

# Flanged thermocouple With protection tube Model TC10-F

WIKA data sheet TE 65.06



for further approvals  
see page 2

## Applications

- Machine building, plant and vessel construction
- Energy and power plant technology
- Chemical and petrochemical industry
- Food and beverage industry
- Sanitary, heating and air-conditioning technology

## Special features

- Sensor ranges from -40 ... +1,200 °C (-40 ... +2,192 °F)
- With integrated fabricated protection tube
- Spring-loaded measuring insert (replaceable)
- Explosion-protected versions

## Description

Thermocouples of this series are designed for fitting into vessels and pipelines. Standard flanges to DIN EN or ASME are available.

These temperature sensors are suitable for liquid and gaseous media under moderate mechanical load. The protection tube is all welded and screwed into the connection head. Stainless steel protection tubes are suitable for normal chemical conditions. Coating is recommended as an optional extra with chemically aggressive media, or solid wear-resistant coating for abrasive media.

The interchangeable measuring insert 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. The choice of standard lengths assists with short delivery times and the possibility of stocking spare parts.



Model TC10-F with protection tube

Insertion length, flange size, protection tube design, connection head and sensor can each be selected to suit the respective application.

Optionally we can fit transmitters from the WIKA range into the connection head of the TC10-F.

## 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 certificate for hazardous areas 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> <ul style="list-style-type: none"> <li>■ EMC directive <sup>1)</sup> EN 61326 emission (group 1, class B) and interference 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 mounting to zone 0 gas [II 1/2G Ex ia IIC T1 ... T6 Ga/Gb]</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 mounting to zone 20 dust [II 1/2D Ex ia IIIC T125 ... T65 °C Da/Db]</li> <li>Zone 21 dust [II 2D Ex ia IIIC T125 ... T65 °C Db]</li> <li>- Ex n <sup>2)</sup> Zone 2 gas [II 3G Ex nA IIC T1 ... T6 Gc X]</li> <li>Zone 22 dust [II 3D Ex tc IIIC T440 ... T80 °C Dc X]</li> </ul> </li> </ul>	European Union
 	<b>IECEx (option)</b> (in conjunction with ATEX) Hazardous areas <ul style="list-style-type: none"> <li>- Ex i Zone 0 gas [Ex ia IIC T1 ... T6 Ga]</li> <li>Zone 1 mounting to zone 0 gas [Ex ia IIC T1 ... T6 Ga/Gb]</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 mounting to zone 20 dust [Ex ia IIIC T125 ... T65 °C Da/Db]</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 [0 Ex ia IIC T3/T4/T5/T6]</li> <li>Zone 1 gas [1 Ex ib IIC T3/T4/T5/T6]</li> <li>Zone 20 dust [DIP A20 Ta 65 °C/Ta 95 °C/Ta 125 °C]</li> <li>Zone 21 dust [DIP A21 Ta 65 °C/Ta 95 °C/Ta 125 °C]</li> <li>- Ex n Zone 2 gas [Ex nA IIC T6 ... T1]</li> <li>Zone 22 dust [DIP A22 Ta 80 ... 440 °C]</li> </ul>	Eurasian Economic Community
	<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 mounting to zone 0 gas [Ex ib IIC T3 ... T6 Ga/Gb]</li> <li>Zone 1 gas [Ex ib IIC T3 ... T6 Gb]</li> <li>Zone 20 dust [Ex ia IIIC T125 ... T65 °C Da]</li> <li>Zone 21 mounting to zone 20 dust [Ex ib IIIC T125 ... T65 °C Da/Db]</li> <li>Zone 21 dust [Ex ib IIIC T125 ... T65 °C Db]</li> </ul>	Brazil
	<b>NEPSI (option)</b> Hazardous areas <ul style="list-style-type: none"> <li>- Ex i Zone 0 gas [Ex ia IIC T3 ~ T6]</li> <li>Zone 1 mounting to zone 0 gas [Ex ia/ib IIC T3 ~ T6]</li> <li>Zone 1 gas [Ex ib IIC T3 ~ T6]</li> <li>- Ex n Zone 2 gas [Ex nA IIC T1 ~ T6 Gc]</li> </ul>	China

Logo	Description	Country
	<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
-	<b>PESO (option)</b> 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
	<b>DNOP - MakNII (option)</b> Hazardous areas - Ex i Zone 0 gas [II 1G Ex ia IIC T3, T4, T5, T6 Ga] Zone 1 mounting to zone 0 gas [II 1/2G Ex ib IIC T3, T4, T5, T6 Ga/Gb] Zone 1 gas [II 2G Ex ia IIC T3, T4, T5, T6 Gb] Zone 20 dust [II 1D Ex ia IIIC T65, T95, T125 °C Da] Zone 21 mounting to zone 20 dust [II 1/2D Ex ib IIIC T65, T95, T125 °C Da/Db] Zone 21 dust [II 2D Ex ib IIIC T125 ... T65 °C Db]	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 (option)</b> Metrology, measurement technology	Ukraine
	<b>Uzstandard (option)</b> Metrology, measurement technology	Uzbekistan

## Manufacturer's information and certifications

Logo	Description
	<b>SIL 2</b> Functional safety (only in conjunction with model T32 temperature transmitter)
	<b>NAMUR NE24</b> Hazardous areas (Ex i)

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

## Thermocouple per IEC 60584-1 bzw. ASTM E230

Types K, J, E, N, T (single or dual thermocouple)

### Measuring point

- Ungrounded (standard)
- Grounded

### Sensor types

Type	Operating temperatures of the thermocouple			
	IEC 60584-1		ASTM E230	
	Class 2	Class 1	Standard	Special
K	-40 ... +1,200 °C	-40 ... +1,000 °C	0 ... 1,260 °C	
J	-40 ... +750 °C	-40 ... +750 °C	0 ... 760 °C	
E	-40 ... +900 °C	-40 ... +800 °C	0 ... 870 °C	
N	-40 ... +1,200 °C	-40 ... +1,000 °C	0 ... 1,260 °C	
T	-40 ... +350 °C		0 ... 370 °C	

