



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,

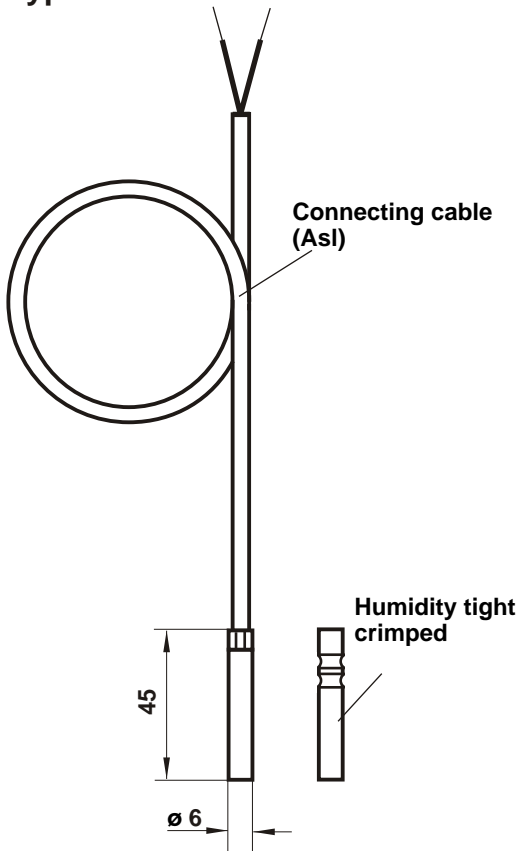
Your SENPRO Sensortechnik GmbH



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Capsule temperature sensor Typ 21A



Technical data:

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

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 ...
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Connecting cable (As):		
P-	PVC	-30..+ 80°C
S-	Silicone	-50..+200°C
T-	Teflon	max. 205°C
GGD-	GS/GS/Wire	max. 350°C

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

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

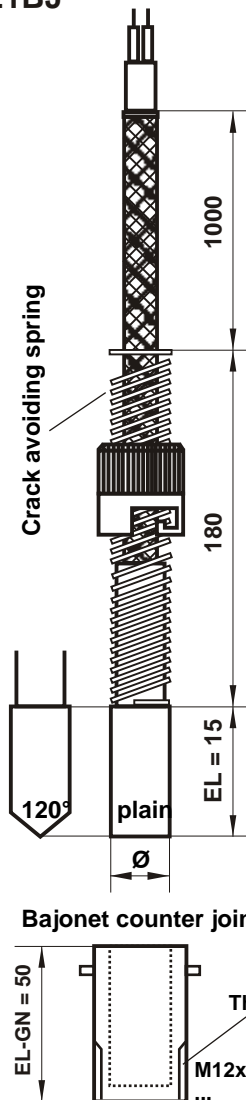
Options:

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
		 MU-I 4..20mA	 MU-U 0..10V	1/2 tolerance class B 1/3 tolerance class B

Resistance thermometer with bayonet joint Typ 21BJ



Technical data (standard construction):

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

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

Connecting cable (As):

P-	PVC	-30..+ 80°C
S-	Silicone	-50..+200°C
T-	Teflon	max. 205°C
GGD-	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 AsI									

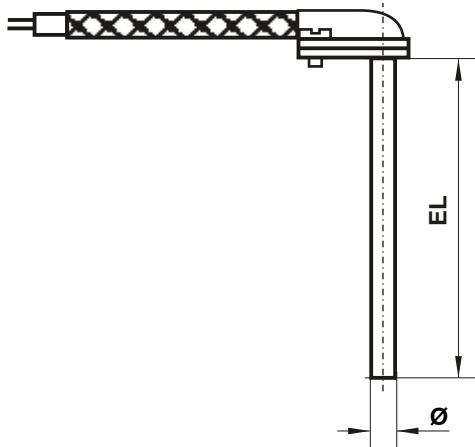
Standard type 21BJ:

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):

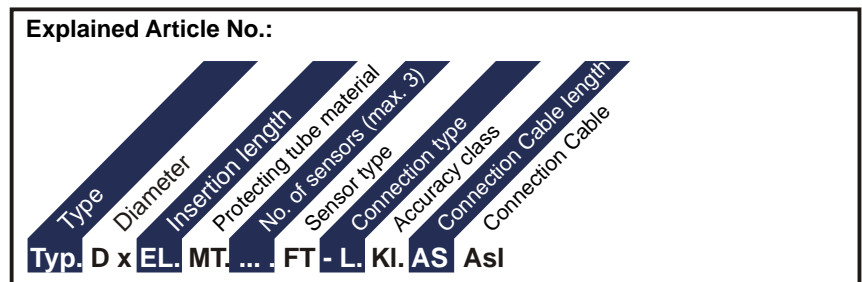
Protection material:	FEP
Protection diameter:	6 mm
Measuring insert:	1 x Pt100, 2 x Pt 100
Connecting cable:	1000 mm, GGD
Measuring range:	-40..+350 °C
Tolerance class:	Class B
Connection type:	2-wire

Available variations:

<p>Accuracy acc. EN IEC 60751:</p> <p>Pt100 / Pt1000 / Ni1000:</p> <p>0 - Class B = Standard ($t = \pm 0,3 + 0,005 \times t$)</p> <p>1 - Class A = 1/2 Class B ($t = \pm 0,15 + 0,002 \times t$)</p> <p>2 - 1/3 Class B = 1/3 ($t = 1/3(\pm 0,3 + 0,005 \times t)$)</p>	<p>Sensor type (FT):</p> <p>Pt - Pt100</p> <p>PtM - Pt1000</p> <p>Ni - Ni1000</p> <p>NTC - NTC</p> <p>PTC - PTC</p>
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<p>Connecting cable (As):</p> <table border="0"> <tr> <td>PP -</td> <td>PVC</td> <td>-30..+ 80°C</td> </tr> <tr> <td>SS -</td> <td>Silicone</td> <td>-50..+200°C</td> </tr> <tr> <td>TT -</td> <td>Teflon</td> <td>max. 205°C</td> </tr> <tr> <td>GGD -</td> <td>GS/GS/Wire</td> <td>max. 350°C</td> </tr> </table> <p>(GGD = glass silk + glass silk + wire shielding)</p>	PP -	PVC	-30..+ 80°C	SS -	Silicone	-50..+200°C	TT -	Teflon	max. 205°C	GGD -	GS/GS/Wire	max. 350°C	<p>Tube (EL):</p> <p>50 mm</p> <p>100 mm</p> <p>...</p>
PP -	PVC	-30..+ 80°C											
SS -	Silicone	-50..+200°C											
TT -	Teflon	max. 205°C											
GGD -	GS/GS/Wire	max. 350°C											

Explained Article No.:



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

Standard type 21w:

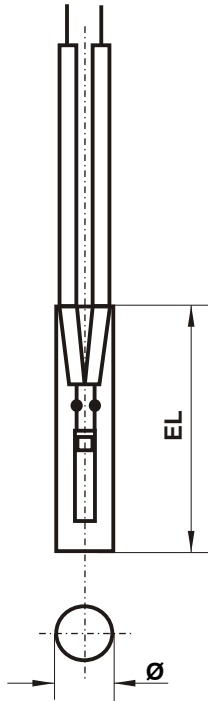
ØxEL	Article-No.: 1xPt100	Article-No.: 2xPt100
Ø 6x50	21w.6x50.3.1Pt-2.0.1SS	21w.6x50.3.2Pt-2.0.1SS
Ø 6x100	21w.6x100.3.1Pt-2.0.1SS	21w.6x100.3.2Pt-2.0.1SS
Ø 6x150	21w.6x150.3.1Pt-2.0.1SS	21w.6x150.3.2Pt-2.0.1SS
Ø 6x50	21w.6x50.3.1Pt-2.0.1TT	21w.6x50.3.2Pt-2.0.1TT
Ø 6x100	21w.6x100.3.1Pt-2.0.1TT	21w.6x100.3.2Pt-2.0.1TT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

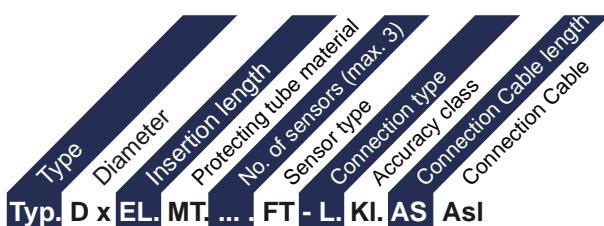
Cable resistance thermometer melted into FEP Type 250

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:



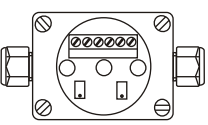
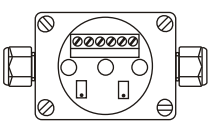
Accuracy acc. EN IEC 60751: Pt100 / Pt1000 / Ni1000: 0 - Class B = Standard ($t = \pm 0,3 + 0,005 \times t $) 1 - Class A = ½ Class B ($t = \pm 0,15 + 0,002 \times t $) 2 - 1/3 Class B = 1/3 ($t = 1/3(\pm 0,3 + 0,005 \times t)$)		Sensor type (FT): Pt - Pt100 PtM - Pt1000 Ni - Ni1000
Connecting cable (Asl): TT - Teflon max. 205°C GGD - GS/GS/Wire max. 350°C <small>(GGD = glass silk + glass silk + wire shielding)</small>		Diameter (D): 3 mm 4 mm 5 mm ...
Explained Article No.:  Typ. D x EL. MT. ... FT - L. Kl. AS Asl		

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:

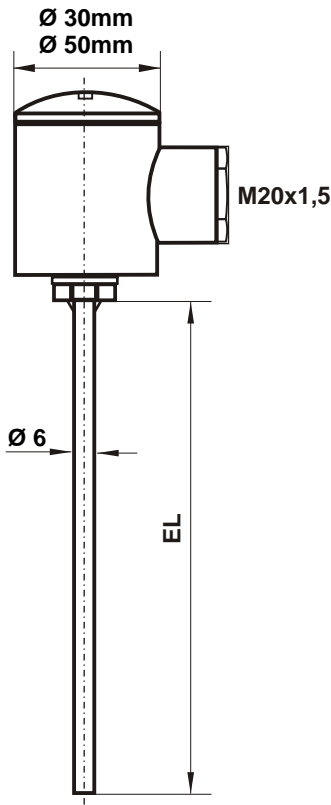
Cable length available as required

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

Resistance thermometer with BR-head Type 212

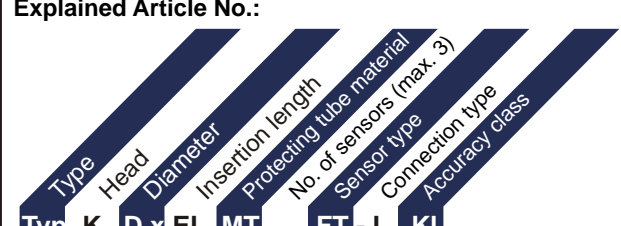
Technical data (standard construction):

Connecting head:	Form BR
Protection tube material:	1.4571 (316 SS), 6 mm diam.
Measuring insert:	none
Process connection:	none
Sensor type:	1 x Pt100
Measuring range:	-40..+200 °C
Tolerance class:	Class B
Connection type:	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): Pt - Pt100 PtM - Pt1000 Ni - Ni1000 NTC - NTC PTC - PTC ...
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Tube diam. (D): 3 mm 6 mm 9 mm	Explained Article No.: 
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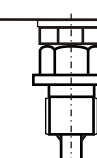


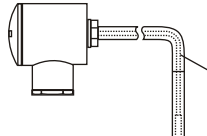
Protecting tube materials (MT): 3 - Stainless steel max. 550°C

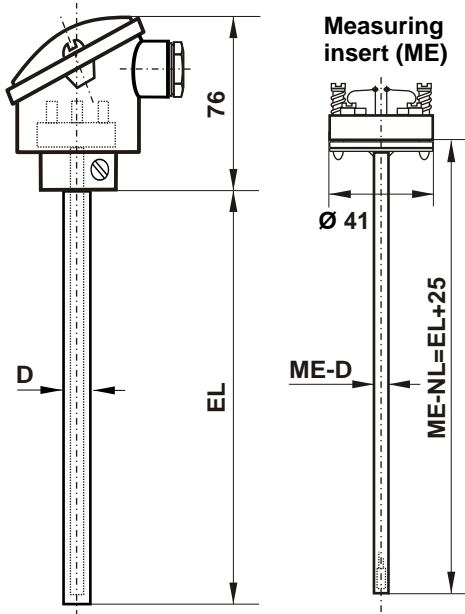
Standard type 212:

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 G1/2 1/4NPT 1/2NPT		Thread: G1/4 G1/2 1/4NPT 1/2NPT		Thread: G1/4 G1/2 1/4NPT 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):

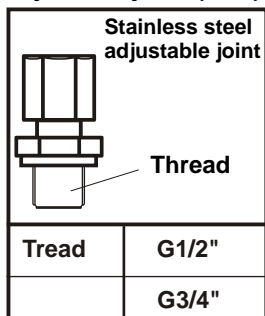
Connecting head:	Form B, light metal Acc. To DIN 43729 With M20x1,5 cable gland
Protection tube material:	1.4571 (316 SS), 9 mm diam.
Measuring insert:	Stainless steel, 6 mm diam.
Process connection:	None
Sensor type:	1 x Pt100
Measuring range:	-40....+500 °C
Tolerance class:	Class B
Connection type: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

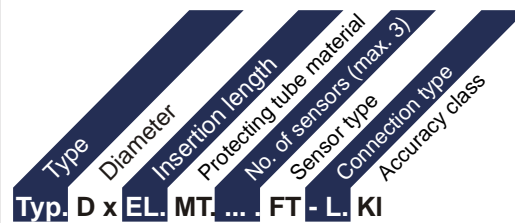
Pt	- Pt100
PtM	- Pt1000
Ni	- Ni1000
NTC	- NTC
PTC	- PTC
...	

Stainless steel adjustable joint (KVV):


Tread	G1/2"
	G3/4"

Stube diam. (D):

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





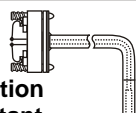
Explained Article No.:

Typ. D x EL. MT. ... FT - L. KI
Protecting tube materials (MT):

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

Standard type 201:

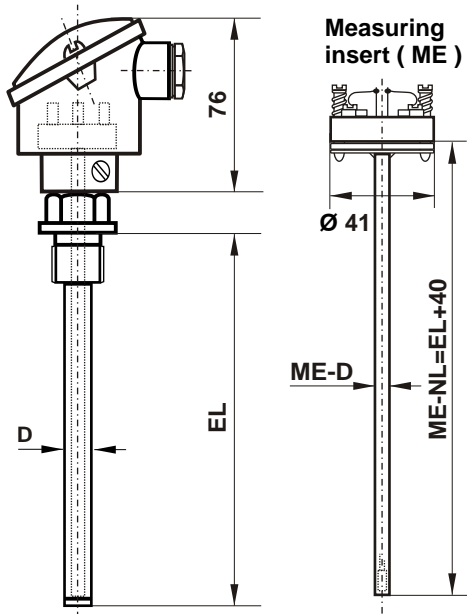
ØxEL	Weight in kg	Nominal length of measuring insert ME-NL	Article No.. 1xPt100	Article No. 2xPt100
Ø 9x100	0,64	135	201.9x100.3.1Pt-2.0	201.9x100.3.2Pt-2.0
Ø 9x160	0,79	195	201.9x160.3.1Pt-2.0	201.9x160.3.2Pt-2.0
Ø 9x200	0,84	235	201.9x200.3.1Pt-2.0	201.9x200.3.2Pt-2.0
Ø 9x250	0,89	285	201.9x250.3.1Pt-2.0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

Options:

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

Resistance thermometer, screw in type Typ 211

Technical data (standard construction):



Connecting head:	Form B, light metal Acc. To DIN 43729 With M20x1,5 cable gland
Protection tube material:	1.4571 (316 SS), 9 mm diam.
Measuring insert:	Stainless steel, 6 mm diam.
Process connection:	Thread G 1/2 A
Sensor type:	1 x Pt100
Measuring range:	-40...+500 °C
Tolerance class:	Class B
Connection type:	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): Pt - Pt100 PtM - Pt1000 Ni - Ni1000 NTC - NTC PTC - PTC ...
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tube diam. (D): 6 mm 9 mm 12 mm 15 mm ...	Explained Article No.:
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Protecting tube materials (MT): 1- Brass max. 400°C 3- Stainless steel max. 550°C ...	Process connection (EG): - M18x1,5 - 1/2NPT - G1/4" - 1/4NPT - G1/2" ...
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Standard type 211:

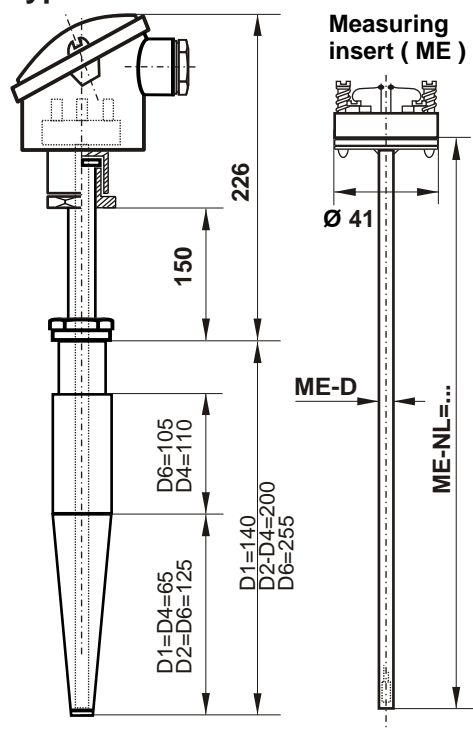
ØxEL	Weight in kg	Nominal length of measuring ME-NL	Article No. 1xPt100	Article No. 2xPt100
Ø 9x100	0,65	140	211.9x100.3.1Pt-2.0.G1/2	211.9x100.3.2Pt-2.0.G1/2
Ø 9x160	0,80	200	211.9x160.3.1Pt-2.0.G1/2	211.9x160.3.2Pt-2.0.G1/2
Ø 9x200	0,85	240	211.9x200.3.1Pt-2.0.G1/2	211.9x200.3.2Pt-2.0.G1/2
Ø 9x250	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 Mineral insulated metal sheathed	1/2 IEC	1/3 IEC
		 MU-I 4..20mA	 MU-U 0..10V	 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>Accuracy acc. EN IEC 60751:</p> <p>Pt100 / Pt1000 / Ni1000:</p> <p>0- Class B = Standard ($t = \pm 0,3 + 0,005 \times t$)</p> <p>1- Class A = 1/2 Class B ($t = \pm 0,15 + 0,002 \times t$)</p> <p>2- 1/3 Class B = 1/3 ($t = 1/3(\pm 0,3 + 0,005 \times t)$)</p>	<p>Sensor type (FT):</p> <p>Pt - Pt100</p> <p>PtM - Pt1000</p> <p>Ni - Ni1000</p> <p>NTC - NTC</p> <p>PTC - PTC</p> <p>...</p>
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<p>tube diam. (D):</p> <p>6 mm</p> <p>9 mm</p> <p>12 mm</p> <p>15 mm</p> <p>...</p>	<p>Explained Article No.:</p> <p>Typ. D. EL. MT. ... FT - L. KI. EG</p>
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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:

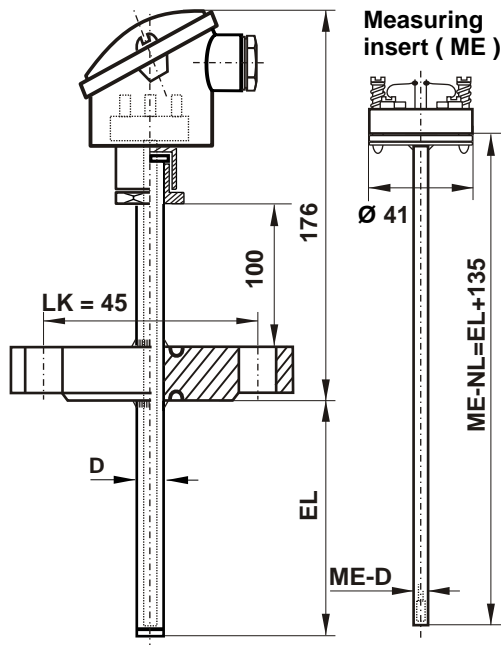
Type	Protection tube length	Length conical	Protection tube diam.	Nominal length of measuring insert ME-NL	Article No. 1xPt100
W-D1 L	140	65	24	315	200.D1.140.19.1Pt-2.0
W-D2 L	200	125	24	375	200.D2.200.19.1Pt-2.0
W-D4 L	200	65	24	375	200.D4.200.19.1Pt-2.0
W-D6 L	255	125	30	430	200.D6.255.19.1Pt-2.0

Options:

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

Resistance thermometer, flanged Typ 221F

Technical data (standard construction):



Connecting head:	Form B, light metal Acc. To DIN 43729 With M20x1,5 cable gland
Extension neck:	100 mm
Protection tube material:	1.4571 (316 SS), 9 mm diam.
Measuring insert:	Stainless steel, 6 mm diam.
Process connection:	Flange
Sensor type:	1 x Pt100
Measuring range:	-40...+500 °C
Tolerance class:	Class B
Connection type:	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): Pt - Pt100 PtM - Pt1000 Ni - Ni1000 NTC - NTC PTC - PTC ...
---	---

tube diam. (D): 6 mm 9 mm 12 mm 15 mm ...	Explained Article No.:
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Protecting tube materials (MT): 3- Stainless steel (1.4571) max. 550 °C	Flange (FL): 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
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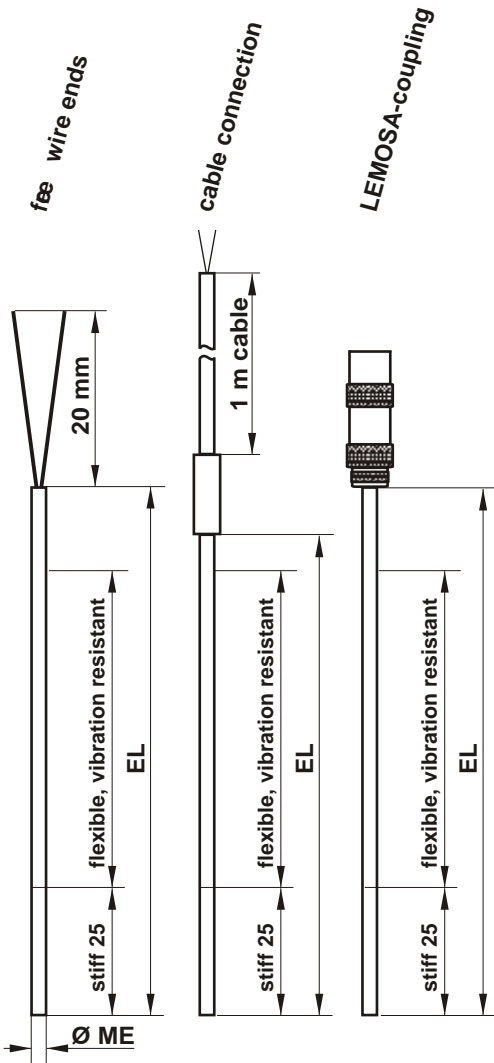
Standard type 221F:

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 Mineral insulated metal sheathed	1/2 IEC	1/3 IEC
		 MU-I 4..20mA	 MU-U 0..10V	 vibration resistant	1/2 tolerance class B	1/3 tolerance 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:


Accuracy acc. EN IEC 60751: Pt100 / Pt1000: 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
Tube diameter (D): 0,5 mm 1,0 mm 1,5 mm 3,0 mm 6,0 mm 8,0 mm ...	Free wire ends or coupling (AS): fE - free wire ends LKS1 - LEMOSA-thermo-coupling, Size 1	
Compensation cable (AS): selectable length in m PP - PVC -30..+ 80°C selectable length in m SS - Silicone -50..+200°C selectable length in m TT - Teflon max. 205°C selectable length in m GGD - GS/GS/Wire max. 350°C (GGD = glass silk + glass silk + wire shielding)		
Tube material (MT): 3- 1.4571 max. 550°C ...		

* MIMS (Mineral insulated metal sheathed)

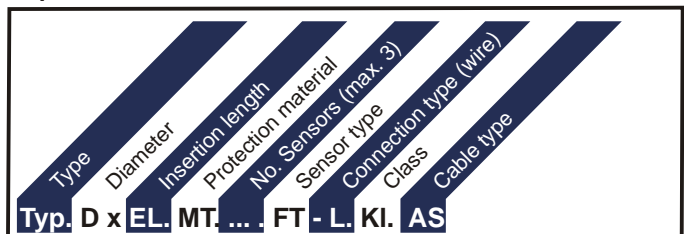
Standard type 21M:

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 G1/2 1/4NPT 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.

