

# Threaded resistance thermometer Model TR11-C with fabricated protection tube, tubular design

WIKA data sheet TE 60.14



for further approvals  
see page 2

## Applications

- Machine building, plant and vessel construction
- Sanitary, heating and air-conditioning technology

## Special features

- Application ranges from -50 ... +250 °C (-58 ... +482 °F)
- With integrated fabricated protection tube
- Sensor built in the tip of the protection tube (standard)
- Replaceable measuring insert (option)
- Explosion-protected versions

## Description

Resistance thermometers of this series are designed for screw-fitting directly into the process, mainly in vessels and pipelines.

These thermometers are suitable for liquid and gaseous media under moderate mechanical load and normal chemical conditions. The protection tube made of stainless steel is all welded and screwed into the connection head. An optional measuring insert (tubular design) can be removed without taking out the complete sensor from the plant. This enables inspection, measuring equipment monitoring or, when servicing is necessary, replacement while the plant is running.



**Fig. left: connection head model BSZ-H**

**Fig. right: connection head model KN4-A**

Insertion length, process connection, protection tube design, connection head, type and number of sensors, accuracy and connection method can each be selected to suit the respective application.

Optionally we can fit analogue or digital transmitters from the WIKA range into the connection head of the TR11-C.

## Explosion protection (option)







The classification/suitability of the instrument (permissible power P<sub>max</sub> 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 fitting is operation in dust Ex hazardous areas permissible.

Built-in transmitters have their own EC-type examination 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> EMC directive <sup>1)</sup> EN 61326 emission (group 1, class B) and interference immunity (industrial application)	European Union
	<b>ATEX directive (option)</b> Hazardous areas - Ex i Zone 0 gas [II 1G Ex ia IIC T3 ... T6 Ga] Zone 1 connection to zone 0 gas [II 1/2G Ex ia IIC T3 ... T6 Ga/Gb] Zone 1 gas [II 2G Ex ia IIC T3 ... T6 Gb] Zone 20 dust [II 1D Ex ia IIIC T125 ... T65 °C Da] Zone 21 connection to zone 20 dust [II 1/2D Ex ia IIIC T125 ... T65 °C Da/Db] Zone 21 dust [II 2D Ex ia IIIC T125 ... T65 °C Db] - Ex n <sup>2)</sup> Zone 2 gas [II 3G Ex nA IIC T1 ... T6 Gc X] Zone 22 dust [II 3D Ex tc IIIC T440 ... T80 °C Dc X]	
	<b>IECEx (option)</b> (in conjunction with ATEX) Hazardous areas - Ex i Zone 0 gas [Ex ia IIC T3 ... T6 Ga] Zone 1 connection to zone 0 gas [Ex ia IIC T3 ... T6 Ga/Gb] Zone 1 gas [Ex ia IIC T3 ... T6 Gb] Zone 20 dust [Ex ia IIIC T125 ... T65 °C Da] Zone 21 connection to zone 20 dust [Ex ia IIIC T125 ... T65 °C Da/Db] Zone 21 dust [Ex ia IIIC T125 ... T65 °C Db]	International
	<b>EAC (option)</b> Hazardous areas - Ex i Zone 0 gas [0 Ex ia IIC T3/T4/T5/T6] Zone 1 gas [1 Ex ib IIC T3/T4/T5/T6] Zone 20 dust [DIP A20 Ta 65 °C/Ta 95 °C/Ta 125 °C] Zone 21 dust [DIP A21 Ta 65 °C/Ta 95 °C/Ta 125 °C] - Ex n Zone 2 gas [Ex nA IIC T6 ... T1]	Eurasian Economic Community
	<b>INMETRO (option)</b> Hazardous areas - Ex i Zone 0 gas [Ex ia IIC T3 ... T6 Ga] Zone 1 connection to zone 0 gas [Ex ib IIC T3 ... T6 Ga/Gb] Zone 1 gas [Ex ib IIC T3 ... T6 Gb] Zone 20 dust [Ex ia IIIC T125 ... T65 °C Da] Zone 21 connection to zone 20 dust [Ex ib IIIC T125 ... T65 °C Da/Db] Zone 21 dust [Ex ib IIIC T125 ... T65 °C Db]	Brazil
	<b>KCS - KOSHA (option)</b> Hazardous areas - Ex i Zone 0 gas [Ex ia IIC T4 ... T6] Zone 1 gas [Ex ib IIC T4 ... T6]	South Korea



