NTC 温度传感器

NTC 热敏电阻器是一种以过渡金属氧化物为主要原材料制造的半导体陶瓷元件。它具有电阻值随着温度的变化而相应变化的特性。即在一定的测量功率下，电阻值随着温度上升而下降。利用这一特性，可将 NTC 热敏电阻器及其温度传感器应用在测控温，温度补偿，和抑制浪涌电流等场合。

Thermistor is a ceramic semiconducting element made from exorbitant oxides materal. It has the feature that the resistance changes according to the ambient temperature. Namely, their resistance declines with the rising of ambient temperature at a determinate measuring power. With this feature NTC thermistor and temperature sensor can be applied in the situation of temperature measurement and control, compensation and surge current protection.

NTC 热敏电阻器及其温度传感器的主要参数：

零功率电阻值 R_T

在规定温度下，采用引起电阻变化相对于总的测量误差来说可以忽略不计的测量功率测的的电阻值

额定零功率电阻值 R_{25}

也称标称电阻值，通常是指 25℃时测得的零功率电阻值

B 值

B 值是负温度系数热敏电阻器的热敏指数，他被定义为两个温度下零功率电阻值的自然对数之差与这两个温度导数之差的比值

$$B=\ln\frac{R_{T1}}{R_{T2}} \Big/ \left(\frac{1}{T_1}-\frac{1}{T_2}\right)=\frac{T_1T_2}{T_2-T_1}\ln\frac{R_{T1}}{R_{T2}}$$

式中：R_{T1}-温度为 T1 时的零功率电阻值

R_{T2}-温度为 T2 时的零功率电阻值

除非特别指出，B 值是由 25℃（298.15K）和 50℃(323.15K)的零功率电阻值计算而得到的，B 值在工作温度范围内并不是一个严格的常数。

零功率电阻温度系数α_T

指在规定温度下，热敏电阻器的零功率电阻值随着温度的变化率与它的零功率电阻值之比。

$$\alpha_T=\frac{1}{R}\frac{dR_T}{dT}=-\frac{B}{T^2}$$

式中：α_T-温度为 T 时的零功率电阻温度系数　　R_T-温度为 T 时的零功率电阻值

Main techno-Parameter of NTC Thermistor:

Zero Power Resistance R_T

At rated temperature ,it is the resistance measured by the measuring power which causes the resistance change that can be ignored relative to the whole measuring error.

Rated Zero Power Resistance R_{25}

Also Known as Nominal Resistance,is the zero power resistance measured at 25℃

B Value

B Value is the thermel exponent of negative temperature coefficient thermistor, which is defined as the ratio of the difference between the napierian logarithm of zero power resistance at two temperatures to the difference between the temperatures' reciprocal.

In the equation: RT1-The zero power resistance at T1

RT2-The zero power resistance at T2

Unless the particular indication, B value is figured out from the zero power resistance at 25℃（298.15K） and 50℃(323.15K) and B value is not a rigorous constant in the range of operating temperature.

Temperature Coefficient of Zero power Resistance α_T

At rated temperature, it is the ratio of the zero power resistance change rate with temperature to the zero power resistance itself.Namely：

T-温度（以 K 表示）

B-B 值

α_T-the temperature coefficient of zero power resistance at T

R_T-the zero power resistance at T

T-temperature

B-B value

耗散系数 δ

在规定的环境温度下，热敏电阻器耗散功率变化与其相应温度变化之比，即

Dissipation coefficient δ

At rated ambient temperature, it is the radio of consumption power change rate of thermistor to the change of the corresponding temperature,namely:

$$\delta = \frac{\Delta P}{\Delta T}$$

在工作温度范围内，δ随着环境温度的变化而变化。

In the range of operating temperature, δ has a little change with the ambient.

热时间常数 τ

在零功率条件下，当温度发生突变时，热敏电阻体温度变化了始末两个温度差的 63.2%所需的时间。

Thermal Time Constant τ

At zero power,it is measured as time in seconds which needed for thermistor temperature change of 63.2% difference between initial and final thermistor temperature when the temperature breaks.

