

## VASTUSLÄMPÖTILA-ANTURI LAIPALLA

TR10-F

TR10F-14369111

PT100 3-johdin -50-500°C 250x12 DN40 form2F

- Mittausalueet -196-600°C
- Vaihdeettava mittaosa
- Atex optiolla
- Saatavana lämpötilälähtettimeillä
- Laipallisella TW40 suojaputkella



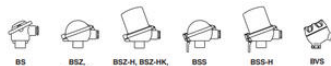
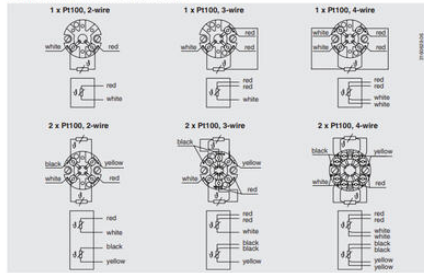
### TUOTEKUVAUS

TR10-F sarjan vastuslämpötila-anturit on suunniteltu kiinnitettäväksi säiliöihin ja putkistoihin. Saatavilla on standardien DIN EN ja ASME mukaisia laippoja. Nämä lämpötilamittapääät sopivat nestemäisille ja kaasumaisille väliaineille, joita käytetään kohtalaisella mekaanisella kuormalla. Mukana putkimateriaalista valmistettu TW40-mallinen suojatasku.

### TEKNISEET TIEDOT

|                                                      |                         |
|------------------------------------------------------|-------------------------|
| Aineen kanssa kosketuksissa olevien osien materiaali | Ruostumaton teräs 316Ti |
| Asennussyvyys                                        | 250 mm                  |
| IP-luokka                                            | IP65                    |
| Kaulan pituus                                        | 0,065 m                 |
| Kytinkotelon materiaali                              | Inconel - 600           |
| Max. käyttölämpötila                                 | 500 °C                  |
| Max. painealue                                       | 16 bar                  |
| Max. ympäristön lämpötila                            | 80 °C                   |
| Min. käyttölämpötila                                 | -50 °C                  |
| Min. ympäristön lämpötila                            | -40 °C                  |
| Pistokkeen halkaisija                                | 12 mm                   |
| Pituus                                               | 340 mm                  |
| Rungon materiaali                                    | Alumiini                |

# Electrical connection (colour code per IEC/EN 60719)



| Model           | Material        | Cable entry thread size      | Ingress protection (max.) | Cap                                             | Surface                | Connection to rack tube |
|-----------------|-----------------|------------------------------|---------------------------|-------------------------------------------------|------------------------|-------------------------|
| BS              | Aluminum        | M20 x 1.5 or 1/2 NPT         | IP65, IP68                | Flat cap with 2 screws                          | Blue, lacquered        | M24 x 1.5, 1/2 NPT      |
| BSZ             | Aluminum        | M20 x 1.5 or 1/2 NPT         | IP65, IP68                | Spherical hinged cover with cylinder head screw | Blue, lacquered        | M24 x 1.5, 1/2 NPT      |
| BSZ-H           | Aluminum        | M20 x 1.5 or 1/2 NPT         | IP65, IP68                | Spherical hinged cover with cylinder head screw | Blue, lacquered        | M24 x 1.5, 1/2 NPT      |
| BSZ-H / DIN19   | Aluminum        | 2 x M20 x 1.5 or 2 x 1/2 NPT | IP65, IP68                | Raised hinged cover with cylinder head screw    | Blue, lacquered        | M24 x 1.5               |
| BSZ-H / DIN19 H | Aluminum        | M20 x 1.5 or 1/2 NPT         | IP65                      | Raised hinged cover with cylinder head screw    | Blue, lacquered        | M24 x 1.5, 1/2 NPT      |
| BSS             | Aluminum        | M20 x 1.5 or 1/2 NPT         | IP65                      | Spherical hinged cover with clamping lever      | Blue, lacquered        | M24 x 1.5, 1/2 NPT      |
| BSS-H           | Aluminum        | M20 x 1.5 or 1/2 NPT         | IP65                      | Raised hinged cover with clamping lever         | Blue, lacquered        | M24 x 1.5, 1/2 NPT      |
| BVS             | Stainless steel | M20 x 1.5                    | IP65                      | Precision-steel screw-on lid                    | Black, electropolished | M24 x 1.5               |
| BSZ-K           | Plastic         | M20 x 1.5 or 1/2 NPT         | IP65                      | Spherical hinged cover with cylinder head screw | Black                  | M24 x 1.5               |
| BSZ-KH          | Plastic         | M20 x 1.5 or 1/2 NPT         | IP65                      | Raised hinged cover with cylinder head screw    | Black                  | M24 x 1.5               |

