

# 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
- Explosion-protected versions are available for many approval types (see page 2)

## 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.

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













**Fig. left: Model TR10-L with connection head 7/8000**  
**Fig. right: Model TR10-L with connection head 1/4000**

## 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.

Transmitters have own certificates for hazardous areas. The permissible ambient temperature ranges of the built-in transmitters can be taken from the corresponding transmitter operating instructions and approvals.


## 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 IIB + H2 T6 ... T4 Gb</li> <li>Zone 1 gas II 2G Ex db IIC T6 ... T4 Gb <sup>2)</sup></li> <li>Zone 21 dust II 2D Ex tb IIIC T85 °C Db IP66</li> </ul> </li> </ul>	European Union
		
	<b>IECEx (option) - in conjunction with ATEX</b> Hazardous areas <ul style="list-style-type: none"> <li>- Ex d Zone 1 gas Ex db IIB + H2 T6 ... T4 Gb</li> <li>Zone 1 gas Ex db IIC T6 ... T4 Gb <sup>2)</sup></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 1Ex d IIC T6 ... T4 Gb X</li> <li>Zone 1 gas 1Ex d IIB+H2 T6 ... T4 Gb X</li> <li>Zone 21 dust Ex tb IIIC T85°C Db X</li> </ul>	Eurasian Economic Community
	<b>Ex Ukraine (option)</b> Hazardous areas <ul style="list-style-type: none"> <li>- Ex d Zone 1 gas II 2G Ex db IIB+H2 T6 ... T4 Gb</li> <li>Zone 1 gas II 2G Ex db IIC T6 ... T4 Gb</li> <li>Zone 1 mounting to zone 0 gas II 1/2G Ex db IIC T6 ... T4 Ga/Gb</li> <li>Zone 21 dust II 2D Ex tb IIIC T85°C Db</li> </ul>	Ukraine
	<b>INMETRO (option)</b> Hazardous areas <ul style="list-style-type: none"> <li>- Ex d Zone 1 gas Ex db IIB + H2 T6 ... T4 Gb IP66</li> <li>Zone 1 gas Ex db IIC T6 ... T4 Gb IP66</li> </ul>	Brazil
	<b>CCC (option) <sup>3)</sup></b> Hazardous areas <ul style="list-style-type: none"> <li>- Ex d Zone 1 gas Ex d IIB+H2 T4~T6 Gb</li> <li>Zone 1 gas Ex d IIC T4~T6 Gb</li> <li>Zone 21 dust Ex tD A21 IP66 T85°C</li> </ul>	China
	<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

Logo	Description	Country
	<b>UkrSEPRO</b> Metrology, measurement technology	Ukraine
	<b>Uzstandard</b> Metrology, measurement technology	Uzbekistan

- 1) Only for built-in transmitter
- 2) With suitable solid-machined thermowell
- 3) Without transmitter

