

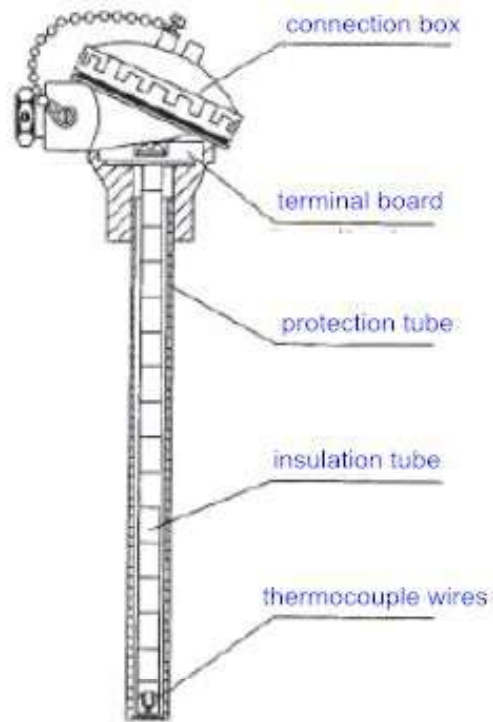
# Assembly Thermocouple

As temperature sensing devices, industrial assembly thermocouples are typically compatible with display units, recording instruments, actuators, PLCs, and DCS systems. They are designed to measure surface temperatures of liquids, steam, gaseous media, and solids within an industrial setting, covering a temperature range from 0°C to 1800°C.

Our thermocouples—manufactured in compliance with national standards—adhere to the IEC International Standard Graduation Mark and JB/T9238-1999 specifications. These include types such as Rhodium-Platinum 30/Rhodium-Platinum 6, Rhodium-Platinum 10/Platinum, Nickel-Chromium/Nisiloy, Nickel-Chromium-Silicon/Nickel-Chromium-Magnesium, Nickel-Chromium/Cupronickel, Ferrum/Cupronickel, and Cuprum/Cupronickel.



## Basic structure of the thermocouple:



## Type, measuring range, class and tolerance of thermocouple:

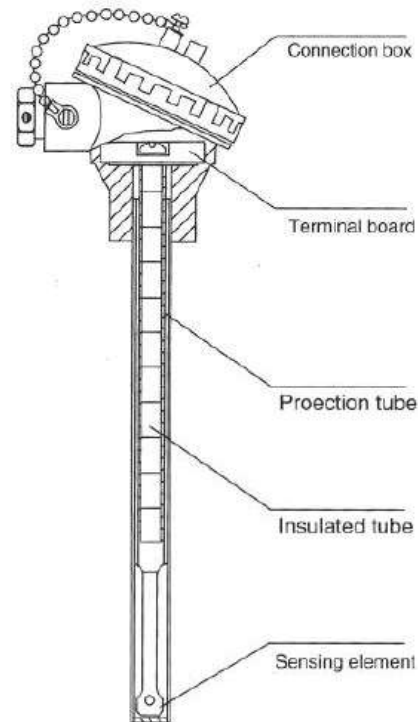
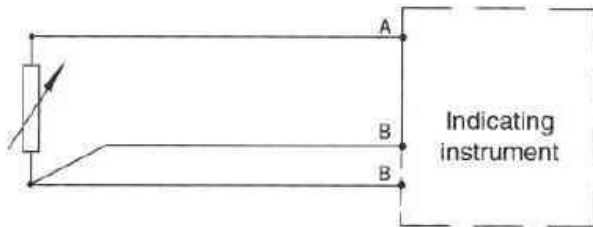
Category	Code	Graduation Mark	Measuring range (°C)	Accuracy	Tolerance $\Delta t$ (°C)
60 Rhodium Platinum30- Rhodium Platinum6	WRR	B	600~1700	2	$\pm 1.5$ or $0.25\%   t  $
Rhodium Platinum10- Platinum	WRP	S	0~1600	1	$\pm 1$ or $\pm [1 + 0.3\% (t - 1100)]$ °C
Nickel-chromium-nisiloy	WRN	K	-40~+1000	1	$\pm 1.5$ or $\pm 0.4\%   t  $
			-40~+1200	2	$\pm 2.5$ or $\pm 0.75\%   t  $
Nickel-Chromium-Silicon- Nickel-silicon-magnesium	WRM	N	-40~+1000	1	$\pm 1.5$ or $\pm 0.4\%   t  $
			-40~+1300	2	$\pm 2.5$ or $\pm 0.75\%   t  $
nickel-chromium- cupronickel	WRE	E	-40~+800	1	$\pm 1.5$ or $\pm 0.4\%   t  $
			-40~+900	2	$\pm 2.5$ or $\pm 0.75\%   t  $
Ferrum-cupronickel	WRJ	J	-40~+750	1	$\pm 1.5$ or $\pm 0.4\%   t  $
Cuprum-cupronickel	WRT	T	-40~+350	1	$\pm 0.5$ or $\pm 0.4\%   t  $

# Assembly thermal resistance

Industrial thermal resistance sensors are generally classified into two types: platinum (Pt) thermal resistance and copper thermal resistance. These sensors operate based on the principle that a material's electrical resistance changes in response to temperature variations.

The temperature-sensing element, which is the heat-sensitive component of the sensor, is constructed by winding fine wires—typically in a dual-coil configuration—around a frame made of insulating materials. When a temperature gradient exists within the measured medium, the sensor captures the average temperature across the dielectric layer where the sensing element is positioned.

