

Threaded resistance thermometer With protection tube, tubular design Model TR11-C

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 are available for many approval types (see page 2)



Fig. left: connection head model BSZ-H

Fig. right: connection head model KN4-A

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.

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.

A large number of different explosion-protected approvals are available for the TR11-C.

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

Explosion protection (option)






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




Attention:

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

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
 	EU declaration of conformity EMC directive ¹⁾ EN 61326 emission (group 1, class B) and interference immunity (industrial application) ATEX directive (option) Hazardous areas - Ex i Zone 0 gas II 1G Ex ia IIC T3 ... T6 Ga Zone 1 mounting 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 mounting 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 ²⁾ 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	European Union
	IECEx (option) - in conjunction with ATEX Hazardous areas - Ex i Zone 0 gas Ex ia IIC T3 ... T6 Ga Zone 1 mounting 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 mounting to zone 20 dust Ex ia IIIC T125 ... T65 °C Da/Db Zone 21 dust Ex ia IIIC T125 ... T65 °C Db	International
	EAC (option) 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 Zone 2 gas 2 Ex nA IIC T6 ... T1 Gc X Zone 22 dust DIP A22 Ta 80 ... 440 °C	Eurasian Economic Community
	Ex Ukraine (option) Hazardous areas - Ex d Zone 0 gas II 1G Ex ia IIC T1 ... T6 Ga Zone 1 mounting an zone 0 gas II 1/2G Ex ia IIC T1 ... T6 Ga/Gb Zone 1 gas II 2G Ex ia IIC T1 ... T6 Gb Zone 20 dust II 1D Ex ia IIIC T65°C Da Zone 21 mounting an zone 20 dust II 1/2D Ex ia IIIC T65°C Da/Db Zone 21 dust II 2D Ex ia IIIC T65°C Db	Ukraine

Logo	Description	Country
	INMETRO (option) Hazardous areas - Ex i Zone 0 gas Ex ia IIC T3 ... T6 Ga Zone 1 mounting an 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 mounting to zone 20 dust Ex ib IIIC T125 ... T65 °C Da/Db Zone 21 dust Ex ib IIIC T125 ... T65 °C Db	Brazil
	KCS - KOSHA (option) Hazardous areas - Ex i Zone 0 gas Ex ia IIC T4 ... T6 Zone 1 gas Ex ib IIC T4 ... T6	South Korea
-	PESO (option) Hazardous areas - Ex i Zone 0 gas Ex ia IIC T1 ... T6 Ga Zone 1 mounting to zone 0 gas Ex ib IIC T3 ... T6 Ga/Gb Zone 1 gas Ex ib IIC T3 ... T6 Gb	India
	GOST Metrology, measurement technology	Russia

- 1) Only for built-in transmitter
 2) Only with model BSZ or BSZ-H connection head (see "Connection heads")

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 (measuring current: 0.1 ... 1.0 mA) ¹⁾

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 ²⁾

Validity limits of the class accuracy in accordance with EN 60751	
Class	Thin-film
Class B	-50 ... +250 °C
Class A ³⁾	-30 ... +250 °C
Class AA ³⁾	0 ... 150 °C