## Manufacturer's information and certificates

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

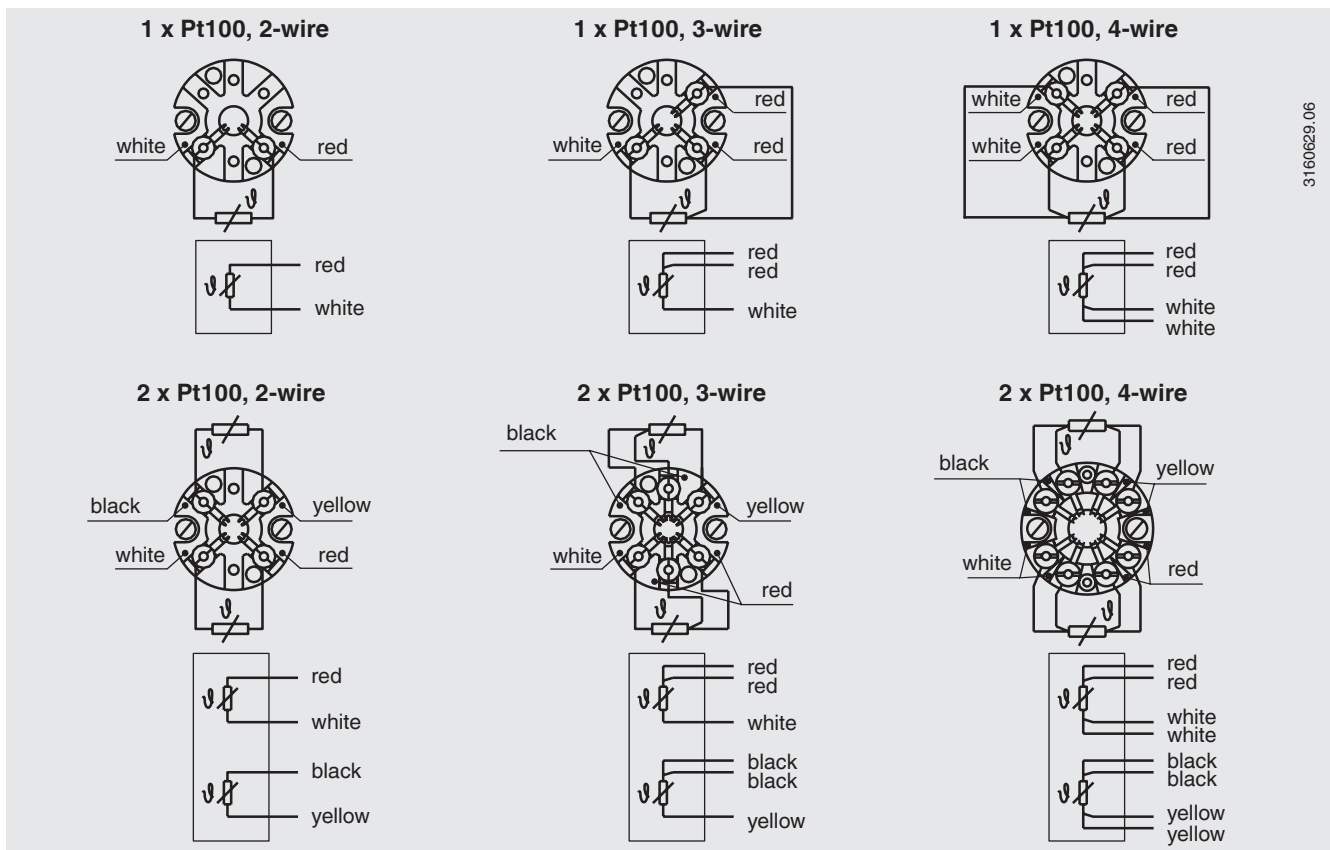
## Validity limits of class accuracy per EN 60751

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)

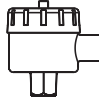


For the electrical connections of built-in temperature transmitters see the corresponding data sheets or operating instructions.

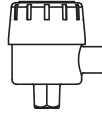
## Connection head



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> IEC/EN 60529	Cover / Cap	Surface	Connection to neck tube
1/4000 F	Aluminium	½ NPT, ¾ NPT, M20 x 1.5	IP66 <sup>2)</sup>	Screw-on lid	Blue, lacquered <sup>3)</sup>	½ NPT
1/4000 S	Stainless steel	½ NPT, ¾ NPT, M20 x 1.5	IP66 <sup>2)</sup>	Screw-on lid	Blank	½ NPT
7/8000 W	Aluminium	½ NPT, ¾ NPT, M20 x 1.5	IP66 <sup>2)</sup>	Screw-on lid	Blue, lacquered <sup>3)</sup>	½ NPT
7/8000 S	Stainless steel	½ NPT, ¾ NPT, M20 x 1.5	IP66 <sup>2)</sup>	Screw-on lid	Blank	½ NPT
7/8000 W / DIH50 <sup>4)</sup>	Aluminium	½ NPT, ¾ NPT, M20 x 1.5	IP66 <sup>2)</sup>	Screw-on lid	Blue, lacquered <sup>3)</sup>	½ NPT
7/8000 S / DIH50 <sup>4)</sup>	Stainless steel	½ NPT, ¾ NPT, M20 x 1.5	IP66 <sup>2)</sup>	Screw-on lid	Blank	½ NPT