## Basic structure of thermal resistance :




## Type, measuring range and tolerance of thermal resistance:

Type	Code	Graduation Mark	Measuring range	$\Delta t$ (°C) Tolerance
Platinum thermal resistance	WZP	Pt100	-200~+850	A grade: $(-200 \sim +650) \pm (0.15 + 0.002 t )$
				B grade: $(-200 \sim +850) \pm (0.30 + 0.005 t )$
Copper thermal resistance	WZC	Cu100	-50~+150	$\pm (0.30 + 0.006 t )$

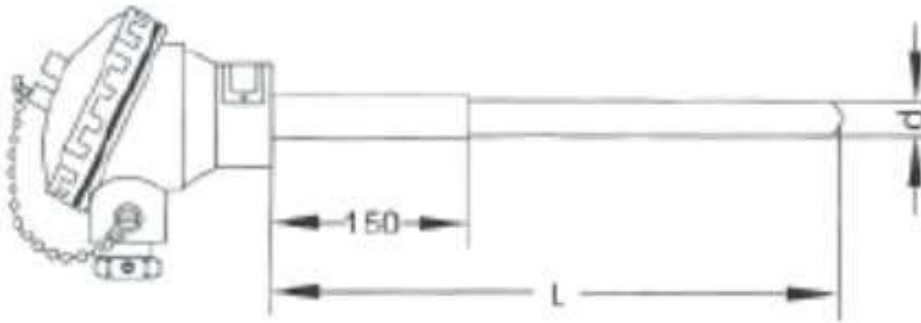
# Simple type platinum - rhodium thermocouple:

Model	Graduation Mark	Measuring Range(℃)	Thermal Response Time t 0.5 (s)	Protection Tube Material	Specification	
					d	L
WRR-010 WRR2-010	B	0~1600	≤2	Corundum	Φ 8	320 670 370 920 420 1170 470 1670 520 2170 570
WRP-010 WRP2-010	S	0~1300				



## Non-fixed device thermocouple ( ceramic protection tube):

Type: B, S, K



**Protection Tube Material:** Stainless Steel, Corundum

**Available Diameters:**  $\Phi 16$  mm,  $\Phi 20$  mm,  $\Phi 25$  mm,  $\Phi 32$  mm

**Tube Length:** Customizable based on application requirements

**Operating Temperature Range:**  $0^{\circ}\text{C}$  to  $1700^{\circ}\text{C}$



## Non-fixed device thermocouple/ RTD pt100(metal protection tube):

Type: K, E, N, J, T, PT100, CU50



**Operating Temperature Range:**  $-200^{\circ}\text{C}$  to  $420^{\circ}\text{C}$

**Probe Material:** Stainless Steel

**Probe Diameter:** Customizable from 6 mm to 20 mm

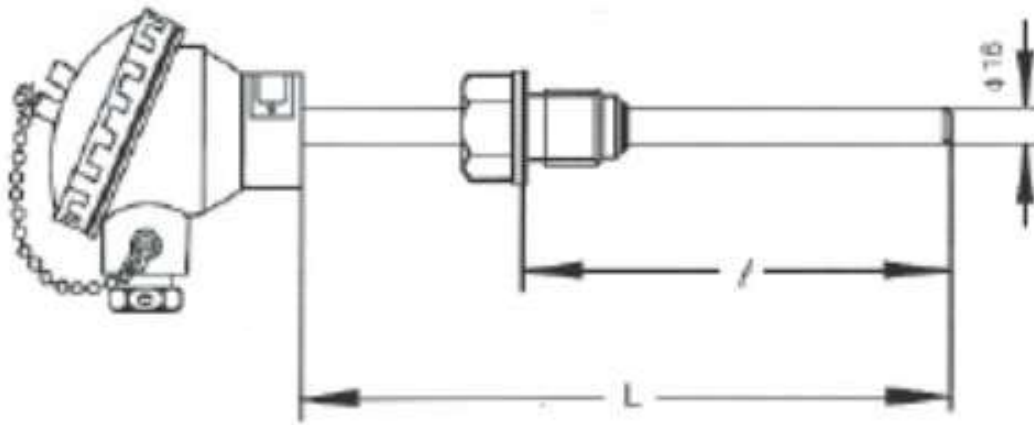
**Probe Length:** Tailored to customer specifications





## Fixed bolt thermocouple/ RTD pt100:

Type: B, S, K, N, PT100, CU50



Temperature Range: -200 to 1700C

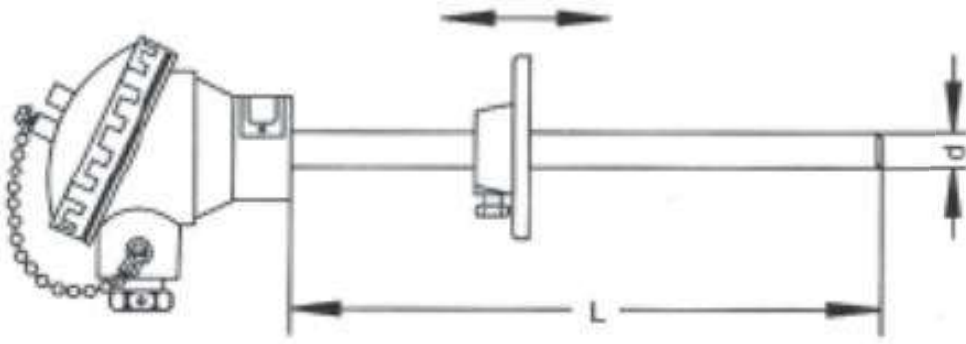
Bolt size: M12\*1.5, M16\*1.5, M20\*1.5 or customized



