

# Threaded resistance thermometer

## Miniature design

### Model TR10-D

WIKA data sheet TE 60.04



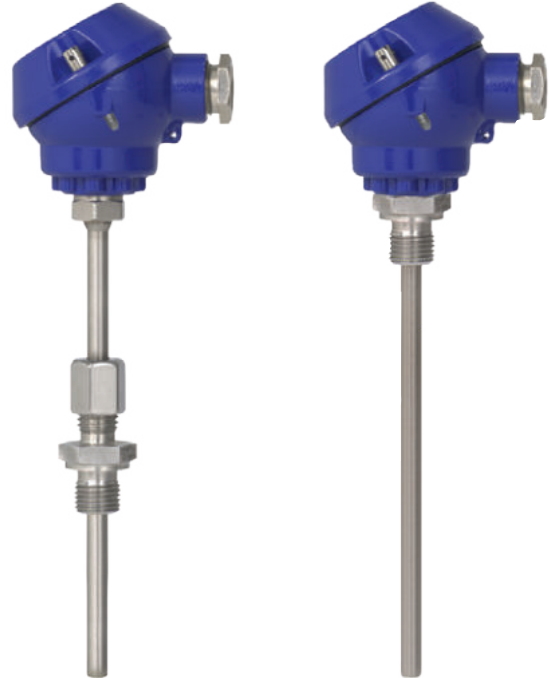
for further approvals  
see page 2

#### Applications

- Machine building, plant and vessel construction
- Propulsion technology
- Air-conditioning and refrigeration systems

#### Special features

- Sensor ranges from -196 ... +500 °C [-320 ... +932 °F]
- Compact design
- Universal application
- Direct installation into the process
- Explosion-protected versions are available for many approval types (see page 2)



**Fig. left: Model TR10-D with process connection compression fitting**

**Fig. right: Model TR10-D with process connection double threaded hex bushing**

#### Description

Resistance thermometers of this series are used for the measurement of liquid and gaseous media at low and medium pressures.

The resistance thermometer is screwed directly into the process. The electrical connection is made via connection terminals in the connection head (splash-proof). The measuring inserts are available in two variants, depending upon the application. There is a choice between versions with a replaceable, spring-loaded miniature measuring insert and versions with a non-replaceable measuring resistor built directly into the thermowell tip.









Insertion length, process connection and sensor can each be selected for the respective application.

A large number of different explosion-protected approvals are available for the TR10-D.






## Explosion protection (option)

The permissible power,  $P_{max}$ , as well as the permissible ambient temperature, for the respective category can be seen on the certificate for hazardous areas or in the operating instructions.