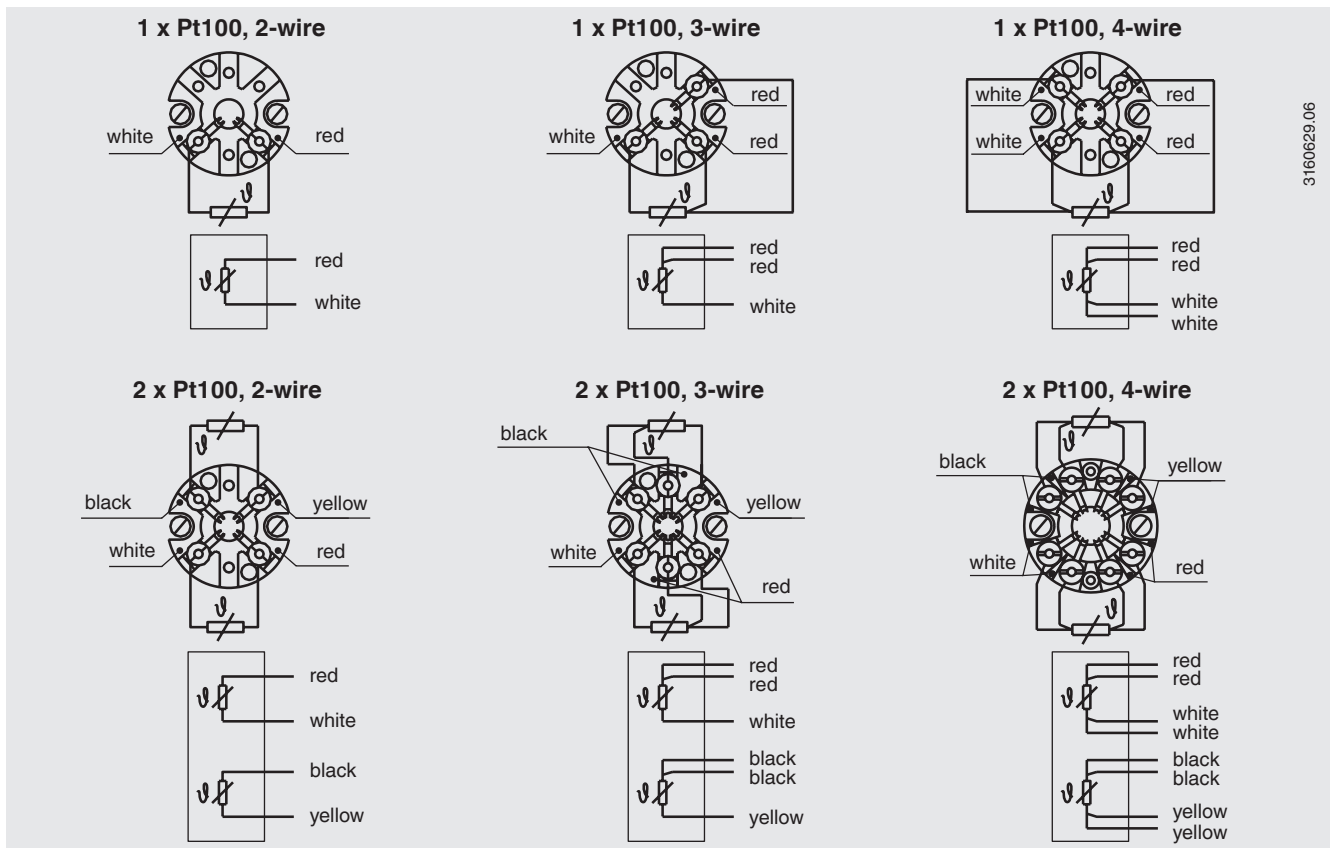
1) For detailed specifications for Pt100 sensors, see Technical information IN 00.17 at www.wika.com.

2) Not with 3 mm diameter

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.

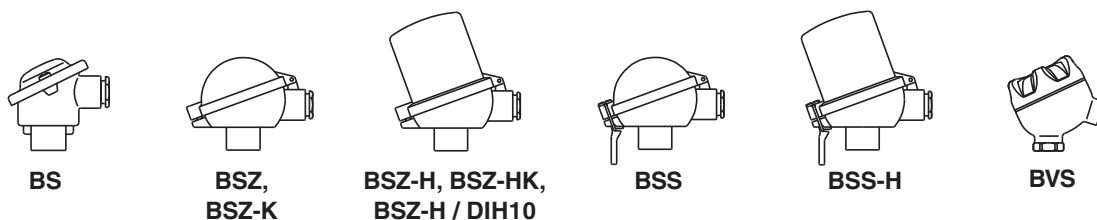
Electrical connection (colour code per IEC/EN 60751)