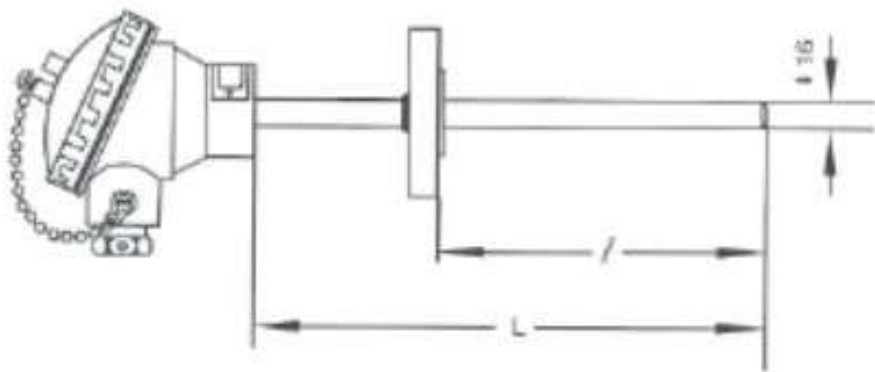


## Movable flange thermocouple/ RTD pt100:

Type: B, S, K, N, pt100, cu50



## Fixed flange thermocouple/ RTD pt100: Type:B, S, K, N, E, J, T, PT100, CU50



**Operating Temperature Range:**  $-200^{\circ}\text{C}$  to  $1700^{\circ}\text{C}$

**Probe Material:** Stainless Steel

**Required Specifications:** Length of L, Length of I, Probe Diameter, Flange Dimensions, Desired Temperature Range, Graduation Mark (Thermocouple Type)



# Fixed bolt taper protection tube thermocouple/ RTD pt100:

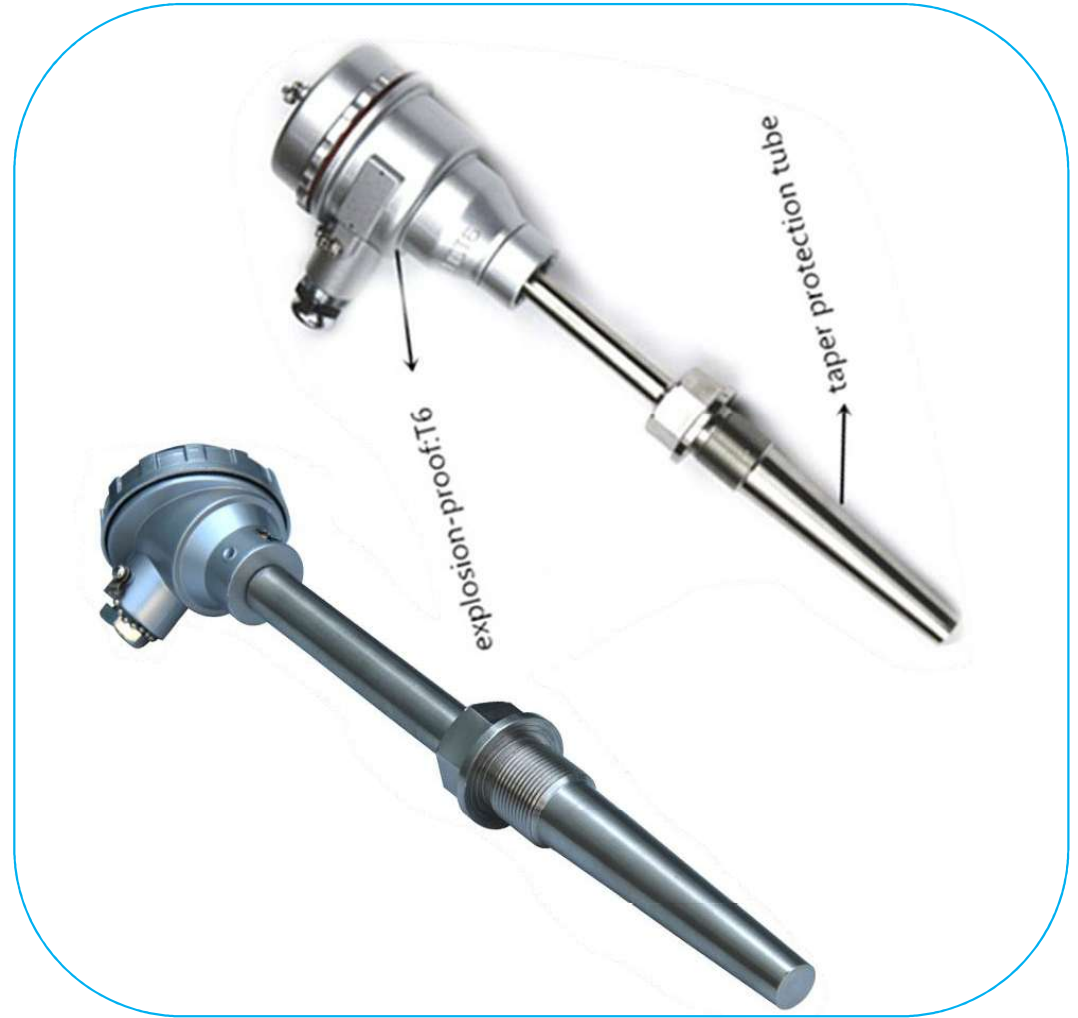
Type: K, E, PT100, CU50



Temperature Range: -200 to 600C

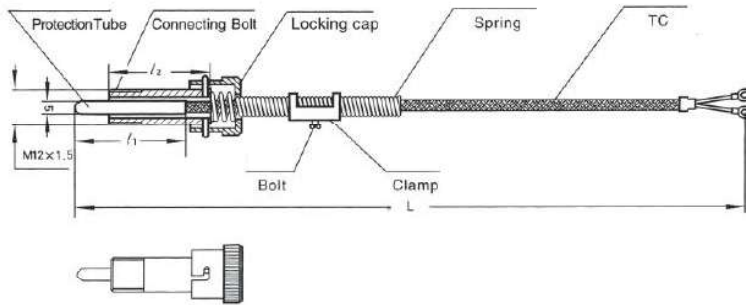
Bolt Size: G1 "