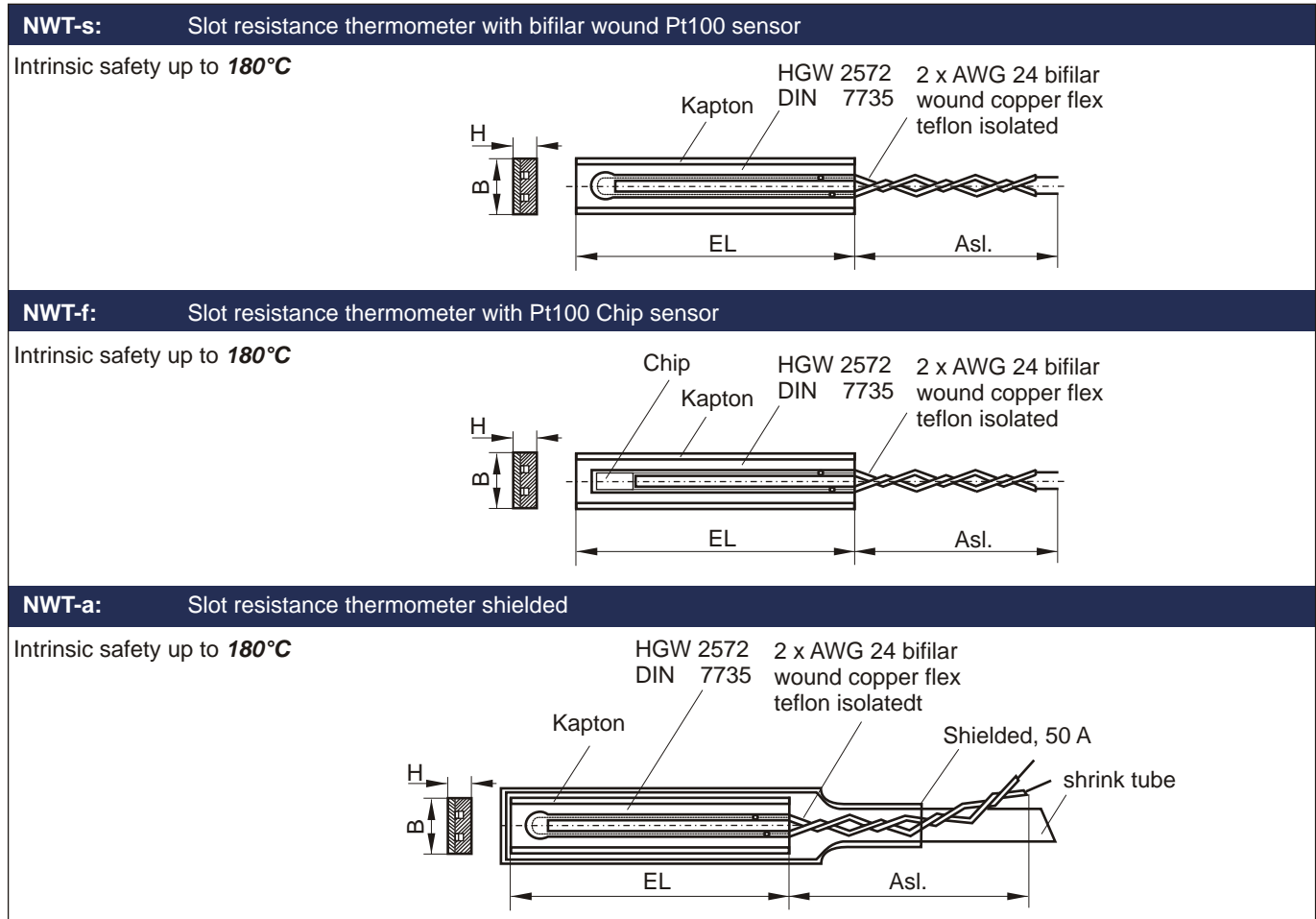
It is possible to integrate the NWT into generator windings on up to 5 m long HGW elements. NWT sensors generally run through a single unit test procedure and become delivered if required with a certificate according to EN 10204.

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 mm	Width mm	Thickness 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:

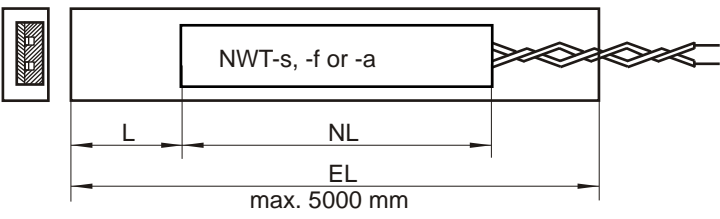
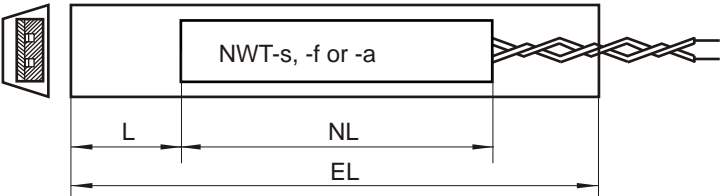
40-250	6-12	1,6-3,0	NWT-f. 40-250	31,70	NWT-f. 40-250	36,70	NWT-f. 40-250	41,70
251-400	6-12	1,6-3,0	NWT-f.251-400	37,30	NWT-f.251-400	42,30	NWT-f.251-400	47,30
401-750	6-12	2,0-3,0	NWT-f.401-750	40,10	NWT-f.401-750	45,10	NWT-f.401-750	50,10
751-950	6-12	2,0-3,0	NWT-f.751-950	43,90	NWT-f.751-950	48,90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

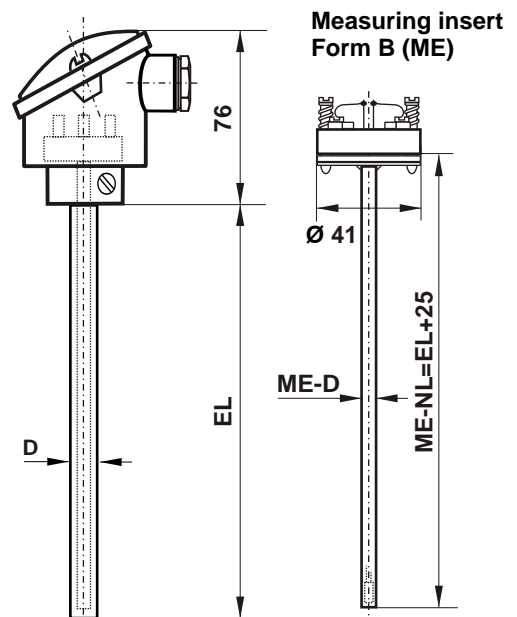
Special Construction:

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

Options:

Description
3kV-Test voltage
Double NWT

Thermocouple, tip in type Type 301



Technical data (standard construction):

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

Protection tube material: 1.4571 (316 SS), 9 mm diam. or 1.4762 (SS-HT), 15 mm diam.

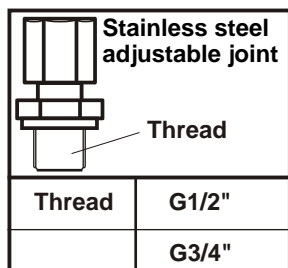
Measuring insert: Stainless steel, 6 mm diam.
Thermopair isolated with ceramic

Process connection: None

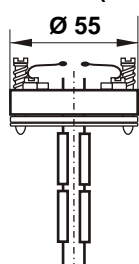
Sensor type: NiCr-Ni (type K)

Measuring range: 0..+800 °C

Stainless steel adjustable joint (KVV):



Measuring insert Form A (ME)



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
		...

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:

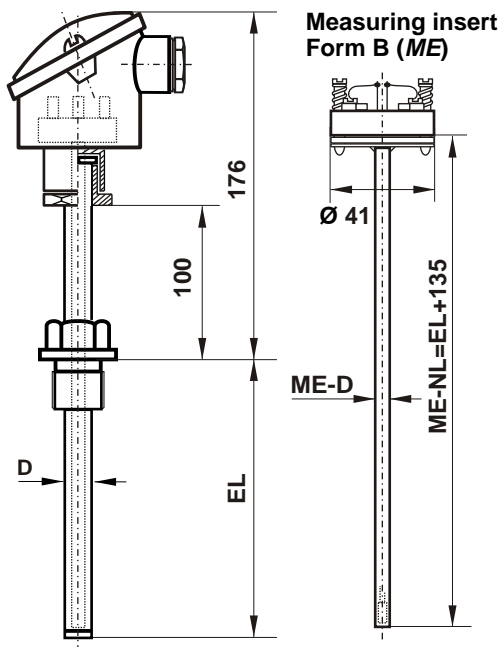
ØxEL	Weight in kg	Nominal length or measuring insert ME-NL	Article No. 1 x K	Article No. 2 x K
Ø 9x100	0,65	135	301. 9x 100. 3.1K	301. 9x 100. 3.2K
Ø 9x160	0,80	195	301. 9x 160. 3.1K	301. 9x 160. 3.2K
Ø 9x200	0,85	235	301. 9x 200. 3.1K	301. 9x 200. 3.2K
Ø 9x250	0,90	285	301. 9x 250. 3.1K	301. 9x 250. 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:

Transmitter-I MU-I 4..20mA	Transmitter-U MU-U 0..10V	Measuring insert MIMS Mineral insulated metal sheathed vibration resistant
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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):

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

Protection tube diam. (D):

6 mm
9 mm
12 mm
15 mm
...

