

# 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 are available for many approval types (see page 2)

## 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.

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

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                     |
|---|--|-----------------------------|
| <br>  | <b>EU declaration of conformity</b> <ul style="list-style-type: none"> <li>■ EMC directive <sup>1)</sup><br/>EN 61326 emission (group 1, class B) and interference immunity (industrial application)</li> <li>■ RoHS directive</li> <li>■ ATEX directive (option)<br/>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 e <sup>2)</sup> Zone 1 gas II 2G Ex eb IIC T1 ... T6 Gb <sup>3)</sup></li> <li>Zone 2 gas II 3G Ex ec IIC T1 ... T6 Gc X</li> <li>Zone 21 dust II 2D Ex tb IIIC TX °C Db <sup>3)</sup></li> <li>Zone 22 dust II 3D Ex tc IIIC TX °C Dc X</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 TX °C Dc X</li> </ul> </li> </ul> | European Union              |
|   | <b>IECEx (option) - in conjunction with ATEX</b><br>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><br>Hazardous areas <ul style="list-style-type: none"> <li>- Ex i Zone 0 gas 0Ex ia IIC T6 ... T1 Ga X</li> <li>Zone 1 gas 1Ex ia IIC T6 ... T1 Gb X</li> <li>Zone 20 dust Ex ia IIIC T80...T440 °C Da X</li> <li>Zone 21 dust Ex ia IIIC T80...T440 °C Db X</li> <li>- Ex n Zone 2 gas 2Ex nA IIC T6 ... T1 Gc X</li> </ul>  | Eurasian Economic Community |
|    | <b>Ex Ukraine (option)</b><br>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 T65°C Da</li> <li>Zone 21 mounting to zone 20 dust II 1/2D Ex ia IIIC T65°C Da/Db</li> <li>Zone 21 dust II 2D Ex ia IIIC T65°C Db</li> </ul>  | Ukraine                     |

| Logo  | Description  | Country   |
|---|--|---|
|    | <b>INMETRO (option)</b><br>Hazardous areas<br>- Ex i Zone 0 gas<br>Zone 1 mounting to zone 0 gas<br>Zone 20 dust<br>Zone 21 mounting to zone 20 dust   | Brazil<br><br>Ex ia IIC T3 ... T6 Ga<br>Ex ia IIC T3 ... T6 Ga/Gb<br>Ex ia IIC T125 ... T65 °C Da<br>Ex ia IIC T125 ... T65 °C Da/Db  |
|    | <b>CCC (option) 4)</b><br>Hazardous areas<br>- Ex i Zone 0 gas<br>Zone 1 gas<br>Zone 1 mounting to zone 0 gas<br>Zone 2 gas<br>Zone 20 dust<br>Zone 21 dust<br>Zone 21 mounting to zone 20 dust<br>- Ex n Zone 2 gas | China<br><br>Ex ia IIC T1 ~ T6 Ga<br>Ex ia IIC T1 ~ T6 Gb<br>Ex ia IIC T1 ~ T6 Ga/Gb<br>Ex ic IIC T1 ~ T6 Gc<br>Ex iaD 20 T65/T95/T125°C<br>Ex iaD 21 T65/T95/T125°C<br>Ex iaD 20/21 T65/T95/T125°C<br>Ex nA IIC T1 ~ T6 Gc |
|    | <b>KCs - KOSHA (option)</b><br>Hazardous areas<br>- Ex i Zone 0 gas<br>Zone 1 gas  | South Korea<br><br>Ex ia IIC T4 ... T6<br>Ex ib IIC T4 ... T6   |
| -   | <b>PESO (option)</b><br>Hazardous areas<br>- Ex i Zone 0 gas<br>Zone 1 mounting to zone 0 gas<br>Zone 1 gas  | India<br><br>Ex ia IIC T1 ... T6 Ga<br>Ex ia IIC T1 ... T6 Ga/Gb<br>Ex ia IIC T1 ... T6 Gb  |
|    | <b>GOST (option)</b><br>Metrology, measurement technology  | Russia  |
|    | <b>KazInMetr (option)</b><br>Metrology, measurement technology   | Kazakhstan  |
| -   | <b>MTSCHS (option)</b><br>Permission for commissioning   | Kazakhstan  |
|  | <b>BelGIM (option)</b><br>Metrology, measurement technology  | Belarus   |
|  | <b>UkrSEPRO (option)</b><br>Metrology, measurement technology  | Ukraine   |
|  | <b>Uzstandard (option)</b><br>Metrology, measurement technology  | Uzbekistan  |



1) Only for built-in transmitter

2) Only for connection head model BSZ, BSZ-H (see "Connection head")

3) Only for insulated thermocouples

4) Without transmitter

## Manufacturer's information and certifications

| Logo  | Description   |
|---|---|
|  | <b>SIL 2</b><br>Functional safety<br>(only in conjunction with model T32 temperature transmitter) |
|  | <b>NAMUR NE 024</b><br>Hazardous areas (Ex i)   |

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 or ASTM E230

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

### Measuring point

- Ungrounded (standard)
- Grounded

### Sensor types

| Type | Validity limits of class accuracy |                   |                |         |
|------|-----------------------------------|-------------------|----------------|---------|
|      | 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.