Normal Pressure: 30MPa



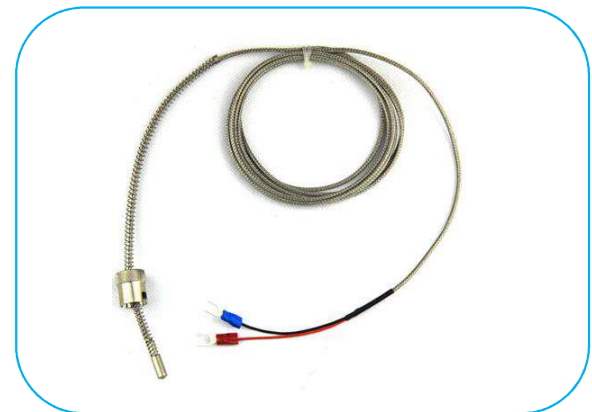
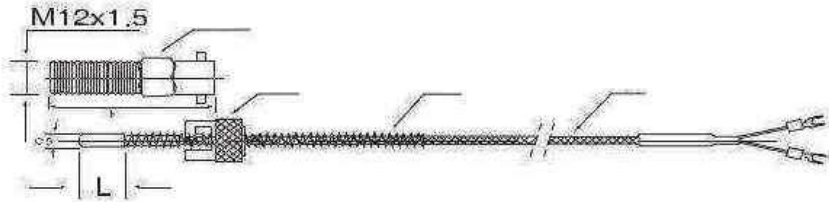
## Pressure spring fixed thermocouple:

Pressure spring fixed thermocouple can cling to the measured objects through a pressure spring in order to increase reliability and accuracy. Matched with indicating instrument, the thermocouple can directly measure the temperature within 0~600°C. Being flexible conductor, the thermocouple can be bent freely and has the characteristics of short response time and convenient usage etc. It is applicable to the industries as **extruder mould, textile, food** etc.



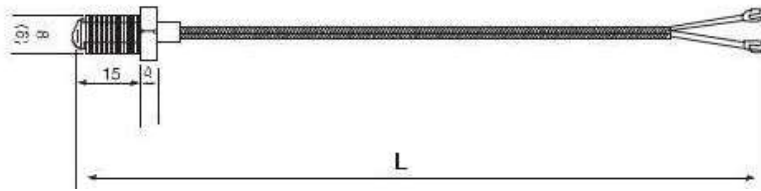
## Ferrule type thermocouple:

It is applicable to **extruder, injection equipment, and surface testing tube**.



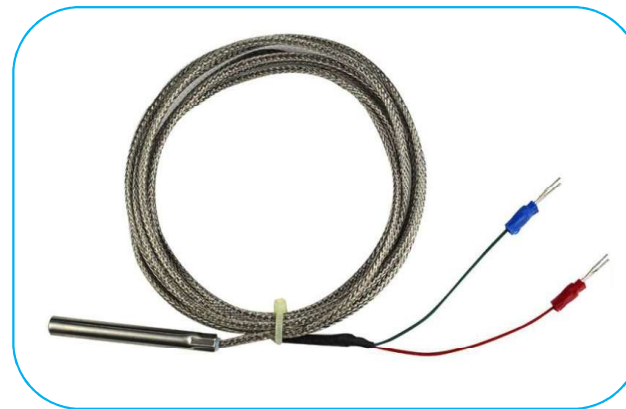
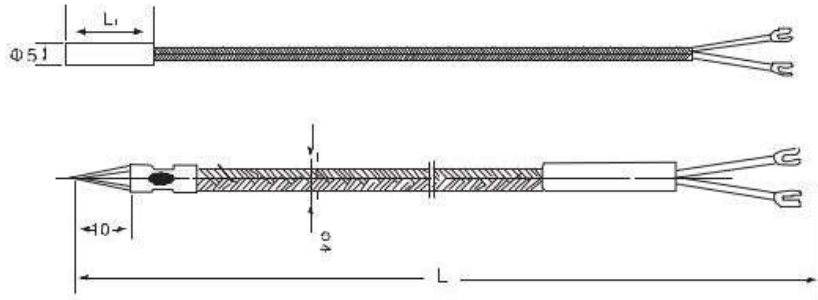
## Screw type thermocouple:

Screw type thermocouple can cling to the measured objects well by thread tightening into the surface of object in order to increase reliability and accuracy. Matched with indicating instrument, the thermocouple can directly measure the temperature within 0~600°C. Being flexible conductor, the thermocouple can be bent freely and has the characteristics of short response time and convenient usage etc. It is applicable to the industries as **mould, machinery, and metal products** etc



## Small type thermocouple:

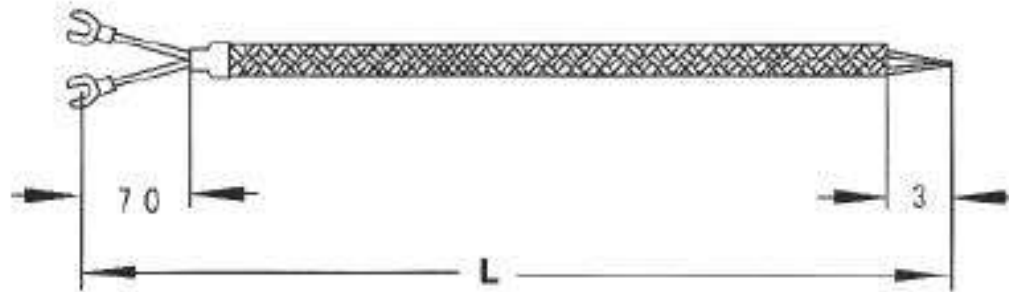
applicable to temperature measurement of solid surface for **plastic industry, extruding machine and packing machine** etc.