# Sensor

## Measuring element

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

Accuracy class / Range of use of the sensor per EN 60751	
Class	Thin-film
Class B	-50 ... +250 °C
Class A <sup>3)</sup>	-30 ... +250 °C
Class AA <sup>3)</sup>	0 ... 150 °C

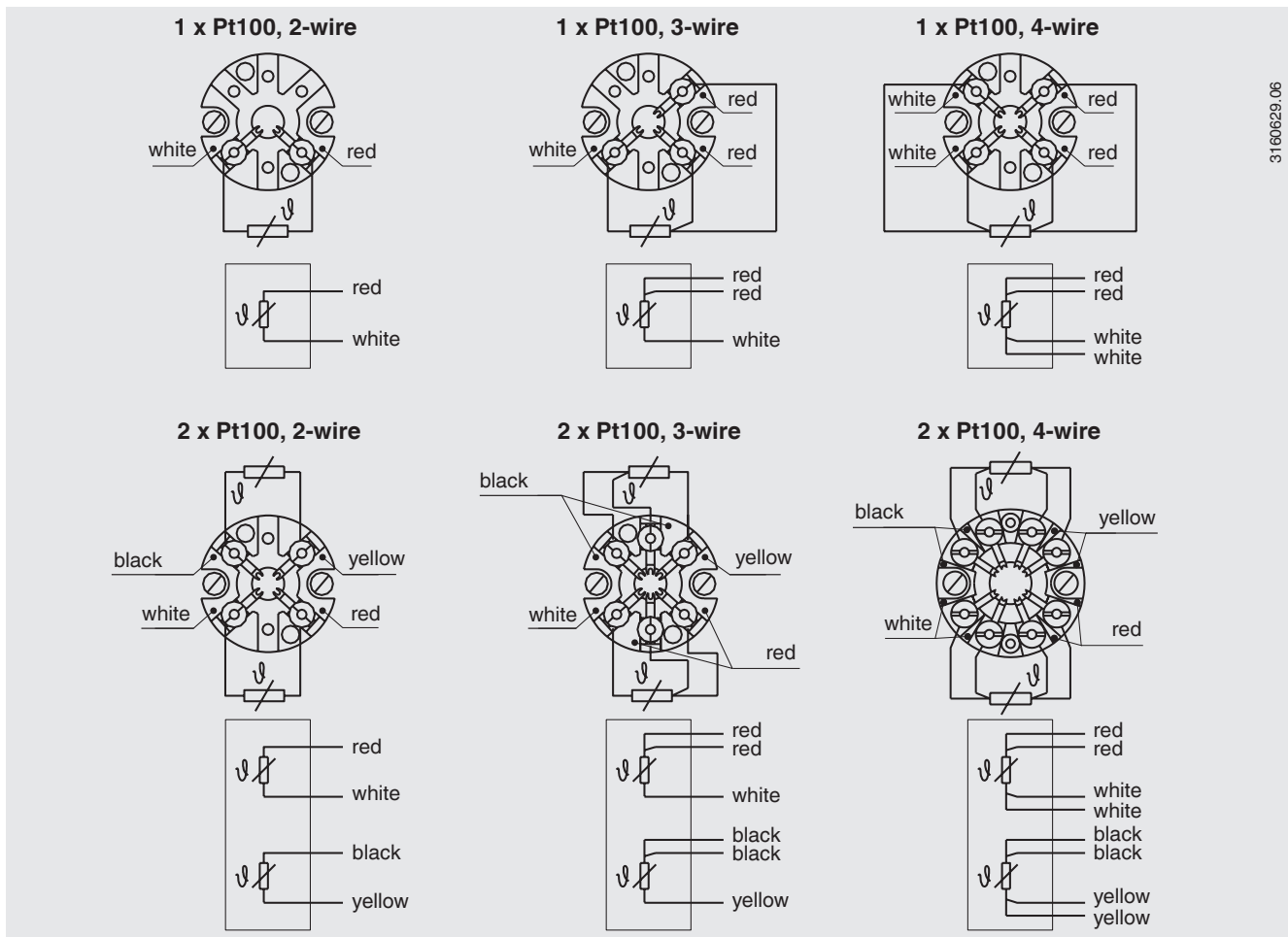
1) For detailed specifications for Pt100 sensors, see Technical information IN 00.17 at [www.wika.com](http://www.wika.com).

