

装配式热电偶 Assembly Thermocouple



工业用装配式热电偶作为测量温度的传感器，通常和显示仪表、记录仪表、调节器、PLC和DCS系统配套使用。它可以直接测量各种生产过程中从0℃～1800℃范围内的液体、蒸汽和气体介质以及固体的表面温度。

我公司严格根据国家规定，生产符合IEC国际标准分度号的铂铑30—铂铑6、铂铑10—铂、镍铬—镍硅、镍铬硅—镍硅镁、镍铬—铜镍、铜—铜镍、铁—铜镍等形式热电偶，符合JB/T9238—1999标准。

As a sensor for measuring temperature, industrial assembly thermocouple are usually compatible with display instrument, recording instrument, actuator, PLC and DCS system. It can be used to measure the surface temperature of liquid, steam and gas mediums and solid from 0℃—1800℃ during industrial production.

The thermocouples, such as Rhodium Platinum30—Rhodium Platinum6, Rhodium Platinum10—Platinum,Nickel—chromium—nisiloy,Nickel—Chromium—Silicon—Nickel—Chromium—Magnesium, Nickel—Chromium—Cupronickel, Ferrum—cupronickel and Cuprum—cupronickel, produced by our company based on the national stipulation are in accordance with the IEC International Standard Graduation Mark and JB/T9238—1999 Standard.

热电偶测温原理 Temperature measurement principle of the thermocouple

热电偶是通过测量其热电势来实现测温的，其两热电极是由两种成份不同的均质导体一端相互连接构成的感温元件。在由两种导体组成的闭合回路中，如果两端点的温度不同，则回路中就会产生一定大小的热电势。其热电势的大小只与导体材料的性质以及两端点的温差有关，同导体的截面积和长度无关。

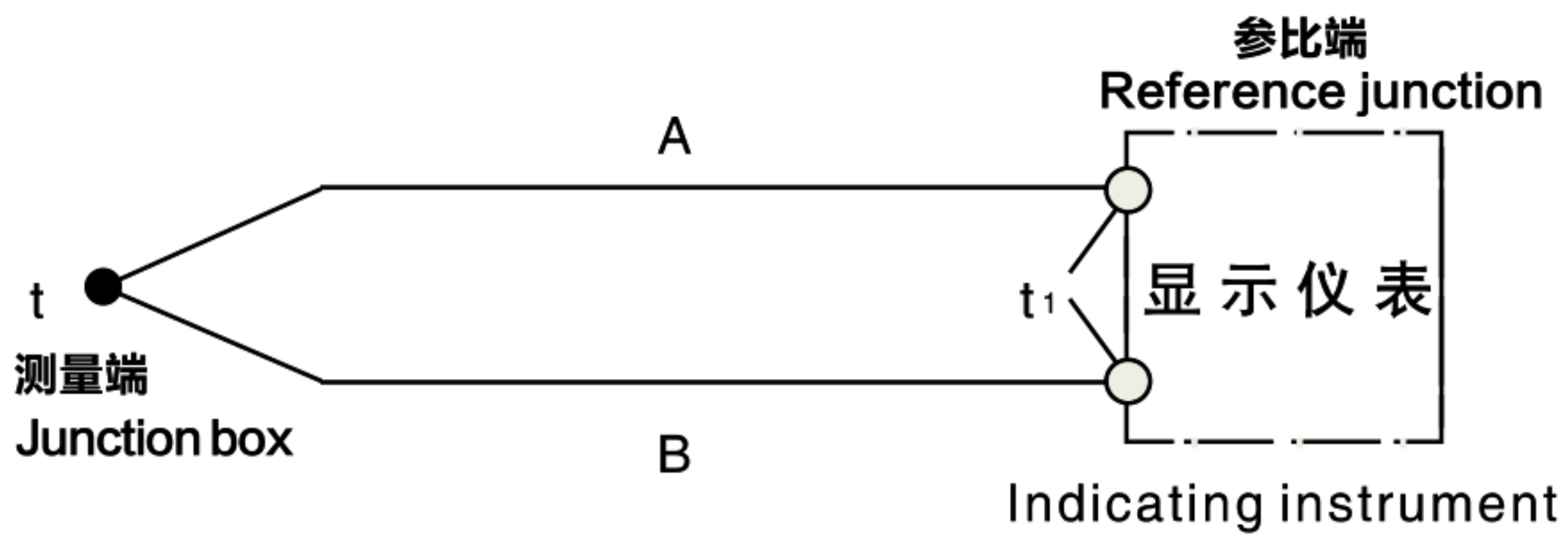
如下图，选用两种不同的金属或合金丝A、B称为热电极，焊接的一端称为测量端，连接显示仪表的一端称为参比端，当测量端和参比端温度不同时，就会产生热电势 $E_{AB}(t, t_1)$ 。当 $t_1 = 0^{\circ}\text{C}$ 时则有：

$$E_{AB}(t,0)=E_{AB}(t)=f(t)$$

The temperature measuring for thermocouple is achieved through measuring its thermoelectrical potential. Its two thermodes are temperature sensing elements made of equivalent conductors with two different compositions and one connected ends. In the closed loop made of two kinds of conductors, if different temperature arises on the two endpoints, then a certain thermoelectrical potential will be created. The thermoelectrical potential intensity is not related to the sectional area and length of copper conductor but the properties of conductor materials and the temperature of their two endpoints.

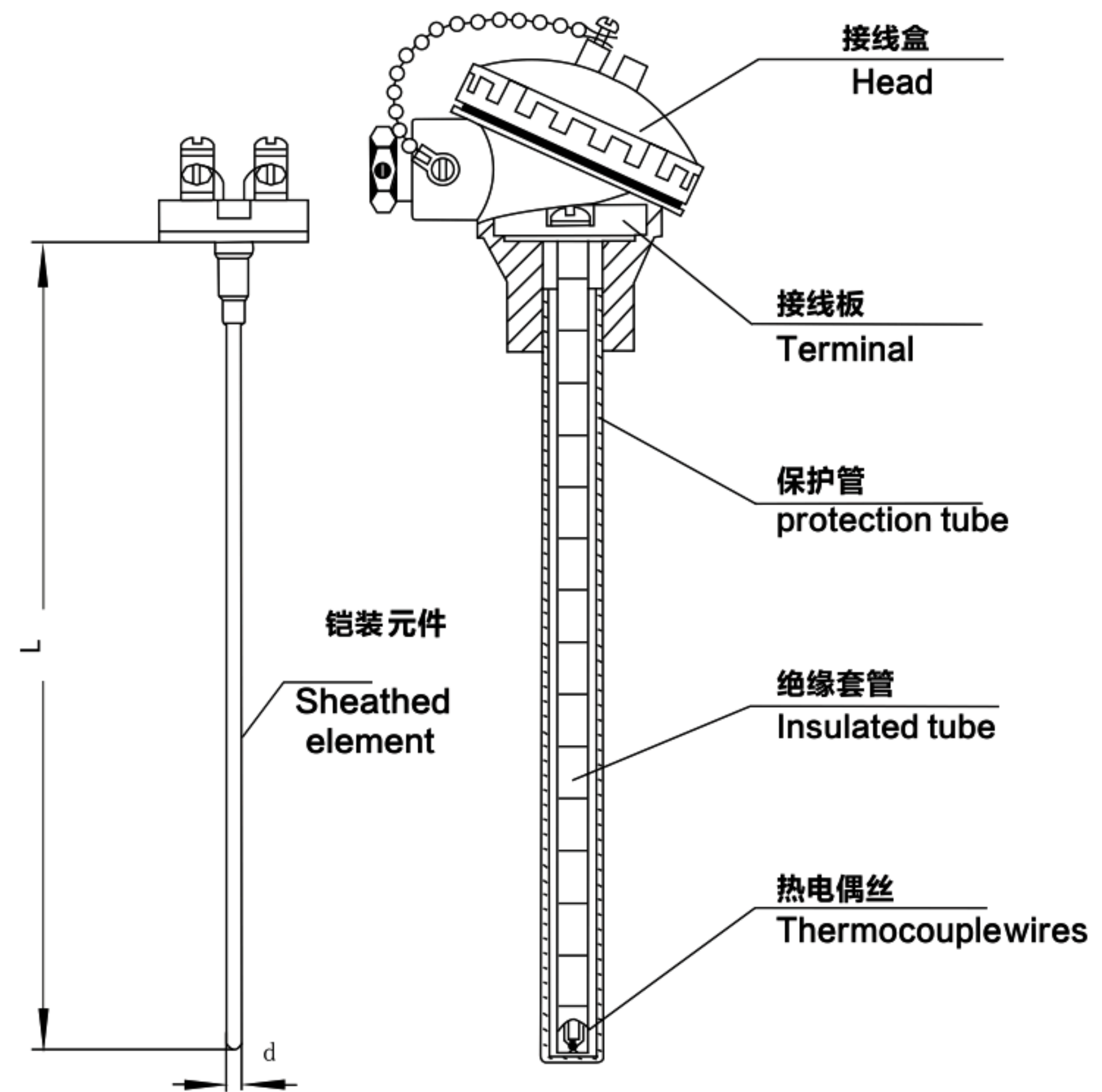
Select two different kinds of wire or alloy wire A and B as thermodes, of which, the welded end is referred to as temperature measurement end, the one connected with the indicating instrument is referred to as reference junction. When the temperature of both ends differs from each

$$E_{AB}(t,0)=E_{AB}(t)=f(t)$$



热电偶测温原理

Temperature measurement principle of the thermocouple



WRK-101

热电偶基本结构

Basic structure of the thermocouple

热电偶特性 Characteristic of the thermocouple

热电偶具有测温范围广，热电性能稳定，结构简单，信号可远传，价格低等优点。

The thermocouple has such advantages as wide scope of temperature measurement, stable thermoelectric property, simple structure, signal available for long distance and low price.

根据不同温区和使用环境的要求，须选用不同型号的热电偶材料和保护管。

It is necessary to select thermocouple materials and protection tube of different type in accordance with requirements of different temperature ranges and application environments.

我公司生产的工业热电偶符合JB/T9238-1999《工业热电偶技术条件》，GB/T18404-2001《铠装热电偶电缆及铠装热电偶》（dit. IEC61515:1995），GB/T16839-1997《热电偶分度表及允差》（dit. IEC584-1 and IEC584-2）等标准。

The industrial thermocouples produced by our company comply with some standards such as JB/T9238-1999 Technical Specification of Industrial Thermocouple, GB/T18404-2001 Sheath Thermocouple Cable and Sheath Thermocouple (dit. IEC61515:1995), GB/T16839-1997 Reference Tables and Tolerances of Thermocouple (dit. IEC584-1 and IEC584-2).

主要技术指标Key technical indexes

热响应时间 Thermal response time

在温度出现阶跃变化时，热电偶的输出变化至相当于该变化的50%，所需要的时间称为热响应时间，用 $\tau_{0.5}$ 表示。实验介质通常为水。

When the temperature shown step changes, the output variation of the thermocouple shall be at least equivalent to 50% of the variation, and the time that needs is thermal response time, denoted as $\tau_{0.5}$. The experimental medium often is water.

热电偶公称压力 Nominal pressure of thermocouple

一般是指在室温情况下保护管所能承受的静态外压而不破损泄漏。实际上，允许工作压力不仅与温度、保护管材料、直径壁厚有关，还与其结构形式、安装方法、置入深度以及被测介质的流速和种类等有关。

It usually indicates the static external pressure the protection tube is capable of bearing under the room temperature while the protection tube does not break. In fact, the safe working pressure is not only related to temperature, materials of protection tube and wall thickness of diameters, but also related to structural configuration, assembling method, placed depth and the flow rate and type of the mediums to be measured.

热电偶最小置入深度 Minimum inset depth of thermocouple
应不小于其保护管外径的8~10倍（特殊产品例外）。

The minimum placed depth shall not be less than 8~10 times of the external dameter of its protection tube (Lexcluding special products).

热电偶的绝缘电阻（常温） Insulation resistance of thermocouple (normal temperature)
常温绝缘电阻的试验电压为直流500 V ± 50 V 。测量常温绝缘电阻的大气条件为：温度15 ~ 35℃，相对湿度45% ~ 75%，大气压力86 ~ 106KPa。

The experimental voltage of insulation resistance at normal temperature is DC 500 V ± 50 V . The atmospheric condition for measuring normal-termperature insulation resistance is 15 ~ 35℃, while the relative humidity is 45% ~ 75%and the atmospheric pressure is 86 ~ 106KPa.

a 对于长度超过1米的热电偶它的常温绝缘电阻与其长度的乘积应≥100M Ω 。

既： $R_r \cdot L \geq 100M\Omega \cdot m > 1m$

式中：L□□热电偶的长度，m。

a. For the thermocouple longer than 1m, the product of its normal-termperature insulation resistance and length shall not be less than 100 M Ω . That is, $R_r \cdot L \geq 100M\Omega \cdot m > 1m$.

Where: L is the length of the thermocouple, m.

b 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100M Ω 。

b. For the thermocouple not longer than 1m, its normal-termperature insulation resistance shall not be less than 100M Ω .

热电偶上限温度绝缘电阻Insulation resistance at upper limit temperature

测量条件为：被加热的长度为300mm或其总长的50%。试验电压为10 ± 1（V · DC）。

Measuring condition: The heated length shall be 300mm or 50% that of the overall length. The test voltage shall be 10 ± 1（V · DC）.

热电偶的上限温度绝缘电阻应不小于下表规定：

The insulation resistance at upper limit temperature shall not less the specifications shown in the table below:

上限温度 t _m (℃) Upper limit temperature	试验温度 t _m (℃) Experimental temperature	电阻值 M Ω Resistance value
100 ≤ t _m < 300	t = t _m	10
300 ≤ t _m < 500	t = t _m	2
500 ≤ t _m < 850	t = t _m	0.5
850 ≤ t _m < 1000	t = t _m	0.08
1000 ≤ t _m < 1300	t = t _m	0.02
t _m > 1300	t = 1300	0.02



NANPU

上海南浦仪表厂

热电偶类型、测量范围、等级和允差 Type, measuring range, class and tolerance (GB/T16839.2)

类别 Model	代号 Code	分度号 Graduation Mark	测量范围(℃) Measuring rang	精度 Accuracy	允差△t(℃) Tolerance
铂铑30－铂铑6 Rhodium Platinum30-Rhodium Platinum6	WR R	B	600~1700	2	±1.5或0.25% t ±1.5or0.25% t
铂铑10－铂 Rhodium Platinum10-Platinum	WR P	S	0~1600	1	±1或± [1+0.3%(t-1100)] °C ±1or± [1+0.3%(t-1100)] °C
铂铑10－铂 Rhodium Platinum13-Platinum	WR Q	Q	0~1600	1	±1或± [1+0.3%(t-1100)] °C ±1or± [1+0.3%(t-1100)] °C
镍铬－镍硅 Nickel-chromium - nisiloy	WR N	K	-40~+1000	1	±1.5或±0.4% t ±1.5 or ±0.4% t
			- 40~+1200	2	±2.5或±0.75% t ±2.5or ±0.75% t
镍铬硅－镍硅镁 Nickel-Chromium-Silicon- Nickel-silicon-magnesium	WR M	N	-40~+1000	1	±1.5或±0.4% t ±1.5 or ±0.4% t
			-40~+1300	2	±2.5或±0.75% t ±2.5or ±0.75% t
镍铬－铜镍 nickel-chromium-cupronickel	WRE	E	-40~+800	1	±1.5或±0.4% t ±1.5or ±0.4% t
			-40~+900	2	±2.5或±0.75% t ±2.5or ±0.75% t
铁－铜镍 Ferrum-cupronickel	WR J	J	-40~+750	1	±1.5或±0.4% t ±1.5or ±0.4% t
				2	±2.5或±0.75% t ±2.5or ±0.75% t
铜－铜镍 Cuprum-cupronickel	WRT	T	-40~+350	1	±0.5或±0.4% t ±0.5or ±0.4% t
				2	±1或±0.75% t ±1or ±0.75% t

注：（1）t为实测温度值。（2）测量范围仅指偶丝。（3）同栏两个允差值中取较大者。
Note: (1) t is the measured temperperature value. (2) The measuring range is used only for thermocouple wires. (3) Of the two tolerance values in the same column, the larger one shall be used.