## Soft thermocouple:

Applicable to temperature measurement for industrial **furnace, aviation, spaceflight, machinery, glasses, aluminum plants, and building materials.**

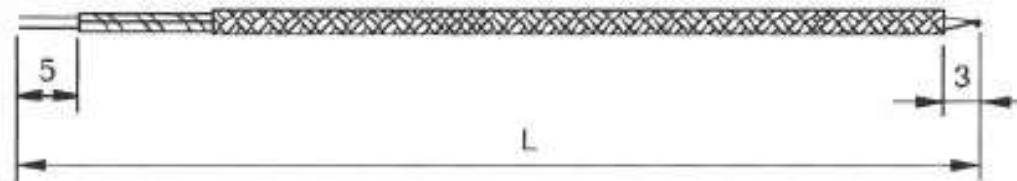


## High temperature soft thermocouple:

Applicable to **steel industry, cast aluminum industry, heat treatment, and experiment.**

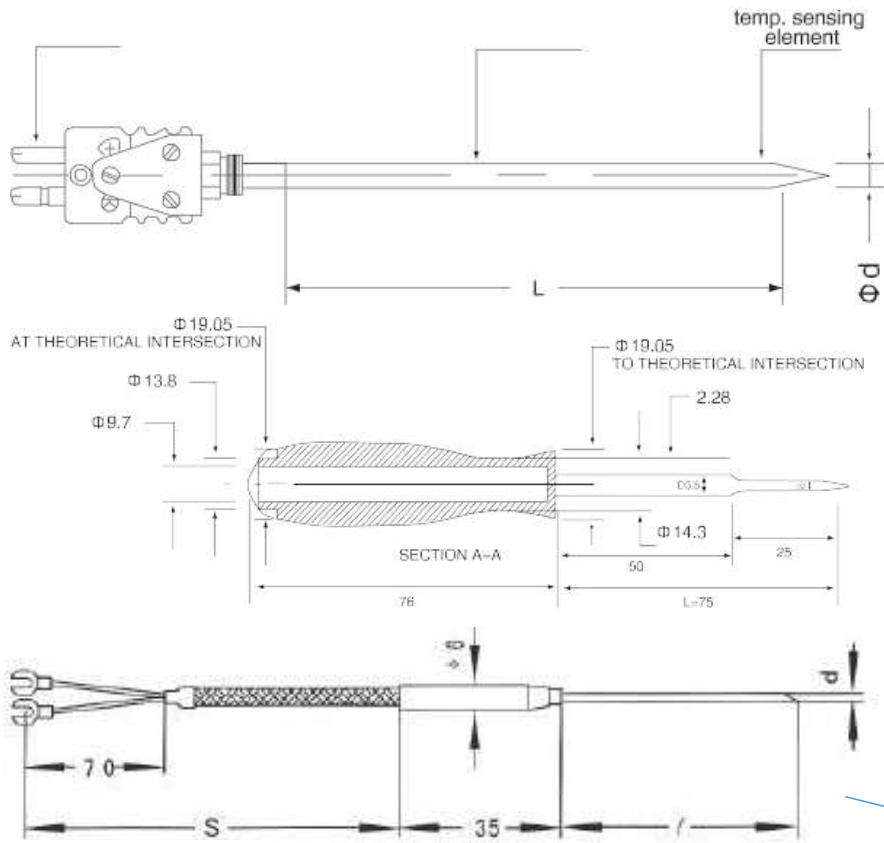
Its insulating layer is made of silicon dioxide fiber and its protective laryer is weaved by silicon dioxide fiber.

Another insulating layer is made of ceramic fiber and the protective layer is weaved by ceramic fiber.



# Needle-shaped thermocouple

Applicable to the temperature measurement for **food processing**:

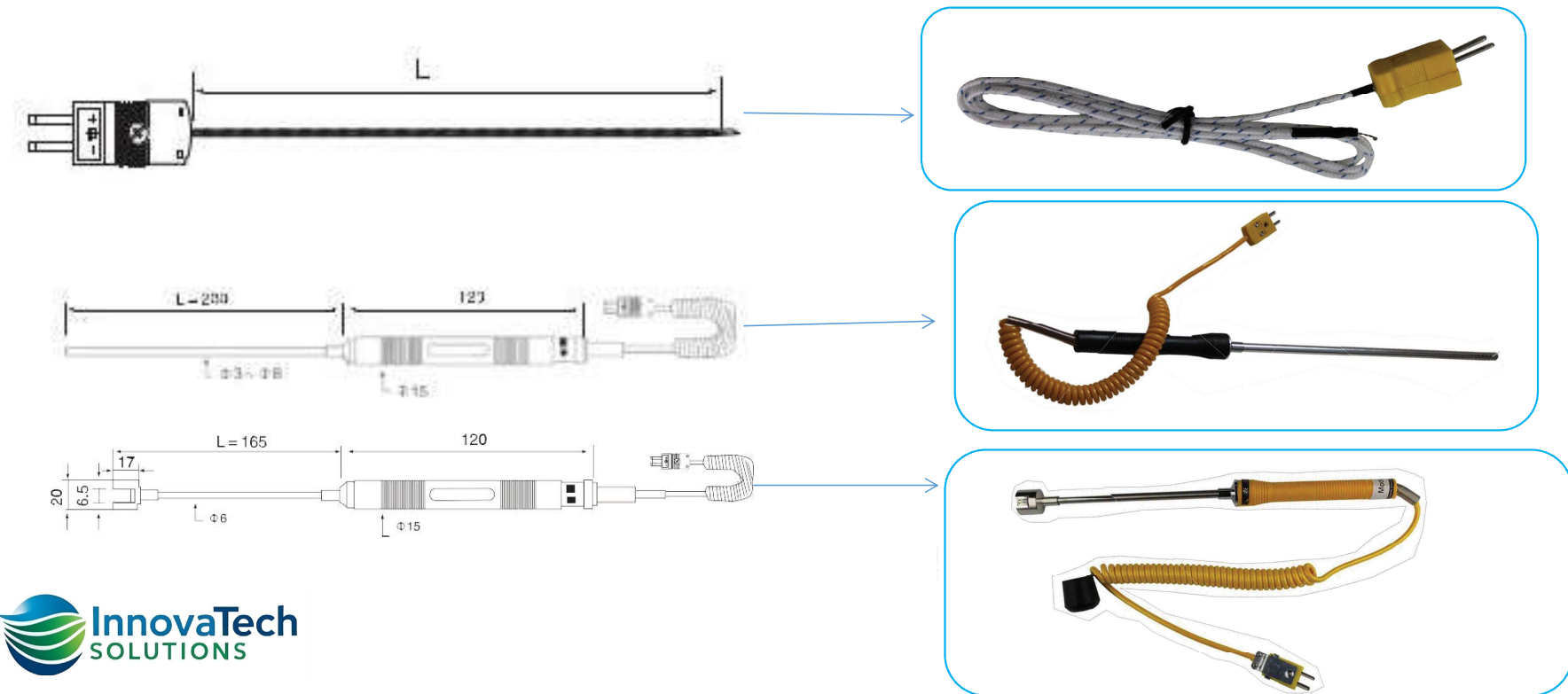


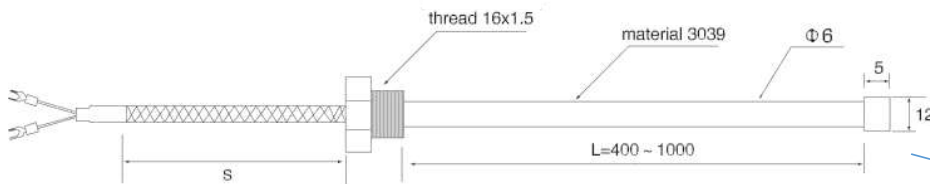
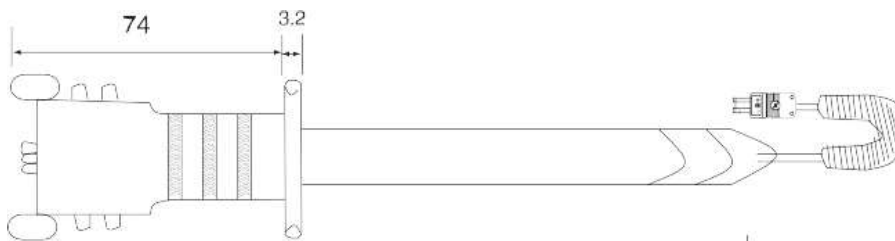
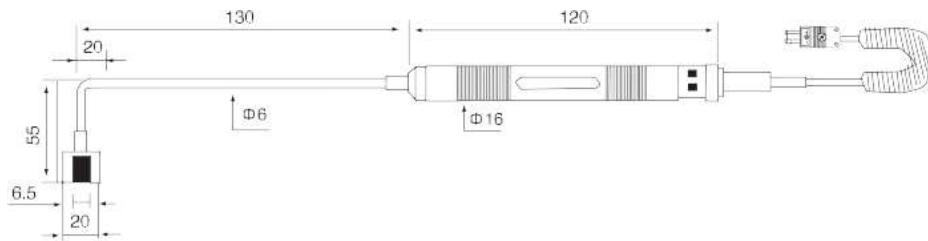


# Surface thermocouple :

Flow measurement is necessary in many cases according to process requirement, WRNM series of surface thermocouples are new products designed on the basis of abovementioned process requirement. Matched with WSK- 101 and WSK-1310 series pocket temperature digital display instruments, WRNM series of surface thermocouples are widely applicable to the industries as **textile, dyeing, papermaking, plastic, rubber, aluminum liquid, construction** etc.

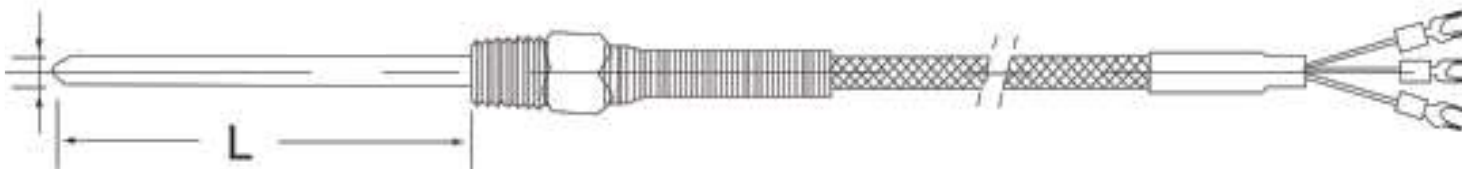
Graduation mark: K Accuracy class: 1.5 Measuring range: -50 ~ +1300





## Immovable thread type RTD:

It is applicable to temperature measurement for **surface of mechanical equipment and small oven**.



