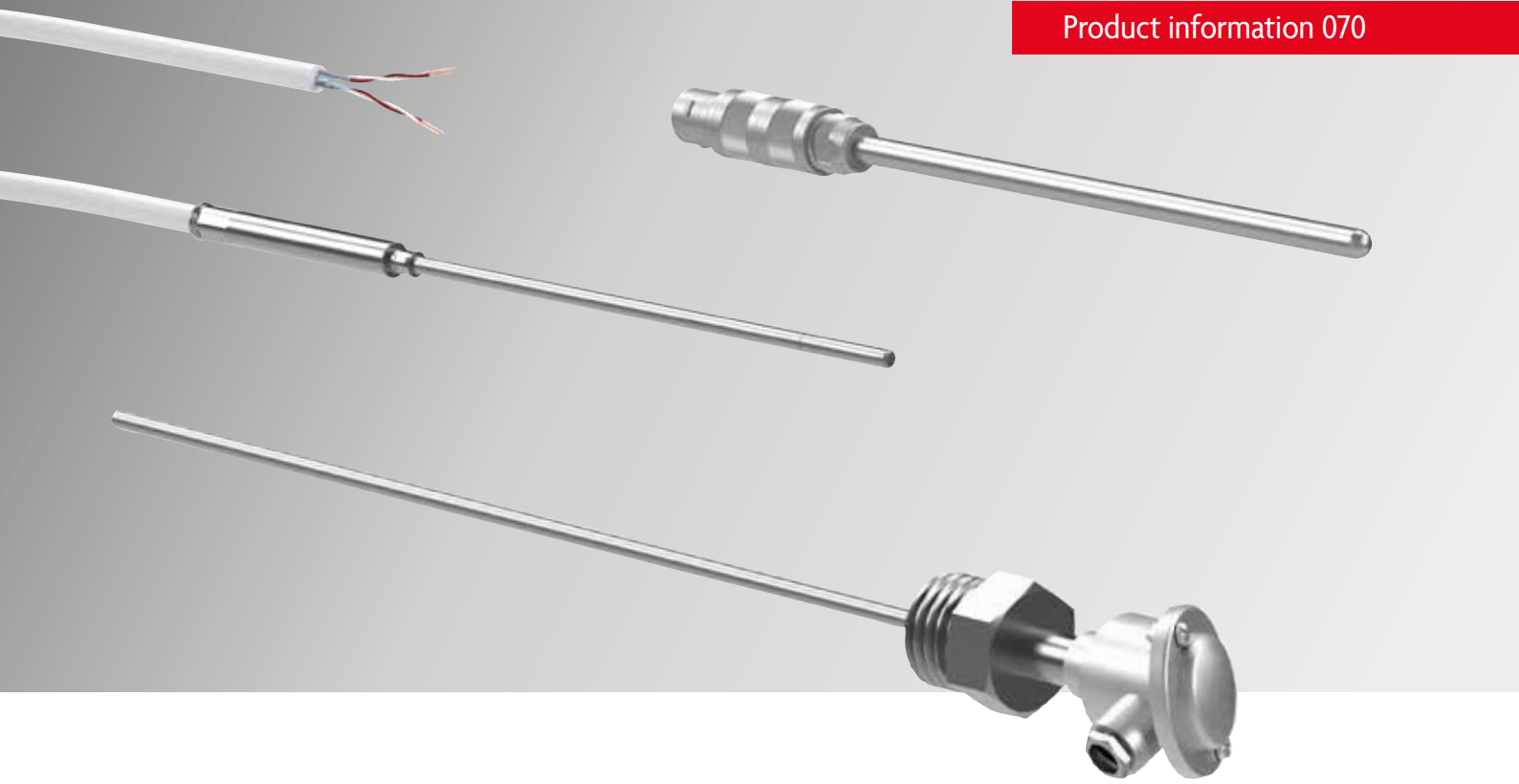


RÖSSEL MESSTECHNIK

Consultation. Solution. Innovation.