| Model                   | Explosion protection | Ex I (gpa)   | Ex I (dust)     | Ex II (gpa) | Ex II (dust) |
|-------------------------|----------------------|--------------|-----------------|-------------|--------------|
| BS                      | without              | Zone 6, 1, 2 | Zone 20, 21, 22 | Zone 2      | Zone 22      |
| BSZ                     | X                    | X            | X               | X           | X            |
| BSZ-H (2x cable outlet) | X                    | X            | X               | X           | X            |
| BSZ-H / DIN19 H         | X                    | X            | X               | X           | X            |
| BSS                     | X                    | X            | X               | X           | X            |
| BSS-H                   | X                    | X            | X               | X           | X            |
| BVS                     | X                    | X            | X               | X           | X            |
| BSZ-K                   | X                    | X            | X               | X           | X            |
| BSZ-KH                  | X                    | X            | X               | X           | X            |

## Cable entry



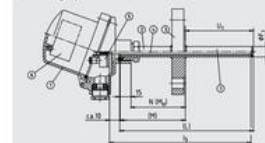
The pictures show examples of connection heads.

| Cable entry                                           | Cable entry thread size |
|-------------------------------------------------------|-------------------------|
| Standard cable entry                                  | M20 x 1.5 or 1/2 NPT    |
| Plastic cable gland (cable Ø ... 16 mm)               | M20 x 1.5 or 1/2 NPT    |
| Nickel-plated brass cable gland (cable Ø 6 ... 12 mm) | M20 x 1.5 or 1/2 NPT    |
| Stainless steel cable gland (cable Ø 7 ... 12 mm)     | M20 x 1.5 or 1/2 NPT    |
| Plain threaded                                        | M20 x 1.5 or 1/2 NPT    |
| 2 x M20 x 1.5                                         | 2 x M20 x 1.5           |
| Junction box M12 x 1 (4-pin)                          | M20 x 1.5               |
| Sealing plugs for transport                           | M20 x 1.5 or 1/2 NPT    |

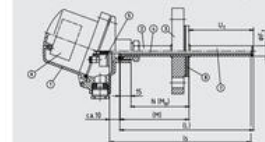
| Cable entry                           | Colour        | Ingress protection (max.) | Min./max. ambient temperature                          | Explosion protection                 | Ex I (gpa) | Ex I (dust) | Ex II (gpa) | Ex II (dust) |
|---------------------------------------|---------------|---------------------------|--------------------------------------------------------|--------------------------------------|------------|-------------|-------------|--------------|
| Standard cable entry                  | Black         | IP65                      | -40 ... +80 °C                                         | X                                    | X          | X           | X           | X            |
| Plastic cable gland                   | Black or grey | IP68, IP69                | -40 ... +80 °C                                         | X                                    | X          | X           | X           | X            |
| Plastic cable gland, Ex e             | Light blue    | IP68, IP69                | -40 ... +80 °C (standard)<br>-40 ... +70 °C (optional) | X                                    | X          | X           | X           | X            |
| Plastic cable gland, Ex e             | Black         | IP68, IP69                | -40 ... +80 °C (standard)<br>-40 ... +70 °C (optional) | X                                    | X          | X           | X           | X            |
| Nickel-plated brass cable gland       | Black         | IP68, IP69                | -40 ... +80 °C                                         | X                                    | X          | X           | X           | X            |
| Nickel-plated brass cable gland, Ex e | Black         | IP68, IP69                | -40 ... +80 °C                                         | X                                    | X          | X           | X           | X            |
| Stainless steel cable gland           | Black         | IP68, IP69                | -40 ... +80 °C                                         | X                                    | X          | X           | X           | X            |
| Stainless steel cable gland, Ex e     | Black         | IP68, IP69                | -40 ... +80 °C                                         | X                                    | X          | X           | X           | X            |
| Plain threaded                        | -             | IP60                      | -40 ... +80 °C                                         | X                                    | X          | X           | X           | X            |
| 2 x M20 x 1.5                         | -             | IP60                      | -40 ... +80 °C                                         | X                                    | X          | X           | X           | X            |
| Junction box M12 x 1 (4-pin)          | -             | IP65                      | -40 ... +80 °C                                         | X                                    | X          | X           | X           | X            |
| Sealing plugs for transport           | Transparent   | -                         | -40 ... +80 °C                                         | not applicable, transport protection | -          | -           | -           | -            |

