



中外技术合作企业 Sino-Foreign Technical Cooperation Enterprise
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国家级高新技术企业 National High-Tech Enterprise

P-089

电站测温用热电偶、热电阻
Thermocouple and platinum resistor for power plant

WR、WZ 系列
WR、WZ Series

WR、WZ 系列
电站测温用热电偶、
热电阻 (引进法国 CMR 公司制造技术)

WR、WZ Series
Thermocouple and platinum resistor for
power plant (adopt technology of French
CMR)



概述

随着我国电力工业的不断发展，急需各种适用于电站的热电偶和热电阻，以代替进口。本厂为了迎头赶上国际先进水平，同时也为国家节约外汇，先后从国外引进了专业制造技术和设备，并在原有产品基础上，广泛听取了设计院和电站用户的意见，同时参考了美国的 EBASCO 规范，对产品进行重新设计，增加了新的品种，使整个配套系列的品种，规格完全符合国产或引进的 30 万、60 万千瓦发电机组以及国内其它机组的配套需要，并以优异的质量来满足市场，应符合，JB / T9238-1999 及 JB / T8622-1997 标准。

Overall

With our country electric power industry development, various thermocouple and thermal resistance suited for power plant are needed to replace the imports. Our factory in order to catch up with the international advanced level, but also save the country foreign exchange, has introduced from abroad the professional manufacturing technology and equipment, and on the basis of original products, widely listen to the design institute and the opinions of the power users, at the same time, the American EBASCO reference specification, to product redesigned, added new varieties, making the specifications of the whole matching series fully compliance with the domestic or the imported 300000,60000KW generators and other domestic units. and with excellent quality to meet market, should conform to, JB/T9238-1999 and JB/T8622-1997 standard.

量程规格 Range specifications

类别 Type	代号 Code	分度号 Graduation	测温范围 Temperature measuring range℃	精度等级 Accuracy class	允许偏差 Allowable deviation Δt
镍铬 - 镍硅 nickel-chromium nisiy	WRNT	K	0~800	I	$\pm 1.5^{\circ}\text{C}$ 或 $\pm 0.004 t $
				II	$\pm 2.5^{\circ}\text{C}$ 或 $\pm 0.0075 t $
镍铬 - 铜镍	WRET	E	0~600	I	$\pm 1.5^{\circ}\text{C}$ 或 $\pm 0.004 t $
				II	$\pm 2.5^{\circ}\text{C}$ 或 $\pm 0.0075 t $
铜 - 铜镍	WRCT	T	-40~350	I	$\pm 0.5^{\circ}\text{C}$ 或 $\pm 0.004 t $
				II	$\pm 1^{\circ}\text{C}$ 或 $\pm 0.75\% t $
铂电阻	WZPT	Pt 100	-200~500	A 级	$\pm (0.15+0.002 t)$
				B 级	$\pm (0.30+0.005 t)$
铜电阻	WZCT	Cu 50	-50~100	II	$\pm (0.30+6.0\times 10^{-3} t)$

注：“t”为感温元件实测温度，对于铂电阻和铜电阻则为感温元件实测温度的绝对值。
Notes: "T" for temperature elements actual temperature, for platinum resistance and copper resistance is temperature elements of the absolute value of actual temperature.

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公称压力

一般是指在常温下，保护管所能承受的静态外压而不破裂，试验压力一般采用公称压力的 1.5 倍。实际上，允许工作压力不仅与保护管材料、直径、壁厚有关，而且还与其结构形式、安装方法、置入深度以及被测介质的流速、种类有关。

Nominal Pressure

PN usually means the static outside pressure that can be contained by the protecting pipe without breaking in the normal temperature . the test pressure is adopted with 1.5 times of PN . In fact , the allowable working pressure not only has relationship with the pipe material , diameter , wall thickness , but also are relevant to the structure , installation method , inserting depth ,flow rate and type of measured

热电偶绝缘电阻

常温绝缘电阻的试验电压为直流 500V。测量常温绝缘电阻的大气条件为：温度 15-35℃，相对湿度 45%，大气压力 86~106kPa。对于长度超过 1 米的热电偶，它的常温绝缘电阻值与其长度的乘积应不小于 1000M Ω •m，
即：Rr•L>1000M Ω •L>1m
式中：Rr-- 热电偶的常温电阻值，M Ω
L- 热电偶的长度，m
对于长度等于或不足 1 米的热电偶，它的常温绝缘电阻值应不小于 1000M Ω。