## Approvals (explosion protection, further approvals)

Logo	Description	Country
 	<b>EU declaration of conformity</b> <ul style="list-style-type: none"> <li>■ EMC directive <sup>1)</sup> EN 61326 emission (group 1, class B) and immunity (industrial application)</li> <li>■ RoHS directive</li> <li>■ ATEX directive (option) Hazardous areas           <ul style="list-style-type: none"> <li>- Ex i Zone 0 gas II 1G Ex ia IIC T1 ... T6 Ga</li> <li>Zone 1 gas II 2G Ex ia IIC T1 ... T6 Gb</li> <li>Zone 20 dust II 1D Ex ia IIIC T125 ... T65 °C Da</li> <li>Zone 21 dust II 2D Ex ia IIIC T125 ... T65 °C Db</li> </ul> </li> </ul>	European Union
	<b>IECEX (option) - in conjunction with ATEX</b> Hazardous areas <ul style="list-style-type: none"> <li>- Ex i Zone 0 gas Ex ia IIC T1 ... T6 Ga</li> <li>Zone 1 gas Ex ia IIC T1 ... T6 Gb</li> <li>Zone 20 dust Ex ia IIIC T125 ... T65 °C Da</li> <li>Zone 21 dust Ex ia IIIC T125 ... T65 °C Db</li> </ul>	International
	<b>EAC (option)</b> Hazardous areas <ul style="list-style-type: none"> <li>- Ex i Zone 0 gas 0Ex ia IIC T6 ... T1 Ga X</li> <li>Zone 1 gas 1Ex ia IIC T6 ... T1 Gb X</li> <li>Zone 20 dust Ex ia IIIC T80 ... T440 °C Da X</li> <li>Zone 21 dust Ex ia IIIC T80 ... T440 °C Db X</li> </ul>	Eurasian Economic Community
	<b>Ex Ukraine (option)</b> Hazardous areas <ul style="list-style-type: none"> <li>- Ex i Zone 0 gas II 1G Ex ia IIC T1 ... T6 Ga</li> <li>Zone 1 gas II 2G Ex ia IIC T1 ... T6 Gb</li> <li>Zone 20 dust II 1D Ex ia IIIC T65°C Da</li> <li>Zone 21 dust II 2D Ex ia IIIC T65°C Db</li> </ul>	Ukraine
	<b>INMETRO (option)</b> Hazardous areas <ul style="list-style-type: none"> <li>- Ex i Zone 0 gas Ex ia IIC T3 ... T6 Ga</li> <li>Zone 1 gas Ex ia IIC T3 ... T6 Gb</li> <li>Zone 20 dust Ex ia IIIC T125 ... T65 °C Da</li> <li>Zone 21 dust Ex ia IIIC T125 ... T65 °C Db</li> </ul>	Brazil
	<b>CCC (option)</b> Hazardous areas <ul style="list-style-type: none"> <li>- Ex i Zone 0 gas Ex ia IIC T1 ~ T6 Ga</li> <li>Zone 1 gas Ex ia IIC T1 ~ T6 Gb</li> <li>Zone 2 gas Ex ic IIC T1 ~ T6 Gc</li> <li>Zone 20 dust Ex iaD 20 T65/T95/T125°C</li> <li>Zone 21 dust Ex iaD 21 T65/T95/T125°C</li> </ul>	China
	<b>KCS - KOSHA (option)</b> Hazardous areas <ul style="list-style-type: none"> <li>- Ex i Zone 0 gas Ex ia IIC T4 ... T6</li> <li>Zone 1 gas Ex ib IIC T4 ... T6</li> </ul>	South Korea

1) Only for built-in transmitter

Logo	Description	Country
-	<b>PESO (option)</b> Hazardous areas - Ex i Zone 0 gas Ex ia IIC T1 ... T6 Ga Zone 1 gas Ex ia IIC T3 ... T6 Gb	India
	<b>GOST (option)</b> Metrology, measurement technology	Russia
	<b>KazInMetr (option)</b> Metrology, measurement technology	Kazakhstan
-	<b>MTSCHS (option)</b> Permission for commissioning	Kazakhstan
	<b>BelGIM (option)</b> Metrology, measurement technology	Belarus
	<b>UkrSEPRO (option)</b> Metrology, measurement technology	Ukraine
	<b>Uzstandard (option)</b> Metrology, measurement technology	Uzbekistan

Instruments marked with “ia” may also be used in areas only requiring instruments marked with “ib” or “ic”.

If an instrument with “ia” marking has been used in an area with requirements in accordance with “ib” or “ic”, it can no longer be operated in areas with requirements in accordance with “ia” afterwards.

