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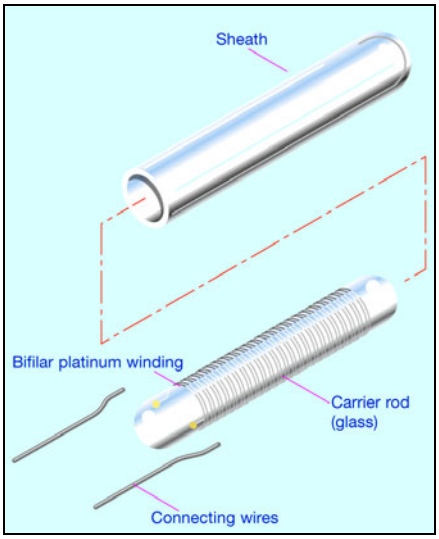
Platinum-glass temperature sensors to EN 60 751

PG + PGL styles



- **for temperatures from -200 to +400 °C**
- **standardized nominal values and tolerances**
- **as single or twin temperature sensor**
- **suitable for measurements under highly humid ambient conditions**
- **can be used directly in many liquids**
- **highly resistant to shock and vibration**

Introduction

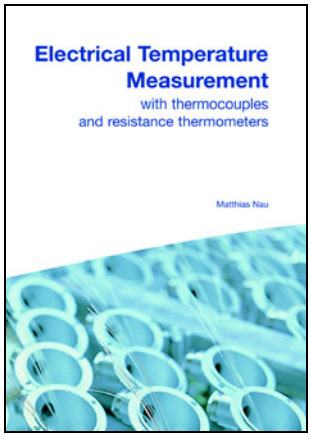
Platinum-glass temperature sensors belong to the category of wirewound constructions. One or two measurement windings are wound on a glass rod, each in the form of a bifilar winding. The winding is fused onto the glass and provided with connecting wires. The nominal resistance is calibrated by altering the winding length. Afterwards, a sleeve is pushed over the glass rod plus measurement winding and the components are then fused together. The glass material used is matched to the expansion coefficient of the platinum wire as far as possible. An additional artificial ageing process ensures that good long-term stability is achieved. The operating temperature covers the range from -200 to +400 °C.

JUMO platinum-glass temperature sensors are distinguished by a design that is extremely resistant to shock and vibration. Furthermore, the connecting wires exhibit a very high tensile strength. Another advantage of this style is that the temperature sensors can readily be used for measurements in highly humid environments or directly in the liquid, thanks to the hermetic sealing of the measurement winding and the excellent chemical resistance of the glass. In addition, the familiar protection tube - a necessary component with other styles - can now be dispensed with, allowing short response times.

A wide variety of platinum-glass temperature sensors with single or double windings and standard nominal values to EN 60 751 are available from JUMO ex-stock.

Customized versions or laboratory resistance thermometers can be supplied on request (see Data Sheet 90.6024).

Technical publication



This revised edition takes account of altered standards and recent developments. The new chapter “Measurement uncertainty” incorporates the basic concept of the internationally recognized ISO guideline “Guide to the expression of uncertainty in measurement” (abbreviated: GUM).
In addition, the chapter on explosion protection for thermometers has been updated in view of the European Directive 94/9/EC, which has been in force since 1st July 2003.

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JUMO platinum temperature sensors

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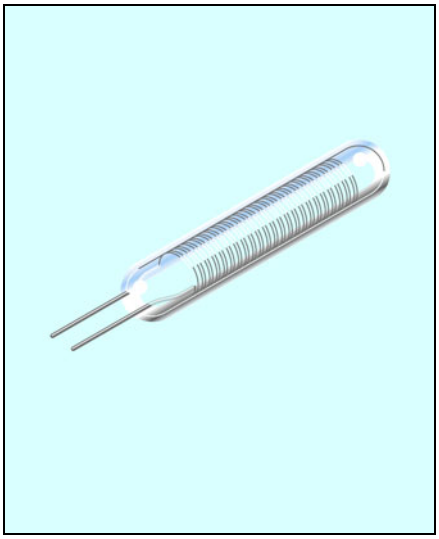
Platinum-glass temperature sensors to EN 60 751

PG style



Brief description

PG style platinum-glass temperature sensors are distinguished by their rugged construction. The wire winding that has been fused into the glass ensures that JUMO glass temperature sensors are generally extremely resistant to shock and vibration. Furthermore, the connecting wires exhibit a very high tensile strength.

Platinum-glass temperature sensors also allow problem-free measurement in highly humid environments, or even directly in various liquids.

Special miniaturized versions with small dimensions and fast response times round off the product range to cover a variety of applications.

These temperature sensors are frequently used in analytical and laboratory technology as well as in HVAC engineering, and for industrial humidity measurement.

