance thermometers is possible	11606304
Adapter cable M12 to PU-448 	Adapter cable for the connection of a model TR21-B resistance thermometer to the PU-448 programming unit	14003193

Software



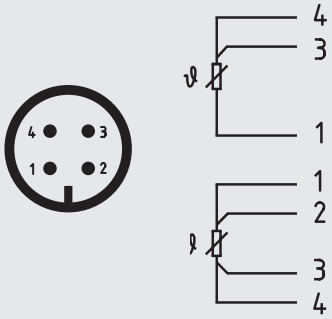
WIKA_TT configuration software (multilingual) as a free download from www.wika.com

Connecting PU-448 programming unit

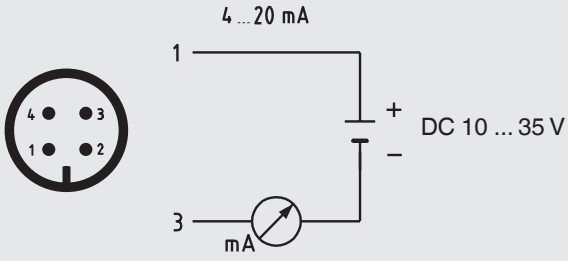


Electrical connection

Pt100 (M12 x 1, 4-pin circular connector)

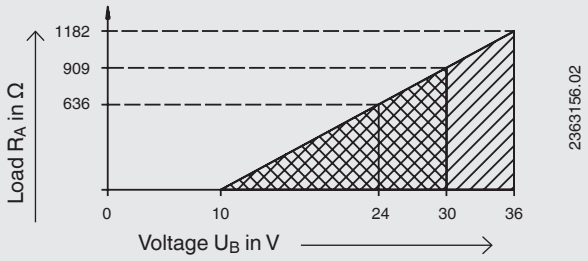


Transmitter (M12 x 1, 4-pin circular connector)



Load diagram

The permissible load depends on the loop supply voltage.



Ordering information

Model / Output / Sensor / Transmitter / Thermowell / Process connection / Thermowell diameter / Material wetted parts / Certificates / Options

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