SHEATHED RESISTANCE THERMOMETER

FOR INDUSTRY, LABORATORIES AND RESEARCH

Sheathed resistance thermometers offer the same mechanical properties as sheathed thermocouples. They are bendable, pressure-resistant, customizable and available in small diameter gradations. Sheathed resistance thermometers are used in temperatures ranging from -196 °C to +600 °C

They offer the following advantages:

- Small bending radius
- Suitable for high pressures and vacuums
- Two, three or four-wire circuit available

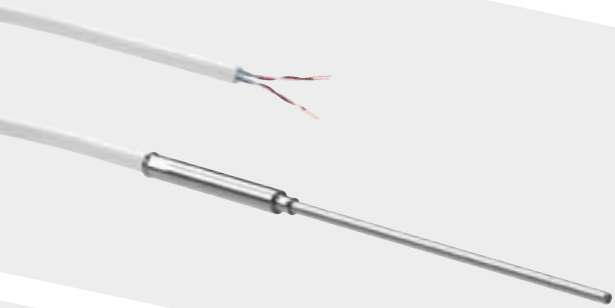
Mineral-insulated sheathed cables are used for supply. The supply wires are enclosed in a compact insulation made of MgO and encased in a metal sheath made of stainless steel (material no: 1.4541). The compact insulation fixes the wires securely so that no damage can occur due to strong vibrations or high bending loads. Short circuits between the wires or between the wire and the sheath are ruled out as a result. The minimum bending radius depends on the diameter of the sheathed cable. The guideline value is 5 to 7 times the sheath diameter. The temperature-sensitive length is 5 to 30 mm at the tip, depending on the measuring resistor used. The resistance thermometers cannot be bent in this area. Flat form resistors are used as measuring resistors. The use of wire-wound or glass measuring resistors is also possible.

SPECIAL ADVANTAGES:

- Particularly shockproof
- Quick to respond
- Impressive bending properties
- Mechanically stable

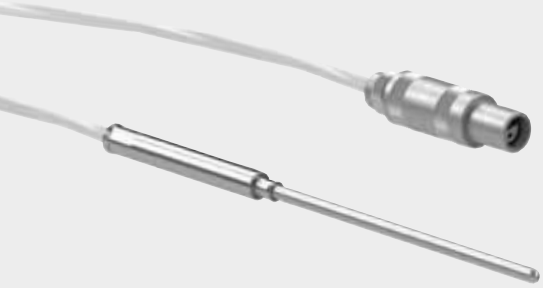
WA VERSION - the basic option

Basic sheath design for a resistance thermometer The length of the free connection ends is 20 mm. The sheath is moisture tight. Tmax for socketing: 350 °C. In the standard version, the sheath diameter is the same throughout. Both split and reinforced versions are available on request. Please specify the required version when placing an order.



WL VERSION WITH PERMANENTLY CONNECTED CABLE

With this version, the stranded copper cable is permanently connected. The transition sleeve has a diameter of 6 or 8 mm depending on the cable type. The standard length of the sleeve is 50 mm. Tmax for the sleeve: 150 °C. The cable type (wire cross-section, insulation structure, shielding) can be varied. A cable individually and jointly insulated with FEP/PFA with a 0.38 mm2 cross-section is used as standard. The free wire ends are tin-plated. Please specify the required version when placing an order.



WLS VERSION WITH PERMANENTLY CONNECTED CABLE AND COUPLER

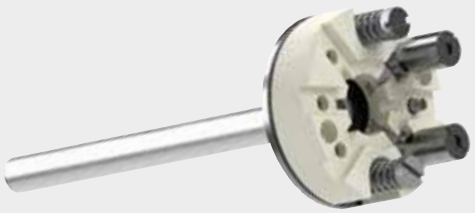
The WLS version is the WL version including a connector system and a type RLK size 1 coupler as standard. The precision contacts are made of brass and are gold-plated. The brass outer casing is matt chrome-plated. Tmax for the sleeve: 150 °C. The connector and coupler are automatically interlocked when joined for optimum contact reliability. Other connector systems are available on request. Please specify the required connector version when placing an order.

