

# Miniature resistance thermometer Model TR33, thread-mounted

WIKA data sheet TE 60.33

## Applications

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

## Special features

- Very compact design, high vibration resistance and fast response time
- With direct sensor output (Pt100, Pt1000 in 2-, 3- or 4-wire) or integrated transmitter with output signal 4 ... 20 mA
- Individually parameterisable for integrated transmitter with free PC configuration software WIKAsoft-TT
- Sensor element with accuracy class A per IEC 60751
- EMC conformity in accordance with NAMUR NE21

## Description

Resistance thermometers of this series are used as universal thermometers for the measurement of liquid and gaseous media in the range of -50 ... +250 °C.

They can be used for pressures up to 140 bar with sensor diameter 3 mm and up to 270 bar with sensor diameter 6 mm, dependent on the instrument version. All electrical components are protected against humidity (IP 67 or IP 69K) and designed to withstand vibration (20 g, depending on the instrument version).

The resistance thermometer is available with direct sensor output or integrated transmitter, which can be configured individually via the PC configuration software WIKAsoft-TT. Measuring range, damping, fault signal per NAMUR NE43 and TAG no. can be adjusted.



**Fig. left: Resistance thermometer, model TR33**  
**Fig. right: Adapter M12 x 1 for angular connector**  
**DIN EN 175301-803**

Insertion length, process connection, sensor and connection method can each be selected for the respective application from the order information. The model TR33 resistance thermometer consists of a thermowell with fixed process connection and is screwed directly into the process. The electrical connection is made via an M12 x 1 circular connector. An adapter for electrical connection with angular connector per DIN EN 175301-803 is optionally available (property right applied for under No. 001370985).

## Sensor

The sensor is located in the tip of the thermometer.

The resistance thermometers of the series TR33 are designed for direct installation into the process. Using it in an additional thermowell makes no sense.

Sensor diameter in mm	Process connection						
	G ¼ B	G ⅜ B	G ½ B	¼ NPT	½ NPT	M12 x 1.5	M20 x 1.5
3	x	x	x	x	x	x	x
6	x	x	x	x	x	x	x

Sensor tube length										
Sensor diameter in mm	Insertion length U <sub>1</sub> in mm									
	50	75	100	120	150	200	250	300	350	400
3	x	-	-	-	-	-	-	-	-	-
6	x	x	x	x	x	x	x	x	x	x

Further sensor tube lengths on request.

## Specifications

Thermometer with transmitter and output signal 4 ... 20 mA (model TR33-ZTT)	
Temperature range	without neck tube -50 ... +150 °C (-58 ... +302 °F) with neck tube -50 ... +250 °C (-58 ... +482 °F) <sup>1)</sup>
Measuring element	Pt1000
Connection method	2-wire
Tolerance value of the measuring element per IEC 60751	Class A <sup>2)</sup>
Measuring deviation of the transmitter per IEC 60770	±0.25 K
Total measuring deviation according to IEC 60770	Measuring deviation of the measuring element + the transmitter
Measuring span	minimum 20 K, maximum 300 K
Basic configuration	Measuring range 0 ... 150 °C (32 ... 302 °F), other measuring ranges are adjustable
Analogue output	4 ... 20 mA, 2-wire
Linearisation	linear to temperature per IEC 60751
Linearisation error	±0.1 % <sup>3)</sup>
Switch-on delay, electrical (time before the first measured value)	max. 4 s
Warming-up period	After approx. 4 minutes the instrument will function to the specified technical data (accuracy).
Current signal for fault signal	configurable in accordance with NAMUR NE43 downscale ≤ 3.6 mA upscale ≥ 21.0 mA
Sensor short-circuit	not configurable, per NAMUR NE43 downscale ≤ 3.6 mA
Sensor current	< 0.3 mA (Self-heating can be neglected.)
Load R <sub>A</sub>	$R_A \leq (U_B - 10 V) / 23 A$ with R <sub>A</sub> in Ω and U <sub>B</sub> in V
Effect of load	±0.05 % / 100 Ω
Power supply U <sub>B</sub>	DC 10 ... 30 V
Max. permissible residual ripple	10 % generated by U <sub>B</sub> < 3 % ripple of the output current
Power supply input	protected against reverse polarity
Power supply effect (depending on the power supply U <sub>B</sub> )	±0.025 % / V
Influence of the ambient temperature	0.1 % of span / 10 K T <sub>amb</sub>
Electromagnetic compatibility (EMC) <sup>5)</sup>	2004/108/EC, EN 61326 emission (group 1, class B) and interference immunity (industrial application) <sup>4)</sup> , configuration at 20 % of the full measuring range
Temperature units	configurable °C, °F, K
Info data	TAG No., description and user message can be stored in transmitter
Configuration and calibration data	permanently stored
Electrical connection	M12 x 1, 4-pin circular connector

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) Protect the temperature transmitter therefore from temperatures over 85 °C (185 °F).

