



SIC
重庆川仪

WZ 系列热电阻

使用说明书

WZ Series Thermal Resistance

Operation Instructions

重庆川仪十七厂有限公司

Chongqing Chuanyi Instrument No.17

Factory Co., Ltd.

特 别 提 示

Particular Notes

本说明书仅限于下列产品使用：

The Instructions is restricted to be applied in the following products:

WZGPK 铠装热电阻

WZGPK sheathed thermal resistance

WZ□装配热电阻

WZ□ thermal resistance assembly

WZPK 铠装芯装配式热电阻

WZPK core-sheathed thermal resistance assembly

WZPKM 铠装多支铂热电阻

WZPKM multiple-branch sheathed platinum
thermal resistance

WZPM 端面热电阻

WZPM end-face thermal resistance

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警告！

Warning!



1. 安装使用前，请认真阅读本使用说明书；
1. Please carefully read the Instructions before installation and use;
2. 隔爆产品严禁带电条件下开盖；
2. Strictly prohibit uncovering any electrified explosion-proof products;
3. 本产品技术规范可能发生改变，恕不另行通知。
3. Changes may happen on the Product Technical Specification, so there will be no further notice.

1. 概述

1. Overview

装配热电阻由感温元件、安装固定装置和接线盒等主要部件组成。

Thermal resistance assembly generally mainly consists of temperature sensing components, fixedly installed devices and junction boxes etc.

装配热电阻执行标准为 GBT 30121-2013 《工业铂热电阻及铂感温元件》。

The executive standard of thermal resistance assembly is GBT 30121-2013 Industrial platinum resistance thermometers and platinum temperature sensors.

铠装铂热电阻是由铂电阻组件、内引线、绝缘材料、金属导管组合而成的坚实体。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，适应性强等特点。

Armoured platinum thermal resistance, a solid device made up of platinum resistance components, intraconnection track, insulation materials, metal conduit and so on, has the characteristics of high precision, perfect stability, small wire diameter, flexible bending, rapid thermal response, good reelability, vibration resistance, pressure resistance, shock resistance, strong adaption etc.

铠装铂热电阻执行标准：Q/CY235-2006 《铠装铂热电阻技术条件》。

Executive standard of armoured platinum thermal resistance: Q/CY235-2006 *Specification of Armoured Platinum Thermal Resistance*

2. 分度表

2. Reference table and tolerance

执行标准:

Executive standard:

JB/T8622-1997 《工业铂热电阻技术条件及分度表》

JB/T8622-1997 *Technical Specification and Reference Table for Industrial Platinum Thermal Resistance*

JB/T8623-1997 《工业铜热电阻技术条件及分度表》

JB/T8623-1997 *Technical Specification and Reference Table for Industrial Copper Thermal Resistance*

3. 最小置入深度

3. Maximum immersion depth

热电阻的最小置入深度应不小于保护管外径的 10 倍。

The minimum merging depth of thermal resistance should be no less than 10 times of external diameter of protective tubes.

4. 热响应时间

4. Thermal Response

4.1 装配热电阻的热响应时间

4.1 Thermal response time of thermal resistance assembly

表 1 装配热电阻的热响应时间

Table 1 Thermal response time of thermal resistance assembly

保护管直径 (mm)	保护管材质	热响应时间 $\tau_{0.5}$ (s)
$\Phi 12$	金属	30~90
$\Phi 16$	金属	30~90
锥形保护管	金属	90~180
铜热电阻 $\Phi 12$	金属	≤ 180

Diameter of protective tube (mm)	Material of protective tube	Thermal response time $\tau_{0.5}$ (s)
$\Phi 12$	Metal	30~90
$\Phi 16$	Metal	30~90
Cone-shape	Metal	90~180

protective tube		
Copper thermal resistance $\Phi 12$	Metal	≤ 180

4.2 铠装热电阻的热响应时间

4.2 Thermal response time of sheathed thermal resistance

表 2 铠装热电阻的热响应时间

Table 2 Thermal response time of thermal resistance

外径 (mm)	热响应时间 $\tau_{0.5}$ (s)
$\leq \Phi 5$	≤ 20
$> \Phi 5$	≤ 30

External diameter (mm)	Thermal response time $\tau_{0.5}$ (s)
$\leq \Phi 5$	≤ 20
$> \Phi 5$	≤ 30

5. 适用环境

5. Application environment

5.1 防护等级

5.1 Protection grade

热电阻接线盒防护等级为 IP66/IP68。

Protection grade of thermal resistance junction box is IP66/IP68.

