I. Overview

Armored TC is the new temperature sensor, a slender build, heat fast response, anti-vibration, high pressure resistance, such as a long life. And show their support instrument can be realized on the gas, liquids and solid surface temperature of the automatic detection or automatic adjustment, widely used in petroleum, chemical industry, metallurgy, machinery, electricity, textile, food, atomic energy, aerospace and other industrial sectors, and science and technology Areas, especially suitable for installation in the pipeline narrow bend and requirements of rapid reaction, special occasions, such as miniature.

I plant in 1985, Okazaki, Japan introduced by the manufacturer produced a full set of armor thermocouple advanced technology and equipment. This created by WR □ K and WRG □ K series armoured thermocouple according to the International Electrotechnical Commission IEC standards of production, the latest products in line with the state professional standards.

II. the role of principle

Armored thermocouple the role of principle, is based on the Seebeck (Seebeck) effect, that is: If two different components of heterogeneous conductor (hot electrode) of closed-loop, when the

temperature gradient exists at both ends, out of loop Current through, then there is between the two ends of Seebeck potential - thermoelectric potential.

Note: the thermocouple hot EMF-year-old rising temperature increases, its size and potential of thermoelectric materials and TC thermocouple ends of the temperature, and the hot electrode and the length, diameter has nothing to do.

III. Armored thermocouple the basic properties:

Variety	Model		Indexing	Tolerance levels		
				I	II	III
	Commission set up	Introduction		Tolerance value (±)	Tolerance value (±)	Tolerance value (±)
Ni-Cr --Nickel Silicon	WRNK	WRGKK	K	1.5℃or 0.4%t	2.5℃or 0.75%t	2.5℃or 1.5%t
Ni-Cr silicon -Silicon Nickel	WRMK	WRGNK	N			
Ni-Cr - Kangtong	WREK	WRGEK	E			
Rail - Kangtong	WRFK	WRGJK	J			
Copper - Kangtong	WRCK	WRGTK	T	0.5℃or 0.4%t	1℃or 0.75%t	1℃or 1.5%t

Variety	Model		Indexing	Tolerance value (±)
	Commission set up	Introduction		
Platinum and rhodium 10 - Platinum	WRPK	WRGSK	S	3℃ or0.5%t
Platinum and rhodium 13 - Platinum	WRQK	WRGRK	R	

Platinum and rhodium 13 - platinum and rhodium 6	WRRK	WRGBK	B	4℃or0.5%t

Note: (1) t is measured temperature (℃), in the same field are the two values of tolerance, for the greater absolute value.

(2) -40 ℃ over the temperature range in line with Ⅰ, Ⅱ level of tolerance T, E, K thermocouples, also requested in -40 ℃ with the following grade Ⅲ Tolerance, from factories and users agreed.

IV. Armoured thermocouple casing material, diameter and temperature range

Variety	Casing materials	Diameter (mm)	The maximum temperature (℃)
Ni-Cr - nickel-silicon(K)	Stainless steel 1Cr18Ni9Ti	0.25	250
		0.5、1.0	400
		1.5、2.0	600
		3.0、4.0、4.5、5.0、6.0、8.0	800
	High-temperature alloy steel GH3030	0.25	300
		0.5、1.0	500
		1.5、2.0、3.0	800
		4.0、4.5、5.0	900
		6.0、8.0	1000
Ni-Cr silicon - Silicon nickel (N)	Stainless steel 1Cr18Ni9Ti	0.25	250
		0.5、1.0	400
		1.5、2.0	600
		3.0、4.0、4.5、5.0、6.0、8.0	800
	High-temperature alloy steel GH3030	0.25	300
		0.5、1.0	500
		1.5、2.0	800
		3.0、4.0、4.5	900
		5.0、6.0、8.0	1000
Ni-Cr - Kang Tong	Stainless steel	0.5、1.0	400