金属保护管材料 Metal protection tube material

代号 Code	材料种类（ 牌号/代号 ） Material type (Brand/Code)		使用最高温度（℃） Maximum application temperature（℃）		特性 Characteristics
	中国（GB） （GB）China	美国（ASTM） （ASTM）USA	长期 Long-term	短期 Short-term	
S4	0Cr18Ni9	304	850	900	铬镍合金；耐热钢，耐酸、耐碱。不适用于硫磺、还原性气氛。 Chrome-nickel alloy; heat-resisting steel, acid proof and alkali proof. Not suitable for sulfur and reducing gas.
L4	00Cr19Ni10	304L	800	900	铬镍合金；是304的超低碳钢，由于含碳量低，耐晶间腐蚀性优越。 Chrome-nickel alloy; 304 ultra-low-carbon steel with low carbon content and fine inter-crystalline corrosion resistance.
C5	0Cr25Ni20	310S	1000	1150	高铬镍合金；耐热性好，具有良好的抗氧化、抗渗碳性能和机械性能。 High-chrome-nickel alloy with good heat-resistance and fine anti-oxidation, anti-carburization and mechanical property.
S6	0Cr17Ni12Mo2	316	800	900	铬镍合金；高温中的耐腐蚀性能好，耐酸、碱、海水与侵蚀性物质。 Chrome-nickel alloy with good corrosion proof in high temperature and acid proof, alkali proof and seawater proof properties.
L6	00Cr17Ni14Mo2	316L	800	900	铬镍合金；超低碳钢，耐晶间腐蚀好，抗氧化物。其余性能同316相似。 Chrome-nickel alloy; ultra-low-carbon steel with fine inter-crystalline corrosion resistance and anti-oxidation properties. Other properties are same as that of 316.
MT	00Cr18Ni12Mo2Ti	316Ti	800	900	铬镍合金；耐晶间腐蚀和点蚀的性能优良。耐尿素、稀硫酸等各种有机酸。 Chrome-nickel alloy with fine inter-crystalline corrosion resistance and pitting corrosion and good organic acid proof properties, such as carbamide and dilute sulphuric acid.
S9	1Cr18Ni9Ti	321	800	900	铬镍合金；抗氧化性能良好。对磷酸和稀硝酸和醋酸具有良好的耐蚀性。 Chrome-nickel alloy with fine anti-oxidation and good organic acid proof properties, such as phosphoric acid and dilute nitric acid.
Nb	0Cr18Ni11Nb	347	750	870	铬镍合金；高温强度好，耐晶间应力腐蚀性良好。耐酸、碱、盐等介质。 Chrome-nickel alloy with fine inter-crystalline corrosion resistance in high temperature and good medium proof properties, such as acid, alkali and salt.
N6	1Cr15Ni75Fe8	Inconel600	1050	1250	镍铬铁合金；最适合高温氧化，还原性气氛。抗氯离子应力腐蚀能好。 Nickel-chromium-iron alloy; especially suitable for high temperature oxidation and reducing gas with good anti-chlorion stress corrosion property.
IN8	0Cr20Ni32AlTi	Inconel800	1100	1100	高镍铁合金；耐硫、氰化物和熔融的中性盐，耐二氧化碳的混合气体。 High chromium-iron alloy with good sulfide, cyanide and fusing neutral salt proof and fine mixed gas of carbon dioxide proof properties.
HB	0Ni65Mo28Fe5V	Hastelloy B	500	800	镍铁钼合金；在沸点下一切浓度和盐酸都有良好的耐蚀性，耐酸、氢氟酸。 Ferro-nickel-molybdenum alloy with good acid corrosion proof property for hydrochloric acid and hydrofluoric acid.
HC	0Cr15Ni60Mo16W5Fe5	Hastelloy C	1000	1090	镍铬铁钼合金；耐氧化性硝酸等、高于常温的次氯酸盐溶液等的腐蚀。 Nickel-chromium-iron alloy with good hypochloric acid solution corrosion proof property above the normal temperature, such as oxidized nitric acid.
5M	Ni70Cu28	Monel K500	150	200	镍铜合金；耐氢氟酸、硫酸、盐酸、抗海水和大多数碱性物质性能优异。 Nickel-copper alloy with fine acid proof, alkali proof and seawater proof properties, such as hydrofluoric acid, sulfuric acid, hydrochloric acid and most alkaline matters.
Ni	Ni9990	Nickel 201	150	200	耐浓碱（纯碱、烧碱）腐蚀特别优异，中性和微酸性溶液以及有机熔剂。 With special fine concentrated base proof (soda and sodium hydroxide), neutral solution, sub-acid solution and organic solvent proof properties.
Ti	TA(1~3)	Grade(1~3)	150	200	耐湿氯气，浓硝酸。对抗含Co2的海水、海生物、海洋大气的腐蚀。 With fine wet chlorine gas, aquafortis proof and anti-seawater with Co2, marine growth and marine atmosphere prosperities.
G3	GH3030	—	1050	1125	镍基高温合金；高温下具有良好的力学性能、抗氧化和抗热腐蚀性能。 Ni-base superalloy with fine mechanical property, oxidation resistance and anti-hot corrosion in high temperature.
G9	GH3039	—	1100	1200	镍基高温合金；高温下抗氧化能力强、足够的持久强度和冷热疲劳性能。 Ni-base superalloy with fine oxidation resistance and long time strength and thermal fatigue behavior.

非金属保护管材料 Material of nonmetal protection tube

代号 Code	材料种类（成份/代号） Type of material (constitution/symbol)	使用最高温度（℃） Highest application temperature (℃)		特性 Characteristics
		长期 Long term	短期 Short term	
SO	石英（SiO2） Quartz	1000	1100	耐高温、膨胀系数低，耐热震性、化学稳定性和电绝缘性能好，急冷，急热强度差。 high temperature resistant, lower coefficient of expansion, good chemical stability and electric insulativity, poor rapid cooling and heating strength.
F4	聚四氟乙烯（PIFE） Polytetrafluoroethylene	250	280	具有优异的化学稳定性和力学强度，广泛适用于各种腐蚀介质的温度测量。 excellent chemical stability and mechanical strength, widely applicable to measuring temperatures for corrosive mediums.
F46	聚全氟乙丙烯（FEP） Fluorinated Ethylene Propylene	200	230	具有F4优良的耐腐蚀化学稳定性，冲击性能特好，成型好，熔融粘接好。 excellent corrosion-proof chemical stability of F4, good impact property, good formability and fine molten adhesion.
A8	高铝质（85%~90%Al2O3） High aluminum texture	1500	1600	有耐高温剧变性能。气密性好，化学性稳定，高温下绝缘良好。急冷，急热强度差。 resistant to high-temperature change, good airtightness, stable chemistry, fine insulation under high temperature, poor rapid cooling and heating strength.
A9	刚玉质（99%Al2O3） Corundum texture	1600	1700	有耐高温剧变性能。气密性良好，化学性稳定，高温下绝缘良好。急冷，急热强度差。 resistant to high-temperature change, good airtightness, stable chemistry, fine insulation under high temperature, poor rapid cooling and heating strength.
SN	氮化硅（Si3N4） Silicon nitride	1000	1100	在高温下具有较好的抗铝液的冲刷能力，机械性能好，适用于铝液的温度测量。 good anti-scour to aluminium pad under high temperature, good mechanical properties, applicable to measuring the temperature of aluminium pad.
SC	碳化硅（99%SiC） Silicon carbide	1600	1650	耐火度和硬度很高。导热性、热膨胀、耐压性以及导电性等方面具有优势。 high refractoriness and hardness, dominant heat conductivity, thermal expansion, pressure resistance and conductivity.
MS	二硅化钼（MoSi2） Molybdenum disilicide	1600	1700	高温抗氧化性优良。抗腐蚀性、热稳定性、气密性良好。具有耐高温剧变的性能。 fine antioxygenic property under high temperature, good corrosion resistance, thermal stability and airtightness, resistant to high-temperature change.

