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# Platinum-ceramic temperature sensors PK style

- for temperatures from -200 to +800 °C
- standardized nominal values and tolerances
- as single or twin temperature sensor
- wide temperature measuring range
- high resistance to temperature shock
- excellent stability, even with varying temperatures

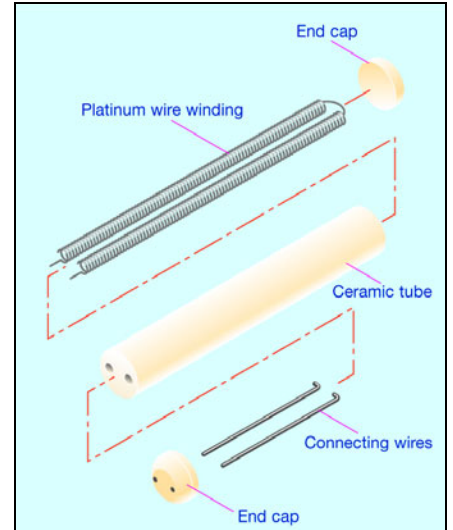
## Introduction

Platinum-ceramic temperature sensors use a ceramic tube as the housing base, in which there are either two or four bores. Depending on the version to be produced, platinum coils that have already been calibrated and fitted with connecting wires are inserted into these bores. The remaining space in the bores is then filled with highly pure alumina powder, to fix the coils and to improve heat transfer. Finally, both ends of the ceramic tube are closed with a sealing compound that is fused on. This seals off the embedded measurement winding and also relieves the strain on the connecting wires.

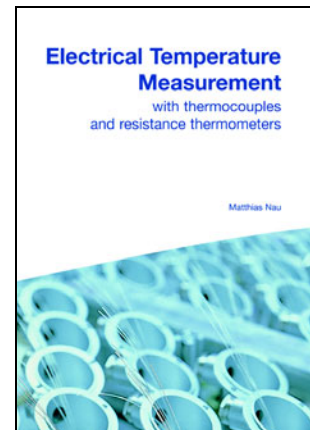
Platinum-ceramic temperature sensors are highly appreciated, mainly because of their wide application temperature range. Depending on the version, the maximum range covers temperatures from -200 to +800°C. In addition, the special internal construction of these temperature sensors ensures excellent temperature stability and shock resistance. A further advantage is the close adherence of the characteristic to the EN 60 751 standard, from which this style deviates only very slightly.

Platinum-ceramic temperature sensors are suitable for almost any application. The comprehensive selection of sizes available from stock and the high accuracy of the dimensional tolerances enable simple and universal processing.

Main application areas include industrial probes for elevated temperatures, and analytical and laboratory technology.



## 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.

August 2002  
 Publication FAS 146  
 Sales No. 90/00085081  
 ISBN: 978-3-935742-07-8

## JUMO platinum temperature sensors

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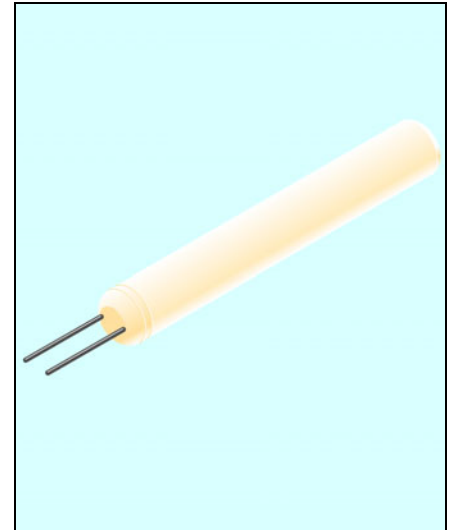
# Platinum-ceramic temperature sensors PK/H style to EN 60 751

## Brief description

PK style platinum-ceramic temperature sensors cover by far the widest temperature range of all platinum temperature sensors. They are the preferred choice for measuring elevated temperatures or for analytical and laboratory applications. Type H temperature sensors are designed for operating temperatures from -200 to +600°C.

The special internal construction of these wirewound temperature sensors largely prevents permanent changes in the resistance value, which may occur in other styles due to significant temperature variations or shock-like temperature changes.

A large selection of different versions is available from JUMO ex-stock. Size, temperature measurement range and tolerance class as well as the number of measurement windings can be chosen as required. Only the nominal value is restricted to 100 ohms, because of the special internal construction of platinum-ceramic temperature sensors in general.