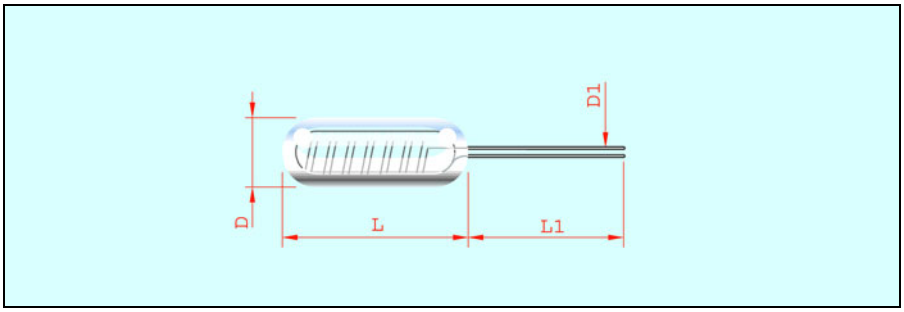
Temperature sensors in blister belt packaging

Temperature sensor				Connecting wire				Sales No. for tolerance class		
Type	R_0/Ω	D	L	Material	D1	L1	R_L in mΩ/mm	1/3 DIN B	A	B
PG 1.0910.1	1x100	0.9	10	Pt-Ni	0.15	10	5	on request	90/00063058	90/00063057
PG 1.1308.1	1x100	1.3	8	Pt-Ni	0.15	10	5	on request	90/00063056	90/00063055
PG 1.1720.1	1x100	1.7	20	Pt-NiFe	0.20	10	12	90/00044808	90/00066020	90/00034067
PG 1.1810.1	1x100	1.8	10	Pt-NiFe	0.20	10	12	90/00062525	90/00088708	90/00043804
PG 1.2010.1	1x100	2.0	10	Pt-NiFe	0.20	10	12	on request	90/00064633	90/00064632
PG 1.2812.1	1x100	2.8	12	Pt-NiFe	0.20	10	12	90/00044809	90/00088709	90/00034065
PG 1.2830.1	1x100	2.8	30	Pt-NiFe	0.30	10	5	90/00046833	90/00087580	90/00031071
PG 1.3812.1	1x100	3.8	12	Pt-NiFe	0.30	10	5	90/00051231	90/00088710	90/00036206
PG 1.3830.1	1x100	3.8	30	Pt-NiFe	0.30	10	5	90/00062525	90/00088736	90/00080803
PG 1.4512.1	1x100	4.5	12	Pt-NiFe	0.30	10	5	90/00040492	90/00088711	90/00031072
PG 1.4825.1	1x100	4.8	25	Pt-NiFe	0.30	10	5	on request	90/00087490	90/00031073
PG 1.4850.1*	1x100	4.8	50	Pt-NiFe	0.30	10	5	on request	90/00088712	90/00054629
PG 1.3830.5	1x500	3.8	30	Pt-NiFe	0.30	10	5	90/00052496	90/00088737	90/00080802
PG 1.2828.10	1x1000	2.8	28	Pt-NiFe	0.30	10	5	90/00063456	90/00088738	90/00063259
PG 2.2525.1	2x100	2.5	25	Pt-NiFe	0.20	15	12	90/00056641	90/00087494	90/00038263
PG 2.4520.1	2x100	4.5	20	Pt-NiFe	0.30	15	5	90/00051227	90/00088713	90/00034544
PG 2.4850.1*	2x100	4.8	50	Pt-NiFe	0.30	10	5	on request	90/00088714	90/00054628

Dim. tolerances: ΔD = ±0.3 / ΔL = ±1.0 / ΔD1 = ±0.02 / ΔL1 = +1.0/-2.0; with 2 x Pt100 ±5.0
Dimensions in mm.
* Not in blister belt packaging, but packed in a cardboard box.