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

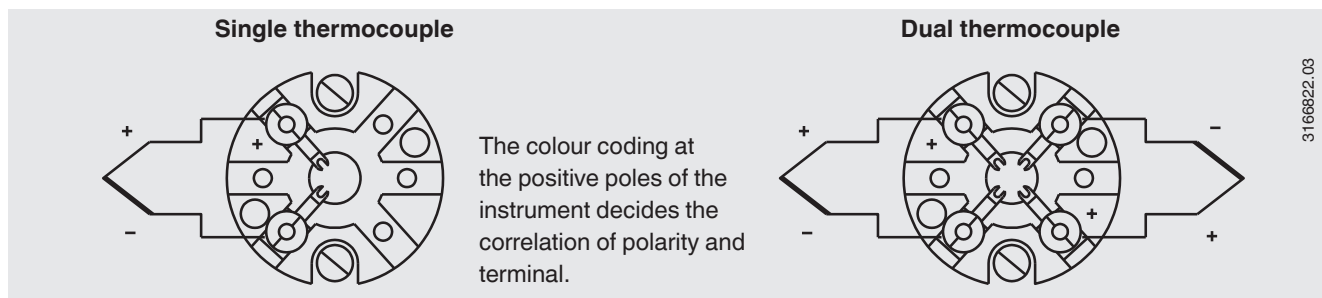
The actual operating temperature of the thermometers is limited both by the maximum permissible working temperature and the diameter of the thermocouple and the MI cable, as well as by the maximum permissible working temperature of the thermowell material.

For detailed specifications for thermocouples, see IEC 60584-1 or ASTM E230 and Technical information IN 00.23 at [www.wika.com](http://www.wika.com).

### Tolerance value

For the tolerance value of thermocouples, a cold junction temperature of 0 °C has been taken as the basis.

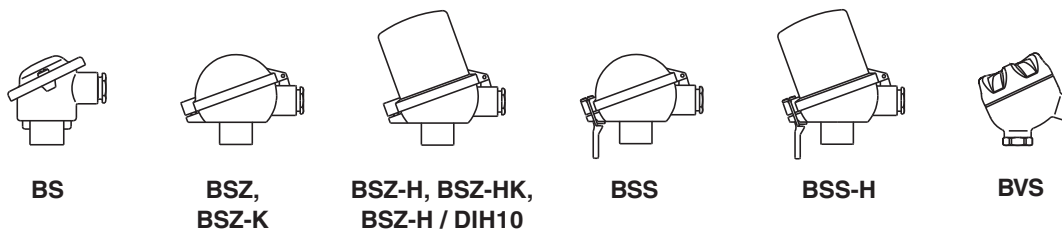
### Electrical connection



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
BS	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, ½ NPT
BSZ	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, ½ NPT
BSZ-H	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, ½ NPT
BSZ-H (2x cable outlet)	Aluminium	2 x M20 x 1.5 or 2 x ½ NPT <sup>3)</sup>	IP65, IP68	Raised hinged cover with cylinder head screw	Blue, lacquered <sup>4)</sup>	M24 x 1.5
BSZ-H / DIH10 <sup>2)</sup>	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, ½ NPT
BSS	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, ½ NPT
BSS-H	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, ½ NPT
BVS	Stainless steel	M20 x 1.5 <sup>2)</sup>	IP65	Precision-cast screw-on lid	Blank, electropolished	M24 x 1.5
BSZ-K	Plastic	M20 x 1.5 or ½ NPT <sup>3)</sup>	IP65	Spherical hinged cover with cylinder head screw	Black	M24 x 1.5
BSZ-HK	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
BS	x	x	-	-	-
BSZ	x	x	x	x	x
BSZ-H	x	x	x	x	x
BSZ-H (2x cable outlet)	x	x	x	x	x
BSZ-H / DIH10 <sup>2)</sup>	x	x	-	-	-
BSS	x	x	-	-	-
BSS-H	x	x	-	-	-
BVS	x	x	-	-	-
BSZ-K	x	x	-	-	-
BSZ-HK	x	x	-	-	-

1) The ingress protection refers to the connection head, for information on the cable glands, see page 7

2) DIH10 LED display

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>2)</sup>	IP65	Screw-on lid	Blue, lacquered <sup>3)</sup>	M24 x 1.5, ½ NPT
KN4-P <sup>4)</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>4)</sup>	x	-	-	-	-

- 1) The ingress protection refers to the connection head, for information on the cable glands, see page 7  
 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
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
2 x M20 x 1.5 <sup>2)</sup>	2 x M20 x 1.5
Junction box M12 x 1 (4-pin) <sup>3)</sup>	M20 x 1.5
Sealing plugs for transport	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	-60 <sup>4)</sup> / -40 ... +80 °C	x	-	-	-	-
Nickel-plated brass cable gland, Ex e	Blank	IP66, IP68	-60 <sup>4)</sup> / -40 ... +80 °C	x	x	x	x	x
Stainless steel cable gland	Blank	IP66, IP68	-60 <sup>4)</sup> / -40 ... +80 °C	x	x	x	-	-
Stainless steel cable gland, Ex e	Blank	IP66, IP68	-60 <sup>4)</sup> / -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>
2 x M20 x 1.5 <sup>2)</sup>	-	IP00	-	x	x	x <sup>6)</sup>	x <sup>6)</sup>	x <sup>6)</sup>
Junction box M12 x 1 (4-pin) <sup>3)</sup>	-	IP65	-40 ... +80 °C	x	x <sup>5)</sup>	x <sup>5)</sup>	-	-
Sealing plugs for transport	Transparent	-	-40 ... +80 °C	not applicable, transport protection				