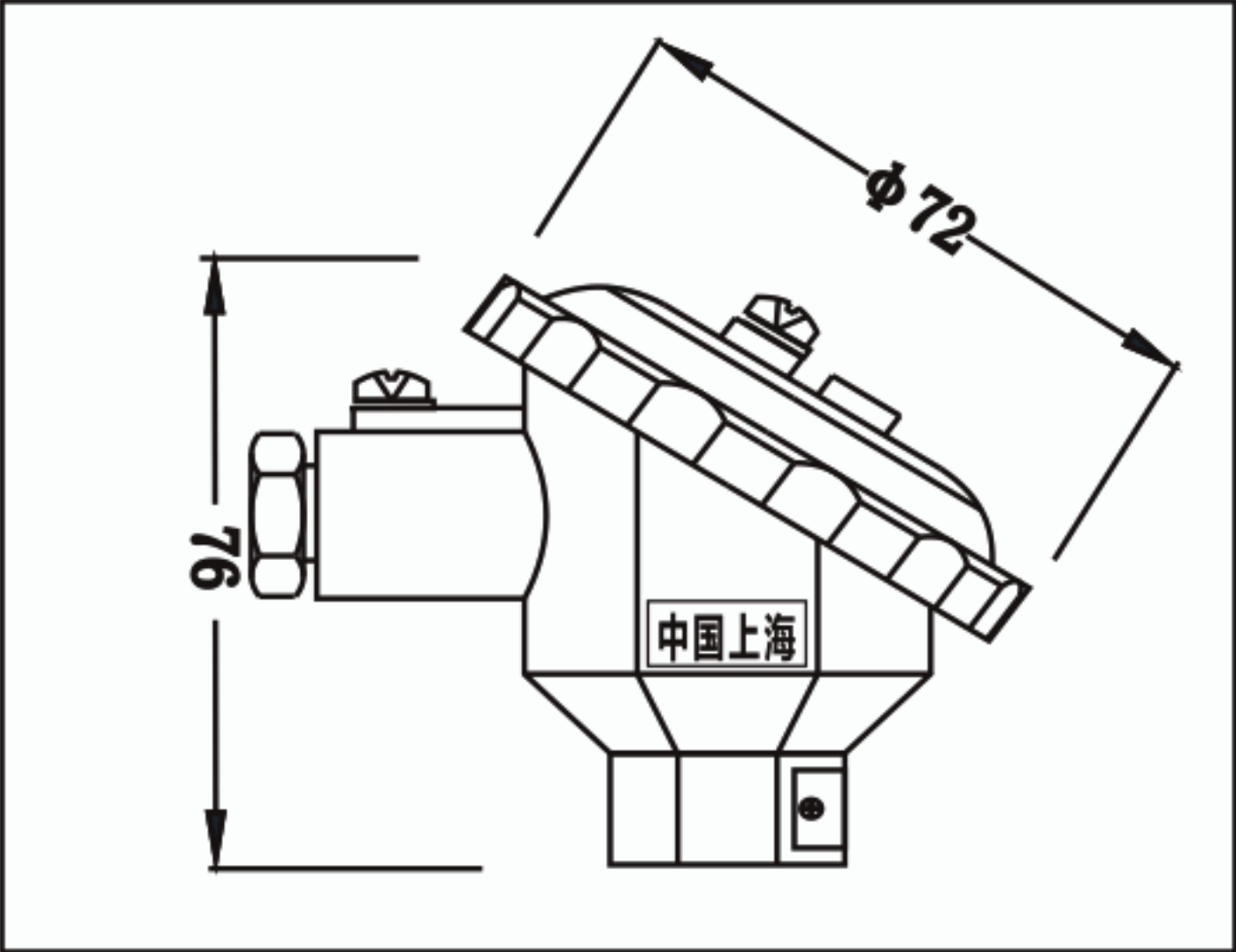
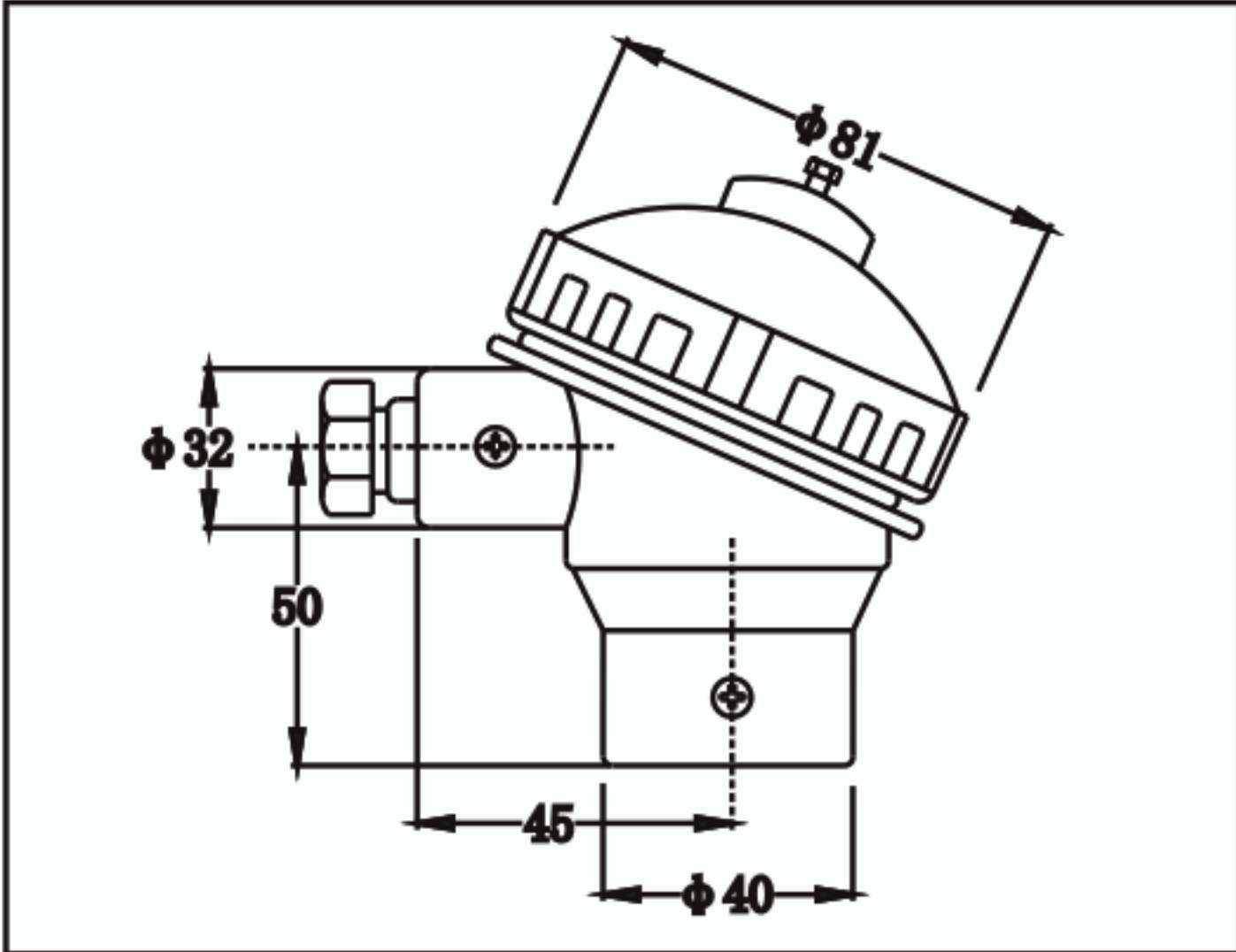
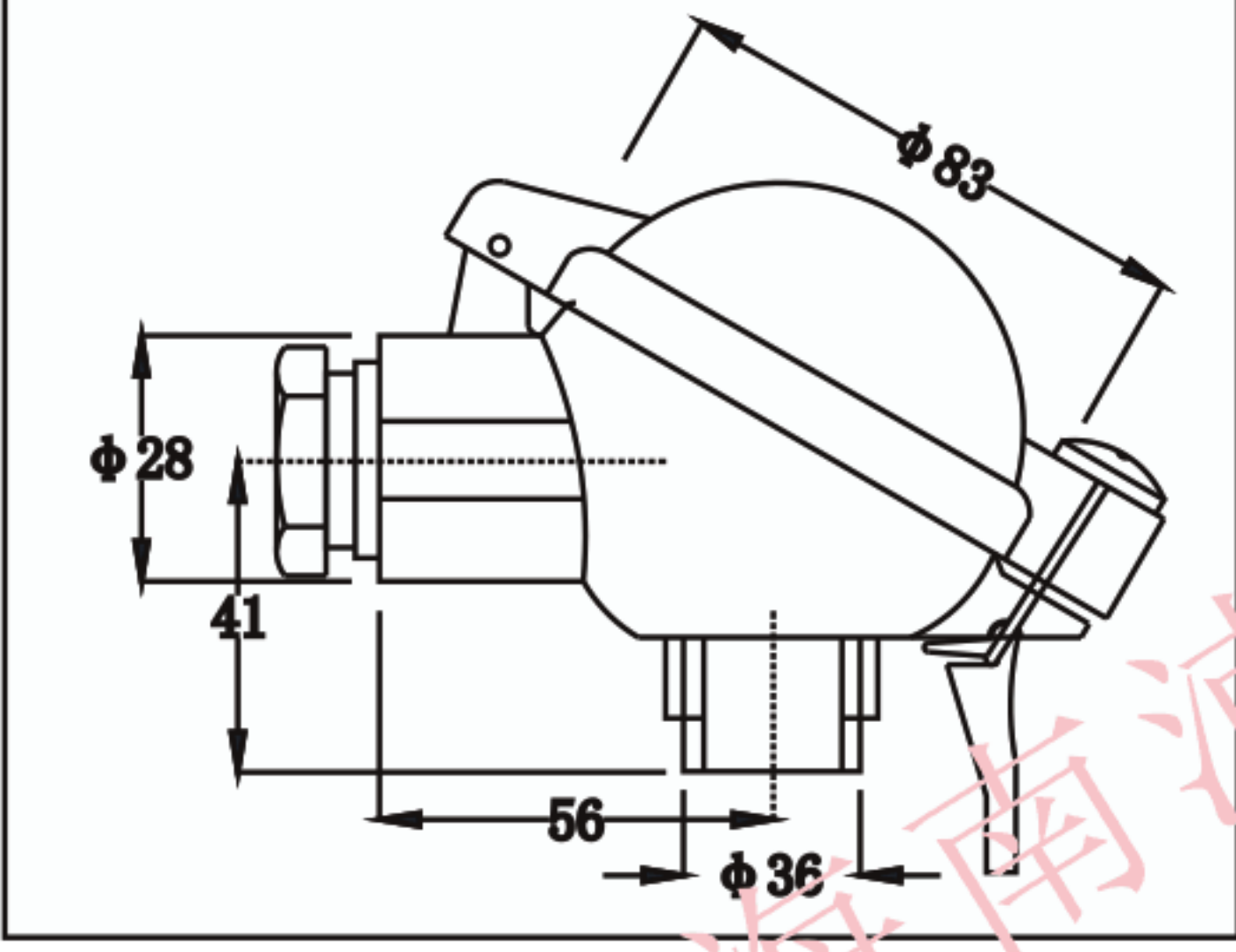
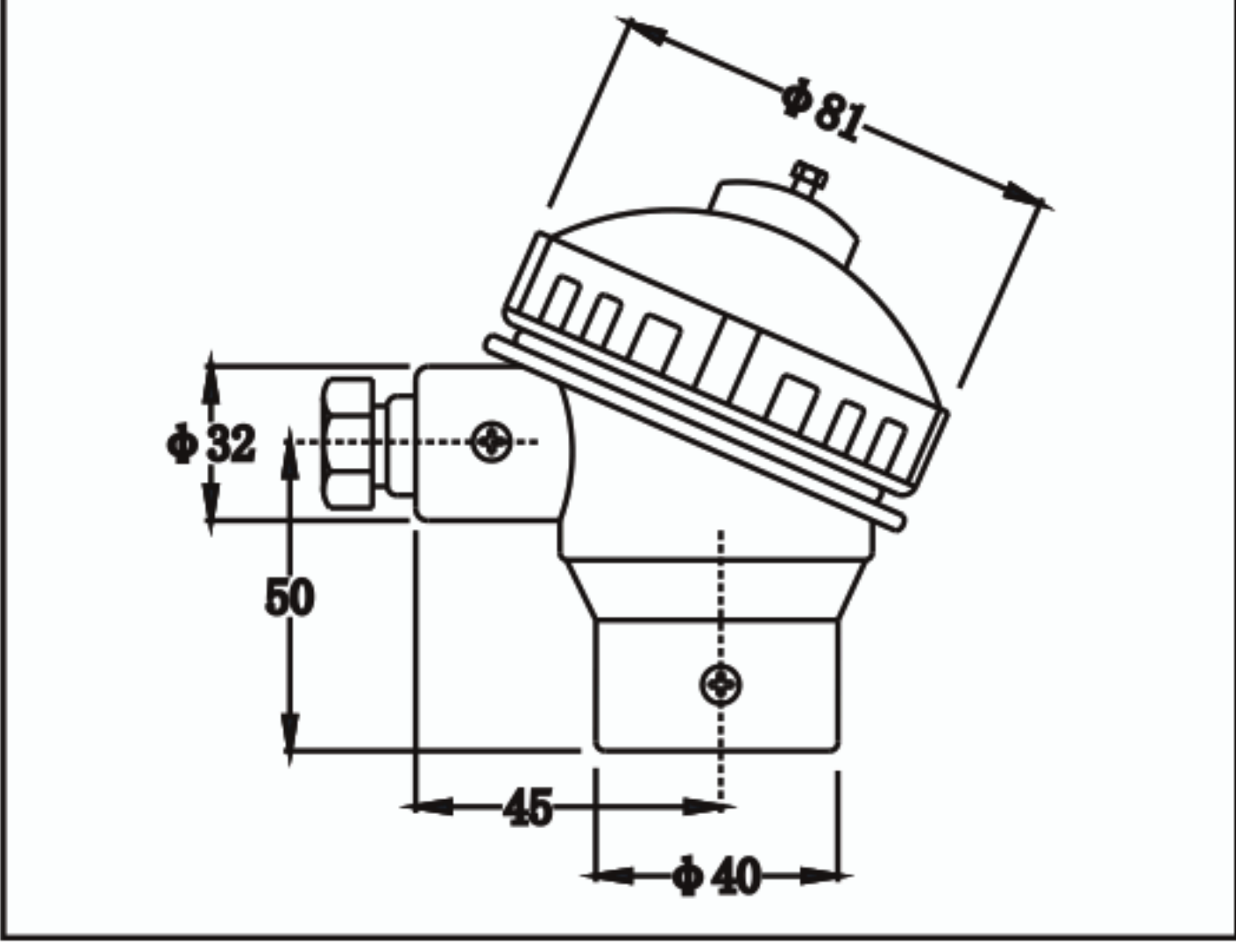
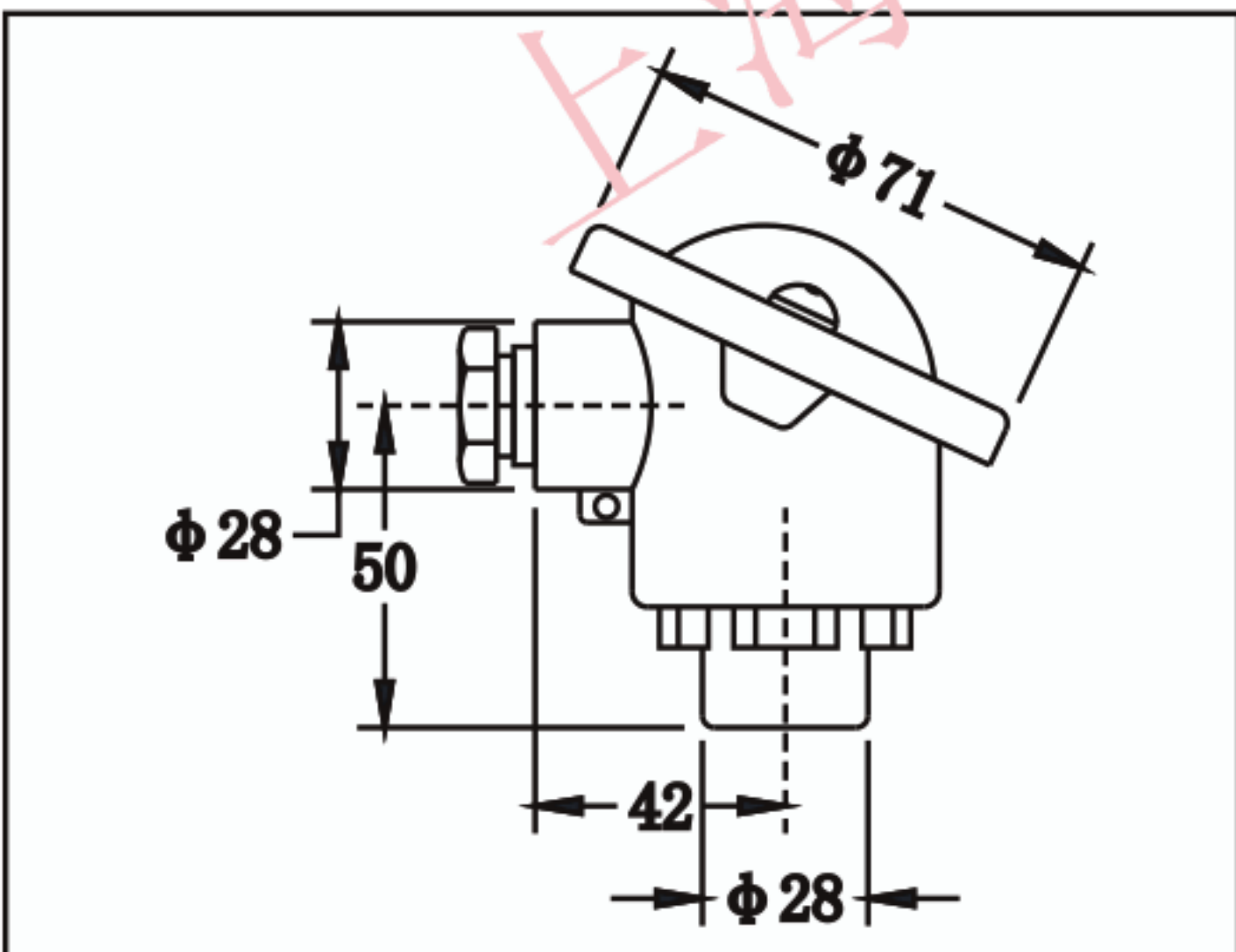
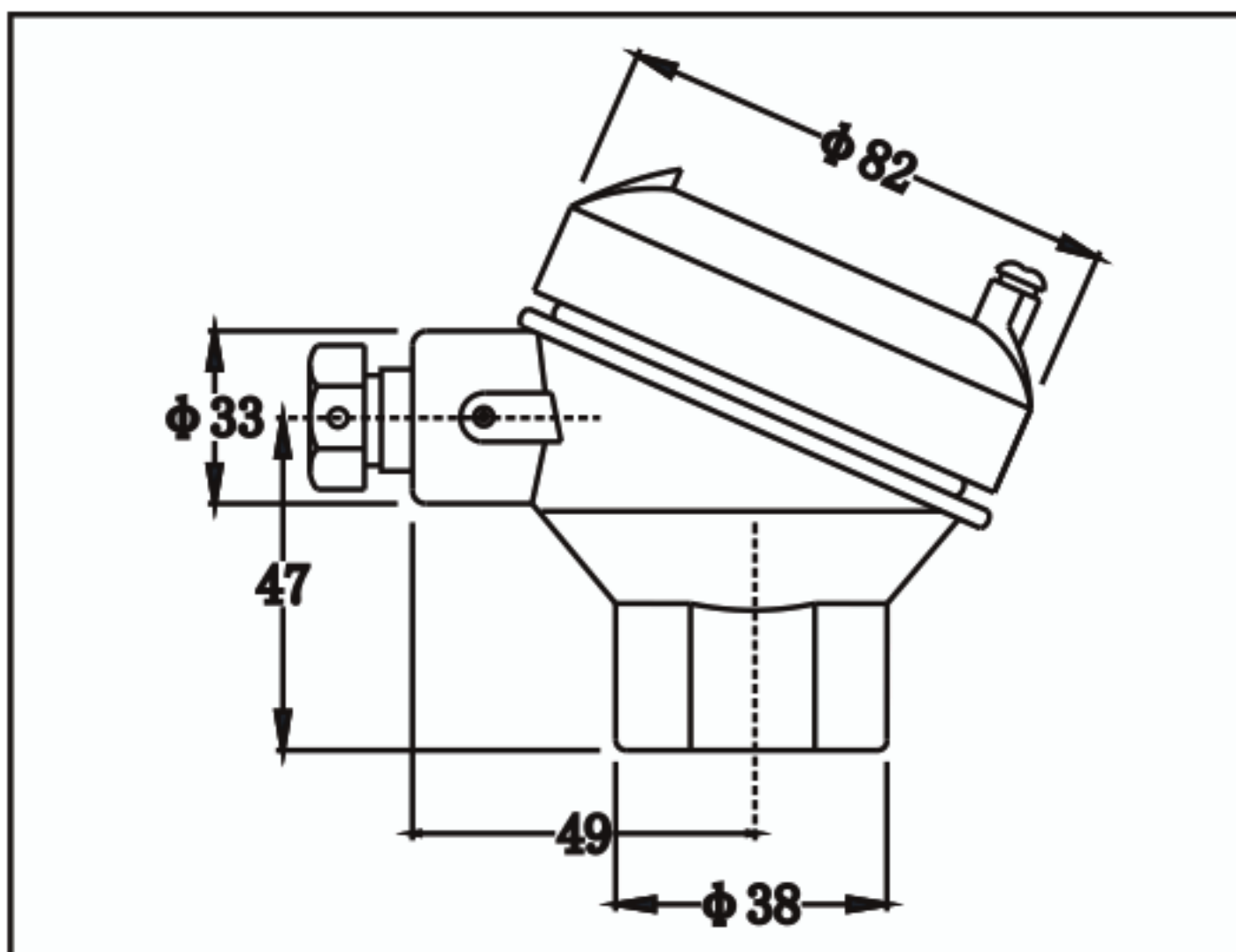
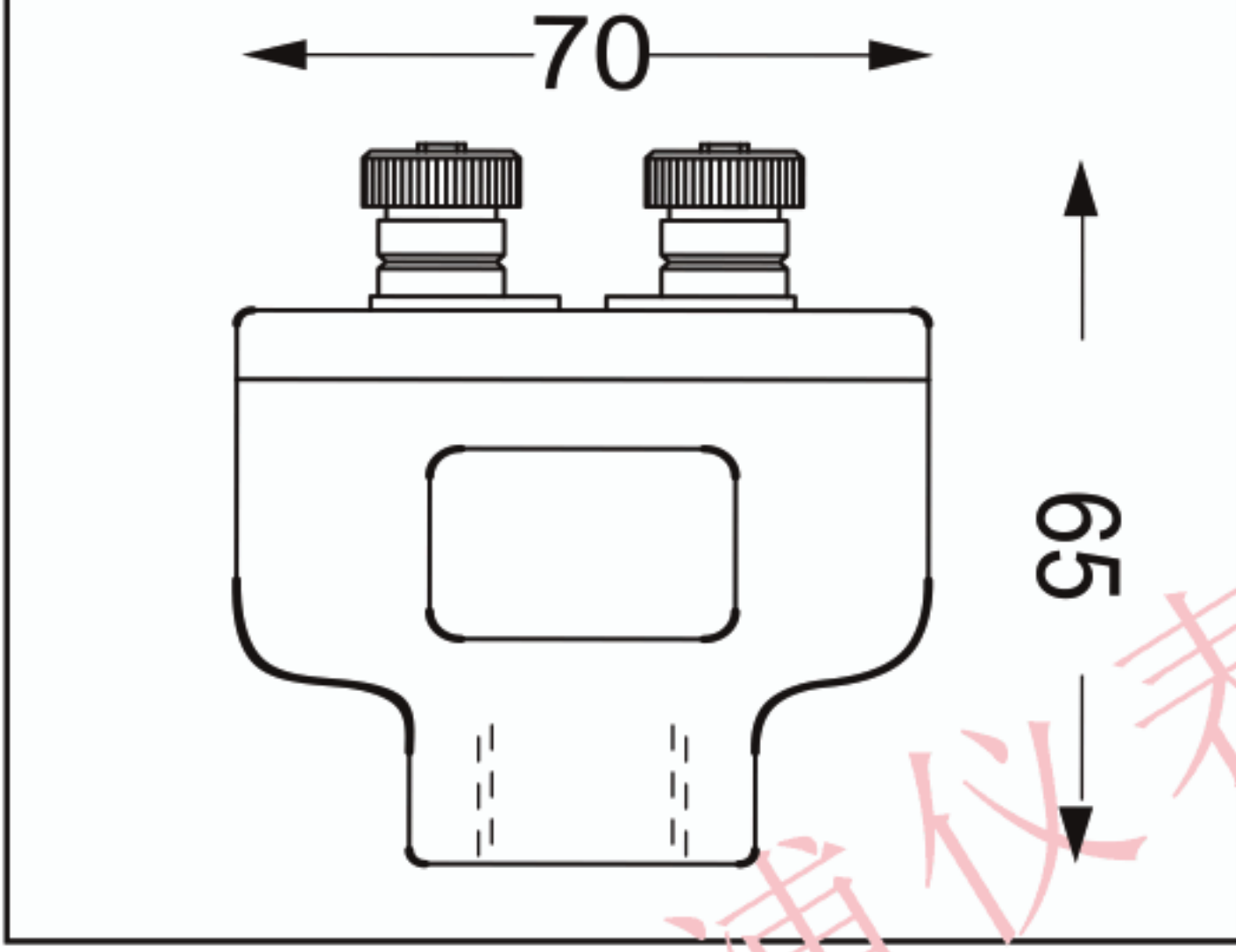
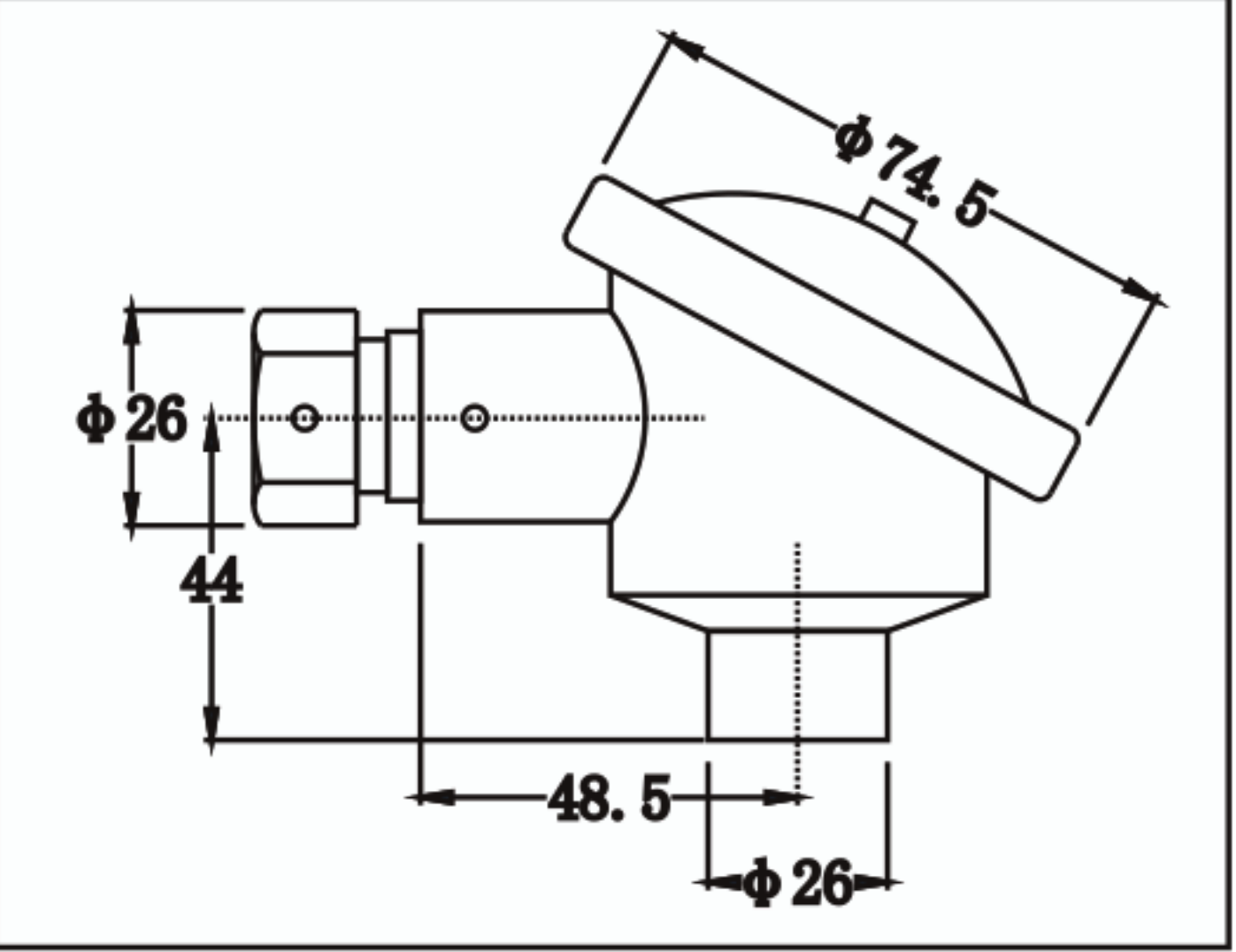
陶瓷保护管直径和长度规格
Diameter and length specification of porcelain protection tube

