



## *INDUSTRIAL SERVICES ENGINEERING*



Sensortechnik for industry and buildings

Edition II

# CATALOGUE SENSOR TECHNIQUE

TEMPERATURE PRESSURE

Dear customers, business partners and prospective buyers,

we measure, guide and control the scales of temperature, pressure, humidity, light, motion, air quality and flow while conserving our resources.



Our company stands for reliable individual solutions, for innovation and flexibility as well as for high quality. We have summarised in this catalogue all important electrical and electronical sensors for the industrial automation and process technique.

We offer to the expert high precision solutions as well as for robust applications :

- food and pharmaceutical industry
- steel works
- engine- and toolbuilding
- systems engineering

Also for special solutions we are a competent partner.

Sensors and transmitters for the building automation you can find in a separate catalogue.

We are looking forward working with you.

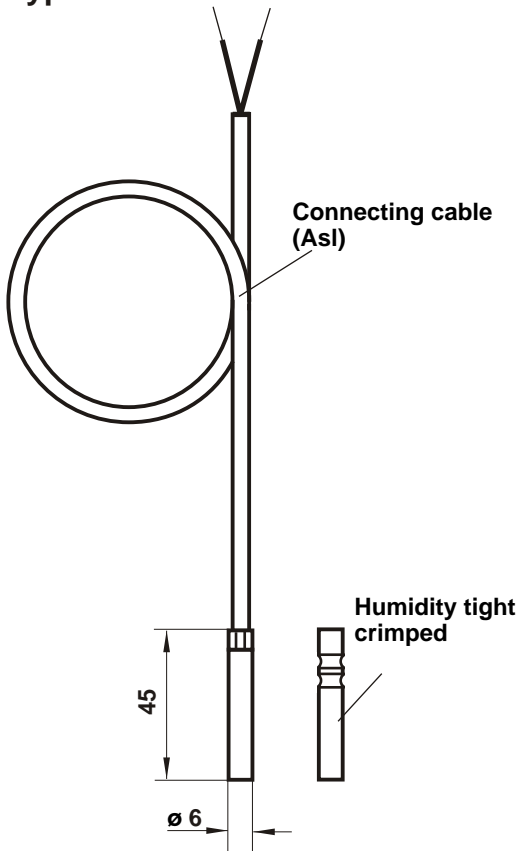
Sincerely,

Your SENPRO Sensortechnik GmbH

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## Capsule temperature sensor Typ 21A



### Technical data:

|                                  |                 |
|----------------------------------|-----------------|
| <b>Measuring range:</b>          | see table       |
| <b>Sensor type:</b>              | see table       |
| <b>Measuring current:</b>        | appr. 1 mA      |
| <b>Protecting tube material:</b> | 1.4571 (316 SS) |
| <b>Nominal length (NL):</b>      | 45 mm           |
| <b>Cable length:</b>             | standard: 1 m   |

### Available variations:

|  |   |
|--|---|
| <b>Accuracy acc. EN IEC 60751:</b><br><br><b>Pt100 / Pt1000 / Ni1000:</b><br><b>0-</b> Class B = Standard ( $t = \pm 0,3 + 0,005 \times  t $ )<br><b>1-</b> Class A = 1/2 Class B ( $t = \pm 0,15 + 0,002 \times  t $ )<br><b>2-</b> 1/3 Class B = 1/3 ( $t = 1/3(\pm 0,3 + 0,005 \times  t )$ ) | <b>Sensor type (FT):</b><br><br><b>Pt</b> - Pt100<br><b>PtM</b> - Pt1000<br><b>Ni</b> - Ni1000<br><b>NTC</b> - NTC<br><b>PTC</b> - PTC<br>... |
|--|---|

|   |            |             |
|---|------------|-------------|
| <b>Connecting cable (As):</b>                                   |            |             |
| <b>P-</b>   | PVC        | -30..+ 80°C |
| <b>S-</b>   | Silicone   | -50..+200°C |
| <b>T-</b>   | Teflon     | max. 205°C  |
| <b>GGD-</b>   | GS/GS/Wire | max. 350°C  |
| <small>(GGD = glass silk + glass silk + wire shielding)</small> |            |             |

**Explained Article No.:**

**Typ. D x EL. MT. ... FT - L. KI. LA AsI**

### REMARK:

The optional transmitters are mounted in a polyamid housing (size: 58x65x35 mm) and have 2 cable glands.

### Standard type 21BJ:

| ØxEL   | Capsule | Article No. 1xPt100     | Article No. 2xPt100     |
|--------|---------|-------------------------|-------------------------|
| Ø 6x45 | crimped | 21A.6x45.3.1Pt-2.0.1PP  | 21A.6x45.3.2Pt-2.0.1PP  |
| Ø 6x45 | crimped | 21A.6x45.3.1Pt-2.0.1SS  | 21A.6x45.3.2Pt-2.0.1SS  |
| Ø 6x45 | tumbled | 21A.6x45.3.1Pt-2.0.1TT  | 21A.6x45.3.2Pt-2.0.1TT  |
| Ø 6x45 | tumbled | 21A.6x45.3.1Pt-2.0.1GGD | 21A.6x45.3.2Pt-2.0.1GGD |

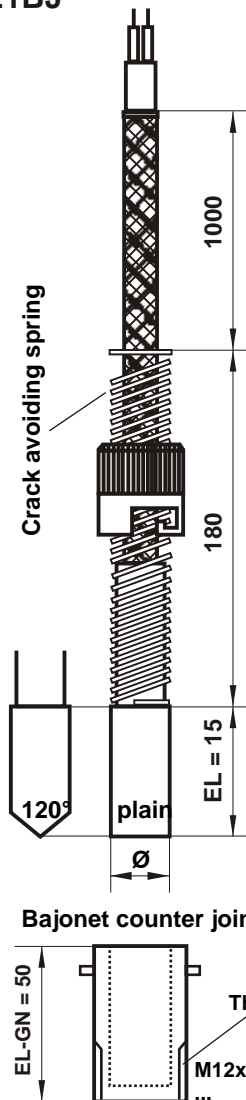
### Options:

Customer specific cable length

**For PVC and silicone only:** Humidity tight, crimped version

| 3 - wire | 4 - wire | Transmitter-I       | 1/2 IEC            | 1/3 IEC  |
|----------|----------|---------------------|--------------------|--|
|          |          | <br>MU-I<br>4..20mA | <br>MU-U<br>0..10V | 1/2 tolerance<br>class B<br><br>1/3 tolerance<br>class B |

## Resistance thermometer with bayonet joint Typ 21BJ



### Technical data (standard construction):

|                                  |                               |
|----------------------------------|-------------------------------|
| <b>Process connection:</b>       | Bayonet joint, 12 mm diameter |
| <b>Protection tube material:</b> | 1.4571 (316 SS)               |
| <b>Protection tube diameter:</b> | 6 or 8 mm                     |
| <b>Sensor type:</b>              | Measuring tip: plain or 120°  |
| <b>Measuring range:</b>          | 1 x Pt100, 2 x Pt100          |
| <b>Tolerance class:</b>          | -40...+350 °C                 |
| <b>Connection type:</b>          | Class B                       |
| <b>Cable length:</b>             | 2 wire as standard            |
|                                  | 1000 mm as standard           |

### Available variations:

#### Accuracy acc. EN IEC 60751:

#### Pt100 / Pt1000 / Ni1000:

- 0- Class B = Standard ( $t = \pm 0,3 + 0,005 \times |t|$ )
- 1- Class A = 1/2 Class B ( $t = \pm 0,15 + 0,002 \times |t|$ )
- 2- 1/3 Class B = 1/3 ( $t = 1/3(\pm 0,3 + 0,005 \times |t|)$ )

#### Sensor type (FT):

|            |          |
|------------|----------|
| <b>Pt</b>  | - Pt100  |
| <b>PtM</b> | - Pt1000 |
| <b>Ni</b>  | - Ni1000 |
| <b>NTC</b> | - NTC    |
| <b>PTC</b> | - PTC    |
| ...        |          |

#### Connecting cable (As):

|             |            |             |
|-------------|------------|-------------|
| <b>P-</b>   | PVC        | -30..+ 80°C |
| <b>S-</b>   | Silicone   | -50..+200°C |
| <b>T-</b>   | Teflon     | max. 205°C  |
| <b>GGD-</b> | GS/GS/Wire | max. 350°C  |

(GGD = glass silk + glass silk + wire shielding)



#### Explained Article No.:

|   |            |                  |                          |                         |             |                 |                |                         |                          |
|---|------------|------------------|--------------------------|-------------------------|-------------|-----------------|----------------|-------------------------|--------------------------|
| Type                                    | Diameter Ø | Insertion length | Protecting tube material | No. of sensors (max. 3) | Sensor type | Connection type | Accuracy class | Connecting cable length | Type of connecting cable |
| Typ. D x EL. MT. ... FT - L. KI. LA Asl |            |                  |                          |                         |             |                 |                |                         |                          |

### Standard type 21BJ:

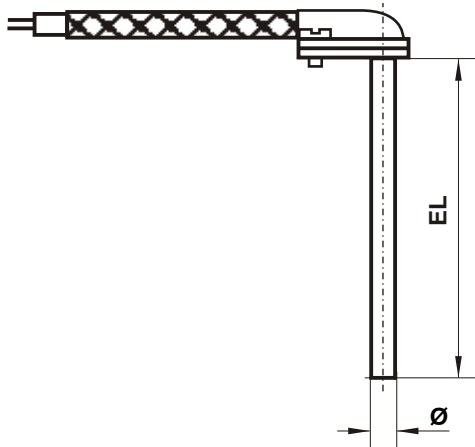
| ØxEL    | Type     | Article No. 1xPt100          | Article No. 2xPt100          |
|---------|----------|------------------------------|------------------------------|
| Ø 6x15  | standard | 21BJ.6x15.3.1Pt-2.0.1GGD.12  | 21BJ.6x15.3.2Pt-2.0.1GGD.12  |
| Ø 8x15  | standard | 21BJ.8x15.3.1Pt-2.0.1GGD.12  | 21BJ.8x15.3.2Pt-2.0.1GGD.12  |
| Ø 10x15 | standard | 21BJ.10x15.3.1Pt-2.0.1GGD.12 | 21BJ.10x15.3.2Pt-2.0.1GGD.12 |
| Ø 6x15  | 120°     | 21BJ.6x15.3.1Pt-2.0.1GGD.12  | 21BJ.6x15.3.2Pt-2.0.1GGD.12  |
| Ø 8x15  | 120°     | 21BJ.8x15.3.1Pt-2.0.1GGD.12  | 21BJ.8x15.3.2Pt-2.0.1GGD.12  |

### Options:

| 3 - wire  | 4 - wire  | Bayonet counter joint | GN      | EL-GN | 1/2 IEC               | 1/3 IEC               |
|---|---|-----------------------|---------|-------|-----------------------|-----------------------|
|  |  |                       | M12 x 1 | 50    | 1/2 tolerance class B | 1/3 tolerance class B |
|   |   | M14 x 1,5             | ...     |       |                       |                       |
|   |   | G1/8                  |         |       |                       |                       |
|   |   | G1/4                  |         |       |                       |                       |



**Angle resistance thermometer  
Type 21w**



**Technical data (standard construction):**

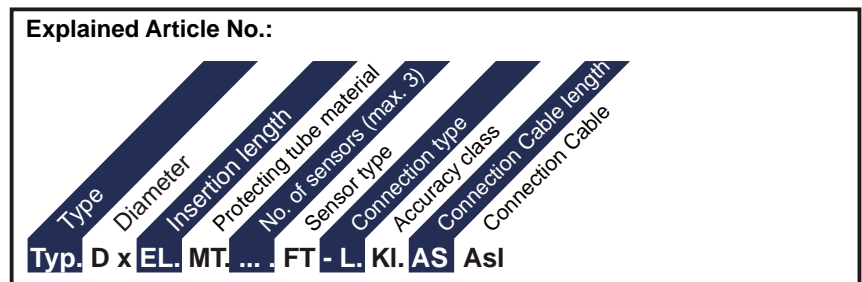
|                             |                       |
|-----------------------------|-----------------------|
| <b>Protection material:</b> | FEP                   |
| <b>Protection diameter:</b> | 6 mm                  |
| <b>Measuring insert:</b>    | 1 x Pt100, 2 x Pt 100 |
| <b>Connecting cable:</b>    | 1000 mm, GGD          |
| <b>Measuring range:</b>     | -40..+350 °C          |
| <b>Tolerance class:</b>     | Class B               |
| <b>Connection type:</b>     | 2-wire                |

**Available variations:**

|   |   |
|---|---|
| <p><b>Accuracy acc. EN IEC 60751:</b></p> <p><b>Pt100 / Pt1000 / Ni1000:</b></p> <p><b>0</b> - Class B = Standard (<math>t = \pm 0,3 + 0,005 \times  t </math>)</p> <p><b>1</b> - Class A = 1/2 Class B (<math>t = \pm 0,15 + 0,002 \times  t </math>)</p> <p><b>2</b> - 1/3 Class B = 1/3 (<math>t = 1/3(\pm 0,3 + 0,005 \times  t )</math>)</p> | <p><b>Sensor type (FT):</b></p> <p><b>Pt</b> - Pt100</p> <p><b>PtM</b> - Pt1000</p> <p><b>Ni</b> - Ni1000</p> <p><b>NTC</b> - NTC</p> <p><b>PTC</b> - PTC</p> |
|---|---|

|  |             |             |             |             |          |             |             |        |            |              |            |            |  |
|--|-------------|-------------|-------------|-------------|----------|-------------|-------------|--------|------------|--------------|------------|------------|--|
| <p><b>Connecting cable (As):</b></p> <table border="0"> <tr> <td><b>PP</b> -</td> <td>PVC</td> <td>-30..+ 80°C</td> </tr> <tr> <td><b>SS</b> -</td> <td>Silicone</td> <td>-50..+200°C</td> </tr> <tr> <td><b>TT</b> -</td> <td>Teflon</td> <td>max. 205°C</td> </tr> <tr> <td><b>GGD</b> -</td> <td>GS/GS/Wire</td> <td>max. 350°C</td> </tr> </table> <p>(GGD = glass silk + glass silk + wire shielding)</p> | <b>PP</b> - | PVC         | -30..+ 80°C | <b>SS</b> - | Silicone | -50..+200°C | <b>TT</b> - | Teflon | max. 205°C | <b>GGD</b> - | GS/GS/Wire | max. 350°C | <p><b>Tube (EL):</b></p> <p>50 mm</p> <p>100 mm</p> <p>...</p> |
| <b>PP</b> -  | PVC         | -30..+ 80°C |             |             |          |             |             |        |            |              |            |            |  |
| <b>SS</b> -  | Silicone    | -50..+200°C |             |             |          |             |             |        |            |              |            |            |  |
| <b>TT</b> -  | Teflon      | max. 205°C  |             |             |          |             |             |        |            |              |            |            |  |
| <b>GGD</b> -   | GS/GS/Wire  | max. 350°C  |             |             |          |             |             |        |            |              |            |            |  |

**Explained Article No.:**



**Typ. D x EL. MT. ... FT - L. KI. AS Asi**

**Standard type 21w:**

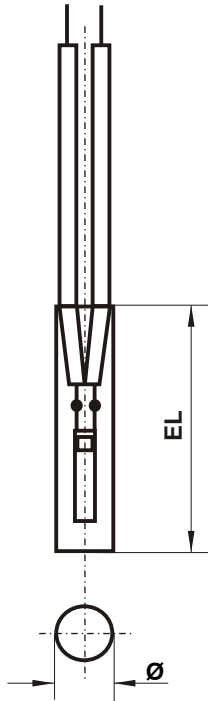
| ØxEL    | Article-No.: 1xPt100     | Article-No.: 2xPt100     |
|---------|--------------------------|--------------------------|
| Ø 6x50  | 21w.6x50.3.1Pt-2.0.1SS   | 21w.6x50.3.2Pt-2.0.1SS   |
| Ø 6x100 | 21w.6x100.3.1Pt-2.0.1SS  | 21w.6x100.3.2Pt-2.0.1SS  |
| Ø 6x150 | 21w.6x150.3.1Pt-2.0.1SS  | 21w.6x150.3.2Pt-2.0.1SS  |
| Ø 6x50  | 21w.6x50.3.1Pt-2.0.1TT   | 21w.6x50.3.2Pt-2.0.1TT   |
| Ø 6x100 | 21w.6x100.3.1Pt-2.0.1TT  | 21w.6x100.3.2Pt-2.0.1TT  |
| Ø 6x150 | 21w.6x150.3.1Pt-2.0.1TT  | 21w.6x150.3.2Pt-2.0.1TT  |
| Ø 6x50  | 21w.6x50.3.1Pt-2.0.1GGD  | 21w.6x50.3.2Pt-2.0.1GGD  |
| Ø 6x100 | 21w.6x100.3.1Pt-2.0.1GGD | 21w.6x100.3.2Pt-2.0.1GGD |
| Ø 6x150 | 21w.6x150.3.1Pt-2.0.1GGD | 21w.6x150.3.2Pt-2.0.1GGD |