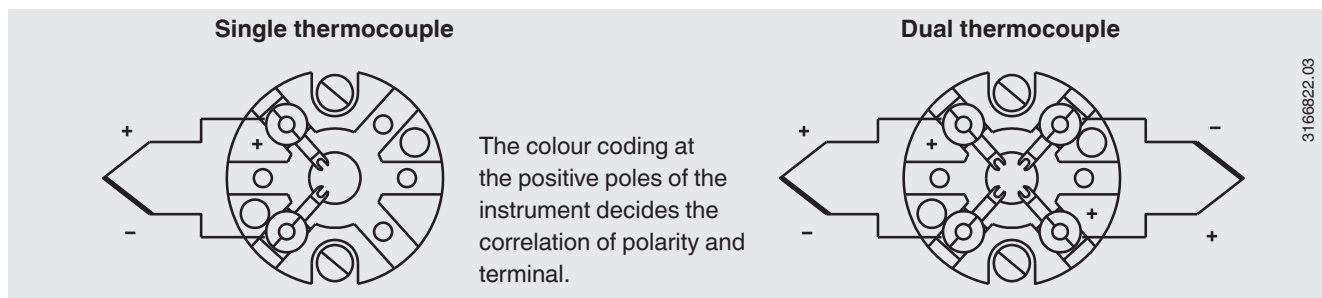
The actual operating temperature of the thermometers is limited both by the maximum permissible working temperature and the diameter of the thermocouple and the MI cable, as well as by the maximum permissible working temperature of the thermowell material.

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.

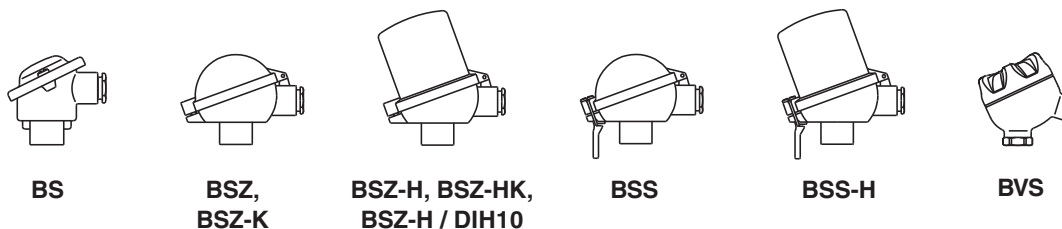
### Electrical connection



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><br>IEC/EN 60529 | Cap   | Surface                     | Connection to neck tube |
|-----------------------------|-----------------|--|---|---|-----------------------------|-------------------------|
| BS                          | Aluminium       | M20 x 1.5 or ½ NPT <sup>3)</sup>         | IP65 <sup>4)</sup>                                      | Flat cap with 2 screws                          | Blue, painted <sup>5)</sup> | M24 x 1.5, ½ NPT        |
| BSZ                         | Aluminium       | M20 x 1.5 or ½ NPT <sup>3)</sup>         | IP65 <sup>4)</sup>                                      | Spherical hinged cover with cylinder head screw | Blue, painted <sup>5)</sup> | M24 x 1.5, ½ NPT        |
| BSZ-H                       | Aluminium       | M20 x 1.5 or ½ NPT <sup>3)</sup>         | IP65 <sup>4)</sup>                                      | Raised hinged cover with cylinder head screw    | Blue, painted <sup>5)</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 <sup>4)</sup>                                      | Raised hinged cover with cylinder head screw    | Blue, painted <sup>5)</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, painted <sup>5)</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, painted <sup>5)</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, painted <sup>5)</sup> | M24 x 1.5, ½ NPT        |
| BVS                         | Stainless steel | M20 x 1.5 <sup>3)</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)<br>Zone 0, 1, 2 | Ex i (dust)<br>Zone 20, 21, 22 | Ex e (gas)<br>Zone 1, 2 | Ex t (dust)<br>Zone 21, 22 | Ex nA (gas)<br>Zone 2 |
| BS                          | x                    | x                          | x                              | -                       | -                          | -                     |
| BSZ                         | x                    | x                          | x                              | x <sup>6)</sup>         | x <sup>6)</sup>            | x <sup>7)</sup>       |
| BSZ-H                       | x                    | x                          | x                              | x <sup>6)</sup>         | x <sup>6)</sup>            | x <sup>7)</sup>       |
| BSZ-H (2x cable outlet)     | x                    | x                          | x                              | x <sup>6)</sup>         | x <sup>6)</sup>            | x <sup>7)</sup>       |
| BSZ-H / DIH10 <sup>1)</sup> | 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 TC10-F 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