1) Not available for BVS connection head

2) Only for BSZ-H connection head

3) Not available for ½ NPT thread size cable entry

4) Special version on request (only available with specific approvals), other temperatures on request

5) With appropriate mating connector connected

6) Suitable cable gland required for operation

## Ingress protection

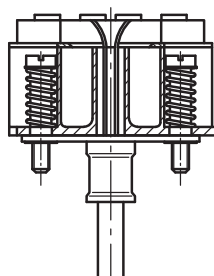
to IP65, IP68 per IEC/EN 60529 under the following conditions:

- 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

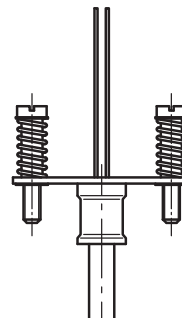
## Transmitter

### 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.



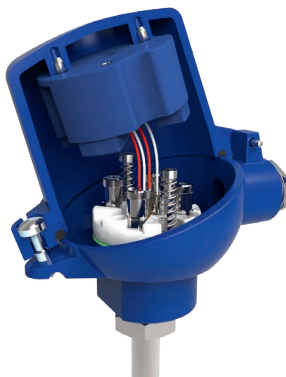
Measuring insert with mounted transmitter (here: Model T32)



Measuring insert prepared for transmitter mounting

### 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, FOUNDATION™ Fieldbus and PROFIBUS® PA			
Transmitter (selectable versions)	Model T16	Model T32	Model T53
Data sheet	TE 16.01	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	K, J, E, N, T	K, J, E, N, T	K, J, E, N, T
<b>Explosion protection</b>	Optional	Optional	Standard

## Possible mounting positions for transmitters

Connection head	T16	T32	T53
BS	○	-	○
BSZ, BSZ-K	○	○	○
BSZ-H, BSZ-HK	●	●	●
BSZ-H (2x cable outlet)	●	●	●
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.

## 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 reached by the safety installations.

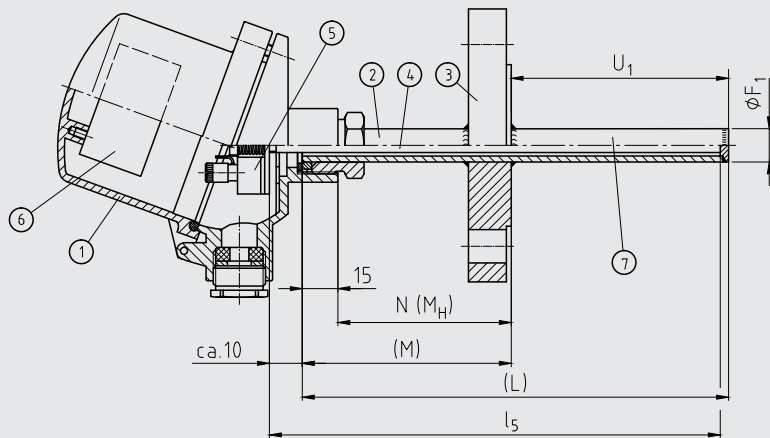
Selected TC10-F thermocouples, in combination with a suitable temperature transmitter (e.g. model T32.1S, TÜV certified SIL version for protection systems developed in

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).

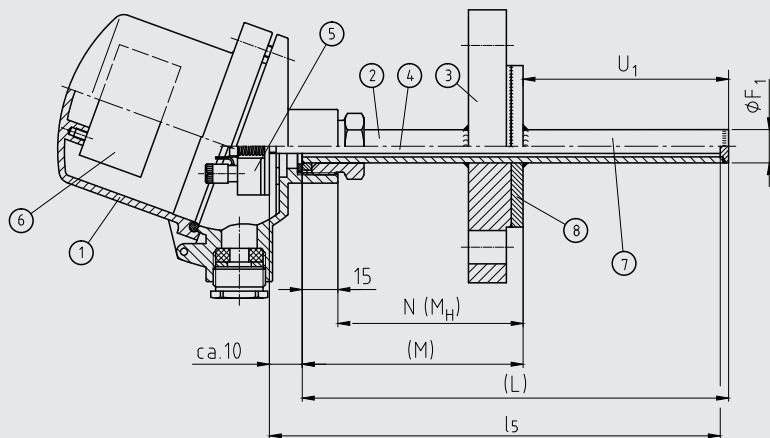
# Components model TC10-F

## Version: Flanged protection tube from standard material



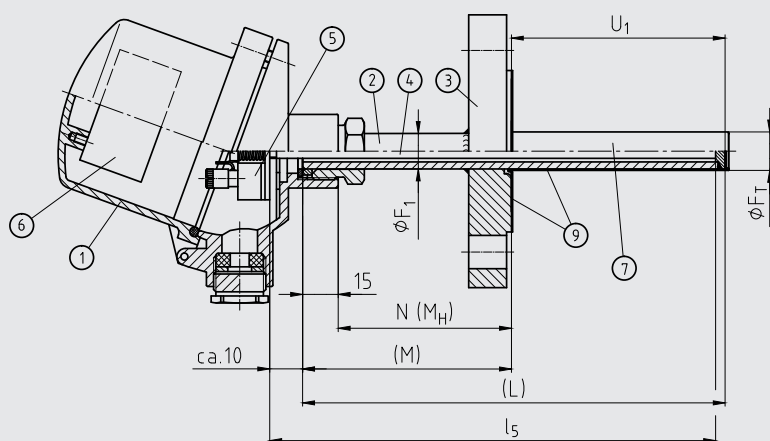
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## Version: Flange from standard material, protection tube and flange disc from special materials



14130069.01

## Version: Flanged protection tube from standard material with tantalum cover



14130070.01

### Legend:

- ① Connection head
- ② Neck tube
- ③ Flange
- ④ Measuring insert (TC10-A)
- ⑤ Terminal block/transmitter (option)
- ⑥ Transmitter (option)
- ⑦ Protection tube
- ⑧ Flange disc from special material
- ⑨ Tantalum cover