2) Not with 3 mm diameter

3) Not with 2-wire connection method

## Electrical connection

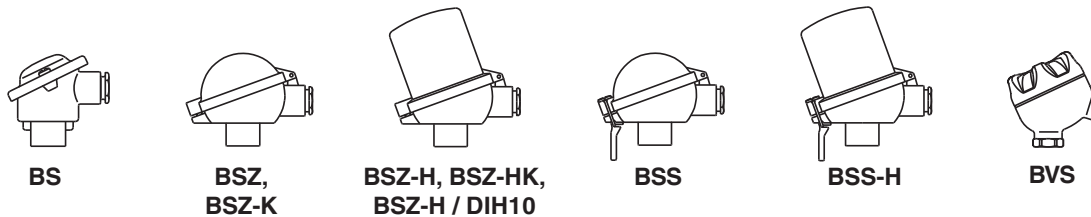
(Colour code per EN/IEC 60751)



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

## Connection head

■ European designs per EN 50446 / DIN 43735



Model	Material	Cable entry thread size	Ingress protection (max.) <sup>1)</sup>	Cap	Surface	Connection to neck tube
<b>BS</b>	Aluminium	M20 x 1.5 or ½ NPT <sup>3)</sup>	IP65, IP68	Flat cap with 2 screws	Blue, lacquered <sup>4)</sup>	M24 x 1.5
<b>BSZ</b>	Aluminium	M20 x 1.5 or ½ NPT <sup>3)</sup>	IP65, IP68	Spherical hinged cover with cylinder head screw	Blue, lacquered <sup>4)</sup>	M24 x 1.5
<b>BSZ-H</b>	Aluminium	M20 x 1.5 or ½ NPT <sup>3)</sup>	IP65, IP68	Raised hinged cover with cylinder head screw	Blue, lacquered <sup>4)</sup>	M24 x 1.5
<b>BSZ-H / DIH10<sup>2)</sup></b>	Aluminium	M20 x 1.5 or ½ NPT <sup>3)</sup>	IP65	Raised hinged cover with cylinder head screw	Blue, lacquered <sup>4)</sup>	M24 x 1.5
<b>BSS</b>	Aluminium	M20 x 1.5 or ½ NPT <sup>3)</sup>	IP65	Spherical hinged cover with clamping lever	Blue, lacquered <sup>4)</sup>	M24 x 1.5
<b>BSS-H</b>	Aluminium	M20 x 1.5 or ½ NPT <sup>3)</sup>	IP65	Raised hinged cover with clamping lever	Blue, lacquered <sup>4)</sup>	M24 x 1.5
<b>BVS</b>	Stainless steel	M20 x 1.5 <sup>3)</sup>	IP65	Precision-cast screw-on lid	Blank, electropolished	M24 x 1.5
<b>BSZ-K</b>	Plastic	M20 x 1.5 or ½ NPT <sup>3)</sup>	IP65	Spherical hinged cover with cylinder head screw	Black	M24 x 1.5
<b>BSZ-HK</b>	Plastic	M20 x 1.5 or ½ NPT <sup>3)</sup>	IP65	Raised hinged cover with cylinder head screw	Black	M24 x 1.5

Model	Explosion protection				
	without	Ex i (gas) Zone 0, 1, 2	Ex i (dust) Zone 20, 21, 22	Ex nA (gas) Zone 2	Ex tc (dust) Zone 22
<b>BS</b>	x	x	-	-	-
<b>BSZ</b>	x	x	x	x	x
<b>BSZ-H</b>	x	x	x	x	x
<b>BSZ-H / DIH10<sup>2)</sup></b>	x	x	-	-	-
<b>BSS</b>	x	x	-	-	-
<b>BSS-H</b>	x	x	-	-	-
<b>BVS</b>	x	x	-	-	-
<b>BSZ-K</b>	x	x	-	-	-
<b>BSZ-HK</b>	x	x	-	-	-