Thermocouple insulation resistance

Normal temperature of insulation resistance test voltage is dc 500 V. Measuring insulation resistance at the atmospheric conditions for: temperature 15-35 ℃ and 45% relative humidity, air pressure 86- 106 kPa.
For thermocouple longer than 1m, the product of it's insulation resistance and length is not less than 1000 M Ω m.,
Mean: Rr•L>1000M Ω L>1m
Rr, thermocouple resistance, M Ω L-the length of the thermocouple, for length equal to or inadequate L M thermocouple, it's normal temperature insulation resistance value should be no less than 1000 M Ω .

热电阻绝缘电阻

常温绝缘电阻的试验电压可取直流电 10 — 100V 任意值，环境温度应在 15 — 35℃ 范围内，相对湿度应不大于 80%，常温绝缘电阻值不小于 100M Ω。

Insulation resistance

Insulation resistance ambient temperature test voltage is DC 10~100V, environmental temperature should be in 15 — 35 ℃ scope, relative humidity should be no more than 80%, normal temperature insulation resistance value is not less than 100 M Ω .

热电阻允许通过电流

通过铂电阻的测量电流最大不超过 5mA。

Thermal resistance allow through the current

Through the platinum resistance to measure the current maximum of not more than 5 mA.

热套式电偶

热套式电偶主要用于测量蒸汽管道及锅炉温度。热电偶采用热套保护管与电偶可分离方式，使用时，用户可将热套焊接或机械固定在设备上，然后装上电偶就可工作，它的优点是提高了保护管的工作压力和使用寿命，又便于电偶的维修或更换，目前这种结构形式被国外广泛采用。
本厂生产的热套保护管采用引进设备和深盲孔技术加工而成，端部不用焊接，提高了热套保护管的强度和使用寿命。
热套式热电偶产品有五种不同的结构和安装方式，用户可根据不同的温度、压力及蒸汽流速来选用，安装尺寸及方式参照 EBASCO 规范。

Hot jacket thermocouple

Hot-jacket thermocouple is used to measure vapor pipeline and boiler. Hot-jacket protection tube and thermocouple are separated. Weld or fix the hot-jacket on the device, and install thermocouple then it works. It improves service life and working pressure, easy to repair, popular among customers.
Hot-jacket protection tube we produce is made of im-ported equipment adopting the deep blind hole techno-logy,and the end need not to be welded which improve the strength and life of the thermal protection tube set.
Hot-jacket thermocouple products have five different structure and installation, users can according to different temperature, pressure and steam flow velocity to choose, installation size and type EBASCO standard reference to party.





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Thermocouple and platinum resistor for power plant

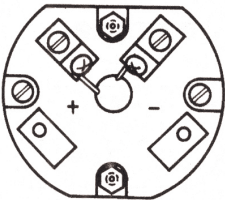
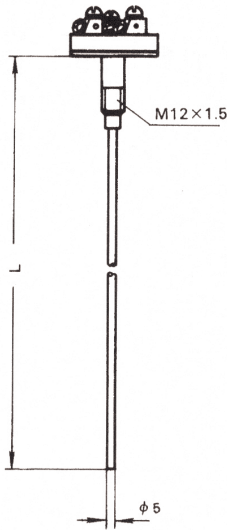
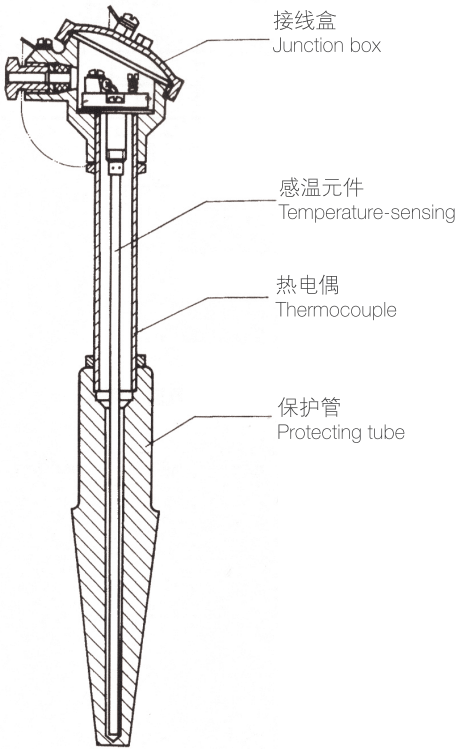
WR、WZ 系列
WR、WZ Series

热电偶感温元件 Thermocouple temperature sensing element

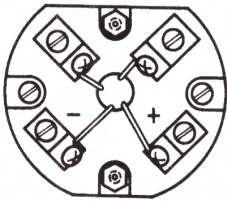
名称 Name	型号 Type	分度号 Graduation	长度 Length mm
单支感温元件 Single temperature -sensing elements	WRNT — 001	K	250 800
双支感温元 件 Double temperature -sensing elements	WRNT ₂ — 001		300 850
			350 900
			400 950
			450 1000
单支感温元件 Single temperature- sensing elements	WRNT — 001	E	500 1050
双支感温元 件 Double temperature- sensing elements	WRNT ₂ -001		550 1400
			600 2270
			650 2770
			700 3200
			750 3500

用途：可做热电偶直接使用，亦可作为热套式热电偶维修更换元件使用。
Usage: can be used as a thermocouple as well as a replace component .

热套式热电偶结构示图 Hot jacket type thermocouple structure diagrams



单支元件接线端子
Single element terminals



双支元件接线端子
Double component terminals

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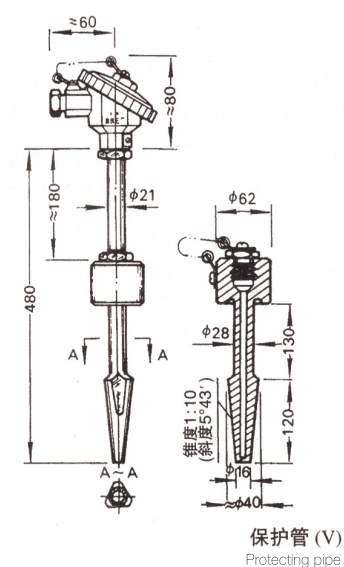


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热套式热电偶 Hot jacket thermocouple

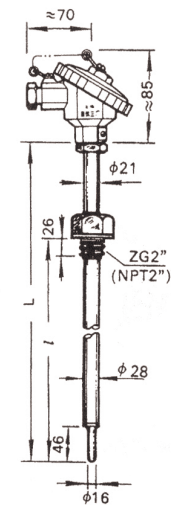
名称 Name	型号 Type	分度号 Graduation	测温范围 Temperature measuring range	公称压力 Nominal pressure	流速 Flow rate	保护管材料 Protection tube material
单支热电偶 Single thermocouple	WRNR — 01	K	0~600℃	≤ 29.4MPa	≤ 100m/s	不锈钢 1Cr18Ni9Ti Stainless Steel
	WRER — 01	E				
双支热电偶 Twin double thermocouple	WRER ₂ — 01	K				
	WRER ₂ — 01	E				



烟道、风道热电偶 Smoke channel and wind channel thermocouple

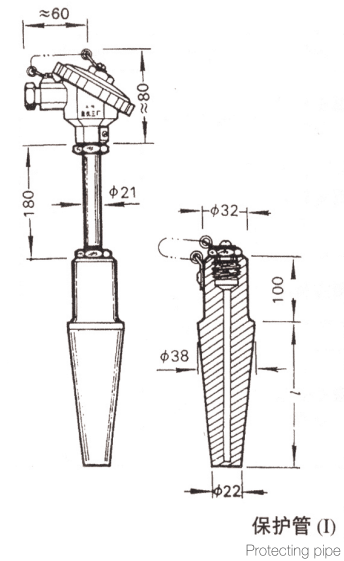
用途：使用在烟道及风道上测温
applied in measuring the temperature of smoke and wind channel