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

Connection head

■ European designs per EN 50446 / DIN 43735



Model	Material	Cable entry thread size	Ingress protection (max.) ¹⁾ IEC/EN 60529	Cap	Surface	Connection to neck tube
BS	Aluminium	M20 x 1.5 or ½ NPT ³⁾	IP65 ⁴⁾	Flat cap with 2 screws	Blue, lacquered ⁵⁾	M24 x 1.5
BSZ	Aluminium	M20 x 1.5 or ½ NPT ³⁾	IP65 ⁴⁾	Spherical hinged cover with cylinder head screw	Blue, lacquered ⁵⁾	M24 x 1.5
BSZ-H	Aluminium	M20 x 1.5 or ½ NPT ³⁾	IP65 ⁴⁾	Raised hinged cover with cylinder head screw	Blue, lacquered ⁵⁾	M24 x 1.5
BSZ-H / DIH10 ²⁾	Aluminium	M20 x 1.5 or ½ NPT ³⁾	IP65	Raised hinged cover with cylinder head screw	Blue, lacquered ⁵⁾	M24 x 1.5
BSS	Aluminium	M20 x 1.5 or ½ NPT ³⁾	IP65	Spherical hinged cover with clamping lever	Blue, lacquered ⁵⁾	M24 x 1.5
BSS-H	Aluminium	M20 x 1.5 or ½ NPT ³⁾	IP65	Raised hinged cover with clamping lever	Blue, lacquered ⁵⁾	M24 x 1.5
BVS	Stainless steel	M20 x 1.5 ³⁾	IP65	Precision-cast screw-on lid	Blank, electropolished	M24 x 1.5
BSZ-K	Plastic	M20 x 1.5 or ½ NPT ³⁾	IP65	Spherical hinged cover with cylinder head screw	Black	M24 x 1.5
BSZ-HK	Plastic	M20 x 1.5 or ½ NPT ³⁾	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 n (gas) Zone 2	Ex t (dust) Zone 22
BS	x	x	-	-	-
BSZ	x	x	x	x	x
BSZ-H	x	x	x	x	x
BSZ-H / DIH10 ²⁾	x	x	-	-	-
BSS	x	x	-	-	-
BSS-H	x	x	-	-	-
BVS	x	x	-	-	-
BSZ-K	x	x	-	-	-
BSZ-HK	x	x	-	-	-

1) IP ingress protection of the connection head. The IP ingress protections of the complete instrument TR11-C must not inevitably correspond to the connection head.

2) LED display DIH10

3) Standard (others on request)

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

5) RAL 5022

■ North American designs



KN4-A
KN4-P

Model	Material	Cable entry thread size	Ingress protection (max.) ¹⁾ IEC/EN 60529	Cover / Cap	Surface	Connection to neck tube
KN4-A	Aluminium	½ NPT or M20 x 1,5 ²⁾	IP65	Screw-on lid	Blue, lacquered ³⁾	M24 x 1.5
KN4-P ⁴⁾	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 n (gas) Zone 2	Ex t (dust) Zone 22
KN4-A	x	x	-	-	-
KN4-P ⁴⁾	x	-	-	-	-

- 1) IP ingress protection of the connection head. The IP ingress protections of the complete instrument TR11-C must not inevitably correspond to the connection head.
 2) Standard (others on request)
 3) RAL 5022
 4) On request