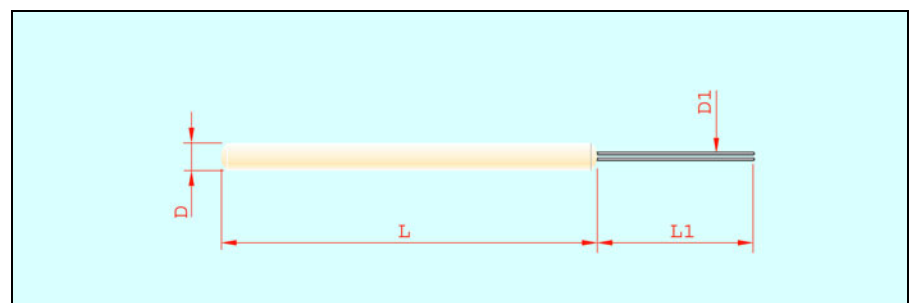
## Temperature sensors in blister pack

Temperature sensor				Connecting wire				Sales No. for tolerance class		
Type	R <sub>0</sub> /Ω	D	L	Material	D1	L1	R <sub>L</sub> in mΩ/mm	1/3 DIN B	A	B
PK 1.1015.1H	1x100	1.0	15	Pd-Au	0.20	10	6	90/00430014	90/00430007	90/00430015
PK 1.1508.1H	1x100	1.5	8	Pd-Au	0.20	10	6	90/00430161	90/00430189	90/00430177
PK 1.1515.1H	1x100	1.5	15	Pd-Au	0.20	10	6	90/00430060	90/00430030	90/00430061
PK 1.1525.1H	1x100	1.5	25	Pd-Au	0.20	10	6	90/00430147	90/00430148	90/00430146
PK 1.2630.1H	1x100	2.6	30	Pd-Au	0.27	10	3	90/00044196	90/00428246	90/00037986
PK 1.3630.1H	1x100	3.6	30	Pd-Au	0.27	10	3	90/00044861	90/00428252	90/00037987
PK 1.4530.1H	1x100	4.5	30	Pd-Au	0.27	10	3	90/00044199	90/00428256	90/00037988
PK 2.1725.1H	2x100	1.7	25	Pd-Au	0.20	10/11	6	90/00430198	90/00430199	90/00430196
PK 2.2630.1H	2x100	2.6	30	Pd-Au	0.27	10/11	3	90/00061608	90/00429088	90/00061390
PK 2.4530.1H	2x100	4.5	30	Pd-Au	0.27	10/11	3	90/00061609	90/00428311	90/00038293

Dim. tolerances: ΔD = ±0.15 / ΔL = +2/-1 / ΔD1 = ±0.02 / ΔL1 = ±2  
 Dimensions in mm.

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

## Dimensional drawing



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## Technical data

<b>Standard</b>	EN 60 751		
<b>Temperature coefficient</b>	$\alpha = 3.850 \times 10^{-3} \text{ } ^\circ\text{C}^{-1}$ (between 0 and 100 °C)		
<b>Temperature range</b>	-200 to +600 °C		
<b>Tolerance</b>	Temperature validity range Class 1/3 DIN B:	- 70 to +250 °C	
	Temperature validity range Class A:	-200 to +600 °C	
	Temperature validity range Class B:	-200 to +600 °C	
<b>Measuring current</b>	recommended: 1.0mA		
<b>Maximum current</b>	20mA		
<b>Operating conditions</b>	Platinum-ceramic temperature sensors may not be used unprotected in humid ambient conditions (condensation) or corrosive atmospheres. Because of their special internal construction, the temperature sensors only have a limited resistance to shock and vibration. However, they exhibit excellent temperature stability and are free from hysteresis. The user may have to carry out some checks before operation.		
<b>Connecting wires</b>	The connecting wires are made of a palladium-gold alloy, 0.27mm thick. On the versions H 2 x Pt100, the connecting wires of the first measurement winding are longer (L1 +1mm), to mark the individual winding more clearly. Any unnecessary bending of the connecting wires must be avoided, as this may result in material fatigue and a wire break.		
<b>Measurement point</b>	The nominal value specified refers to the standard connecting wire length L1. The measurement is acquired 2mm from the open end of the wire. If the wire length is altered, changes in resistance will occur, which may result in the tolerance class not being met.		
<b>Long-term stability</b>	max. R <sub>0</sub> drift 0.03%/year (see Data Sheet 90.6000 for definitions)		
<b>Insulation resistance</b>	>10MΩ at room temperature		
<b>Vibration strength</b>	see EN 60 751, Section 4.4.2		
<b>Shock resistance</b>	see EN 60 751, Section 4.4.1		
<b>Self-heating</b>	$\Delta t = I^2 \times R \times E$ (see Data Sheet 90.6000 for definitions)		
<b>Packaging</b>	Blister pack		
<b>Storage</b>	In the standard packaging, JUMO temperature sensors, PK/H style, can be stored for at least 12 months under normal ambient conditions. It is not permissible to store the sensors in aggressive atmospheres, corrosive media, or in high humidity.		
<b>RoHS approved</b>	Yes		