1) Ingress protection describes the connection head, specifications on cable glands see page 6

2) LED display DIH10

3) Standard (others on request)

4) RAL 5022

■ North American designs



KN4-A  
KN4-P

Model	Material	Cable entry thread size	Ingress protection (max.) <sup>1)</sup>	Cover / Cap	Surface	Connection to neck tube
KN4-A	Aluminium	½ NPT or M20 x 1,5 <sup>3)</sup>	IP65	Screw-on lid	Blue, lacquered <sup>4)</sup>	M24 x 1.5
KN4-P <sup>5)</sup>	Polypropylene	½ NPT	IP65	Screw-on lid	White	½ NPT

Model	Explosion protection				
	without	Ex i (gas) Zone 0, 1, 2	Ex i (dust) Zone 20, 21, 22	Ex nA (gas) Zone 2	Ex tc (dust) Zone 22
KN4-A	x	x	-	-	-
KN4-P <sup>5)</sup>	x	-	-	-	-

1) Ingress protection describes the connection head, specifications on cable glands see page 7

3) Standard (others on request)

4) RAL 5022

5) On request

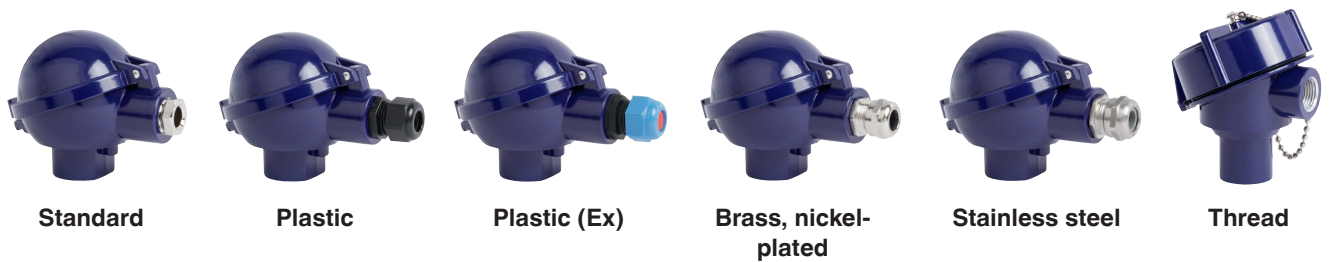
## Connection head with digital display



**Connection head BSZ-H with LED display model DIH10**  
see data sheet AC 80.11

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

## Cable entry



The pictures show examples of connection heads.

Cable entry	Cable entry thread size
Standard cable entry <sup>1)</sup>	M20 x 1.5 or ½ NPT
Plastic cable gland (cable Ø 6 ... 10 mm) <sup>1)</sup>	M20 x 1.5 or ½ NPT
Nickel-plated brass cable gland (cable Ø 6 ... 12 mm)	M20 x 1.5 or ½ NPT
Stainless steel cable gland (cable Ø 7 ... 12 mm)	M20 x 1.5 or ½ NPT
Plain threaded	M20 x 1.5 or ½ NPT

Cable entry	Colour	Ingress protection (max.)	Min./max. ambient temperature	Explosion protection				
				without	Ex i (gas) Zone 0, 1, 2	Ex i (dust) Zone 20, 21, 22	Ex nA (gas) Zone 2	Ex tc (dust) Zone 22
Standard cable entry <sup>1)</sup>	Blank	IP65	-40 ... +80 °C	x	x	-	-	-
Plastic cable gland <sup>1)</sup>	Black or grey	IP66, IP68	-40 ... +80 °C	x	-	-	-	-
Plastic cable gland, Ex e <sup>1)</sup>	Light blue	IP66, IP68	-20 ... +80 °C (standard) -40 ... +70 °C (option)	x	x	x	-	-
Plastic cable gland, Ex e <sup>1)</sup>	Black	IP66, IP68	-20 ... +80 °C (standard) -40 ... +70 °C (option)	x	-	-	x	x
Nickel-plated brass cable gland	Blank	IP66, IP68	-40 ... +80 °C	x	-	-	-	-
Nickel-plated brass cable gland, Ex e	Blank	IP66, IP68	-40 ... +80 °C	x	x	x	x	x
Stainless steel cable gland	Blank	IP66, IP68	-40 ... +80 °C	x	x	x	-	-
Stainless steel cable gland, Ex e	Blank	IP66, IP68	-40 ... +80 °C	x	x	x	x	x
Plain threaded	-	IP00	-	x	x	x <sup>6)</sup>	x <sup>6)</sup>	x <sup>6)</sup>