5.2 非防爆产品

5.2 Non-explosion insulation product

- 热电阻参比端（接线盒外）的温度一般不应超过 100°C ，并保持其稳定不变。

- Temperature of thermal resistance (thermal resistance) reference junction (on the exterior of junction box) should not exceed 100 °C and keep stable and invariant.
- 应避免装在炉门旁边或与加热物体距离过近及具有强磁场之外，热电阻的接线盒不可碰到被测介质的容器壁。
- In addition to avoid being installed on the side of fire door or being close to heating objects as well as having high-intensity magnetic field, Thermal resistance junction box should not contact container wall of mediums measured.

5.3 防爆产品

5.3 Explosion insulation product

通常情况下，防爆电气设备使用的环境温度为-20~+40℃。

In general, electric apparatus for explosive atmospheres should be used under -20~+40℃ environmental temperature.

6. 安装使用要求

6. Installation and use requirements

6.1 连接电缆应采用绝缘（最好是屏蔽）铜线，截面积根据热电阻与显示仪表间的距离而定，但一般不得小于 1.5mm²。电缆的电阻值按显示仪表技术条件规定的资料配准（一般为 5~15Ω），电缆的电阻值可用惠斯顿电桥来调整。

6.1 Insulated (shield preferably) copper wires should be adopted for connections of cables; the section area should be determined according to the distance between thermal resistance and indicating instrument, but it should not be under 1.5mm². The resistance value of cables should be rectified as per the data stated in the technical conditions of indicating instruments (generally 5~15Ω); the adjustment and calibration on resistance value can be conducted by Wheatstone bridge.

6.2应选用具有适当热响应时间的铠装铂热电阻，因为热响应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相当重要的作用。

6.2 Sheathed platinum thermal resistance with appropriate thermal response time should be selected since values of thermal response time are a vital factor and directly proportional to the dynamic errors, so that it plays a significant role in the automatic adjustment and control over temperature.

6.3铠装铂热电阻在使用时，不能在测量端150mm 范围内弯曲，以免造成损坏。

6.3 When using sheathed platinum thermal resistance curves, bending within 150mm from the measuring ends is not allowed in case of damages.

6.4电缆从接线盒的电缆接头引出，并拧紧电缆接头，极性不可接反。

6.4 Cables should be drawn forth from the cable joints inside junction boxes; meanwhile, tightly screw cable joints; and no reverse connection of polarity is allowed.

7. 防爆产品要求

7. Requirements on explosion proof products

7.1安装场所中气体、蒸汽、薄雾状易燃物质的级别不得高于产品铭牌中所规定的级别，运行时接线盒、保护管和固定装置等任何暴露于爆炸性混合物部分的表面温度不得超过产品铭牌中所规定的温度级别。

7.1 Levels of gas, steam, mist shape inflammable materials on installation spot shall not exceed that stipulated in product nameplate. The surface temperature of any part exposed to explosive mixture during

operation, including junction box, protective tube, fixed device and so on, shall not exceed temperature levels stipulated in the product nameplate.

- 隔爆型热电阻在可氧化性或中性气氛中使用，但不适用于强烈氧化气氛。
- Explosion insulation thermal resistance can be used under oxidizable or neutral atmosphere but not to be suitable for strong oxidizing atmosphere.
- 使用隔爆型热电阻时必须选用相匹配的电缆，并注意补偿电缆与热电阻极性相一致。
- During operation of explosion insulation **thermal resistance**, matched compensating lead wire must be selected, which shall conform to the polarity of **thermal resistance**.

7.2隔爆型热电阻（防爆标志“**Ex d II C T6 Gb**”）只能用于爆炸性气体环境，且限于1区、2区危险场所，不能在0区使用。

7.2 Explosion insulation thermal resistance (**explosion sign “Ex d II C T6 Gb”**) shall be only used for explosive gas environment. Moreover, it is limited to be used in hazardous locations of Area 1 and Area 2 and cannot be used in Area 0.