直径 Diameter	长度规格L × I Length specification									
	总长度 L Total length	300	350	400	450	550	650	900	1150	1650
φ 16 (单套管) Single shell-tube	插入长度 I Insertion length	150	200	250	300	400	500	750	1000	1500
	总长度 L Total length	—	—	400	450	550	650	900	1150	1650
φ 20 (单套管) Single shell-tube	插入长度 I Insertion length	—	—	250	300	400	500	750	1000	1500
	总长度 L Total length	—	—	—	—	550	650	900	1150	1650
φ25 (双层套管) Double shell-tube	插入长度 I Insertion length	—	—	—	—	400	500	750	1000	1500
	总长度 L Total length	—	—	—	—	550	650	900	1150	1650

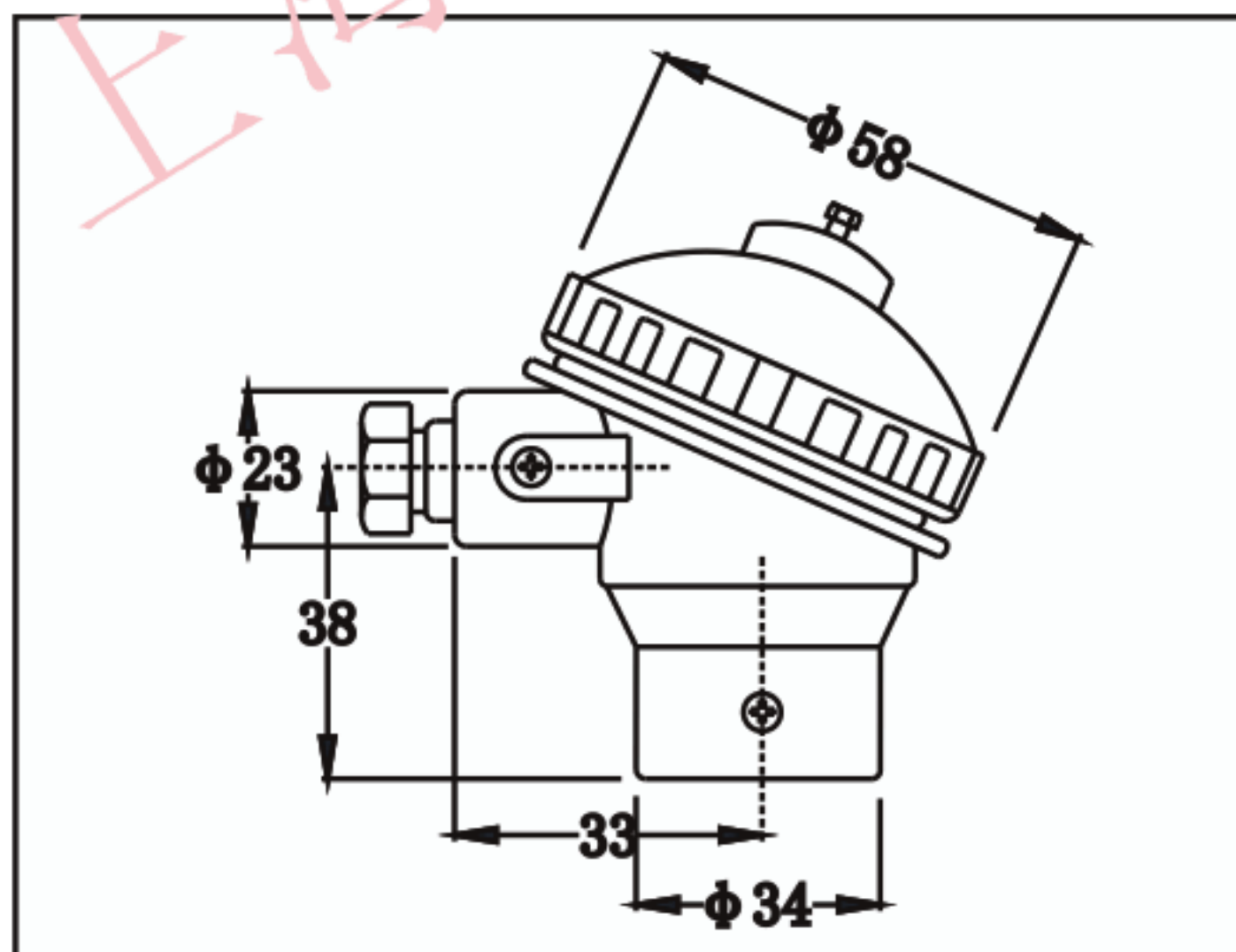
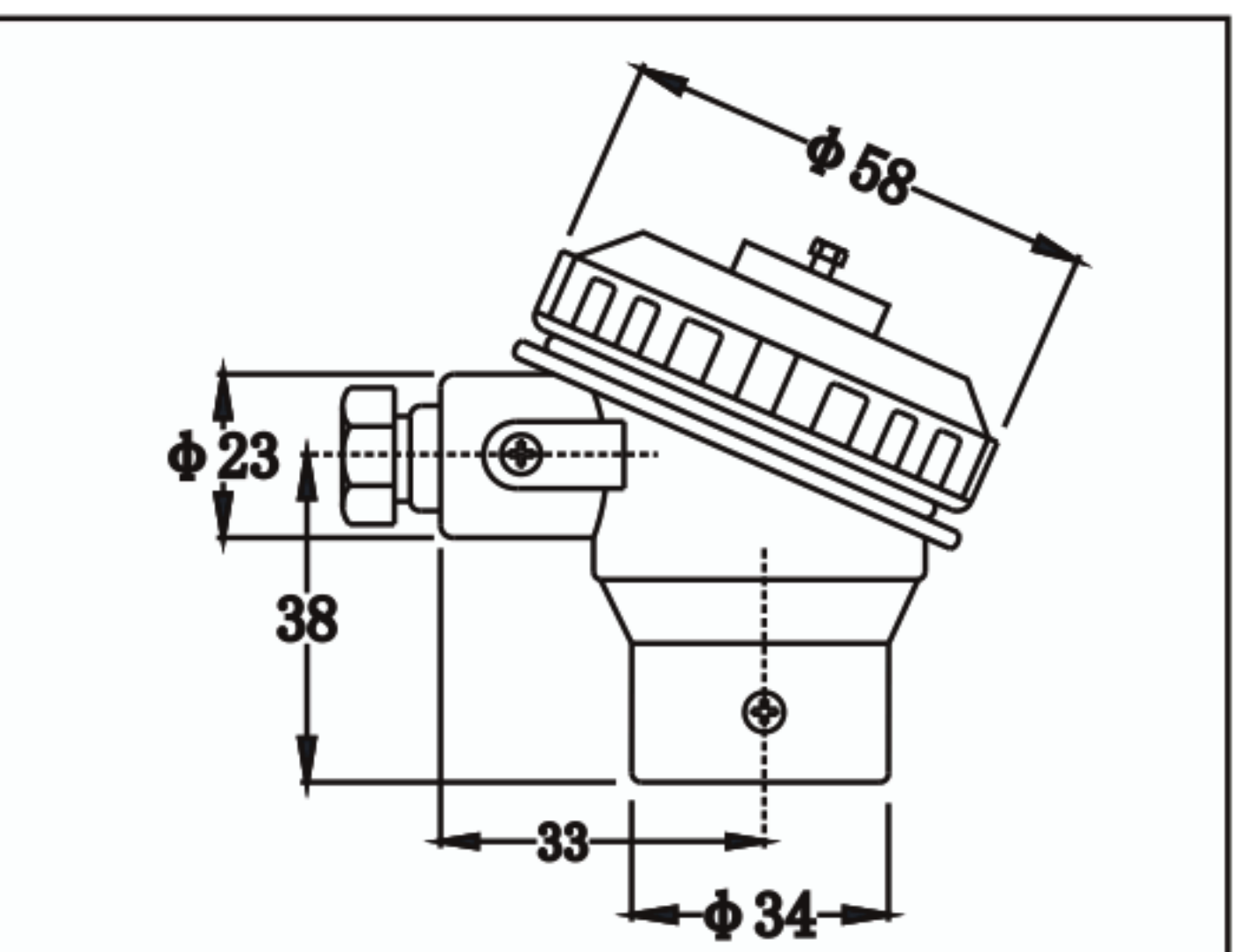
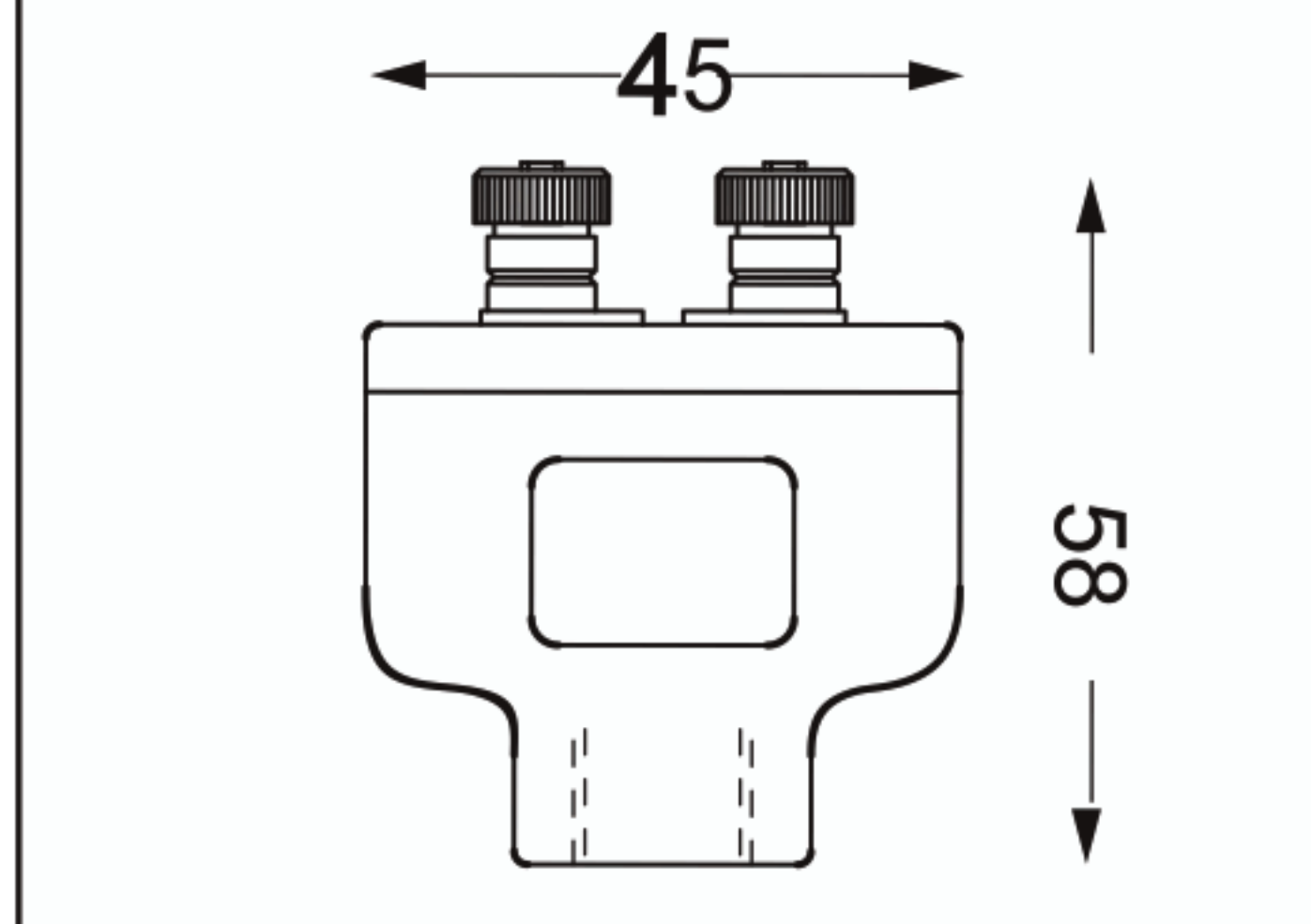
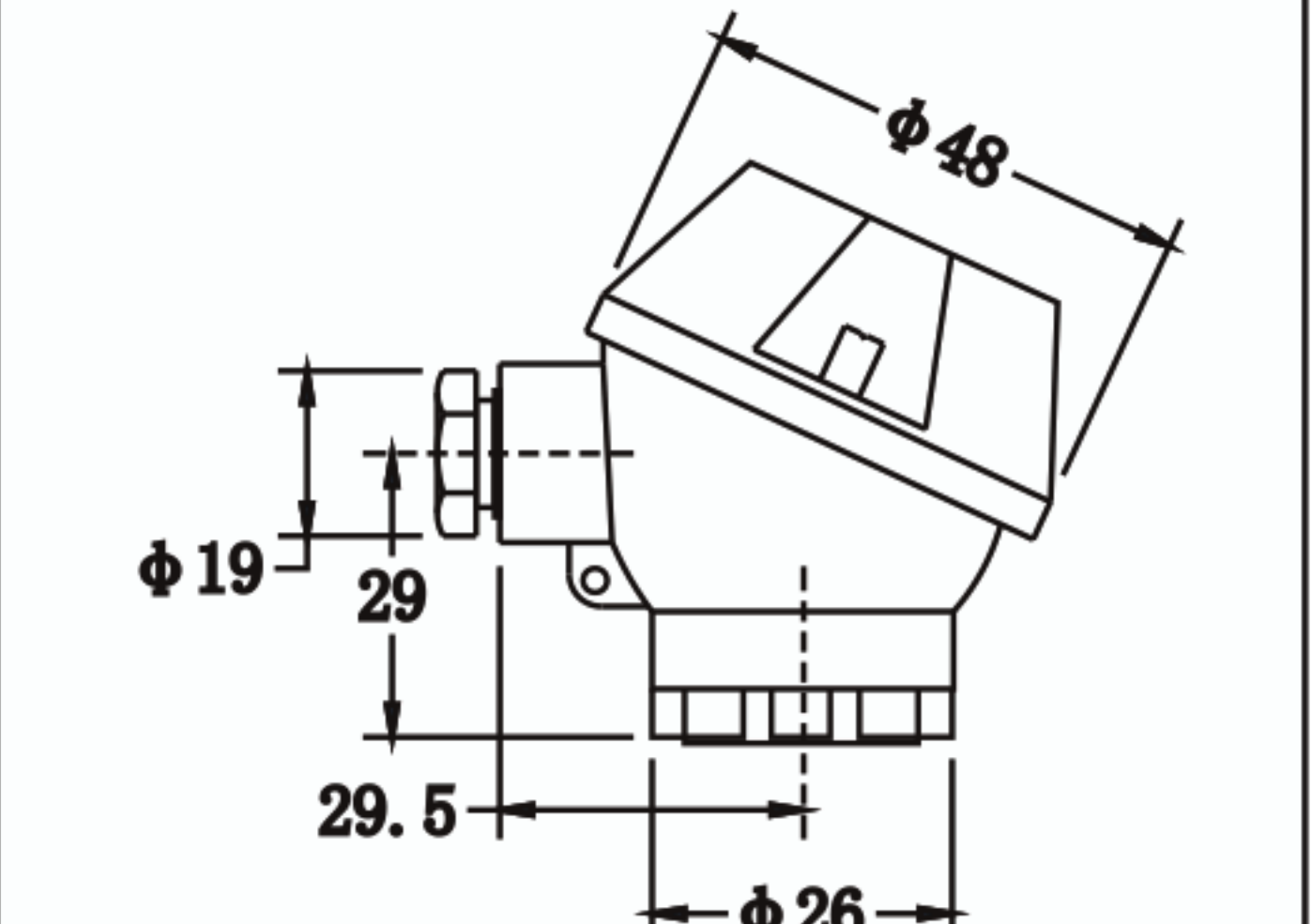
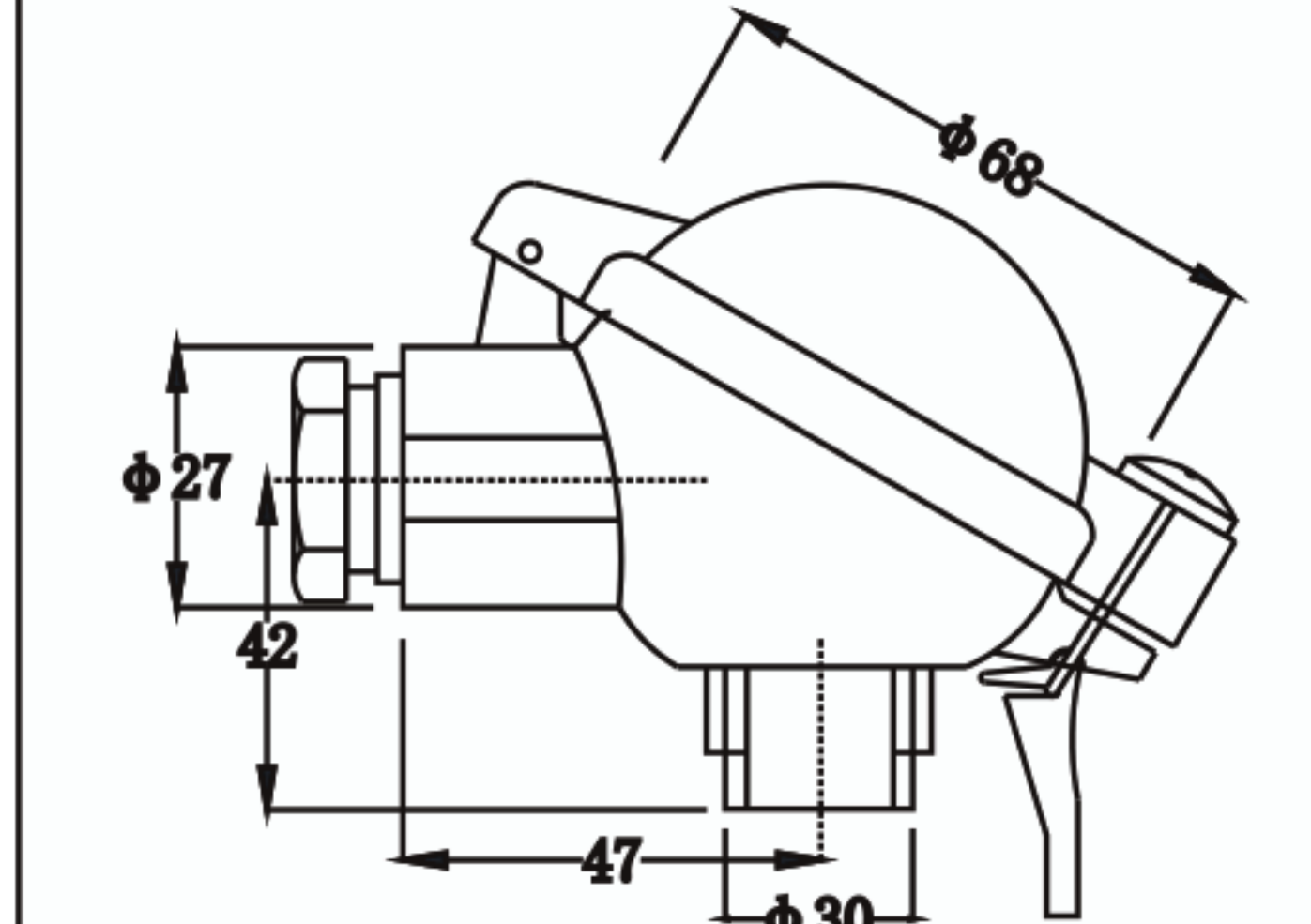
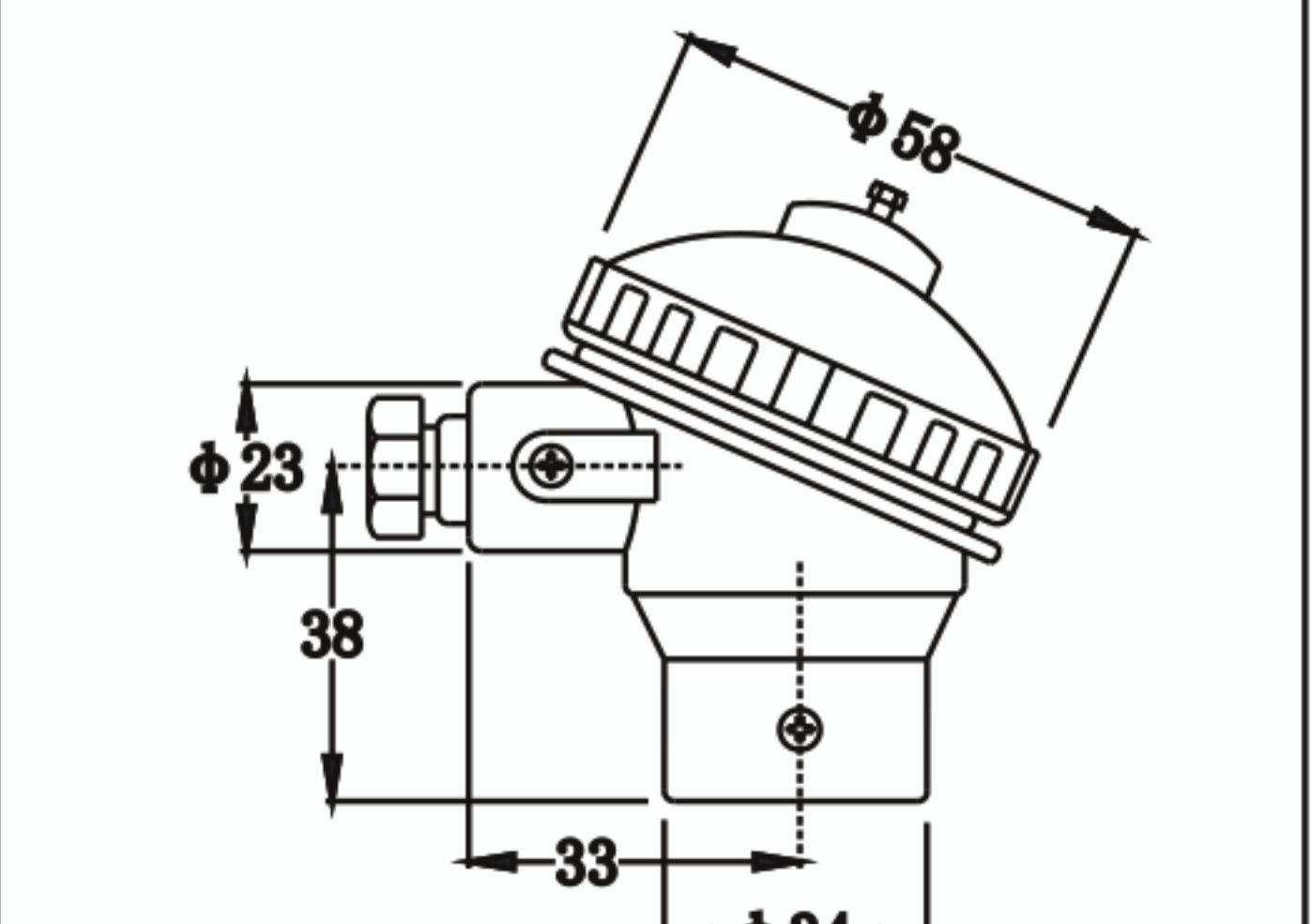
工业用装配式热电偶作为测量温度的传感器，通常和显示仪表、记录仪表、调节器、PLC和DCS系统配套使用。它可以直接测量各种生产过程中的工艺温度。温度范围：-200~1300℃。测量原理：热电偶的测温原理是热电效应。热电偶由两种不同材料的导体组成，当它们的两端温度不同时，就会产生电动势。通过测量这个电动势，就可以确定被测物体的温度。热电偶具有结构简单、使用方便、测量精度高、使用寿命长等优点。它广泛应用于工业、科研、医疗等领域。在工业生产中，热电偶常用于测量炉温、窑温、管道温度等。在科研领域，热电偶常用于测量材料的热性能。在医疗领域，热电偶常用于测量体温。总之，热电偶是一种非常重要的温度测量工具。上海南浦仪表厂是一家专业生产热电偶的企业，其产品种类齐全，质量可靠，价格公道。欢迎广大客户垂询。