1) Not available for BVS connection head

2) Suitable cable gland required for operation

## Ingress protection

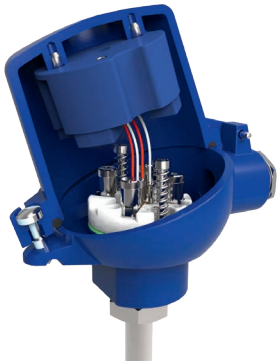
to IP65/IP68 per EN/IEC 60529 under the following conditions:

- 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

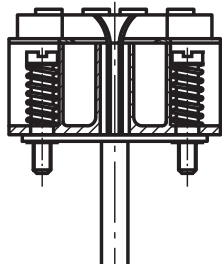
### Mounted within the cap of the connection head

Mounting the transmitter in the cap of the connection head is preferable to mounting it on the measuring insert. With this type of mounting, a better thermal insulation is ensured.

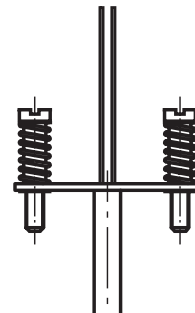


### Installation on the measuring insert (optional: replaceable measuring insert)

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



T15



T32



T53

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, 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
BS	○	-	○
BSZ	○	○	○
BSZ-K	○	○	○
BSZ-H, BSZ-HK	●	●	●
BSZ-H / DIH10	○	○	-
BSS	○	○	○
BSS-H	●	●	●
BVS	○	○	○
KN4-A / KN4-P	○	○	○

○ Mounted instead of terminal block

● Mounted within the cap of the connection head

- Mounting not possible

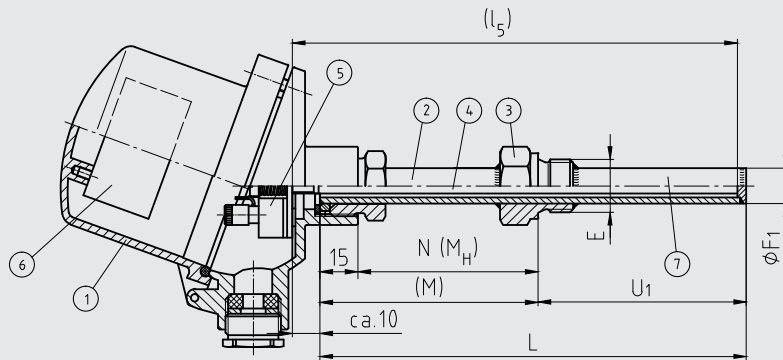
The mounting of a transmitter on the measuring insert is possible with all the connection heads listed here. The fitting of a transmitter in the (screw) cap of a North American design connection head is not possible.

Mounting of 2 transmitters on request.