Special constructions on request

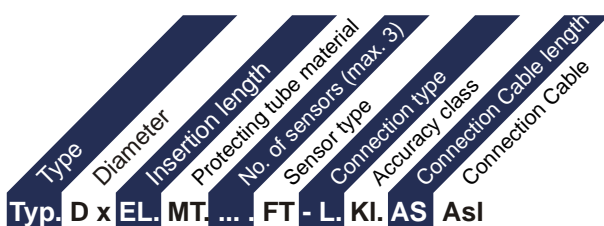
## Cable resistance thermometer melted into FEP Type 250

### Technical data (standard construction):

|                      |                         |
|----------------------|-------------------------|
| Protection material: | FEP                     |
| Protection diameter: | 6 mm                    |
| Measuring insert:    | 1 x Pt100, 2 x Pt 100   |
| Connecting cable:    | 1000 mm, 2xAWG24 Teflon |
| Measuring range:     | -40..+200°C             |
| Tolerance class:     | Class B                 |
| Connection type:     | 2-wire                  |



### Available variations:



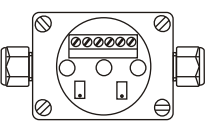
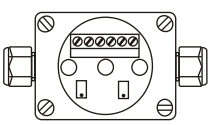
|   |  |  |
|---|--|--|
| <b>Accuracy acc. EN IEC 60751:</b><br><br><b>Pt100 / Pt1000 / Ni1000:</b><br><br><b>0</b> - Class B = Standard ( $t = \pm 0,3 + 0,005 \times  t $ )<br><b>1</b> - Class A = 1/2 Class B ( $t = \pm 0,15 + 0,002 \times  t $ )<br><b>2</b> - 1/3 Class B = 1/3 ( $t = 1/3(\pm 0,3 + 0,005 \times  t )$ ) |  | <b>Sensor type (FT):</b><br><br><b>Pt</b> - Pt100<br><b>PtM</b> - Pt1000<br><b>Ni</b> - Ni1000 |
| <b>Connecting cable (Asl):</b><br><b>TT</b> - Teflon max. 205°C<br><b>GGD</b> - GS/GS/Wire max. 350°C<br><br><small>(GGD = glass silk + glass silk + wire shielding)</small>  |  | <b>Diameter (D):</b><br>3 mm<br>4 mm<br>5 mm<br>...  |
| <b>Explained Article No.:</b><br>   |  |  |
| <b>Typ. D x EL. MT. ... FT - L. Kl. AS Asl</b>  |  |  |

### Standard type 250 into FEP:

| ØxEL   | Article-No.: 1xPt100   | Article-No.: 2xPt100   |
|--------|------------------------|------------------------|
| Ø 3x20 | 250.3x20.3.1Pt-2.0.1Tv | 250.3x20.3.2Pt-2.0.1Tv |
| Ø 4x20 | 250.4x20.3.1Pt-2.0.1Tv | 250.4x20.3.2Pt-2.0.1Tv |
| Ø 5x20 | 250.5x20.3.1Pt-2.0.1Tv | 250.5x20.3.2Pt-2.0.1Tv |

### Options:

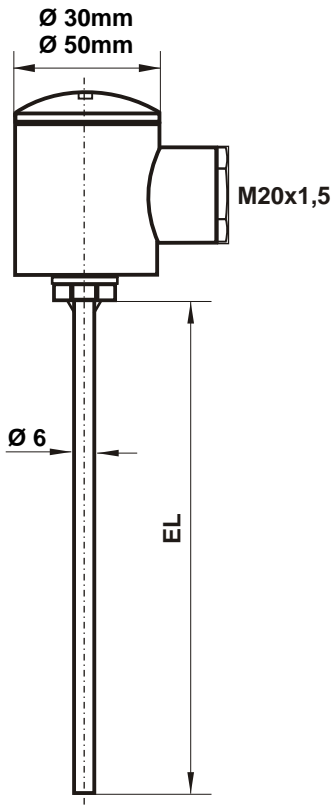
Cable length available as required

| 3-wire  | 4-wire  | Transmitter-I   | Transmitter-U   | 1/2 IEC     | 1/3 IEC     |
|---|---|---|---|-------------|-------------|
|  |  |  <b>MU-I</b><br><b>4..20mA</b> |  <b>MU-U</b><br><b>0..10V</b> | 1/2 Class B | 1/3 Class B |

## Resistance thermometer with BR-head Type 212

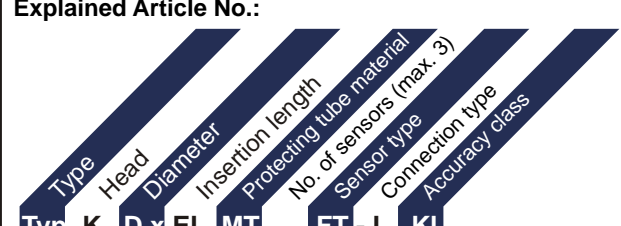
### Technical data (standard construction):

|                                  |                             |
|----------------------------------|-----------------------------|
| <b>Connecting head:</b>          | Form BR                     |
| <b>Protection tube material:</b> | 1.4571 (316 SS), 6 mm diam. |
| <b>Measuring insert:</b>         | none                        |
| <b>Process connection:</b>       | none                        |
| <b>Sensor type:</b>              | 1 x Pt100                   |
| <b>Measuring range:</b>          | -40..+200 °C                |
| <b>Tolerance class:</b>          | Class B                     |
| <b>Connection type:</b>          | 2-wire                      |



### Available variations:

|  |                          |
|--|--------------------------|
| <b>Accuracy acc. EN IEC 60751:</b>                                     | <b>Sensor type (FT):</b> |
| <b>Pt100 / Pt1000 / Ni1000:</b>  | <b>Pt</b> - Pt100        |
| <b>0</b> - Class B = Standard ( $t = \pm 0,3 + 0,005 \times  t $ )     | <b>PtM</b> - Pt1000      |
| <b>1</b> - Class A = 1/2 Class B ( $t = \pm 0,15 + 0,002 \times  t $ ) | <b>Ni</b> - Ni1000       |
| <b>2</b> - 1/3 Class B = 1/3 ( $t = 1/3(\pm 0,3 + 0,005 \times  t )$ ) | <b>NTC</b> - NTC         |
|  | <b>PTC</b> - PTC         |
|  | ...                      |

|                        |   |
|------------------------|---|
| <b>Tube diam. (D):</b> | <b>Explained Article No.:</b>   |
| 3 mm                   |  |
| 6 mm                   |   |
| 9 mm                   |   |
|                        |   |



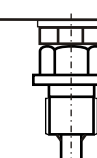


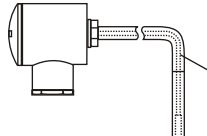
|  |
|--|
| <b>Protecting tube materials (MT):</b> |
| 3 - Stainless steel max. 550°C         |

### Standard type 212:

| ØxEL    | Head | Article No.: 1xPt100, 2-wire | Article No.: 2xPt100, 2-wire |
|---------|------|------------------------------|------------------------------|
| Ø 6x100 | BR20 | 212BR20.6x100.3.1Pt-2.0      | 212BR20.6x100.3.2Pt-2.0      |
| Ø 6x100 | BR24 | 212BR24.6x100.3.1Pt-2.0      | 212BR24.6x100.3.2Pt-2.0      |
| Ø 6x100 | BR30 | 212BR30.6x100.3.1Pt-2.0      | 212BR30.6x100.3.2Pt-2.0      |
| Ø 6x100 | BR40 | 212BR40.6x100.3.1Pt-2.0      | 212BR40.6x100.3.2Pt-2.0      |
| Ø 6x100 | BR50 | 212BR50.6x100.3.1Pt-2.0      | 212BR50.6x100.3.2Pt-2.0      |

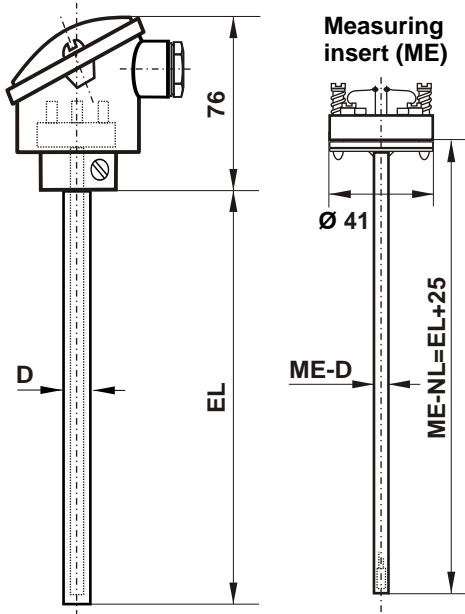
### Options:

Other insertion length (EL) available as required

| Stainless steel adjustable joint  |   | Version with cap nut  |  | Version with thread joint   |  |
|---|---|---|--|---|--|
|  | Thread: G1/4<br>G1/2<br>1/4NPT<br>1/2NPT  |  | Thread: G1/4<br>G1/2<br>1/4NPT<br>1/2NPT |  | Thread: G1/4<br>G1/2<br>1/4NPT<br>1/2NPT |
|   |   | Type 212BR..U   |  | Type 212BR..EG  |  |
| 3-wire  | 4-wire  | MIMS (Mineral Insulated Metal Sheathed)   |  | 1/2 IEC   | 1/3 IEC                                  |
|  |  |  |  | 1/2 tolerance class B   | 1/3 tolerance class B                    |
|   |   | vibration resistant, flexible   |  |   |  |



## Resistance thermometer, tip in type Typ 201



### Technical data (standard construction):

|                                  |  |
|----------------------------------|--|
| <b>Connecting head:</b>          | Form B, light metal<br>Acc. To DIN 43729<br>With M20x1,5 cable gland |
| <b>Protection tube material:</b> | 1.4571 (316 SS), 9 mm diam.  |
| <b>Measuring insert:</b>         | Stainless steel, 6 mm diam.  |
| <b>Process connection:</b>       | None   |
| <b>Sensor type:</b>              | 1 x Pt100  |
| <b>Measuring range:</b>          | -40....+500 °C   |
| <b>Tolerance class:</b>          | Class B  |
| <b>Connection type:</b>          | 2 - wire   |

### Available variations:

#### Accuracy acc. EN IEC 60751:

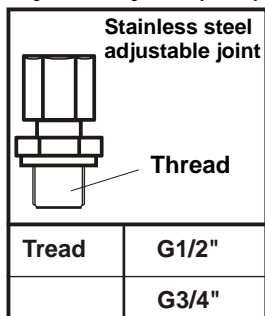
#### Pt100 / Pt1000 / Ni1000:

- 0- Class B = Standard ( $t = \pm 0,3 + 0,005 \times |t|$ )
- 1- Class A = 1/2 Class B ( $t = \pm 0,15 + 0,002 \times |t|$ )
- 2- 1/3 Class B = 1/3 ( $t = 1/3(\pm 0,3 + 0,005 \times |t|)$ )

#### Sensor type (FT):

|            |          |
|------------|----------|
| <b>Pt</b>  | - Pt100  |
| <b>PtM</b> | - Pt1000 |
| <b>Ni</b>  | - Ni1000 |
| <b>NTC</b> | - NTC    |
| <b>PTC</b> | - PTC    |
| ...        |          |

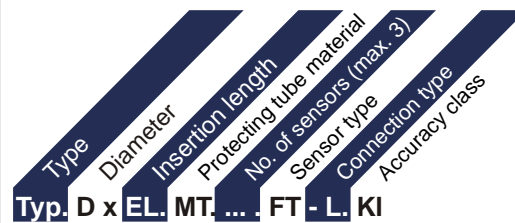
### Stainless steel adjustable joint (KVV):



#### Stube diam. (D):

- 6 mm
- 9 mm
- 12 mm
- 15 mm
- ...

#### Explained Article No.:







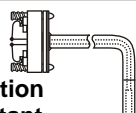
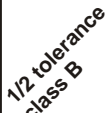

#### Protecting tube materials (MT):

- 1- Brass max. 400°C
- 3- Stainless steel max. 550°C
- ...

### Standard type 201:

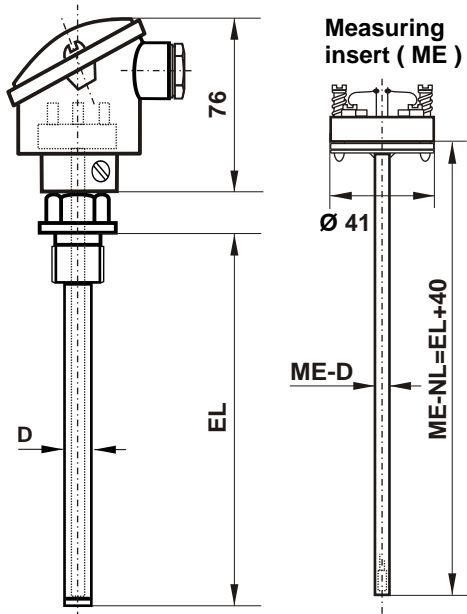
| ØxEL    | Weight in kg | Nominal length of measuring insert ME-NL | Article No.. 1xPt100 | Article No. 2xPt100 |
|---------|--------------|--|----------------------|---------------------|
| Ø 9x100 | 0,64         | 135                                      | 201.9x100.3.1Pt-2.0  | 201.9x100.3.2Pt-2.0 |
| Ø 9x160 | 0,79         | 195                                      | 201.9x160.3.1Pt-2.0  | 201.9x160.3.2Pt-2.0 |
| Ø 9x200 | 0,84         | 235                                      | 201.9x200.3.1Pt-2.0  | 201.9x200.3.2Pt-2.0 |
| Ø 9x250 | 0,89         | 285                                      | 201.9x250.3.1Pt-2.0  | 201.9x250.3.2Pt-2.0 |

### Options:

| 3 - wire  | 4 - wire  | Transmitter-I  | Transmitter-U   | Measuring insert MIMS<br>Mineral insulated<br>metal sheathed   | 1/2 IEC   | 1/3 IEC   |
|---|---|--|---|--|---|---|
|  |  | <br>MU-I<br>4..20mA | <br>MU-U<br>0..10V | <br>vibration resistant | <br>1/2 tolerance<br>class B | <br>1/3 tolerance<br>class B |

## Resistance thermometer, screw in type Typ 211

### Technical data (standard construction):



|                                  |  |
|----------------------------------|--|
| <b>Connecting head:</b>          | Form B, light metal<br>Acc. To DIN 43729<br>With M20x1,5 cable gland |
| <b>Protection tube material:</b> | 1.4571 (316 SS), 9 mm diam.  |
| <b>Measuring insert:</b>         | Stainless steel, 6 mm diam.  |
| <b>Process connection:</b>       | Thread G 1/2 A   |
| <b>Sensor type:</b>              | 1 x Pt100  |
| <b>Measuring range:</b>          | -40...+500 °C  |
| <b>Tolerance class:</b>          | Class B  |
| <b>Connection type:</b>          | 2 - wire   |

### Available variations:

|   |   |
|---|---|
| <b>Accuracy acc. EN IEC 60751:</b><br><br><b>Pt100 / Pt1000 / Ni1000:</b><br>0- Class B = Standard ( $t = \pm 0,3 + 0,005 \times  t $ )<br>1- Class A = 1/2 Class B ( $t = \pm 0,15 + 0,002 \times  t $ )<br>2- 1/3 Class B = 1/3 ( $t = 1/3(\pm 0,3 + 0,005 \times  t )$ ) | <b>Sensor type (FT):</b><br><br><b>Pt</b> - Pt100<br><b>PtM</b> - Pt1000<br><b>Ni</b> - Ni1000<br><b>NTC</b> - NTC<br><b>PTC</b> - PTC<br>... |
|---|---|

|   |                                       |
|---|---------------------------------------|
| <b>tube diam. (D):</b><br><br>6 mm<br>9 mm<br>12 mm<br>15 mm<br>... | <b>Explained Article No.:</b><br><br> |
|---|---------------------------------------|

|   |   |
|---|---|
| <b>Protecting tube materials (MT):</b><br>1- Brass max. 400°C<br>3- Stainless steel max. 550°C<br>... | <b>Process connection (EG):</b><br>- M18x1,5 - 1/2NPT<br>- G1/4" - 1/4NPT<br>- G1/2"<br>... |
|---|---|

### Standard type 211:

| ØxEL    | Weight in kg | Nominal length of measuring ME-NL | Article No. 1xPt100      | Article No. 2xPt100      |
|---------|--------------|-----------------------------------|--------------------------|--------------------------|
| Ø 9x100 | 0,65         | 140                               | 211.9x100.3.1Pt-2.0.G1/2 | 211.9x100.3.2Pt-2.0.G1/2 |
| Ø 9x160 | 0,80         | 200                               | 211.9x160.3.1Pt-2.0.G1/2 | 211.9x160.3.2Pt-2.0.G1/2 |
| Ø 9x200 | 0,85         | 240                               | 211.9x200.3.1Pt-2.0.G1/2 | 211.9x200.3.2Pt-2.0.G1/2 |
| Ø 9x250 | 0,90         | 290                               | 211.9x250.3.1Pt-2.0.G1/2 | 211.9x250.3.2Pt-2.0.G1/2 |