各类选配热电偶接线盒

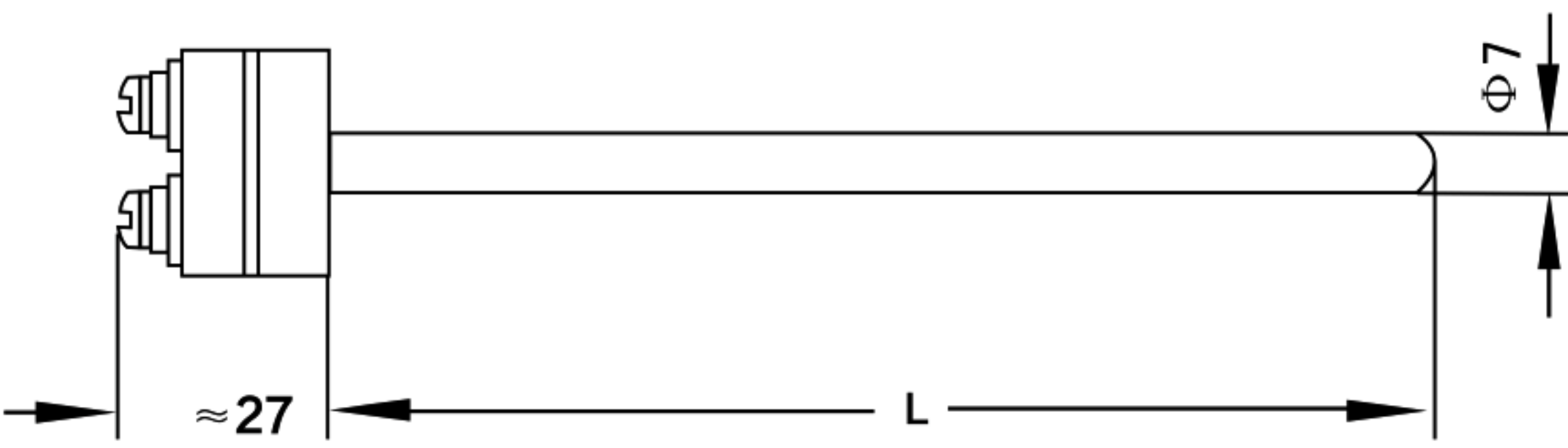
可选配热电偶头类型（偶头外径大于70MM）

默认经典铝合金喷漆			仿进口铝合金喷漆	A2  +15.00	
仿进口铝合金喷漆	A3  +25.00		仿进口胶木	A4  +30.00	
仿进口铝合金喷漆	A5  +25.00		仿进口铝合金喷漆	A6  +30.00	
仿进口铝合金喷漆	A7  +15.00		仿进口不锈钢	A8  +120.00	

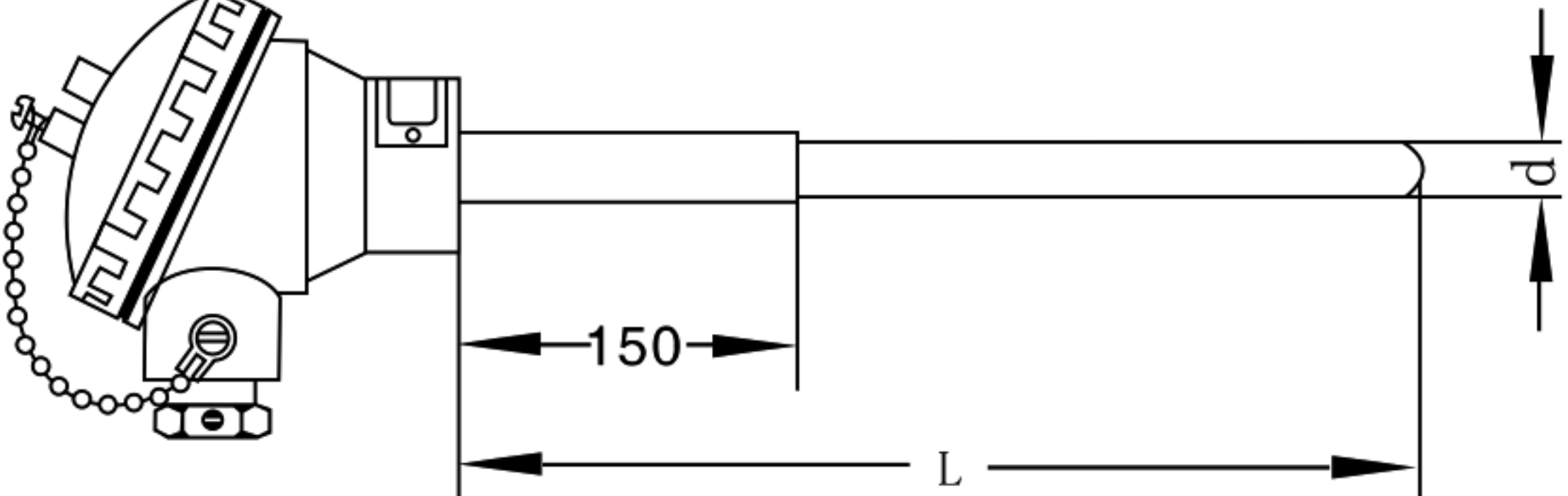
小型热电偶头适用保护管12MM以下热电偶（偶头外径小于70MM）

仿进口铝合金喷漆	B1  +15.00		仿进口铝合金喷漆	B2  +15.00	
仿进口铝合金喷漆	B3  +15.00		仿进口铝合金喷漆	B4  +25.00	
仿进口铝合金喷漆	B5  +25.00		仿进口铝胶木	B6  +30.00	

小型铂铑热电偶Small-sized platinum-rhodium thermocouple

型号 Model	分度号 Graduation Mark	测量范围 (℃) Measuring Range(℃)	热相应时间 τ 0.5(s) Thermal Response Time τ 0.5(s)	保护管材料 Protection Tube Material	L(mm)	
WRR-100	B	0~1600	≤45	刚玉质 Corundum	225	
WRP-100	S	0~1300		高铝质 High Al2O3		
WRQ-100	R	0~1300				

无固定装置式热电偶（瓷保护管）Non-fixed device thermocouple (ceramic protection tube)

热电偶类别 Category	产品型号 Model	分度号 Graduation Mark	测温范围 Measuring Range ℃	规格Specificatino		热响应时间 Thermal Response Time τ 0.5(s)	
				直径 Diameter mm	保护管材料 Protection tube material		
单支铂铑30-铂铑6 Single rhodium platinum 30-rhodium platinum 6	WRR-130	B (LL-2)*	0~1600	φ16	刚玉质 Corundum	≤120	
	WRR-131			φ25		≤240	
双支铂铑30-铂铑6 Twin rhodium platinum 30-rhodium platinum 6	WRR ₂ -130			φ16		≤120	
	WRR ₂ -131			φ25		≤240	
单支铂铑10-铂 Single rhodium platinum 10-platinum	WRP-130	S (LB-3)*	0~1300	φ16	高铝质 High Al2O3	≤120	
	WRP-131			φ25		≤240	
双支铂铑10-铂 Twin rhodium platinum 10-Platinum	WRP ₂ -130			φ16		≤120	
	WRP ₂ -131			φ25		≤240	
单支铂铑13-铂 Single rhodium platinum 10-platinum	WRQ-130	R	0~1300	φ16	高铝质 High Al2O3	≤120	
	WRQ-131			φ25		≤240	
双支铂铑13-铂 Twin rhodium platinum 10-Platinum	WRQ ₂ -130			φ16		≤120	
	WRQ ₂ -131			φ25		≤240	
单支镍铬-镍硅 Single nickel-chromium-nisiloy	WRN-132	K (EU-2)*	0~1100	φ16	高铝质High Al2O3	≤120	
	WRN-133		0~1200	φ20		≤160	
双支镍铬-镍硅 Twin nickel-chromium-nisiloy	WRN ₂ -132		0~1100	φ16		≤120	
	WRN ₂ -133		0~1200	φ20		≤160	
单支镍铬硅-镍硅镁 Single nickel-chromium-nisiloy	WRM-132	N	0~1100	φ16	高铝质High Al2O3	≤120	
	WRM-133		0~1200	φ20		≤160	
双支镍铬硅-镍硅镁 Twin nickel-chromium-nisiloy	WRM ₂ -132		0~1100	φ16		≤120	
	WRM ₂ -133		0~1200	φ20		≤160	

(2) 直径φ 25mm为双层瓷套管。

(3) 打 “*” 分度号作特殊规格订货。

Note: (1) Refer to Page 6, Table 5 for length specification. Non-placed part is of carbon steel 20 # or stainless steel.