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

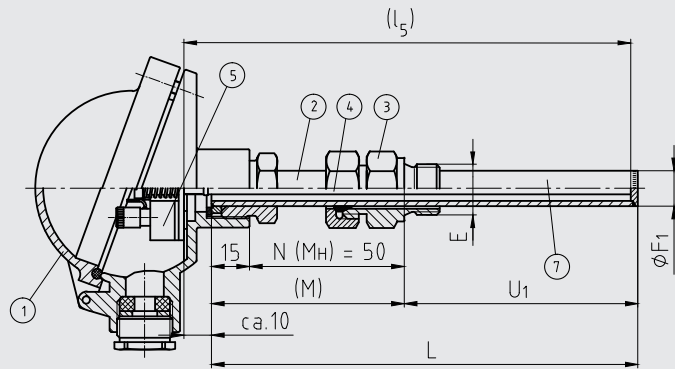
# Components model TR11-C

## Process connection: mounting thread, welded



3175431.07

## Process connection: compression fitting



**Legend:**

- |                                       |  |
|---------------------------------------|--|
| ① Connection head                     | (L) Overall length protection tube                   |
| ② Neck tube                           | $l_5$ Measuring insert length                        |
| ③ Process connection                  | $U_1$ Protection tube insertion length per DIN 43772 |
| ④ Measuring insert                    | $\varnothing F_1$ Protection tube diameter           |
| ⑤ Terminal block/transmitter (option) | E Mounting thread                                    |
| ⑥ Transmitter (option)                | $N (M_H)$ Neck length                                |
| ⑦ Protection tube model TW35          | (M) Neck tube length                                 |

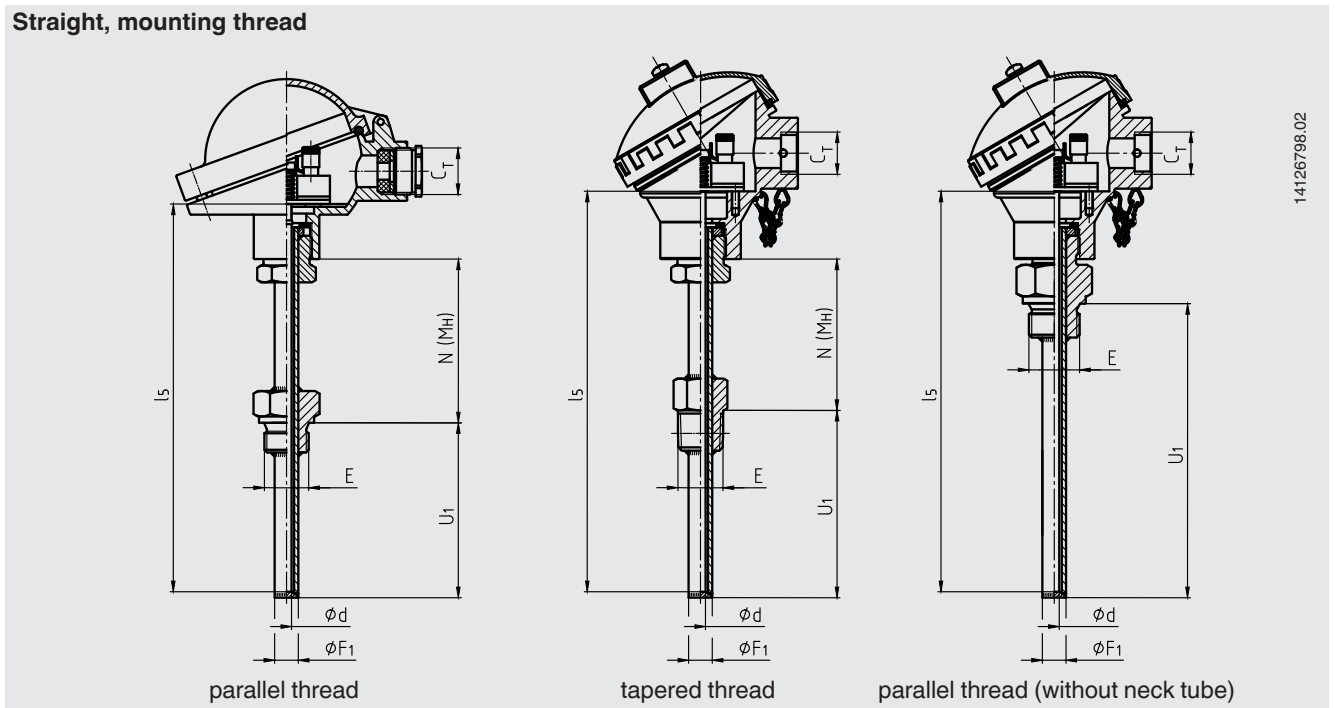
Fig. with parallel or tapered thread see chapter "Protection tube"

The figures show the optional exchangeable measuring insert.