## Components model TR10-F

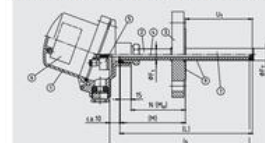
### Version: flanged protection tube from standard material



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



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

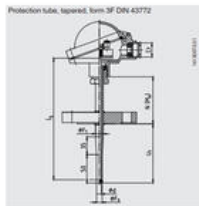
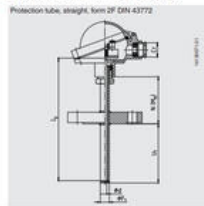


|         |                                                               |
|---------|---------------------------------------------------------------|
| Legend: | Connection head                                               |
| 1       | Rack tube                                                     |
| 2       | Flange                                                        |
| 3       | Measuring insert (TR10-F)                                     |
| 4       | Normal shock/pressure (optional)                              |
| 5       | Removable (optional)                                          |
| 6       | Protection tube                                               |
| 7       | Flange disc from special material                             |
| 8       | Tantalum cover                                                |
| L1      | Overall length of protection tube                             |
| L2      | Measuring insert length                                       |
| L3      | Protection tube insertion length in accordance with DIN 43772 |
| Ø P1    | Protection tube diameter                                      |
| Ø P2    | Outer diameter of flange cover                                |
| H1      | Rack length                                                   |
| H2      | Rack tube length                                              |

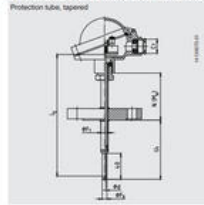
## Protection tube

### Protection tube designs

#### Protection tube, straight, form 3F DIN 43772

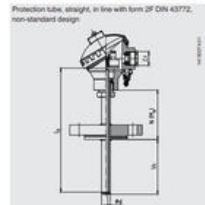


#### Protection tube in line with DIN 43772, weld-on solid tip



|         |                          |      |                                   |
|---------|--------------------------|------|-----------------------------------|
| Legend: | Insertion length         | Ø P1 | Diameter of protection tube tip   |
| L1      | Measuring insert length  | Ø P2 | Outer diameter of tantalum cover  |
| H1      | Rack length              | L2   | Overall length of protection tube |
| C1      | Thread cable entry       | Ø P3 | Measuring insert diameter         |
| Ø P1    | Protection tube diameter |      |                                   |

#### Protection tube in line with DIN 43772, welded parts from special material, gilder flange: stainless steel



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



|         |                          |      |                                   |
|---------|--------------------------|------|-----------------------------------|
| Legend: | Insertion length         | Ø P1 | Diameter of protection tube tip   |
| L1      | Measuring insert length  | Ø P2 | Outer diameter of tantalum cover  |
| H1      | Rack length              | L2   | Overall length of protection tube |
| C1      | Thread cable entry       | Ø P3 | Measuring insert diameter         |
| Ø P1    | Protection tube diameter |      |                                   |

The pictures show examples of connection heads.