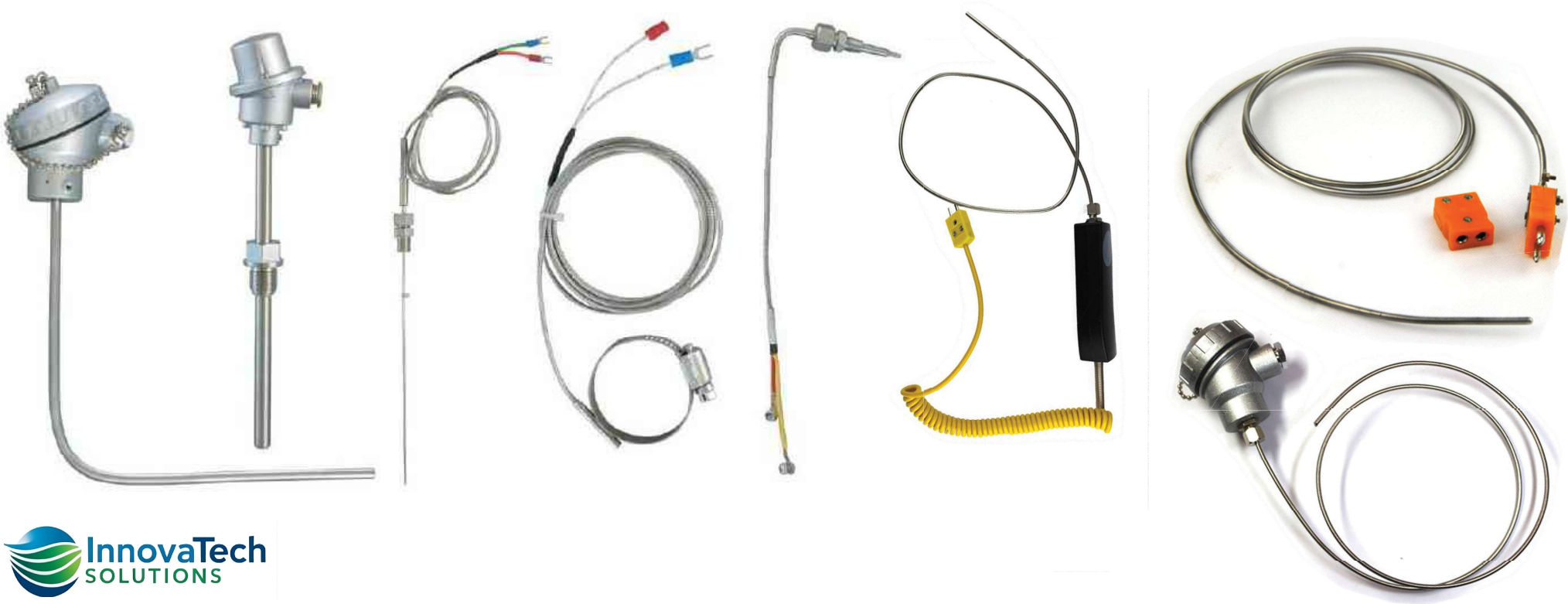
## Embedded type RTD:

It is mainly used for temperature measurement of **underground concreting, construction site, well and mine, with depth from 20mm to 100mm** (equiped with quick connector).



# Sheathed thermocouple/PT100 RTD

Sheathed thermocouple has the advantages of slimness, easy bending, short thermal response time, anti-vibration, temperature resistance, compression resistance and robustness etc. It can be used not only for direct measurement, but also for Assembly thermocouple as inner core element to replace conventional porcelain bead string type element. Especially, it is suitable for **installation for pipelines with narrow distance, bent pipeline, and special temperature measurement places** that quick response and micromotion are required.



## Explosion-proof TC and RTD (EPTC and EPRTD):

At the production site of chemical industry, petrochemical industry, natural gas and metallurgy, there often with various flammable & explosive gas and steam, using common TC and RTD is easy to cause explosion of environment gas, therefore, EPTC and EPRTD must used as temperature sensor. EPTC and EPRTD are suitable for the places with explosive gas between temperature grades dIIBT4 and dIIBT5.

Explosion-proof type: d II BT4, Ex d IICT5, Ex ia II CT5 (intrinsic safety), DIP DT T11 (dust)

Enclosure protection class: IP54, IP65 (GB4208 standard)



## TC and RTD for temperature measurement in power station:

The TC and RTD of ordinary structure has not met the special requirements of high temperature, high pressure and high-speed steam flow of the power station. Therefore, there are TCs and RTDs especially special for power station. Users can select them in accordance with different temperature, pressure and steam flow speed.





## Other Special types Thermocouple/RTD:

1) Thermocouple and platinum thermal resistance for flue

2) Abrasion proof thermocouple and platinum thermal resistance for coal dust storehouse

3) **Bearing thermocouple and platinum thermal resistance:** Bearing thermocouple and Pt thermal resistance are mainly used to measure bearing temperature of the equipments in **power station**. Provide with **the structure of anti-vibration and anti-oil leakage for fixed device, and measuring terminal tightly touched surface of measure objects**, thus accuracy of temperature measurement can be improved.