(E)	1Cr18Ni9Ti	1.5、2.0	500
		3.0、4.0、4.5、5.0 6.0、8.0	600
Rail - Kang Tong (J)	Stainless steel 1Cr18Ni9Ti	0.5、1.0	300
		1.5、2.0	400
		3.0、4.0、4.5、5.0	500
		6.8、8.0	600
Copper - Kang Tong (T)	Stainless steel 1Cr18Ni9Ti	0.5、1.0	200
		1.5、2.0、3.0、4.0、 4.5、5.0	250
		6.0、8.0	300
Platinum and rhodium 10 - Platinum (S) Platinum and rhodium 13 - Platinum (R)	High-temperature alloy steel GH3039	2.0、3.0、4.0、4.5	1000
		5.0、6.0	1100
	Platinum and rhodium 6	2.0、3.0、4.0、4.5 5.0、6.0	1100
Platinum and rhodium 30 -- Platinum and rhodium 6 (B)	Platinum and rhodium 6	2.0、3.0	1200
		4.0、4.5、5.0、6.0	1300

Note: The use of temperature and tested medium conditions and environmental conditions and other factors, the only reference to the user, measuring end-to-open, the temperature should be reduced accordingly.

V. insulation resistance at room temperature

Dual-sheathed insulation in the ambient temperature of 20 ± 15 ℃, relative humidity of not more than 80 percent, the heat between the electrode and the coat of insulation resistance shall meet the following requirements.

Armored dual diameter (mm)	Test voltage (DC V)	Insulation resistance M Ω • m
0.25	50±5	≥100
0.5~1.5	50±5	≥1000
>1.5	500±50	≥1000

Notes: 1. Insulation resistance with M Ω • m, which is normal temperature insulation resistance and the length of the armoured dual product, for example: 1000 M Ω • m said

1m long sample of the insulation resistance of 1000 M Ω

10m long sample of the insulation resistance of 100 M Ω

The length of less than 1 m of armoured dual calculated by 1 m

2. Conductor with the compensation of its armoured even at room temperature insulation resistance provided by GB4989

3. With metal connectors armoured even its normal temperature insulation resistance and armoured even the product of the length of ≥ 100 M Ω • m

VI. Armored thermocouple the largest thermal response time τ0.5 the following table (in seconds)

Armored dual diameter (mm) / Heat response time τ0.5 / Measurement-type	0.25	0.5	1.0	1.5	2.0	3.0	4.0	4.5	5.0	6.0	8.0
Lu--	-	-	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0
Next Shell	0.1	0.2	0.2	0.3	0.4	0.6	0.8	1.0	1.2	2.0	4.0
Insulation -	0.2	0.4	0.6	0.8	1.0	2.0	2.5	3.0	4.0	6.0	8.0

Note: thermal response time of armoured thermocouple measurement since the end in the air at room temperature in the

rapidly into the boiling water, until the temperature reaches the entire temperature range of 50 percent instantaneous only the time required.

VII. the installation of armoured thermocouple

1, armoured thermocouple installation, should be avoided in the Furnace Door next to or from heating too close to objects, and has a strong magnetic field, the junction box should not be measured met the vessel wall media. Armored thermocouple reference-the temperature should not generally exceed 100 ℃, if the Senate than the end of the sets of polythene plastics, generally should not exceed 80 ℃.

2, armoured thermocouple depth can be inserted into the actual needs and circumstances decision, the general sheathed thermocouple not less than six times the diameter.

3, armoured thermocouple length of the exposed, the user should be based on the level of their environmental temperature and the size of the position be identified. And to install a suitable casing, or support to platen support, pinched and fixed. To prevent the Senate than the end (junction box) shaking and damage. In the medium measured by a higher level position or velocity at the time of installation, preferably in its support to insert some protection against fracture or bending from side measurement.

4, sheathed thermocouple measuring surface temperature, it should be possible to measure the surface Tiejin detected objects to maintain good contact with heat, reduce measurement error.

5, junction box down the Chuxian the best-placed to prevent water vapor, dust and Zangwu, such as falling into the cable box.