粉尘防爆型热电阻（防爆标志“**Ex t III C Db**”）只能用于可燃性粉尘环境，且限于21区、22区危险场所，不能在20区使用。

Dust explosion insulation **thermal resistance** (thermal resistance) “**explosion sign Ex t III C Db**” shall be only used for combustible dust environment. Moreover, it is limited to be used in hazardous locations of Region 21 and Region 22 and cannot be used in Region 20.

防爆产品使用时，应符合相应防爆等级的有关规定。

Any explosion insulation products shall comply with the relevant regulations on explosion insulation grades when using.

7.3 现场使用时，接线盒的盖子须在切断电源后方可开盖。

7.3 During on-site installation, any junction boxes cannot be uncovered unless being cut off in advance.

7.4 必须防止热流引爆。

7.4 It requires preventing thermal flow detonation.

7.5 对隔爆外壳材质有明显腐蚀的地方不能使用。

7.5 Any places that are obviously capable of corrosive effects on explosion insulation shell materials are not allowed to use.

7.6 电缆应为隔爆阻燃型电缆。

7.6 Compensating lead wires should adopt explosion and flame insulation cables.

7.7 各连接件应保护连接可靠。

7.7 It must make sure reliable protective connections of various fastenings.

7.8 外接地端子必须可靠接地。

7.8 External grounding terminals are required of reliable earthing.

7.9 安装场所存在可燃性气体的温度组别与产品使用中外露部分最高表面温度均应符合下表参数：

7.9 Temperature grading groups of combustible gases in installation site and the maximum surface temperature of product exposed parts during use shall be in consistence with the parameters stated in the table below:

表 3 产品外露部分最高表面温度

Table 3 Maximum surface temperature of product exposed parts

温度组别	T1	T2	T3	T4	T5	T6
允许最高表面温度	440℃	290℃	195℃	130℃	95℃	80℃

Temperature class	T1	T2	T3	T4	T5	T6
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Tolerable maximum surface temperature	440℃	290℃	195℃	130℃	95℃	80℃
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7.10 隔爆铭牌应保持清晰、完好、不得丢失。

7.10 All explosion insulation nameplates shall be distinct and complete; make sure safekeeping and no loss is allowed.

7.11 使用过程中严禁拆卸热电阻中的任何部件。

7.11 Strictly prohibit dismantling any components contained in thermal resistance during use.

7.12 现场安装必须符合“中华人民共和国爆炸危险场所电气安全规程（试行）”和 GB 3836.15-2000 爆炸性环境用防爆电气设备 第 15 部分-危险场所电气安装（煤矿除外）中有关规定。

7.12 Filed installation shall meet the relevant stipulations in “Rules for electrical safety in explosive hazardous areas of the People’s Republic of China (tentative)” and “GB 3836.15-2000 Electrical apparatus for explosive gas atmospheres--Part 15: Electrical installations in hazardous areas(other than mines)”.

8. 接线图

8. Wiring Diagram

在接线时，先打开接线盒盖，然后根据图 1 所示接线板种类查找表 4，按表 4 规定的接线规则进行接线。

First, open the junction box covers; then refer to Table 2 according to the wiring board types shown in Fig. 1; finally, conduct wiring operation as per the relevant rules stated in Table 4.