4) Platinum thermal resistance for pump

5) Damping leakage platinum thermal resistance for bearing

6) Double point platinum thermal leakage resistance for bearing

7) **Boiler furnace wall and tube wall thermocouple and thermal resistance:** The furnace wall of boiler, thermocouple of shell of pipe and platinum thermal resistance adopt the sheathed elements with the  $\Phi 4$  or  $\Phi 5$  diameter as probe, leaded out by armored cable or thermometric extension wire, whose heat conduction shield of measuring terminal is equipped with camber suitable for pipes or furnace wall and fixed to the tube (furnace) wall by bolts, welding or holding down clip. The surface temperature of the furnace wall or tubes can be measured by the conduction of the heat conduction shield.



### 8) Tungsten-Rhenium Temperature Sensor and Special Anti-Oxidation Tungsten-Rhenium Thermocouple:

Tungsten-rhenium thermocouple is suitable for temperature measurement of vacuum at 0-2300°C, inert atmosphere and reducing atmosphere, as well as quick measurement for steel liquid and measurement in high-temperature environment. Our company invented and manufactured special tungsten-rhenium thermocouple which provides solutions for high-temperature anti-oxidation. It has the characteristics of high-temperature resistance, anti-oxidation, long life, and can be used in redox or alternative oxidation & reduction. Common industrial thermocouple can not meet vacuum system requirement due to no strict sealing measures, furthermore, the vacuum system will connect with outside when protection tube breaks, which will make heating element oxidize and lead to serious loss. This series of products adopt high-temp. resistance material as protection tube, researched special thermocouple for vacuum oven by unique solid technique and connection mode with highly strong leakage, and can effectively ensure system vacuum degree unchanged even though the protection tube is broken. It can work under high temperature chronically and steadily. It is mainly suitable for temperature measurement of all kinds of vacuum ovens with high temperature vacuum, superhigh temperature vacuum 10<sup>-6</sup>Pa etc., at present we also developed special sealed thermocouple for high temp. & high pressure (6~10MPa), which is mainly applicable to measurement for aviation, spaceflight, metallurgy, chemicals, high temperature furnace etc.

**9) Abrasion-proof thermocouple and thermal resistance:** Because of the high temperature in the charge end of furnace in fluid bed, circulating fluid bed and cement rotary kiln, the wear of the material flow and the corrosion caused by diversified harmful gases, the temperature sensor always needs to be changed frequently, which not only increases the labour intensity of instrument workers and production cost but brings about serious hidden danger

**10) High temp. abrasion-proof thermocouple and thermal resistance:** Adopting the special technology and abrasion-proof alloy material protection tube with its degree of hardness up to HRC85~90 and having the good performance in abrasion-proof and corrosion-resisting, they are applicable to the temperature measurement of the **circulating fluidized bed boiler (CFB) of power plant**, the mixing temperature of **coal dust** caused by primary air flow, **the inlet and outlet of the coal grinding machine, the pulverizing system, the petroleum cracking, the building asphalt mixture and the flow dust and particle.**

**11) Thermocouple for high temperature salt bath furnace:** Ceramic metal tube made from powder metallurgy has good corrosion resistance and high temperature resistance performance, which can be used for continuous measurement on high temperature salt bath furnace in mechanical industry.

BaCl<sub>2</sub> fused salt: 1280°C life > 1400 hours BaCl<sub>2</sub>+NaCl fused salt: 1000°C life > 1500 hours KCl+ NaCl fused salt: 1050°C life > 300 hours

**12) Abrasion-proof thermocouple for cement rotary kiln:** The thermocouple under the bad condition, such as cement rotary kiln, is likely to be influenced by its high temperature wear, and corrosion of harmful gases. The products of this series have a good performance in high temperature resistant, abrasion-proof and corrosion resistant, which can be perfectly used to measure the temperature of cement rotary kiln tail and also circulating fluidized bed.

**13) Anti high temperature and strong corrosion thermocouple:**

Application: continuous temperature measurement for the liquid with high temperature and strong corrosion, such as copper liquid, aluminum liquid, zinc liquid, magnesium liquid.

**14) TC for temperature measurement in metal smelting and building materials kiln:** In the industry, such as steel, metallurgy and cement, general thermocouple and thermal resistance are available. However, under some special environment and in some special mediums, the special designed temperature thermocouple shall be used. The products of this series are frequently used thermocouples with a perfectly practical application effect.

**15) Electrolytic aluminum tank temperature thermocouple:** Handle type sheathed TC matched with portable digital thermometer can be used to measure the temperature for oven, liquid, chemicals, food, electrolytic aluminum tank, which is convenient, flexible and fast response. Considering high temperature and strong corrosion medium in the tank, our company provides not only various common thermocouples with different handle types but composite sheathed thermocouples, which have longer service life and widely used in electrolytic aluminum industry.

**16) Thermocouple for rotary kiln flue:** The special composite tube and insulating tube can be effectively used to the rotary kiln flue with high temperature and harmful gas corrosion.

**17) Thermocouple for rotary kiln head**

## Thermocouple extension wire:

The extension wire both have good property of resistance to acid,alkali,abrasion and fire,Its temperature range used commonly is  $-25\sim+200^{\circ}\text{C}$ .In addition,it can used for a ling time by immersing into the oil.The extension wire complies with GB/ T4989-94-1994 standard.

The extension wire listed in the table is applicable to the gruaduation symbol of S,(R),K, E, J and T.



### Structrue type:

