

BETA-RTD



Platinum Thin-film Temperature Detectors

***This is a summary of our standard product range.
Other items - for instance with non standard lead
wires or special coatings - are available on request.***

Features.

- *Very short response time*
- * Excellent long term stability.*

- * Insignificant self heating*
- * Simple interchangeability*
- * Small dimensions*

Design.

The working part of any Resistance Temperature Detector (RTD) is a length of a temperature dependent material. In this case it is an etched film of Platinum on a ceramic substrate. The etched film is terminated and coated to give the element mechanical strength and resistance to humidity and chemicals.

Function.

The measuring principle is the change in electrical resistance with temperature. The temperature coefficient (dR/dT) is 0,385 %/K (from 0 - 100 °C) according to IEC 751 (so called DIN-elements).

This standard characteristic curve makes the elements interchangeable and eliminates the need for costly calibrations.

Tolerances and stability.

The values and tolerance classes of the platinum resistance elements in this datasheet are according to the IEC 751 standard.

This standard specifies the tolerance classes A and B over the temperature range minus - 200 to + 850 °C. On request we can supply narrower tolerances in narrower ranges. These are proportional restrictions of class B - specified as 1/2 B. A 1/2 B element has the tolerance $\Delta(T) = \pm 1/2 (0,3 + 0,005 |t|)$ over the range specified.

Wider tolerances are also available as well as sensors selected in tolerance groups. Group selected sensors allow very high accuracies with very simple adjustments in the electronics.

The long term stability of the elements meets or exceeds the IEC specs. Depending on conditions a drift less than 0,04 % after 5 years is to be expected.

Self heating.

All resistance elements heat up slightly when current flows through them. The resulting temperature rise depends on the thermal contact to the medium to be measured and also by the thermal conductivity of the medium.

Self heating coefficients for each element are shown below for the element in 1 m/sec. air.

The resulting temperature rise can be calculated as: $\Delta(T) = P \times S$, where $\Delta(T)$ is the temperature rise due to self heat in °K, P is the power in mW dissipated in the element, and S is the self heat coefficient in °K/mW.

Response time.

The figures stated below are $t_{0,5}$, which is the time it takes the element to reach half way to the temperature of the temperature source. The values are stated for the element in 0,4 m/sec. water and 1 m/sec. air.

Hysteresis.

After exposure to extreme temperatures (high or low) the resistance value can deviate from the specified one. This phenomenon is called hysteresis.

The effect can be compensated for by taking the element to the opposite extreme.

Hysteresis can also be caused by thermal shock.

Assembly recommendations.

It is possible to connect leads to the elements by soldering, brazing, or welding.

Flux should be remove.

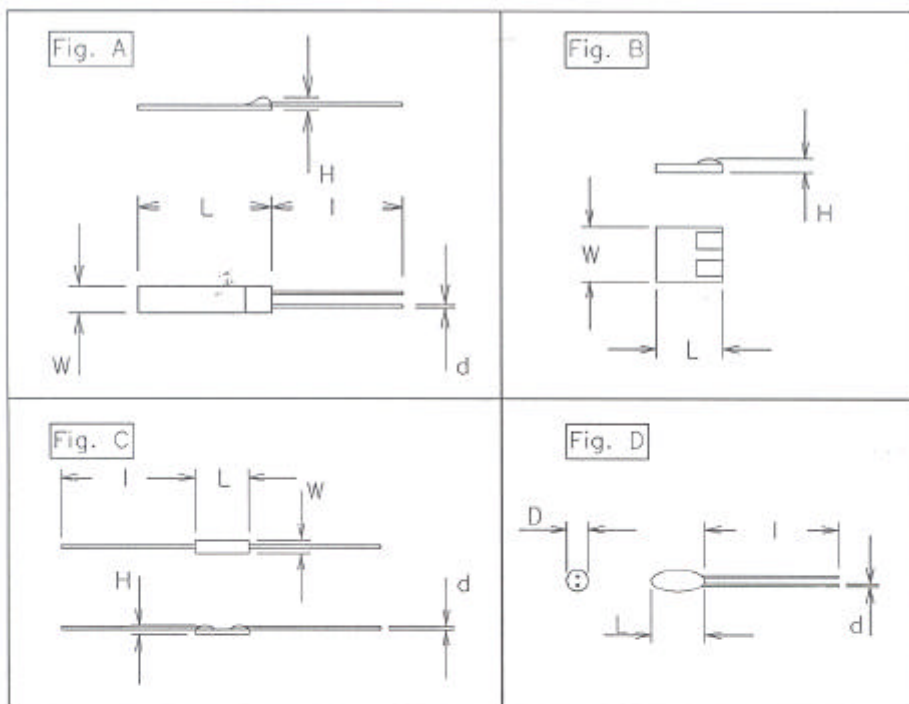
Basic values and Tolerance table for platinum resistance elements.

These are specified by DIN IEC 751 as follows:

Class B: $\Delta(T) = \pm (0,3 + 0,005 |t|)$

Class A: $\Delta(T) = \pm (0,15 + 0,002 |t|)$

Temp. °C	Basic values acc. to DIN IEC 751 Pt res. elements		+/- Tolerance acc. to DIN IEC 751 Pt res. elements			
	ohms	ohms/K	class A		class B	
			ohms	°C	ohms	°C
-200	18,49	0,44	0,24	0,55	0,56	1,3
-100	60,25	0,41	0,14	0,35	0,32	0,8
0	100,00	0,39	0,06	0,15	0,12	0,3
100	138,5	0,38	0,13	0,35	0,3	0,8
200	175,84	0,37	0,20	0,55	0,48	1,3
300	212,02	0,35	0,27	0,75	0,64	1,8
400	247,04	0,34	0,33	0,95	0,79	2,3
500	280,90	0,33	0,38	1,15	0,93	2,8
600	313,59	0,33	0,43	1,35	1,06	3,3
700	345,13	0,31	-	-	1,17	3,8
800	375,71	0,30	-	-	1,28	4,3
850	390,26	0,29	-	-	1,34	4,6



Resistance @ 0 °C ohms	Part #	Dimensions					Response time		Self heat air K/mW	Temp. range °C	Fig.
		L mm	W/D mm	I mm	H mm	d mm	air s	water s			
100	PT110-10A01	10	2	15	1,4	0,25	4	0,2	0,2	-70 +500	A
100	PT110-10A02	2,3	2	15	1,4	0,25	3	0,3	1	-70 +500	A
100	PT110-10A05	4	1	10	1	0,2	2	0,2	0,5	-70 +500	C
100	PT110-10A07	4	1,4	10		0,2	4	0,4	0,8	-70 +500	D
100	PT110-10A08	5	4	-	1,4	-	8	0,5	-	-50 +180	B
1000	PT210-10A01	10	2	15	1,4	0,25	4	0,2	0,2	-70 +500	A
1000	PT210-10A02	4	3	15	1,4	0,25	4	0,2	0,4	-70 +500	A
1000	PT210-10A03	5	4	-	1,4	-	8	0,5	-	-50 +180	B

Please note!

The table only shows stocking items. Other types can be factory ordered.

These could be tight - or loose tolerance elements as well as elements with non standard lead wires or special coatings.

Ceramic - and glass wire-wound elements are also available although not included in this catalogue.