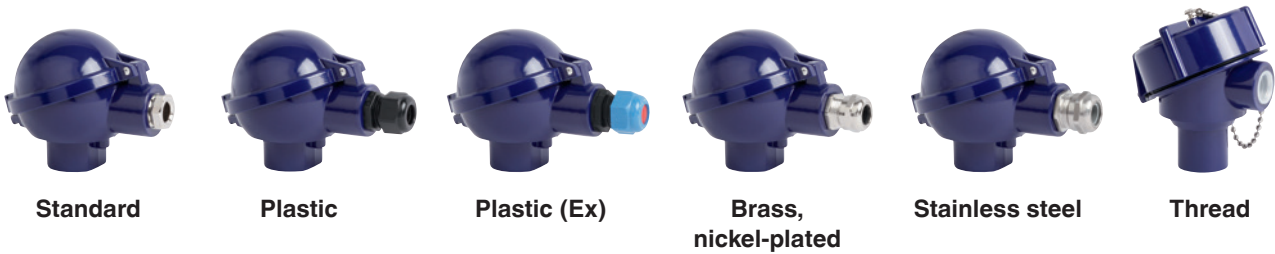
Connection head with digital display



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	Min./max. ambient temperature
Standard cable entry ¹⁾	M20 x 1.5 or ½ NPT	-40 ... +80 °C
Plastic cable gland (cable Ø 6 ... 10 mm) ¹⁾	M20 x 1.5 or ½ NPT	-40 ... +80 °C
Plastic cable gland (cable Ø 6 ... 10 mm), Ex e ¹⁾	M20 x 1.5 or ½ NPT	-20 ... +80 °C (standard) -40 ... +70 °C (option)
Nickel-plated brass cable gland (cable Ø 6 ... 12 mm)	M20 x 1.5 or ½ NPT	-40 ... +80 °C
Stainless steel cable gland (cable Ø 7 ... 12 mm)	M20 x 1.5 or ½ NPT	-40 ... +80 °C
Plain threaded	M20 x 1.5 or ½ NPT	-

Cable entry	Colour	Ingress protection (max.) IEC/EN 60529 ²⁾	Explosion protection				
			without	Ex i (gas) Zone 0, 1, 2	Ex i (dust) Zone 20, 21, 22	Ex n (gas) Zone 2	Ex t (dust) Zone 22
Standard cable entry ¹⁾	Blank	IP65	x	x	-	-	-
Plastic cable gland ¹⁾	Black or grey	IP66 ³⁾	x	-	-	-	-
Plastic cable gland, Ex e ¹⁾	Light blue	IP66 ³⁾	x	x	x	-	-
Plastic cable gland, Ex e ¹⁾	Black	IP66 ³⁾	x	-	-	x	x
Nickel-plated brass cable gland	Blank	IP66 ³⁾	x	-	-	-	-
Nickel-plated brass cable gland, Ex e	Blank	IP66 ³⁾	x	x	x	x	x
Stainless steel cable gland	Blank	IP66 ³⁾	x	x	x	-	-
Stainless steel cable gland, Ex e	Blank	IP66 ³⁾	x	x	x	x	x
Plain threaded	-	IP00	x	x	x ⁴⁾	x ⁴⁾	x ⁴⁾

1) Not available for BVS connection head

2) IP ingress protection of the connection head. The IP ingress protections of the complete instrument TR11-C must not inevitably correspond to the cable gland.

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

4) Suitable cable gland required for operation

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 1)	Protected against the effects of temporary immersion in water	per IEC/EN 60529
8 1)	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 TR11-C 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

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.

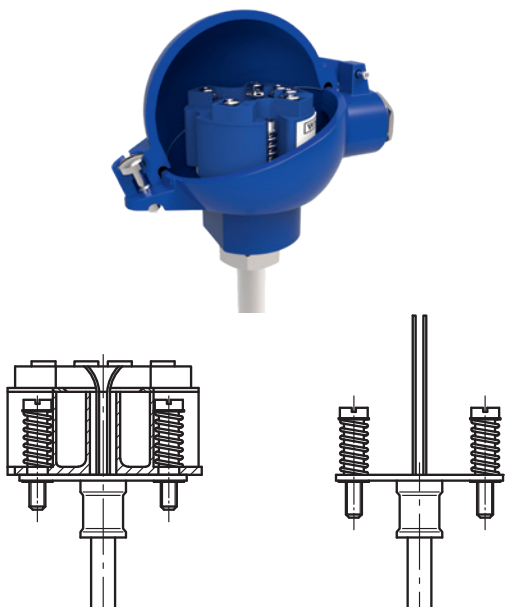


Fig. left: Measuring insert with mounted transmitter (here: model T32)
Fig. right: Measuring insert prepared for transmitter mounting

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, for one, a better thermal insulation is ensured, and in addition, exchange and mounting for servicing is simplified.