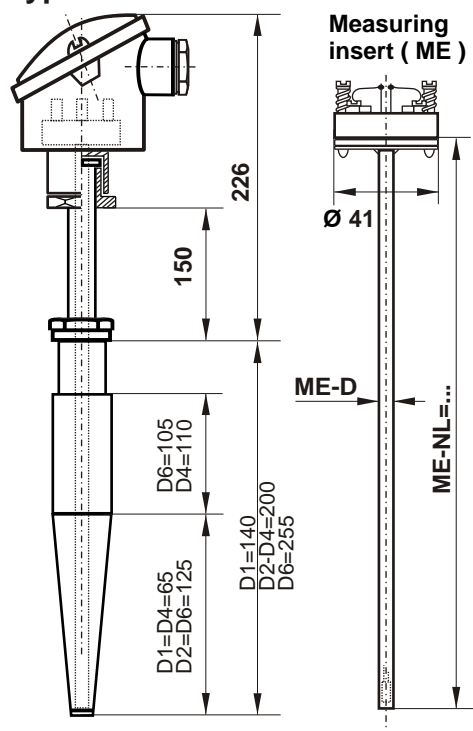
### Options:

|          |          |                 |                |  |                       |                       |
|----------|----------|-----------------|----------------|--|-----------------------|-----------------------|
| 3 - wire | 4 - wire | Transmitter-I   | Transmitter-U  | Measuring insert MIMS<br>Mineral insulated<br>metal sheathed | 1/2 IEC               | 1/3 IEC               |
|          |          | MU-I<br>4..20mA | MU-U<br>0..10V | <br>vibration resistant                                      | 1/2 tolerance class B | 1/3 tolerance class B |





**Resistance thermometer, weld in construction  
Typ 200**



**Technical data (standard construction):**

**Connecting head:** Form B, light metal  
Acc. To DIN 43729  
With M20x1,5 cable gland

**Extension neck:** 150 mm

**Protection tube material:** 1.4571 (316 SS), 24 to 12 mm reduced diameter

**Measuring insert:** Stainless steel, 6 mm diam.

**Process connection:** weld in

**Sensor type:** 1 x Pt100

**Measuring range:** -40...+500 °C

**Tolerance class:** Class B

**Connection type:** 2 wire

**Available variations:**

|   |  |
|---|--|
| <p><b>Accuracy acc. EN IEC 60751:</b></p> <p><b>Pt100 / Pt1000 / Ni1000:</b></p> <p>0- Class B = Standard (<math>t = \pm 0,3 + 0,005 \times  t </math>)</p> <p>1- Class A = 1/2 Class B (<math>t = \pm 0,15 + 0,002 \times  t </math>)</p> <p>2- 1/3 Class B = 1/3 (<math>t = 1/3(\pm 0,3 + 0,005 \times  t )</math>)</p> | <p><b>Sensor type (FT):</b></p> <p><b>Pt</b> - Pt100</p> <p><b>PtM</b> - Pt1000</p> <p><b>Ni</b> - Ni1000</p> <p><b>NTC</b> - NTC</p> <p><b>PTC</b> - PTC</p> <p>...</p> |
|---|--|

|  |   |
|--|---|
| <p><b>tube diam. (D):</b></p> <p>6 mm</p> <p>9 mm</p> <p>12 mm</p> <p>15 mm</p> <p>...</p> | <p><b>Explained Article No.:</b></p> <p><b>Typ. D. EL. MT. ... FT - L. KI. EG</b></p> |
|--|---|

**Protecting tube materials (MT):**

|                     |            |             |
|---------------------|------------|-------------|
| 3 - Stainless steel | ( 1.4571 ) | max. 550 °C |
| 19- High Temp.      | ( 1.7335 ) | max. 550 °C |
| 0 - High Temp.      | ( 1.7380 ) | max. 550 °C |

**Standard type 200:**

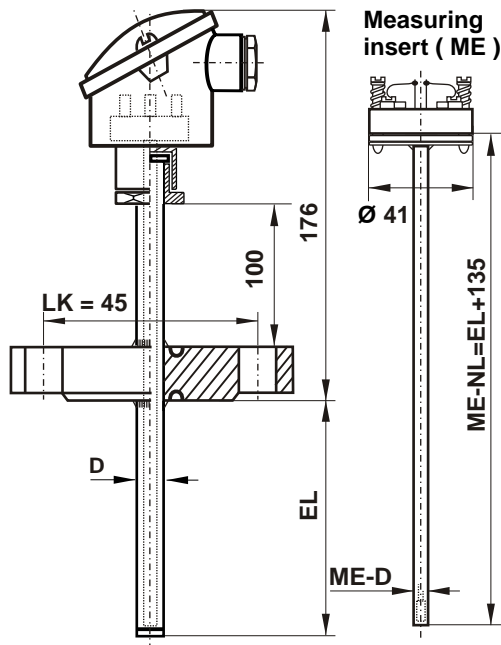
| Type   | Protection tube length | Length conical | Protection tube diam. | Nominal length of measuring insert ME-NL | Article No. 1xPt100   |
|--------|------------------------|----------------|-----------------------|--|-----------------------|
| W-D1 L | 140                    | 65             | 24                    | 315                                      | 200.D1.140.19.1Pt-2.0 |
| W-D2 L | 200                    | 125            | 24                    | 375                                      | 200.D2.200.19.1Pt-2.0 |
| W-D4 L | 200                    | 65             | 24                    | 375                                      | 200.D4.200.19.1Pt-2.0 |
| W-D6 L | 255                    | 125            | 30                    | 430                                      | 200.D6.255.19.1Pt-2.0 |

**Options:**

|          |          |                 |                |  |                       |                       |
|----------|----------|-----------------|----------------|--|-----------------------|-----------------------|
| 3 - wire | 4 - wire | Transmitter-I   | Transmitter-U  | Measuring insert MIMS<br>Mineral insulated<br>metal sheathed | 1/2 IEC               | 1/3 IEC               |
|          |          | MU-I<br>4..20mA | MU-U<br>0..10V | <br>vibration resistant                                      | 1/2 tolerance class B | 1/3 tolerance class B |

## Resistance thermometer, flanged Typ 221F

### Technical data (standard construction):



|                                  |  |
|----------------------------------|--|
| <b>Connecting head:</b>          | Form B, light metal<br>Acc. To DIN 43729<br>With M20x1,5 cable gland |
| <b>Extension neck:</b>           | 100 mm   |
| <b>Protection tube material:</b> | 1.4571 (316 SS), 9 mm diam.  |
| <b>Measuring insert:</b>         | Stainless steel, 6 mm diam.  |
| <b>Process connection:</b>       | Flange   |
| <b>Sensor type:</b>              | 1 x Pt100  |
| <b>Measuring range:</b>          | -40...+500 °C  |
| <b>Tolerance class:</b>          | Class B  |
| <b>Connection type:</b>          | 2 wire   |

### Available variations:

|   |   |
|---|---|
| <b>Accuracy acc. EN IEC 60751:</b><br><br><b>Pt100 / Pt1000 / Ni1000:</b><br>0- Class B = Standard ( $t = \pm 0,3 + 0,005 \times  t $ )<br>1- Class A = 1/2 Class B ( $t = \pm 0,15 + 0,002 \times  t $ )<br>2- 1/3 Class B = 1/3 ( $t = 1/3(\pm 0,3 + 0,005 \times  t )$ ) | <b>Sensor type (FT):</b><br><br><b>Pt</b> - Pt100<br><b>PtM</b> - Pt1000<br><b>Ni</b> - Ni1000<br><b>NTC</b> - NTC<br><b>PTC</b> - PTC<br>... |
|---|---|

|   |                                       |
|---|---------------------------------------|
| <b>tube diam. (D):</b><br><br>6 mm<br>9 mm<br>12 mm<br>15 mm<br>... | <b>Explained Article No.:</b><br><br> |
|---|---------------------------------------|

|  |   |
|--|---|
| <b>Protecting tube materials (MT):</b><br><br>3- Stainless steel ( 1.4571 )<br>max. 550 °C | <b>Flange (FL):</b><br>A- C DN 25 PN 40, DIN 25 10<br>B- C DN 40 PN 40, DIN 25 10<br>C- DN 1" ANSI 150 lbs RF<br>D- DN 1/2" ANSI 150 lbs RF<br>E- DN 1" ANSI 300 lbs RF<br>F- DN 1/2" ANSI 300 lbs RF |
|--|---|

### Standard type 221F:

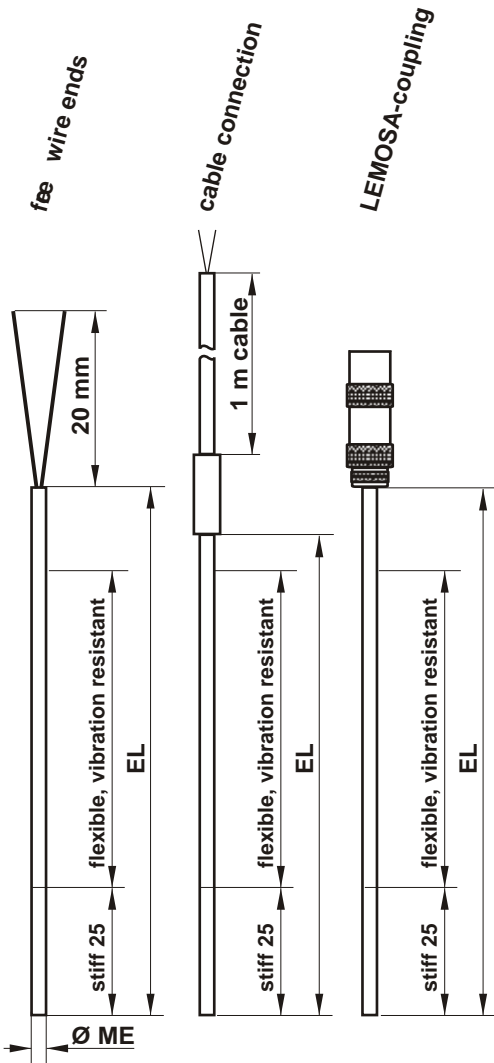
| ØxEL    | Nominal length of measuring insert ME-NL | Article No. 1xPt100    | Article No. 2xPt100    |
|---------|--|------------------------|------------------------|
| Ø 9x100 | 245                                      | 221F.9x100.3.1Pt-2.0.A | 221F.9x100.3.2Pt-2.0.A |
| Ø 9x160 | 305                                      | 221F.9x160.3.1Pt-2.0.A | 221F.9x160.3.2Pt-2.0.A |
| Ø 9x200 | 345                                      | 221F.9x200.3.1Pt-2.0.A | 221F.9x200.3.2Pt-2.0.A |
| Ø 9x250 | 395                                      | 221F.9x250.3.1Pt-2.0.A | 221F.9x250.3.2Pt-2.0.A |

### Options:

|          |          |                     |                    |  |                          |                          |
|----------|----------|---------------------|--------------------|--|--------------------------|--------------------------|
| 3 - wire | 4 - wire | Transmitter-I       | Transmitter-U      | Measuring insert MIMS<br>Mineral insulated<br>metal sheathed | 1/2 IEC                  | 1/3 IEC                  |
|          |          | <br>MU-I<br>4..20mA | <br>MU-U<br>0..10V | <br>vibration resistant                                      | 1/2 tolerance<br>class B | 1/3 tolerance<br>class B |



**MIMS\* Resistance thermometer  
Type 21M**



**Technical data (standard construction):**

**Connection:** free wires, fixed cable or coupling  
**Tube material:** 1.4571, Ø 3 mm, flexible  
**Sensor:** 1xPt100  
**Tolerance:** Class B

**Available variations:**


|   |   |  |
|---|---|--|
| <b>Accuracy acc. EN IEC 60751:</b><br><b>Pt100 / Pt1000:</b><br>0 - Class B = Standard ( $t = \pm 0,3 + 0,005 \times  t $ )<br>1 - Class A = 1/2 Class B ( $t = \pm 0,15 + 0,002 \times  t $ )<br>2 - 1/3 Class B = 1/3 ( $t = 1/3(\pm 0,3 + 0,005 \times  t )$ ) |   | <b>Sensor type (FT):</b><br><b>Pt</b> - Pt100<br><b>PtM</b> - Pt1000 |
| <b>Tube diameter (D):</b><br>0,5 mm<br>1,0 mm<br>1,5 mm<br>3,0 mm<br>6,0 mm<br>8,0 mm<br>...  | <b>Free wire ends or coupling (AS):</b><br><b>fE</b> - free wire ends<br><b>LKS1</b> - LEMOSA-thermo-coupling, Size 1 |  |
| <b>Tube material (MT):</b><br>3- 1.4571 max. 550°C<br>...   |   |  |

\* MIMS (Mineral insulated metal sheathed)

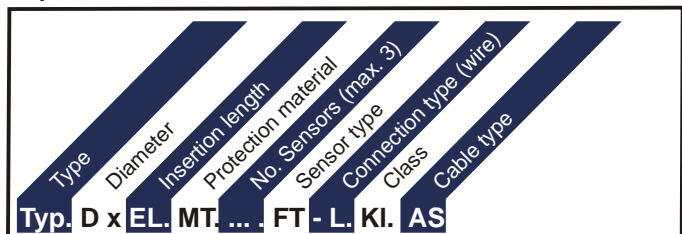
**Standard type 21M:**

| ØME-EL  | Article-No. 1xPt100      | Article-No. 2xPt100      |
|---------|--------------------------|--------------------------|
| Ø 3x100 | 21M.3x100.3.1Pt-2.0.fE   | 21M.3x100.3.2Pt-2.0.fE   |
| Ø 3x160 | 21M.3x160.3.1Pt-2.0.fE   | 21M.3x160.3.2Pt-2.0.fE   |
| Ø 3x100 | 21M.3x100.3.1Pt-2.0.1PP  | 21M.3x100.3.2Pt-2.0.1PP  |
| Ø 3x160 | 21M.3x160.3.1Pt-2.0.1PP  | 21M.3x160.3.2Pt-2.0.1PP  |
| Ø 3x100 | 21M.3x100.3.1Pt-2.0.LKS1 | 21M.3x100.3.2Pt-2.0.LKS1 |
| Ø 3x160 | 21M.3x160.3.1Pt-2.0.LKS1 | 21M.3x160.3.2Pt-2.0.LKS1 |

**Options:**

|             |             |   |  |
|-------------|-------------|---|--|
| 1/2 IEC     | 1/3 IEC     | Stainless steel adjustable joint  |  |
| 1/2 Class B | 1/3 Class B |  | Thread: G1/4<br>G1/2<br>1/4NPT<br>1/2NPT |

**Explained Article No.:**



Special constructions on request

## Slot resistance thermometers Type NWT

Slot resistance thermometers are manufactured flexible that means embedded in a Kapton-foil or stiff as coiled platinum winding positioned in a U-form cut in a body of silicone HGW - shock, pressure and vibration resistant. This is a totally sealed solution.

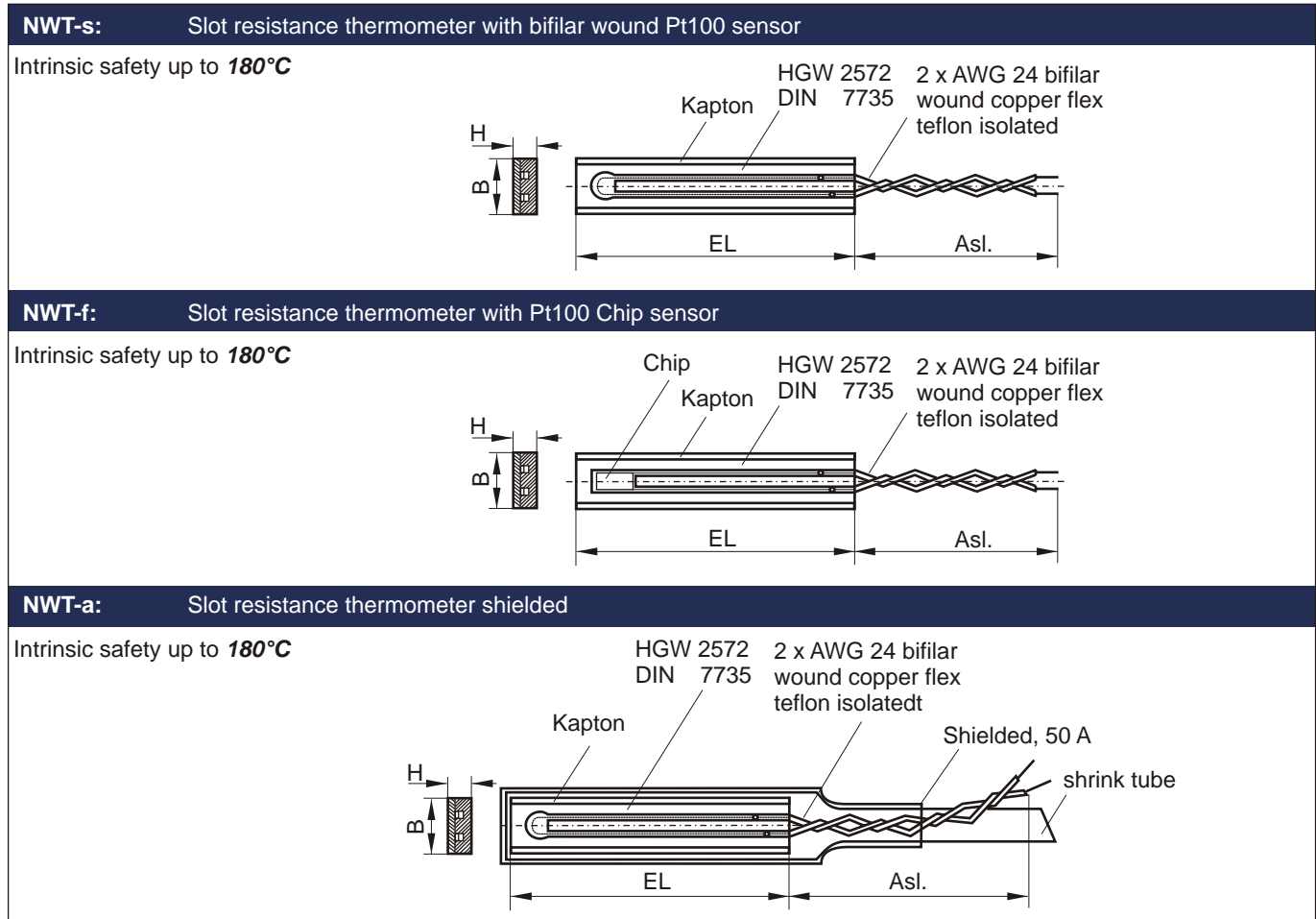
It is possible to integrate the NWT into generator windings on up to 5 m long HGW elements. NWT sensors generally run through a single unit test procedure and become delivered if required with a certificate according to EN 10204.