6) Only ATEX

7) Only ATEX, CCC and EAC

■ North American designs



KN4-A  
KN4-P

| Model               | Material      | Cable entry thread size          | Ingress protection (max.) <sup>1)</sup><br>IEC/EN 60529 | 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, painted <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)<br>Zone 0, 1, 2 | Ex i (dust)<br>Zone 20, 21, 22 | Ex e (gas)<br>Zone 1, 2 | Ex t (dust)<br>Zone 21, 22 | Ex nA (gas)<br>Zone 2 |
| KN4-A               | x                    | x                          | -                              | -                       | -                          | -                     |
| KN4-P <sup>4)</sup> | x                    | -                          | -                              | -                       | -                          | -                     |

1) IP ingress protection of the connection head. The IP ingress protections of the complete instrument TC10-F 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



Standard



Plastic



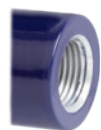
Brass,  
nickel-plated



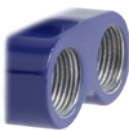
Stainless steel



Junction box,  
M12 x 1 (4-pin)



Plain  
threaded



2 x plain  
threaded



Sealing plugs for  
transport

The pictures show examples of connection heads.

| Cable entry   | Cable entry thread size | Min./max. ambient temperature                        |
|---|-------------------------|--|
| Standard cable entry <sup>1)</sup>                            | M20 x 1.5 or ½ NPT      | -40 ... +80 °C                                       |
| Plastic cable gland (cable Ø 6 ... 10 mm) <sup>1)</sup>       | M20 x 1.5 or ½ NPT      | -40 ... +80 °C                                       |
| Plastic cable gland (cable Ø 6 ... 10 mm), Ex e <sup>1)</sup> | M20 x 1.5 or ½ NPT      | -20 ... +80 °C (standard)<br>-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      | -  |
| 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               | -40 ... +80 °C                                       |
| Sealing plugs for transport                                   | M20 x 1.5 or ½ NPT      | -40 ... +80 °C                                       |

| Cable entry                                | Colour        | Ingress protection (max.) <sup>4)</sup> IEC/EN 60529 | Explosion protection                 |                         |                             |                      |                         |                    |
|--|---------------|--|--------------------------------------|-------------------------|-----------------------------|----------------------|-------------------------|--------------------|
|  |               |  | without                              | Ex i (gas) Zone 0, 1, 2 | Ex i (dust) Zone 20, 21, 22 | Ex e (gas) Zone 1, 2 | Ex t (dust) Zone 21, 22 | Ex nA (gas) Zone 2 |
| Standard cable entry <sup>1)</sup>         | Blank         | IP65   | x                                    | x                       | -                           | -                    | -                       | -                  |
| Plastic cable gland <sup>1)</sup>          | Black or grey | IP66 <sup>5)</sup>                                   | x                                    | x                       | -                           | -                    | -                       | -                  |
| Plastic cable gland, Ex e <sup>1)</sup>    | Light blue    | IP66 <sup>5)</sup>                                   | x                                    | x                       | x                           | -                    | -                       | -                  |
| Plastic cable gland, Ex e <sup>1)</sup>    | Black         | IP66 <sup>5)</sup>                                   | x                                    | x                       | x                           | x                    | x                       | x                  |
| Nickel-plated brass cable gland            | Blank         | IP66 <sup>5)</sup>                                   | x                                    | x                       | x                           | -                    | -                       | -                  |
| Nickel-plated brass cable gland, Ex e      | Blank         | IP66 <sup>5)</sup>                                   | x                                    | x                       | x                           | x                    | x                       | x                  |
| Stainless steel cable gland                | Blank         | IP66 <sup>5)</sup>                                   | x                                    | x                       | x                           | -                    | -                       | -                  |
| Stainless steel cable gland, Ex e          | Blank         | IP66 <sup>5)</sup>                                   | x                                    | x                       | x                           | x                    | x                       | x                  |
| Plain threaded                             | -             | IP00   | x                                    | x                       | x <sup>7)</sup>             | x <sup>7)</sup>      | x <sup>7)</sup>         | x <sup>7)</sup>    |
| 2 x M20 x 1.5 <sup>2)</sup>                | -             | IP00   | x                                    | x                       | x <sup>7)</sup>             | x <sup>7)</sup>      | x <sup>7)</sup>         | x <sup>7)</sup>    |
| Junction box M12 x 1 (4-pin) <sup>3)</sup> | -             | IP65   | x                                    | x <sup>6)</sup>         | x <sup>6)</sup>             | -                    | -                       | -                  |
| Sealing plugs for transport                | Transparent   | -  | 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) IP ingress protection of the cable gland. The IP ingress protections of the complete instrument TC10-F must not inevitably correspond to the cable gland.