名称 Name	型号 Type	分度号 Graduation	测温范围 Temperature measuring range	公称压力 Nominal pressure	保护管材料 Protection tube material	LX l mm
单支热电偶 Single thermocouple	WRNR — 12	K	0~800℃	9.8MPa	不锈钢 1Cr18Ni9Ti Stainless Steel	480x230 680x430 880x630 1380x1130
	WRER — 12	E	0~600℃			
双支热电偶 Twin thermocouple	WRNR ₂ — 12	K	0~800℃			
	WRER ₂ — 12	E	0~600℃			



高温高压热电偶 High temperature and pressure thermocouple

名称 Name	型号 Type	分度号 Graduation	测温范围 measuring range	公称压力 Nominal pressure	流速 Flow rate	保护管材料 Protection tube material
单支热电偶 Single thermocouple	WRNR — 13	K	0~565℃	≤29.4MPa	≤ 100m/s	不锈钢 1Cr18Ni9Ti Stainless Steel
	WRER — 13	E				
双支热电偶 Double thermocouple	WRNR ₂ — 13	K				
	WRER ₂ — 13	E				



置入长度：50，100，150 l ≤100mm 时，保护管可用于 600℃。
Inserting (mm): 50，100，150 l ≤100mm 时，Protecting tube can be used to 600℃.



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WR、WZ 系列
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中温中压电偶 Middle temperature and pressure thermocouple

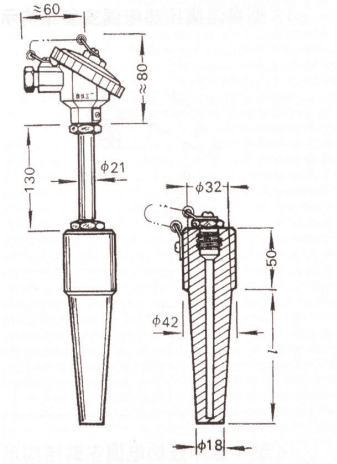
名称 Name	型号 Type	分度号 Graduation	测温范围 measuring range	公称压力 Nominal pressure	流速 Flow rate	保护管材料 Protection tube material
单支热电偶 Single thermocouple	WRNR — 14	K	0~340℃	≤14.7 MPa	≤ 30m/s	不锈钢 1Cr18Ni9Ti Stainless Steel
	WRER — 14	E				
双支热电偶 Double thermocouple	WRNR ₂ — 14	K				
	WRER ₂ — 14	E				

置入深度: 50, 100, 150, 200, 250, 300 $l \leq 250\text{mm}$ 时, 保护管可用于 600℃。
Inserting(mm): 50, 100, 150, 200, 250, 300 $l \leq 250\text{mm}$, Protecting tube can be used to 600℃ .

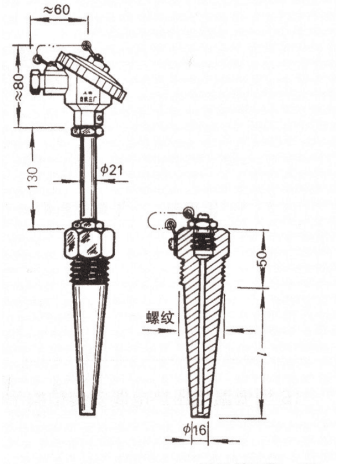
低温低压电偶 Low temperature and pressure thermocouple

名称 Name	型号 Type	分度号 Graduation	测温范围 measuring range	公称压力 Nominal pressure	流速 Flow rate	保护管材料 Protection tube material
单支热电偶 Single thermocouple	WRNR — 15	K	0~260℃	≤9.8 MPa	≤ 9m/s	保护管 M33*2 Protective tube (III)
	WRER — 15	E				
双支热电偶 Double thermocouple	WRNR ₂ — 15	K				保护管 ZGI"(NPT1") Protective tube (IV)
	WRER ₂ — 15	E				
单支热电偶 Single thermocouple	WRNR — 15A	K				
	WRER — 15A	E				
双支热电偶 Double thermocouple	WRNR ₂ — 15A	K				
	WRER ₂ — 15A	E				