WS VERSION WITH PERMANENTLY CONNECTED COUPLER

The WS version is the WA version including a connector system. The standard version includes a type RLK size 1 coupler (up to 3.0 mm sheath diameter. Size 2 required for larger diameters). Tmax for the coupler: 150 °C. Other connector systems are available on request. Please specify the required connector version when placing an order.

WMM VERSION WITH SHEATH MEASURING INSERT, CONTINUOUS DIAMETER OR REINFORCED MEASURING INSERT

Measuring insert with connector base, sheath terminals and pressing device Suitable for installation in type B connection heads in accordance with DIN EN 50 446. An adapter plate is available for installations into type A connection heads on request.

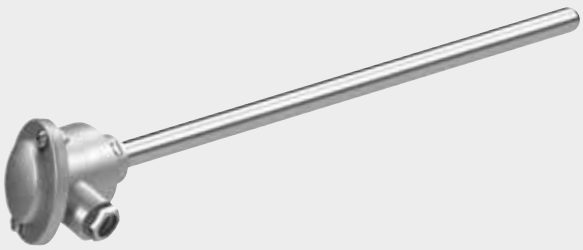


Standard versions:

- Sheath diameter 3.0 mm, continuous
- Sheath diameter 6.0 mm, continuous
- Sheath diameter 5.0 mm
- Measuring tip 6 mm diameter x 50 mm length
- Sheath diameter 6.0 mm
- Measuring tip 8 mm diameter x 50 mm length

WB VERSION (B-Wmm)
with type B connection head

This version consists of a measuring insert with a connector base and sheath terminal installed in a type B connection head in accordance with DIN EN 50 446. A special stainless steel pipe screw joint holds the measuring insert in place. The nominal length from the lower edge of this joint is specified.



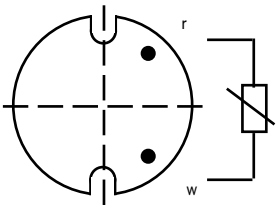
Standard versions:

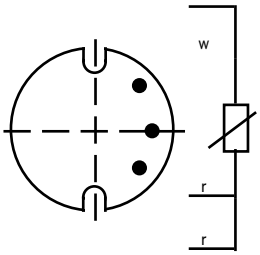
- Sheath diameter 3.0 mm
- Sheath diameter 6.0 mm

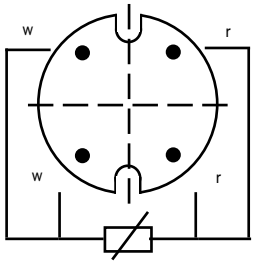
Please specify the required version when placing an order. Other head types and diameters are available on request.