6, card sets of devices are simple, user-friendly features, under pressure of the fixed-armoured card sets Thermocouple, be sure to adjust the depth inserted immediately after the fight to be tight, the attention of appropriate force to ensure that Pressure to seal without damage to the request.

Fixed-card sets of devices used for the first time again, the insertion depth is adjustable, once tightened, is no longer deep into adjustable.

Moving card sets of devices, into the deep is adjustable, but not under pressure, if appropriate to join the auxiliary sealed seasoning (such as asbestos rope, etc.), can also be sealed up to a certain degree of demand.

7, armoured dual hot wiring

Thermocouple connection, to check whether the compensation wire, thermocouple points of agreement, unanimously confirmed only after the wiring. Thermocouple connection when. You open the junction box, click on map-circuit blocks. Wiring must be solid.

Compensation for the Chuxian wire-gap, with rubber gaskets, Saijin hollow after tightening bolts, and then cover lid of wiring, cables and wires attention should be paid compensation thermocouple Instruments Posts and show that the polarity, non-access. The socket structure, attention should be paid wiring signs: "+" positive "-" negative.

Compensation for the protection of wire without external mechanical damage and the magnetic field caused by the electronic display instruments of interference, compensation should be shielded wires, wires and other compensation to the best grounding into the pipe, wire without compensation, and other twists and turns to return Phenomenon.

In addition to dual-dual-armoured, single-armoured dual switch in the non-use of the circumstances, can not be connected at the same time for two millivolts, at the same time we should not connect one millivolts and a Taipower potentiometer, Otherwise, the low will cause instructions or guidelines, such as beating phenomenon.

VIII. Armored thermocouple:

Armored Thermocouple Temperature inserted after a certain period of time, the general temperature can be measured as the actual temperature measured object. In fact, armoured thermocouple and the environment between the heat to a certain extent, with the end

result of the survey measured the temperature difference between objects, measured the temperature lower than the actual temperature, otherwise high deviation.

In order to maximize the heat and the elimination of error, the general use of the following measures:

(1) reduce the radiation factor thermocouple.

(2) increase the cycle of measured media, the pressure in the permit conditions, as far as possible, thermocouple and tested medium to spread the heat increased.

(3) should do everything possible to reduce the diameter of the thermocouple.

(4) increase the thermocouple insertion depth, as far as possible, so that some increase in heating thermocouple.

(5) as far as possible, using small heat transfer coefficient of the material for armoured casing. To heat faster response time, reduce the dynamic error, should be used thermal conductivity of the material. There are contradictions between the two should be based on actual need to be care for.

In addition, the thermocouple when used on certain occasions, should pay attention to heat between the earth electrode and should maintain good insulation, otherwise there will be a thermoelectric potential loss directly affects the accuracy of the measurement results,

serious, even Instruments will affect the normal operation. When thermocouples used to measure changes in temperature field, often the existence of dynamic error. Therefore, attention must also choose a proper response to the thermocouple hot. The size of the response time is to determine the size of a dynamic error factors, and in proportion with the same time, it's automatic temperature control and temperature regulation and the rapid determination, and so plays an important role.

In short, in the use of armoured thermocouple temperature, we must first correct selection and reasonable to install and use, also of the need to avoid contamination, and where possible, to try to eliminate all outside influence, reducing the additional errors, so as to achieve Measuring accurate, simple and durable, and other purposes. Armored hot spots should be kept or even conduct regular inspections and measures to ensure the reliability of its use. Inspection of the project are: Armored dual surface erosion, parts defects, insulation resistance, reciprocating and electrical characteristics such as resistance.