The test voltage normally is 3 kV, optionally up to 10 kV are possible. All NTW sensors are permitted for temperature class H and approved by the PTB for extended safety and intrinsic safety applications.

Optional a transmitter with 4-20 mA output is available. NTW sensors are available with 2-, 3- and 4-wire connections as well as double sensors.

Slot resistance thermometers are manufacturable in nearly each dimension fitting into the slots of the machine. 2 variations are offered:

- Bifilar wound sensors for integrated measurement.
- Chip sensors for point measurement.



## Slot resistance thermometers

### Type NWT

NWT-s:

| Length<br>mm | Width<br>mm | Thickness<br>mm | Test voltage and wiring |            |               |            |               |            |
|--------------|-------------|-----------------|-------------------------|------------|---------------|------------|---------------|------------|
|              |             |                 | 3 kV 2-wire             | Price in € | 3 kV 3-wire   | Price in € | 3 kV 4-wire   | Price in € |
| 40-250       | 6-12        | 1,6-3,0         | NWT-s. 40-250           | 44,80      | NWT-s. 40-250 | 48,10      | NWT-s. 40-250 | 49,50      |
| 251-400      | 6-12        | 1,6-3,0         | NWT-s.251-400           | 47,30      | NWT-s.251-400 | 50,80      | NWT-s.251-400 | 52,30      |
| 401-750      | 6-12        | 2,0-3,0         | NWT-s.401-750           | 50,10      | NWT-s.401-750 | 58,80      | NWTs.401-750  | 60,30      |
| 751-950      | 6-12        | 2,0-3,0         | NWT-s.751-950           | 54,00      | NWT-s.751-950 | 60,30      | NWT-s.751-950 | 61,80      |

NWT-f:

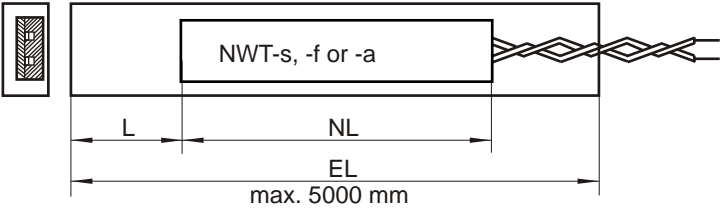
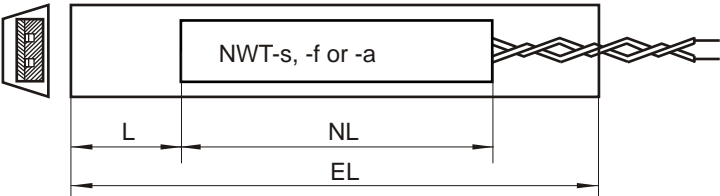
|         |      |         |               |       |               |       |               |       |
|---------|------|---------|---------------|-------|---------------|-------|---------------|-------|
| 40-250  | 6-12 | 1,6-3,0 | NWT-f. 40-250 | 31,70 | NWT-f. 40-250 | 36,70 | NWT-f. 40-250 | 41,70 |
| 251-400 | 6-12 | 1,6-3,0 | NWT-f.251-400 | 37,30 | NWT-f.251-400 | 42,30 | NWT-f.251-400 | 47,30 |
| 401-750 | 6-12 | 2,0-3,0 | NWT-f.401-750 | 40,10 | NWT-f.401-750 | 45,10 | NWT-f.401-750 | 50,10 |
| 751-950 | 6-12 | 2,0-3,0 | NWT-f.751-950 | 43,90 | NWT-f.751-950 | 48,90 | NWT-f.751-950 | 53,90 |

NWT-a

|         |      |         |               |        |               |        |               |        |
|---------|------|---------|---------------|--------|---------------|--------|---------------|--------|
| 40-250  | 6-12 | 1,6-3,0 | NWT-a. 40-250 | 151,70 | NWT-a. 40-250 | 156,70 | NWT-a. 40-250 | 161,70 |
| 251-400 | 6-12 | 1,6-3,0 | NWT-a.251-400 | 157,30 | NWT-a.251-400 | 162,30 | NWT-a.251-400 | 167,30 |
| 401-750 | 6-12 | 2,0-3,0 | NWT-a.401-750 | 160,10 | NWT-a.401-750 | 165,10 | NWT-a.401-750 | 170,10 |
| 751-950 | 6-12 | 2,0-3,0 | NWT-a.751-950 | 163,90 | NWT-a.751-950 | 168,90 | NWT-a.751-950 | 173,90 |

Standard: All slot resistance thermometers with 1 m Teflon cable

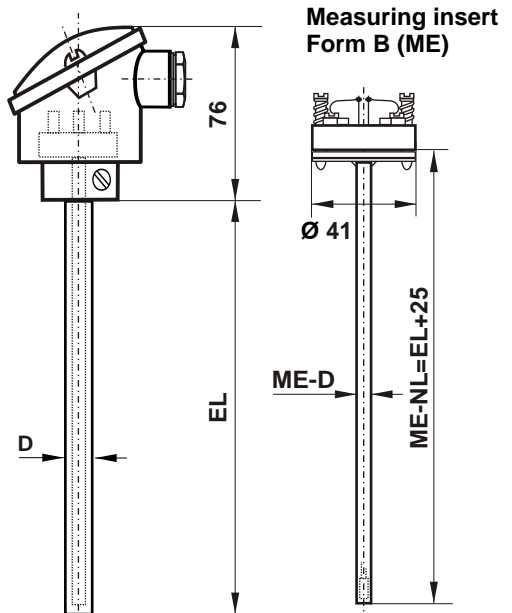
### Special Construction:

|   |  |
|---|--|
| <p><b>NWT-ns</b><br/>Slot resistance thermometer manufactured ready for pushing into the generator winding.</p> |  |
| <p><b>NWT-k:</b><br/>Special groove form</p>  |  |

### Options:

| Description      |
|------------------|
| 3kV-Test voltage |
| Double NWT       |

## Thermocouple, tip in type Type 301



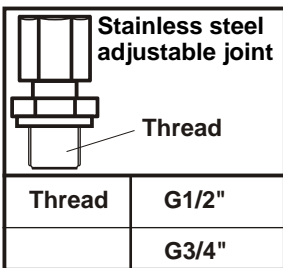
### Technical data (standard construction):

|                                  |   |
|----------------------------------|---|
| <b>Connecting head:</b>          | Form A or B, light metal<br>Acc. To DIN 43729<br>With M20x1,5 cable gland |
| <b>Protection tube material:</b> | 1.4571 (316 SS), 9 mm diam. or<br>1.4762 (SS-HT), 15 mm diam.             |
| <b>Measuring insert:</b>         | Stainless steel, 6 mm diam.<br>Thermopair isolated with ceramic           |
| <b>Process connection:</b>       | None  |
| <b>Sensor type:</b>              | NiCr-Ni ( type K )  |
| <b>Measuring range:</b>          | 0..+800 °C  |

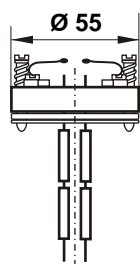
### Available variations:

| Sensor type (FT): |                 | Protection tube diam. (D): |
|-------------------|-----------------|----------------------------|
| L- Fe-CuNi        | bis max. 600°C  | 6 mm                       |
| J- Fe-CuNi        | bis max. 600°C  | 9 mm                       |
| K- NiCr-Ni        | bis max. 1200°C | 12 mm                      |
| N- NiCrSi-NiSi    | bis max. 1200°C | 15 mm                      |
| ...               |                 | 22 mm                      |
|                   |                 | 26 mm                      |
|                   |                 | ...                        |

### Stainless steel adjustable joint (KVV):



### Measuring insert Form A (ME)



### Protecting tube materials (MT):

|                |             |                 |              |
|----------------|-------------|-----------------|--------------|
| 1- Brass       | max. 400°C  | 14- SS (1.4749) | max. 1.200°C |
| 3- SS (1.4571) | max. 800°C  | 15- SS (1.4841) | max. 1.200°C |
| 8- SS (1.4762) | max. 1200°C | ...             |              |

### Standard type 301:

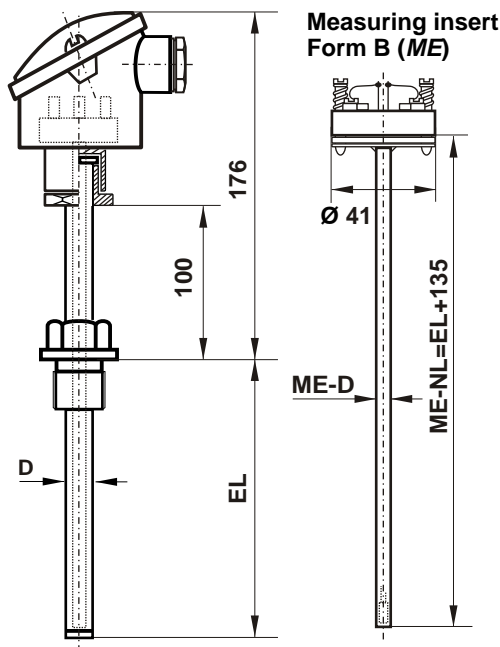
| ØxEL      | Weight in kg | Nominal length or measuring insert ME-NL | Article No. 1 x K  | Article No. 2 x K  |
|-----------|--------------|--|--------------------|--------------------|
| Ø 9x100   | 0,65         | 135                                      | 301. 9x 100. 3.1K  | 301. 9x 100. 3.2K  |
| Ø 9x160   | 0,80         | 195                                      | 301. 9x 160. 3.1K  | 301. 9x 160. 3.2K  |
| Ø 9x200   | 0,85         | 235                                      | 301. 9x 200. 3.1K  | 301. 9x 200. 3.2K  |
| Ø 9x250   | 0,90         | 285                                      | 301. 9x 250. 3.1K  | 301. 9x 250. 3.2K  |
| Ø 15x500  | 1,00         | 535                                      | 301.15x 500. 8.1K  | 301.15x 500. 8.2K  |
| Ø 15x710  | 1,15         | 745                                      | 301.15x 710. 8.1K  | 301.15x 710. 8.2K  |
| Ø 15x1000 | 1,30         | 1035                                     | 301.15x1000. 8.1K  | 301.15x1000. 8.2K  |
| Ø 22x500  | 1,00         | 535                                      | 301.22x 500. 8.1K  | 301.22x 500. 8.2K  |
| Ø 22x710  | 1,15         | 745                                      | 301.22x 710. 8.1K  | 301.22x 710. 8.2K  |
| Ø 22x1000 | 1,15         | 1035                                     | 301.22x 1000. 8.1K | 301.22x 1000. 8.2K |
| Ø 26x1000 | 1,30         | 1025                                     | 301.26x1000.14.1K  | 301.26x1000.14.2K  |

### Options:

|  |   |  |
|--|---|--|
| <b>Transmitter-I</b><br><br><b>MU-I</b><br>4..20mA | <b>Transmitter-U</b><br><br><b>MU-U</b><br>0..10V | <b>Measuring insert MIMS</b><br>Mineral insulated metal sheathed<br><br><b>vibration resistant</b> |
|--|---|--|

### Explained Article No.:

|                         |          |                  |                          |                         |             |
|-------------------------|----------|------------------|--------------------------|-------------------------|-------------|
| Type                    | Diameter | Insertion length | Protection tube material | No. of sensors (max. 3) | Sensor type |
| Typ. D x EL. MT. ... FT |          |                  |                          |                         |             |

**Thermocouple, screw in type**  
**Type 321**

**Technical data (standard construction):**

|                                  |  |
|----------------------------------|--|
| <b>Connecting head:</b>          | Form B, light metal<br>Acc. To DIN 43729<br>With M20x1,5 cable gland |
| <b>Extension neck:</b>           | 100 mm   |
| <b>Protection tube material:</b> | 1.4571 (316 SS), 9 mm diam.  |
| <b>Measuring insert:</b>         | Stainless steel, 6 mm diam.<br>Thermopair isolated with ceramic      |
| <b>Process connection:</b>       | Thread G 1/2   |
| <b>Sensor type:</b>              | Fe-CuNi (type L)   |
| <b>Measuring range:</b>          | -40..+600 °C   |

**Available variations:**

| Sensor type (FT): |             | Protection tube diam. (D): |
|-------------------|-------------|----------------------------|
| L- Fe-CuNi        | max. 600°C  | 6 mm                       |
| J- Fe-CuNi        | max. 600°C  | 9 mm                       |
| K- NiCr-Ni        | max. 1200°C | 12 mm                      |
| N- NiCrSi-NiSi    | max. 1200°C | 15 mm                      |
| ...               |             | ...                        |

**Process connection (EG):**

- M18x1,5    - G1/4"    - G1/2"    - G3/4"    ...



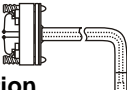

**Protecting tube materials (MT):**

|                |             |                 |              |
|----------------|-------------|-----------------|--------------|
| 1- Brass       | max. 400°C  | 14- SS (1.4749) | max. 1.200°C |
| 3- SS (1.4571) | max. 800°C  | 15- SS (1.4841) | max. 1.200°C |
| 8- SS (1.4762) | max. 1200°C | ...             |              |

**Standard type 321:**

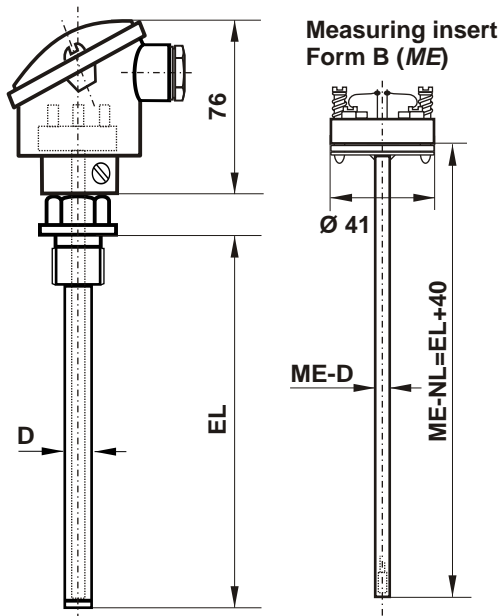
| ØxEL    | Weight in kg | Nominal length or measuring insert ME-NL | Article No. 1 x K   | Article No. 2 x K   |
|---------|--------------|--|---------------------|---------------------|
| Ø 9x100 | 0,65         | 140                                      | 321.9x100.3.1L.G1/2 | 321.9x100.3.2L.G1/2 |
| Ø 9x160 | 0,80         | 200                                      | 321.9x160.3.1L.G1/2 | 321.9x160.3.2L.G1/2 |
| Ø 9x200 | 0,85         | 240                                      | 321.9x200.3.1L.G1/2 | 321.9x200.3.2L.G1/2 |
| Ø 9x250 | 0,90         | 290                                      | 321.9x250.3.1L.G1/2 | 321.9x250.3.2L.G1/2 |

**Options:**

|  |   |  |  |
|--|---|--|--|
| <b>Transmitter-I</b><br><br>MU-I<br>4..20mA | <b>Transmitter-U</b><br><br>MU-U<br>0..10V | <b>Measuring insert MIMS</b><br>Mineral insulated metal sheathed<br><br>vibration resistant | <br><b>Typ. D x EL. MT. ... FT. EG</b> |
|--|---|--|--|

**Special constructions on request**

## Thermocouple, tip in type Type 311



### Technical data (standard construction):

|                                  |  |
|----------------------------------|--|
| <b>Connecting head:</b>          | Form B, light metal<br>Acc. To DIN 43729<br>With M20x1,5 cable gland |
| <b>Protection tube material:</b> | 1.4571 (316 SS), 9 mm diam.  |
| <b>Measuring insert:</b>         | Stainless steel, 6 mm diam.<br>Thermopair isolated with ceramic      |
| <b>Process connection:</b>       | Thread G ½   |
| <b>Sensor type:</b>              | Fe-CuNi ( type L )   |
| <b>Measuring range:</b>          | -40..+600 °C   |

### Available variations:

|                          |                 |  |
|--------------------------|-----------------|--|
| <b>Sensor type (FT):</b> |                 | <b>Protection tube diam. (D):</b><br>6 mm<br>9 mm<br>12 mm<br>15 mm<br>... |
| L- Fe-CuNi               | bis max. 600°C  |  |
| J- Fe-CuNi               | bis max. 600°C  |  |
| K- NiCr-Ni               | bis max. 1200°C |  |
| N- NiCrSi-NiSi           | bis max. 1000°C |  |
| ...                      |                 |  |

### Process connection (EG):

- M18x1,5    - G1/4"    - G1/2"    - G3/4"    ...