τ 与热敏电阻器的热容量 C 成正比，与其耗散系数 δ 成反比，即：

τ is in direct ratio to thermal capacity C of thermistor and in inverse ratio to the dissipation coefficient δ ,namely:

$$\tau = \frac{C}{\delta}$$

电阻-温度特性

热敏电阻器的零功率电阻值与其电阻体温度之间的依赖关系。

Resistance-Temperature Characteristic

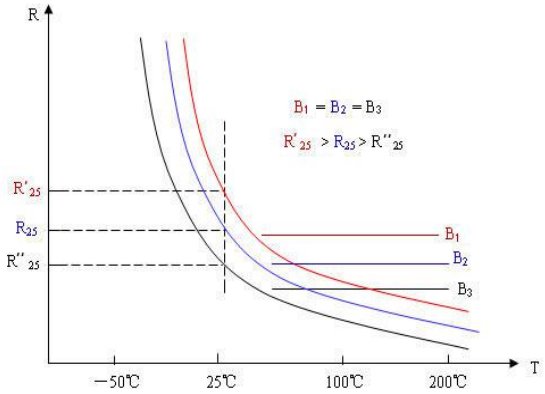
The reliant relationship between the zero power resistance of thermistor and its temperature.

R 值与 B 值关系

热敏电阻器的零功率电阻值与其电阻体温度之间的依赖关系。

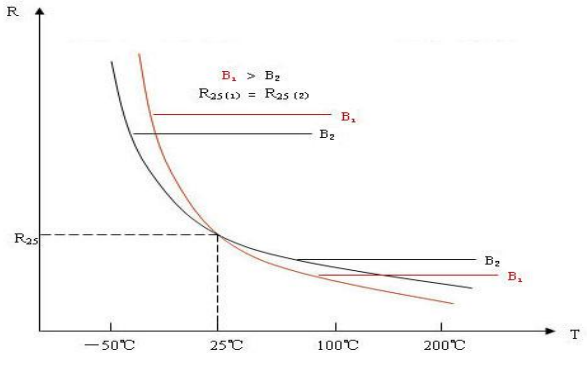
R-T curve NTC thermisor

The reliant relationship between the zero power resistance of thermistor and its temperature.



B 值相同，阻值不同的 R-T 特性曲线示意图

R-T curve based on same B value, different resistance



相同阻值，不同 B 值的 R-T 特性曲线示意图

R-T curve based on different B value, same resistance

MF51 玻封测温型 NTC 热敏电阻器系列

MF51 Temperature-Mesurement chip in glass NTC Thermistor series

应用范围

- 空调，暖气设备
- 电子体温计
- 液位传感器
- 汽车电子
- 电子台历

Applications

- Air-Conditioner, Heating apparatus
- Electric Thermometer
- Liquid level sensor
- Automoblie electronic
- Electric table-board

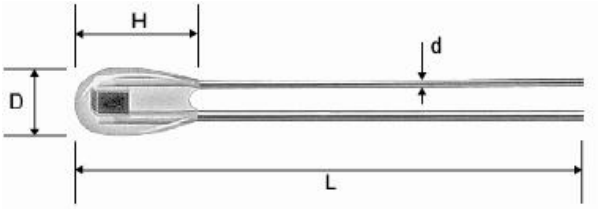
特点

- 体积小
- 测试精度高
- 反应速度快
- 一致性，互换性好
- 可在高温高湿等恶劣环境下使用

Characteristic

- Small size
- High testing precision
- Fast response
- Good quality of coherence and interchange
- It can be used in such worse environment as high temperature and humdity etc.