5) Ingress protections, which describe temporary or continuous immersion, available on request

6) With appropriate mating connector connected

7) 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 <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 TC10-F is IP65.

The stated degrees of protection apply under the following conditions:

- Use of a suitable thermowell
- 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.

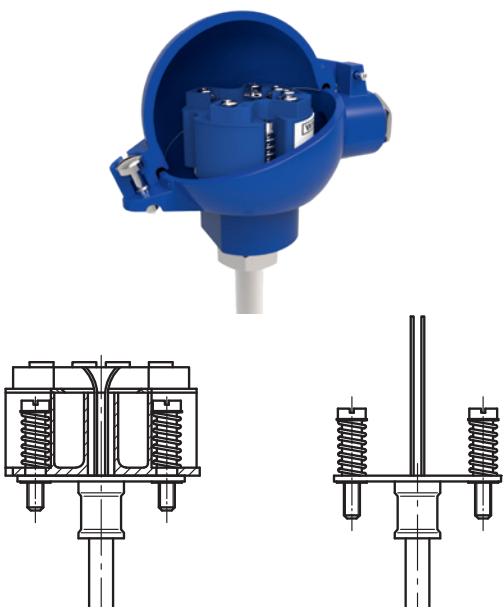


Fig. left: Measuring insert with mounted transmitter (here: model T32)  
 Fig. right: Measuring insert prepared for transmitter mounting

### 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

**HART**  
COMMUNICATION PROTOCOL



| Output signal 4 ... 20 mA, HART® protocol |               |               |
|---|---------------|---------------|
| Transmitter (selectable versions)         | Model T16     | Model T32     |
| Data sheet                                | TE 16.01      | 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              | K, J, E, N, T | K, J, E, N, T |
| <b>Explosion protection</b>               | Optional      | Optional      |

## Possible mounting positions for transmitters

| Connection head         | T16 | T32 |
|-------------------------|-----|-----|
| 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.

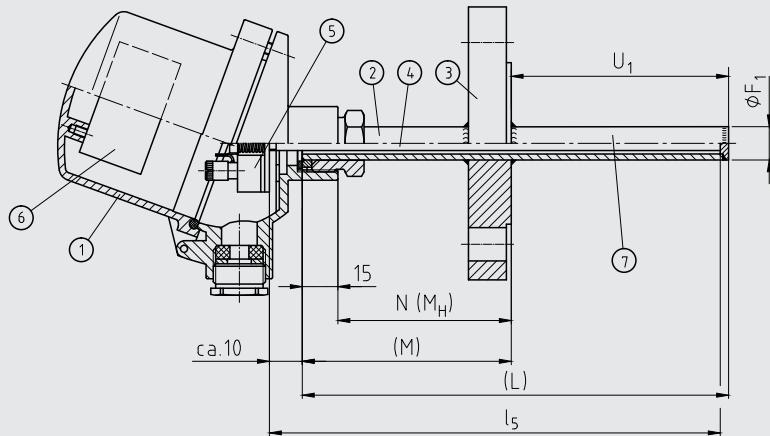
Selected TC10-F thermocouples, in combination with a suitable temperature transmitter (e.g. model T32.1S, TÜV certified SIL version for protection systems developed in

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).