(2) Diameter φ 25mm is of two-layer porcelain bushing.

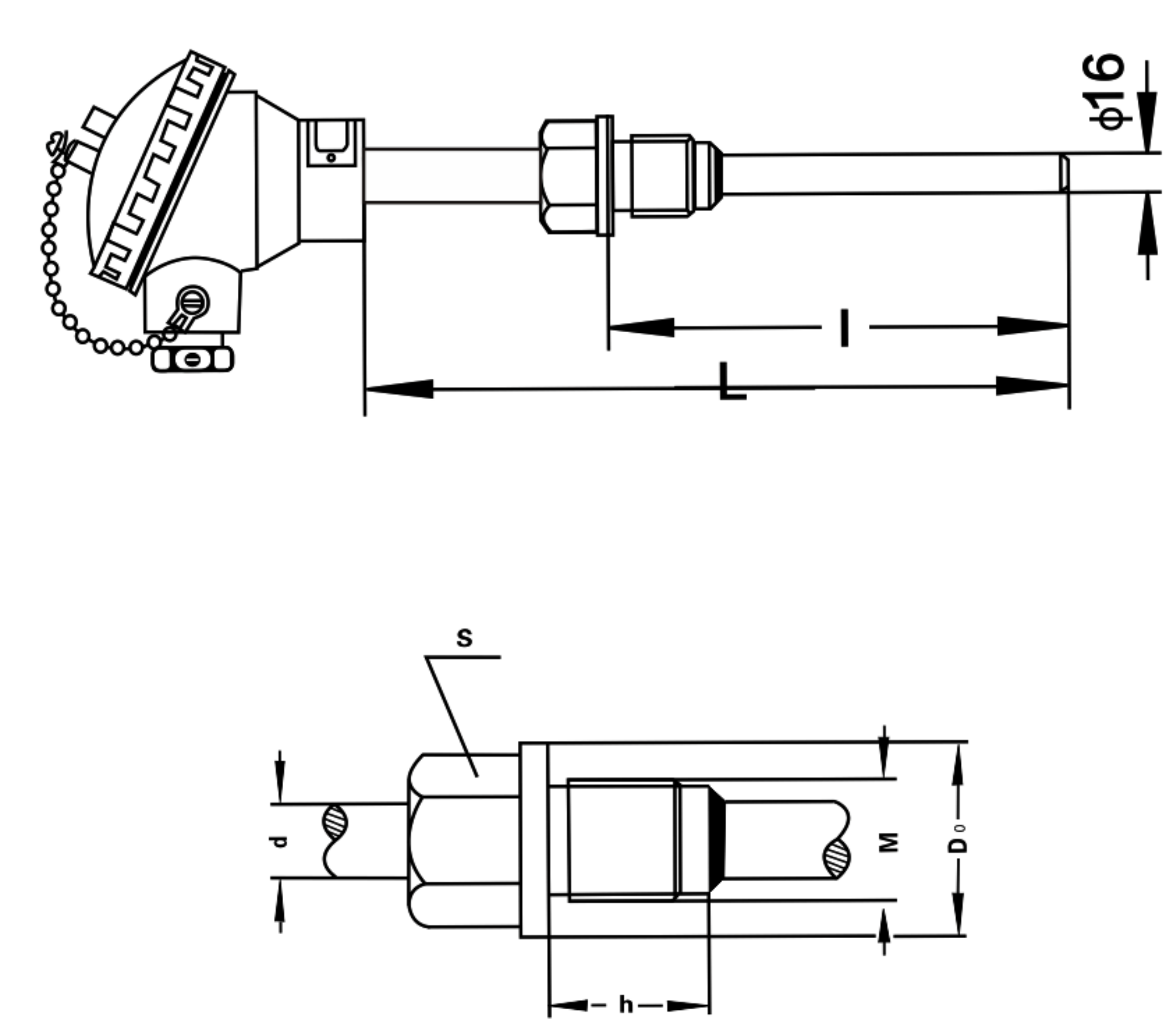
(3) That of “*” is the order of special specification.

专注温度测量 www.nanpuyibiao.com 电话: 021-33040697 传真: 021-33040769

WRQ-230系列固定螺纹式铂铑热电偶

热电偶类别 Category	产品型号 Model	分度号 Graduation Mark	测温范围 Measuring Range ℃	规格Specificatio		热响应时间 Thermal Response Time τ 0.5(s)
				直径 Diameter mm	保护管材料 Protection tube material	
单支铂铑30-铂铑6 Single rhodium platinum 30- rhodium platinum 6	WRR-230	B (LL-2)*	0~1600	φ16	刚玉质 Corundum	≤120
	WRR-231			φ25		≤240
双支铂铑30-铂铑6 Twin rhodium platinum 30- rhodium platinum 6	WRR ₂ -230			φ16		≤120
	WRR ₂ -231			φ25		≤240
单支铂铑10-铂 Single rhodium platinum 10-platinum	WRP-230	S (LB-3)*	0~1300	φ16	高铝质 High Al ₂ O ₃	≤120
	WRP-231			φ25		≤240
双支铂铑10-铂 Twin rhodium platinum 10-Platinum	WRP ₂ -230			φ16		≤120
	WRP ₂ -231			φ25		≤240
单支铂铑13-铂 Single rhodium platinum 10-platinum	WRQ-230	R	0~1300	φ16	高铝质 High Al ₂ O ₃	≤120
	WRQ-231			φ25		≤240
双支铂铑13-铂 Twin rhodium platinum 10-Platinum	WRQ ₂ -230			φ16		≤120
	WRQ ₂ -231			φ25		≤240
单支镍铬-镍硅 Single nickel- chromium-nisiloy	WRN-232	K (EU-2)*	0~1100	φ16	高铝质High Al ₂ O ₃	≤120
	WRN-233		0~1200	φ20		≤160
双支镍铬-镍硅 Twin nickel- chromium-nisiloy	WRN ₂ -232		0~1100	φ16		≤120
	WRN ₂ -233		0~1200	φ20		≤160
单支镍铬硅-镍硅 Single nickel- chromium-nisiloy	WRM-232	N	0~1100	φ16	高铝质High Al ₂ O ₃	≤120
	WRM-233		0~1200	φ20		≤160
双支镍铬硅-镍硅 Twin nickel- chromium-nisiloy	WRM ₂ -232		0~1100	φ16		≤120
	WRM ₂ -233		0~1200	φ20		≤160

可以根据用户的要求
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(2) 直径φ25mm为双层瓷套管。

(3) 打“*”分度号作特殊规格订货。

Note: (1) Refer to Page 6, Table 5 for length specification. Non-placed part is of carbon steel 20# or stainless steel.

(2) Diameter φ25mm is of two-layer porcelain bushing.

(3) That of “*” is the order of special specification.

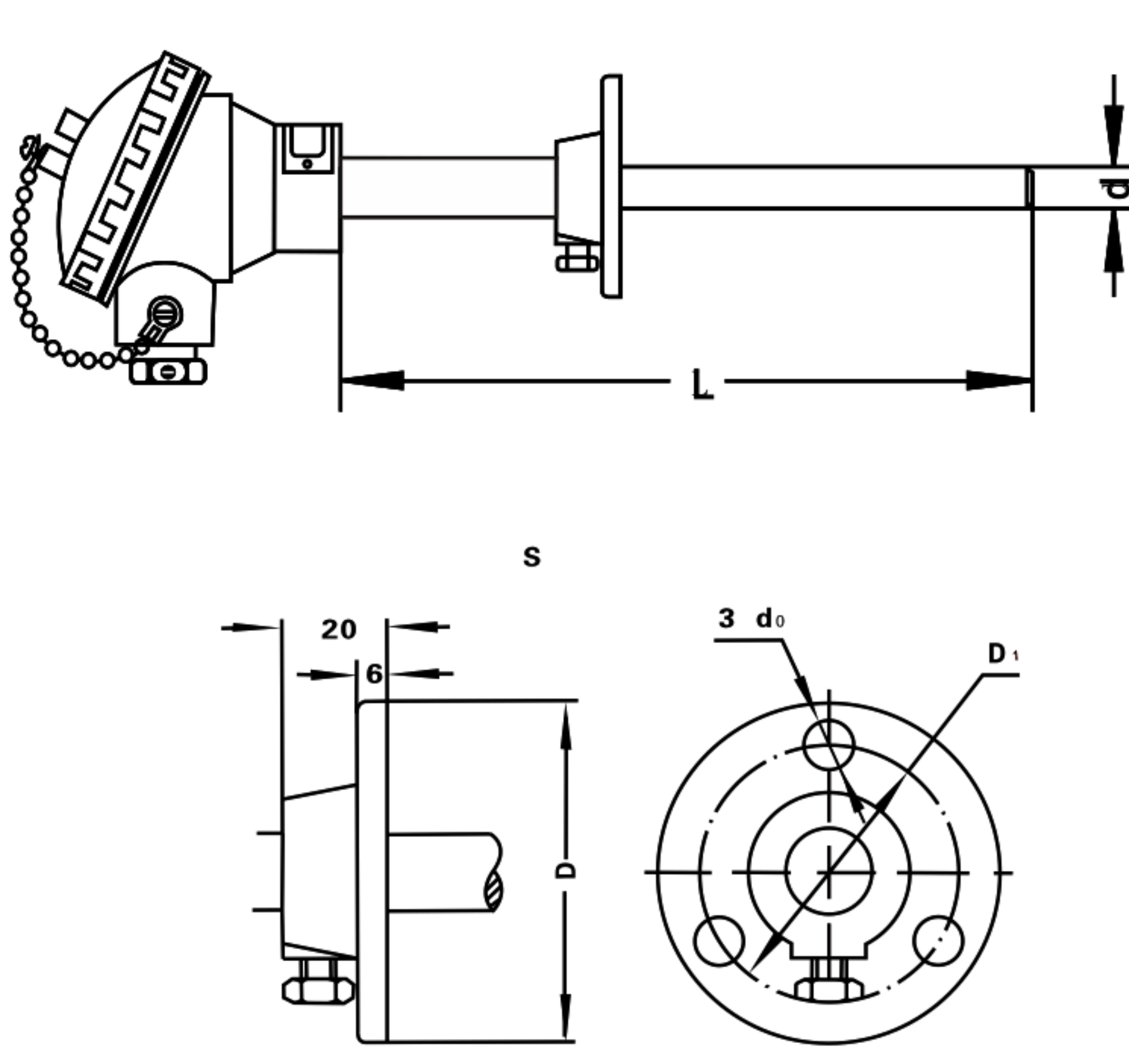
常用保护管长度规格

总长L(mm)	225	250	300	350	400	450	550	650	900	1150	1400	1650	2150
置入深度l (mm)	75	100	150	200	250	300	400	500	750	1000	1250	1500	2000

WR□-330系列固定螺纹式铂铑热电偶

热电偶类别 Category	产品型号 Model	分度号 Graduation Mark	测温范围 Measuring Range ℃	规格Specificatino		热响应时间 Thermal Response Time τ 0.5(s)
				直径 Diameter mm	保护管材料 Protection tube material	
单支铂铑30-铂铑6 Single rhodium platinum 30-rhodium platinum 6	WRR-330	B (LL-2)*	0~1600	φ16	刚玉质 Corundum	≤120
	WRR-331			φ25		≤240
双支铂铑30-铂铑6 Twin rhodium platinum 30-rhodium platinum 6	WRR ₂ -330			φ16		≤120
	WRR ₂ -331			φ25		≤240
单支铂铑10-铂 Single rhodium platinum 10-platinum	WRP-330	S (LB-3)*	0~1300	φ16	高铝质 High Al ₂ O ₃	≤120
	WRP-331			φ25		≤240
双支铂铑10-铂 Twin rhodium platinum 10-Platinum	WRP ₂ -330			φ16		≤120
	WRP ₂ -331			φ25		≤240
单支铂铑13-铂 Single rhodium platinum 10-platinum	WRQ-330	R	0~1300	φ16	高铝质 High Al ₂ O ₃	≤120
	WRQ-331			φ25		≤240
双支铂铑13-铂 Twin rhodium platinum 10-Platinum	WRQ ₂ -330			φ16		≤120
	WRQ ₂ -331			φ25		≤240
单支镍铬-镍硅 Single nickel-chromium-nisiloy	WRN-332	K (EU-2)*	0~1100	φ16	高铝质High Al ₂ O ₃	≤120
	WRN-333		0~1200	φ20		≤160
双支镍铬-镍硅 Twin nickel-chromium-nisiloy	WRN ₂ -332		0~1100	φ16		≤120
	WRN ₂ -333		0~1200	φ20		≤160
单支镍铬硅-镍硅镁 Single nickel-chromium-nisiloy	WRM-332	N	0~1100	φ16	高铝质High Al ₂ O ₃	≤120
	WRM-333		0~1200	φ20		≤160
双支镍铬硅-镍硅镁 Twin nickel-chromium-nisiloy	WRM ₂ -332		0~1100	φ16		≤120
	WRM ₂ -333		0~1200	φ20		≤160

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- (2) 直径φ 25mm为双层瓷套管。
(3) 打 “*” 分度号作特殊规格订货。

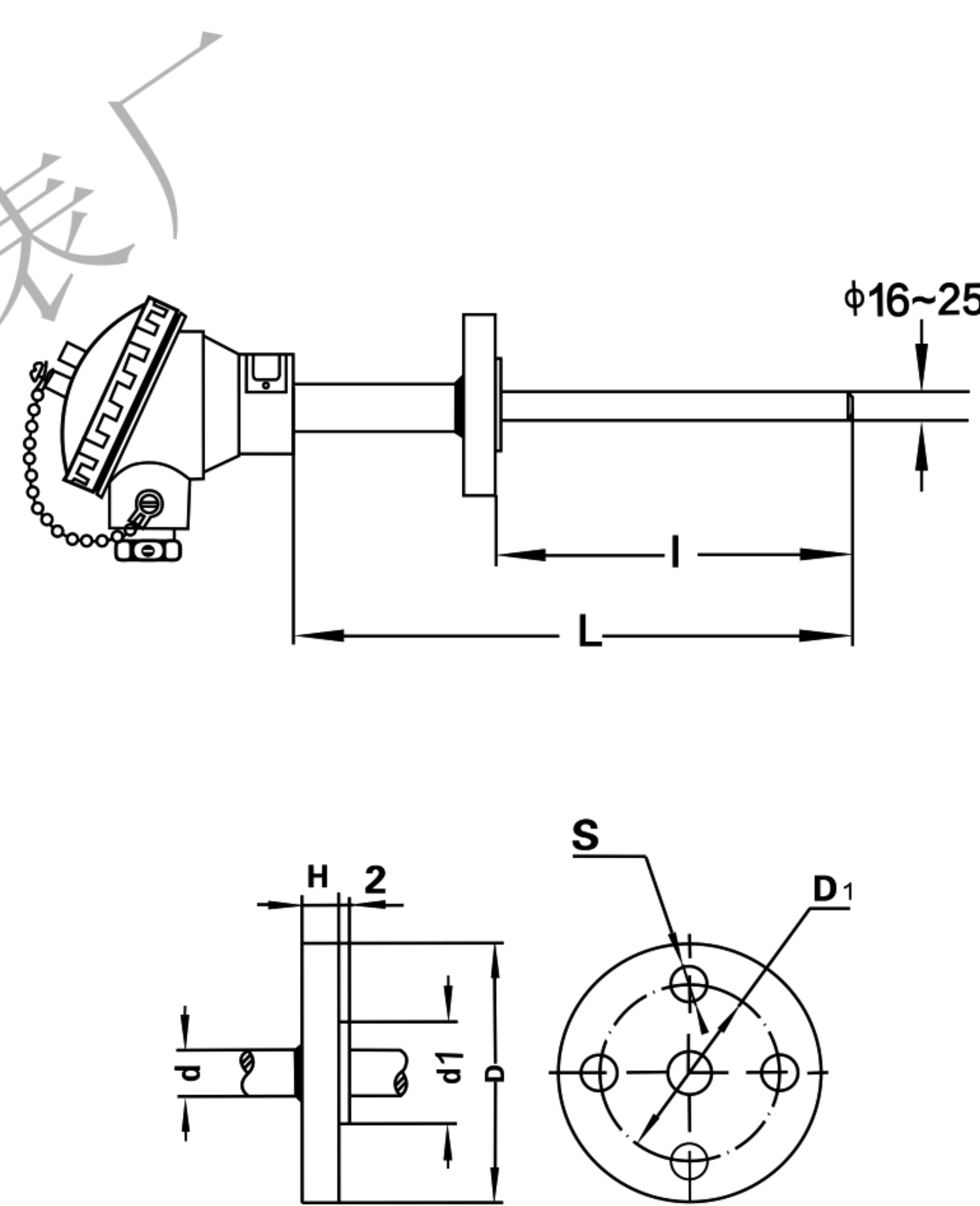
Note: (1) Refer to Page 6, Table 5 for length specification. Non-placed part is of carbon steel 20 # or stainless steel.
(2) Diameter φ 25mm is of two-layer porcelain bushing.
(3) That of “*” is the order of special specification.