Process connection (EG):

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



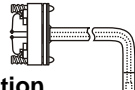

Protecting tube materials (MT):

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:

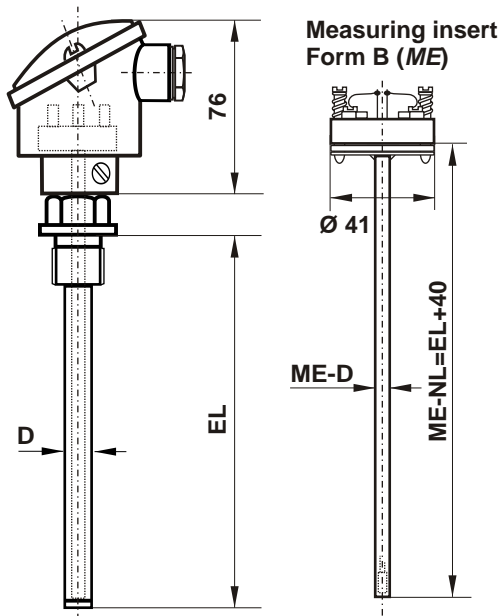
ØxEL	Weight in kg	Nominal length or measuring insert ME-NL	Article No. 1 x K	Article No. 2 x K
Ø 9x100	0,65	140	321.9x100.3.1L.G1/2	321.9x100.3.2L.G1/2
Ø 9x160	0,80	200	321.9x160.3.1L.G1/2	321.9x160.3.2L.G1/2
Ø 9x200	0,85	240	321.9x200.3.1L.G1/2	321.9x200.3.2L.G1/2
Ø 9x250	0,90	290	321.9x250.3.1L.G1/2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

Options:

Transmitter-I  MU-I 4..20mA	Transmitter-U  MU-U 0..10V	Measuring insert MIMS Mineral insulated metal sheathed  vibration resistant	
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Special constructions on request

Thermocouple, tip in type Type 311



Technical data (standard construction):

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

Available variations:

Sensor type (FT):		Protection tube diam. (D): 6 mm 9 mm 12 mm 15 mm ...
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	...		

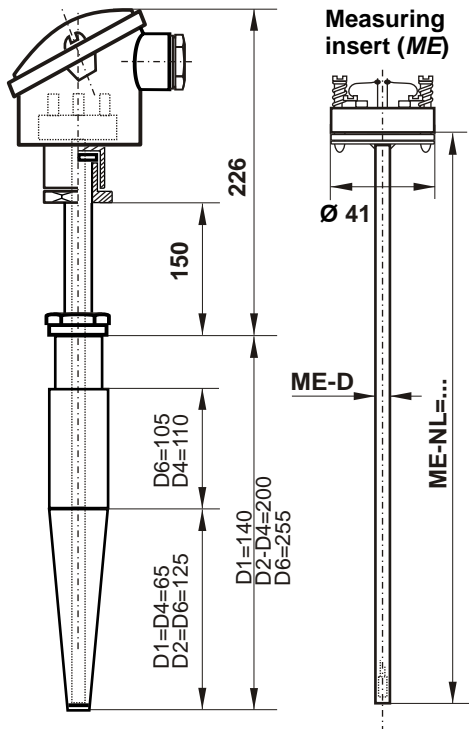
Standard type 311:

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:

Transmitter-I MU-I 4..20mA	Transmitter-U MU-U 0..10V	Measuring insert MIMS Mineral insulated metal sheathed vibration resistant	 Typ. D x EL. MT. ... FT. EG
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**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>tube diam. (D):</p> <p>6 mm 9 mm 12 mm 15 mm ...</p>	<p>Explained Article No.:</p>
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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

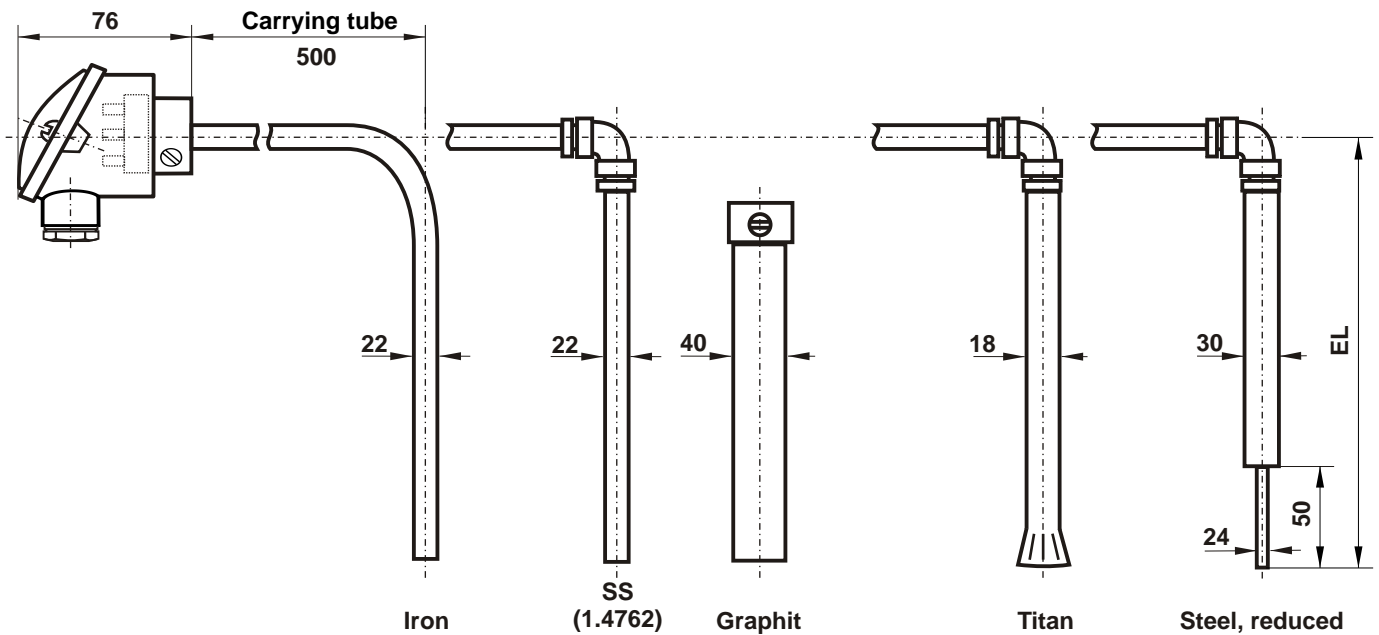
Standard type 300:

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>MU-I 4..20mA</p>	<p>MU-U 0..10V</p>	<p>vibration resistant, flexible</p>

**Thermocouple, angle type
Typ 310w**



Available variations:

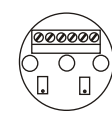
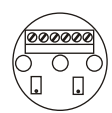
Protection tube diam. (D): 18 mm 22 mm 30 mm ...	Protecting tube materials (MT): 8- SS (1.4762) max. 1200°C 16- Iron max. 550°C 17- Graphit max. 1300°C 18- Titan max. 1200°C 21- 1.4821 max. 1200°C ...	Sensor type (FT): L- Fe-CuNi max. 600°C J- Fe-CuNi max. 600°C K- NiCr-Ni max. 1200°C N- NiCrSi-NiSi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

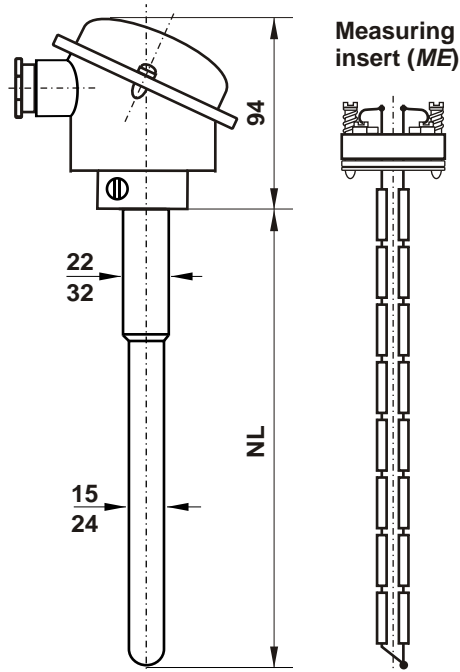
Options:

Transmitter-I  MU-I 4..20mA	Transmitter-U  MU-U 0..10V
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Special constructions on request

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



Technical data (standard construction):

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

Available variations:

Sensor type (FT):

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

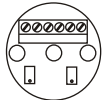
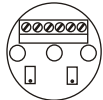
Protecting tube materials (MT):


53-	C 530	max. 1500°C
61-	C 610	max. 1600°C
71-	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 Typ C 610 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 Typ C 710 gastight 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 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 Typ C 710 gastight 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

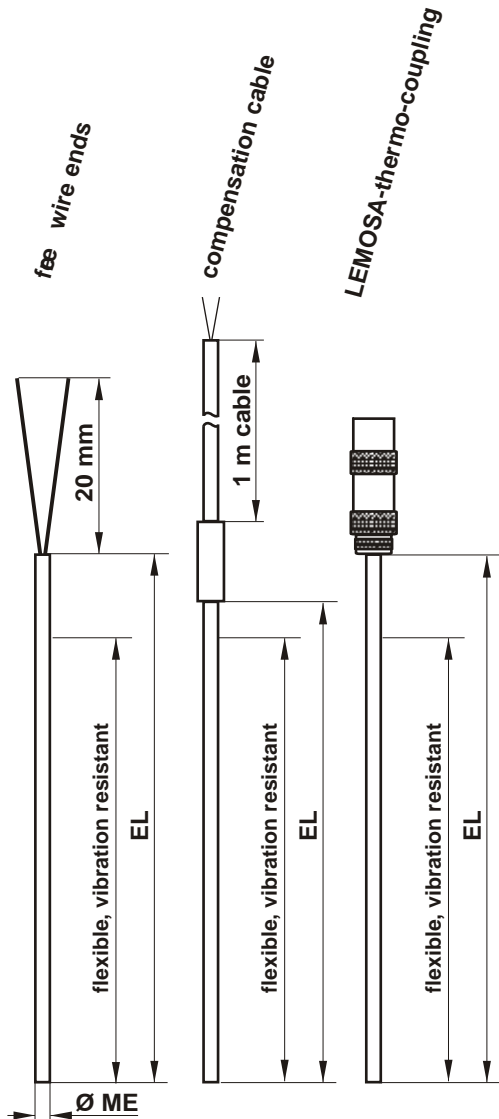
Options:

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

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

Special constructions on request

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	PP - PVC	-30..+ 80°C
selectable length in m	SS - Silicone	-50..+200°C
selectable length in m	TT - Teflon	max. 205°C
selectable length in m	GGD - 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)

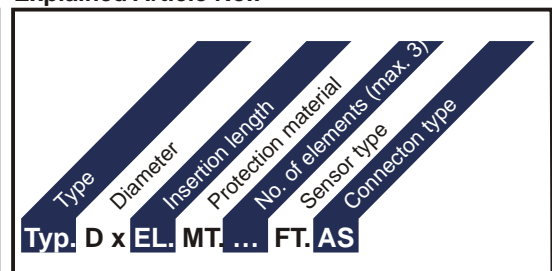
Standard Type 31M:

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:

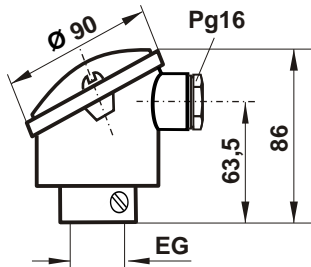
1/2 IEC	1/3 IEC	Stainless steel adjustable joint Thread	LEMOSA-thermo-plug Size 1 For the sensor type see table above (FT) 100LS.FT.9x34,5.2
1/2 Class B	1/3 Class B		

Explained Article No.:



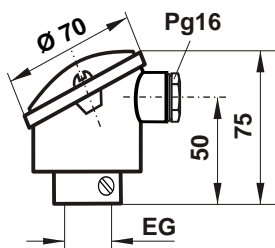
Connecting heads Type 15

Connecting head form A, light metal, IP54



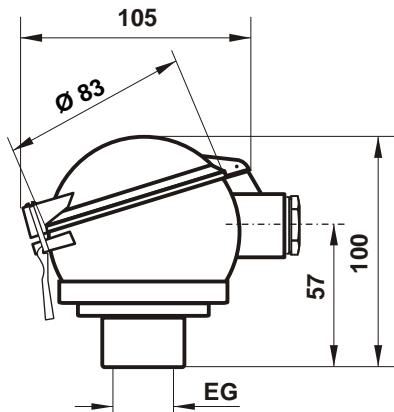
Temperature in °C	Head-connection (EG)	Article No.
-20..+100 °C	22,8 mm	15AL.22,8.Alu.PG16
-20..+100 °C	26,5 mm	15AL.26,5.Alu.PG16
-20..+100 °C	32,5 mm	15AL.32,5.Alu.Pg16

Connecting head form B, light metal, IP54



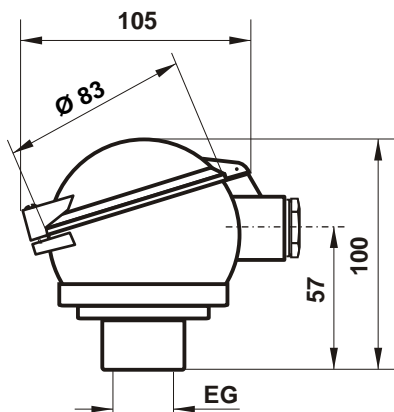
Temperature in °C	Head-connection (EG)	Article No.
-20..+100 °C	15,8 mm	15BL.15,5.Alu.PG16
-20..+100 °C	M24 x 1,5	15BL.M24.Alu.PG16

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



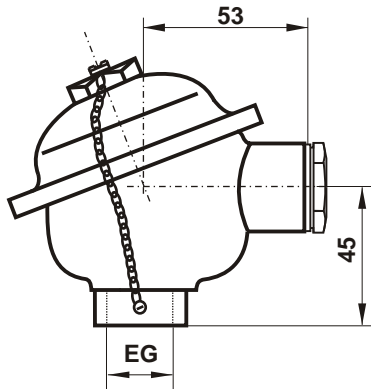
Temperature in °C	Head-connection (EG)	Article No.
-20..+100 °C	M24 x 1,5	15BUS.M24.Alu.PG16

Special constructions on request

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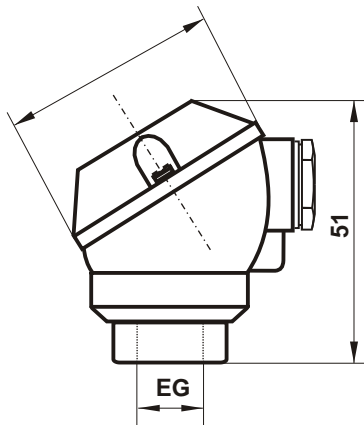
Connecting heads Type 15

Connecting head form GG, cast iron, IP54



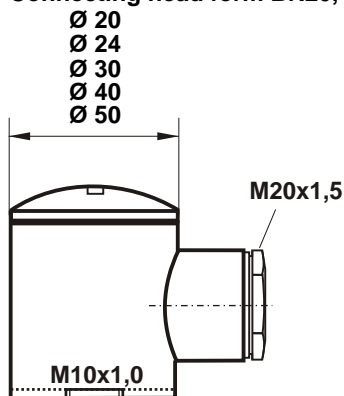
Temperature in °C	Head-connection (EG)	Article No.
-20..+100 °C	15,5 mm	15BL.15,5.GG.PG16
-20..+100 °C	M24 x 1,5	15BL.M24.GG.PG16

Connecting head form J, light metal, IP54



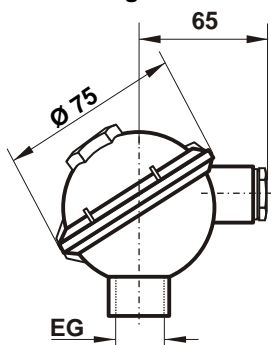
Temperature in °C	Head-connection (EG)	Article No.
-20..+100 °C	M10 x 1	15J.M10x1.Alu.PG16

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



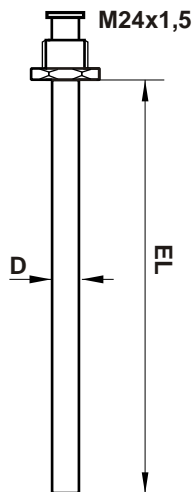
Temperature in °C	Head-connection (EG)	Article No.
-20..+100 °C	M24 x 1,5	15BL.M24x1,5.KUN.PG16

Special constructions on request

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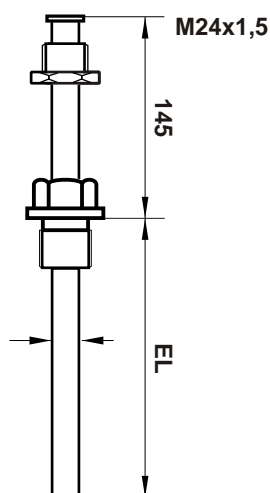
Protecting tubes Type 100

Protecting tube, form A



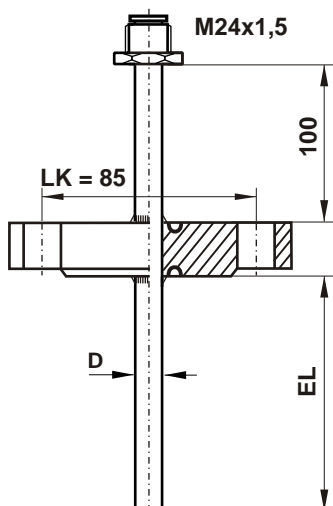
Technische-Daten	Nominal length (EL)	Article No.
Protecting tube material: 1.4571 (max. 400 °C) Process connection: None	Ø 9x 100	100A.9x100.3
	Ø 9x 160	100A.9x160.3
	Ø 9x 200	100A.9x200.3
	Ø 9x 250	100A.9x250.3
	Ø 15x 500	100A.15x500.3
	Ø 15x 710	100A.15x710.3
	Ø 15x1000	100A.15x1000.3

Protecting tube, form B



Technical data	Nominal length (EL)	Article No.
Protection tube material: 1.4571 (max. 550°C) Process connection: G1/2	Ø 9x 100	100B.9x100.3
	Ø 9x 160	100B.9x160.3
	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