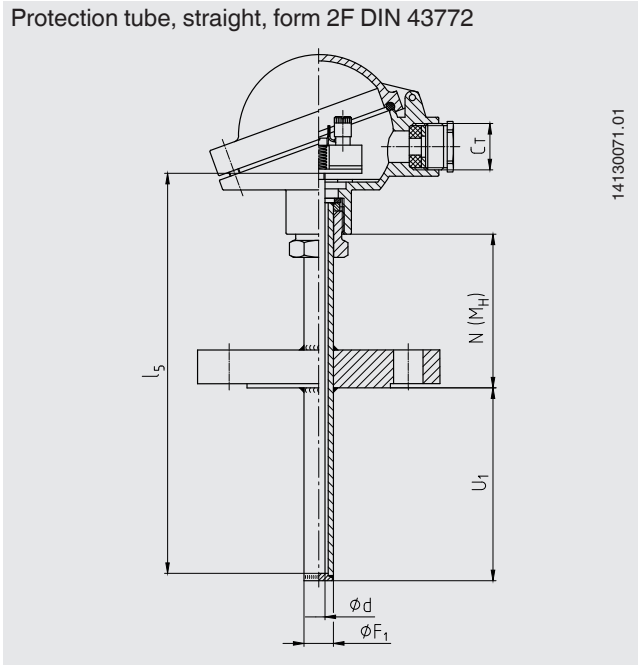
- (L) Overall length of protection tube
- $l_5$  Measuring insert length
- $U_1$  Protection tube insertion length in accordance with DIN 43772
- $\varnothing F_1$  Protection tube diameter
- $\varnothing F_T$  Outer diameter of tantalum cover
- $N (M_H)$  Neck length
- (M) Neck tube length