常用保护管长度规格

总长L(mm)	225	250	300	350	400	450	550	650	900	1150	1400	1650	2150
置入深度l (mm)	75	100	150	200	250	300	400	500	750	1000	1250	1500	2000

WR□-430系列固定螺纹式铂铑热电偶

热电偶类别 Category	产品型号 Model	分度号 Graduation Mark	测温范围 Measuring Range ℃	规格Specificatio		热响应时间 Thermal Response Time τ 0.5(s)
				直径 Diameter mm	保护管材料 Protection tube material	
单支铂铑30-铂铑6 Single rhodium platinum 30-rhodium platinum 6	WRR-430	B (LL-2)*	0~1600	φ16	刚玉质 Corundum	≤120
	WRR-431			φ25		≤240
双支铂铑30-铂铑6 Twin rhodium platinum 30-rhodium platinum 6	WRR ₂ -430			φ16		≤120
	WRR ₂ -431			φ25		≤240
单支铂铑10-铂 Single rhodium platinum 10-platinum	WRP-430	S (LB-3)*	0~1300	φ16	高铝质 High Al ₂ O ₃	≤120
	WRP-431			φ25		≤240
双支铂铑10-铂 Twin rhodium platinum 10-Platinum	WRP ₂ -430			φ16		≤120
	WRP ₂ -431			φ25		≤240
单支铂铑13-铂 Single rhodium platinum 10-platinum	WRQ-430	R	0~1300	φ16	高铝质 High Al ₂ O ₃	≤120
	WRQ-431			φ25		≤240
双支铂铑13-铂 Twin rhodium platinum 10-Platinum	WRQ ₂ -430			φ16		≤120
	WRQ ₂ -431			φ25		≤240
单支镍铬-镍硅 Single nickel-chromium-nisiloy	WRN-432	K (EU-2)*	0~1100	φ16	高铝质High Al ₂ O ₃	≤120
	WRN-433		0~1200	φ20		≤160
双支镍铬-镍硅 Twin nickel-chromium-nisiloy	WRN ₂ -432		0~1100	φ16		≤120
	WRN ₂ -433		0~1200	φ20		≤160
单支镍铬硅-镍硅镁 Single nickel-chromium-nisiloy	WRM-432	N	0~1100	φ16	高铝质High Al ₂ O ₃	≤120
	WRM-433		0~1200	φ20		≤160
双支镍铬硅-镍硅镁 Twin nickel-chromium-nisiloy	WRM ₂ -432		0~1100	φ16		≤120
	WRM ₂ -433		0~1200	φ20		≤160



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- (2) 直径φ 25mm为双层瓷套管。
(3) 打 “*” 分度号作特殊规格订货。

Note: (1) Refer to Page 6, Table 5 for length specification. Non-placed part is of carbon steel 20 # or stainless steel.
(2) Diameter φ 25mm is of two-layer porcelain bushing.
(3) That of “*” is the order of special specification.

常用保护管长度规格

总长L(mm)	225	250	300	350	400	450	550	650	900	1150	1400	1650	2150
置入深度l (mm)	75	100	150	200	250	300	400	500	750	1000	1250	1500	2000

无固定装置式热电偶 (金属保护管) Non-fixed device thermocouple(metal protection tube)

热电偶类别Category	产品型号 Model	分度号 Graduation Mark	测温范围 Measuring Range ℃	保护管材料 Protection tube material	规格Specification
					总长 Overall length Lmm
单支镍铬-镍硅 Single nickel-chromium-nisiloy	WRN-130	K (EU-2) *	0 ~ 800	1Cr18Ni9Ti	250 300 350 400 450 550 650 900 1150 1650 2150
双支镍铬-镍硅 Twin nickel-chromium-nisiloy	WRN ₂ -130		0 ~ 1000	0Cr25Ni20	
单支镍铬-铜镍 Single nickel-chromium-cupronickel	WRE-130	E (EA-2)*	0 ~ 600	1Cr18Ni9Ti	
双支镍铬-铜镍 Twin nickel-chromium-cupronickel	WRE ₂ -130				
单支镍铬硅-镍硅镁 Single nickel-chromium-silicon-nickel-silicon-magnesium	WRM-130	N	0 ~ 800	1Cr18Ni9Ti	
双支镍铬硅-镍硅镁 Twin nickel-chromium-silicon-nickel-silicon-magnesium	WRM ₂ -130		0 ~ 1000	0Cr25Ni20	
单支铁-铜镍 Single ferrum-cupronickel	WRJ-130	J	0 ~ 500	1Cr18Ni9Ti	
双支铁-铜镍 Twin ferrum-cupronickel	WRJ ₂ -130				
单支铜-铜镍 Single cuprum-cupronickel	WRT-130	T	-40 ~ +350		
双支铜-铜镍 Twin cuprum-cupronickel	WRT ₂ -130				

注：（1）热响应时间 τ 0.5<90s。
（2）保护管材料参见5页。
（3）打“*” 分度号作特殊规格订货。
（4）保护管选用0Cr25Ni20，型号后面加“H”，例：WRN-130H。

Note: (1) Thermal Response Time τ 0.5(s) is less than 90s.
(2) Refer to page 5, table 3 for protection tube material.
(3) That of “*” is the order of special specification.
(4) The protection tube shall use 0Cr25Ni20, and be remarked a “H” be hind the model, for example WRN-130H.



固定螺栓式热电偶 Fixed bolt thermocouple

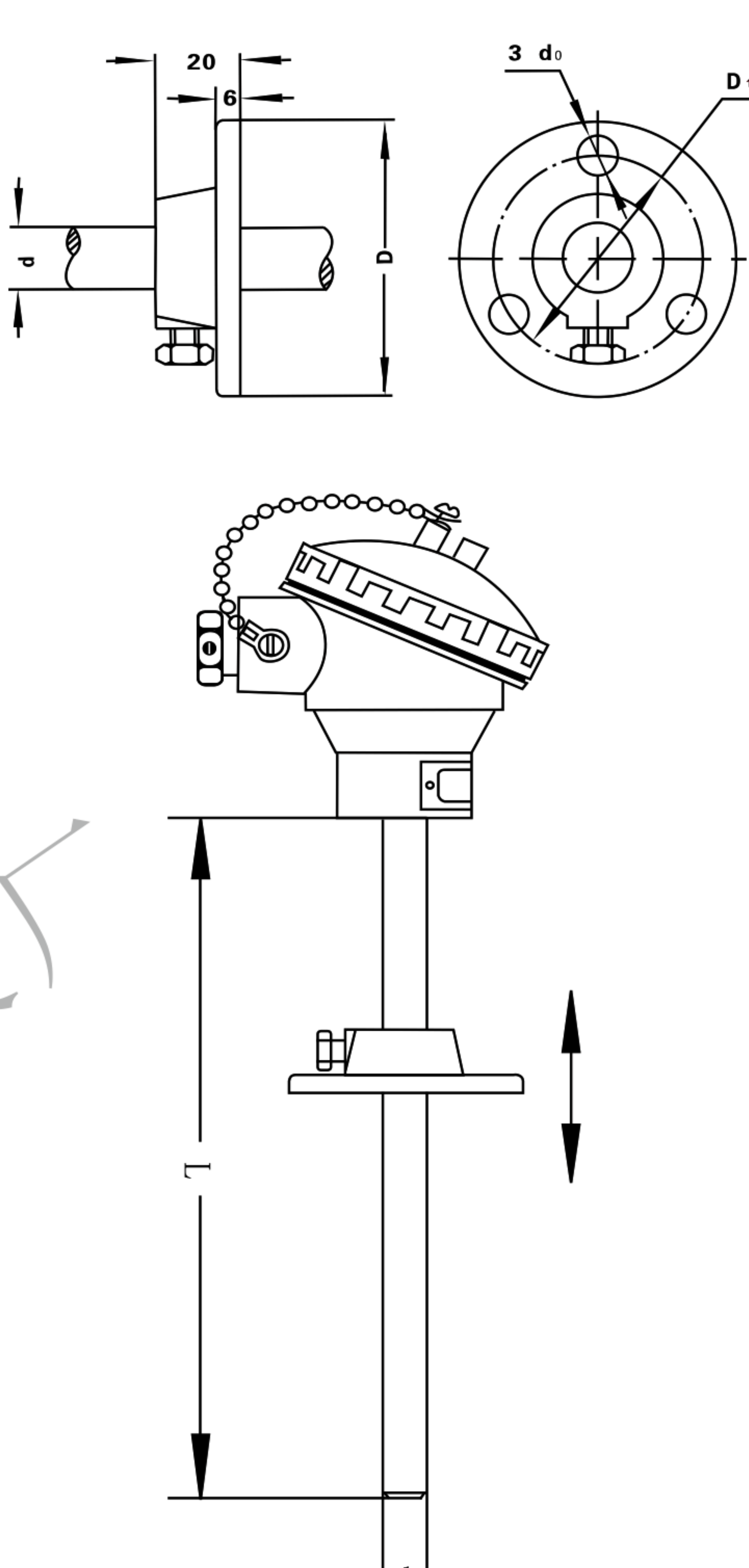
热电偶类别Category	产品型号 Model	分度号 Graduation Mark	测量范围 (℃) Measuring Range(℃)	热响应时间 τ 0.5(s) Thermal Response Time τ 0.5(s)	保护管材料 Protection Tube Material	规格 Specification					
						L × I					
单支铂铑30－铂铑6 Single rhodium platinum 30-rhodium platinum 6	WRR-230	B	0~1600	≤120	钢玉质 Corundum	250×100					
双支铂铑30－铂铑6 Twin rhodium platinum 30- rhodium platinum 6	WRR ₂ -230										
单支铂铑10－铂 Single rhodium platinum 10- platinum	WRP-230	S	0~1300		高铝质 High Al2O3 Ceramic	300×150					
双支铂铑10－铂 Single rhodium platinum 10- platinum	WRP ₂ -230					350×200					
单支镍铬－镍硅 Single nickel-chromium- nisiloy	WRN-232	K	0~1100	400×250							
双支镍铬－镍硅 Twin nickel-chromium- nisiloy	WRN ₂ -232										
单支镍铬－镍硅 Single nickel-chromium- nisiloy	WRN-233			450×300							
双支镍铬－镍硅 Twin nickel-chromium- nisiloy	WRN ₂ -233										
单支镍铬硅－镍硅镁 Single nickel-chromium- silicon- nickel-silicon- magnesium	WRM-232	N	0~1200	≤90	550×400						
双支镍铬硅－镍硅镁 Twin nickel-chromium- silicon- nickel-silicon- magnesium	WRM ₂ -232				650×500						
单支镍铬硅－镍硅镁 Single nickel-chromium- silicon- nickel-silicon- magnesium	WRM-233				900×750						
双支镍铬硅－镍硅镁 Twin nickel-chromium- silicon- nickel-silicon- magnesium	WRM ₂ -233										
单支镍铬－镍硅 Single nickel-chromium- nisiloy	WRN-230	K (EU-2)*	0~1000		1Cr18Ni9Ti 0Cr25Ni20	1150×1000					
双支镍铬－镍硅 Twin nickel-chromium- nisiloy	WRN ₂ -230				1650×1500						
单支镍铬－铜镍 Single nickel-chromium- cupronickel	WRE-230	E (EA-2)*	0~600		1Cr18Ni9Ti	2150×2000					
双支镍铬－铜镍 Twin nickel-chromium- cupronickel	WRE ₂ -230										

d	M	h	s	D0	公称压力 Nominal pressure
φ10	M27×2 G3/4"	32	32	φ40	10 Mpa
φ12					
φ16					
φ20	M33×2 G1"	35	36	φ48	

注：（1）保护管材料参见第5页，长度参见第6页。
（2）打“*”分度号作特殊规格订货。
（3）公称压力：10MPa。
（4）型号后加（K），内芯元件为铠装元件。例：WRN-230（K）。

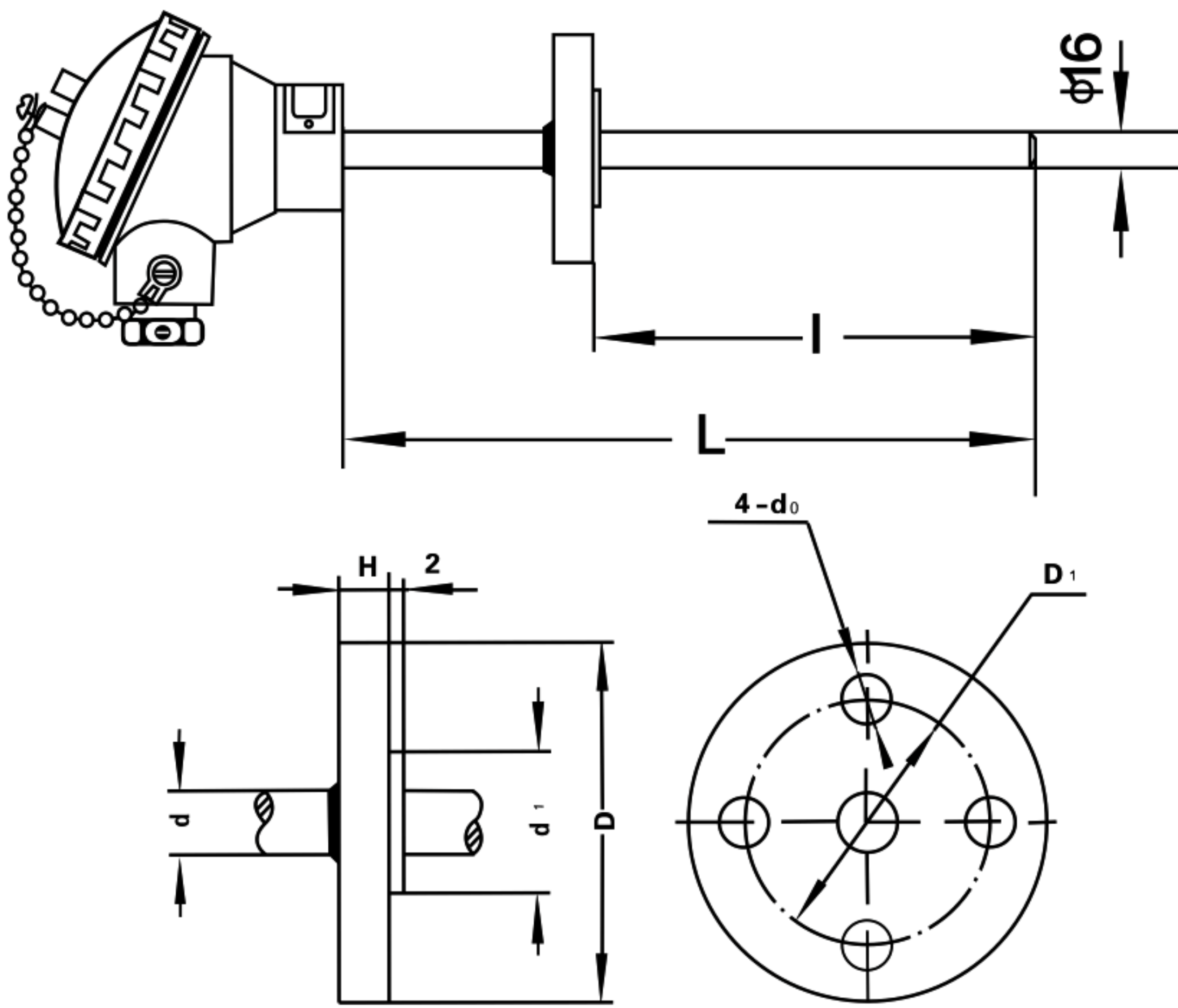
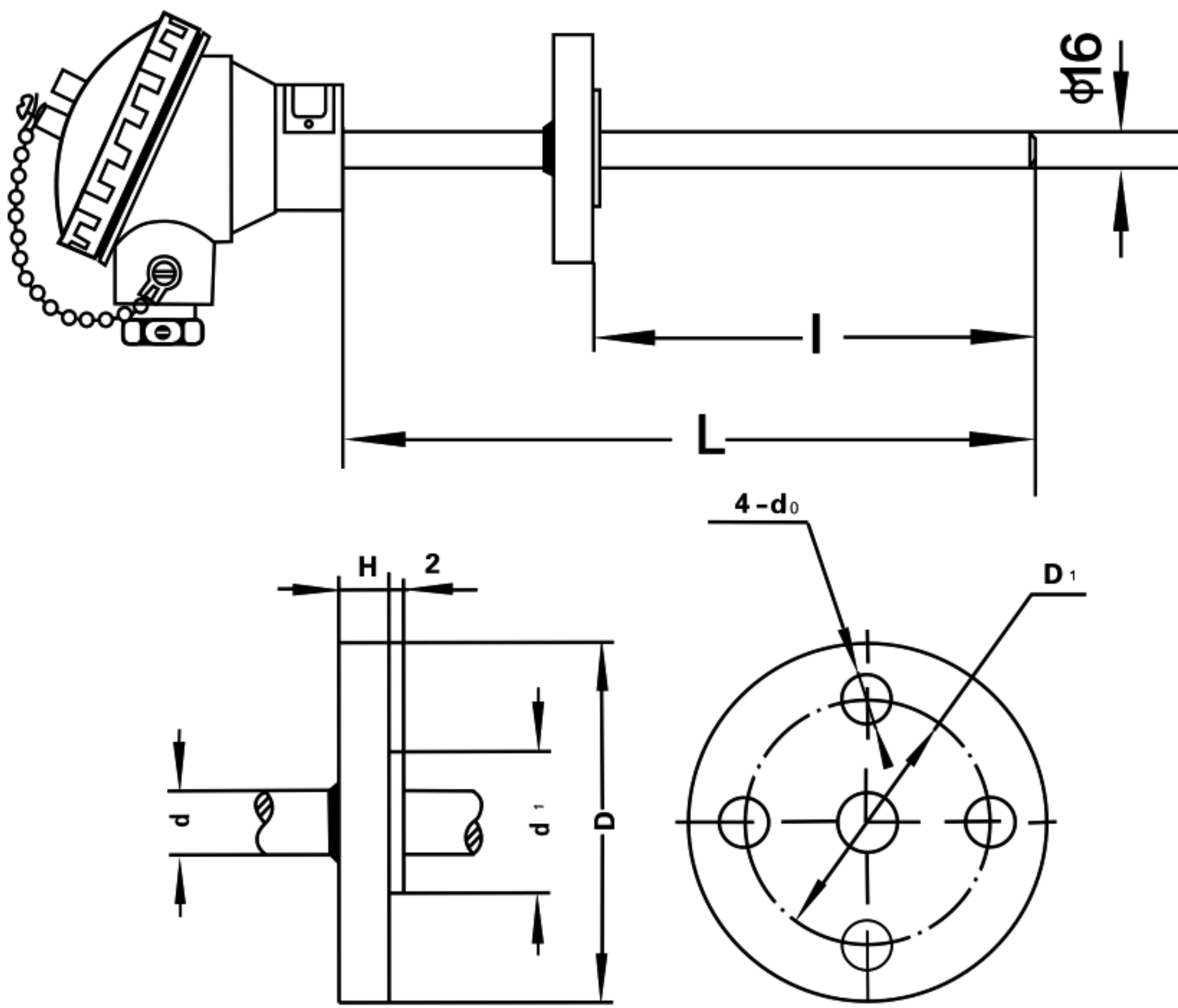
Note: (1) Refer to page 5, and page 6, for protection tube material.
(2) That of “*” is the order of special specification.
(3) Nominal pressure is 10MPa.
(4) Model with suffix (K), its inner core is sheathed element. For example WRN-230 (K).