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

2) Ingress protections, which describe temporary or lasting submersion, available on request

3) RAL 5022

4) LC display DIH50

## 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.

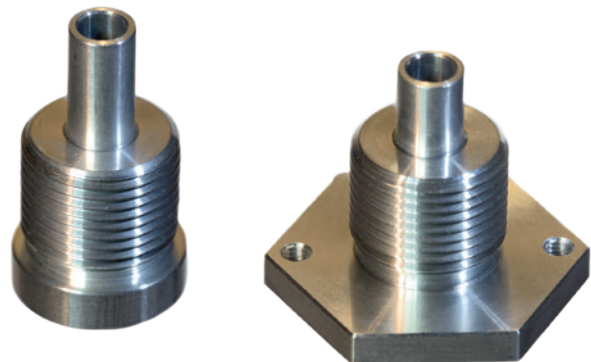


Fig. left: Flame path fitting for model 1/4000 connection head

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	Min./max. ambient temperature
Ex d cable gland stainless steel	M20 x 1.5 or ½ NPT	-60 <sup>1)</sup> / -40 ... +80 °C
Plain threaded	M20 x 1.5 or ½ NPT	-
Sealing plugs for transport	M20 x 1.5 or ½ NPT	-40 ... +80 °C

Cable entry	Colour	Ingress protection (max.) <sup>2)</sup> IEC/EN 60529
Ex d cable gland stainless steel	Blank	IP66
Plain threaded	-	IP00
Sealing plugs for transport	Transparent	-

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

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

# 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
6	Protected against strong water jets	per IEC/EN 60529
7 <sup>1)</sup>	Protected against the effects of temporary immersion in water	per IEC/EN 60529
8 <sup>1)</sup>	Protected against the effects of continuous immersion in water	by agreement

1) Ingress protections, describing temporary or permanent immersion, on request

Standard ingress protection of model TR10-L is IP65.

The stated degrees of protection apply under the following conditions:

- Use of a suitable thermowell (without suitable thermowell: IP40)
- 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.

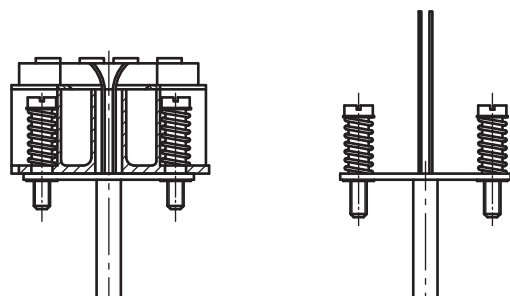
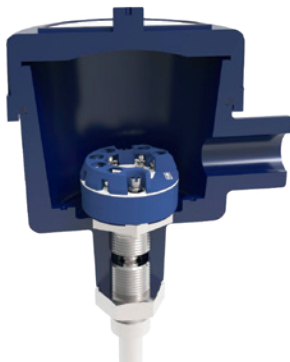


Fig. left: Measuring insert with mounted transmitter (here: model T32)  
Fig. right: Measuring insert prepared for transmitter mounting

## Transmitter models

HART  
COMMUNICATION PROTOCOL



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

## Possible mounting positions for transmitters

Connection head	T15	T32
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.

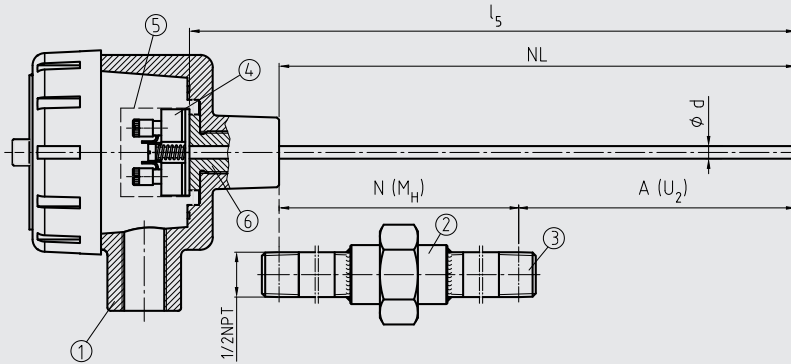
For detailed specifications, see Technical information IN 00.19 at [www.wika.com](http://www.wika.com).



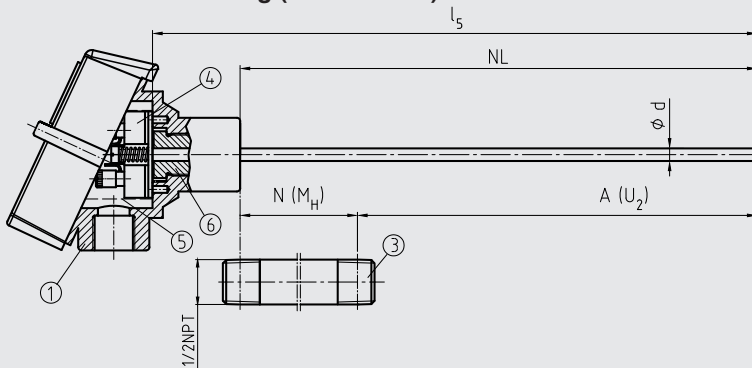
# Components model TR10-L

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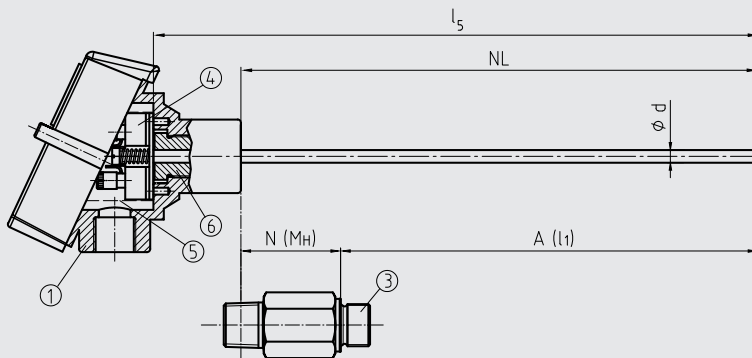
## “Nipple-union-nipple” neck tube



## Double threaded hex bushing (tube section)

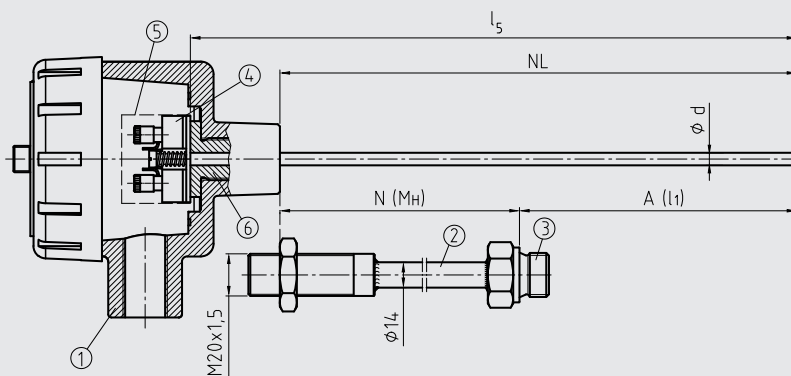


## Double threaded hex bushing (with hexagonal spanner flats)



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## Neck tube with counter nut to head



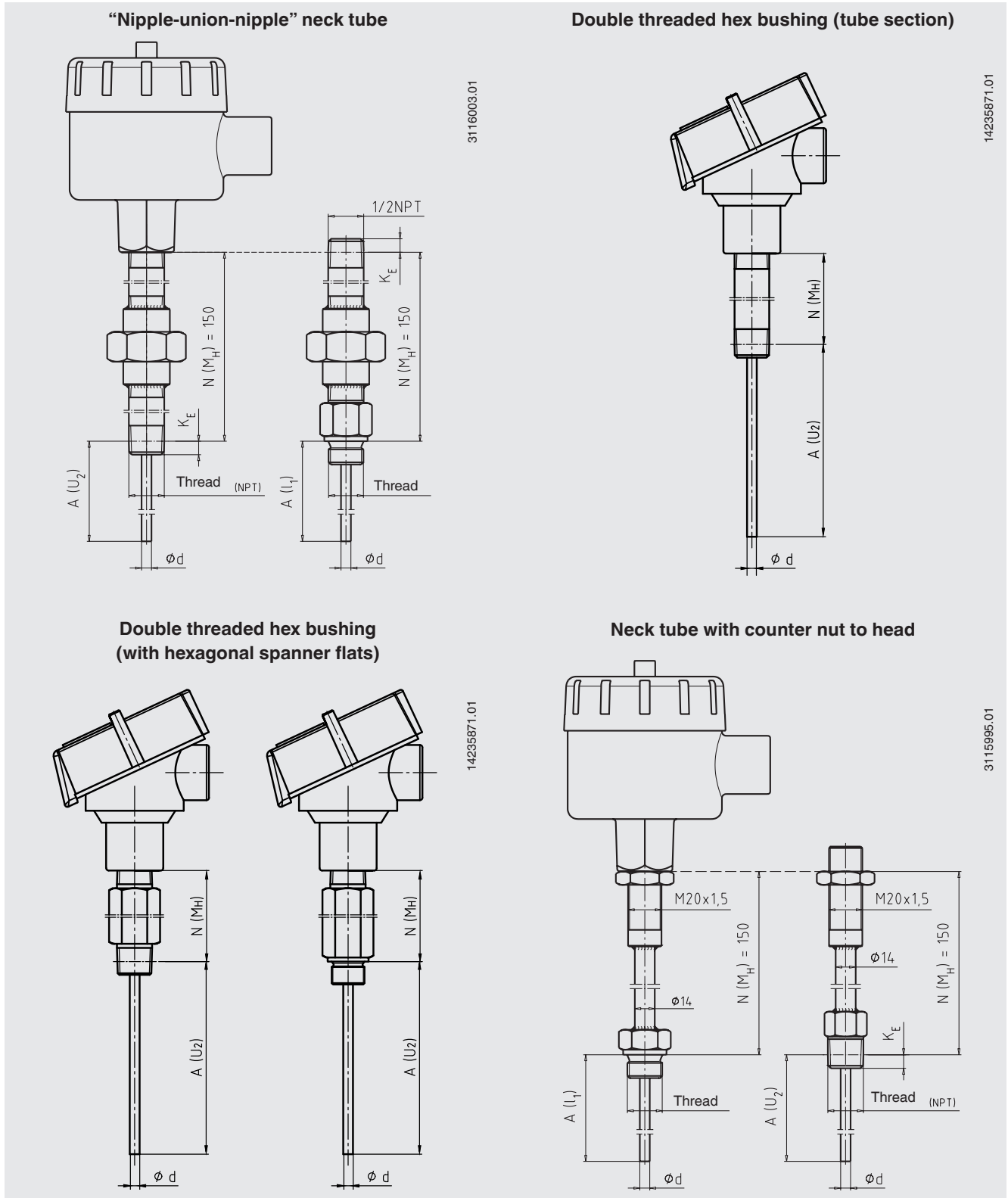
### Legend:

- 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 in]	75 mm [approx. 3 in] / 250 mm [approx. 10 in]
Double threaded hex bushing (tube section)	50 mm [approx. 2 in]	50 mm [approx. 2 in] / 250 mm [approx. 10 in]
Double threaded hex bushing (with hexagonal spanner flats)	25 mm	
Neck tube with counter nut to head	150 mm [approx. 6 in]	75 mm [approx. 3 in] / 250 mm [approx. 10 in]

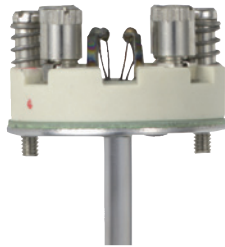
The neck tube is screwed into the connection head. The neck length depends on the intended use. Usually an isolation is bridged by the neck tube. Also, in many cases, the neck tube serves as a cooling extension between the connection head and the medium, in order to protect a possible built-in transmitter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