For a definition of the tolerance classes, see Data Sheet 90.6000

Dimensional drawing



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Technical data

Standard	EN 60 751
Temperature coefficient	α = 3.850 x 10^{-3} °C^{-1} (between 0 and 100 °C)
Temperature range	-200 to +400 °C
Tolerance	Temperature validity range Class 1/3 DIN B: - 70 to +250 °C Temperature validity range Class A: -200 to +400 °C Temperature validity range Class B: -200 to +400 °C
Measuring current	Pt100 recommended: 1.0 mA Pt500 recommended: 0.7 mA Pt1000 recommended: 0.1 mA
Maximum current	Pt100 10 mA Pt500 5 mA Pt1000 3 mA
Operating conditions	Suitable also for unprotected application in high-humidity environments and in liquid media (e. g. caustic solutions). The medium to be measured must not form a chemical bond with the temperature sensor (qualification by the user).
Chemical resistance	Water resistance class (ISO 719) HGB 3 Acidity class (DIN 12 116) Class S1 Caustic solution class (ISO 695) Class A2
Connecting wires	The connecting wires are of sheathed platinum wire, with varying diameters according to the sensor geometry. Any unnecessary bending of the wires must be avoided, as this may result in material fatigue and a wire break.
Measurement point	2 mm from the end of the wire; the nominal value given refers to the standard connecting wire length L1, with the measurement being acquired 2 mm from the end of the wire. Any alteration to the wire length will lead to changes in resistance.
Long-term stability	max. drift <0.05 °C after 1000 hrs at 200 °C max. drift <0.10 °C after 1000 hrs at 400 °C
Insulation resistance	100 MΩ at room temperature
Vibration strength	30 g within the frequency range 30 — 3000 Hz
Self-heating	$\Delta t = I^2 \times R \times E$ (see Data Sheet 90.6000 for definitions)
Packaging	Blister belt Exception: temperature sensors with an overall length >45 mm, including the connecting wires. These are packed in a cardboard box with foam padding.
Storage	In normal surroundings, JUMO temperature sensors, PG style, can be stored indefinitely in the (standard) belt packaging. It is not permissible to store the sensors in aggressive atmospheres or corrosive media.

Self-heating coefficients and response times

Type	Self-heating coefficient E in °C/mW		Response times in seconds			
	in water (v = 0.2 m/sec)	in air (v = 2 m/sec)	in water (v = 0.4 m/sec)		in air (v = 1 m/sec)	
			$t_{0.5}$	$t_{0.9}$	$t_{0.5}$	$t_{0.9}$
PG 1.0910.1	0.02	0.2	0.1	0.3	2	7
PG 1.1308.1	0.02	0.2	0.1	0.4	4	13
PG 1.1720.1	0.015	0.1	0.2	0.7	8	28
PG 1.1810.1	0.02	0.2	0.2	0.8	9	30
PG 1.2010.1	0.02	0.2	0.2	1.0	9	35
PG 1.2812.1	0.015	0.2	0.3	1.4	13	44
PG 1.2830.1	0.01	0.1	0.3	1.5	13	47
PG 1.3812.1	0.02	0.2	0.8	3.2	10	33
PG 1.3830.1	0.01	0.1	0.7	3.2	8	28
PG 1.4512.1	0.02	0.1	0.8	3.5	13	39
PG 1.4825.1	0.01	0.1	0.8	4.5	13	40
PG 1.4850.1	0.01	0.05	0.9	4.3	15	50
PG 1.3830.5	0.005	0.05	0.7	3.0	8	28
PG 1.2828.10	0.005	0.05	0.3	1.5	13	47
PG 2.2525.1	0.02	0.2	0.3	1.2	8	23
PG 2.4520.1	0.02	0.2	0.7	3.4	15	41
PG 2.4850.1	0.02	0.2	0.9	4.8	15	50

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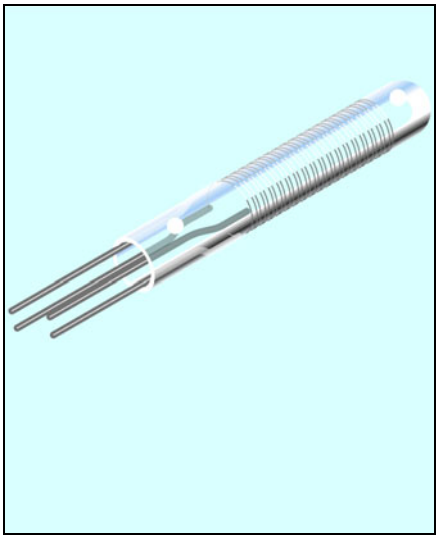
Platinum-glass temperature sensors to EN 60 751

PGL style



Brief description

PGL style platinum-glass temperature sensors are of a similar rugged construction to the standard PG form. These temperature sensors, too, are distinguished by their excellent resistance to shock and vibration, as a result of the wire winding being fused onto the glass. In addition, the connecting wires exhibit a very high tensile strength.

Compared with the standard PG style, PGL style temperature sensors have an additional glass neck, which, for example, allows for a better insulation of the connecting wires for further processing. Furthermore, the glass neck enables glass extensions to be fitted at a later stage and fabrication into laboratory resistance thermometers.