图 1 热电阻接线板

Fig. 1 Thermal resistance wiring board

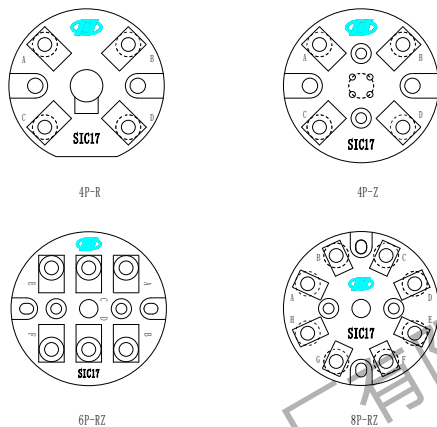


表 4 接线板接线规则

Table 4 Wiring rules for wiring boards

产品类别	接线板类型			
	4P-R	4P-Z	6P-RZ	8P-RZ
铂阻单支式（3 线制）	A+B-D-	—	A+B-F-	—
铂阻单支式（4 线制）	A+C+B-D-	—	A+E+B-F-	—
铂阻双支式（4 线制）	—	—	—	G+H+A-B- C+D+E-F-
铂阻双支式（3 线制）	—	—	A+C-E-, F+D-B-	—
装配阻双支式（3 线制）	—	—	A+C-E-, F+D-B-	—
装配阻单支式（3 线制）	—	A+B-C-	—	—
装配阻单支式（4 线制）	—	A+D+B-C-	—	—

装配阻双支式（2 线制）	—	A+B-, D+C-	—	—
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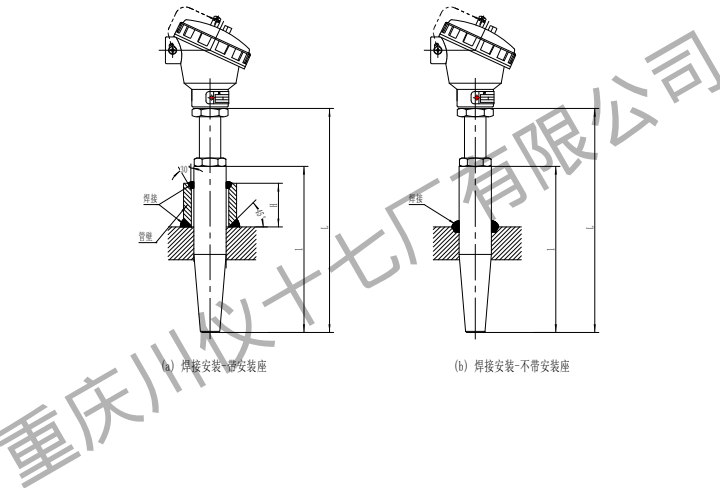
Product category	Type of wiring board			
	4P-R	4P-Z	6P-RZ	8P-RZ
Single-branch sheathed thermal resistance (3 wire system)	A+B-D-	—	A+B-F-	—
Single-branch sheathed thermal resistance (4 wire system)	A+C+B-D-	—	A+E+B-F-	—
Double-branch sheathed thermal resistance (4 wire system)	—	—	—	G+H+A-B- C+D+E-F-
Double-branch sheathed thermal resistance (3 wire system)	—	—	A+C-E-, F+D-B-	—
Double-branch thermal resistance assembly (3 wire system)	—	—	A+C-E-, F+D-B-	—
Single-branch thermal resistance assembly (3 wire system)	—	A+B-C-	—	—
Single-branch thermal resistance assembly (4 wire system)	—	A+D+B-C-	—	—
Double-branch thermal resistance assembly (2 wire system)	—	A+B-, D+C-	—	—

注：实际使用时未在图 1 和表 4 所示的接线板和接线规则中的接线方式，应根据实际标示进行接线。

Note: In actual practice, in case of wiring modes not be indicated and described in the wiring boards and rules respectively stated in Fig. 1 and Table 4, wiring should be conducted according to the actual marks.

9. 典型安装示意图

9. Typical Installation Diagram



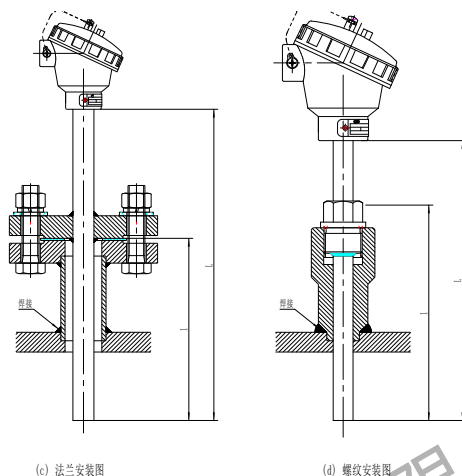


图 2 热电阻典型安装图

Fig. 2 Typical installation diagram of thermal resistance

注：若安装方式为特殊结构，可来电商榷。

Note: in case of applying special construction as installation mode, please call us for negotiation.