### Protecting tube materials (MT):

|                |             |                 |              |
|----------------|-------------|-----------------|--------------|
| 1- Brass       | max. 400°C  | 14- SS (1.4749) | max. 1.200°C |
| 3- SS (1.4571) | max. 800°C  | 15- SS (1.4841) | max. 1.200°C |
| 8- SS (1.4762) | max. 1200°C | ...             |              |

### Standard type 311:

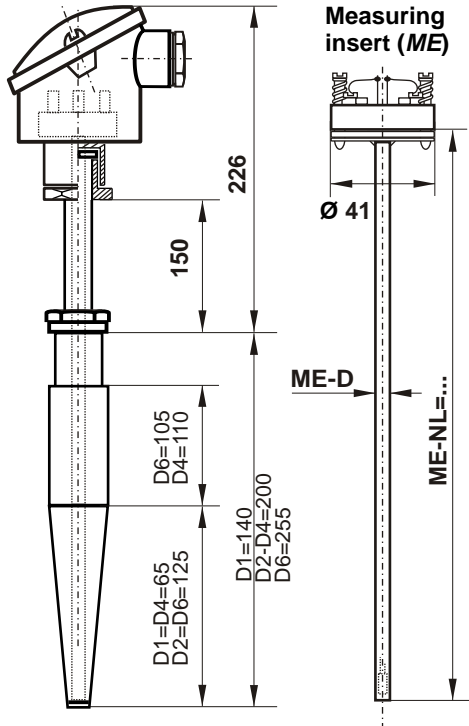
| ØxEL    | Weight in kg | Nominal length or measuring insert ME-NL | Article No. 1 x K   | Article No. 2 x K   |
|---------|--------------|--|---------------------|---------------------|
| Ø 9x100 | 0,65         | 140                                      | 311.9x100.3.1L.G1/2 | 311.9x100.3.2L.G1/2 |
| Ø 9x160 | 0,80         | 200                                      | 311.9x160.3.1L.G1/2 | 311.9x160.3.2L.G1/2 |
| Ø 9x200 | 0,85         | 240                                      | 311.9x200.3.1L.G1/2 | 311.9x200.3.2L.G1/2 |
| Ø 9x250 | 0,90         | 290                                      | 311.9x250.3.1L.G1/2 | 311.9x250.3.2L.G1/2 |

### Options:

|  |   |  |  |
|--|---|--|--|
| <b>Transmitter-I</b><br><br><b>MU-I</b><br>4..20mA | <b>Transmitter-U</b><br><br><b>MU-U</b><br>0..10V | <b>Measuring insert MIMS</b><br>Mineral insulated metal sheathed<br><br><b>vibration resistant</b> | <br><b>Typ. D x EL. MT. ... FT. EG</b> |
|--|---|--|--|



**Thermocouple, weld in construction  
Type 300**



**Technical data (standard construction):**

**Connecting head:** Form B, light metal  
Acc. To DIN 43729  
with M20x1,5 cable gland

**Extension neck:** 150 mm

**Protection tube material:** 1.4571 (316 SS), 24 to 12 mm reduced diameter

**Measuring insert:** Stainless steel, 6 mm diam.

**Process connection:** weld in

**Element type:** NiCr-Ni (type K)

**Measuring range:** -40..+800 °C

**Available variations:**

| Sensor type (FT): |                         |
|-------------------|-------------------------|
| L-                | Fe-CuNi max. 600°C      |
| J-                | Fe-CuNi max. 600°C      |
| K-                | NiCr-Ni max. 1200°C     |
| N-                | NiCrSi-NiSi max. 1200°C |
| ...               |                         |

|  |                                      |
|--|--------------------------------------|
| <p><b>tube diam. (D):</b></p> <p>6 mm<br/>9 mm<br/>12 mm<br/>15 mm<br/>...</p> | <p><b>Explained Article No.:</b></p> |
|--|--------------------------------------|

| Protecting tube materials (MT): |                           |             |
|---------------------------------|---------------------------|-------------|
| 3-                              | Stainless steel (1.4571)  | max. 800 °C |
| 19-                             | High temp. steel (1.7335) | max. 550 °C |
| 20-                             | High temp. steel (1.7380) | max. 550 °C |

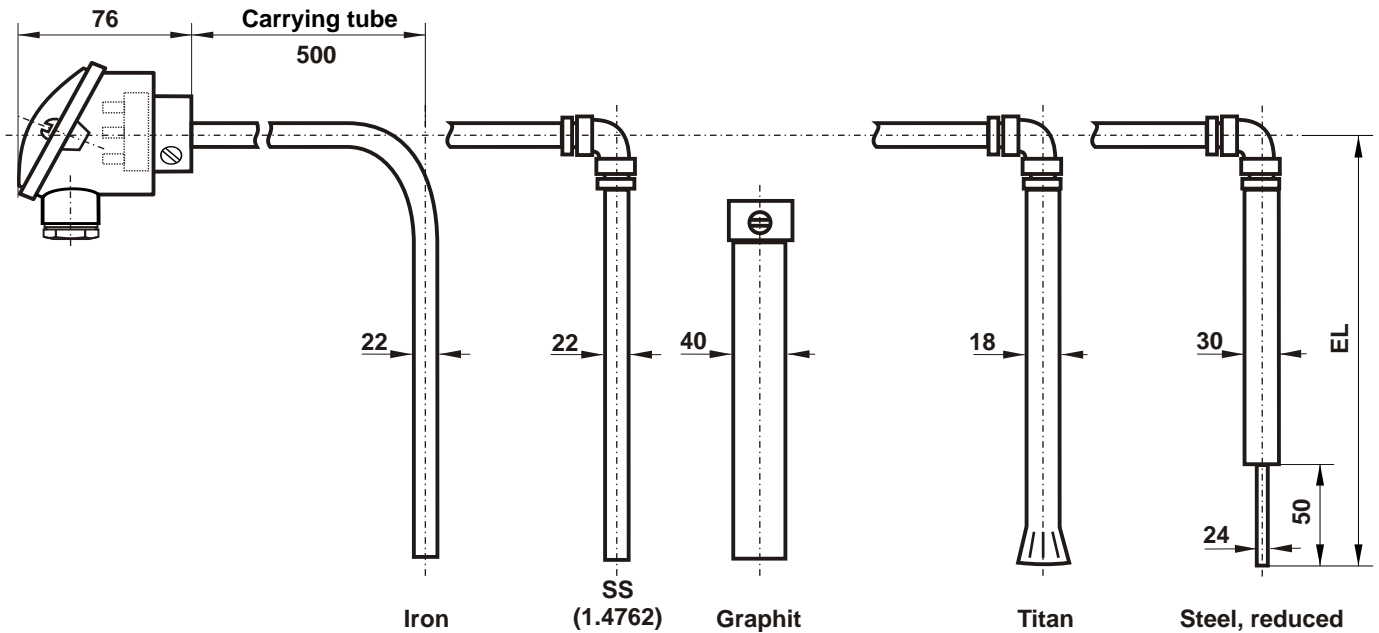
**Standard type 300:**

| Type | Protection tube length | Length conical | Protection tube diam. | Nominal length of measuring insert ME-NL | Article No. 1 x NiCr-Ni |
|------|------------------------|----------------|-----------------------|--|-------------------------|
| D1 L | 140                    | 65             | 24                    | 315                                      | 300.D1.140.19.1K        |
| D2 L | 200                    | 125            | 24                    | 375                                      | 300.D2.200.19.1K        |
| D4 L | 200                    | 65             | 24                    | 375                                      | 300.D4.200.19.1K        |
| D6 L | 255                    | 125            | 30                    | 430                                      | 300.D6.255.19.1K        |

**Options:**

| Transmitter-I                  | Transmitter-U                 | Measuring insert MIMS (Mineral insulated metal sheathed) |
|--------------------------------|-------------------------------|--|
| <p><b>MU-I</b><br/>4..20mA</p> | <p><b>MU-U</b><br/>0..10V</p> | <p>vibration resistant, flexible</p>                     |

**Thermocouple, angle type  
Typ 310w**



**Available variations:**

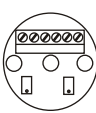
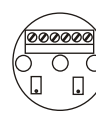
|   |  |   |
|---|--|---|
| <b>Protection tube diam. (D):</b><br>18 mm<br>22 mm<br>30 mm<br>... | <b>Protecting tube materials (MT):</b><br>8- SS (1.4762) max. 1200°C<br>16- Iron max. 550°C<br>17- Graphit max. 1300°C<br>18- Titan max. 1200°C<br>21- 1.4821 max. 1200°C<br>... | <b>Sensor type (FT):</b><br>L- Fe-CuNi max. 600°C<br>J- Fe-CuNi max. 600°C<br>K- NiCr-Ni max. 1200°C<br>N- NiCrSi-NiSi max. 1200°C<br>S- Pt10Rh-Pt max. 1600°C<br>... |
|---|--|---|

**Type 310w:**

| ØxEL         | material | Article No. 1 x L      | Article No. 2 x L        |
|--------------|----------|------------------------|--------------------------|
| Ø 22 x 500   | Iron     | 310w. 22 x 500.16.1L   | 310w. 22 x 500.16.2L     |
| Ø 22 x 710   | Iron     | 310w. 22 x 710.16.1L   | 310w. 22 x 710.16.2L     |
| Ø 22 x1000   | Iron     | 310w. 22 x1000.16.1L   | 310w. 22 x 710.16.2L     |
| Ø 22 x 500   | 1.4762   | 310w. 22 x 500. 8.1L   | 310w. 22 x 500. 8.2L     |
| Ø 22 x 710   | 1.4762   | 310w. 22 x 710. 8.1L   | 310w. 22 x 710. 8.2L     |
| Ø 22 x1000   | 1.4762   | 310w. 22 x1000. 8.1L   | 310w. 22 x1000. 8.2L     |
| Ø 18 x 500   | Titan    | 310w. 18 x 500.18.1L   | 310w. 18 x 500.18.2L     |
| Ø 18 x 710   | Titan    | 310w. 18 x 710.18.1L   | 310w. 18 x 710.18.2L     |
| Ø 18 x1000   | Titan    | 310w. 18 x1000.18.1L   | 310w. 18 x1000.18.2L     |
| Ø30/24 x 500 | 1.4821   | 310w.30/24 x 500.21.1L | 310w. 30/24 x 500. 21.2L |
| Ø30/24 x 710 | 1.4821   | 310w.30/24 x 710.21.1L | 310w. 30/24 x 710. 21.2L |
| Ø30/24 x1000 | 1.4821   | 310w.30/24 x1000.21.1L | 310w. 30/24 x1000. 21.2L |

**Other protecting tube materials are available on request**

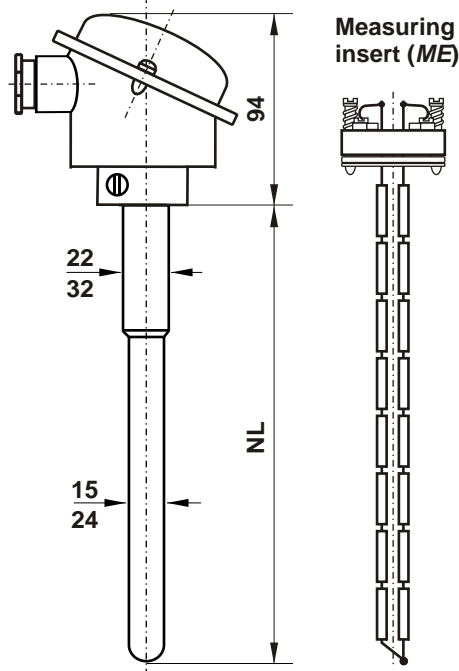
**Options:**

|  |   |
|--|---|
| <b>Transmitter-I</b><br><br>MU-I<br>4..20mA | <b>Transmitter-U</b><br><br>MU-U<br>0..10V |
|--|---|



**Special constructions on request**

## Thermocouple, high temperature Type 310 ceramic 15 mm with mounting tube



### Technical data (standard construction):

|                                  |  |
|----------------------------------|--|
| <b>Connecting head:</b>          | Form B, light metal<br>Acc. To DIN 43729<br>With M20x1,5 cable gland                                   |
| <b>Protection tube material:</b> | C 530, C 610 or C 710<br>in gastight construction<br>Diameter: 15 x 2,0 mm or<br>Diameter: 24 x 2,4 mm |
| <b>Carrying tube material:</b>   | steel (1.0305), length 200 mm<br>Diameter: 22 x 2,0 mm or<br>Diameter: 32 x 2,0 mm                     |
| <b>Measuring insert:</b>         | Ceramic, diameter 3 mm   |
| <b>Sensor type:</b>              | NiCr-Ni (type K)   |

### Available variations:

#### Sensor type (FT):

|           |              |             |
|-----------|--------------|-------------|
| <b>K-</b> | NiCr-Ni      | max. 1200°C |
| <b>N-</b> | NiCrSi-NiSi  | max. 1200°C |
| <b>S-</b> | Pt10Rh-Pt    | max. 1600°C |
| <b>R-</b> | Pt13Rh-Pt    | max. 1600°C |
| <b>B-</b> | Pt30Rh-Pt6Rh | max. 1800°C |
| ...       |              |             |

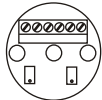
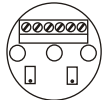
#### Protecting tube materials (MT):


|            |       |             |
|------------|-------|-------------|
| <b>53-</b> | C 530 | max. 1500°C |
| <b>61-</b> | C 610 | max. 1600°C |
| <b>71-</b> | C 710 | max. 1600°C |
| ...        |       |             |

### Type 310:

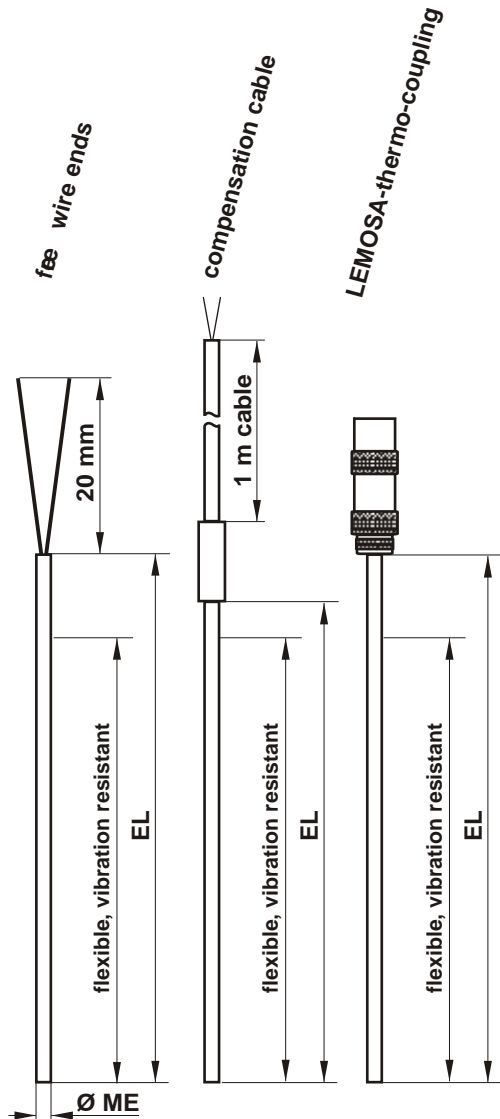
| Protection tube mat.                      | Dimensions (DxEL) | Weight in kg | Thermo pair length (mm) | Article No. 1 x K | Article No. 2 x K |
|---|-------------------|--------------|-------------------------|-------------------|-------------------|
| Ceramic<br>Typ C 610<br>22/15             | Ø 15x 500         | 1,05         | 545                     | 310.15x 500.61.1K | 310.15x 500.61.2K |
|   | Ø 15x 710         | 1,25         | 755                     | 310.15x 710.61.1K | 310.15x 710.61.2K |
|   | Ø 15x1000         | 1,35         | 1045                    | 310.15x1000.61.1K | 310.15x1000.61.2K |
| Ceramic<br>Typ C 710<br>gastight<br>22/15 | Ø 15x 500         | 1,05         | 545                     | 310.15x 500.71.1K | 310.15x 500.71.2K |
|   | Ø 15x 710         | 1,25         | 755                     | 310.15x 710.71.1K | 310.15x 710.71.2K |
|   | Ø 15x1000         | 1,35         | 1045                    | 310.15x1000.71.1K | 310.15x1000.71.2K |
| Ceramic<br>Typ C 530                      | Ø 24x 500         | 1,05         | 545                     | 310.24x 500.61.1K | 310.24x 500.61.2K |
|   | Ø 24x 710         | 1,25         | 755                     | 310.24x 710.61.1K | 310.24x 710.61.2K |
|   | Ø 24x1000         | 1,35         | 1045                    | 310.24x1000.61.1K | 310.24x1000.61.2K |
| Ceramic<br>Typ C 710<br>gastight<br>32/24 | Ø 24x 500         | 1,05         | 545                     | 310.24x 500.71.1K | 310.24x 500.71.2K |
|   | Ø 24x 710         | 1,25         | 755                     | 310.24x 710.71.1K | 310.24x 710.71.2K |
|   | Ø 24x1000         | 1,35         | 1045                    | 310.24x1000.71.1K | 310.24x1000.71.2K |