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

| Protection tube             | Material               | Protection tube Ø                    | Insert Ø | Connection to head                                              |
|-----------------------------|------------------------|--------------------------------------|----------|-----------------------------------------------------------------|
| Straight, form 3F DIN 43772 | 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<br>available<br>Predefined<br>connection,<br>male nut |
| Tapered, form 3F DIN 43772  | 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                                                                       | Insert Ø | Connection to head                                              |
|-------------------------------------------------------------------------|------------------------|-----------------------------------------------------------------------------------------|----------|-----------------------------------------------------------------|
| Tapered, weld-on solid tip, in line with DIN 43772, non-standard design | 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<br>available<br>Predefined<br>connection,<br>male nut |

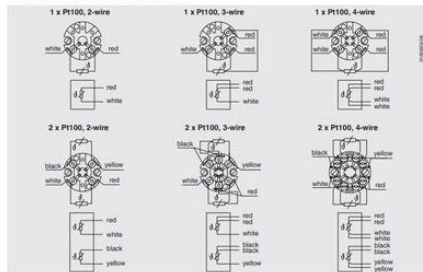
#### Protection tube designs in line with DIN 43772, welded parts: special material, gilder flange: stainless steel

| Protection tube                                               | Material                                                                                                                                                                 | Protection tube Ø | Insert Ø                       | Connection to head                                              |
|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------|-----------------------------------------------------------------|
| Straight, in line with form 3F DIN 43772, non-standard design | 2.4360 (MonelK500) / stainless steel<br>2.4810 (Hastelloy C276) / stainless steel<br>2.4810 (Hastelloy C4) / stainless steel<br>3.7035 (Titan Grade 5) / stainless steel | 13.7 x 2.2 mm     | 6 mm with sleeve Ø 6 mm / 8 mm | M24 x 1.5<br>available<br>Predefined<br>connection,<br>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                                                              | Insert Ø | Connection to head                                              |
|---------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------|----------|-----------------------------------------------------------------|
| Straight, in line with form 3F DIN 43772, non-standard design | Tantalum / stainless steel | 11 x 2 mm, tantalum cover 12 x 0.4 mm<br>15 x 3 mm, tantalum cover 18 x 0.4 mm | 6 mm     | M24 x 1.5<br>available<br>Predefined<br>connection,<br>male nut |
| Tapered, in line with form 3F DIN 43772, non-standard design  | Tantalum / stainless steel | 12 x 2.5 mm, tantalum cover 13 x 0.4 mm                                        | 6 mm     |                                                                 |

## Electrical connection (colour code per IEC 60318)



## Cable entry



The pictures show examples of connection heads.

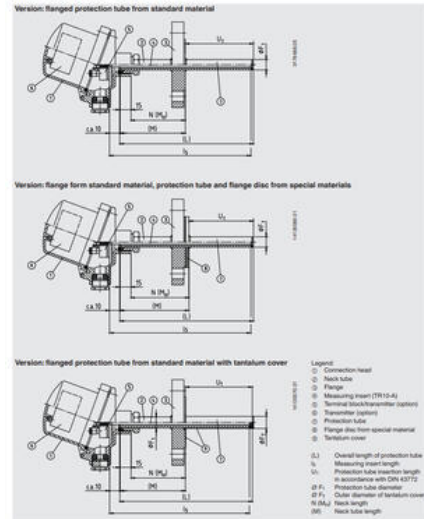
| Cable entry                                             | Cable entry thread size |
|---------------------------------------------------------|-------------------------|
| Standard cable entry <sup>1)</sup>                      | M20 x 1.5 or 1/2 NPT    |
| Plastic cable gland (cable Ø 6 ... 18 mm) <sup>1)</sup> | M20 x 1.5 or 1/2 NPT    |
| Nickel-plated brass cable gland (cable Ø 6 ... 12 mm)   | M20 x 1.5 or 1/2 NPT    |
| Stainless steel cable gland (cable Ø 7 ... 12 mm)       | M20 x 1.5 or 1/2 NPT    |
| Plain threaded                                          | M20 x 1.5 or 1/2 NPT    |
| 2 x M20 x 1.5 <sup>1)</sup>                             | 2 x M20 x 1.5           |
| Junction box M12 x 1 (4-pin) <sup>1)</sup>              | M20 x 1.5               |
| Sealing plug for transport                              | M20 x 1.5 or 1/2 NPT    |