Approvals and certificates, see website

# Sensor

## Measuring element

Pt100, Pt1000 <sup>1)</sup> (measuring current: 0.1 ... 1.0 mA) <sup>2)</sup>

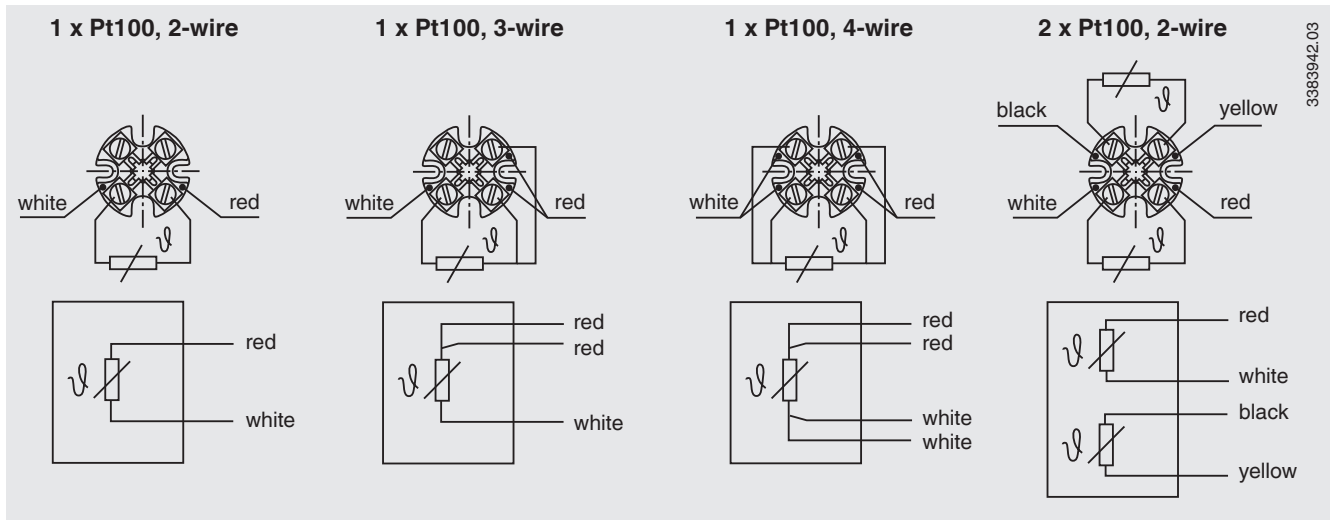
Connection method	
Single elements	1 x 2-wire 1 x 3-wire 1 x 4-wire
Dual elements	2 x 2-wire

Validity limits of class accuracy per EN 60751		
Class	Sensor construction	
	Wire-wound	Thin-film
Class B	-196 ... +500 °C	-50 ... +500 °C
Class A <sup>3)</sup>	-100 ... +450 °C	-30 ... +300 °C
Class AA <sup>3)</sup>	-50 ... +250 °C	0 ... 150 °C

1) Pt1000 only available as a thin-film measuring resistor  
 2) For detailed specifications for Pt100 sensors, see Technical information IN 00.17 at [www.wika.com](http://www.wika.com).  
 3) Not with 2-wire connection method

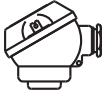
The table shows the temperature ranges listed in the respective standards, in which the tolerance values (class accuracies) are valid.

## Electrical connection



For the electrical connections of built-in temperature transmitters see the corresponding data sheets or operating instructions.

## Connection head



JS

Model	Material	Cable entry thread size	Ingress protection (max.) <sup>1)</sup> IEC/EN 60529	Cap	Surface	Connection to neck tube
JS	Aluminium	M16 x 1.5 <sup>2)</sup>	IP65	Cover with 2 screws	Blue, painted <sup>3)</sup>	M24 x 1.5, ½ NPT

Model	Explosion protection		
	Without	Ex i (gas) Zone 0, 1, 2	Ex i (dust) Zone 20, 21
JS	x	x	x

1) IP ingress protection of the connection head. The IP ingress protections of the complete instrument TR10-D must not inevitably correspond to the connection head.

2) Standard

3) RAL 5022

## Cable entry



Standard



Plastic



Brass,  
nickel-plated

The pictures show examples of connection heads.

Cable entry	Cable entry thread size	Min./max. ambient temperature
Standard cable entry	M16 x 1.5	-40 ... +80 °C
Plastic cable gland (cable Ø 6 ... 10 mm)	M16 x 1.5	-40 ... +80 °C
Brass cable gland, nickel-plated (cable Ø 6 ... 12 mm)	M16 x 1.5	-40 ... +80 °C

Cable entry	Colour	Ingress protection (max.) IEC/EN 60529 <sup>1)</sup>	Explosion protection	
			without	Ex i (gas), zone 0, 1, 2
Standard cable entry	Blank	IP65	x	x
Plastic cable gland	Black or grey	IP65	x	x
Plastic cable gland, Ex e	Light blue	IP65	x	x
Plastic cable gland, Ex e	Black	IP65	x	x
Brass cable gland, nickel-plated	Blank	IP65	x	x
Brass cable gland, nickel-plated, Ex e	Blank	IP65	x	x

1) IP ingress protection of the cable gland. The IP ingress protections of the complete instrument TR10-D must not inevitably correspond to the cable gland.