保护管材料: 1Cr18Ni9Ti 不锈钢
置入深度 (mm): 50, 100, 150, 200, 250, 300, 350, 400, 450, 500 ($l \leq 250\text{mm}$ 时, 保护管可用于 600℃)。
Protection tube material: 1Cr18Ni9Ti Stainless Steel
Length(mm): 50, 100, 150, 200, 250, 300, 350, 400, 450, 500 ($l \leq 250\text{mm}$, Protecting tube can be used to 600℃)



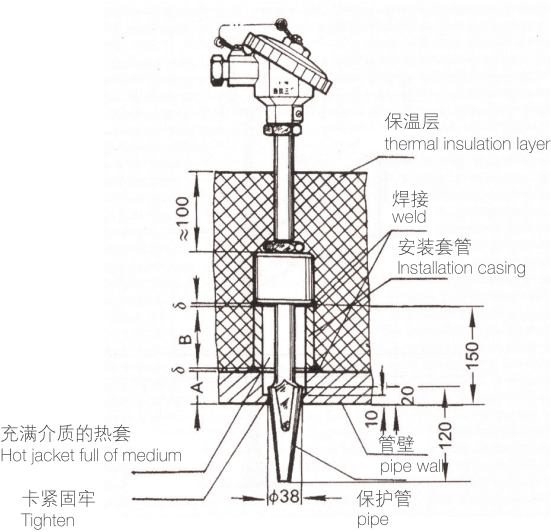
保护管 (II)
Protecting pipe



保护管 (III)、(IV)
Protecting pipe

安装结构示意图 Installation structure diagrams

01 型热套式热电偶安装结构示意图
Diagram of 01 type hot-jacket thermocouple



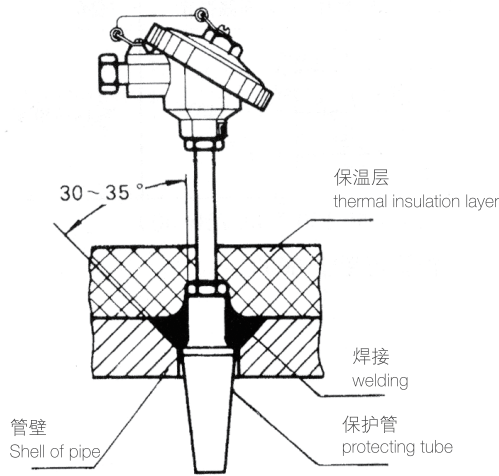
电站测温用热电偶、热电阻
 Thermocouple and platinum resistor for power plant



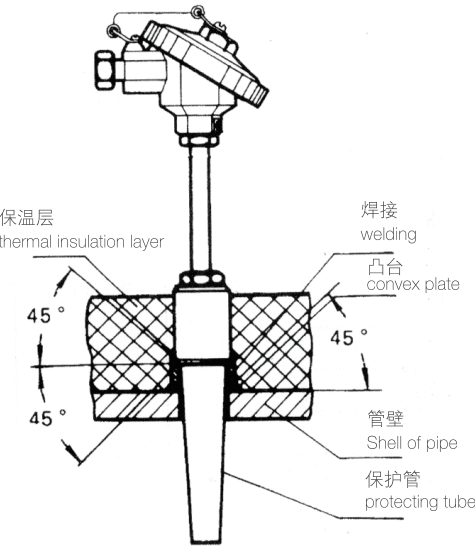
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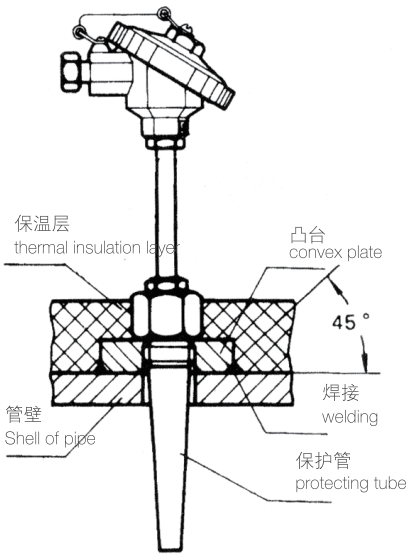
13 型高温高压热电偶安装结构图
 Installation diagrams of 13 type High temperature high pressure thermocouples