SOCKET ASSIGNMENT FOR WMM OR WB VERSION

Single Pt 100/0

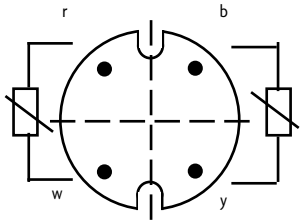


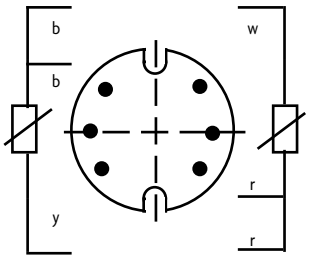




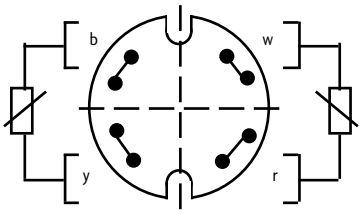
Red	= r
White	= w
Yellow	= y
Black	= b

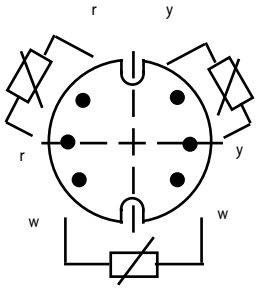
Double Pt 100/0



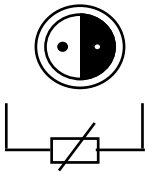


Triple Pt 100/0

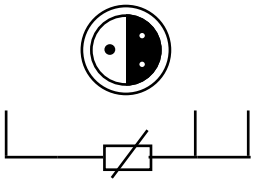




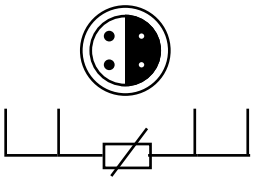
PIN ASSIGNMENT FOR WS OR WLS VERSION WITH ROUND COUPLER



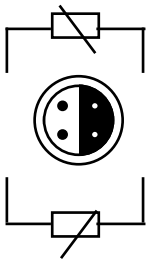
Single 2-wire cable



Single 3-wire cable

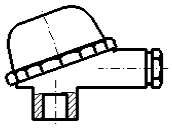


Single 4-wire cable

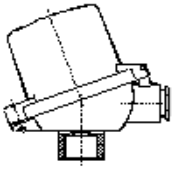


Double 2-wire cable

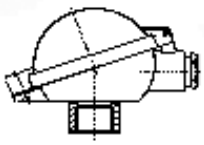
CONNECTION HEADS FOR WB VERSION



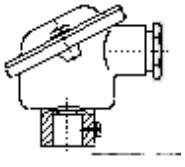
Version BKK



Version BKD-RPH



Version BKD-RP



Version B

ORDER CODE STRUCTURE

Version-diameter-sensor-class-length-cable length-cable type

The following order code can be used for versions that are not listed on the following pages. However, please note that not all conceivable combinations are available. Please get in touch to receive assistance with configuration.

Example: A sheathed resistance thermometer with a permanently connected cable and coupler is required. The sheath diameter needs to be 3.0 mm with a thermocouple length of 300 mm. A single platinum measuring resistor with 100 ohm basic resistance at 0 °C needs to be installed. The limit deviation must correspond to class A. 3 m in length is specified for the cable. A standard type RLK size 1 coupler is used. The class A thermometer is installed in a 4-wire circuit from the measuring resistor. The version of the measuring resistor must always be specified separately!

Example: **WLS** - **3.0** - **1 Pt** - **A** - **300** - **3**

Versions

WA	Standard version
WL	With connection cable
WLS	With cable and coupler
WS	With coupler
WMM	Sheath measuring insert
WB	With connection head type B
	No letter = no plate

Sheath diameter

1.5/1.6	= dia. 1.5/1.6 mm
2.0	= dia. 2.0 mm
3.0	= dia. 3.0 mm
6.0	= dia. 6.0 mm
5.0/6.0	= dia. 5.0 reinforced to 6.0 mm
6.0/8.0	= dia. 6.0 reinforced to 8.0 mm
8.0	= dia. 8.0 mm

Sensor ???

1 PT	= Single Pt 100/0
2 PT	= Double Pt 100/0
3 PT	= Triple Pt 100/0

Limit deviation classes

B	= DIN EN 60751 class B
A	= DIN EN 60751 class A*
AA	= DIN EN 60751 class A**
1/5 B	= 1/5 class B (at 0 °C)
1/10 B	= 1/10 class B (on request)

Thermocouple length in mm (or measuring insert length)

Cable length in m

Please specify separately:
- Wire-wound measuring resistor or film resistor (see page 7)
- Circuit type (2, 3 or 4-wire circuit)
- Coupler type for WS or WLS version

*) Pursuant to DIN EN 60 751:2022, thermometers with an accuracy better than class B must be configured in a 3 or 4-wire circuit.

**) Pursuant to DIN EN 60 751:2022, the temperature ranges for class AA thermometers have been established as -50 ... +250 °C for wire-wound resistors and 0 ... +150 °C for flat form resistors. Deviating temperature ranges are to be agreed separately.

