

WZPK 系列铠装铂热电阻

WZPK series armoured platinum thermal resistance

安 装 说 明 书

Installation Manual

上海南浦仪表厂

Shanghai nanpu meter factory

铠装铂热电阻安装使用说明书

一、概述

铠装铂热电阻是由铂电阻元件，内引线、绝缘材料，金属导管组合而成的坚实体。它作为一种温度传感器通常用来和显示仪表配套，以直接测量和调节-200~600℃范围内的液体、气体、蒸气介质以及固体表面等的温度。它具有精度高，稳定性好，线径小，可任意弯曲，热响应快，可绕性好，抗震，耐压，抗冲击，适应性强等优点。

二、选择

1. 根据测量的范围和对象，选择适当的铠装铂热电阻及规格。
2. 选用铠装铂热电阻的分度号必须与显示仪表的分度号一致。
3. 除双支式的铠装铂热电阻外，在不使用切换开关的情况下，每支铠装铂热电阻不可同时和两台显示仪表连接使用。

三、铠装铂热电阻的基本性能

1. 在 0℃时的公称电阻值（ R_0 ）及测温允差（见下表）

分度号	0℃时的公称电阻值		电阻比		测量范围（℃）	允差（℃）
	R_0 （ Ω ）	允差	R_{100}/R_0	允差		
Pt10	10.000	± 0.0117	1.3850	± 0.0005	-200~+600	A 级： $\pm (0.15+0.2\% t)$
Pt100	100.000	± 0.117		± 0.0012	-200~+500	B 级： $\pm (0.30+0.5\% t)$

注：① $|t|$ 为被测量的绝对值。

②分度号为 Pt10、Pt100 的铠装铂热电阻的电阻—温度关系，符合 ZBY301-85《工业铂热电阻技术条件及分度表》标准。

③凡订购分度号为 Pt10 的铠装铂热电阻，均须由供需双方以“技术协议”的形式供货。

2. 绝缘电阻：

- 1). 铠装铂热电阻的常温绝缘电阻不大于 100M Ω ；
- 2). 铠装铂热电阻的常温绝缘电阻值应符合下表中的规定；

上限温度（℃）	绝缘电阻最小允许值（M Ω ）
100~300	10
300~500	2
500~650	0.5

注：①在测量铠装铂热电阻的常规绝缘电阻时，试验电压可取直流 10~100V 任意值。环境温度应在 15~35℃，相对湿度应不大于 80%。

②在测量铠装铂热电阻的上限温度绝缘电阻值之前，应让铠装铂热电阻在试验温度停留至少 30 分钟，并记录试验温度值。试验电压应不超过直流 10V。

3. 自热影响：

单支式铠装铂热电阻的自热试验，其激励电流值不得大于 5mA，双支式不得大于 3mA 测得的电阻增量换算成温度值应不大于 0.30℃。

4. 热响应时间 $\tau_{0.5}$

外径(mm)	响应时间 $\tau_{0.5}(S)$
$\leq \phi 5$	≤ 20
$> \phi 5$	≤ 30

四、安装

1. 铠装铂热电阻的安装地点，应避免安装在炉门旁边和避免与加热物体距离过近之处。

2. 铠装铂热电阻的接线盒不可碰到被测介质的容器壁，接线盒的温度不宜超过 100°C ，并尽可能地保持稳定不变。

3. 铠装铂热电阻的插入深度，侵入被测介质中的长度应不小于保护管外径的 10 倍。

五、使用注意事项

1. 连接导线应采用绝缘（最好是屏蔽）铜线，截面积视铠装铂热电阻与显示仪表见的距离而定，但一般不得小于 1.5mm^2 。导线的电阻值应按显示仪表技术条件规定的数据为准（一般为 $5\sim 15\Omega$ ），导线的电阻值可用惠斯顿电桥来调整。

2. 增加被测介质的循环，使铠装铂热电阻与被测介质间的对流传热增加。

3. 当铠装铂热电阻用来测量变化的温场时，常有动态误差的存在，请注意选用具有适当热响应时间的铠装铂热电阻，因为热响应时间的大小是决定动态误差大小的主要因素，并与之成正比，它对温度的自动调节和控制起作相当重要的作用。