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

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. Operate the instrument grounded.

5) During interference consider an increased measuring deviation of up to 2 %.

## Thermometer with direct sensor output with Pt100 (model TR33-Z-Px) and Pt1000 (model TR33-Z-Sx)

Temperature range	without neck tube -50 ... +150 °C (-58 ... +302 °F) with neck tube -50 ... +250 °C (-58 ... +482 °F)
Temperature at the plug	max. 85 °C (185 °F)
Measuring element	■ Pt100 (measuring current: 0.1 ... 1.0 mA) ■ Pt1000 (measuring current: 0.1 ... 0.3 mA)
Connection method	■ 2-wire The lead resistance is recorded as an error in the measurement. ■ 3-wire With a cable length of 30 m or longer, measuring errors can occur. ■ 4-wire The lead resistance can be neglected.
Tolerance value of the measuring element per IEC 60751	■ Class A <sup>6)</sup> ■ Class B at 2-wire
Electrical connection	M12 x 1, 4-pin circular connector

For detailed specifications for Pt sensors, see Technical information IN 00.17 at [www.wika.com](http://www.wika.com).

## Case

Material	Stainless steel
Ingress protection	
■ Case with connected plug	IP 67 and IP 69K per IEC 60529/EN 60529 The stated ingress protection only applies when plugged in using mating connectors that have the appropriate ingress protection.
■ Coupler connector, not connected	IP 67 per IEC 60529/EN 60529
Weight in kg	ca. 0.2 ... 0.7 (depending on version)
Dimensions	see "Dimensions in mm"

## Ambient conditions

Ambient temperature range	-50 ... +85 °C (-58 ... 185 °F)
Storage temperature range	-40 ... +85 °C (-40 ... 185 °F)
Climate class per IEC 60654-1	Cx (-50 ... +85 °C bzw. -58 ... +185 °F, 5 ... 95 % relative air humidity)
Maximum permissible humidity per IEC 60068-2-30 var. 2	100 % r. h., condensation allowed
Maximum operating pressure <sup>7) 8)</sup>	140 bar with 3 mm sensor diameter 270 bar with 6 mm sensor diameter
Vibration per IEC 60068-2-6	10 ... 2,000 Hz, 20 g <sup>7)</sup>
Shock	IEC 60068-2-27
Salt fog	IEC 60068-2-11

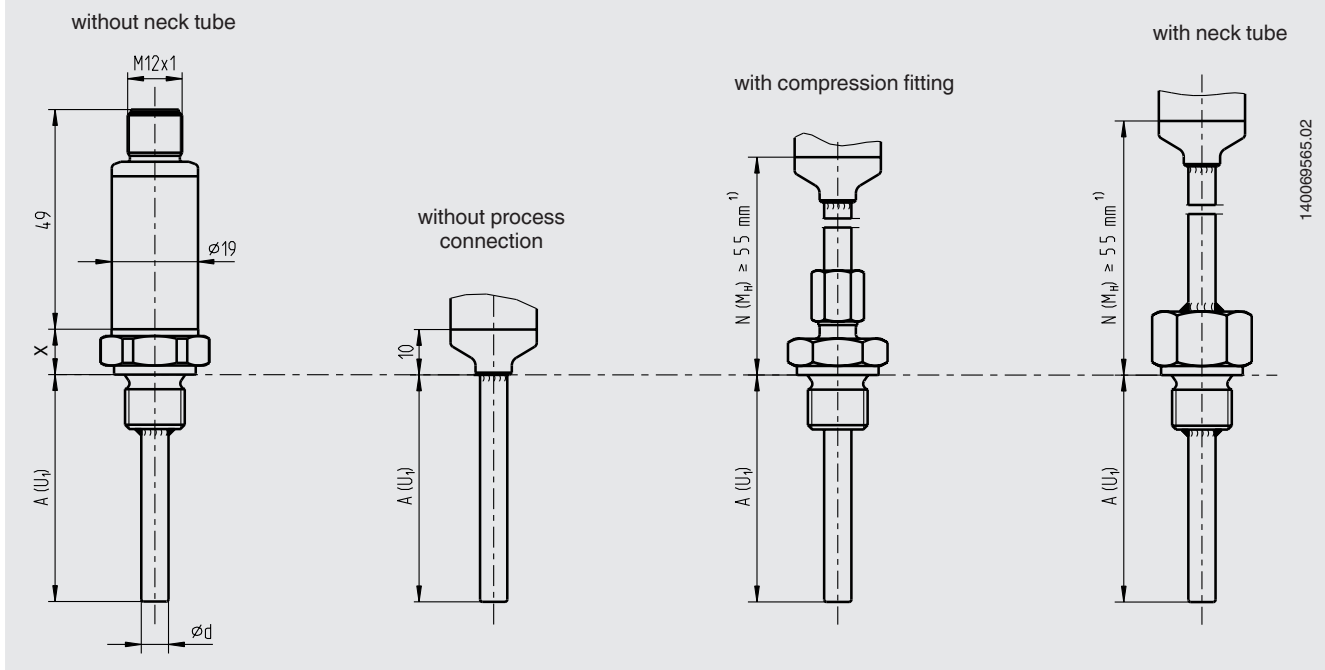
6) Class accuracy A only valid in the temperature range -30 ... +150 °C (-22 ... +302 °F) or -30 ... +250 °C (-22 ... +482 °F), otherwise class B