TEMPERATURE RESISTANCE TABLE PURSUANT TO DIN EN 60 751 (IEC 60 751)

t_{90} in °C	0	1	2	3	4	5	6	7	8	9
-100	60.256	60.661	61.066	61.471	61.876	62.280	62.684	63.088	63.492	63.896
-90	64.300	64.703	65.106	65.509	65.912	66.315	66.717	67.120	67.522	67.924
-80	68.325	68.727	69.129	69.530	69.931	70.332	70.733	71.134	71.534	71.934
-70	72.335	72.735	73.134	73.534	73.934	74.333	74.732	75.131	75.530	75.929
-60	76.328	76.726	77.125	77.523	77.921	78.319	78.717	79.114	79.512	79.909
-50	80.306	80.703	81.100	81.497	81.894	82.290	82.687	83.083	83.479	83.875
-40	84.271	84.666	85.062	85.457	85.853	86.248	86.643	87.038	87.432	87.827
-30	88.222	88.616	89.010	89.404	89.798	90.192	90.586	90.980	91.373	91.767
-20	92.160	92.553	92.946	93.339	93.732	94.124	94.517	94.909	95.302	95.694
-10	96.086	96.478	96.870	97.261	97.653	98.044	98.436	98.827	99.218	99.609
0	100.000	100.391	100.781	101.172	101.562	101.953	102.343	102.733	103.123	103.513
10	103.903	104.292	104.682	105.071	105.460	105.849	106.238	106.627	107.016	107.405
20	107.794	108.182	108.570	108.959	109.347	109.735	110.123	110.510	110.898	111.286
30	111.673	112.060	112.447	112.835	113.221	113.608	113.995	114.382	114.768	115.155
40	115.541	115.927	116.313	116.699	117.085	117.470	117.856	118.241	118.627	119.012
50	119.397	119.782	120.167	120.552	120.936	121.321	121.705	122.090	122.474	122.858
60	123.242	123.626	124.009	124.393	124.777	125.160	125.543	125.926	126.309	126.692
70	127.075	127.458	127.840	128.223	128.605	128.987	129.370	129.752	130.133	130.515
80	130.897	131.278	131.660	132.041	132.422	132.803	133.184	133.565	133.946	134.326
90	134.707	135.087	135.468	135.848	136.228	136.608	136.987	137.367	137.747	138.126
100	138.506	138.885	139.264	139.643	140.022	140.400	140.779	141.158	141.536	141.914
110	142.293	142.671	143.049	143.426	143.804	144.182	144.559	144.937	145.314	145.691
120	146.068	146.445	146.822	147.198	147.575	147.951	148.328	148.704	149.080	149.456
130	149.832	150.208	150.583	150.959	151.334	151.710	152.085	152.460	152.835	153.210
140	153.584	153.959	154.333	154.708	155.082	155.456	155.830	156.204	156.578	156.952
150	157.325	157.699	158.072	158.445	158.818	159.191	159.564	159.937	160.309	160.682
160	161.054	161.427	161.799	162.171	162.543	162.915	163.286	163.658	164.030	164.401
170	164.772	165.143	165.514	165.885	166.256	166.627	166.997	167.368	167.738	168.108
180	168.478	168.848	169.218	169.588	169.958	170.327	170.696	171.066	171.435	171.804
190	172.173	172.542	172.910	173.279	173.648	174.016	174.384	174.752	175.120	175.488
200	175.856	176.224	176.591	176.959	177.326	177.693	178.060	178.427	178.794	179.161
210	179.528	179.894	180.260	180.627	180.993	181.359	181.725	182.091	182.456	182.822
220	183.188	183.553	183.918	184.283	184.648	185.013	185.378	185.743	186.107	186.472
230	186.836	187.200	187.564	187.928	188.292	188.656	189.019	189.383	189.746	190.110
240	190.473	190.836	191.199	191.562	191.924	192.287	192.649	193.012	193.374	193.736
250	194.098	194.460	194.822	195.183	195.545	195.906	196.268	196.629	196.990	197.351
260	197.712	198.073	198.433	198.794	199.154	199.514	199.875	200.235	200.595	200.954
270	201.314	201.674	202.033	202.393	202.752	203.111	203.470	203.829	204.188	204.546
280	204.905	205.263	205.622	205.980	206.338	206.696	207.054	207.411	207.769	208.127
290	208.484	208.841	209.198	209.555	209.912	210.269	210.626	210.982	211.339	211.695
300	212.052	212.408	212.764	213.120	213.475	213.831	214.187	214.542	214.897	215.252
310	215.608	215.962	216.317	216.672	217.027	217.381	217.736	218.090	218.444	218.798
320	219.152	219.506	219.860	220.213	220.567	220.920	221.273	221.626	221.979	222.332
330	222.685	223.038	223.390	223.743	224.095	224.447	224.799	225.151	225.503	225.855
340	226.206	226.558	226.909	227.260	227.612	227.963	228.314	228.664	229.015	229.366
350	229.716	230.066	230.417	230.767	231.117	231.467	231.816	232.166	232.516	232.865
360	233.214	233.564	233.913	234.262	234.610	234.959	235.308	235.656	236.005	236.353
370	236.701	237.049	237.397	237.745	238.093	238.440	238.788	239.135	239.482	239.829
380	240.176	240.523	240.870	241.217	241.563	241.910	242.256	242.602	242.948	243.294
390	243.640	243.986	244.331	244.677	245.022	245.367	245.713	246.058	246.403	246.747
400	247.092	247.437	247.781	248.125	248.470	248.814	249.158	249.502	249.845	250.189
410	250.533	250.876	251.219	251.562	251.906	252.248	252.591	252.934	253.277	253.619
420	253.962	254.304	254.646	254.988	255.330	255.672	256.013	256.355	256.696	257.038
430	257.379	257.720	258.061	258.402	258.743	259.083	259.424	259.764	260.105	260.445