Transmitter models



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

Possible mounting positions for transmitters

Connection head	T15	T32
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

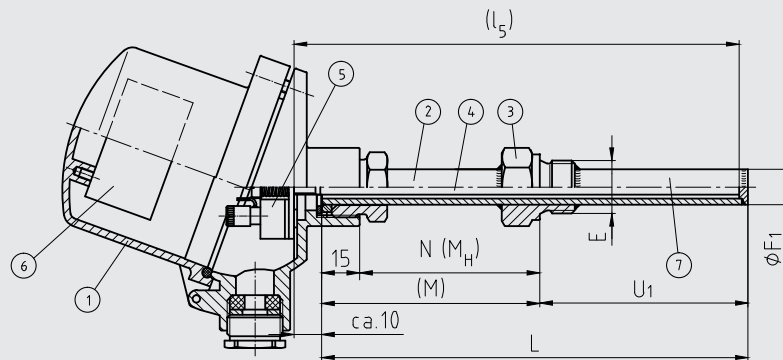
The mounting of a transmitter on the measuring insert is possible with all the connection heads listed here. The fitting of a transmitter in the (screw) cap of a North American design connection head is not possible.

Mounting of 2 transmitters on request.

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

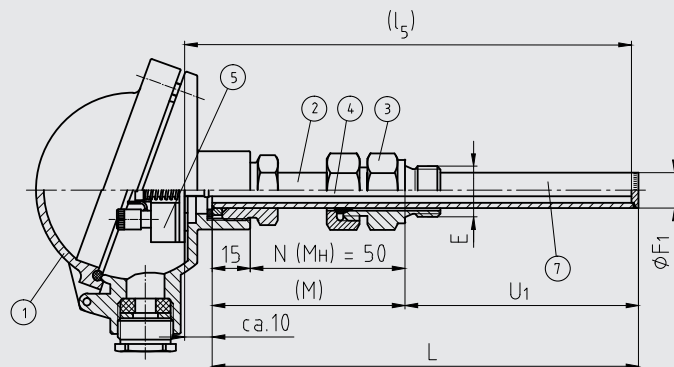
Components model TR11-C

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 |

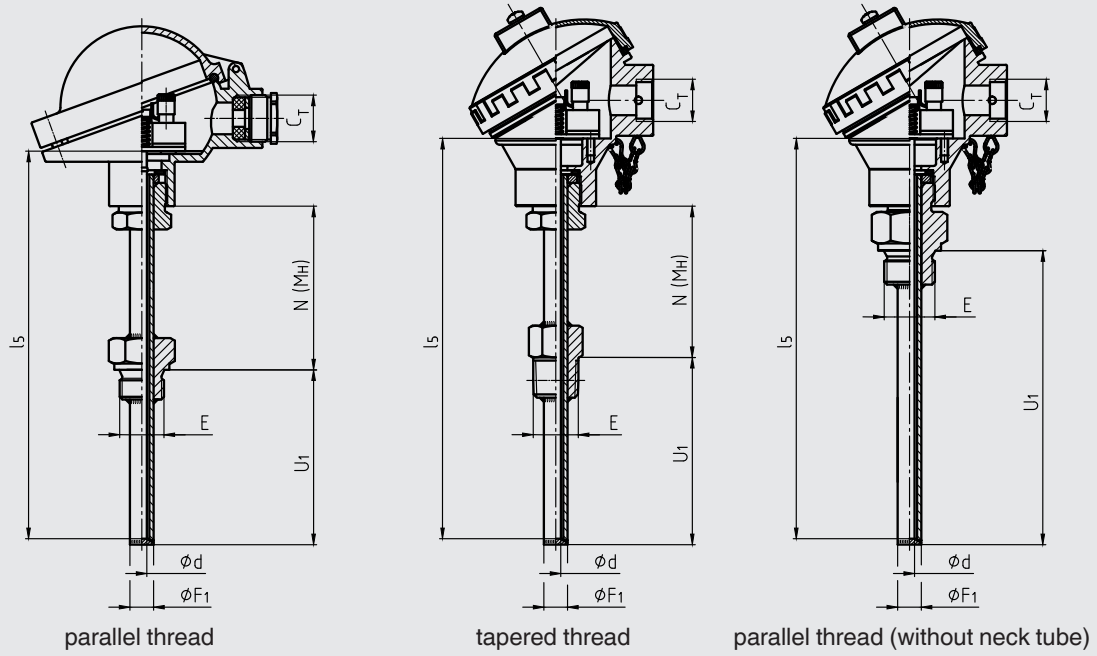
Fig. with parallel or tapered thread see chapter "Protection tube"

The figures show the optional exchangeable measuring insert.