外形结构和尺寸 Dimensions（mm）



型号 Part NO.	D	H	L	d
MF51-A				
MF51-B				
MF51-C				

产品标识说明 Specification

MF51 B 103 F 3750 E

B 值允许偏差代号（根据需要标注） E：±0.5%，F：±1%	The allowable tolerance of(label by requirment) E：±0.5%，F：±1%
B 值 25/85℃：为 3750K	B value 25/85℃; namedly 3750K
阻值允许偏差代号：F：±1%，G：±2%，H：±3%，J：±5%，K：±10%	Resistance Tolerance Code: Namely F;±1%，G;±2%，H;±3%，J;±5%，K;±10%
标称电阻值：103 为 10KΩ	Rated Resistance:103 namely 10KΩ
外形尺寸代号：B 型	Configuration Code; B model
型号：为玻封测温型 NTC 热敏电阻器	Type: Temp-measurement chip in glass NTC thermistor

主要技术参数 Main Techno-Parameter

型号 Part No.	耗散系数（mw/℃） Dissi.coef.(mw/℃)	热时间常数（S） Thermal time constant(S)	最大功耗@25℃ Pmax（mW）
MF51-A	约 1.4	约 14	50
MF51-B	约 0.9	约 7	35
MF51-C	约 0.75	约 5	15

	型号 Part No.	标称阻值 R25 Rate Resistance R25	B 值（25/85℃） B value（25/85℃）

		R25(KΩ)	精度 Tolerance	K	精度 Tolerance
常规型号	MF51□□□3435	2～10	±1% ±2% ±3% ±5%	3435	±1% ±2%
	MF51□□□3450	2～10		3450	
	MF51□□□3750	8～10		3750	
	MF51□□□3950	10～50		3950	
	MF51□□□4150	50～100		4150	
	MF51□□□4200	100～350		4200	
	MF51□□□4350	870～980		4350	
	MF51□□□4450	1000～1500		4450	
特殊型号	MF51□2.186K□3420	R25=2.186 R0=6	±2% ±3% ±5%	3420(B0/100=3390)	±1% ±2%
	MF51□5.369K□3480	R25=5.369 R0=15		3480(B0/100=3450)	
	MF51□49.12K□3992	R25=49.12 R0=3.3		3992(B0/100=3970)	
	MF51□98.63K□4066	R25=98.63 R0=0.55		4066(B0/100=4300)	
	MF51□231.4K□4240	R25=231.4 R0=1		4240(B0/100=4537)	

MF52 珠状精密型 NTC 热敏电阻器系列
MF52 Pearl-Shape Temp Measurement NTC Thermistor

应用范围
- 空调设备
- 暖气设备
- 电子体温计
- 液位传感器
- 汽车电子
- 电子台历
- 手机电池

Applications
- Air-Conditioner Equipments
- Heating Apparatus
- Electric Thermometer
- Liquid level sensor
- Automoblie electronic
- Electric table-board
- Battery of MobilenTelephone

特点
- 测试精度高
- 体积小,反应速度快
- 能长时间稳定工作
- 互换性，一致性好
- 规模化生产，性价比高

Characteristic
- High testing precision
- Small size，Fast Response
- Steady Operating For Long time
- Good quality of coherence and interchange
- Scale production,high ratio of features to cost

产品标识说明 Specification

MF52	A	103	G	3380	E

B 值允许偏差代号（根据需要标注） E：±0.5%，F：±1%	The allowable tolerance of(label by requirment) E：±0.5%，F：±1%
B 值：为 3380K	B value; namedly 3380K
阻值允许偏差代号：F：±1%，G：±2%，H：±3%，J：±5%，K：±10%	Resistance Tolerance Code: Namely F;±1%，G;±2%，H;±3%，J;±5%，K;±10%
标称电阻值：103 为 10KΩ	Rated Resistance:103 namely 10KΩ
不同外形结构和尺寸代号：A 型引线为镀锡铜线或者镀锡铜包钢线	Diffierent Configuration and Code:Model A is Cu or Cp wire
型号：珠状精密型型 NTC 热敏电阻器	Type: Temp-measurement chip in glass NTC thermistor