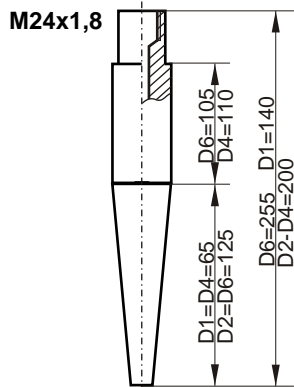
Technical data	Nominal length (EL)	Article No.
Protection tube material: SS 1.4571 (max. 550°C)	Ø 9x 100	100F.9x100.3
	Ø 9x 160	100F.9x160.3
	Ø 9x 200	100F.9x200.3
Process connection: Flange (FL): A- C DN 25 PN 40, DIN 25 10 B- C DN 40 PN 40, DIN 25 10 C- DN 1" ANSI 150 lbs RF D- DN 1/2" ANSI 150 lbs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

Special constructions on request

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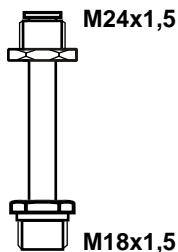
Protecting tubes Typ 100

Protecting tube, weld in type, form D



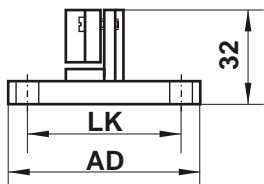
Technical data	Length in total	Length conical part	Diameter Outside	Article No.
Protecting tube material: 1.4571 (max. 550°C) Process connection: for welded in	140 mm	65 mm	24 mm	100.D1K
	200 mm	125 mm	24 mm	100.D2K
	255 mm	125 mm	30 mm	100.D6K
Protecting tube material: 1.7335 (max. 550°C) Process connection: 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
Protecting tube material: 1.7380 (max. 550°C) Process connection: 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



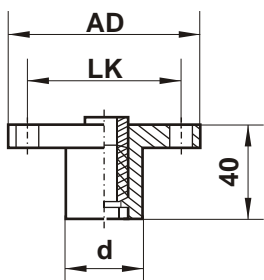
Technical data	Length	Prozess connection	Article No.
Protection tube material: 1.4571 (max 400°C)	165 mm	M18 x 1,5	100GR.165.M18x1,5

Flange, DIN EN 43 734, adjustable



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

Counter flange DN 15



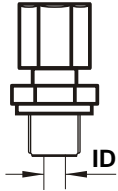
Material	Pipe diameter in mm	Dimensions		Article No.
		AD	LK	
Steel, not painted	10	75	55	100BF.0911
	15	90	70	100BF.0912
	26	90	70	100BF.0913

Special constructions on request

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Accessories and termination sockets Type 100

Adjustable thread joint

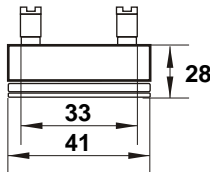


Technical data	Inner diameter (ID)	Article No.
Material: Steel Thread: G1/4"	6 mm	100.6.G1/8
Material: Steel Thread: G1/2"	6 mm	100.6.G1/6
	8 mm	100.8.G1/4
	10 mm	100.9.G1/2
Material: Steel Thread: G3/4"	6 mm	100.6.G1/6
	8 mm	100.8.G1/4
	10 mm	100.9.G1/2
	15 mm	100.9.G1/2

Options:

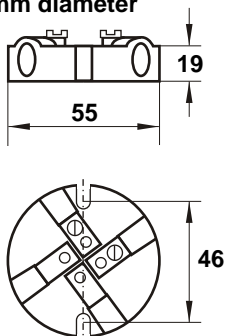
Thread	Stainless steel	Stainless steel
Fixing ring	Teflon	Stainless steel

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

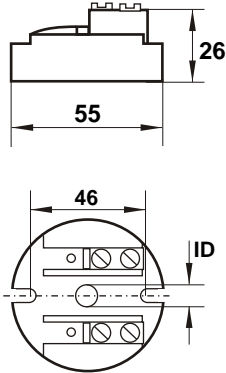
Termination socket for connection head form A for non-precious thermocouples up to 3 mm diameter



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

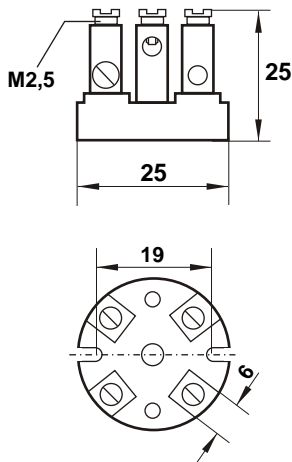
Termination sockets Type 100

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

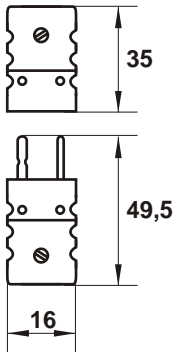


Center hole diameter in mm	Quantity of terminations	For thermo wires up to ... mm diameter	Article No.
with screwed terminations	2	1,0	100BK.6201
	4	1,0	100BK.6401
with soldering connector	2	1,0	100BK.6101
	4	1,0	100BK.6101

Special constructions on request

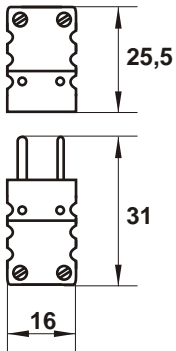
Plug connectors Typ 100S, 100M, 100L

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



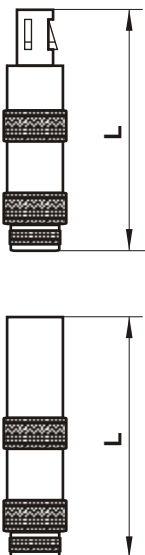
Type	Sensor	Colour	Size (LxB)	Article No.
coupling	Fe-CuNi "J"	black	35 x 25 mm	100SK.J.SW
coupling	NiCr-Ni "K"	yellow/green	35 x 25 mm	100SK.K.GE/GR
coupling	Pt10Rh-Pt "S"	white	35 x 25 mm	100SK.S.WS
plug	Fe-CuNi "J"	black	49,5 x 25 mm	100SS.J.SW
plug	NiCr-Ni "K"	yellow/green	49,5 x 25 mm	100SS.K.GE/GR
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 Ltg.-Ø 4,2 mm	100LS.9x34,5.2
0	34,5 mm	4-poles Ltg.-Ø 4,2 mm	100LS.9x34,5.4
2	50 mm	2-poles Ltg.-Ø 4,2 mm	100LS.15x50.2
2	50 mm	4-poles, size II Ltg.-Ø 4,2 mm	100LS.15x50.4

LEMOSA-coupling

Diameter	Length (L)	Description	Article No.
0	35 mm	2-poles Ltg.-Ø 4,2 mm	100LK.9x34,5.2
0	35 mm	4-poles Ltg.-Ø 4,8 mm	100LK.9x34,5.4
2	52,5 mm	4-poles 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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Fon 03329 61 25 24 · Fax 03329 61 51 19 · info@senpro-sensortechnik.de

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	

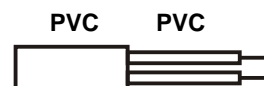
Compensation cable type 3

size mm ²	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

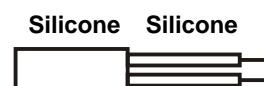
PVC/PVC

Size in mm ²	Article No.
2x0,50	2.2x050.PP
4x0,50	2.4x050.PP



Teflon/Silicone

2x0,35	2.2x035.TS
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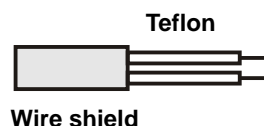
Teflon/Teflon

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



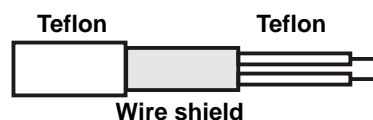
Teflon/Wire shield

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



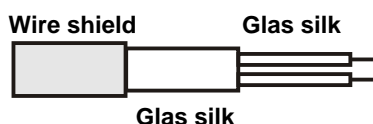
Teflon/Wire shield/Teflon

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

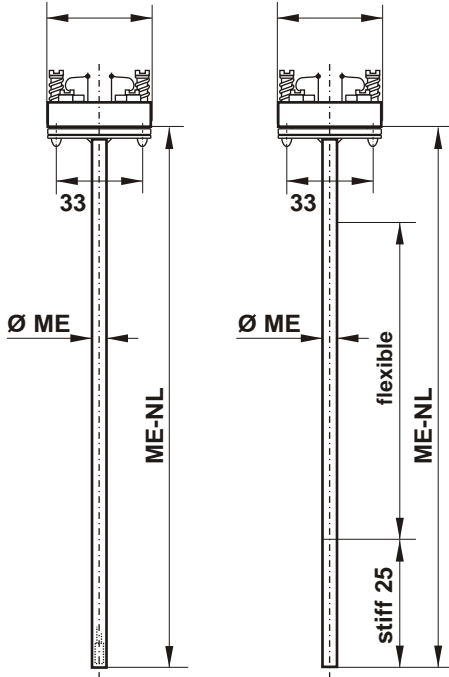
Measuring inserts for resistance thermometers
Type 20, Ø 6 mm und Ø 8 mm