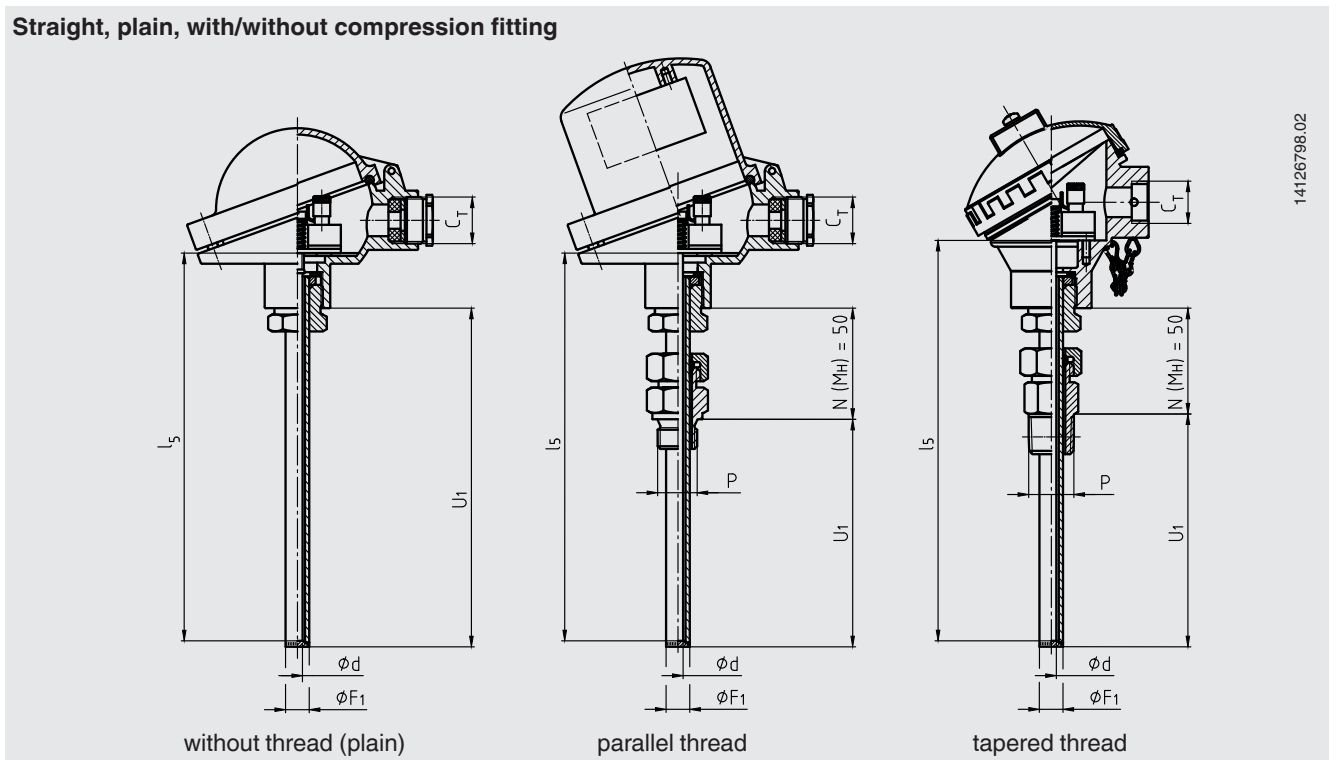
# Protection tube

## Protection tube designs

### Straight, mounting thread



### Straight, plain, with/without compression fitting



#### Legend:

U <sub>1</sub>	Insertion length	Ø F <sub>1</sub>	Protection tube diameter
l <sub>5</sub>	Measuring insert length	E	Mounting thread
N (M <sub>H</sub> )	Neck length	Ø d	Measuring insert diameter
C <sub>T</sub>	Thread cable entry	P	Compression fitting mounting thread

The pictures show examples of connection heads.