## Ingress protection per IEC/EN 60529

### Degrees of protection against solid foreign bodies (defined by the first index number)

First index number	Degree of protection / short description	Test parameter
5	Dust-protected	per IEC/EN 60529
6	Dust-tight	per IEC/EN 60529

### Degrees of protection against water (defined by the second index number)

Second index number	Degree of protection / short description	Test parameter
4	Protected against splash water	per IEC/EN 60529
5	Protected against water jets	per IEC/EN 60529

Standard ingress protection of model TR10-D is IP65.

The stated degrees of protection apply under the following conditions:

- Use of a suitable cable gland
- Use of a cable cross-section appropriate for the gland or select the appropriate cable gland for the available cable
- Adhere to the tightening torques for all threaded connections

## Transmitter (option)

Within the model JS connection head, a model T91.20 analogue temperature transmitter can be factory-fitted. It is mounted in place of the terminal block.

The version with temperature transmitter is not suitable for use in hazardous areas.

For further specifications on the model T91.20 temperature transmitter please refer to WIKA data sheet TE 91.01.

### Transmitter model



Output signal 4 ... 20 mA	
Transmitter (selectable versions)	Model T91.20
Data sheet	TE 91.01
Output	
4 ... 20 mA	x
Connection method	
1 x 2-wire	x
Measuring current	0.8 ... 1 mA <sup>1)</sup>
Explosion protection	-

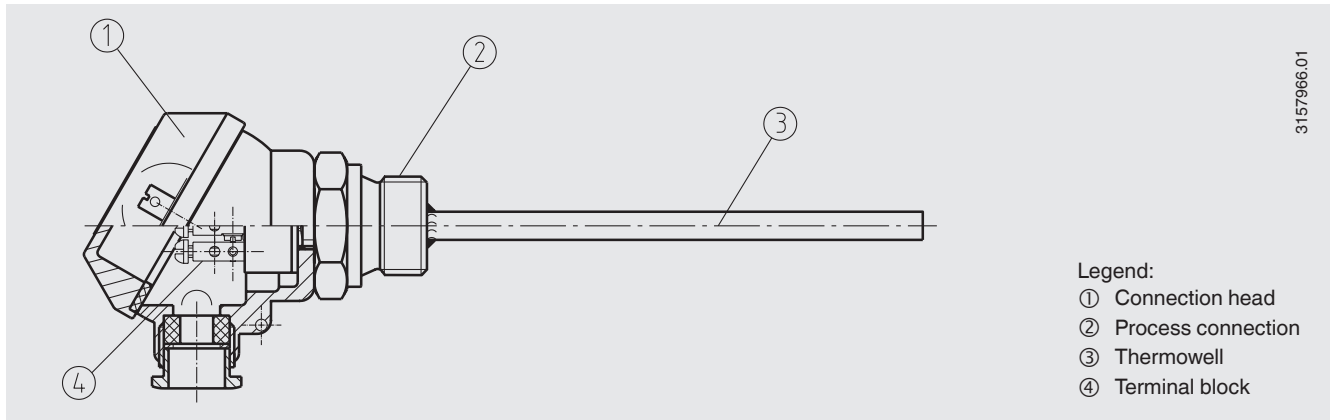
### Possible mounting positions for transmitters