14 型中温中压热电偶安装结构图
 Installation diagrams of 14 type temperature medium voltage thermocouples



15 型低温低压热电偶安装结构图
 Installation diagrams of 15 type Low temperature low voltage thermocouples



温度仪表系列 Temperature Instruments series



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轴承温度计 Bearing thermometer

轴承铂电阻温度计和轴承热电偶温度计主要用于测量电站各种带有轴承设备的轴承温度，温度计带有避震结构使之能紧贴在被测轴承表面，从而提高了温度的测量的准确性。

Bearing platinum resistance thermometers and bearing thermocouple thermometer is mainly used for measuring power plant bearings, shock-proof structure of thermometer makes it close the bearing surface, so as to increase the temperature of the accuracy of the measurement.

轴承热电偶 Bearing thermocouple

名称 Name	型号 Type	分度号 Graduation	测温范围 Temperature measuring range	保护管长度 Protection tube length mm
单支轴 承热电偶 Single shaft bearing thermocouples	WRNT — 31	K	0~200℃	100
	WRET — 31	E		150
双支轴 承热电偶 Double shaft bearing thermocouples	WRNT ₂ — 31	K		200
	WRET ₂ — 31	E		250
				300

轴承热电阻 Bearing thermal resistance

名称 Name	型号 Type	分度号 Graduation	热响应时间 Thermal response time	测温范围 measuring range	保护管长度 Protection tube length mm	精度等级 Accuracy class
轴承铂 电阻 Bearing platinum resistance	WZPT — 31	Pt100	$\tau_{0.5} \leq 20s$	0~100℃	100 150 200 250 300	B 级 B class

其它用途热电偶、热电阻

Other application of thermocouple and thermal resistance

锅炉炉壁热电偶 The boiler furnace wall thermocouples

锅炉炉壁热电偶采用 $\Phi 4mm$ 的铠装热电偶做测温元件，做成电缆状，热接点紧固在带有不同曲面的不锈钢导热板上，可用于锅炉管壁、炉壁及其它圆柱体表面的测量温度。
技术条件符合 GB / T18404-2001 规定。

The boiler furnace wall thermocouple uses the 4mm armoured thermocouple as thermometric element which is made into cable form, the hot contact tightened in the stainless steel heat conduction board with different surface, and it can measure the temperature of the boiler tube wall, furnace wall and surface temperature of other cylinders. Technology condition according to GB/T18404-regulations.

WRNT — 11, WRET — 11

测温范围 Temperature measuring range℃: (WRNT — 11)0~800
(WRET — 11)0~600

分度号 Graduation: K 或 E K or E

热响应时间 Thermal response time $T_{0.5}S$: 接壳式 Shell types ≤ 0.8
绝缘式 Insulation types ≤ 2.5

安装方式 Installation Method: 三点焊接 Three welding (A 部为焊接点或用 M8 螺钉固定 A department for welding points or with M8 screws)

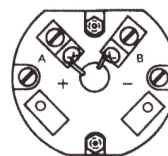
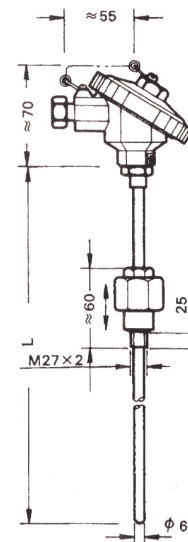
曲面 R 尺寸 Surface R size: R=29mm, R=100mm

导热板面积 Thermal conductive plate area: 20X40mm²

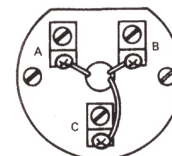
结构方式 Structure: 接壳式 shell type (最长 L=25000mm)

绝缘式 Insulation type (最长 L=8000mm)

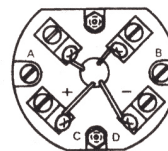
长度 L mm: 3000, 4000, 6000, 8000, 10000, 15000, 20000, 25000