10. 维护与修理

10. Maintenance and repair

10.1 维护

10.1 Maintenance

10.1.1 带切断阀产品的维护

10.1.1 Maintenance of products with stop valves

- 不得随意关闭切断阀。一旦关闭，热电阻丝即被切断。
- Closing stop valves at will is not allowed. Thermal resistance wires will be cut down once closing.
- 带切断阀产品的耐磨头损坏时，应立即将切断阀关闭，即将

阀芯旋转 90°。

- If any wear-resisting heads of products with stop valves are damaged, it must immediately close stop valves, e.g. rotate valve cores by 90°.

10.1.2 定期检查

10.1.2 Regular inspection

- 要经常清除隔爆型热电阻外露部分的杂物和易燃物，保持外露部分的清洁，其最高表面温度不得超过相关温度组别中规定的要求。
- It requires frequently clearing foreign articles and inflammables in the exposed positions of explosion insulation thermal resistance to keep any exposing parts clean, and the maximum surface temperature shall not exceed the requirements stipulated in the relevant temperature classes.
- 定期检查接线盒盖、引入装置密封塞是否良好；安装是否牢固；防松装置是否有效；接地是否牢靠。
- Regularly check whether the sealing plugs of junction box covers and entry devices are in complete and serviceable conditions; check and confirm fixed installation; check whether anti-loose devices are in effect; make sure reliable grounding.

10.2 修理

10.2 Repair

表 2 热电阻故障现象及修理方法

Table 2 Thermal resistance fault phenomena and repairing methods

序号	故障现象	可能原因	修理方法
1	热电势比实际应	(1) 热电阻内部	(1) 将热电阻感温元件取出，

序号	故障现象	可能原因	修理方法
	有的小（仪表指示值偏低）	电极漏电（短路） （2）热电阻接线盒内接线柱短路。 （3）热电阻阻丝变质或工作端损坏。	检查漏电原因，若是因潮湿引起，应将热电阻感温元件烘干，若是绝缘管绝缘不良，则应更换。 （2）打开接线盒清洁接线柱，清除造成短路的原因。 （3）更换元件。
2	指示仪表无指示	热电阻断路	更换元件。
3	仪表指示值不稳定（仪表本身无故障的情况下）	（1）接线盒内感温元件和电缆接触不良。 （2）热电极有断续短路和断续接地现象。（3）热电阻安装不牢而发生振动。	（1）打开接线盒，重新紧固。 （2）更换元件。 （3）将热电阻牢固安装。

N o.	Fault phenomenon	Possible cause	Repair method
1	Thermoelectric potential is less than the actual competent value (lower indicated value of instrument)	(1) Electric leakage of internal electrode of thermal resistance (short circuit) (2) Short circuit on binding post in the	(1) Take out the heat responsive element of thermal resistance and check the cause of electric leakage. If it is caused by moist, heat responsive element of thermal resistance should be dried; if it is caused by poor

No.	Fault phenomenon	Possible cause	Repair method
		junction box of thermal resistance (3) Metamorphism of thermo wire or breakdown of working end of thermal resistance.	insulation of insulation tube, the insulation tube should be changed. (2) Open the junction box and clean the binding post to eliminate the cause leading to short circuit. (3) Replace components
2	No indication by instrument	Disconnection of thermal resistance	Replace components.
3	Unsteady indicating value from instrument (if no fault of instrument)	(1) Poor contact of heat responsive element and compensating lead wire in the junction box. (2) Interrupted short circuit and ground connection of thermode. (3) Occurrence of vibration due to unfirm installation of thermal resistance.	(1) Open the junction box and refasten the instrument. (2) Replace components. (3) Install the thermal resistance firmly.

11. 贮存

11. Storage

热电阻应贮存在周围环境温度 10~35℃，相对湿度不高于 80%，且空气中不含可能使零部件腐蚀的介质中。

Thermal resistance should be stored in 10-35 °C surrounding environment temperature with relative humidity less than 80%. Moreover, medium that may corrode the components and parts is not included in the air.