## Self-heating coefficients and response times

Type	Self-heating coefficient E in °C/mW		Response times in seconds			
	in water (v = 0.2m/sec)	in air (v = 2m/sec)	in water (v = 0.4m/sec)		in air (v = 1m/sec)	
	t <sub>0.5</sub>	t <sub>0.9</sub>	t <sub>0.5</sub>	t <sub>0.9</sub>	t <sub>0.5</sub>	t <sub>0.9</sub>
PK 1.1015.1H	0.02	0.2	0.2	0.3	3	9
PK 1.1508.1H	0.02	0.2	0.2	0.5	7	22
PK 1.1515.1H	0.02	0.2	0.2	0.4	5	16
PK 1.1525.1H	0.05	0.2	0.2	0.4	6	16
PK 1.2630.1H	0.01	0.05	0.3	0.6	11	34
PK 1.3630.1H	0.01	0.05	0.4	1.0	20	60
PK 1.4530.1H	0.01	0.05	0.4	1.4	26	90
PK 2.1725.1H	0.05	0.2	0.2	0.4	6	19
PK 2.2630.1H	0.02	0.1	0.3	0.6	11	36
PK 2.4530.1H	0.02	0.1	0.4	1.4	27	84

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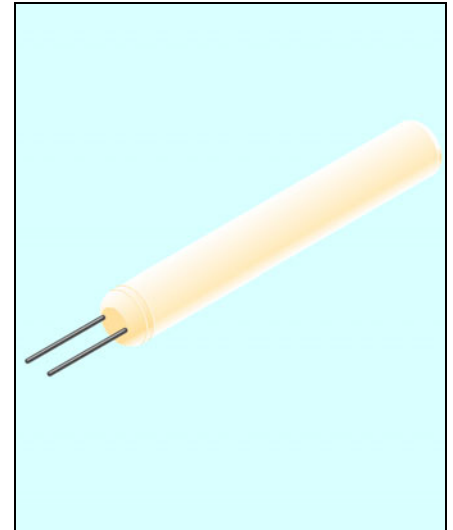
# Platinum-ceramic temperature sensors PK/U style to EN 60 751

## Brief description

PK style platinum-ceramic temperature sensors cover by far the widest temperature range of all temperature sensors. They are the first choice for measuring elevated temperatures or for analytical and laboratory applications. Type U temperature sensors are designed for operating temperatures from -200 to +800°C.

The special internal construction of these wirewound temperature sensors largely prevents permanent changes in the resistance value, which may occur in other styles as a result of significant temperature variations or shock-like temperature changes.

A large selection of different versions is available from JUMO ex-stock. Size, temperature measurement range and tolerance class as well as the number of measurement windings can be chosen as required. Only the nominal value is restricted to 100 ohms, because of the special internal construction of platinum-ceramic temperature sensors in general.