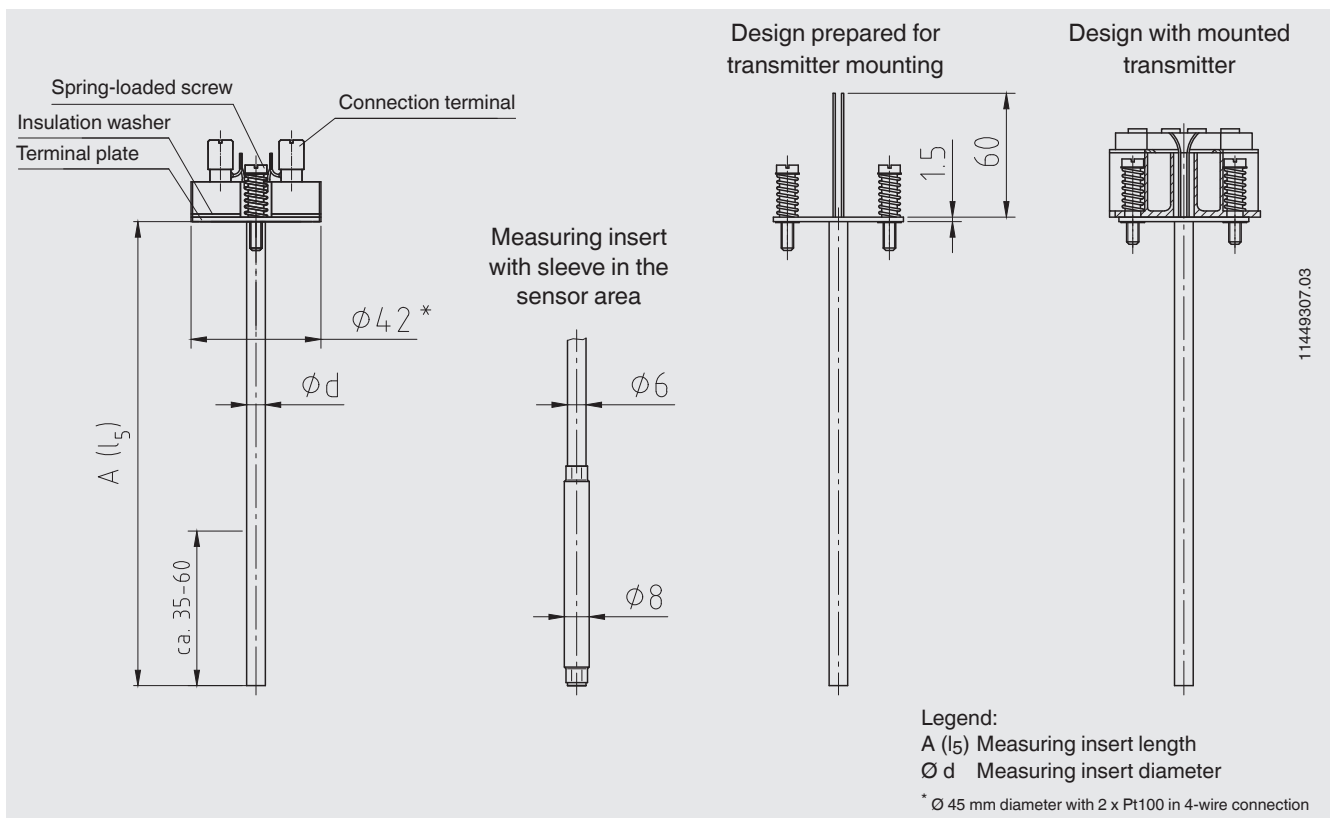
Pay special attention to the assembly/disassembly of the measuring insert. The surface of the sheathed cable of the measuring insert must not be damaged! (No creases, grooves, scratches etc.). Any damaged measuring insert must be replaced. It is advisable to renew the corresponding flame path fitting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