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:

<p>Accuracy acc. EN IEC 60751:</p> <p>Pt100 / Pt1000 / Ni1000:</p> <p>0- Class B = Standard ($t = \pm 0,3 + 0,005 \times t$)</p> <p>1- Class A = 1/2 Class B ($t = \pm 0,15 + 0,002 \times t$)</p> <p>2- 1/3 Class B = 1/3 ($t = 1/3(\pm 0,3 + 0,005 \times t)$)</p>	<p>Sensor type (FT):</p> <p>Pt - Pt100</p> <p>PtM - Pt1000</p> <p>Ni - Ni1000</p> <p>NTC - NTC</p> <p>PTC - PTC</p> <p>...</p>
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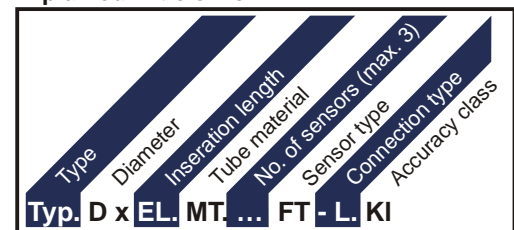
<p>Head Connection:</p> <p>Form B- Sockel Ø 41 mm, ME Ø 6 mm</p> <p>Form A- Sockel Ø 55 mm, ME Ø 8 mm</p>
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ME-NL	Article No. 1xPt100	Article No. 2xPt100
125	20_x125.3.1Pt-2.0	20_x125.3.2Pt-2.0
185	20_x185.3.1Pt-2.0	20_x185.3.2Pt-2.0
225	20_x225.3.1Pt-2.0	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

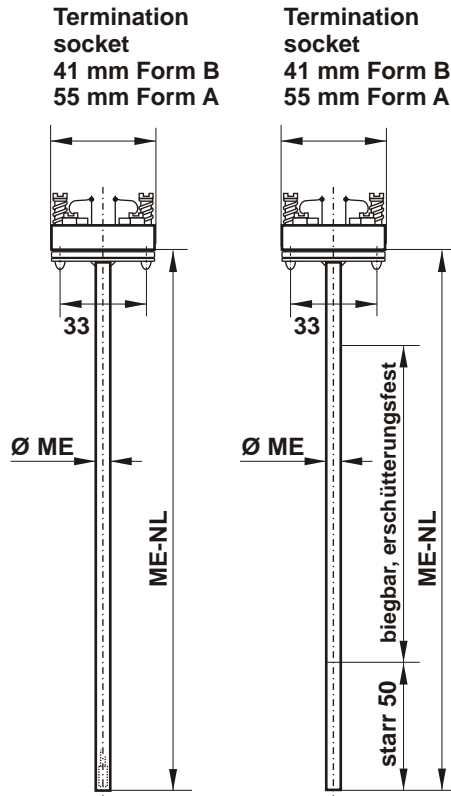
Options:

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

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

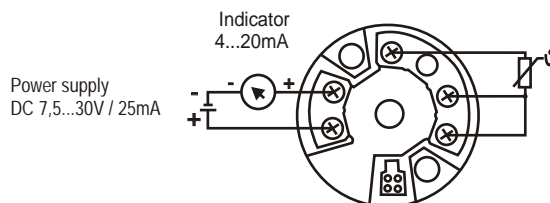
Special constructions on request

Temperature transmitters

Typ MU-P T03 J

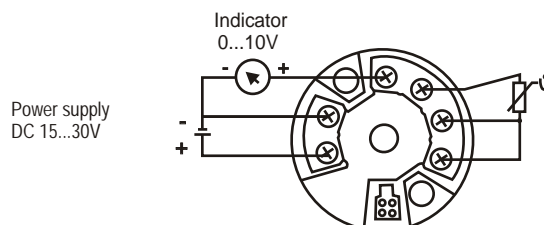
Technical data for MU 4...20 mA

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



Technical Data for MU 0...10 V

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



Transmitter head mount type

Price in €

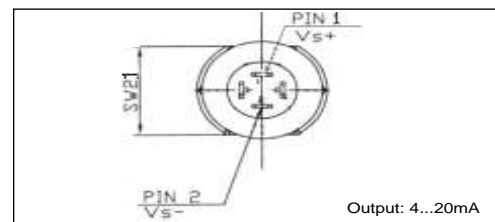
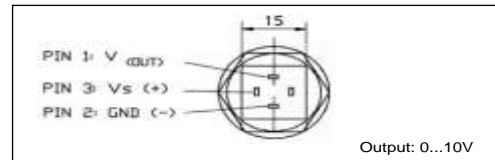
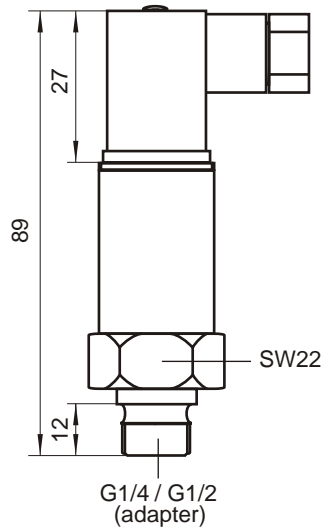
MU-P T03 J-I

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 Al₂ O₃
piezoresistive
 Installation:.....directly on pressure pipe
 Parts touching material:.....Ceramic Al₂ O₃
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_A >10kOhm/ <100nF
4...20mA 2-wire connection
R_A < $\frac{\text{supply}}{0,02 \text{ A}}$ [Ohm]
 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

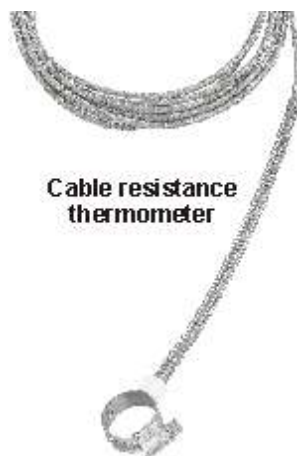
Type	Measuring range	Output	Price in €
SHD- U 1	0-1bar	0 ... 10 V	132,00
SHD- U 2,5	0-2,5bar	0 ... 10 V	132,00
SHD- U 6	0-6bar	0 ... 10 V	132,00
SHD- U 10	0-10bar	0 ... 10 V	132,00
SHD- U 16	0-16bar	0 ... 10 V	132,00
SHD- U 25	0-25bar	0 ... 10 V	132,00
SHD- U 40	0-40bar	0 ... 10 V	132,00

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

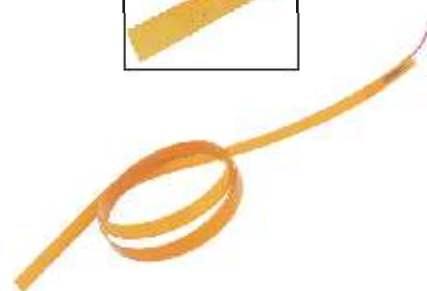
Special Temperature Sensors



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

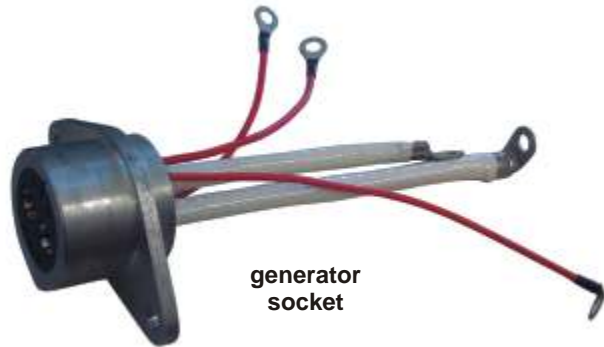


surface heater for
the laboratory

Special Railway Components



**generator power connector
type 601**



**generator
socket**



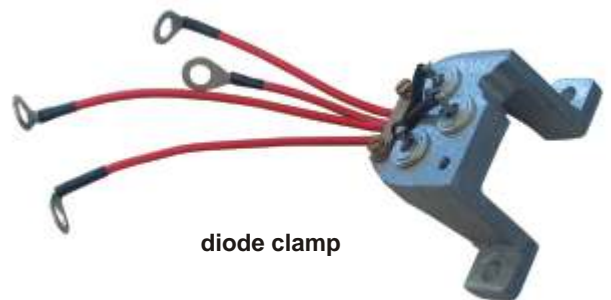
**cable sensor with
perforated protecting tube**



**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
Ruhlsdorfer Straße 95
D-14532 Stahnsdorf

Tel: +49 (0) 3329 61 25 24
Fax: +49 (0) 3329 61 51 19
info@senpro-sensortechnik.de