# Protection tube

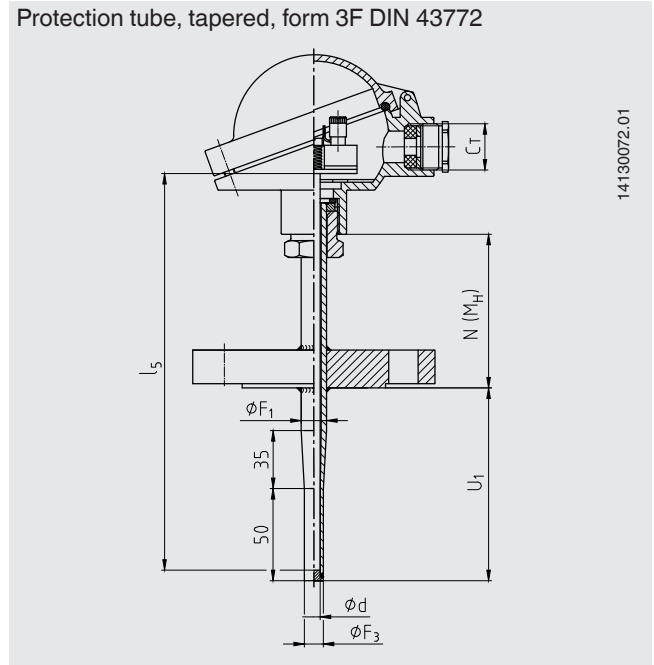
## Protection tube designs

### ■ Protection tube in accordance with DIN 43772

Protection tube, straight, form 2F DIN 43772

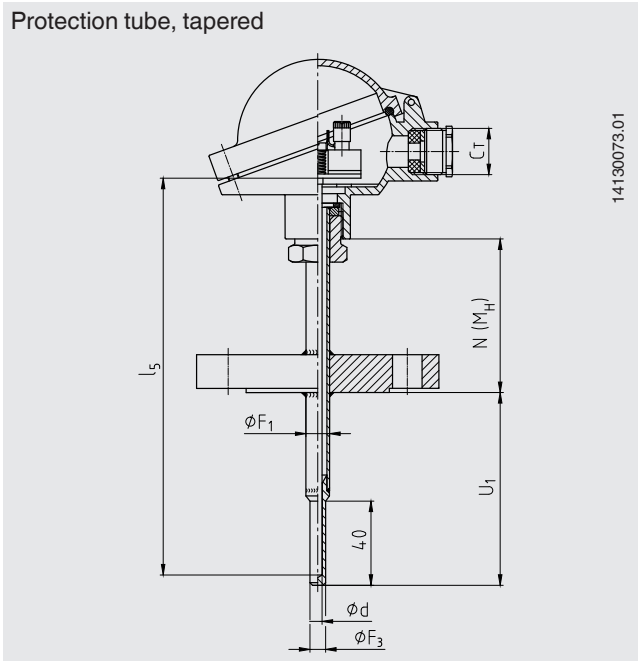


Protection tube, tapered, form 3F DIN 43772



### ■ Protection tube in line with DIN 43772, weld-on solid tip

Protection tube, tapered



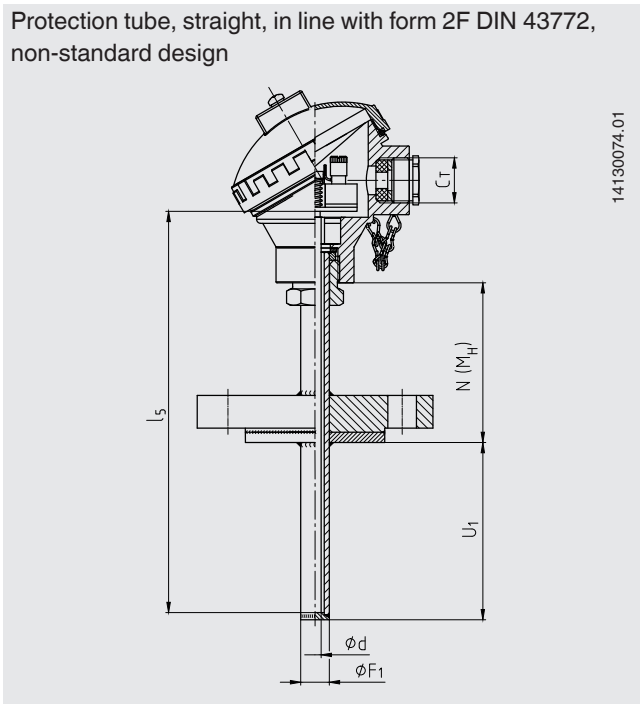
**Legend:**

- |                   |                          |                   |                                   |
|-------------------|--------------------------|-------------------|-----------------------------------|
| $U_1$             | Insertion length         | $\varnothing F_3$ | Diameter of protection tube tip   |
| $l_s$             | Measuring insert length  | $\varnothing F_T$ | Outer diameter of tantalum cover  |
| $N (M_H)$         | Neck length              | (L)               | Overall length of protection tube |
| $C_T$             | Thread cable entry       | $\varnothing d$   | Measuring insert diameter         |
| $\varnothing F_1$ | Protection tube diameter |                   |                                   |

The pictures show examples of connection heads.

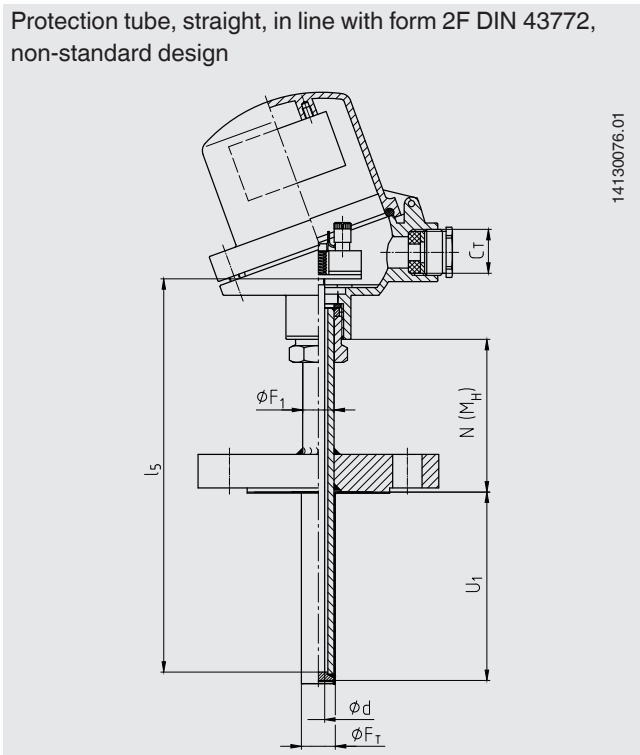
■ Protection tube in line with DIN 43772, wetted parts from special material, girder flange: Stainless steel

Protection tube, straight, in line with form 2F DIN 43772, non-standard design

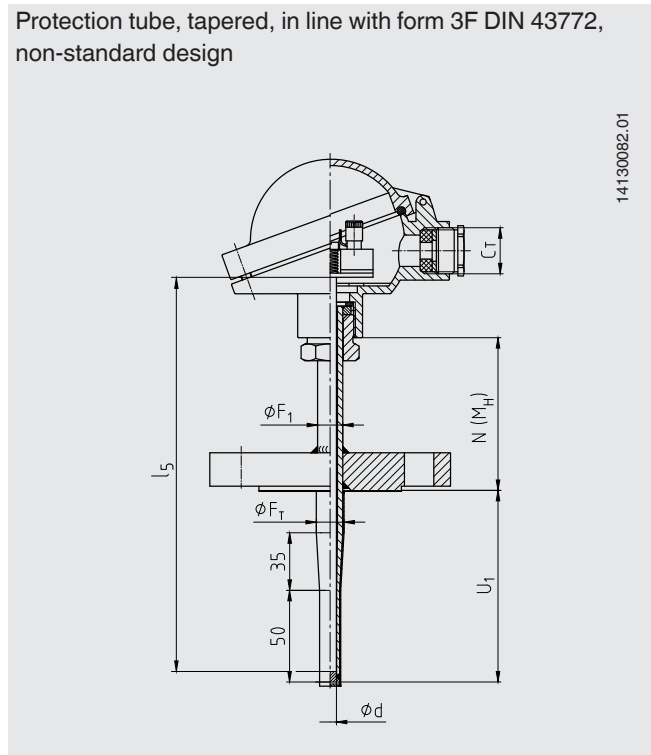


■ Protection tube in line with DIN 43772, tantalum cover with tantalum flange disc, carrier protection tube: Stainless steel

Protection tube, straight, in line with form 2F DIN 43772, non-standard design



Protection tube, tapered, in line with form 3F DIN 43772, non-standard design



Legend:

- |                     |                          |                  |                                   |
|---------------------|--------------------------|------------------|-----------------------------------|
| U <sub>1</sub>      | Insertion length         | Ø F <sub>3</sub> | Diameter of protection tube tip   |
| l <sub>5</sub>      | Measuring insert length  | Ø F <sub>T</sub> | Outer diameter of tantalum cover  |
| N (M <sub>H</sub> ) | Neck length              | (L)              | Overall length of protection tube |
| C <sub>T</sub>      | Thread cable entry       | Ø d              | Measuring insert diameter         |
| Ø F <sub>1</sub>    | Protection tube diameter |                  |                                   |

The pictures show examples of connection heads.



### Protection tube designs

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. The flange is welded on to customer specification at the factory. This determines the insertion length. Standard insertion lengths are preferable.

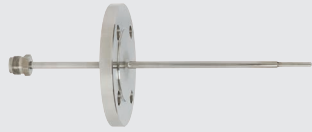
The immersion depth into the process medium should be at least 10 times the protection tube outer diameter.

For replacement requirements use model TW40 protection tube.