### Options:

| Transmitter-I  | Transmitter-U   |
|--|---|
|  <p><b>MU-I</b><br/>4..20mA</p> |  <p><b>MU-U</b><br/>0..10V</p> |

|   |
|---|
|  <p>Typ. D x EL. MT. ... FT</p> |
|---|

### MIMS\* Thermocouple Type 31M



**Technical Data (standard construction):**

**Connection:** free wires, fixed compensation cable or LEMOSA-thermo-coupling  
**Material:** 1.4571, Ø 3 mm, flexible  
**Sensor type:** NiCr-Ni (type K)  
**Tolerance:** Class B

**Available variations:**

| Sensor type (FT): |             |
|-------------------|-------------|
| L- Fe-CuNi        | max. 600°C  |
| J- Fe-CuNi        | max. 600°C  |
| K- NiCr-Ni        | max. 1200°C |
| N- NiCrSi-NiSi    | max. 1200°C |
| ...               |             |

| Tube diameter (D): | Free wire ends or coupling (AS):             |
|--------------------|--|
| 0,5 mm             | <i>fE</i> - free wire ends                   |
| 1,0 mm             | <i>LKS1</i> - LEMOSA-thermo-coupling, Size 1 |
| 1,5 mm             |  |
| 3,0 mm             |  |
| 6,0 mm             |  |
| 8,0 mm             |  |
| ...                |  |

| Compensation cable (AS):  |                         |             |
|---|-------------------------|-------------|
| selectable length in m  | <i>PP</i> - PVC         | -30..+ 80°C |
| selectable length in m  | <i>SS</i> - Silicone    | -50..+200°C |
| selectable length in m  | <i>TT</i> - Teflon      | max. 205°C  |
| selectable length in m  | <i>GGD</i> - GS/GS/Wire | max. 350°C  |
| <small>(GGD = glass silk + glass silk + wire shielding)</small> |                         |             |

| Tube material (MT): |             |
|---------------------|-------------|
| 3- 1.4571           | max. 550 °C |
| ...                 |             |

\* MIMS (Mineral insulated metal sheathed)

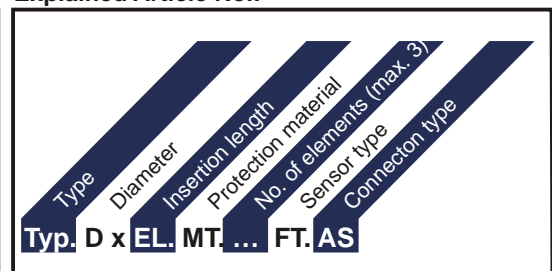
**Standard Type 31M:**

| ØME-EL  | Article No. 1 x NiCr-Ni | Article No. 2 x NiCr-Ni |
|---------|-------------------------|-------------------------|
| Ø 3x100 | 31M.3x100.3.1K.fE       | 31M.3x100.3.2K.fE       |
| Ø 3x160 | 31M.3x160.3.1K.fE       | 31M.3x160.3.2K.fE       |
| Ø 3x100 | 31M.3x100.3.1K.1PP      | 31M.3x100.3.2K.1PP      |
| Ø 3x160 | 31M.3x160.3.1K.1PP      | 31M.3x160.3.2K.1PP      |
| Ø 3x100 | 31M.3x100.3.1K.LKS1     | 31M.3x100.3.2K.LKS1     |
| Ø 3x160 | 31M.3x160.3.1K.LKS1     | 31M.3x160.3.2K.LKS1     |

**Options:**

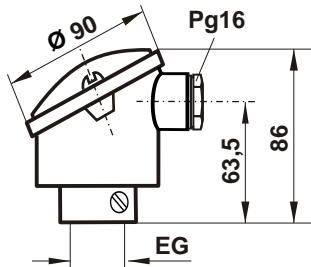
|             |             |  |   |
|-------------|-------------|--|---|
| 1/2 IEC     | 1/3 IEC     | <b>Stainless steel adjustable joint</b><br><br><b>Thread</b> | <b>LEMOSA-thermo-plug Size 1</b><br><br>For the sensor type see table above (FT)<br>100LS.FT.9x34,5.2 |
| 1/2 Class B | 1/3 Class B |  |   |

**Explained Article No.:**



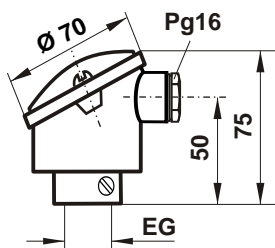
## Connecting heads Type 15

Connecting head form A, light metal, IP54



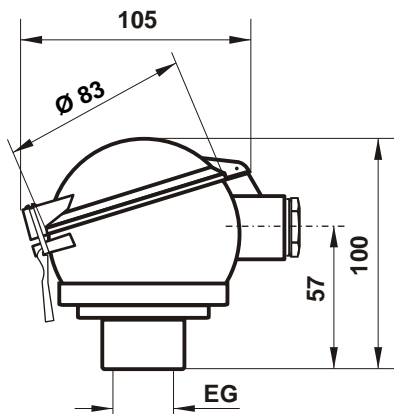
| Temperature in °C | Head-connection (EG) | Article No.        |
|-------------------|----------------------|--------------------|
| -20..+100 °C      | 22,8 mm              | 15AL.22,8.Alu.PG16 |
| -20..+100 °C      | 26,5 mm              | 15AL.26,5.Alu.PG16 |
| -20..+100 °C      | 32,5 mm              | 15AL.32,5.Alu.Pg16 |

Connecting head form B, light metal, IP54



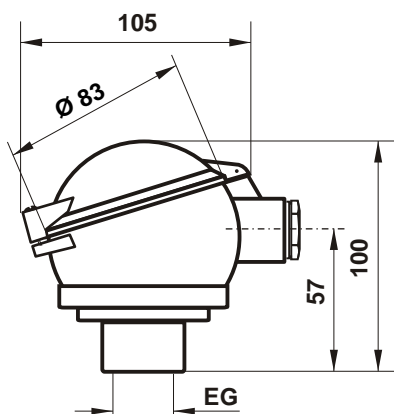
| Temperature in °C | Head-connection (EG) | Article No.        |
|-------------------|----------------------|--------------------|
| -20..+100 °C      | 15,8 mm              | 15BL.15,5.Alu.PG16 |
| -20..+100 °C      | M24 x 1,5            | 15BL.M24.Alu.PG16  |

Connecting head form BUSH, light metal, IP65



| Temperature in °C | Head-connection (EG) | Article No.         |
|-------------------|----------------------|---------------------|
| -20..+100 °C      | M24 x 1,5            | 15BUSH.M24.Alu.PG16 |

Connecting head form BUS, light metal, IP65



| Temperature in °C | Head-connection (EG) | Article No.        |
|-------------------|----------------------|--------------------|
| -20..+100 °C      | M24 x 1,5            | 15BUS.M24.Alu.PG16 |

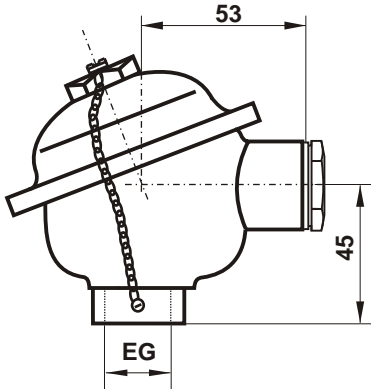
Special constructions on request

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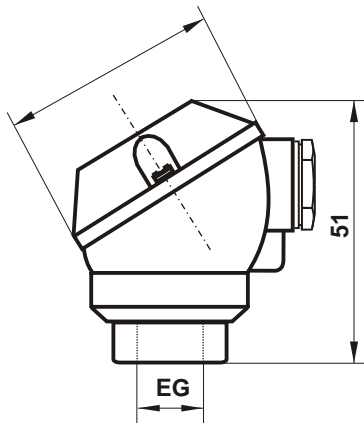
## Connecting heads Type 15

Connecting head form GG, cast iron, IP54



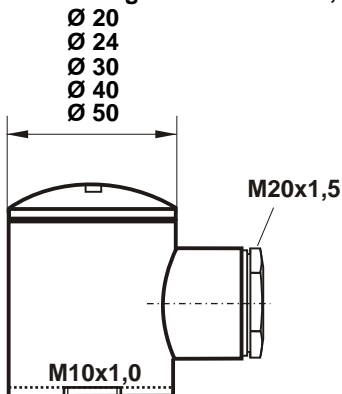
| Temperature in °C | Head-connection (EG) | Article No.       |
|-------------------|----------------------|-------------------|
| -20..+100 °C      | 15,5 mm              | 15BL.15,5.GG.PG16 |
| -20..+100 °C      | M24 x 1,5            | 15BL.M24.GG.PG16  |

Connecting head form J, light metal, IP54



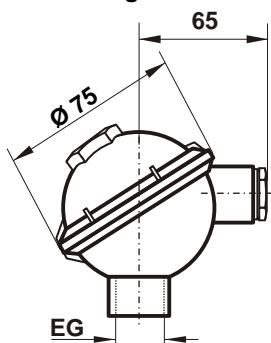
| Temperature in °C | Head-connection (EG) | Article No.        |
|-------------------|----------------------|--------------------|
| -20..+100 °C      | M10 x 1              | 15J.M10x1.Alu.PG16 |

Connecting head form BR20, BR25, BR30, BR40, Br50



| Temperature in °C | Diameter D in mm | Article No.          |
|-------------------|------------------|----------------------|
| -20..+100 °C      | 20 mm            | 15BR20.M10x1.MSv.M20 |
| -20..+100 °C      | 24 mm            | 15BR24.M10x1.MSv.M20 |
| -20..+100 °C      | 30 mm            | 15BR30.M10x1.MSv.M20 |
| -20..+100 °C      | 40 mm            | 15BR40.M10x1.MSv.M20 |
| -20..+100 °C      | 50 mm            | 15BR50.M10x1.MSv.M20 |

Connecting head form BK, plastic PPO, IP54



| Temperature in °C | Head-connection (EG) | Article No.           |
|-------------------|----------------------|-----------------------|
| -20..+100 °C      | M24 x 1,5            | 15BL.M24x1,5.KUN.PG16 |

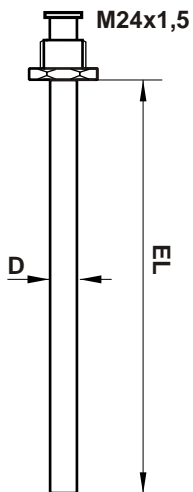
Special constructions on request

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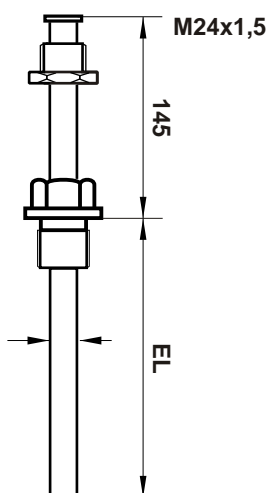
## Protecting tubes Type 100

### Protecting tube, form A



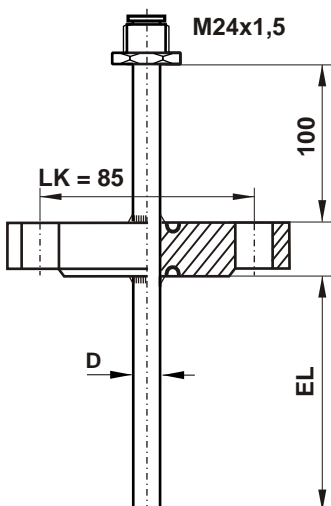
| Technische-Daten                                  | Nominal length (EL) | Article No.    |
|---|---------------------|----------------|
| Protecting tube material:<br>1.4571 (max. 400 °C) | Ø 9x 100            | 100A.9x100.3   |
|   | Ø 9x 160            | 100A.9x160.3   |
| Process connection:<br>None                       | Ø 9x 200            | 100A.9x200.3   |
|   | Ø 9x 250            | 100A.9x250.3   |
|   | Ø 15x 500           | 100A.15x500.3  |
|   | Ø 15x 710           | 100A.15x710.3  |
|   | Ø 15x1000           | 100A.15x1000.3 |

### Protecting tube, form B



| Technical data                                   | Nominal length (EL) | Article No.    |
|--|---------------------|----------------|
| Protection tube material:<br>1.4571 (max. 550°C) | Ø 9x 100            | 100B.9x100.3   |
|  | Ø 9x 160            | 100B.9x160.3   |
| Process connection:<br>G1/2                      | Ø 9x 200            | 100B.9x200.3   |
|  | Ø 9x 250            | 100B.9x250.3   |
|  | Ø 15x 500           | 100B.15x500.3  |
|  | Ø 15x 710           | 100B.15x710.3  |
|  | Ø 15x1000           | 100B.15x1000.3 |
|  | Ø 22x 500           | 100B.22x500.3  |
|  | Ø 22x 710           | 100B.22x710.3  |
|  | Ø 26x 710           | 100B.26x710.3  |
|  | Ø 26x1000           | 100B.26x1000.3 |

### Protecting tube with flange, form F



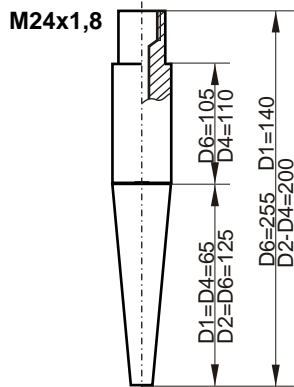
| Technical data                                      | Nominal length (EL) | Article No.  |
|---|---------------------|--------------|
| Protection tube material:<br>SS 1.4571 (max. 550°C) | Ø 9x 100            | 100F.9x100.3 |
|   | Ø 9x 160            | 100F.9x160.3 |
| Process connection:<br>Flange (FL):                 | Ø 9x 200            | 100F.9x200.3 |
|   | Ø 9x 250            | 100F.9x250.3 |
|   |                     |              |
| A- C DN 25 PN 40, DIN 25 10                         |                     |              |
| B- C DN 40 PN 40, DIN 25 10                         |                     |              |
| C- DN 1" ANSI 150 lbs RF                            |                     |              |
| D- DN 1/2" ANSI 150 lbs RF                          |                     |              |
| E- DN 1" ANSI 300 lbs RF                            |                     |              |
| F- DN 1/2" ANSI 300 lbs RF                          |                     |              |

### Special constructions on request

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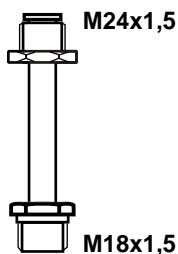
## Protecting tubes Typ 100

Protecting tube, weld in type, form D



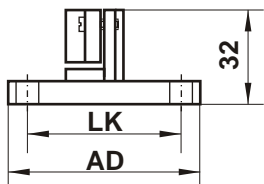
| Technical data   | Length in total | Length conical part | Diameter Outside | Article No. |
|--|-----------------|---------------------|------------------|-------------|
| <b>Protecting tube material:</b><br>1.4571 (max. 550°C)<br><b>Process connection:</b><br>for welded in | 140 mm          | 65 mm               | 24 mm            | 100.D1K     |
|  | 200 mm          | 125 mm              | 24 mm            | 100.D2K     |
|  | 255 mm          | 125 mm              | 30 mm            | 100.D6K     |
| <b>Protecting tube material:</b><br>1.7335 (max. 550°C)<br><b>Process connection:</b><br>for welded in | 140 mm          | 65 mm               | 24 mm            | 100.D1L     |
|  | 200 mm          | 125 mm              | 24 mm            | 100.D2L     |
|  | 255 mm          | 125 mm              | 30 mm            | 100.D6L     |
| <b>Protecting tube material:</b><br>1.7380 (max. 550°C)<br><b>Process connection:</b><br>for welded in | 140 mm          | 65 mm               | 24 mm            | 100.D1M     |
|  | 200 mm          | 125 mm              | 24 mm            | 100.D2M     |
|  | 255 mm          | 125 mm              | 30 mm            | 100.D6M     |