IX. the fault may occur and repairs

NO.	Occurrence	Possible reasons for	Repair methods
1	Potential output without thermoelectric	1. Electrode opening heat 2. Measurement or reference-point opening-welding	1. Replacement 2. Re-welding 3. Replacement

		3. Thermoelectric very very same name	
2	Thermoelectric potential than the value should be small (measuring instrument that the low value)	1. Thermocouple internal electrode leakage (short circuit) 2. Thermocouple internal moisture absorption 3. Short-circuit wiring box Posts 4. Compensation wires short-circuit 5. Metamorphic extremely hot or damage measurement - 6. Compensation to the anti-polarity wire 7. Compensation wire varieties configuration errors 8. Thermocouple installation location or improper insertion depth 9. Thermocouple reference high-temperature 10. Thermocouple varieties inconsistent with the instrument calibration	1. Thermoelectric potential test, measurement check-welding conditions. If the unqualified and should be replaced or re-welding 2. Zhaoou table with check insulation resistance, the failure should be replaced or cut, dried and re-welding 3. Clean wiring boards, to eliminate short-circuit factors 4. Short-circuit the re-wire insulation or replacement of compensation. 5. Metamorphic part of the cut, re-measurement of welding. 6. Diverted to re - 7. Thermocouple replaced with the corresponding compensation wire 8. Change the location or method of installation, insert the depth of change 9. Reference to the right-temperature compensation 10. Thermocouple and compensation for the replacement of wire, or the replacement of display instruments, make it compatible.

3	Thermoelectric potential to be the largest numerical (measuring instrument that high value)	1. Thermocouple species and display instruments do not match. 2. Compensation wire inconsistent with the thermocouple varieties	1. Thermocouple and compensation for the replacement of wire, or the replacement of instruments, make it compatible 2. Thermocouple replaced with the corresponding compensation wire
4	Measuring instruments showed the value of instability (in the instrument did not fault the circumstances)	1. Thermocouple Posts connection is bad and very hot 2. Thermocouple have intermittent short circuit or grounding of intermittent 3. Hotspots have been very broken, or breaking off and did not connect with intermittent phenomenon 4. Thermocouple does not install a solid swing 5. Grounding wire compensation, the phenomenon of intermittent short circuit or open circuit	1. Thermoelectric clean junction box and the Department of extremism, re-link good 2. Multimeter check with dual line resistance values, the failure should be replaced 3. Multimeter check with dual line resistance values, the more unqualified to be replaced 4. Thermocouple will be firmly installed 5. To find fault and the repair, replacement or compensation wire
5	Thermocouple changes THERMOELECTRIC POWER	1. Metamorphic hot electrode 2. Thermocouple improper installation location or method	1. Replacement 2. Change the location or method of installation

Note: When found more fault conditions, compensation should be separated from wires and junction box, and then check each

thermocouple wire and compensation, to be determined fault lies, and then for treatment.

X. transport and preservation

Armored thermocouple and its annex in the installation, must be kept in shock from the collision and where the most suitable conditions for the storage places: the ambient temperature 20 ± 15 ℃, the relative temperature of not more than 80 percent of ambient air should not be Another instrument may contain pieces of corrosion of the medium.

Armored thermocouple in the process of long-distance transport should be carefully packaged

XI. added

1、product acceptance. After receiving this product, please promptly by national standards or products in our factory standards for factory acceptance test items. If it has quality problems, from the date of the receipt within one month (postmark date of the communication users), I set out plants, I plant will promptly accepted. Late acceptance is deemed to have qualified.

2、thermoelectric potential test on the issue. Potential is a thermoelectric-voltage test, coupled with outside influence, control the temperature deviations many factors, uV level test accuracy is very difficult, plus the wear-resistant thermoelectric potential

inherent in the dual temperature, vibration, and other conditions affecting difficult to achieve fixed. Members user acceptance attention when several questions: (1) used to monitor temperature corresponding grades (2) with the dual standards of measurement-even measured in the same, and so must the temperature (3) ensure sufficient depth immersion (4) avoid Insulator, or the protection of the pollution caused by leakage test and error (5) tests the temperature must be stable (6) and measured dual standard dual-placed in the Senate than the same freezing point (7) the same level of compensation for connecting wires.