### Protection tube designs in accordance with DIN 43772

Protection tube	Material	Protection tube Ø	Suitable for measuring insert Ø	Connection to head
<b>Straight, form 2F DIN 43772</b> 	Stainless steel 1.4571	9 x 1 mm 11 x 2 mm 12 x 2.5 mm	6 mm	M24 x 1.5 (rotatable threaded connection, male nut)
		14 x 2.5 mm	6 mm with sleeve Ø 8 mm / 8 mm	
<b>Tapered, form 3F DIN 43772</b> 	Stainless steel 1.4571	12 x 2.5 mm, tapered to 9 mm	6 mm	



### Protection tube designs in line with DIN 43772, weld-on solid tip

Protection tube	Material	Protection tube Ø	Suitable for measuring insert Ø	Connection to head
<b>Tapered, weld-on solid tip, in line with DIN 43772, non-standard design</b> 	Stainless steel 1.4571	9 x 1 mm, tapered to 6 mm 11 x 2 mm, tapered to 6 mm 12 x 2.5 mm, tapered to 6 mm	3 mm	M24 x 1.5 (rotatable threaded connection, male nut)

### Protection tube designs in line with DIN 43772, wetted parts: special material, girder flange: stainless steel

Protection tube	Material	Protection tube Ø	Suitable for measuring insert Ø	Connection to head
<b>Straight, in line with form 2F DIN 43772, non-standard design</b> 	2.4360 (Monel400) / stainless steel 2.4819 (Hastelloy C276) / stainless steel 2.4610 (Hastelloy C4) / stainless steel 3.7035 (Titan Grade 2) / stainless steel	13.7 x 2.2 mm	6 mm with sleeve Ø 8 mm / 8 mm	M24 x 1.5 (rotatable threaded connection, male nut)

### Protection tube designs in line with DIN 43772, tantalum cover with tantalum flange disc, carrier protection tube: stainless steel

Protection tube	Material	Protection tube Ø	Suitable for measuring insert Ø	Connection to head
<b>Straight, in line with form 2F DIN 43772, non-standard design</b> 	Tantalum / stainless steel	11 x 2 mm, tantalum cover 12 x 0.4 mm	6 mm	M24 x 1.5 (rotatable threaded connection, male nut)
		15 x 3 mm, tantalum cover 16 x 0.4 mm	6 mm with sleeve Ø 8 mm / 8 mm	
<b>Tapered, in line with form 3F DIN 43772, non-standard design</b> 	Tantalum / stainless steel	12 x 2.5 mm, tantalum cover 13 x 0.4 mm	6 mm	

## Sealing face

### ■ Flange material, 1.4571 stainless steel

Flange nominal width	Pressure rating	Sealing face	Protection tube diameter		
			9 x 1 mm	11 x 2 mm 12 x 2,5 mm 14 x 2,5 mm	
EN 1092-1, DN 25 EN 1092-1, DN 40	PN 6	Form B1	x	x	
		Form B2	x	x	
		Form C (tongue)	x	x	
		Form D (groove)	x	x	
	PN 10 ... 40	Form B1	x	x	
		Form B2	x	x	
		Form C (tongue)	x	x	
		Form D (groove)	x	x	
	PN 63 ... 100	Form B1	-	x	
		Form B2	-	x	
		Form C (tongue)	-	x	
		Form D (groove)	-	x	
EN 1092-1, DN 50	PN 6	Form B1	x	x	
		Form B2	x	x	
		Form C (tongue)	x	x	
		Form D (groove)	x	x	
	PN 10 ... 16	Form B1	x	x	
		Form B2	x	x	
		Form C (tongue)	x	x	
		Form D (groove)	x	x	
	PN 25 ... 40	Form B1	x	x	
		Form B2	x	x	
		Form C (tongue)	x	x	
		Form D (groove)	x	x	
	PN 63	Form B1	-	x	
		Form B2	-	x	
		Form C (tongue)	-	x	
		Form D (groove)	-	x	
	PN 100	Form B1	-	x	
		Form B2	-	x	
		Form C (tongue)	-	x	
		Form D (groove)	-	x	
	DIN 2526/2527, DN 25 DIN 2526/2527, DN 40	PN 6	Form C	x	x
			Form E	x	x
			Form N (groove)	x	x
			Form F (tongue)	x	x
PN 10 ... 16		Form C	x	x	
		Form E	x	x	
		Form N (groove)	x	x	
		Form F (tongue)	x	x	
PN 25 ... 40		Form C	x	x	
		Form E	x	x	
		Form N (groove)	x	x	
		Form F (tongue)	x	x	

Continued on next page

Flange nominal width	Pressure rating	Sealing face	Protection tube diameter	
			9 x 1 mm	11 x 2 mm 12 x 2,5 mm 14 x 2,5 mm
<b>DIN 2526/2527, DN 25</b> <b>DIN 2526/2527, DN 40</b>	PN 64 ... 100	Form C	-	x
		Form E	-	x
		Form N (groove)	-	x
		Form F (tongue)	-	x
<b>DIN 2526/2527, DN 50</b>	PN 6	Form C	x	x
		Form E	x	x
		Form N (groove)	x	x
		Form F (tongue)	x	x
	PN 10 ... 16	Form C	x	x
		Form E	x	x
		Form N (groove)	x	x
		Form F (tongue)	x	x
	PN 25 ... 40	Form C	x	x
		Form E	x	x
		Form N (groove)	x	x
		Form F (tongue)	x	x
<b>DIN 2526/2527, DN 50</b>	PN 64	Form C	-	x
		Form E	-	x
		Form N (groove)	-	x
		Form F (tongue)	-	x
	PN 100	Form C	-	x
		Form E	-	x
		Form N (groove)	-	x
		Form F (tongue)	-	x
<b>ASME 1 inch</b> <b>ASME 1 ½ inch</b> <b>ASME 2 inch</b>	150 lbs	RF (Raised face)	x	x
		RFSF (Raised face smooth finish)	x	x
		FF (Flat face)	x	x
		RTJ (Ring type joint)	x	x
	300 lbs	RF (Raised face)	x	x
		RFSF (Raised face smooth finish)	x	x
		FF (Flat face)	x	x
		RTJ (Ring type joint)	x	x
	600 lbs	RF (Raised face)	-	x
		RFSF (Raised face smooth finish)	-	x
		FF (Flat face)	-	x
		RTJ (Ring type joint)	-	x
	1,500 lbs	RF (Raised face)	-	x
		RFSF (Raised face smooth finish)	-	x
		FF (Flat face)	-	x
		RTJ (Ring type joint)	-	x