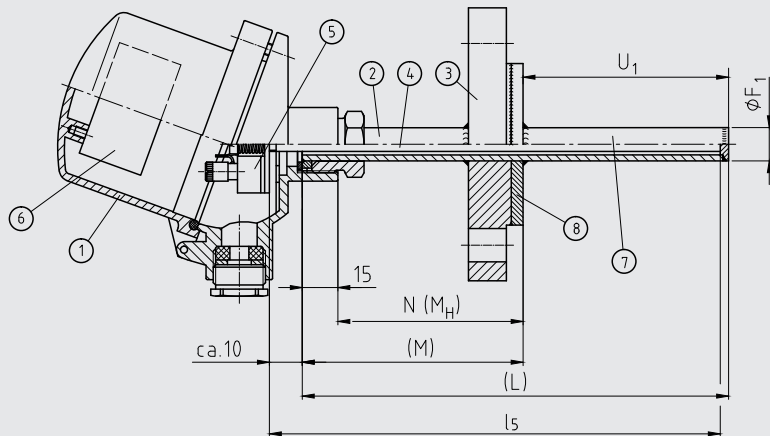
# Components model TC10-F

## Version: Flanged protection tube from standard material



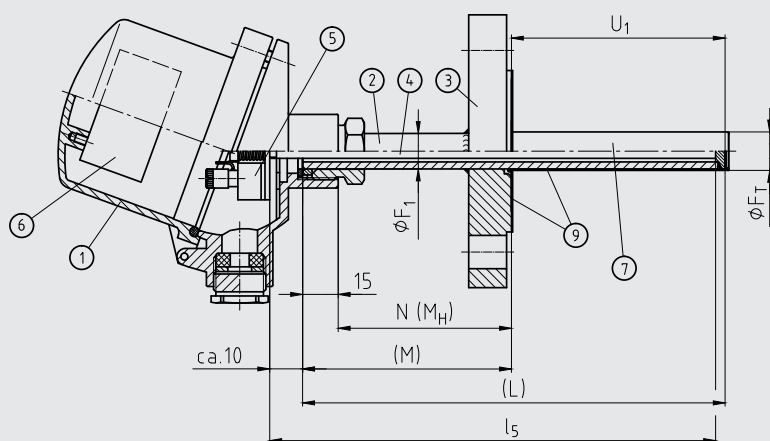
3176488.05

## 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

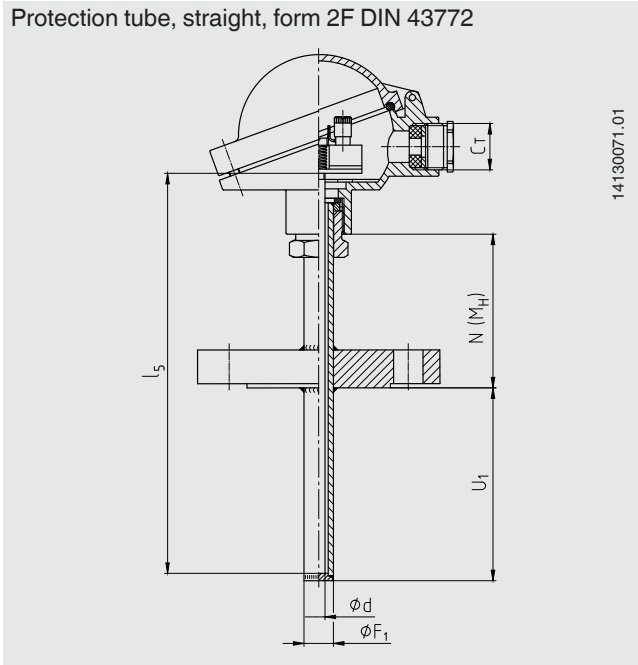
- (L) Overall length of protection tube
- $l_5$  Measuring insert length
- $U_1$  Protection tube insertion length in accordance with DIN 43772
- $\varnothing F_1$  Protection tube diameter
- $\varnothing F_T$  Outer diameter of tantalum cover
- $N (M_H)$  Neck length
- (M) Neck tube length