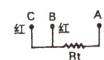
单支热电偶接线端子
Single thermocouple terminals



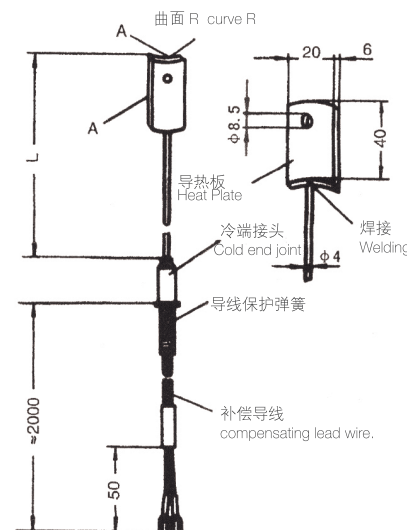
热电阻接线端子
Thermal resistance terminals



双支热电偶接线端子
Double thermocouple terminals

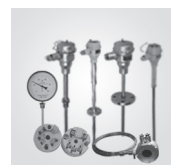


热电阻接线图
Electric connection



电站测温用热电偶、热电阻

Thermocouple and platinum resistor for power plant



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电机铁芯热电偶 Motor Core thermocouple

电机铁芯热电偶主要用于测量电机的定子铁芯温度，它除具有一般热电偶的特性外还具有抗振、耐压等优点，它的外保护层由非金属绝缘材料构成薄片状，因此具有良好的绝缘性能。使用时，可直接嵌入电极的铁芯，它与显示、记录、调节仪配合能直接测量 0~150℃ 范围内温度。

Motor iron core thermocouple is mainly used for measuring the motor stator core temperature, besides the characteristics of general thermocouple also has such advantages as ant-vibration, compression, its protective layer outside by a thin insulation materials nonmetal sheet, therefore it has a good insulation performance. When using, can direct embedded electrode iron core, work with display, recording, adjusting instrument it can direct measure of 0-150-C range temperature.

WRCT — 01

测温范围 Temperature measuring range: 0~150℃

分度号 Graduation: T

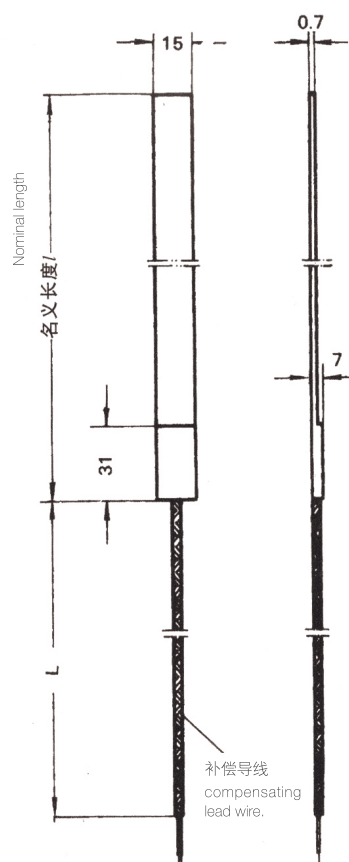
热响应时间 Thermal response time: $\tau_{0.5} \leq 30$

名义长度 Name length | 和补偿导线长度

Compensation conductor length (mm):

60X2500, 294X4000, 390X4500

570X4500, 590X4800, 797X12700



电机绕组铜电阻 Motor winding copper resistance

电机绕组铜电阻主要用于测量大、中、小、型电机绕组、定子及其它小间隙表面测温场合，它除具有热电阻的一般特性外，还具有抗振、耐压等优点，保护片采用非金属绝缘材料提高了元件的绝缘性能，它是电力工程中必不可少的测温元件。

Motor winding copper resistance is mainly used for measuring large, medium and small, type motor winding, stator and other small gaps surface temperature it is in addition to the general nature of thermal resistance, still have such advantages as ant-vibration, compression, protection of the non-metallic insulating materials improve the insulation performance of components, it is essential to the electric power project temperature sensor.

WZCT — 201

测温范围 Temperature measuring range: 0~120℃

分度号 Graduation: Cu50

电阻比值 Resistance ratio: $W=R100 / R0=1.428 \pm 0.002$

$R0=50 \pm 0.050 \Omega$

压力试验 Pressure test: 平面静压不小于 0.14Mpa

The static pressure not less than 0.14 Mpa plane.

热响应时间 Thermal response time: $\tau_{0.5} \leq 30$