## ■ Special materials

Flange nominal width	Pressure rating	Sealing face			
		Flange disc material			
		2.4360 (Monel 400), 2.4819 (Hastelloy C276), 2.4610 (Hastelloy C4), 3.7035 (titanium grade 2)	Tantalum		
EN 1092-1, DN 25 EN 1092-1, DN 40	PN 6	Form B1, B2, C, D	Form B2		
	PN 10 ... 40				
EN 1092-1, DN 50	PN 6				
	PN 10 ... 16				
	PN 25 ... 40				
DIN 2526/2527, DN 25 DIN 2526/2527, DN 40	PN 6			Form C, E, N, F	Form E
	PN 10 ... 16				
	PN 25 ... 40				
DIN 2526/2527, DN 50	PN 6				
	PN 10 ... 16				
	PN 25 ... 40				
ASME 1 inch ASME 1 ½ inch ASME 2 inch	150 lbs	Form RF (Raised face), RFSF (Raised face smooth finish)	Form RFSF		
	300 lbs				
	600 lbs				

Girder flange and connection components: Stainless steel

## Sealing face roughness

Flange standard		AARH in $\mu\text{inch}$	Ra in $\mu\text{m}$	Rz in $\mu\text{m}$
ASME B16.5	Stock finish	125 ... 250	3.2 ... 6.3	-
	Smooth finish	< 125	< 3.2	-
	RTJ	< 63	< 1.6	-
	Tongue / Groove	< 125	< 3.2	-
EN 1092-1	Form B1	-	3.2 ... 12.5	12.5 ... 50
	Form B2	-	0.8 ... 3.2	3.2 ... 12.5
DIN 2527	Form C	-	-	40 ... 160
	Form E	-	-	< 16

## Insertion lengths

Protection tube design	Standard insertion length	Min./max. insertion length
Straight, form 2F DIN 43772	225, 315, 465 mm	50 mm / 3,000 mm
Tapered, form 3F DIN 43772	225, 285, 345 mm	85 mm / 3,000 mm
Tapered, weld-on solid tip, in line with DIN 43772	160, 250, 400 mm	75 mm / 3,000 mm
Straight, in line with form 2F DIN 43772, special material	225, 315, 465 mm	50 mm / 3,000 mm
Straight, in line with form 2F DIN 43772, tantalum cover	225, 315, 465 mm	50 mm / 1,000 mm
Tapered, in line with form 3F DIN 43772, tantalum cover	225, 285, 345 mm	85 mm / 1,000 mm

Other insertion lengths to customer specification



## Neck lengths

### ■ Protection tube designs in accordance with DIN 43772

Protection tube design	Standard neck length	Min./max. neck length				
		PN 6 ... PN 40 (DN 25 ... DN 50)	PN 63 ... PN 100 (DN 25 ... DN 50)	150 ... 300 lbs (1" ... 2")	600 lbs (1" ... 2")	900 ... 1,500 lbs (1" ... 2")
Straight, form 2F DIN 43772	65 mm	40 / 900 mm	50 / 900 mm	45 / 900 mm	55 / 900 mm	65 / 900 mm
Tapered, form 3F DIN 43772	67 mm	40 / 900 mm	50 / 900 mm	45 / 900 mm	55 / 900 mm	67 / 900 mm
Tapered, weld-on solid tip, in line with DIN 43772, non-standard design	130 mm	40 / 900 mm	50 / 900 mm	45 / 900 mm	55 / 900 mm	65 / 900 mm

### ■ Wetted parts: special material

Protection tube design	Standard neck length	Min./max. neck length				
		PN 6 ... PN 40 (DN 25 ... DN 50)	PN 63 ... PN 100 (DN 25 ... DN 50)	150 ... 300 lbs (1" ... 2")	600 lbs (1" ... 2")	900 ... 1,500 lbs (1" ... 2")
Straight, in line with DIN 43772, non-standard design	65 mm	50 / 150 mm	60 / 150 mm	55 / 150 mm	65 / 150 mm	75 / 150 mm

### ■ Tantalum cover with tantalum flange disc

Protection tube design	Standard neck length	Min./max. neck length				
		PN 6 ... PN 40 (DN 25 ... DN 50)	PN 63 ... PN 100 (DN 25 ... DN 50)	150 ... 300 lbs (1" ... 2")	600 lbs (1" ... 2")	900 ... 1,500 lbs (1" ... 2")
Straight, in line with DIN 43772, non-standard design	65 mm	40 / 900 mm	50 / 900 mm	45 / 900 mm	55 / 900 mm	65 / 900 mm
Tapered, in line with DIN 43772, non-standard design	67 mm	40 / 900 mm	50 / 900 mm	45 / 900 mm	55 / 900 mm	65 / 900 mm

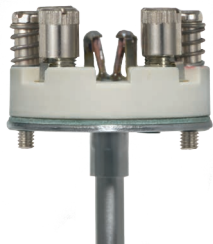
The neck tube is screwed into the connection head. The neck length depends on the intended use. Usually an isolation is bridged by the neck tube. Also, in many cases, the neck tube serves as a cooling extension between the connection head and the medium, in order to protect any possible built-in transmitter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

Other versions on request

## Measuring insert

Within the TC10-F, the measuring insert of model TC10-A is fitted.