12. 补充说明

12. Supplementary instructions

12.1 产品验收

12.1 Product acceptance

收到本产品后，请及时按产品国家标准或我厂标准规定的出厂检验项目验收。若有质量问题，请于收货之日起一个月内（以用户来函邮戳日期为准）函告我厂，我厂将及时受理。逾期则被视为已验收合格。

After receiving the product, please timely make check and acceptance in accordance with product national standard or factory inspection project specified on the standard of our factory. If there has any quality problem, please inform us in letter within one month after date of receiving (subject to the postmark date of letter from users), we will accept and hear without delay. Expiry will be regarded as accepted and qualified.

12.2 关于热电阻测试问题

12.2 Issues on thermal resistance test

请各位用户在验收时注意几个问题：

Please pay attention to the following items during check and

acceptance:

- (1) 采用相应等级标准监测温度;
- (1) Adopt standard supervising temperature at corresponding levels;
- (2) 标准阻与被测阻的测量端必须在同一等温区;
- (2) The measuring ends of standard resistance and tested resistance must lie in a same isothermal region;
- (3) 保证足够的浸入深度;
- (3) Ensure adequate immersion depth;
- (4) 避免因绝缘体或保护管污染和漏电造成测试误差;
- (4) Avoid those test errors caused by contamination of insulator or protective tubes and electricity leakage;
- (5) 测试时必须温度稳定;
- (5) It requires maintaining a constant temperature during test;
- (6) 标准阻与被测阻参比端置于同一冰点;
- (6) Reference ends of standard resistance and measured resistance should be placed in a same freezing point;
- (7) 连接相同等级的电缆。
- (7) Use cables at the same grade for connection.

12.3 我公司提供的包装物有可能对贵方的环境造成影响, 请妥善处理。

12.3 Please properly dispose the packaging materials supplied by our company that may influence the environment.

13. 附表

13. Annexed table

爆炸性气体分级、分组举例表:

Example Table of Grading and Grouping of Explosive Gases:

类和级			II A	II B	II C
引燃温度 (°C) 与组别	T1	$T > 450$	乙烷、丙烷、丙酮、苯 乙烯、氯乙烯、氨苯、 甲苯、苯胺、甲醇、一 氧化碳、乙酸乙脂、乙 酸、丙烯酸	二甲苯、 民用煤 气、环戊 烷	煤气、氢 气、焦炉 煤气
	T2	$450 \geq T > 300$	丁烷、乙酸、丙烯、丁 醇、乙酸丁脂、乙酸戊 脂、乙酸酐	环氧乙 烷、环氧 戊烷、丁 二烯、乙 烯	乙炔
	T3	$300 \geq T > 200$	戊烷、己烷、庚烷、葵 烷、辛烷、汽油、硫化 氢、环乙烷	异戊二 烯	-
	T4	$200 \geq T > 135$	乙醚、乙醛	-	-
	T5	$135 \geq T > 100$	-	-	二硫化碳
	T6	$100 \geq T > 85$	亚硝酸乙脂	-	硝酸乙烯
注：表中未列入的爆炸性气体见 GB3836.1-2010					

Classification & Grade			II A	II B	II C
Ignition temperature (°C) and groups	T1	$T > 450$	Ethane, propane, acetone, styrene, vinyl chloride, phenalgin, methyl benzene, aniline, methyl alcohol, carbon monoxide, acetic aster, acetic acid, acrylic acid	Dimethyl benzene domestic gas, cyclopentane	Coal gas, hydrogen and coke oven gas
	T2	$450 \geq T > 300$	Butane, ethanol,	Ethylene	acetylene

			propene, butanol, butyl acetate, amyl acetate, acetic anhydride	oxide, pentene oxide, butadiene and ethylene	
	T3	$300 \geq T > 200$	Pentane, hexane, heptane, decane, octane, gasoline, hydrogen sulfide, cyclohexane	isoprene	-
	T4	$200 \geq T > 135$	Ether, acetic aldehyde	-	-
	T5	$135 \geq T > 100$	-	-	Carbon disulfide
	T6	$100 \geq T > 85$	Nitrous ether	-	Ethyl nitrate
Note: See GB3836.1-2010 for explosive gases not listed in the table.					

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