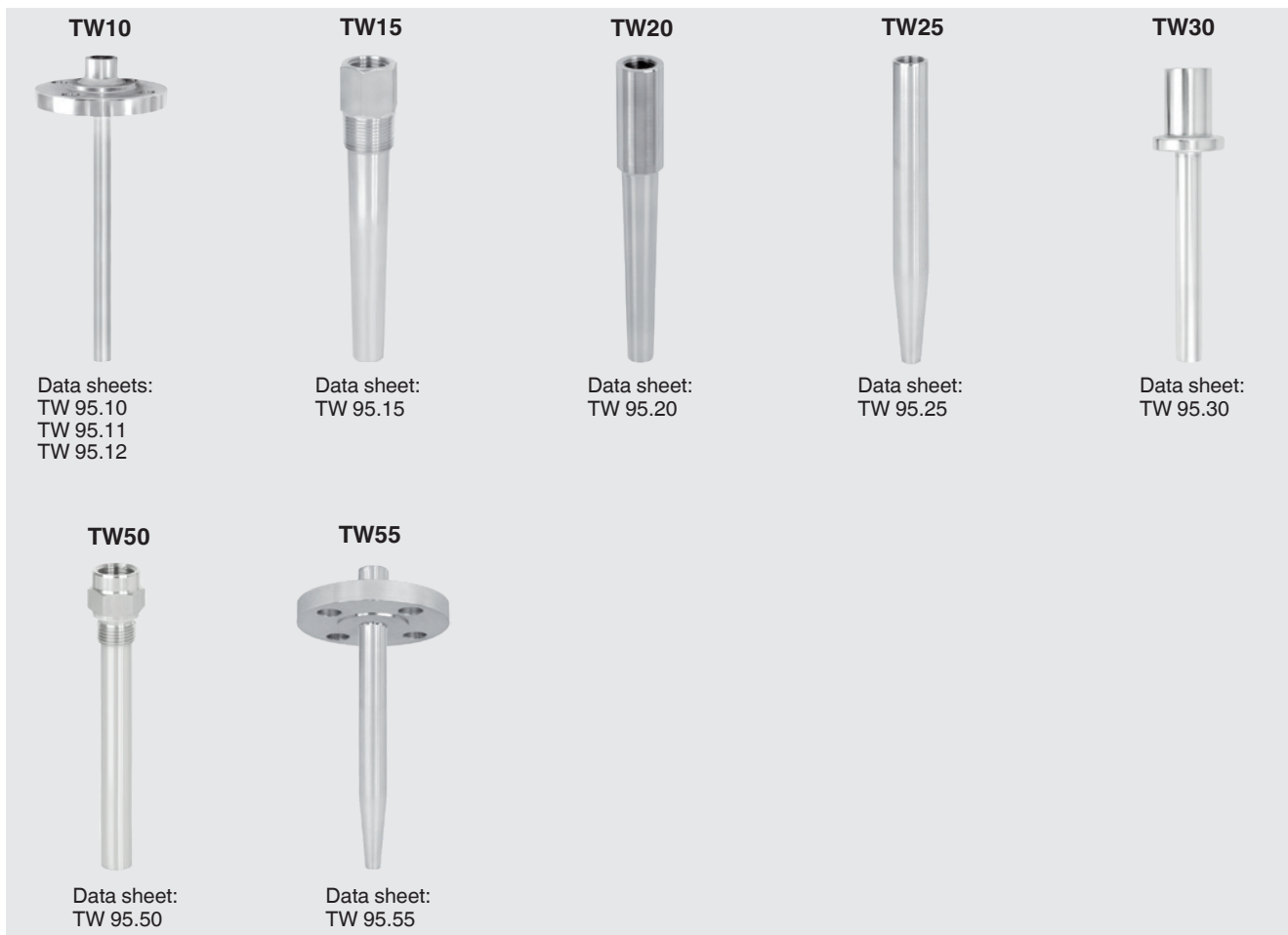
## Dimensions in mm



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> / -20 ... +80 °C

1) Special version on request

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	-

2) Thermowells have their own material certificates

The different certifications can be combined with each other.

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

## 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(MH) / Certificates / Options

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