# Protection tube

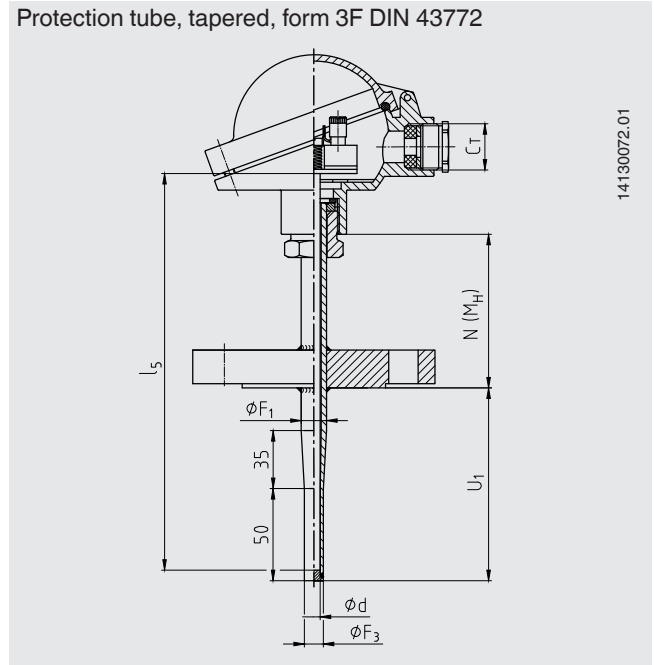
## Protection tube designs

### ■ Protection tube in accordance with DIN 43772

Protection tube, straight, form 2F DIN 43772

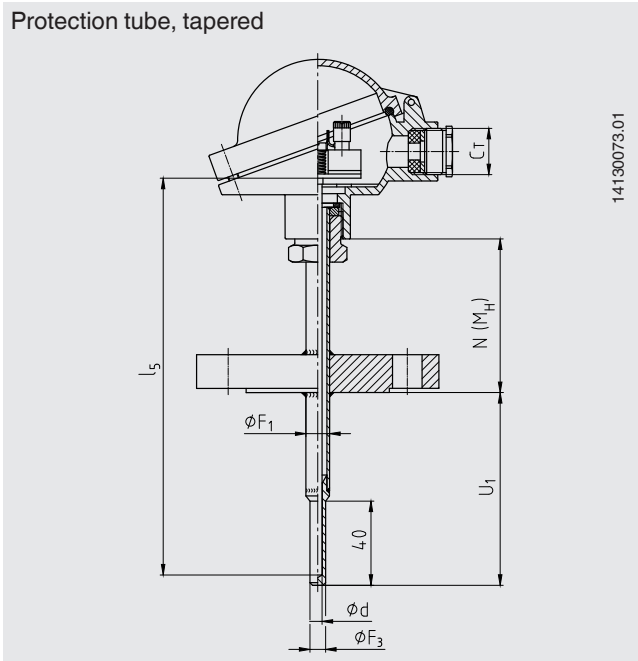


Protection tube, tapered, form 3F DIN 43772



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

Protection tube, tapered



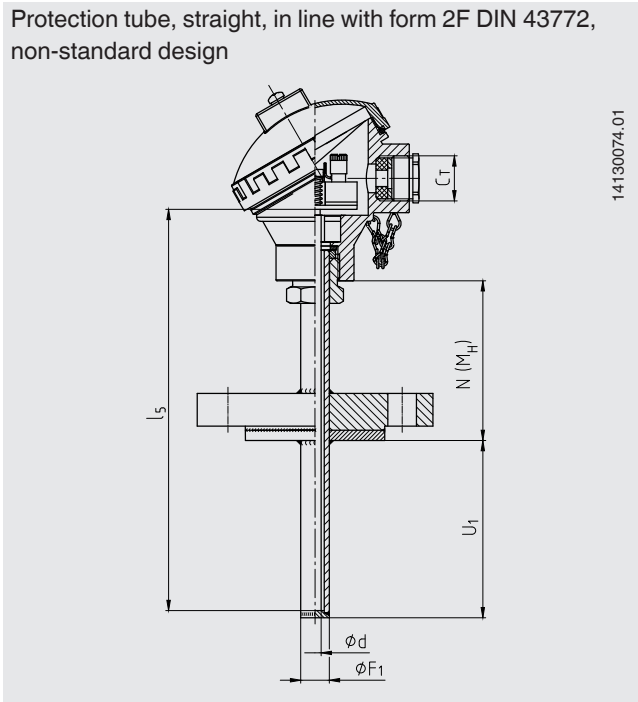
#### Legend:

|                   |                          |                   |                                   |
|-------------------|--------------------------|-------------------|-----------------------------------|
| $U_1$             | 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.

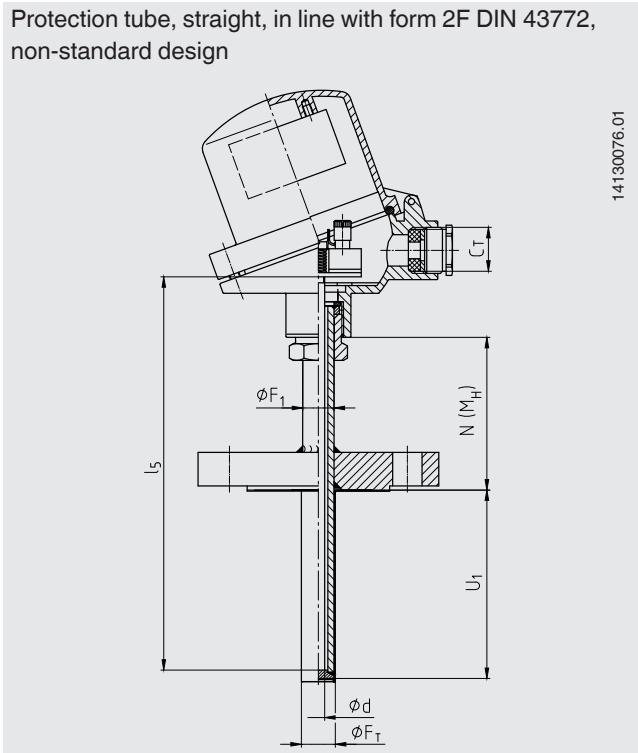
■ Protection tube in line with DIN 43772, wetted parts from special material, girder flange: Stainless steel