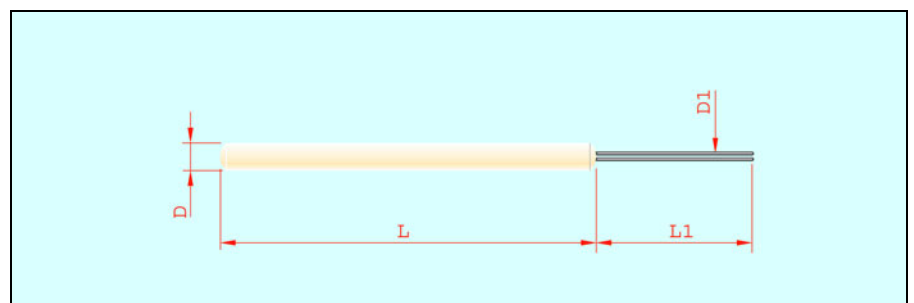
## Temperature sensors in blister pack

Temperature sensor				Connecting wire				Sales No. for tolerance class		
Type	R <sub>0</sub> /Ω	D	L	Material	D1	L1	R <sub>L</sub> in mΩ/mm	1/3 DIN B	A	B
PK 1.0915.1U	1x100	0.9	15	Pt	0.15	7	6	90/00082337	90/00429114	90/00038272
PK 1.1515.1U	1x100	1.5	15	Pt	0.25	7	2	90/00429411	90/00429115	90/00038276
PK 1.1525.1U	1x100	1.5	25	Pt	0.25	7	2	90/00317057	90/00380936	90/00038274
PK 1.2006.1U	1x100	2.0	6	Pt	0.25	7	2	90/00082338	90/00430173	90/00038275
PK 1.2630.1U	1x100	2.6	30	Pt	0.27	10	3	90/00429113	90/00429112	90/00038278
PK 1.4530.1U	1x100	4.5	30	Pt	0.40	7	1	90/00429162	90/00429236	90/00429237
PK 2.1525.1U	2x100	1.5	25	Pt	0.25	7	2	90/00429318	90/00083180	90/00038290
PK 2.2630.1U	2x100	2.6	30	Pt	0.27	10	3	90/00429321	90/00429320	90/00038291

Dim. tolerances: ΔD = ±0.15 / ΔL = +2/-1 / ΔD1 = ±0.02 / ΔL1 = ±2  
 Dimensions in mm.

For definition of tolerance classes, see Data Sheet 90.6000

## Dimensional drawing



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## Technical data

<b>Standard</b>	EN 60 751		
<b>Temperature coefficient</b>	$\alpha = 3.850 \times 10^{-3} \text{ } ^\circ\text{C}^{-1}$ (between 0 and 100 °C)		
<b>Temperature range</b>	-200 to +800 °C		
<b>Tolerance</b>	Temperature validity range Class 1/3 DIN B:	- 70 to +250 °C	
	Temperature validity range Class A:	-200 to +600 °C	
	Temperature validity range Class B:	-200 to +800 °C	
<b>Measuring current</b>	recommended: 1.0 mA		
<b>Maximum current</b>	20 mA		
<b>Operating conditions</b>	Platinum-ceramic temperature sensors may not be used unprotected in humid environments (condensation) or corrosive atmospheres. Because of their special internal construction, the temperature sensors only have a limited resistance to shock and vibration. However, they exhibit excellent temperature stability and are free from hysteresis. The user may have to carry out some checks before operation.		
<b>Connecting wires</b>	The connecting wires are made from pure platinum and may have different wire lengths and thicknesses. Any unnecessary bending of the connecting wires must be avoided as this may result in material fatigue and a wire break.		
<b>Measurement point</b>	The nominal value specified refers to the standard connecting wire length L1. The measurement is acquired 2 mm from the open end of the wire. If the wire length is altered, changes in resistance will occur which may result in the tolerance class not being met.		
<b>Long-term stability</b>	max. R <sub>0</sub> drift 0.03%/year (see Data Sheet 90.6000 for definitions)		
<b>Insulation resistance</b>	>100 MΩ at room temperature		
<b>Vibration strength</b>	see EN 60 751, Section 4.4.2		
<b>Shock resistance</b>	see EN 60 751, Section 4.4.1		
<b>Self-heating</b>	$\Delta t = I^2 \times R \times E$ (see Data Sheet 90.6000 for definitions)		
<b>Packaging</b>	Blister pack		
<b>Storage</b>	In the standard packaging, JUMO temperature sensors, PK/U style, can be stored for at least 12 months under normal ambient conditions. It is not permissible to store the sensors in aggressive atmospheres, corrosive media, or in high humidity.		
<b>RoHS approved</b>	Yes		

## Self-heating coefficients and response times

Type	Self-heating coefficient E in °C/mW		Response times in seconds			
	in water (v = 0.2m/sec)	in air (v = 2m/sec)	in water (v = 0.4 m/sec)		in air (v = 1 m/sec)	
			t <sub>0.5</sub>	t <sub>0.9</sub>	t <sub>0.5</sub>	t <sub>0.9</sub>
PK 1.0915.1U	0.02	0.2	0.1	0.2	7	22
PK 1.1515.1U	0.02	0.2	0.2	0.4	3	9
PK 1.1525.1U	0.05	0.2	0.2	0.4	5	16
PK 1.2006.1U	0.02	0.2	0.2	0.5	5	14
PK 1.2630.1U	0.01	0.05	0.3	0.6	11	34
PK 1.4530.1U	0.01	0.05	0.4	1.4	26	90
PK 2.1525.1U	0.02	0.05	0.2	0.4	6	19
PK 2.2630.1U	0.05	0.1	0.3	0.6	11	36