7) Depending on the instrument version

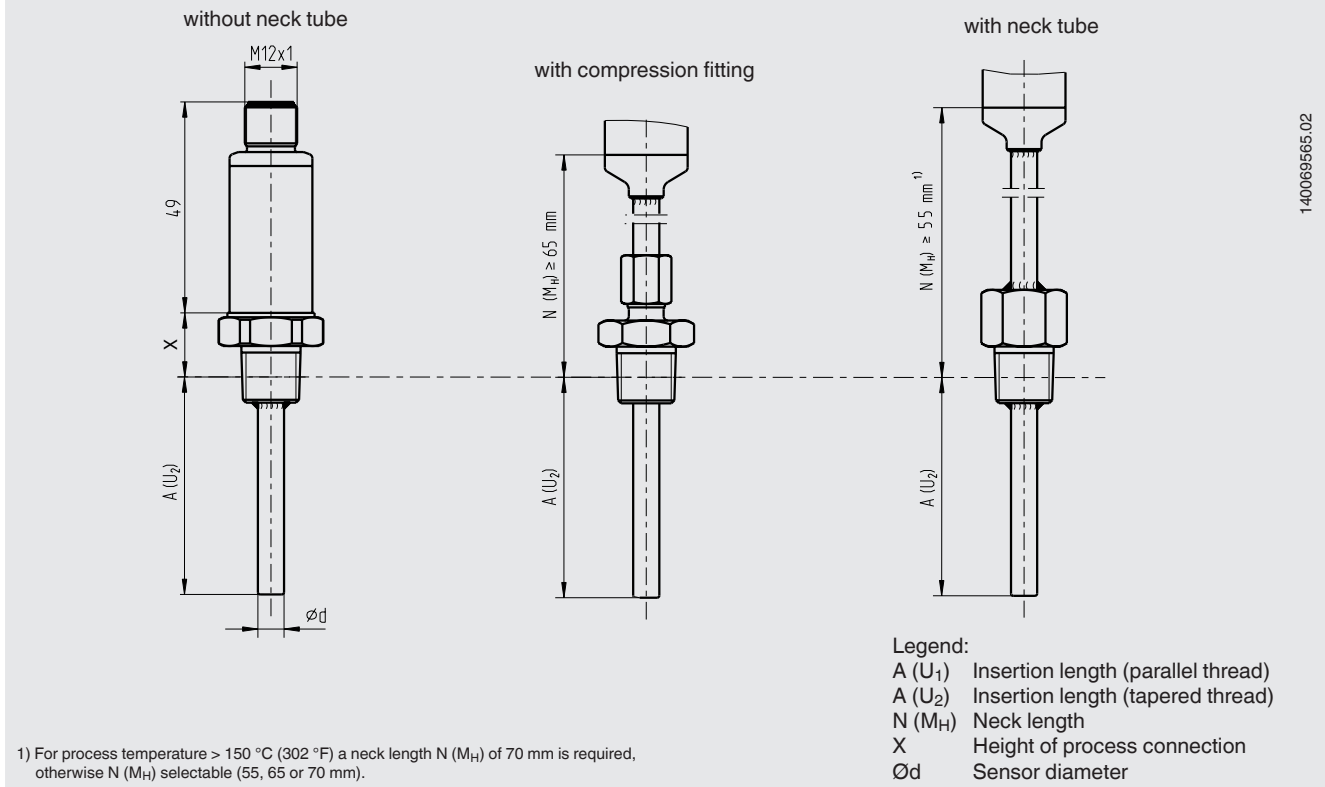
8) Reduced operating pressure when using a compression fitting: Stainless steel: max. 100 bar  
PTFE: max. 8 bar