t_{90} in °C	0	1	2	3	4	5	6	7	8	9
440	260.785	261.125	261.465	261.804	262.144	262.483	262.823	263.162	263.501	263.840
450	264.179	264.518	264.857	265.195	265.534	265.872	266.210	266.548	266.886	267.224
460	267.562	267.900	268.237	268.574	268.912	269.249	269.586	269.923	270.260	270.597
470	270.933	271.270	271.606	271.942	272.278	272.614	272.950	273.286	273.622	273.957
480	274.293	274.628	274.963	275.298	275.633	275.968	276.303	276.638	276.972	277.307
490	277.641	277.975	278.309	278.643	278.977	279.311	279.644	279.978	280.311	280.644
500	280.978	281.311	281.643	281.976	282.309	282.641	282.974	283.306	283.638	283.971
510	284.303	284.634	284.966	285.298	285.629	285.961	286.292	286.623	286.954	287.285
520	287.616	287.947	288.277	288.608	288.938	289.268	289.599	289.929	290.258	290.588
530	290.918	291.247	291.577	291.906	292.235	292.565	292.894	293.222	293.551	293.880
540	294.208	294.537	294.865	295.193	295.521	295.849	296.177	296.505	296.832	297.160
550	297.487	297.814	298.142	298.469	298.795	299.122	299.449	299.775	300.102	300.428
560	300.754	301.080	301.406	301.732	302.058	302.384	302.709	303.035	303.360	303.685
570	304.010	304.335	304.660	304.985	305.309	305.634	305.958	306.282	306.606	306.930
580	307.254	307.578	307.902	308.225	308.549	308.872	309.195	309.518	309.841	310.164
590	310.487	310.810	311.132	311.454	311.777	312.099	312.421	312.743	313.065	313.386
600	313.708	314.029	314.351	314.672	314.993	315.314	315.635	315.956	316.277	316.597

LIMIT DEVIATIONS FOR RESISTANCE THERMOMETERS

In DIN EN 60 751, the relationship between temperature in °C and resistance is ohm is defined at a resistance of 100 ohm at 0 °C for platinum resistance thermometers. The entire temperature range spans - 200 °C to + 800 °C. For technical reasons, the limit deviations were redefined in IEC 60 751:2008. Notably, a clear distinction was made between flat form and wire-wound resistors on the one hand and thermometers on the other. In addition to resistance thermometers with 100 ohm basic resistance at 0 °C, resistance thermometers with 500 and 1000 ohm basic resistance are also available.