## Protection tube

The protection tubes are made of drawn tube with a welded bottom and are screwed into the connection head with a rotatable threaded connection (male nut). By loosening this male nut, the connection head, and thus the cable outlet, can be adjusted to the desired position. For the mounting thread version the process connection is welded on to customer specification. This determines the insertion length. The compression fitting process connection allows a variable insertion length. The immersion depth into the process medium should be at least 10 times the protection tube outer diameter.

### Protection tube versions

Protection tube	Protection tube diameter	Process connection	Suitable for measuring insert diameter <sup>1)</sup>	Connection to head	Material
<b>Straight, mounting thread</b>	6 x 1 mm 8 x 1 mm	G 1/4 B, mounting thread	3 mm	M24 x 1.5 (rotatable threaded connection, male nut)	1.4571 316L (8 x 1 mm)
		G 1/2 B, mounting thread			
		M18 x 1.5, mounting thread			
		M20 x 1.5, mounting thread			
		1/2 NPT, mounting thread			
	9 x 1 mm	G 1/4 B, mounting thread	6 mm		1.4571
		G 1/2 B, mounting thread			
		G 3/4 B, mounting thread			
		G 1 B, mounting thread			
		M18 x 1.5, mounting thread			
		M20 x 1.5, mounting thread			
		M27 x 2, mounting thread			
		1/2 NPT, mounting thread			
		3/4 NPT, mounting thread			
	10 x 1 mm 10 x 1.5 mm	G 1/2 B, mounting thread	6 mm		316L
		G 3/4 B, mounting thread			
		G 1 B, mounting thread			
		M18 x 1.5, mounting thread			
		M20 x 1.5, mounting thread			
		M27 x 2, mounting thread			
1/2 NPT, mounting thread					
3/4 NPT, mounting thread					
12 x 1 mm 12 x 1.5 mm	G 1/2 B, mounting thread	8 mm	316L		
	G 3/4 B, mounting thread				
	G 1 B, mounting thread				
	M18 x 1.5, mounting thread				
	M20 x 1.5, mounting thread				
	M27 x 2, mounting thread				
	1/2 NPT, mounting thread				
	3/4 NPT, mounting thread				
<b>Straight, plain, with/without compression fitting</b>	6 x 1 mm 8 x 1 mm	G 1/2 B compression fitting (metal ferrule)	3 mm	M24 x 1.5 (rotatable threaded connection, male nut)	1.4571 316L (8 x 1 mm)
		1/2 NPT compression fitting (metal ferrule)			
		Without threaded connection, plain			
	9 x 1 mm 10 x 1 mm 10 x 1.5 mm 12 x 1 mm 12 x 1.5 mm	G 1/2 B compression fitting (metal ferrule)	6 mm		1.4571 (9 x 1 mm) 316L
		1/2 NPT compression fitting (metal ferrule)			
		Without threaded connection, straight			

1) Measuring insert optional

## Insertion lengths

Protection tube design	Standard insertion length	Min. / Max. insertion length
Straight mounting thread	160, 250, 400 mm	50 mm / 500 mm
Straight, plain, with/without compression fitting	-	50 mm / 500 mm

## Neck lengths

Protection tube design	Standard neck length	Min. / Max. neck length
Straight mounting thread	130 mm	30 mm / 200 mm
Straight, plain, with compression fitting	50 mm	50 mm
Straight, plain, without process connection	without	-

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 any possible built-in transmitter from high medium temperatures.

Other versions on request

## Measuring insert

Standard: Not replaceable

Optionally, the measuring insert of model TR11-A is fitted within the TR11-C.

## Operating conditions

### Mechanical requirements

Version (per EN 60751)	
Standard	6 g peak-to-peak

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

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

### Ambient and storage temperature

-40 ... +80 °C

## Certificates

Certification type	Measurement accuracy	Material certificate <sup>1)</sup>
2.2 test report	x	x
3.1 inspection certificate	x	x
DKD/DAkkS calibration certificate	x	-

1) Protection tubes

The different certifications can be combined with each other.

## Ordering information

Model / Explosion protection / Further approvals, certificates / Sensor / Accuracy class, range of use of the sensor / Connection housing / Cable entry / Transmitter / Connection to neck tube / Protection tube / Protection tube diameter / Process connection / Protection tube material / Insertion length / Neck length / Certificates / Options

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