| Model                       | Material        | Cable entry thread size                    | Ingress protection (IP) | Explosion protection                             | Explosion protection (Ex)     | Explosion protection (Ex) | Explosion protection (Ex) | Explosion protection (Ex) |
|-----------------------------|-----------------|--------------------------------------------|-------------------------|--------------------------------------------------|-------------------------------|---------------------------|---------------------------|---------------------------|
| BS                          | Aluminum        | M20 x 1.5 or 1/2 NPT <sup>1)</sup>         | IP65, IP68              | Flat cap with 2 screws                           | Blue, lacquered <sup>1)</sup> | MD4 x 1.5, 1/2 NPT        | MD4 x 1.5, 1/2 NPT        | MD4 x 1.5, 1/2 NPT        |
| BS2                         | Aluminum        | M20 x 1.5 or 1/2 NPT <sup>1)</sup>         | IP65, IP68              | Spherical flanged cover with cylinder head screw | Blue, lacquered <sup>1)</sup> | MD4 x 1.5, 1/2 NPT        | MD4 x 1.5, 1/2 NPT        | MD4 x 1.5, 1/2 NPT        |
| BS2-H                       | Aluminum        | M20 x 1.5 or 1/2 NPT <sup>1)</sup>         | IP65, IP68              | Raised flanged cover with cylinder head screw    | Blue, lacquered <sup>1)</sup> | MD4 x 1.5, 1/2 NPT        | MD4 x 1.5, 1/2 NPT        | MD4 x 1.5, 1/2 NPT        |
| BS2-H (Ex cable outlet)     | Aluminum        | 2 x M20 x 1.5 or 2 x 1/2 NPT <sup>1)</sup> | IP65, IP68              | Raised flanged cover with cylinder head screw    | Blue, lacquered <sup>1)</sup> | MD4 x 1.5, 1/2 NPT        | MD4 x 1.5, 1/2 NPT        | MD4 x 1.5, 1/2 NPT        |
| BS2-H / D0110 <sup>1)</sup> | Aluminum        | M20 x 1.5 or 1/2 NPT <sup>1)</sup>         | IP65                    | Raised flanged cover with cylinder head screw    | Blue, lacquered <sup>1)</sup> | MD4 x 1.5, 1/2 NPT        | MD4 x 1.5, 1/2 NPT        | MD4 x 1.5, 1/2 NPT        |
| BSS                         | Aluminum        | M20 x 1.5 or 1/2 NPT <sup>1)</sup>         | IP65                    | Spherical flanged cover with clamping lever      | Blue, lacquered <sup>1)</sup> | MD4 x 1.5, 1/2 NPT        | MD4 x 1.5, 1/2 NPT        | MD4 x 1.5, 1/2 NPT        |
| BSS-H                       | Aluminum        | M20 x 1.5 or 1/2 NPT <sup>1)</sup>         | IP65                    | Raised flanged cover with clamping lever         | Blue, lacquered <sup>1)</sup> | MD4 x 1.5, 1/2 NPT        | MD4 x 1.5, 1/2 NPT        | MD4 x 1.5, 1/2 NPT        |
| BVS                         | Stainless steel | M20 x 1.5 <sup>1)</sup>                    | IP65                    | Physion-clad screw on lid                        | Black, electropolished        | MD4 x 1.5                 | MD4 x 1.5                 | MD4 x 1.5                 |
| BS2-A                       | Plastic         | M20 x 1.5 or 1/2 NPT <sup>1)</sup>         | IP65                    | Spherical flanged cover with cylinder head screw | Black                         | MD4 x 1.5                 | MD4 x 1.5                 | MD4 x 1.5                 |
| BS2-HK                      | Plastic         | M20 x 1.5 or 1/2 NPT <sup>1)</sup>         | IP65                    | Raised flanged cover with cylinder head screw    | Black                         | MD4 x 1.5                 | MD4 x 1.5                 | MD4 x 1.5                 |