LIMIT DEVIATIONS FOR RESISTORS DIN EN 60 751:2022

Wire-wound resistors		Flat form resistors		Tolerance value in °C
Tolerance class	Valid temperature range in °C	Tolerance class	Valid temperature range in °C	
W 0.1	-100 to 350	F 0.1	0 to 150	± (0.1+0.0017*I t I)
W 0.15	-100 to 450	F 0.15	-30 to 300	± (0.15+0.002*I t I)
W 0.3	-196 to 660	F 0.3	-50 to 500	±(0.3+0.005*I t I)
W 0.6	-196 to 660	F 0.6	-50 to 600	± (0.6+0.01*I t I)

I t I = absolute value for temperature in °C independent of the algebraic sign

LIMIT DEVIATIONS FOR THERMOMETERS DIN EN 60 751:2022

Tolerance class	Valid temperature range in °C		Tolerance value in °C
	Wire-wound resistors	Flat form resistors	
AA	-50 to 250	0 to 150	± (0.1+0.0017*I t I)
B	-196 to 600	-50 to 500	± (0.3+0.005*I t I)
C	-196 to 600	-50 to 600	± (0.6+0.01*I t I)

I t I = absolute value for temperature in °C independent of the algebraic sign

TECHNICAL INFORMATION:

Measuring resistor:

Standard Pt 100 design pursuant to DIN EN 60 751
Other basic values and designs are available on request.

Limit deviation:

Class A or B as per DIN EN 60 751

Confined limit deviations (e.g. class AA) are available on request.

Sheath diameter:

Standard series: 1.0; 1.5; 3.0; 6.0, 8.0
Special series: 1.6; 2.0; 3.2 ; 4.5 ; 4.8; 10.0

Insulation resistance:

Standard >/= 5000 MOhm * m at 23 °C
Min. 1000 MOhm * m (DIN EN 61 515)

Insulation material:

High purity magnesium oxide (MgO)

Sheath material:

Inconel 600	mat. no.: 2.4816
Heat resistant steel	mat. no.: 1.4841
Stainless steel	mat. no.: 1.4541

Circuit:

2-wire from measuring resistor as standard

Options:

3 or 4-wire from measuring resistor as single Pt 100; 3-wire as double Pt 100 with 5.0 or 6.0 mm diameter.
Round couplers and connectors:
LEMO round couplers size 1 are used for the WS and WLS versions. Depending on the connection type, the couplers have 2, 3 or 4 poles. The precision contacts are made of brass and are gold-plated. The brass outer casing is matt chrome-plated.
Other connector systems and sizes are available on request.

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Cable types:

A) TT - 465 - 4Cu - 0.38 L (stranded):
Individually and jointly insulated with FEP or PFA; Cu tin-plated shielding braid
4 x stranded wires 0.38 mm2 cross-section,
max. ambient temperature 220 °C

B) SS - 350 - 2Cu - 0.25 L:
Insulated individually and jointly with silicone,
2 x stranded wires 0.25 mm² cross-section,
max. ambient temperature 180 °C

C) PP - 520 - 2Cu - 0.25 L:
Insulated individually and jointly with PVC,
2 x stranded wires 0.25 mm2 cross-section,
max. ambient temperature 85 °C

D) TG - 412 - 4Cu - 0.25 L:
Single cables insulated with FEP or PFA,
covered together with glass silk,
braided with stainless steel wire,
4 x stranded wires 0.25 mm2 cross-section,
max. ambient temperature 220 °C

Connection heads:

The WB version features a aluminum type B connection head in accordance with DIN EN 50 446.

Heads with larger volumes, e.g. for installing one or two transducers are also available (types BKD - SP or BKD - RP and BKD - RPH or BKK-RPH).
A plastic version with a screw or hinged cover is also available.

The cable gland on type B connection heads is M 20 x 1.5 as standard.

The protection class for the heads is IP 43 as standard. IP 54 or IP 65 are available on request.

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