Neck tube fitting to protecting tube form D



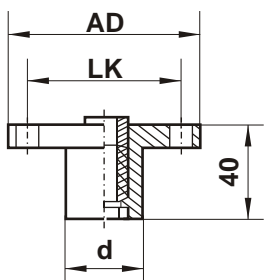
| Technical data   | Length | Prozess connection | Article No.       |
|--|--------|--------------------|-------------------|
| <b>Protection tube material:</b><br>1.4571 (max 400°C) | 165 mm | M18 x 1,5          | 100GR.165.M18x1,5 |

Flange, DIN EN 43 734, adjustable



| Material              | Pipe diameter in mm | Dimensions |    | Article No. |
|-----------------------|---------------------|------------|----|-------------|
|                       |                     | AD         | LK |             |
| Steel,<br>not painted | 15                  | 75         | 55 | 100BF.0901  |
|                       | 22                  | 90         | 70 | 100BF.0902  |
|                       | 32                  | 90         | 70 | 100BF.0903  |

Counter flange DN 15



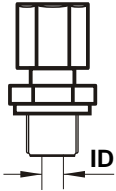
| Material              | Pipe diameter in mm | Dimensions |    | Article No. |
|-----------------------|---------------------|------------|----|-------------|
|                       |                     | AD         | LK |             |
| Steel,<br>not painted | 10                  | 75         | 55 | 100BF.0911  |
|                       | 15                  | 90         | 70 | 100BF.0912  |
|                       | 26                  | 90         | 70 | 100BF.0913  |

Special constructions on request

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## Accessories and termination sockets Type 100

Adjustable thread joint

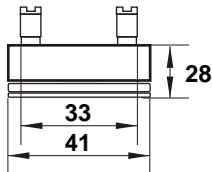


| Technical data                                       | Inner diameter (ID) | Article No. |
|--|---------------------|-------------|
| <b>Material:</b><br>Steel<br><b>Thread:</b><br>G1/4" | 6 mm                | 100.6.G1/8  |
| <b>Material:</b><br>Steel<br><b>Thread:</b><br>G1/2" | 6 mm                | 100.6.G1/6  |
|  | 8 mm                | 100.8.G1/4  |
|  | 10 mm               | 100.9.G1/2  |
| <b>Material:</b><br>Steel<br><b>Thread:</b><br>G3/4" | 6 mm                | 100.6.G1/6  |
|  | 8 mm                | 100.8.G1/4  |
|  | 10 mm               | 100.9.G1/2  |
|  | 15 mm               | 100.9.G1/2  |

Options:

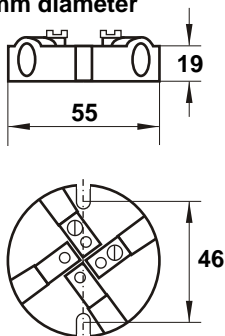
|                    |                        |                        |
|--------------------|------------------------|------------------------|
| <b>Thread</b>      | <b>Stainless steel</b> | <b>Stainless steel</b> |
| <b>Fixing ring</b> | <b>Teflon</b>          | <b>Stainless steel</b> |

Standard termination socket for connection head form B, modular



| Center hole diameter in mm | Quantity of terminations | Article No. |
|----------------------------|--------------------------|-------------|
| 3,2                        | 2                        | 100BK.5311  |
|                            | 4                        | 100BK.5511  |
|                            | 6                        | 100BK.5711  |
| 6,0                        | 2                        | 100BK.5321  |
|                            | 4                        | 100BK.5521  |
|                            | 6                        | 100BK.5721  |
|                            | 8                        | 100BK.5921  |
| 8,0                        | 2                        | 100BK.5331  |
|                            | 4                        | 100BK.5531  |
|                            | 6                        | 100BK.5731  |
|                            | 8                        | 100BK.5931  |

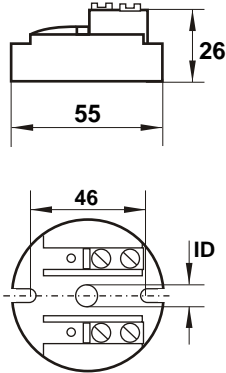
Termination socket for connection head form A for non-precious thermocouples  
up to 3 mm diameter



| Center hole diameter in mm | Quantity of terminations | Article No. |
|----------------------------|--------------------------|-------------|
| 8,0                        | 2                        | 100BK.3331  |
|                            | 4                        | 100BK.3531  |

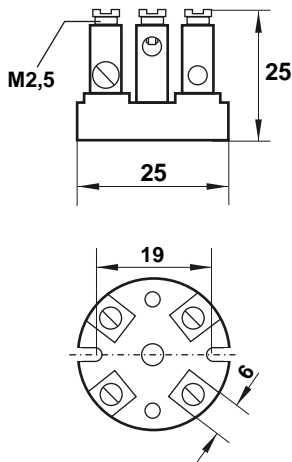
## Termination sockets Type 100

Termination socket for connection head form A for precious thermocouples



| Center hole diameter in mm | Quantity of terminations | For thermo wires up to ... mm diameter | Article No. |
|----------------------------|--------------------------|--|-------------|
| precious                   | 2                        | 1,38                                   | 100BK.1231  |
| with screwed terminations  | 4                        | 1,38                                   | 100BK.1431  |

Standard termination socket for connection head form J

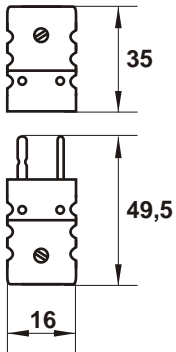


| Center hole diameter in mm | Quantity of terminations | For thermo wires up to ... mm diameter | Article No. |
|----------------------------|--------------------------|--|-------------|
| with screwed terminations  | 2                        | 1,0                                    | 100BK.6201  |
|                            | 4                        | 1,0                                    | 100BK.6401  |
| with soldering connector   | 2                        | 1,0                                    | 100BK.6101  |
|                            | 4                        | 1,0                                    | 100BK.6101  |

Special constructions on request

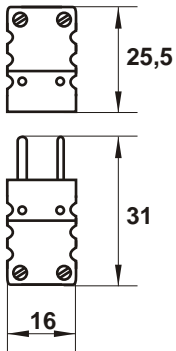
## Plug connectors Typ 100S, 100M, 100L

Standard plug connectors, free of thermovoltages, for temperatures 60°C...+200°C



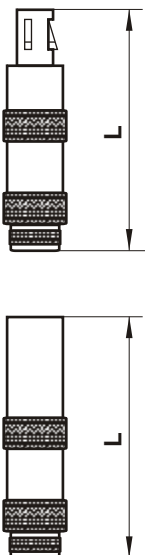
| Type     | Sensor        | Colour       | Size (LxB)   | Article No.   |
|----------|---------------|--------------|--------------|---------------|
| coupling | Fe-CuNi "J"   | black        | 35 x 25 mm   | 100SK.J.SW    |
| coupling | NiCr-Ni "K"   | yellow/green | 35 x 25 mm   | 100SK.K.GE/GR |
| coupling | Pt10Rh-Pt "S" | white        | 35 x 25 mm   | 100SK.S.WS    |
| plug     | Fe-CuNi "J"   | black        | 49,5 x 25 mm | 100SS.J.SW    |
| plug     | NiCr-Ni "K"   | yellow/green | 49,5 x 25 mm | 100SS.K.GE/GR |
| plug     | Pt10Rh-Pt "S" | white        | 49,5 x 25 mm | 100SS.S.WS    |

Miniature plug connectors, free of thermovoltages, for temperatures 60°C...+200°C



| Type     | Sensor        | Colour       | Size (LxB)   | Article No.   |
|----------|---------------|--------------|--------------|---------------|
| coupling | Fe-CuNi "J"   | black        | 25,5 x 16 mm | 100MK.J.SW    |
| coupling | NiCr-Ni "K"   | yellow/green | 25,5 x 16 mm | 100MK.K.GE/GR |
| coupling | Pt10Rh-Pt "S" | white        | 25,5 x 16 mm | 100MK.S.WS    |
| plug     | Fe-CuNi "J"   | black        | 31 x 16 mm   | 100MS.J.SW    |
| plug     | NiCr-Ni "K"   | yellow/green | 31 x 16 mm   | 100MS.K.GE/GR |
| plug     | Pt10Rh-Pt "S" | white        | 31 x 16 mm   | 100MS.S.WS    |

LEMOSA-plug and coupling, for temperatures 60°C...+260°C



### LEMOSA-plug

| Diameter | Length (L) | Description                       | Article No.    |
|----------|------------|-----------------------------------|----------------|
| 0        | 34,5 mm    | 2-poles<br>Ltg.-Ø 4,2 mm          | 100LS.9x34,5.2 |
| 0        | 34,5 mm    | 4-poles<br>Ltg.-Ø 4,2 mm          | 100LS.9x34,5.4 |
| 2        | 50 mm      | 2-poles<br>Ltg.-Ø 4,2 mm          | 100LS.15x50.2  |
| 2        | 50 mm      | 4-poles, size II<br>Ltg.-Ø 4,2 mm | 100LS.15x50.4  |

### LEMOSA-coupling

| Diameter | Length (L) | Description              | Article No.    |
|----------|------------|--------------------------|----------------|
| 0        | 35 mm      | 2-poles<br>Ltg.-Ø 4,2 mm | 100LK.9x34,5.2 |
| 0        | 35 mm      | 4-poles<br>Ltg.-Ø 4,8 mm | 100LK.9x34,5.4 |
| 2        | 52,5 mm    | 4-poles<br>Ltg.-Ø 6,7 mm | 100LK.15x52.4  |

**Remark: Plug 100LS.15x50.2 fits into coupling 100LK.15x52.4**

Special constructions on request

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## Thermo wires, compensation and connection cables Type 3, 2

### Thermo wire type 3

#### Thermo wire, non precious, blank

| Type      | Norm         | Diameter in mm | Article No. |
|-----------|--------------|----------------|-------------|
| L Fe-CuNi | DIN 43 710   | 2,50           | 3.1L025     |
| J Fe-CuNi | DIN EN 60584 | 2,50           | 3.1J025     |
| K NiCr-Ni | DIN EN 60584 | 2,50           | 3.1K025     |

#### Thermo wire, precious, blank

|                |              |      |              |
|----------------|--------------|------|--------------|
| S Pt10Rh-Pt    | DIN EN 60584 | 0,35 | 3.1S.035.050 |
|                |              | 0,50 |              |
| R Pt13Rh-Pt    | DIN EN 60584 | 0,35 | 3.1R.035.050 |
|                |              | 0,50 |              |
| B Pt30Rh-Pt6Rh | DIN EN 60584 | 0,35 | 3.1B.035.050 |
|                |              | 0,50 |              |

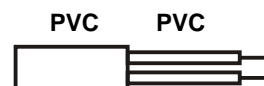
#### Compensation cable type 3

| size mm <sup>2</sup> | Material | Type       | Article No.     |
|----------------------|----------|------------|-----------------|
| 2x1,50               | PVC/PVC  | J, L, K, S | 3.1Type.150.PP  |
| 4x1,50               |          |            | 3.2Type.150.PP  |
| 2x0,50               | Gs/Gs/Ws | J, L, K, S | 3.1Type.150.GGD |
| 4x0,50               |          |            | 3.2Type.150.GGD |

#### Connection cable type 2

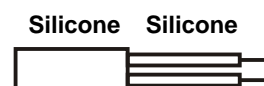
##### PVC/PVC

| Size in mm <sup>2</sup> | Article No. |
|-------------------------|-------------|
| 2x0,50                  | 2.2x050.PP  |
| 4x0,50                  | 2.4x050.PP  |



##### Teflon/Silicone

|        |            |
|--------|------------|
| 2x0,35 | 2.2x035.TS |
|--------|------------|



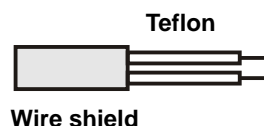
##### Teflon/Teflon

|        |            |
|--------|------------|
| 2x0,22 | 2.2x022.TT |
| 3x0,22 | 2.3x022.TT |
| 4x0,22 | 2.4x022.TT |
| 6x0,22 | 2.6x022.TT |



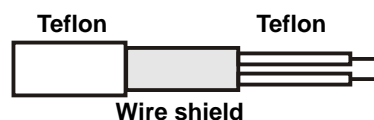
##### Teflon/Wire shield

|        |            |
|--------|------------|
| 4x0,22 | 2.4x022.TD |
| 6x0,22 | 2.6x022.TD |
| 8x0,22 | 2.8x022.TD |



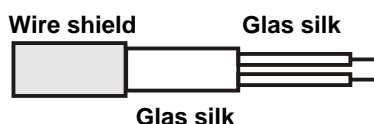
##### Teflon/Wire shield/Teflon

|        |             |
|--------|-------------|
| 3x0,22 | 2.3x022.TDT |
| 4x0,22 | 2.3x022.TDT |



##### Glas silk/Glas silk/Wire shield

|        |             |
|--------|-------------|
| 3x0,22 | 2.3x022.GGD |
| 4x0,22 | 2.3x022.GGD |



#### Special constructions on request

SENPRO Sensortechnik GmbH · Ruhlsdorfer Straße 95 · D-14532 Stahnsdorf



**Measuring inserts for resistance thermometers**  
**Type 20, Ø 6 mm und Ø 8 mm**

Technical data (standard construction):

Termination socket  
41 mm Form B  
55 mm Form A

Termination socket  
41 mm Form B  
55 mm Form A

Termination socket:

fitting to connection head  
form B, form DA, form AP

Protection tube material:

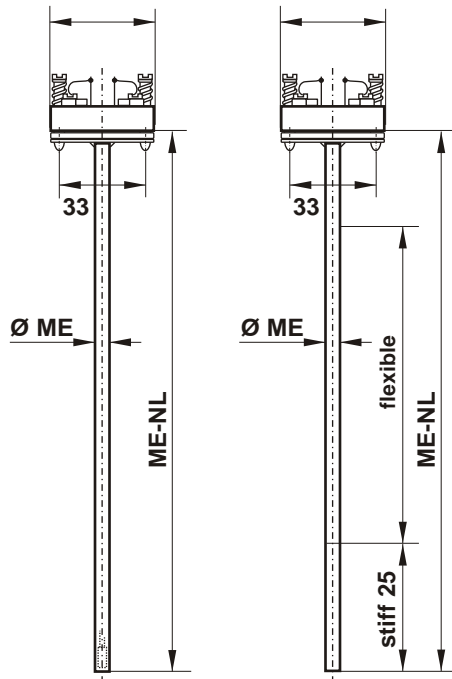
1.4571 (316 SS), 6 or 8 mm diam.

Measuring range:

-40..+500 °C

Sensor type:

Pt100



Available variations:

Accuracy acc. EN IEC 60751:

**Pt100 / Pt1000 / Ni1000:**

- 0- Class B = Standard ( $t = \pm 0,3 + 0,005 \times |t|$ )
- 1- Class A = 1/2 Class B ( $t = \pm 0,15 + 0,002 \times |t|$ )
- 2- 1/3 Class B = 1/3 ( $t = 1/3(\pm 0,3 + 0,005 \times |t|)$ )

Sensor type (FT):

- Pt** - Pt100
- PtM** - Pt1000
- Ni** - Ni1000
- NTC** - NTC
- PTC** - PTC
- ...

