

# Resistance thermometer

## For additional thermowell, flameproof enclosure (Ex d)

### Model TR10-L

WIKA data sheet TE 60.12



for further approvals  
see page 2

#### Applications

- Chemical industry
- Petrochemical industry
- Offshore

#### Special features

- Sensor ranges from -196 ... +600 °C (-320 ... +1,112 °F)
- Measuring insert replaceable
- For many thermowell designs



Fig. left: Model TR10-L with connection head 7/8000

Fig. right: Model TR10-L with connection head 1/4000

#### Description

Resistance thermometers in this series can be combined with a large number of thermowell designs.

A wide variety of possible combinations of sensor, connection head, insertion length, neck length, connection to thermowell etc. are available for the thermometers; suitable for almost any thermowell dimension.

## Explosion protection (option)












The permissible power  $P_{max}$  as well as the permissible ambient temperature for the respective category can be seen on the EC-type examination certificate, the Ex certificate or in the operating instructions.

### Attention:


Only with the correspondingly suitable protective components is operation in dust Ex hazardous areas permissible.

The built-in transmitter has its own certificate. The permissible ambient temperature ranges of the built-in transmitters can be taken from the corresponding transmitter approval.

## 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 d Zone 1 gas [II 2G Ex db IIC T1 ... T6 Gb] - with suitable solid-machined thermowell [II 2G Ex db IIB + H<sub>2</sub> T1 ... T6 Gb]</li> <li>Zone 21 dust [II 2D Ex tb IIIC T85 °C Db IP66]</li> </ul> </li> </ul>	European Union
		
	<b>IECEX (option)</b> (in conjunction with ATEX) Hazardous areas <ul style="list-style-type: none"> <li>- Ex d Zone 1 gas [Ex db IIC T1 ... T6 Gb] - with suitable solid-machined thermowell [Ex db IIB + H<sub>2</sub> T1 ... T6 Gb]</li> <li>Zone 21 dust [Ex tb IIIC T85 °C Db IP66]</li> </ul>	International
	<b>EAC (option)</b> Hazardous areas <ul style="list-style-type: none"> <li>- Ex d Zone 1 gas [1 Ex d IIC T1 ... T6]</li> <li>Zone 21 dust [DIP A21 Ta 80 ... 440 °C]</li> </ul>	Eurasian Economic Community
	<b>INMETRO (option)</b> Hazardous areas <ul style="list-style-type: none"> <li>- Ex d Zone 1 gas [Ex d IIC T* Gb IP66] [Ex d IIB + H<sub>2</sub> T* Gb IP66]</li> </ul>	Brazil
	<b>DNOP - MakNII (option)</b> Hazardous areas <ul style="list-style-type: none"> <li>- Ex d Zone 1 gas [II 2G Ex d IIB + H<sub>2</sub> T4 ... T6] + [II 2G Ex d IIC T4 ... T6]</li> <li>Zone 21 dust [II 2D Ex tD A21 IP66 T85 °C]</li> </ul>	Ukraine
	<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</b> Metrology, measurement technology	Ukraine
	<b>Uzstandard</b> Metrology, measurement technology	Uzbekistan

## Manufacturer's information and certificates

Logo	Description
	<b>SIL 2</b> Functional safety (only in conjunction with model T32 temperature transmitter)

1) Only for built-in transmitter

Approvals and certificates, see website

# Sensor

## Measuring element

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

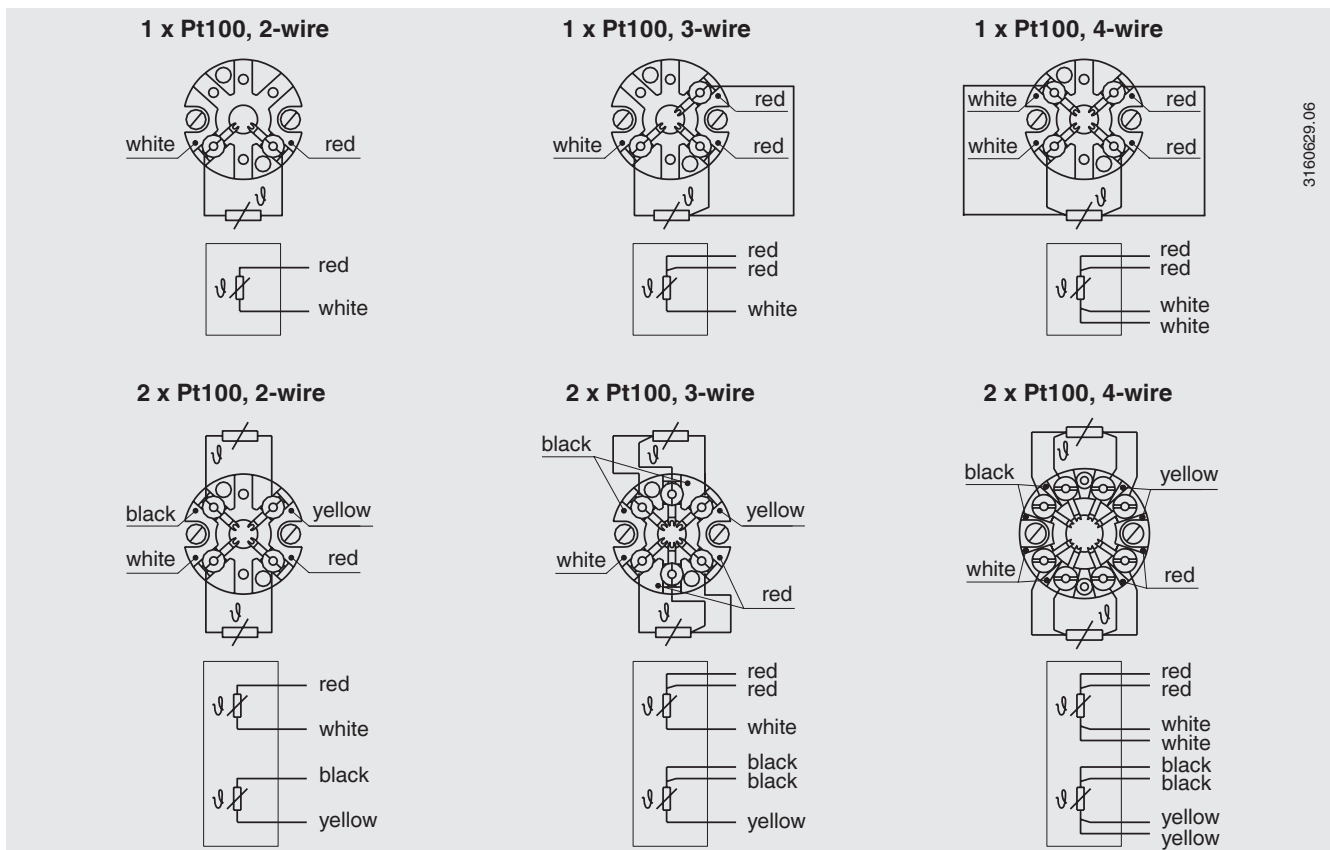
Connection method	
Single elements	1 x 2-wire 1 x 3-wire 1 x 4-wire
Dual elements	2 x 2-wire 2 x 3-wire 2 x 4-wire <sup>3)</sup>

Accuracy class / Range of use of the sensor per EN 60751		
Class	Sensor construction	
	Wire-wound	Thin-film
Class B	-196 ... +600 °C	-50 ... +500 °C
	-196 ... +450 °C	-50 ... +250 °C
Class A <sup>4)</sup>	-100 ... +450 °C	-30 ... +300 °C
Class AA <sup>4)</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 3 mm diameter
- 4) 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 (colour code per IEC/EN 60751)



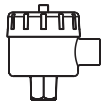
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For the electrical connections of built-in temperature transmitters see the corresponding data sheets or operating instructions.

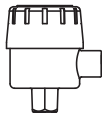
## Connection head



1/4000 F  
1/4000 S



7/8000 W  
7/8000 S



7/8000 W / DIH50  
7/8000 S / DIH50

Model	Material	Cable entry thread size	Ingress protection (max.) <sup>1)</sup>	Cover / Cap	Surface	Connection to neck tube
1/4000 F	Aluminium	½ NPT, ¾ NPT, M20 x 1.5	IP66 <sup>4)</sup>	Screw-on lid	Blue, lacquered <sup>2)</sup>	½ NPT
1/4000 S	Stainless steel	½ NPT, ¾ NPT, M20 x 1.5	IP66 <sup>4)</sup>	Screw-on lid	Blank	½ NPT
7/8000 W	Aluminium	½ NPT, ¾ NPT, M20 x 1.5	IP66 <sup>4)</sup>	Screw-on lid	Blue, lacquered <sup>2)</sup>	½ NPT
7/8000 S	Stainless steel	½ NPT, ¾ NPT, M20 x 1.5	IP66 <sup>4)</sup>	Screw-on lid	Blank	½ NPT
7/8000 W / DIH50 <sup>3)</sup>	Aluminium	½ NPT, ¾ NPT, M20 x 1.5	IP66 <sup>4)</sup>	Screw-on lid	Blue, lacquered <sup>2)</sup>	½ NPT
7/8000 S / DIH50 <sup>3)</sup>	Stainless steel	½ NPT, ¾ NPT, M20 x 1.5	IP66 <sup>4)</sup>	Screw-on lid	Blank	½ NPT