活动法兰式热电偶 Flexible flange thermocouple

热电偶类别Category	产品型号 Model	分度号 Graduation Mark	测量范围 (℃) Measuring Range(℃)	热响应时间 τ 0.5(s) Thermal Response Time τ 0.5(s)	保护管材料 Protection Tube Material	规格 Specification										
						L × I										
单支铂铑30－铂铑6 Single rhodium platinum 30-rhodium platinum 6	WRR-330	B	0~1600	≤120	钢玉质 Corundum	250×100										
双支铂铑30－铂铑6 Twin rhodium platinum 30-rhodium platinum 6	WRR2-330					300×150										
单支铂铑10－铂 Single rhodium platinum 10- platinum	WRP-330	S	0~1300		350×200											
双支铂铑10－铂 Single rhodium platinum 10- platinum	WRP2-330				400×250											
单支镍铬－镍硅 Single nickel-chromium- nisiloy	WRN-332	K	0~1100	高铝质 High Al2O3 Ceramic	450×300											
双支镍铬－镍硅 Twin nickel-chromium- nisiloy	WRN2-332				550×400											
单支镍铬－镍硅 Single nickel-chromium- nisiloy	WRN-333				650×500											
双支镍铬－镍硅 Twin nickel-chromium- nisiloy	WRN2-333				900×750											
单支镍铬硅－镍硅镁 Single nickel-chromium- silicon- nickel-silicon- magnesium	WRM-332	N	0~1200	≤90	1150×1000		d						D	D1	d0	公称压力 Nominal pressure
双支镍铬硅－镍硅镁 Twin nickel-chromium- silicon- nickel-silicon- magnesium	WRM2-332				1650×1500											
单支镍铬硅－镍硅镁 Single nickel-chromium- silicon- nickel-silicon- magnesium	WRM-333						φ10 φ16 φ20 φ22 φ25	φ70	φ54	φ6	常压 Normal pressure					
双支镍铬硅－镍硅镁 Twin nickel-chromium- silicon- nickel-silicon- magnesium	WRM2-333															
单支镍铬－镍硅 Single nickel-chromium- nisiloy	WRN-330	K (EU-2)*	0~1000		1Cr18Ni9Ti 0Cr25Ni20											
双支镍铬－镍硅 Twin nickel-chromium- nisiloy	WRN2-330															
单支镍铬－铜镍 Single nickel-chromium- cupronickel	WRE-330	E (EA-2)*	0~600		1Cr18Ni9Ti											
双支镍铬－铜镍 Twin nickel-chromium-	WRE2-330															

- (1) 打 “*” 分度号作特殊规格订货。
- (2) 型号后加 (K)，内芯为铠装元件。例：WRN-330 (K)。
- (1) That of “*” is the order of special specification.
- (2) Model with suffix (K), its inner core is sheathed element. For example WRN-330 (K).

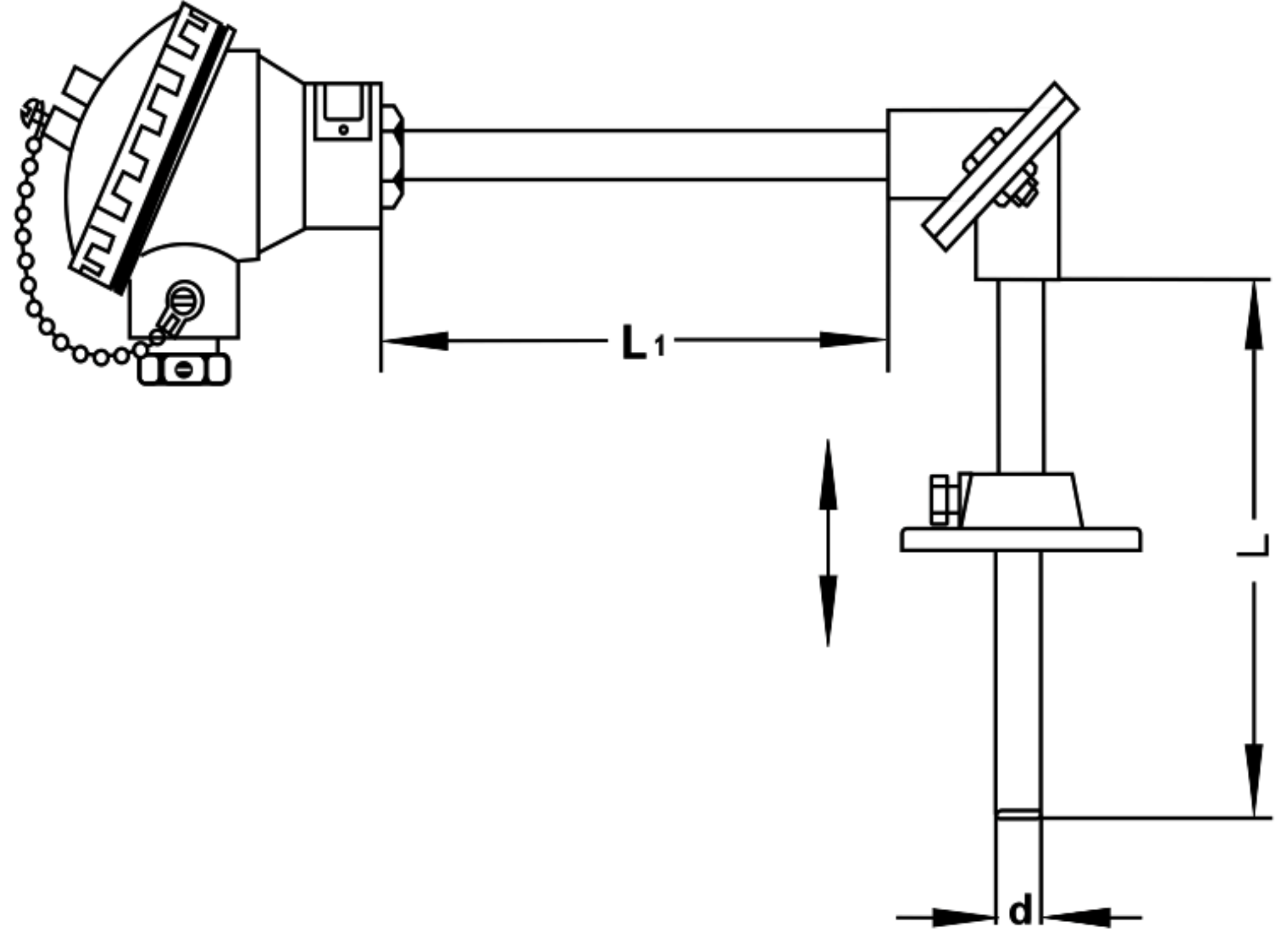
固定法兰式热电偶Fixed flange thermocouple

热电偶类别Category	产品型号 Model	分度号 Graduation Mark	测量范围 (℃) Measuring Range(℃)	热响应时间 τ 0.5(s) Thermal Response Time τ 0.5(s)	保护管材料 Protection Tube Material	规格 Specification													
						L × I													
单支镍铬－镍硅 Single nickel-chromium-nisiloy	WRN-430	K	0～800	≤ 90	1Cr18Ni9Ti	250X100													
双支镍铬－镍硅 Twin nickel-chromium-nisiloy	WRN ₂ -430		0～1000		0Cr25Ni20	300×150													
单支镍铬硅－镍硅镁 Single nickel-chromium-nickel-silicon-magnesium	WRM-430	N	0～800		1Cr18Ni9Ti	350×200													
双支镍铬硅－镍硅镁 Twin nickel-chromium-silicom-nickel-silicon-magnesium	WRM ₂ -430		0～1000		0Cr25Ni20	400×250													
单支镍铬－铜镍 Single nickel-chromjum-cupronickel	WRE-430	E	0～600		0Cr25Ni20	450×300													
双支镍铬－铜镍 Twin nickel-chromium-cupronickel	WRE ₂ -332					550×400													
单支铁－铜镍 Single ferrum-cupronickel	WRJ-430	J	0～500		1Cr18Ni9Ti	650×500													
双支铁－铜镍 Twin ferrum-cupronickel	WEJ ₂ -430					900×750													
单支铜－铜镍 Single cuprum-cupronickel	WRT-430	T	-40～+350			1150×1000													
双支铜－铜镍 Twin cuprum-cupronickel	WRT ₂ -430					1650×1500													
							d	D	D1	d1	H	d0	公称压力 Nominal pressure						
							φ8 φ10	φ95	φ65	φ45	16	φ14	2.5 Mpa						
							φ12 φ16	φ105	φ75	φ55									
							φ20 φ22 φ25	φ115	φ85	φ65	18								

注：（1）公称压力：2.5MPa。（2）型号后加（K），内芯为铠装元件。例：WRN-430（K）。

Note: (1) Normal pressure: 2.5MPa. (2) Model with suffix (K), its inner core is sheathed element. For example WRN-430 (K).

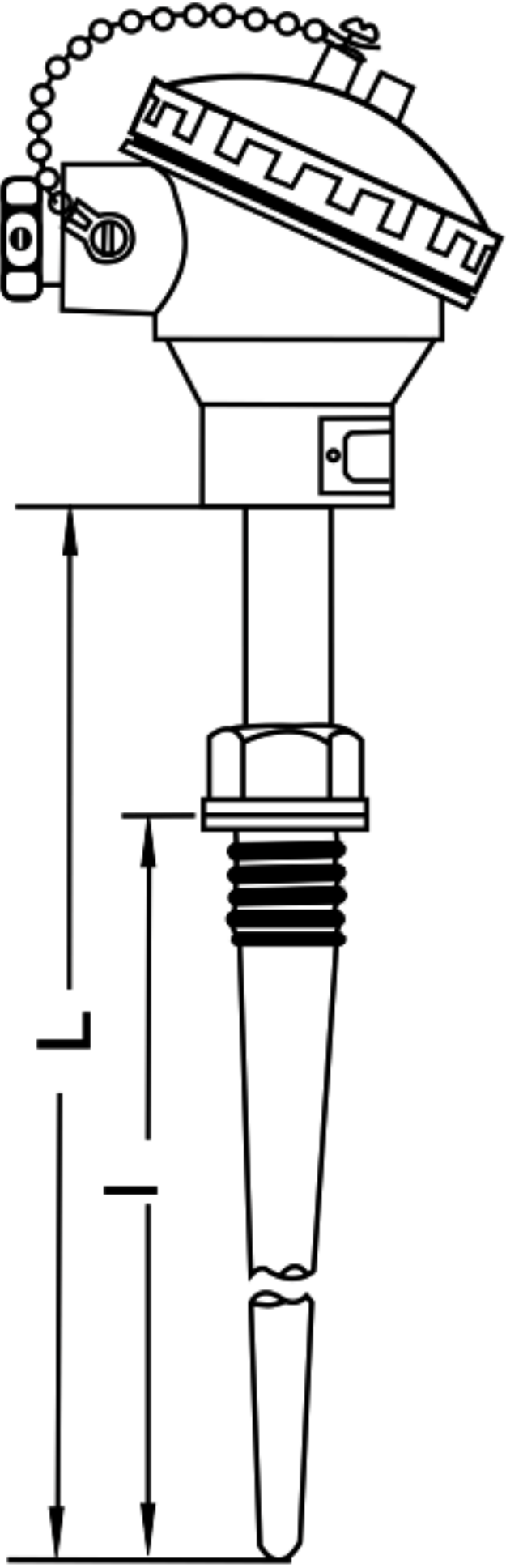
活动法兰角尺式热电偶Flexible flange L-square thermocouple

热电偶类别Category	产品型号 Model	分度号 Graduation Mark	测量范围 (℃) Measuring Range(℃)	热响应时间 τ 0.5(s) Thermal Response Time τ 0.5(s)	保护管材料 Protection Tube Material	规格Specification	
						d	L × l
单支镍铬—镍硅 Single nickel—chromium— nisiloy	WRN-530	K	0~800	≤90	1Cr18Ni9Ti 0Cr25Ni20	φ16	
双支镍铬—镍硅 Twin nickel—chromium— nisiloy	WRN ₂ -530		0~1000				
单支镍铬硅—镍硅镁 Single nickel—chromium— nickel—silicon—magnesium	WRM-530	N	0~800				
双支镍铬硅—镍硅镁 Twin nickel—chromium— nickel—silicon—magnesium	WRM ₂ -530		0~1000				
单支镍铬—铜镍 Single nickel—chromium— cupronickel	WRE-530	E	0~600				
双支镍铬—铜镍 Twin nickel—chromium— cupronickel	WRE ₂ -530						
单支铂铑10—铂 Single Rhodium Platinum 10-Platinum	WRP-530	S	0~1300	≤120	刚玉质	φ20	
双支铂铑10—铂 Twin Rhodium Platinum 10-Platinum	WRP ₂ -530	S					

注：（1）公称压力为常压。（2）型号后加（K）内芯为铠装元件。例：WRN-530（K）。

Note: Nominal pressure is ordinary pressure. (2) Model with suffix (K), its inner core is sheathed element. For example WRN-530 (K).

固定螺栓锥形保护管热电偶Fixed bolt taper protection tube thermocouple

热电偶类别Category	产品型号 Model	分度号 Graduation Mark	测量范围 (°) Measuring Range(°C)	热响应时间 τ 0.5(s) Thermal Response Time τ 0.5(s)	保护管材料 Protection Tube Material	规格Specification	
						L ×I	
单支镍铬-镍硅 Single nickel-chromium-nisiloy 双支镍铬-镍硅 nickel-chromium-nisiloy	WRN-630 (K) WRN ₂ -630 (K)	K	0~600	≤45	1Cr18Ni9Ti	225 75	
	WRN-630A(K) WRN ₂ -630A(K)					250 ×100	
	WRN-630B(K) WRN ₂ -630B(K)					300 ×150	
单支镍铬-铜镍 双支镍铬-铜镍 Single nickel-chromium-cupronickel Twin nickel-chromium-cupronickel	WRE-630(K) WRE ₂ -630(K)	E	0~600			350 ×200	
	WRE-630A(K) WRE ₂ -630A(K)					400 ×250	
	WRE-630B(K) WRE ₂ -630B(K)					450 ×300	
				500 ×350			
				550 ×400			
				600 ×450			
				650 ×500			

- 注：（1）公称压力：30MPa。流速≤80m/s
- （2）选用英制G1”螺栓，内芯铠装元件，应在型号后加A。例如：WRN-630A(K)
- （3）选配齿形垫片，应在型号后加B,例如：WRN-630B(K)。齿形垫片参见93页，图152。
- Note: (1) Normal pressure:30MPa. Flow rate≤80m/s.
- (2) “A” shall be attached to the model if British system G1” bolt and sheat elements for inner core is selected for use, for example: WRN-630A(K).
- (3) When serrated washer is used,B should be added after model, for example: WRN-630B(K). Refer to page 93, Fig 152 for specification of serrated waster.

拱顶热电偶Dome thermocouple

WRP型拱顶热电偶是为了适应高炉拱顶温度的检测，而进行设计制造的新型热电偶。热电偶保护管选用进口Sic再结晶材料能够满足高炉测温的特殊要求。在构造上，有密封、耐震动、可以垂直安装和有快速装卸的法兰结构。

WRP-type dome thermocouple is a new thermocouple designed and manufactured to be adapted to measuring the temperature of the dome of blast furnace. The thermocouple protection tube, made of imported Sic recrystallized material can meet the special requirements that are needed to measure the temperature of blast furnace. For the structure, it has a flange structure which is sealed, and quake-resistant and can be installed vertically and assembled or disassembled quickly.