4. 每当弯曲使用铠装铂热电阻时，应注意在测量端部 150mm 范围内不允许有弯曲以免折断铂电阻元件和保护管，引起短路或断路。

5. 根据用户需要，我厂可为用户提供各种要求特殊性能规格和尺寸的铠装铂热电阻。可来人来函联系以技术协议的形式供货。

六、运输与保存

铠装铂热电阻在安装使用前，应保存在不受震动和碰撞的地方。最合适的存放场所条件为：

环境温度为 $-20\sim +40^{\circ}\text{C}$ 。相对湿度不大于 80% 的通风室内，且不含有相对铠装铂热电阻起腐蚀作用的有害杂质。

七、可能发生故障及修理

序号	故障现象	可能原因	修理办法
1	显示仪表指示值无限大	元件或引线断路	更换
2	显示仪表指示值比实际值低	<ol style="list-style-type: none"> 1. 热电阻内部引线短路。 2. 热电阻盒内接线柱短路。 3. 热电阻分度号与显示仪表不一致 4. 热电阻安装位置与插入深度不当。 	<ol style="list-style-type: none"> 1. 更换 2. 清洁接线板，消除短路因素。 3. 更换热电阻或显示仪表 4. 改变安装位置或方法，改变插入深度。
3	显示仪表指示比实际值高	<ol style="list-style-type: none"> 1. 热电阻分度号与显示仪表不符。 2. 热电阻安装位置与插入深度不当。 	<ol style="list-style-type: none"> 1. 更换热电阻或显示仪表。 2. 改变安装位置或方法，改变插入深度
4	显示仪表的示值不稳定	<ol style="list-style-type: none"> 1. 热电阻导线与接线柱接触不良。 2. 热电阻有断路或短路及接地现象。 	<ol style="list-style-type: none"> 1. 清洁接线盒和接线柱，重新联接好。 2. 用万用表检查，如电阻值不合格应予更换。

Operating Instruction For Sheathed Platinum RTDs

I . Summary

Sheathed Platinum Resistance Thermometer Detector(RTD) is a solid integration which is composed by a platinum RTD element,internal leads,insulating material and metal sheath.As a temperature sensor it is generally designed to work in conjunction with a display instrument for direct measuring and regulating the temperature range of -200~+600℃ such as liquid,gas,vapor mediums and solid surface. They have advantages of high accuracy, good stability, small diameter, good flexibility, quick response, drop proof, pressure resistance and shock resistance etc.

II . Selection

- 1. According to the measured range and object , please select suitable Sheathed Platinum RTDs and size.**
- 2. The calibration of a Sheathed Platinum RTD and a display instrument must be unification.**
- 3. If a switch—over is not used, a single element Sheathed Platinum RTD couldn't be connected with two display instruments at the same time, except a double element of Sheathed Platinum RTD.**

III.Features of Sheathed Platinum RTDs

1. Nominal resistance value(R_0) at 0 °C and tolerances of measurement temperature.

Calibration	Nominal Resistance at 0°C		Resistance Ratio		Temp.Range (°C)	Tolerance (°C)
	R_0 (Ω)	Tolerance	R_{100}/R_0	Tolerance		
Pt10	10.000	± 0.0117	1.3850	± 0.0005	-200~+600	Class A: $\pm (0.15+0.2\% t)$
Pt100	100.000	± 0.117		± 0.0012	-200~+500	Class B: $\pm (0.30+0.5\% t)$

Note:① $|t|$ denotes to the absolute value of a temperature being measured.

②The characteristics of resistance and temperature of Sheathed Platinum RTDs (Pt10 and Pt100) conform to standard ZBY301-85specifications for Industrial RTDs and Reference Table.

③Pt10 Sheathed Platinum RTDs shall be supplied according to ‘technical agreement’ reached by two parties.

2. Insulation Resistance

1) At indoor temperature the insulation resistance of Sheathed Platinum RTDs is more than 100M.

2) At high temperature the insulation resistance of Sheathed Platinum RTDs should conform with the table stipulations.

Upper Limit Temp.	The Smallest Tolerance Value of Insulation Resistance (MΩ)
100~300	10
300~500	2
500~650	0.5

Note:①When measure the insulation resistance of Sheathed Platinum RTDs at indoor temper ature,testing voltage may be 10~100Vd,cambient temperature is 15~35°C amd relative humid ity is not more than 80%RH.