1) The ingress protection refers to the connection head, for information on the cable glands, see page 5

2) RAL 5022

3) LC display DIH50

4) Suitable seal/cable gland required

## Connection head with digital display



Connection head 7/8000 W with LC display, model DIH50  
see data sheet AC 80.10

To operate the digital display, a transmitter with a 4 ... 20 mA output is always required.

## Flame path fitting

A flame path fitting is built into the connection head which, in conjunction with the measuring insert, generates a flame-proof gap.



Fig. left: Flame path fitting for model 1/4000 connection head

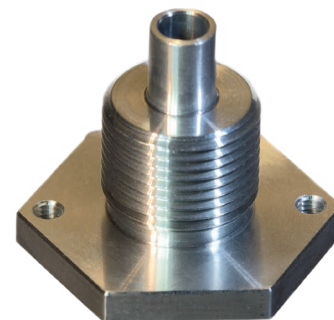


Fig. right: Flame path fitting for 7/8000 and 7/8000 connection heads with DIH50

## Cable entry



**Ex d cable gland stainless steel**



**Plain threaded**



**Sealing plugs for transport**

The pictures show examples of threaded connections and connection heads.

Cable entry	Cable entry thread size
Ex d cable gland stainless steel	M20 x 1.5 or ½ NPT
Plain threaded	M20 x 1.5 or ½ NPT
Sealing plugs for transport	M20 x 1.5 or ½ NPT

Cable entry	Colour	Ingress protection (max.)	Min./max. ambient temperature
Ex d cable gland stainless steel	Blank	IP66	-60 <sup>1)</sup> / -40 ... +80 °C
Plain threaded	-	IP00	-
Sealing plugs for transport	Transparent	-	-40 ... +80 °C

1) Special version on request (only available with selected approvals), other temperatures on request

## Ingress protection

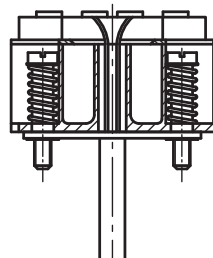
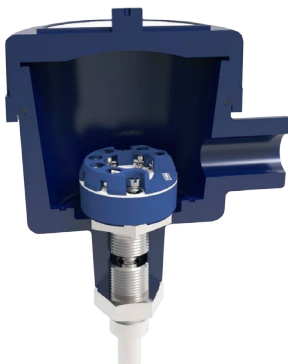
to IP66 per IEC/EN 60529 under the following conditions:

- 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

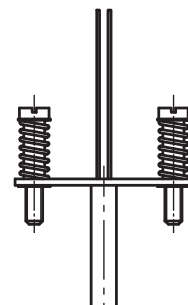
## Transmitter

### Mounting onto the measuring insert

With mounting on the measuring insert, the transmitter replaces the terminal block and is fixed directly to the terminal plate of the measuring insert.



**Measuring insert with mounted transmitter (here: Model T32)**



**Measuring insert prepared for transmitter mounting**

## Transmitter models



Output signal 4 ... 20 mA, HART® protocol, FOUNDATION™ Fieldbus and PROFIBUS® PA			
Transmitter (selectable versions)	Model T15	Model T32	Model T53
Data sheet	TE 15.01	TE 32.04	TE 53.01
<b>Output</b>			
■ 4 ... 20 mA	x	x	
■ HART® protocol		x	
■ FOUNDATION™ Fieldbus and PROFIBUS® PA			x
<b>Connection method</b>			
■ 1 x 2-wire, 3-wire or 4-wire	x	x	x
<b>Measuring current</b>	< 0.2 mA	< 0.3 mA	< 0.2 mA
<b>Explosion protection</b>	Optional	Optional	Standard

## Possible mounting positions for transmitters

Connection head	T15	T32	T53
1/4000 F, 1/4000 S	○	○	○
7/8000 W, 7/8000 S	○	○	○
7/8000 W / DIH50, 7/8000 S / DIH50	○	○	-

○ Mounted instead of terminal block

– Mounting not possible

The mounting of a transmitter on the measuring insert is possible with all the connection heads listed here. The fitting of a transmitter in the (screw) cap of a North American design connection head is not possible.