| Model                   | Explosion protection | Explosion protection | Explosion protection | Explosion protection | Explosion protection |
|-------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                         | Without              | Ex I (gas)           | Ex I (dust)          | Ex II (gas)          | Ex II (dust)         |
| BS                      | X                    | X                    | X                    | X                    | X                    |
| BS2                     | X                    | X                    | X                    | X                    | X                    |
| BS2-H                   | X                    | X                    | X                    | X                    | X                    |
| BS2-H (Ex cable outlet) | X                    | X                    | X                    | X                    | X                    |
| BSS                     | X                    | X                    | X                    | X                    | X                    |
| BSS-H                   | X                    | X                    | X                    | X                    | X                    |
| BVS                     | X                    | X                    | X                    | X                    | X                    |
| BS2-A                   | X                    | X                    | X                    | X                    | X                    |
| BS2-HK                  | X                    | X                    | X                    | X                    | X                    |

| Cable entry                                       | Colour        | Ingress protection (IP) | Min. max. ambient temperature                          | Explosion protection                 | Explosion protection (Ex) | Explosion protection (Ex) | Explosion protection (Ex) | Explosion protection (Ex) |
|---------------------------------------------------|---------------|-------------------------|--------------------------------------------------------|--------------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Standard cable entry <sup>1)</sup>                | Black         | IP65                    | -40 ... +80 °C                                         | X                                    | X                         | X                         | X                         | X                         |
| Plastic cable gland                               | Black or grey | IP65, IP68              | -40 ... +80 °C                                         | X                                    | X                         | X                         | X                         | X                         |
| Plastic cable gland, Ex <sup>1)</sup>             | Light blue    | IP65, IP68              | -20 ... +80 °C (standard)<br>-40 ... +75 °C (optional) | X                                    | X                         | X                         | X                         | X                         |
| Plastic cable gland, Ex <sup>1)</sup>             | Black         | IP65, IP68              | -20 ... +80 °C (standard)<br>-40 ... +75 °C (optional) | X                                    | X                         | X                         | X                         | X                         |
| Nickel-plated brass cable gland                   | Black         | IP65, IP68              | -40 ... +80 °C                                         | X                                    | X                         | X                         | X                         | X                         |
| Nickel-plated brass cable gland, Ex <sup>1)</sup> | Black         | IP65, IP68              | -40 ... +80 °C                                         | X                                    | X                         | X                         | X                         | X                         |
| Stainless steel cable gland                       | Black         | IP65, IP68              | -40 ... +80 °C                                         | X                                    | X                         | X                         | X                         | X                         |
| Stainless steel cable gland, Ex <sup>1)</sup>     | Black         | IP65, IP68              | -40 ... +80 °C                                         | X                                    | X                         | X                         | X                         | X                         |
| Plain threaded                                    | -             | IP60                    | -                                                      | X                                    | X                         | X                         | X                         | X                         |
| 2 x M20 x 1.5 <sup>1)</sup>                       | -             | IP65                    | -40 ... +80 °C                                         | X                                    | X                         | X                         | X                         | X                         |
| Junction box M12 x 1 (4-pin) <sup>1)</sup>        | -             | IP65                    | -40 ... +80 °C                                         | X                                    | X                         | X                         | X                         | X                         |
| Sealing plug for transport                        | Transparent   | -                       | -40 ... +80 °C                                         | not applicable, transport protection | -                         | -                         | -                         | -                         |