②Before measuring Insulation resistances of upper limit temperature for

Sheathed Platinum RTDs, insert Sheathed Platinum RTDs into a tested temperature for half an hour at least and record temperature value. The test voltage shouldn't be more than 10Vd,c

3. Self-heating Influence

Through self-heating test, the exciting current value of a single element Sheathed Platinum RTDs should be less than 5mA and a double element Sheathed Platinum RTD should be less than 3 mA, the temperature value which is transformed by the incremental resistance is less than 0.30℃.

4. Thermal Response Time $\tau_{0.5}$

Dia:(mm)	Response Time $\tau_{0.5}(S)$
$\leq \phi 5$	≤ 20
$> \phi 5$	≤ 30

IV.Installation

1. Installation place for Sheathed Platinum RTDs shall keep far away from the side door of a furnace or a very near distance to heating object.
2. The terminal box should not be touched the container wall of the measured medium,the temperture at the terminal box should not exceed 100℃, and maintain as stable as possible.
3. The immersion depth of Sheathed Platinum RTDs which was in the measured medium usually shall not be less than 10 times of the outside diameter of the protective tube.

V.Operating Points for attention

- 1. The lead wire should be insulated (shielded Preferably) copper wire, whose section area can be determined by the distance between a Sheathed Platinum RTD and a display instrument, generally it shall not be less than 1.5mm^2 . The lead wire resistance should be determined according to the specifications for the display instrument ($5\text{-}15\ \Omega$ as usual), and the lead wire resistance can be adjusted by Whealstone bridge.**
- 2. Increase cycling of the measured medium, increase the convective heat transfer between Sheathed Platinum RTDs and the medium.**
- 3. When a Sheathed Platinum RTD serves to measure a changing temperature fields, there usually exist dynamic error. Therefore please pay attention to select a RTD with suitable thermal response time. The thermal response time is the main factor to determine the dynamic error, and plays an important role in automatic adjustment and control of temperature.**
- 4. When a Sheathed Platinum RTD need to be bended , for avoiding the platinum element and the protective tube broken cause short circuit or open circuit. Please pay attention to the range of 150mm measuring junction prohibits winded.**
- 5. According to customers requirement we could produce all kinds of particular size Sheathed Platinum RTDs and would supply on the basis of technique agreement reached by the two parties.**

VI. Transportation and Storage

Before installation, Sheathed Platinum RTDs should be stored without

vibration and collision till installation. The suitable conditions for storage:the ambient temperature is -20~40℃,the relative humidity is not exceed 80%RH, indoor is ventilated and the ambient atmosphere shall not contain impurities may corrode the Sheathed Pletinum RTDs.

VII.Possible Fault and Service

No.	Fault Appearance	Possible Cause	Service
1	Readings from the display Instrument are infinite great	Open circuit of element or lead wire	Replacement
2	Readings from the display instrument are lower than the actual values	<ol style="list-style-type: none"> 1. The lead wire inside a RTD is short circuit. 2. The fastener inside the terminal box is short circuit. 3. The calibration of RTD and display instrument are not unification. 4. The installing place and immersing depth of the RTD is inadequacy. 	<ol style="list-style-type: none"> 1. Replacement. 2. Clear fastener to eliminate short circuit factors. 3. Change the RTD or the display instrument. 4. Change the installing place or way and change the immersing depth.
3	Readings from the display instrument are higher than the actual values	<ol style="list-style-type: none"> 1. The calibration of the RTD and display instrument are not unification. 2. The installing place and the immersing depth of the RTD are inadequate. 	<ol style="list-style-type: none"> 1. Change the RTD or the display instrument. 2. Change the installing place or way, change the immersion depth.
4	Readings from the display instrument are instability.	<ol style="list-style-type: none"> 1. The RTD lead wire is not well connect with the fastener. 2. There are open circuit, short circuit and ground connection inside the RTD. 	<ol style="list-style-type: none"> 1. Clear terminal box and fastener,reconnection. 2. Be tested by multimeter, if the resistance is not certified, please replaces it.