# Dimensions in mm

## Process connection with parallel threads (or without process connection)




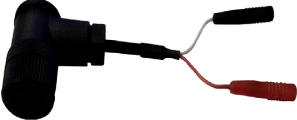
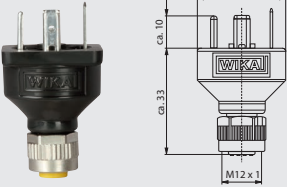
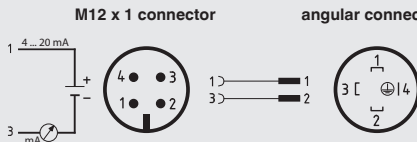
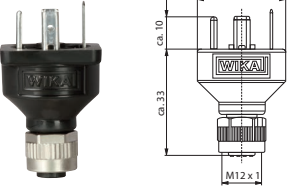
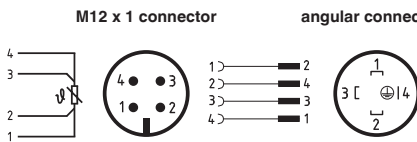
## Process connection with tapered threads



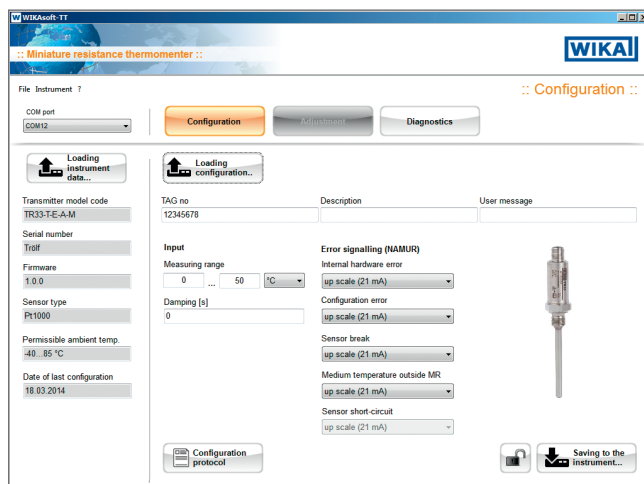
Thread	Height of process connection X
G 1/2	11
G 3/8	11
G 1/4	10
1/4 NPT	15
1/2 NPT	19
M12	11
M20	11

# Accessories

## Configuration set

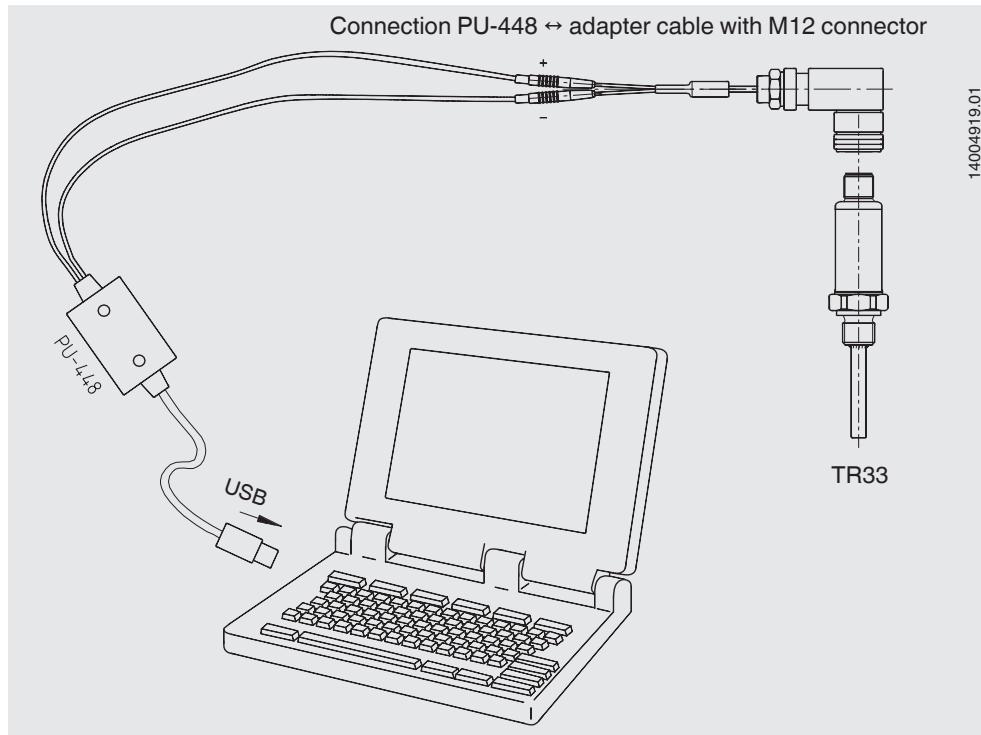
Model	Special features	Order no.
Programming unit Model PU-448 	<ul style="list-style-type: none"> <li>■ Easy to use</li> <li>■ LED status/diagnostic displays</li> <li>■ Compact design</li> <li>■ No further power supply is needed for either the programming unit or for the transmitter</li> </ul>	11606304
Adapter cable M12 to PU-448 	Adapter cable for the connection of model TR33 resistance thermometer to the model PU-448 programming unit	14003193
M12 x 1 transmitter adapter to angular connector DIN EN 175301-803 (yellow female connector element) 	Adapter for the connection of a resistance thermometer with an angular connector DIN EN 175301-803 form A with 4 ... 20 mA output signal <b>Case:</b> PA <b>Ambient temperature:</b> -40 ... +115 °C <b>Union nut:</b> Zinc diecast <b>Contacts:</b> Copper-zinc alloy tin-coated <b>Dielectric strength:</b> 500 V <b>Ingress protection:</b> IP 65 	14069503
M12 x 1 Pt adapter to angular connector DIN EN 175301-803 (black female connector element) 	Adapter for the connection of a resistance thermometer with an angular connector DIN EN 175301-803 form A with direct resistance output signal <b>Case:</b> PA <b>Ambient temperature:</b> -40 ... +115 °C <b>Union nut:</b> Zinc diecast <b>Contacts:</b> Copper-zinc alloy tin-coated <b>Dielectric strength:</b> 500 V <b>Ingress protection:</b> IP 65 	14061115