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

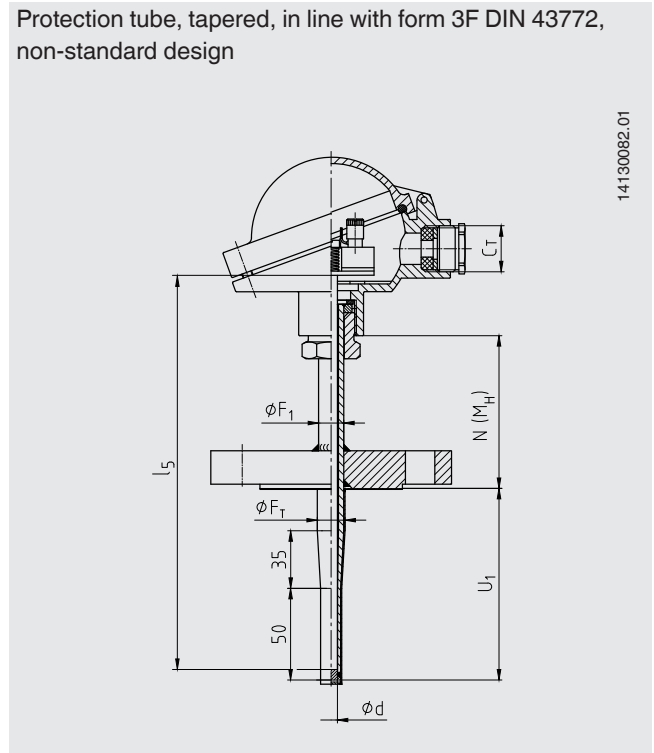


■ Protection tube in line with DIN 43772, tantalum cover with tantalum flange disc, carrier protection tube: Stainless steel

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><br> | Stainless steel 1.4571 | 9 x 1 mm<br>11 x 2 mm<br>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><br>  | Stainless steel 1.4571 | 12 x 2.5 mm, tapered to 9 mm         | 6 mm                            |   |


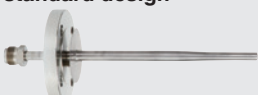
### Protection tube designs in line with DIN 43772, weld-on solid tip

| 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><br> | Stainless steel 1.4571 | 9 x 1 mm, tapered to 6 mm<br>11 x 2 mm, tapered to 6 mm<br>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><br> | 2.4360 (Monel400) / stainless steel<br>2.4819 (Hastelloy C276) / stainless steel<br>2.4610 (Hastelloy C4) / stainless steel<br>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><br> | 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><br>  | 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<br>12 x 2,5 mm<br>14 x 2,5 mm |
| EN 1092-1, DN 25<br>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<br>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<br>12 x 2,5 mm<br>14 x 2,5 mm |
| <b>DIN 2526/2527, DN 25</b><br><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><br><b>ASME 1 ½ inch</b><br><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<br>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<br>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<br>ASME 1 ½ inch<br>ASME 2 inch  | 150 lbs         | Form RF (Raised face),<br>RF SF (Raised face smooth finish)                                   | Form RF SF |                 |        |
|  | 300 lbs         |   |            |                 |        |
|  | 600 lbs         |   |            |                 |        |

Girder flange and connection components: Stainless steel

## Sealing face roughness

| Flange standard |                 | AARH<br>in $\mu\text{inch}$ | Ra<br>in $\mu\text{m}$ | Rz<br>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<br>(DN 25 ... DN 50) | PN 63 ... PN 100<br>(DN 25 ... DN 50) | 150 ... 300 lbs<br>(1" ... 2") | 600 lbs<br>(1" ... 2") | 900 ... 1,500 lbs<br>(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<br>(DN 25 ... DN 50) | PN 63 ... PN 100<br>(DN 25 ... DN 50) | 150 ... 300 lbs<br>(1" ... 2") | 600 lbs<br>(1" ... 2") | 900 ... 1,500 lbs<br>(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<br>(DN 25 ... DN 50) | PN 63 ... PN 100<br>(DN 25 ... DN 50) | 150 ... 300 lbs<br>(1" ... 2") | 600 lbs<br>(1" ... 2") | 900 ... 1,500 lbs<br>(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.