Connection head	T91.20
JS	○

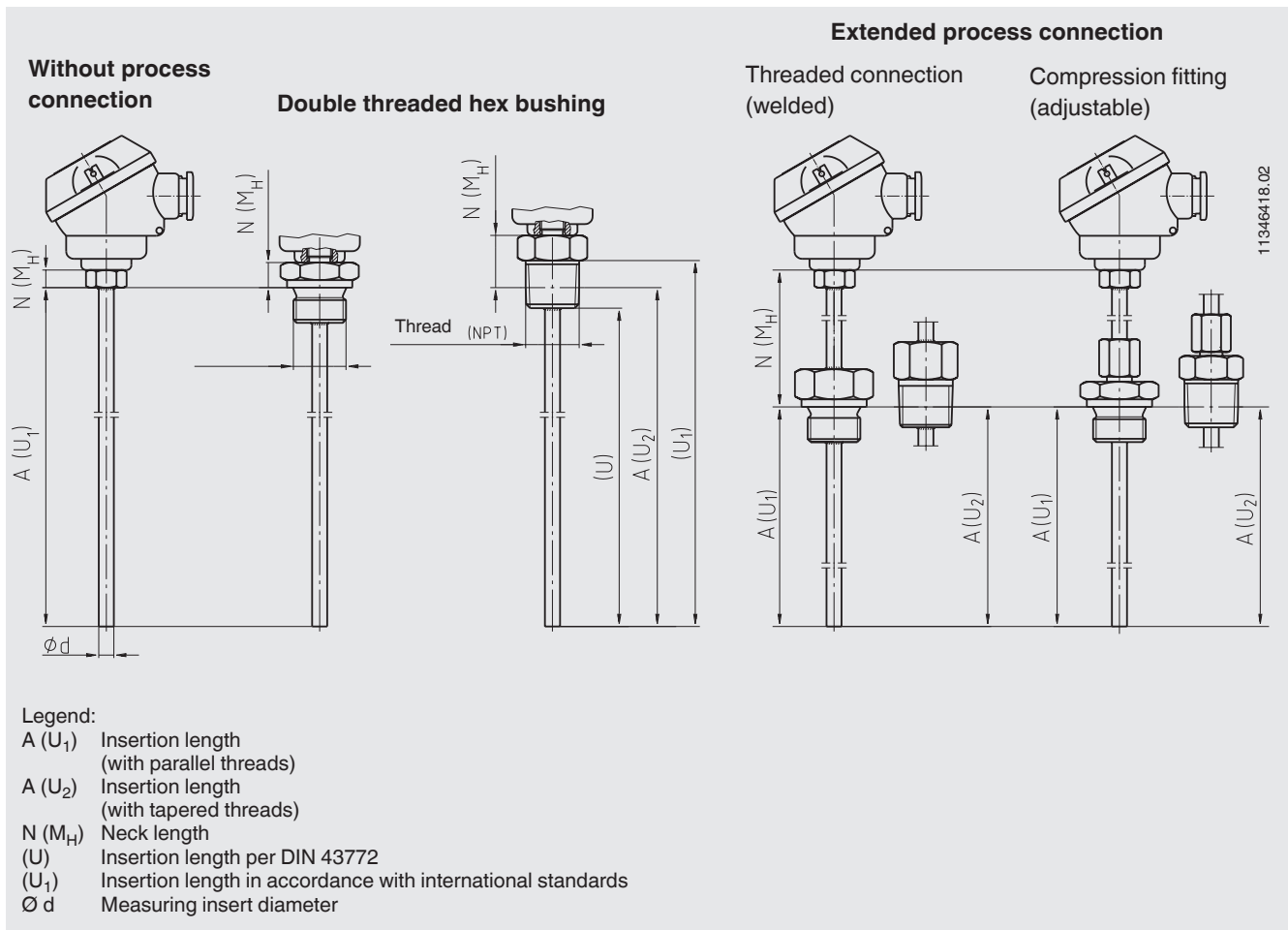
○ Mounted instead of terminal block

For a correct determination of the overall measuring deviation, the sensor and transmitter measuring deviations must be added.