Temperature sensors in blister belt packaging

Temperature sensor					Connecting wire				Sales No. for tolerance class		
Type	R_0/Ω	D	L	L2	Material	D1	L1	R_L in mΩ/mm	1/3 DIN B	A	B
PGL 1.3530.1	1x100	3.5	30	10	Pt-NiFe	0.30	15	5	90/00033714	90/00088715	90/00038266
PGL 1.4825.1	1x100	4.8	25	10	Pt-NiFe	0.30	15	5	90/00046834	90/00088716	90/00031070
PGL 1.4845.1*	1x100	4.8	45	7	Pt-NiFe	0.30	15	5	90/00044811	90/00088717	90/00031068
PGL 2.3535.1	2x100	3.5	35	10	Pt-NiFe	0.20	15	12	90/00045836	90/00088719	90/00038270
PGL 2.4830.1	2x100	4.8	30	10	Pt-NiFe	0.30	15	5	90/00051229	90/00088720	90/00038271
PGL 2.4845.1*	2x100	4.8	45	7	Pt-NiFe	0.30	15	5	90/00044812	90/00088739	90/00027510

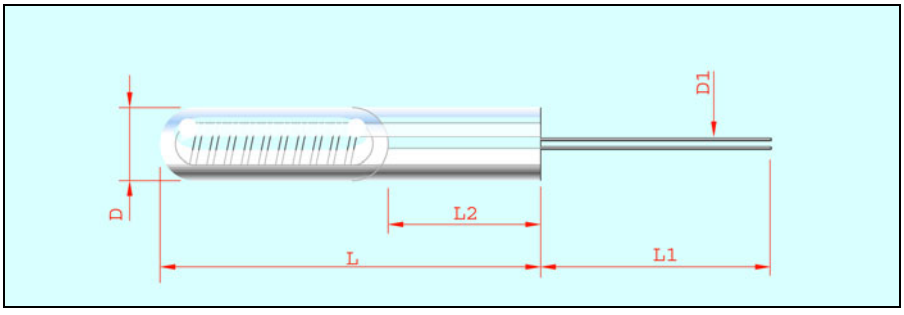
Dim. tolerances: ΔD = ±0.3 / ΔL = ±1.0 / ΔD1 = ±0.02 / ΔL1 = +1.0/-2.0;
with 2 x Pt100 ±5.0 / L2 = approx. dimensions

Dimensions in mm.

* Not in blister belt packaging, but packed in a cardboard box.

For a definition of the tolerance classes, see Data Sheet 90.6000

Dimensional drawing



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Technical data

Standard EN 60 751

Temperature coefficient α = 3.850 x 10^{-3} °C^{-1} (between 0 and 100 °C)

Temperature range -200 + 400 °C

Tolerance

Temperature validity range Class 1/3 DIN B:	- 70 to +250 °C
Temperature validity range Class A:	-200 to +400 °C
Temperature validity range Class B:	-200 to +400 °C

Measuring current

Pt100	recommended: 1.0 mA
Pt500	recommended: 0.7 mA
Pt1000	recommended: 0.1 mA

Maximum current

Pt100	10 mA
Pt500	5 mA
Pt1000	3 mA

Operating conditions Also suitable for unprotected application in high-humidity environments and in liquid media (e.g. caustic solutions). The medium to be measured must not form a chemical bond with the temperature sensor (qualification by the user).

Chemical resistance
Water resistance class (ISO 719) HGB 3
Acidity class (DIN 12 116) Class S1
Caustic solution class (ISO 695) Class A2

Connecting wires The connecting wires are made from sheathed platinum wire, with varying diameters according to the sensor geometry. Any unnecessary bending of the wires must be avoided, as this will result in material fatigue and a wire break.

Measurement point 2 mm from the end of the wire; the specified nominal value refers to the standard connecting wire length L1, with the measurement being acquired 2 mm from the end of the wire. Any alteration of the wire length will lead to changes in the resistance.

Long-term stability
1000 hrs at 200 °C <0.05 °C
1000 hrs at 400 °C <0.10 °C

Insulation resistance 100 MΩ at room temperature

Vibration strength 30 g within the frequency range 30 — 3000 Hz

Self-heating $\Delta t = I^2 \times R \times E$ (see Data Sheet 90.6000 for definitions)

Packaging Blister belt
Exception: temperature sensors with an overall length >45 mm, including the connecting wires. These are packed in a cardboard box with foam padding.

Storage In normal surroundings, JUMO temperature sensors, PGL style, can be stored indefinitely in the original (standard) belt packaging. It is not permissible to store the sensors in aggressive atmospheres or corrosive media.

Self-heating coefficients and response times

Type	Self-heating coefficient E in °C/mW		Response times in seconds			
	in water (v = 0.2 m/sec)	in air (v = 2 m/sec)	in water (v = 0.4 m/sec)		in air (v = 1 m/sec)	
			$t_{0.5}$	$t_{0.9}$	$t_{0.5}$	$t_{0.9}$
PGL 1.3530.1	0.02	0.1	0.7	2.6	9	31
PGL 1.4825.1	0.015	0.1	0.8	4.0	12	40
PGL 1.4845.1	0.005	0.05	0.8	4.3	14	48
PGL 2.3535.1	0.02	0.2	0.6	2.6	7	27
PGL 2.4830.1	0.015	0.1	0.8	3.6	14	42
PGL 2.4845.1	0.01	0.1	0.8	3.8	15	49