Mounting of 2 transmitters on request.

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

## Functional safety (option) with temperature transmitter model T32



In safety-critical applications, the entire measuring chain must be taken into consideration in terms of the safety parameters. The SIL classification allows the assessment of the risk reduction achieved by the safety installations.

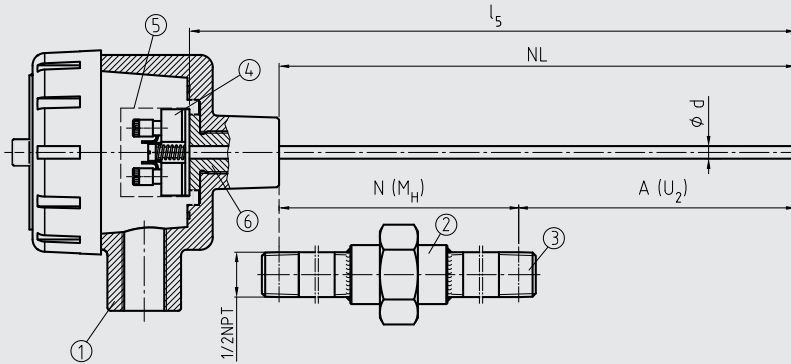
Selected TR10-L resistance thermometers, in combination with a suitable temperature transmitter (e.g. model T32.1S, TÜV certified SIL version for protection systems developed in accordance with IEC 61508), are suitable as sensors for safety functions to SIL 2.

For detailed specifications, see Technical information IN 00.19 at [www.wika.com](http://www.wika.com).

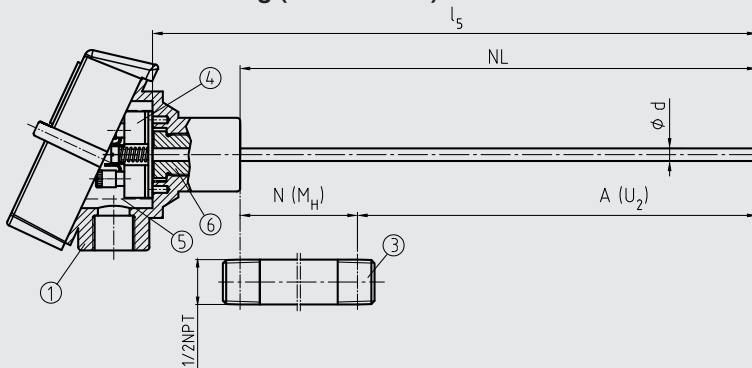
# Components model TR10-L

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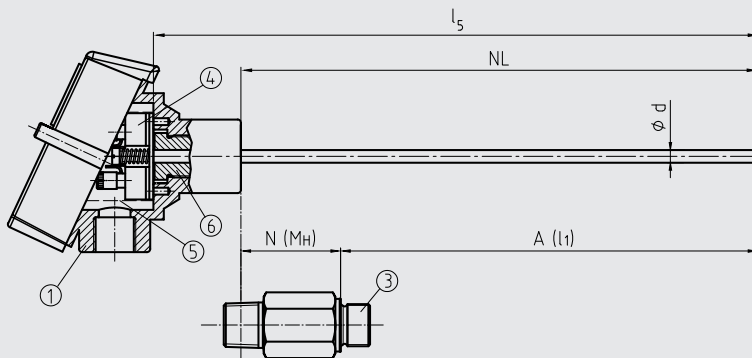
## “Nipple-union-nipple” neck tube



## Double threaded hex bushing (tube section)

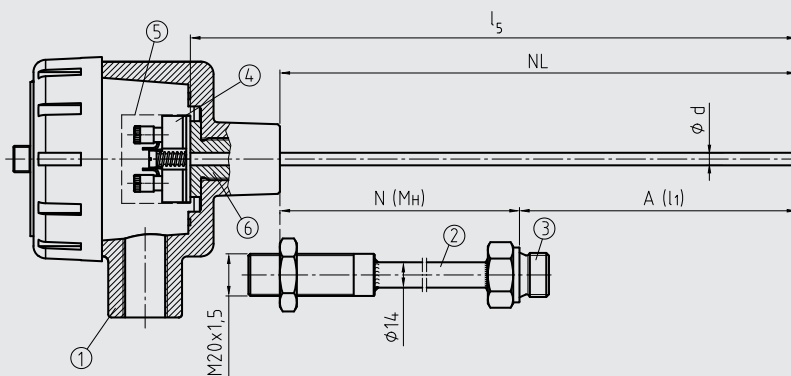


## Double threaded hex bushing (with hexagonal spanner flats)



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## Neck tube with counter nut to head



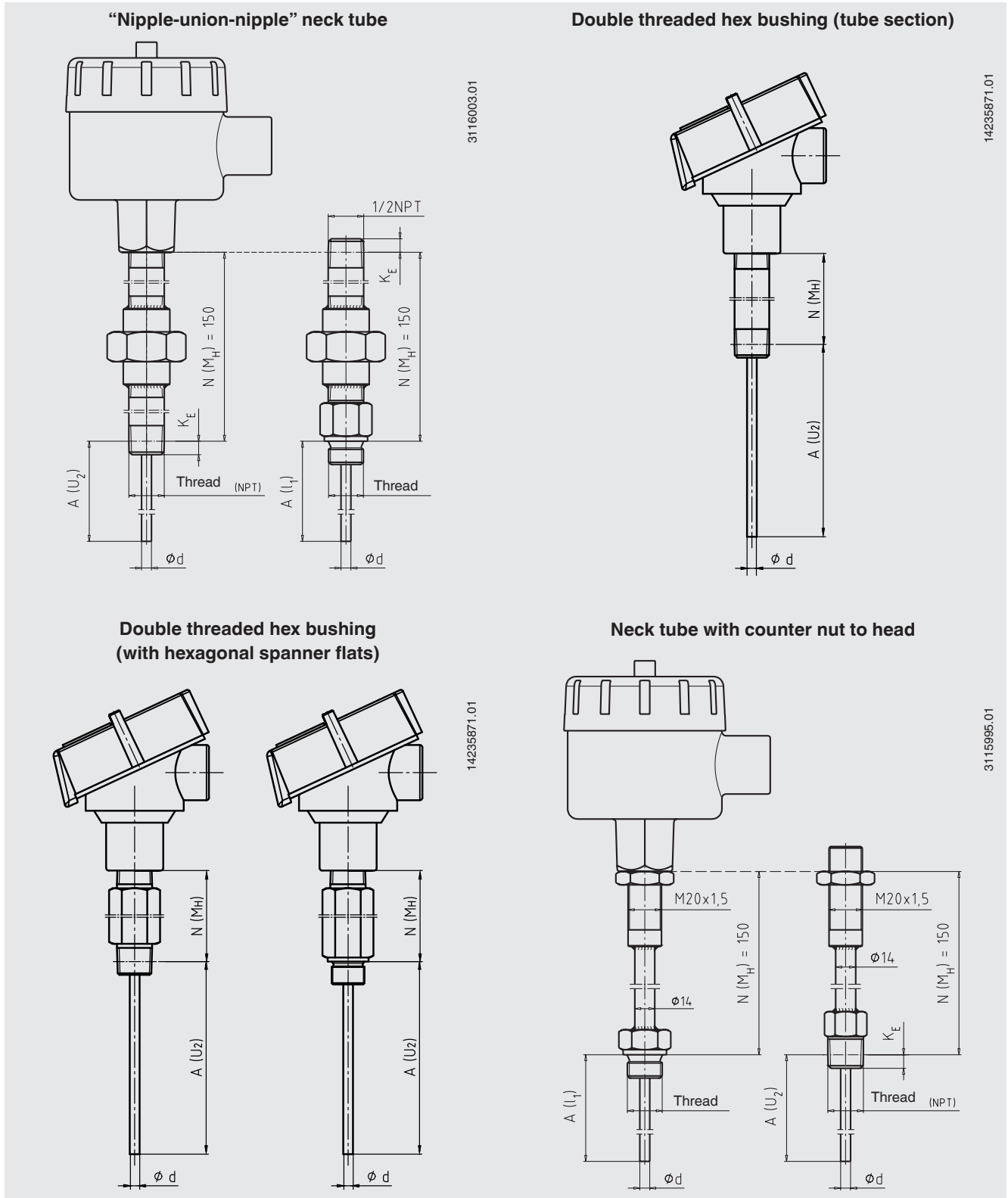
### Legend:

- ① Connection head
- ② Neck tube
- ③ Connection to thermowell
- ④ Measuring insert
- ⑤ Transmitter (option)
- ⑥ Flame path fitting

- A (I1) Insertion length (with parallel threads)
- A (U2) Insertion length (with tapered threads)
- l5 Measuring insert length
- Ø d Measuring insert diameter
- NL Nominal length
- N (MH) Neck length

# Neck tube

## Neck tube designs



**Legend:**

$A(I_1)$  Insertion length (with parallel threads)  
 $A(U_2)$  Insertion length (with tapered threads)  
 $N(M_H)$  Neck length

$\phi d$  Measuring insert diameter  
 $K_E$  Screw-in length by hand  
 - with  $1/2$  NPT approx. 8.1 mm  
 - with  $3/4$  NPT approx. 8.6 mm



## Neck tube versions

Neck tube design	Diameter	Connection to head	Connection to thermowell	Material
"Nipple-union-nipple" neck tube (nipple-union-nipple)	~ 22 mm	½ NPT	Mounting thread	316
	~ 27 mm	¾ NPT		
Double threaded hex bushing (tube section)	~ 22 mm	½ NPT	Mounting thread	316
	~ 27 mm	¾ NPT		
Double threaded hex bushing (with hexagonal spanner flats)	-	M24 x 1.5, ½ NPT	Mounting thread	1.4571
Neck tube with counter nut to head	14 x 2.5 mm	M20 x 1.5 (with counter nut)	Mounting thread	1.4571

## Thread sizes

Neck tube design	Diameter	Thread to the thermowell
"Nipple-union-nipple" neck tube	~ 22 mm	½ NPT
	~ 27 mm	¾ NPT
Double threaded hex bushing (tube section)	~ 22 mm	½ NPT
	~ 27 mm	¾ NPT
Double threaded hex bushing (with hexagonal spanner flats)	-	G ½ B
		G ¾ B
		G ¼ B
		½ NPT
		¾ NPT
		M14 x 1.5
		M18 x 1.5
		M20 x 1.5
Neck tube with counter nut to head	14 x 2.5 mm	½ NPT
		¾ NPT
		G ½ B
		G ¾ B
		G ¼ B
		M14 x 1.5
		M18 x 1.5
		M20 x 1.5

## Neck lengths

Neck tube design	Neck length	Min. / Max. neck length
"Nipple-union-nipple" neck tube	150 mm (approx. 6 inch)	75 mm (approx. 3 inch) / 250 mm (approx. 10 inch)
Double threaded hex bushing (tube section)	50 mm (approx. 2 inch)	50 mm (approx. 2 inch) / 250 mm (approx. 10 inch)
Double threaded hex bushing (with hexagonal spanner flats)	25 mm	
Neck tube with counter nut to head	150 mm (approx. 6 inch)	75 mm (approx. 3 inch) / 250 mm (approx. 10 inch)

The neck tube is screwed into the connection head. 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.

Other versions on request

## Measuring insert

Within the TR10-L, the measuring insert of model TR10-K is fitted.

The replaceable measuring insert is made of a vibration-resistant, sheathed measuring cable (MI cable).



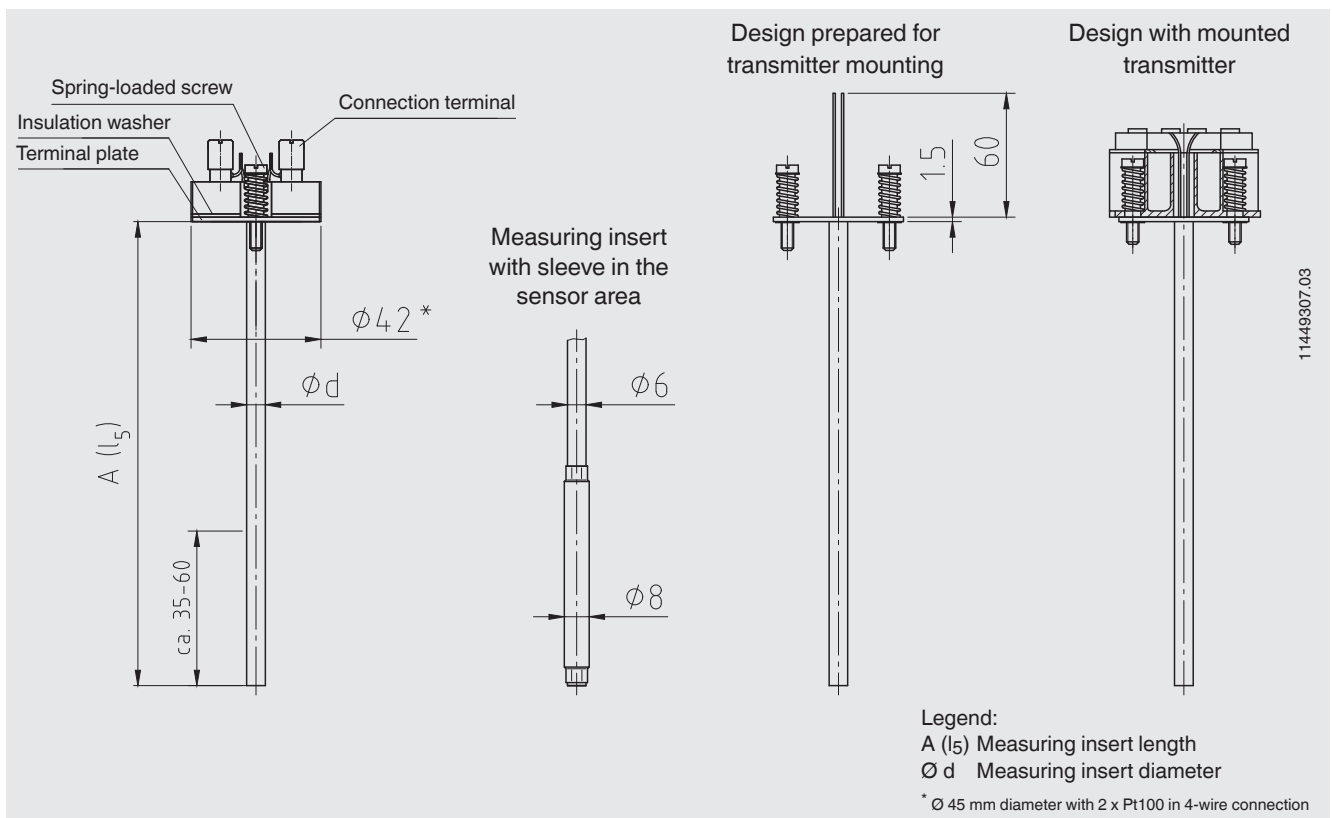
Pay special attention to the assembly/disassembly of the measuring insert. The surface of the sheathed cable of the measuring insert must not be damaged! (No creases, grooves, scratches etc.). Any damaged measuring insert must be replaced. It is advisable to renew the corresponding flame path fitting in this case.

### Attention:

Only correct measuring insert length and correct measuring insert diameter ensure sufficient heat transfer from thermowell to the measuring insert. The bore diameter of the thermowell should be a max. 1 mm larger than the measuring insert diameter. Gaps of more than 0.5 mm between thermowell and the measuring insert will have a negative effect on the heat transfer, and they will result in unfavourable response behaviour of the thermometer.

When fitting the measuring insert into a thermowell, it is very important to determine the correct insertion length (= thermowell length for bottom thicknesses of  $\leq 5.5$  mm). In order to ensure that the measuring insert is firmly pressed down onto the bottom of the thermowell, the measuring insert must be spring-loaded (spring travel: max. 10 mm).

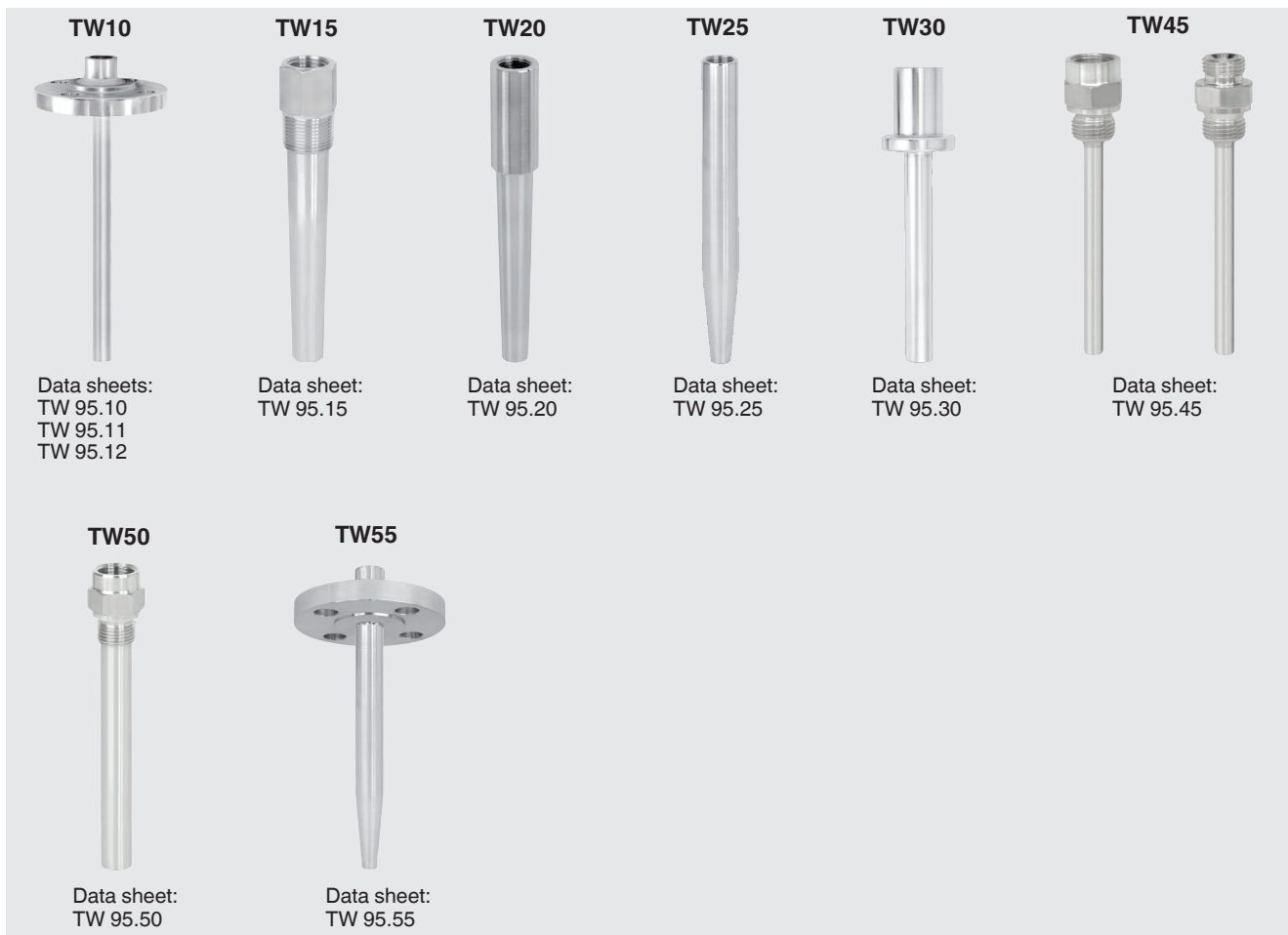
## Dimensions in mm



Measuring insert diameter Ø d in mm	Sheath material
3 <sup>1)</sup>	1.4571, 316L <sup>1)</sup>
6	1.4571, 316L <sup>1)</sup>
8 (6 mm with sleeve)	1.4571

1) Not possible with 2 x 4-wire versions

## Thermowell selection



Special thermowells on request

## Operating conditions

### Mechanical requirements

Version	
<b>Standard</b>	6 g peak-to-peak, wire-wound measuring resistor or thin film
<b>Option</b>	Vibration-resistant probe tip, max. 20 g peak-to-peak, thin-film measuring resistor
	Highly vibration-resistant probe tip, max. 50 g peak-to-peak, thin-film measuring resistor

The information on vibration resistance refers to the tip of the measuring insert.

For detailed specifications on the vibration resistance of Pt100 sensors, see Technical information IN 00.17 at [www.wika.com](http://www.wika.com).

### Ambient and storage temperature

-60 <sup>1)</sup> / -40 ... +80 °C

1) Special version on request (only available with specific approvals)

Other ambient and storage temperatures on request

## Certificates (option)

Certification type	Measurement accuracy	Material certificate <sup>2)</sup>
<b>2.2 test report</b>	x	x
<b>3.1 inspection certificate</b>	x	x
<b>DKD/DAkkS calibration certificate</b>	x	-

The different certifications can be combined with each other.

2) Thermowells have their own material certificates

### Ordering information

Model / Explosion protection / Process connection / Version and material of threaded connection / Thread size / Measuring element / Connection method / Temperature range / Probe diameter / Insertion length A / Neck length N(M<sub>H</sub>) / Certificates / Options

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