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



### Measuring insert for thermocouple, model TC10-A

Only correct measuring insert length and correct measuring insert diameter ensure sufficient heat transfer from protection tube to the measuring insert.

The bore diameter of the protection tube should be a max. 1 mm larger than the measuring insert diameter. Gaps of more than 0.5 mm between protection tube and the measuring insert will have a negative effect on the heat transfer, and they will result in unfavourable response behaviour of the thermometer.

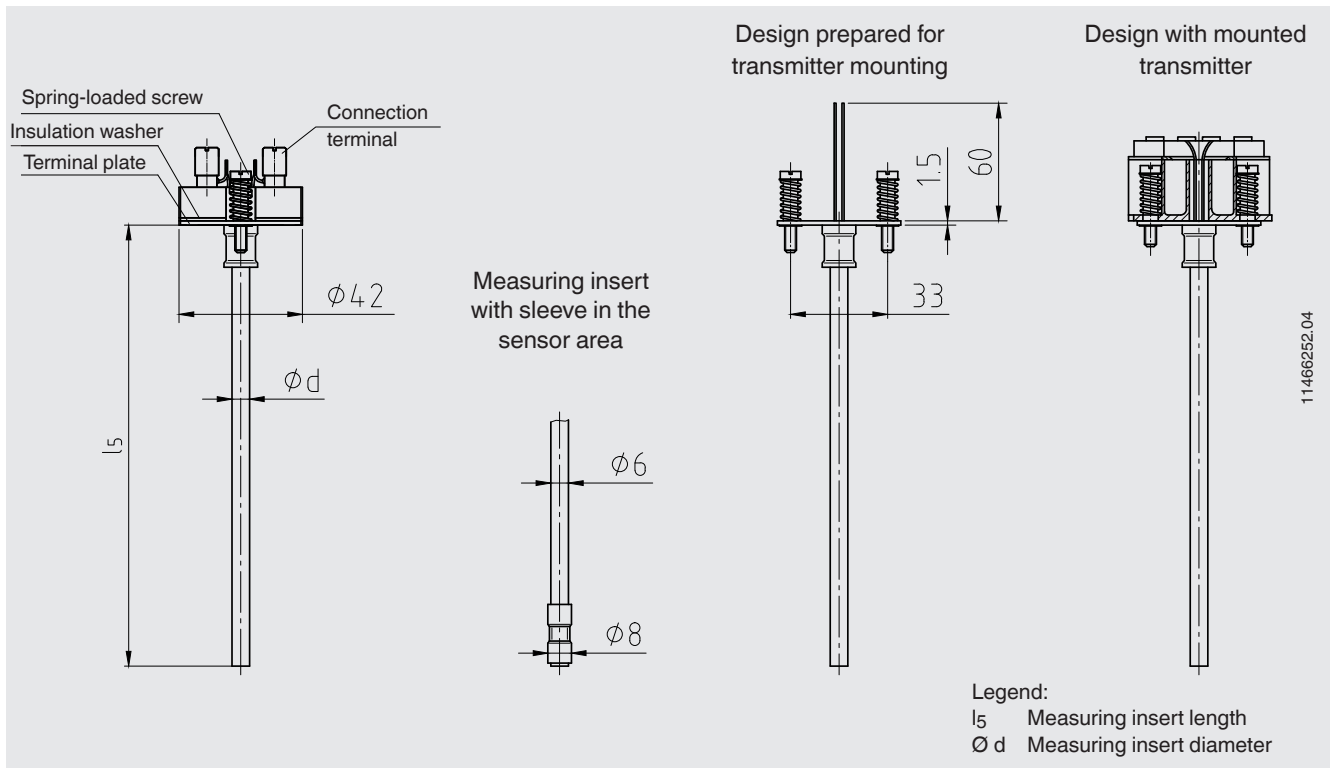
When fitting the measuring insert into a protection tube, it is very important to determine the correct insertion length (= protection tube length for bottom thicknesses of  $\leq 5.5$  mm). In order to ensure that the measuring insert is firmly pressed down onto the bottom of the protection tube, the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

#### Material

<b>Sheath material</b>	Ni alloy: alloy 600
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Other sheath materials on request.

# Dimensions in mm



Measuring insert length $l_5$ in mm	Tolerance in mm
75 ... 825	+2 0
> 825	+3 0

Measuring insert diameter $\phi d$ in mm		Index per DIN 43735	Tolerance in mm
3 <sup>1)</sup>	Standard	30	$3 \pm 0.05$
6	Standard	60	$6 \begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$
8 (6 mm with sleeve)	Standard	-	$8 \begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$
8	Standard	80	$8 \begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$
1/8 inch (3.17 mm) 1/4 inch (6.35 mm) 3/8 inch (9.53 mm)	Option, on request	-	-

## Operating conditions

The replaceable measuring insert is made of a vibration-resistant, sheathed measuring cable (MI cable).  
Standard vibration resistance: 50 g (sensor tip)

### Max. process temperature, process pressure

Depending on:

- Load diagram DIN 43772
- Protection tube design
  - Dimensions
  - Material
- Process conditions
  - Flow rate
  - Medium density

### Ambient and storage temperature

-40 ... +80 °C

Other ambient and storage temperatures on request

### Thermowell calculation

With critical operating conditions, a thermowell calculation in accordance with Dittrich/Klotter is recommended as a WIKA engineering service.

Note: ASME PTC 19.3 TW-2016 is not applicable for the TC10-F.

For further information, see Technical information IN 00.15 "Strength calculation for thermowells".

## Certificates (option)

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	-

The different certifications can be combined with each other.

1) Protection tubes

## Ordering information

Model / Sensor / Explosion protection / Process connection / Measuring element / Connection method / Temperature range / Design of the sensor tip / Sensor diameter / Insertion length A / Neck length N(MH) / Certificates / Options

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