Protection tube

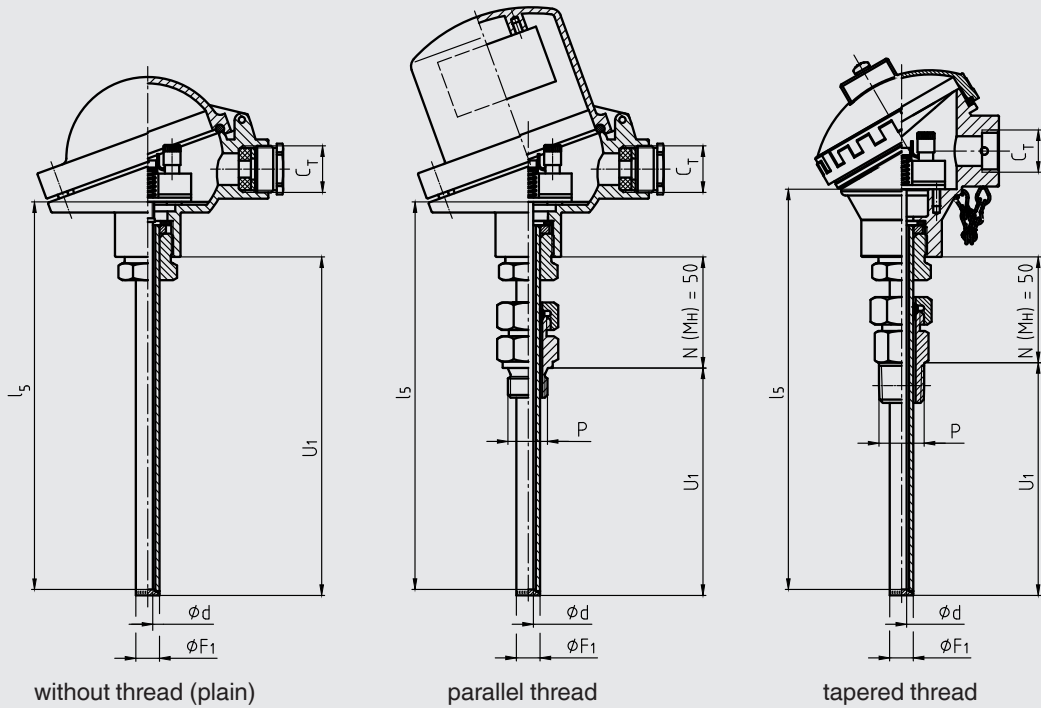
Protection tube designs

Straight, mounting thread



14126798.02

Straight, plain, with/without compression fitting



14126798.02

Legend:

- | | | | |
|-----------|-------------------------|--------------|-------------------------------------|
| U_1 | Insertion length | ϕ_{F_1} | Protection tube diameter |
| l_s | Measuring insert length | E | Mounting thread |
| $N (M_H)$ | Neck length | ϕ_d | Measuring insert diameter |
| C_T | Thread cable entry | P | Compression fitting mounting thread |

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 ¹⁾	Connection to head	Material
Straight, mounting thread	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				
Straight, plain, with/without compression fitting	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.

Ambient and storage temperature

-40 ... +80 °C

Certificates

Certification type	Measurement accuracy	Material certificate ¹⁾
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.

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.

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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ICS Schneider Messtechnik GmbH
Briesestrasse 59
D-16562 Hohen Neuendorf / OT Bergfelde
Tel.: +49 3303 5040-66
Fax: +49 3303 5040-68
E-Mail: info@ics-schneider.de



WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Straße 30
63911 Klingenberg/Germany
Tel. +49 9372 132-0
Fax +49 9372 132-406
info@wika.de
www.wika.de