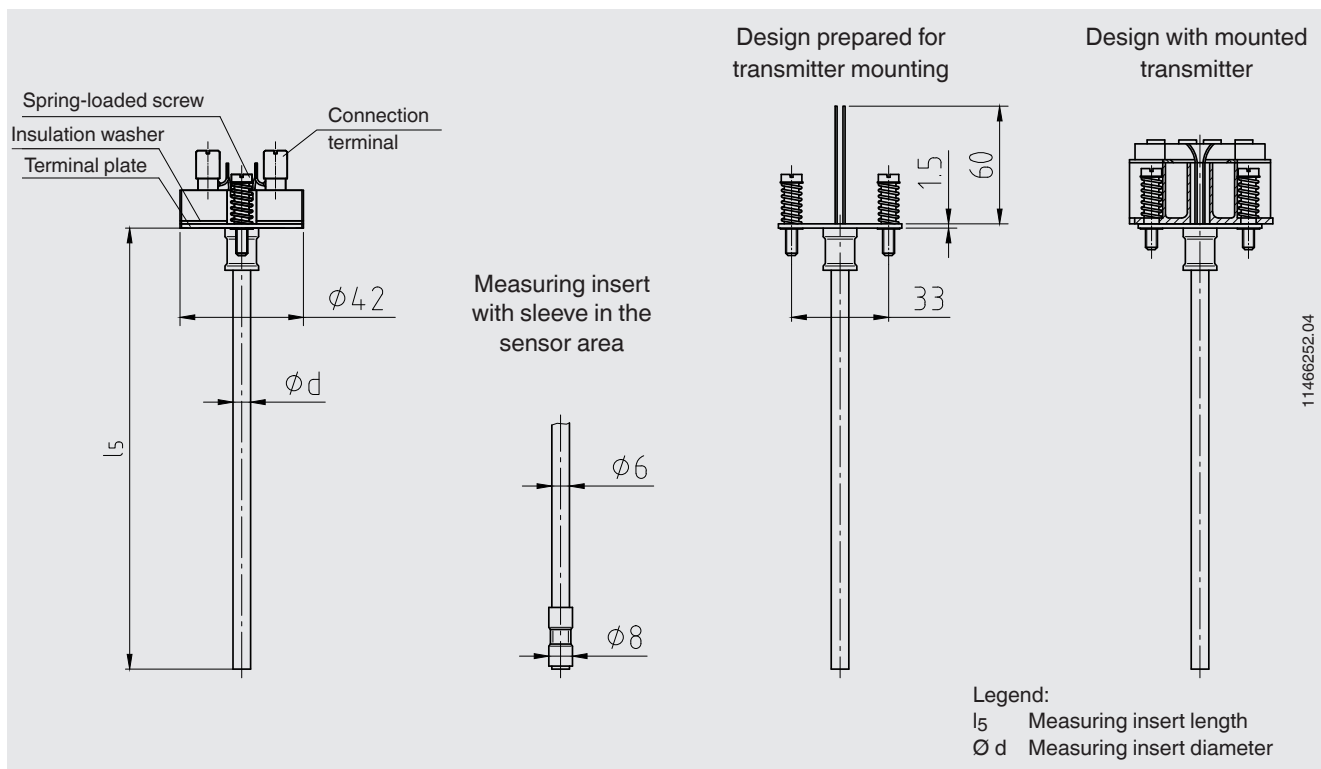
When fitting the measuring insert into a protection tube, it is very important to determine the correct insertion length (= protection tube length for bottom thicknesses of  $\leq 5.5$  mm). In order to ensure that the measuring insert is firmly pressed down onto the bottom of the protection tube, the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

#### Material

|                        |                     |
|------------------------|---------------------|
| <b>Sheath material</b> | Ni alloy: alloy 600 |
|------------------------|---------------------|

Other sheath materials on request.

# Dimensions in mm



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

| Measuring insert diameter $\phi d$ in mm                 | Index per DIN 43735 | Tolerance in mm                                     |
|--|---------------------|---|
| 3  | Standard            | 30  |
| 3  |                     | $3 \pm 0.05$  |
| 6  | Standard            | 60  |
| 6  |                     | $6 \begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$ |
| 8 (6 mm with sleeve)                                     | Standard            | -   |
| 8  |                     | $8 \begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$ |
| 8  | Standard            | 80  |
| 8  |                     | $8 \begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$ |
| 1/8 in [3.17 mm]<br>1/4 in [6.35 mm]<br>3/8 in [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                    | -                                  |

1) Protection tubes

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 / Sensor / Explosion protection / Process connection / Measuring element / Connection method / Temperature range / Design of the sensor tip / Sensor diameter / Insertion length A / Neck length N(M<sub>H</sub>) / Certificates / Options

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