## Configuration software WIKAsoft-TT



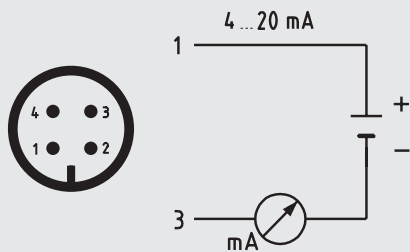
Configuration software (multilingual) as download from [www.wika.com](http://www.wika.com)

## Connecting PU-448 programming unit

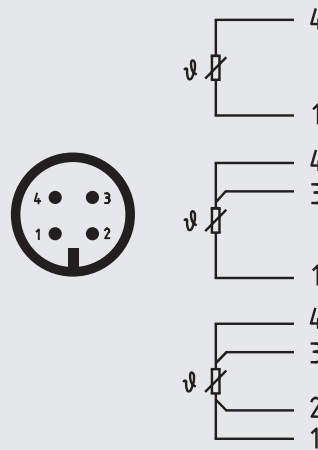


## Electrical connection

Output signal 4 ... 20 mA  
M12 x 1, 4-pin circular connector



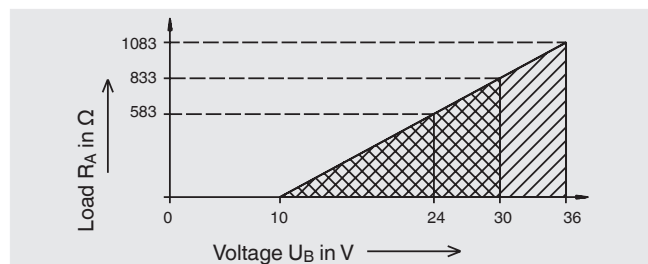
Output signal Pt100 or Pt1000 sensor  
M12 x 1, 4-pin circular connector



Pin	Signal	Description
1	L+	10 ... 30 V
2	VQ	not connected
3	L-	0 V
4	C	not connected

## Load diagram

The permissible load depends on the loop supply voltage. For communication with the instrument with programming unit PU-448, a max. load of 350 Ω is admissible.



## CE conformity

### EMC directive <sup>1)</sup>

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

1) Only for built-in transmitter

## Certificates (option)

Certification type	Measuring accuracy	Material certificate
2.2 test report	x	x
3.1 inspection certificate	x	x
DKD/DAkkS calibration certificate	x	-

The different certifications can be combined with each other.

Approvals and certificates, see website

## Ordering information

Model / Output signal / Transmitter temperature unit / Process temperature / Transmitter initial value / Transmitter end value / Process connection / Sensor diameter / Insertion length A (U<sub>1</sub>) or A (U<sub>2</sub>) / Neck length N (M<sub>H</sub>) / Accessories / Certificates

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