Head Connection:

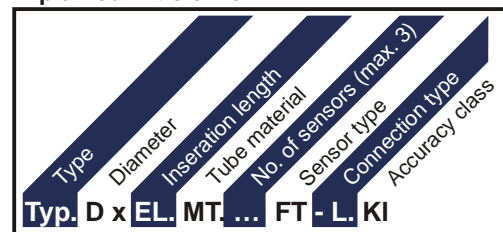
- Form B**- Sockel Ø 41 mm, ME Ø 6 mm
- Form A**- Sockel Ø 55 mm, ME Ø 8 mm

| ME-NL | Article No. 1xPt100 | Article No. 2xPt100 |
|-------|---------------------|---------------------|
| 125   | 20_x125.3.1Pt-2.0   | 20_x125.3.2Pt-2.0   |
| 185   | 20_x185.3.1Pt-2.0   | 20_x185.3.2Pt-2.0   |
| 225   | 20_x225.3.1Pt-2.0   | 20_x225.3.2Pt-2.0   |
| 245   | 20_x245.3.1Pt-2.0   | 20_x245.3.2Pt-2.0   |
| 285   | 20_x285.3.1Pt-2.0   | 20_x285.3.2Pt-2.0   |
| 295   | 20_x295.3.1Pt-2.0   | 20_x295.3.2Pt-2.0   |

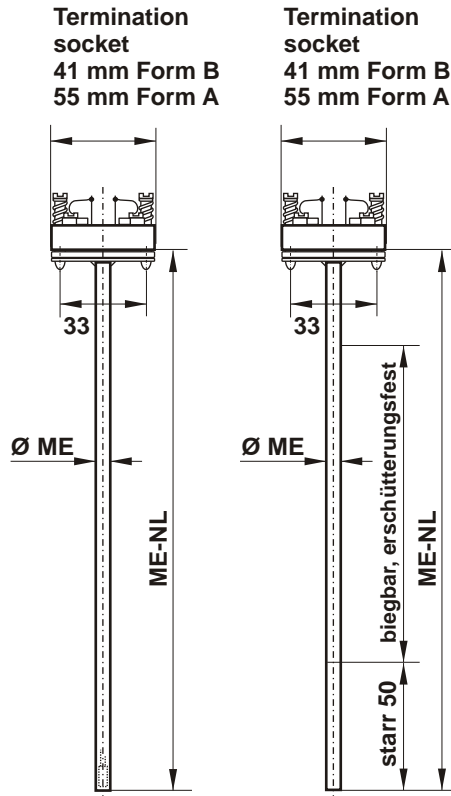
Options:

| Transmitter-I   | Transmitter-U  | Measuring insert, ME,                | 1/2 IEC                  | 1/3 IEC                  |
|-----------------|----------------|--------------------------------------|--------------------------|--------------------------|
| MU-I<br>4..20mA | MU-U<br>0..10V | <br>Bendable,<br>Vibration resistant | 1/2 tolerance<br>class B | 1/3 tolerance<br>class B |

Explained Article-No.:



## Measuring inserts for thermocouples Type 30, Ø 6 mm und Ø 8 mm



### Technical data (standard construction):

Terminal block:

fitting to connection head  
form B, form DA, form AP  
1.4571 (316 SS), 6 or 8 mm diam.  
-40...+600 °C  
Fe-CuNi (type L)

Protection tube material:

Measuring range:

Sensor type:

### Sensor type (FT):

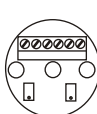
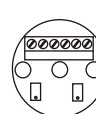
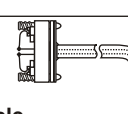
|               |             |                |
|---------------|-------------|----------------|
| - Fe-CuNi     | max. 600°C  | L DIN 43710    |
| - Fe-CuNi     | max. 600°C  | J DIN EN 60584 |
| - NiCr-Ni     | max. 1200°C | K DIN EN 60584 |
| - NiCrSi-NiSi | max. 1200°C | N DIN EN 60584 |
| ...           |             |                |

### Head connection:

**Form B**- Sockel Ø 41 mm, ME Ø 6 mm  
**Form A**- Sockel Ø 55 mm, ME Ø 8 mm

| ME-NL | Article No. 1 x L | Article No. 2 x L |
|-------|-------------------|-------------------|
| 125   | 30._x125.3.1L.0   | 30._x125.3.2L.0   |
| 185   | 30._x185.3.1L.0   | 30._x185.3.2L.0   |
| 225   | 30._x225.3.1L.0   | 30._x225.3.2L.0   |
| 245   | 30._x245.3.1L.0   | 30._x245.3.2L.0   |
| 285   | 30._x285.3.1L.0   | 30._x285.3.2L.0   |
| 295   | 30._x295.3.1L.0   | 30._x295.3.2L.0   |

### Options:

|  |   |   |                                     |                                     |
|--|---|---|-------------------------------------|-------------------------------------|
| <b>Transmitter-I</b><br><br>MU-I<br>4..20mA | <b>Transmitter-U</b><br><br>MU-U<br>0..10V | <b>Measuring insert, ME,</b><br><br>Bendable,<br>Vibration resistant | 1/2 IEC<br>1/2 tolerance<br>class B | 1/3 IEC<br>1/3 tolerance<br>class B |
|--|---|---|-------------------------------------|-------------------------------------|

### Explained Article-No.:

|      |          |                  |               |                         |             |                 |                |
|------|----------|------------------|---------------|-------------------------|-------------|-----------------|----------------|
| Type | Diameter | Insertion length | Tube material | No. of sensors (max. 3) | Sensor type | Connection type | Accuracy class |
| Typ. | D x      | EL               | MT            | ...                     | FT -        | L               | KI             |

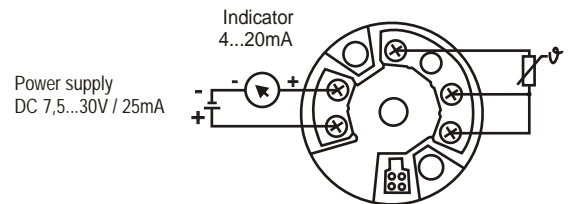
Special constructions on request

## Temperature transmitters

### Typ MU-P T03 J

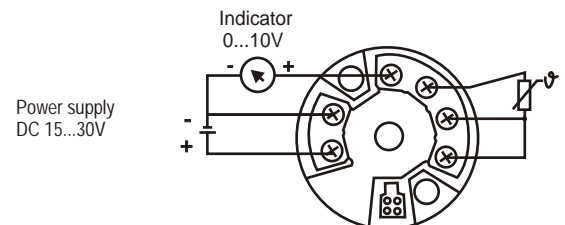
#### Technical data for MU 4...20 mA

|                           |   |
|---------------------------|---|
| <b>Connection type :</b>  | 2 wire  |
| <b>Low range output:</b>  | min. 3,6 mA   |
| <b>High range output:</b> | max. 22...28 mA ( typically: 24 mA )                                  |
| <b>Sensor short cut:</b>  | < 3,6 mA  |
| <b>Burnout:</b>           | upscale: > 22...< 28 mA<br>(Typically: 24 mA )<br>downscale: < 3,6 mA |
| <b>Output signal:</b>     | 4...20 mA current   |
| <b>Output character :</b> | temperature linear  |
| <b>Accuracy:</b>          | < +/- 0,1 %   |
| <b>Load ( Rb ):</b>       | $R_b = ( U_b \cdot 7,5 \text{ V} ) / 11 \text{ mA}$                   |



#### Technical Data for MU 0...10 V

|                           |   |
|---------------------------|---|
| <b>Connection type :</b>  | 3 wire  |
| <b>Low range output:</b>  | min. 0 V  |
| <b>High range output:</b> | max. 11...14 V ( typically: 12 V )                              |
| <b>Sensor short cut:</b>  | 0 V   |
| <b>Burnout:</b>           | upscale: > 11...< 14 V<br>( typically: 12 V )<br>downscale: 0 V |
| <b>Output signal:</b>     | 0...10 V DC   |
| <b>Output character :</b> | temperature linear  |
| <b>Accuracy:</b>          | < +/- 0,2 %   |
| <b>Load ( Rb ):</b>       | $R_b > 10 \text{ kOhm}$   |
| <b>Supply voltage:</b>    | 15...30 V DC  |



Transmitter head mount type

Price in €

MU-P T03 J-I

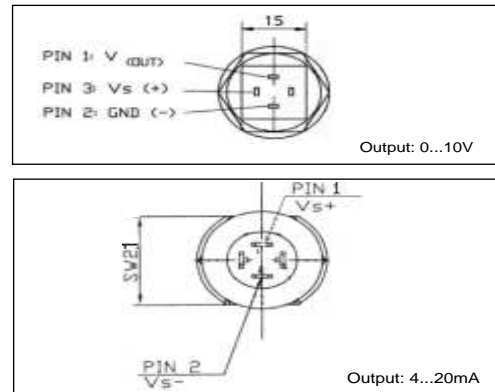
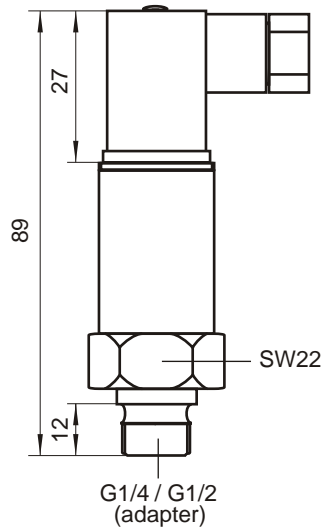
55,00

MU-P T03 J-U

55,00

Special constructions on request

## Pressure transformer DMU



### Technical data:

Measuring range:.....see table  
 Temperature range:.....-40...+150°C  
 Pressure connection:.....G1/4" as DIN 3852  
 .....Form E,  
 .....Optional G 1/2" DIN 16288  
 Degree of pressure:.....relativ  
 Principle of measurement:.....Ceramic Al<sub>2</sub> O<sub>3</sub>  
 .....piezoresistive  
 Installation:.....directly on pressure pipe  
 Parts touching material:.....Ceramic Al<sub>2</sub> O<sub>3</sub>  
 .....Steel 1.4305  
 Voltage supply.....8...30V DC at output 4...20mA;  
 .....16...34V AC at output 0...10V  
 Output signal:.....0...10V 3-wire connection,  
 .....R<sub>A</sub> >10kOhm/ <100nF  
 .....4...20mA 2-wire connection  
 .....R<sub>A</sub> <  $\frac{\text{supply}}{0,02}$  [Ohm]  
 .....0,02 A  
 Reponse time:.....2ms  
 Class:.....< +/- 0,3% FS  
 Total error:.....< +/- 0,3% FS  
 Overload: 2,5 times  
 Pressure at bursting point:.....2,5 times  
 Electrical connection: angle plug  
 Protection class:.....IP 65 as designated by DIN 40050

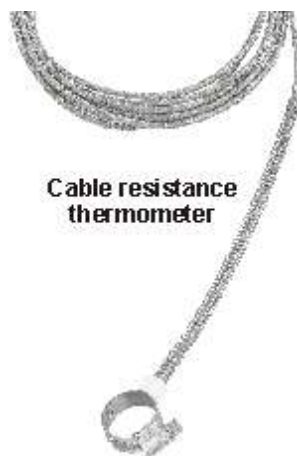
| Type       | Measuring range | Output     | Price in € |
|------------|-----------------|------------|------------|
| SHD- U 1   | 0-1bar          | 0 ... 10 V | 132,00     |
| SHD- U 2,5 | 0-2,5bar        | 0 ... 10 V | 132,00     |
| SHD- U 6   | 0-6bar          | 0 ... 10 V | 132,00     |
| SHD- U 10  | 0-10bar         | 0 ... 10 V | 132,00     |
| SHD- U 16  | 0-16bar         | 0 ... 10 V | 132,00     |
| SHD- U 25  | 0-25bar         | 0 ... 10 V | 132,00     |
| SHD- U 40  | 0-40bar         | 0 ... 10 V | 132,00     |

| Type       | Measuring range | Output      | Price in € |
|------------|-----------------|-------------|------------|
| SHD- I 1   | 0-1bar          | 4 ... 20 mA | 132,00     |
| SHD- I 2,5 | 0-2,5bar        | 4 ... 20 mA | 132,00     |
| SHD- I 6   | 0-6bar          | 4 ... 20 mA | 132,00     |
| SHD- I 10  | 0-10bar         | 4 ... 20 mA | 132,00     |
| SHD- I 16  | 0-16bar         | 4 ... 20 mA | 132,00     |
| SHD- I 25  | 0-25bar         | 4 ... 20 mA | 132,00     |
| SHD- I 40  | 0-40bar         | 4 ... 20 mA | 132,00     |

## Special Temperature Sensors



Cable resistance thermometer,  
screw in type



Cable resistance  
thermometer



very thin sensor



cable resistance thermometer,  
tip in type



resistance thermometer,  
screw in type  
with special connection head



Angle resistance thermometer  
with LEMOSA-plug

## Special Heating Components



Heater with  
thermoelement



Pt100 temperature sensor



pipe heater with 1200W



pipe heater with 800W



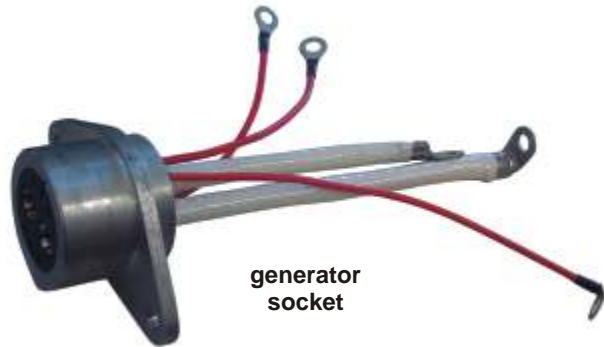
surface heater for  
the laboratory



**Special Railway Components**



**generator power connector  
type 601**



**generator  
socket**



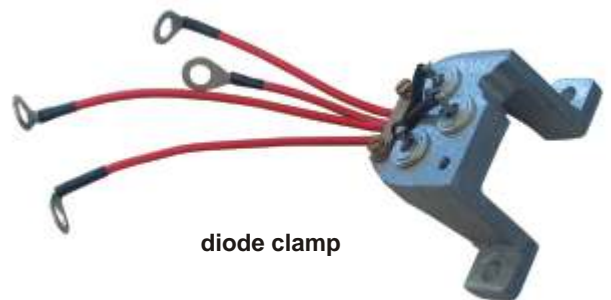
**cable sensor with  
perforated protecting tube**



**Pt100, 2-Leiter  
resistance thermometer**



**bearing thermometer**



**diode clamp**



**bottom view**

## General terms and conditions for entrepreneurs

### Area of validity:

These terms and conditions apply exclusively to entrepreneurs in terms of § 14 BGB (German Civil Code), that act upon completion of a transaction in their commercial or independent activities.

### Accepting an order:

Orders can be placed in writing, by telephone, by fax or per e-mail. Please list the desired items and include a description, the quantity and if possible the preferred delivery date. Special orders must generally be placed in writing with a detailed description of the desired features.

### Terms of delivery:

We deliver according to the „General Electrical Industry Terms and Conditions of Services and Products“ which are the general delivery conditions for products and services in the electrical industry. Delivery ensues ex work, by means of parcel service or shipping agency, plus the costs of shipping agency, plus the costs of shipping an insurance for goods in transit. We calculate the express delivery costs for each case in which rushed delivery is requested. Our terms of delivery are still valid even if the customer in his terms of purchase exerts the validity of other terms of sale. No formal objection to delivery is required from our side.

### Delivery times:

The standard program is available in partial amounts in the warehouse. Larger order and specialty order delivery is determined by the order of order receipts and order releases or by arrangement. We reserve the right to part shipment. In the occurrence of events controlled by a higher power, for example: material shortages, strikes etc., we reserve the right to back out of the contract.

### Prices / offers:

The prices and offers in the catalogue are gross prices. We calculate our prices in EUR. Our offers are not binding and require confirmation. The obligation to deliver exists only after a written order confirmation by us.

### Terms of payment:

A 2% discount exists for payment within 10 days of the date on the receipt, net cash 30 days. When there is a failure to meet arranged agreements or when the payment is late, we reserve the right to charge the customer with the resulting costs, for example bank charges.

### Returns:

Only originally packaged, complete and unused items can be returned and are only accepted within 10 days post delivery. By returns in which we do not represent the reasons for the return, the customer only receives 75% of the original price, possibly minus the shipping expenses. Special orders such as room temperature sensors with service elements are generally not taken back and are excluded from exchanges.

**Guarantee:** 12 month guarantee

### Safety instructions:

These instruments are only to be used for their specifically assigned tasks. The safety instructions of the VDE of individual nations, the local safety controlling agencies, the TÜV and the local EVU are to be followed. The buyer should follow the instructions and the construction safety guidelines in order to avoid all possible hazards. We do not grant a warranty for defects or damages that occurs due to the improper use of our instruments. Our instruments should only be installed by a professional.

### Liability:

We are liable in accordance with statutory provisions if the customer makes a claim for damages based on intent or gross negligence, including intent or gross negligence of our representatives or agents or for culpable injury to life, body or health. The liability is excluded except for the following provisions in other respects.

As far as we are not liable under a guarantee, liability for claims for damages is limited as follows: For damages caused by carelessness, we are only liable to the extent these to the violation of essential contractual obligations (cardinal obligations) based. Cardinal obligations are such contractual obligations, the fulfillment of which could make the proper execution of the contract at all and rely on the compliance of the contractors. Our liability for simple negligence under this Regulation is limited to the contract-typical foreseeable damage.

If we neglect a contractual obligation, the obligation to pay damages is limited to the contract-typical damage.

For slight negligence caused delay damages our liability is limited to the typically foreseeable damage, but not more than 5% of the agreed total price in the concerned contract.

The provisions of the preceding paragraphs shall apply accordingly to the limitation of liability for compensation for futile expenses (§ 284 BGB - German Civil Code) as well as for the benefit of our vicarious agents.

### Place of jurisdiction:

The inclusion and interpretation of these terms and conditions of sale and delivery as well as the conclusion and interpretation of legal transactions with the purchaser itself are exclusively governed by the laws of the Federal Republic of Germany. Applicability of the uniform law concerning entering into international sales contracts regarding mobile goods (BGB) of the uniform law concerning the international purchase of mobile goods (BGB) as well as the UN Convention on Contracts for the International Sale of Goods is excluded.

### Imprint:

None of the statements in our catalogues, pamphlets or inserts guarantee, that a product has specific features, rather the statements are rules of thumb, by which one can orientate oneself. We reserve the right to make changes to the products as more advanced technology becomes available. Exceptions to this rule are product characteristics that we individually guarantee in writing. With this price list all previous prices lose validity.

## Notes

### Note:

None of the data given in our folders and data sheets assure special characteristics to a product, but are empirical values, for general orientation. Changes due to the technical progress are reserved. Obviously this regulation is invalid for quotations and technical descriptions based on inquiries and technical clarifications.

### Central order acceptance:

**SENPRO Sensortechnik GmbH**  
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