# Components model TR10-D



## Dimensions in mm



## Thermowell / Process connection

Diameter	Process connection	Thread size	Neck length (standard)	Max. neck length	Min. insertion length	Max. insertion length	Material
			N (M <sub>H</sub> )	N (M <sub>H</sub> )	A (U <sub>1</sub> ) / A (U <sub>2</sub> )	A (U <sub>1</sub> ) / A (U <sub>2</sub> )	
6 mm 8 mm	without	-	7 mm (Hex height)	7 mm (Hex height)	50 mm	600 mm	1.4571
	Double threaded hex bushing (male thread direct on the connection head)	G ¼ B	10 mm (Hex height incl. dimension up to the screw-in plane)	10 mm (Hex height incl. dimension up to the screw-in plane)			
		G ⅜ B					
		G ½ B					
		M10 x 1 <sup>1)</sup>					
		M14 x 1.5					
		M18 x 1.5					
		M20 x 1.5					
		¼ NPT					
	½ NPT	approx. 19 mm (Hex height incl. dimension up to the screw-in plane)	approx. 19 mm (Hex height incl. dimension up to the screw-in plane)				
	Male thread (offset-welded to thermowell)	G ¼ B	55 mm	200 mm			
		G ⅜ B					
		G ½ B					
		M10 x 1 <sup>1)</sup>					
		M14 x 1.5					
		M18 x 1.5					
		M20 x 1.5					
		¼ NPT					
		½ NPT					
		Compression fitting with metal clamping ring Compression fitting with PTFE clamping ring <sup>2)</sup>			G ¼ B	approx. 55 mm	
	G ⅜ B						
	G ½ B						
	M10 x 1 <sup>1)</sup>						
	M14 x 1.5						
	M18 x 1.5						
	M20 x 1.5						
¼ NPT							
½ NPT							
Spring-loaded compression fitting	G ¼ B	approx. 100 mm					
	G ⅜ B						
	G ½ B						
	M14 x 1.5						
	M18 x 1.5						
	M20 x 1.5						
	¼ NPT						
	½ NPT						

1) only Ø = 6 mm

2) Maximum temperature at process connection: 150 °C



## Compression fitting

Ferrules from stainless steel are only adjustable once; once the fitting has been loosened, sliding along the thermowell is no longer possible.

Ferrules from PTFE can be adjusted numerous times; once the fitting has been loosened it can again be tightened onto the thermowell.

Max. temperature at process connection: 150 °C

On delivery, the compression fittings are only tightened hand-tight. Insertion length A and neck length N (M<sub>H</sub>) can thus be checked. The final positioning/fixing of the compression fitting is carried out at the installation location.

## Neck length N (M<sub>H</sub>)

The neck length depends on the intended use. Usually an isolation is bridged by the neck tube. Also, in many cases, the neck tube serves as a cooling extension between the connection head and the medium, in order to protect a possible built-in transmitter from high medium temperatures.

## Measuring insert

Specifications		
	Removable design	Fixed design
<b>Description</b>	The measuring insert is spring-mounted with two screws into the connection head and can simply be removed from the thermowell for calibration purposes. The thermowell itself can thus remain in the process. The terminal base for electrical connection is connected to the probe tube of the measuring insert.	There is no removable measuring insert in this version. Instead, the sensor element is mounted directly in the thermowell tip. The terminal base for the electrical connection is permanently screwed into the connection head.
<b>Diameter</b> (for thermowell Ø = 6 mm)	3 mm	-
<b>Diameter</b> (for thermowell Ø = 8 mm)	6 mm	-
<b>Operating temperatures</b> (dependent upon the sensor design type and the accuracy class)	Min: -196 °C Max: +500 °C	Min: -50 °C Max: +250 °C
<b>Built-in measuring insert model</b>	<ul style="list-style-type: none"><li>■ TR10-A (from 100 mm measuring insert lengths) Mineral-insulated line (MI cable)</li><li>■ TR11-A (up to 99 mm measuring insert lengths) Tubular design</li></ul>	-

## Operating conditions

### Ambient and storage temperature

-40 ... +80 °C

Other ambient and storage temperatures on request

## Certificates (option)

Certification type	Measurement 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.

The minimum length (metal part of the probe) for carrying out a measurement accuracy test 3.1 or DKD/DAkkS is 100 mm. Calibration of shorter lengths on request.

Versions with exchangeable measuring insert:

For calibration, the measuring insert is removed from the thermometer.