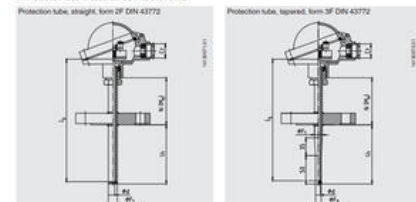
## Components model TR10-F



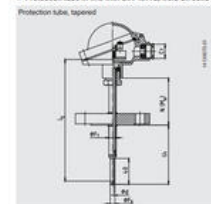
## Protection tube

### Protection tube designs

#### Protection tube in accordance with DIN 43772

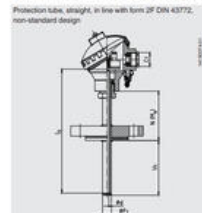


#### Protection tube in line with DIN 43772, weld-on solid tip

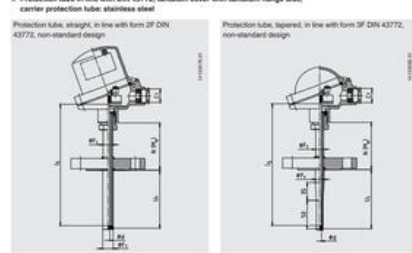


|                                        |                                                    |                                                    |
|----------------------------------------|----------------------------------------------------|----------------------------------------------------|
| Legend:                                | U <sub>1</sub> Insertion length                    | Ø F <sub>1</sub> Diameter of protection tube tip   |
| U <sub>2</sub> Measuring insert length | Ø F <sub>2</sub> Outer diameter of tantalum cover  | Ø F <sub>3</sub> Outer diameter of protection tube |
| h <sub>BAU</sub> Back length           | Ø F <sub>4</sub> Overall length of protection tube | Ø F <sub>5</sub> Measuring insert diameter         |
| C <sub>1</sub> Thread cable entry      | Ø F <sub>6</sub> Thread cable entry                | Ø F <sub>7</sub> Protection tube diameter          |

#### Protection tube in line with DIN 43772, welded parts from special material, girder flange stainless steel



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



|                                        |                                                    |                                                    |
|----------------------------------------|----------------------------------------------------|----------------------------------------------------|
| Legend:                                | U <sub>1</sub> Insertion length                    | Ø F <sub>1</sub> Diameter of protection tube tip   |
| U <sub>2</sub> Measuring insert length | Ø F <sub>2</sub> Outer diameter of tantalum cover  | Ø F <sub>3</sub> Outer diameter of protection tube |
| h <sub>BAU</sub> Back length           | Ø F <sub>4</sub> Overall length of protection tube | Ø F <sub>5</sub> Measuring insert diameter         |
| C <sub>1</sub> Thread cable entry      | Ø F <sub>6</sub> Thread cable entry                | Ø F <sub>7</sub> Protection tube diameter          |

The pictures show examples of connection heads.

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

| Protection tube             | Material               | Protection tube Ø                                   | Suitable for measuring insert Ø | Connection to head                                  |
|-----------------------------|------------------------|-----------------------------------------------------|---------------------------------|-----------------------------------------------------|
| Straight, form 3F DIN 43772 | Stainless steel 1.4371 | 9 x 1 mm<br>11 x 2 mm<br>12 x 2.5 mm<br>14 x 2.5 mm | 6 mm                            | MD4 x 1.5 (rotatable threaded connection, male nut) |
| Tapered, form 3F DIN 43772  | Stainless steel 1.4371 | 12 x 2.5 mm, tapered to 6 mm                        | 6 mm                            | MD4 x 1.5 (rotatable threaded connection, male nut) |

#### 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                                  |
|-------------------------------------------------------------------------|------------------------|-----------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------------|
| Tapered, weld-on solid tip, in line with DIN 43772, non-standard design | Stainless steel 1.4371 | 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 | 6 mm                            | MD4 x 1.5 (rotatable threaded connection, male nut) |

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

| Protection tube                                               | Material                                                                                                                                   | Protection tube Ø | Suitable for measuring insert Ø | Connection to head                                  |
|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------------------|-----------------------------------------------------|
| Straight, in line with form 3F DIN 43772, non-standard design | 2.4360 (MonelK500) / stainless steel 2.4819 (Inconel 625) / stainless steel 2.4610 (Hastelloy C4) / stainless steel 3.7035 (Titan Grade 2) | 13.7 x 2.2 mm     | 6 mm with sleeve Ø 6 mm / 8 mm  | MD4 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                                  |
|---------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------|----------------------------------------|-----------------------------------------------------|
| Straight, in line with form 3F DIN 43772, non-standard design | Tantalum / stainless steel | 11 x 2 mm, tantalum cover 12 x 0.4 mm<br>15 x 3 mm, tantalum cover 16 x 0.4 mm | 6 mm<br>6 mm with sleeve Ø 6 mm / 8 mm | MD4 x 1.5 (rotatable threaded connection, male nut) |
| Tapered, in line with form 3F DIN 43772, non-standard design  | Tantalum / stainless steel | 12 x 2.5 mm, tantalum cover 13 x 0.4 mm                                        | 6 mm                                   | MD4 x 1.5 (rotatable threaded connection, male nut) |