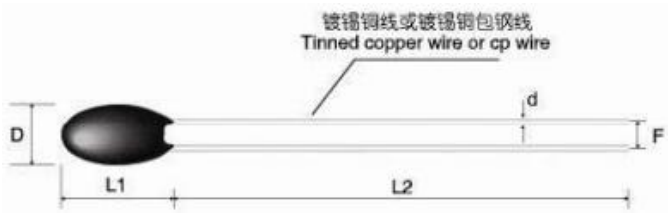
主要技术参数 Main Techno-Parameter

型号 Part No.	标称阻值 R25 （KΩ） Rated Resistance R25 (KΩ)	B 值（25/50℃） （K） B Value(25/50℃) (K)	额定功率 （mW） Rated Power (mW)	耗散系数 （mW/℃） Dissi.Coef. (mW/℃)	热时间常数 （S） Thermal time Constant(S)	工作温度 （℃） Operating Temp.(℃)
MF52□□□3100	0.1～20	3100	≤50	≥2.0 静止空气中 In still air	≤12 静止空气中 In still air	-40～+125℃
MF52□□□3270	0.2～20	3270				
MF52□□□3380	0.5～50	3380				
MF52□□□3470	0.5～50	3470				
MF52□□□3600	1～100	3600				
MF52□□□3950	5～100	3950				
MF52□□□4000	5～100	4000				
MF52□□□4050	5～200	4050				
MF52□□□4150	10～250	4150				
MF52□□□4300	20～1000	4300				
MF52□□□4500	20～1000	4500				

外形结构和尺寸 Dimensions(mm)

A 型：（引线为镀锡铜线或镀锡铜包钢线）

(Tin.nickle Cu or Cp wire)



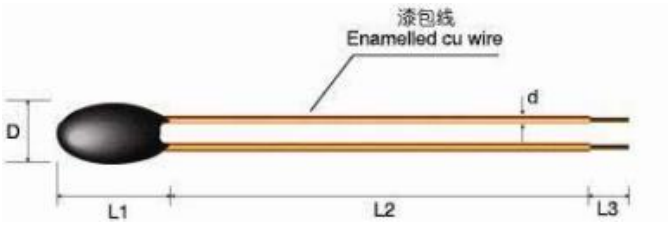
常规尺寸表

Normal dimension table

代号 Code	Dmax	L1max	L2min	d ±0.05	F ±0.5
A1	2.5	4.0	25	0.3	1.7
A2	3	4.5	25	0.45	2.2

B 型：（引线为锡包线）

(Enamelled cu wire)



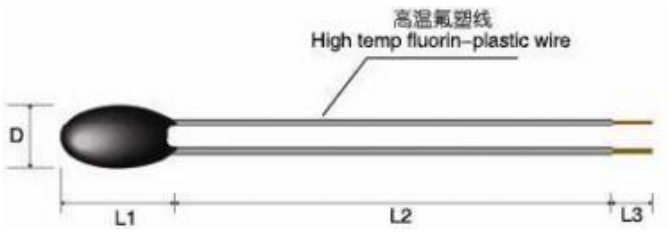
常规尺寸表

Normal dimension table

代号 Code	Dmax	L1max	L2min	L3 ±1	d ±0.05
B1	2	3.5	用户定制 By user determine	3	0.2
B2	3	4	用户定制 By user determine	3	0.3

C 型：（引线为高温氟塑线）

(High temp fluorin-plastic wire)



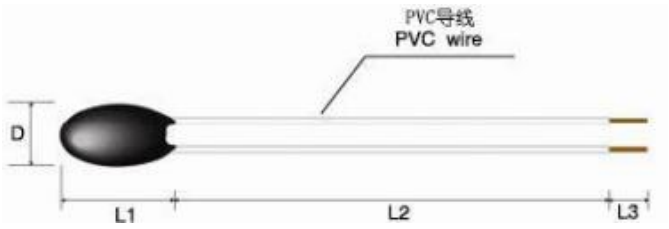
常规尺寸表

Normal dimension table

代号 Code	Dmax	L1max	L2min	L3 ±1	线材 型号
C1	3	7.5	用户定制 By user determine	5	30#
C2	4	7.5	用户定制 By user determine	5	28#

D 型：（引线为 PVC 导线）

(PVC Wire)



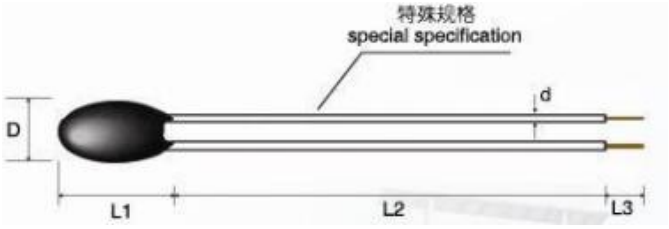
常规尺寸表

Normal dimension table

代号 Code	Dmax	L1max	L2min	L3 ±1	线材 型号
D1	3	7.5	用户定制 By user determine	5	30#
D2	4	7.5	用户定制 By user determine	5	28#

E 型：（引线和包封头均为特殊规格）

(Lead and head are all special specification)



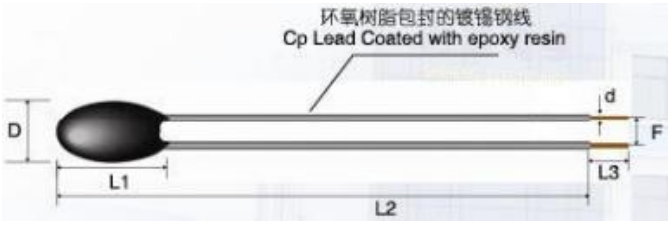
常规尺寸表

Normal dimension table

代号 Code	Dmax	L1max	L2min	L3 ±1	线材 型号
E1	用户定制 By user determine	用户定制 By user determine	用户定制 By user determine	5	用户定制 By user determine
E2	用户定制 By user determine	用户定制 By user determine	用户定制 By user determine	5	用户定制 By user determine

DE 型：（引线为环氧树脂包封的镀锡钢线）

(Cp Lead coated with epoxy resin)



常规尺寸表

Normal dimension table

代号 Code	Dmax	L_{1max}	L_{2min}	L3	d ±0.05	F ±0.5
DE1	3	6.0	55	用户定制 By user determine	5	/
DE2	4	7.5	55	用户定制 By user determine	5	/

F 型：（引线为镀锡钢线）

(Tinned steel wire)

常规尺寸表

Normal dimension table

代号 Code	Dmax	L1max	L2 ±1.5	d ±0.1	F ±0.05	Tmax
F	3.8	9.5	17	0.6	2.5	3.5

MF58 玻壳测温型 NTC 热敏电阻器系列
MF58 Glass shell Temp Measurement NTC Thermistor Series

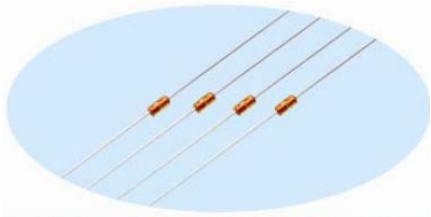
应用范围

●家用电器（如空调机，微波炉，电磁炉，多士炉，电风扇，电取暖炉等）的温度控制与温度检测

●办公自动化设备（如复印机，打印机等）的温度检测或温度补偿

●手机电池，电池组

●仪表线圈，集成电路，石英晶体振荡器和热电偶的温度补偿



Applications

●Temperature control and examination of household electrical appliance(such as air-condition, microwave oven, induction cooker, toaster fanner, electric heating and so on)

● Temperature examination and compensation of the automatic work facilities(such as copycat, printer and so on)

●Battery of mobile telephone, battery pile

●Temperature compensation of loops of instrument, integrate circuit, quartz crystal monofier and thermocouple.

特点

●稳定性好，可靠性高

●阻值范围宽，精度高

●可在高温和高湿等恶劣环境下使用

●体积小，重量轻，结构坚固，便于自动化安装

●热感应快，灵敏度高

Characteristics

●Good stability and security

●Broad range of resistance

● Capability of operating in the bad envi ronment of high temperature and high humidity because of glassencapsulation framework.

● Small size, light weight, strong frame, easy automatic installation (on the printed-circuit board)

●Fast response to the temperature,high delicacy.

主要技术参数

●额定零功率电阻值范围（R25）：0.1～3780KΩ

●R25 允许偏差：±1%，±2%，±3%，±5%，±10%

●B 值范围（B25/50℃）:3100～4500K

●B 值允许偏差（根据需要标注）：±0.5%，±1%

●耗散系数：≥2mW/℃（在静止空气中）

●热时间常数：≤20S（在静止空气中）

●工作温度范围：-55℃～+250℃

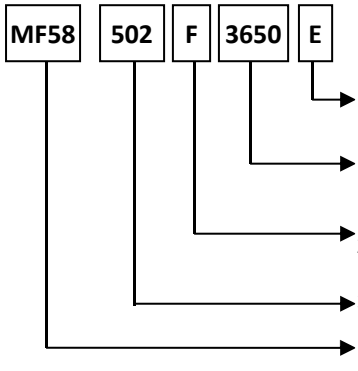
●额定功率：≤50mW

Main techno-parameter

- The range of resisitance under the rated zero power(R25): 0.1-3780KΩ
- The allowable tolerance of R25: ±1%，±2%，±3%，±5%，±10%
- The range of B value: 3100～4500K
- The allowable tolerance of (label by requirment)B value: ±0.5%，±1%
- Dissipation factor: ≥2mW/℃(in still air)
- Thermal time constant: ≤20S(in still air)
- The range of operating temperature: -55℃～+250℃

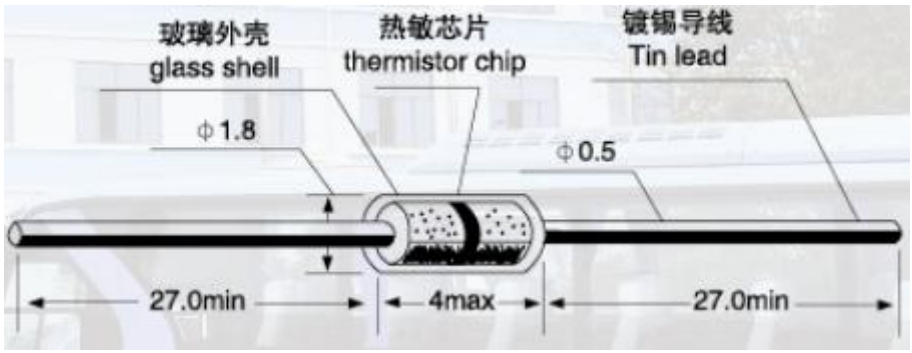
Rated power: ≤50mW

产品标识说明 Specification



B 值允许偏差代号（根据需要标注） E：±0.5%，F：±1%	The allowable tolerance of(label by requirment) E：±0.5%，F：±1%
B 值：为 3650K	B value; namedly 3650K
阻值允许偏差代号：F：±1%，G：±2%，H：±3%，J：±5%，K：±10%	Resistance Tolerance Code: Namely F;±1%，G;±2%，H;±3%，J;±5%，K;±10%
标称电阻值：502 为 5KΩ	Rated Resistance:502 namely 5KΩ
型号	Type

外形结构和尺寸 Dimensions(mm)



CWF 精密型 NTC 温度传感器系列
CWF Precision NTC Temperature sensor Series

应用范围

应用于家用空调，汽车空调，冰箱，冷柜，热水器，饮水机，暖风机，洗碗机，消毒柜，洗衣机，烘干机以及中低温干燥箱，恒温箱等场合的温度测量与控制。

Applications

Temperature measurement and contril of household and automobile air-condition, refrigeratory, icebox, water heater, drinking trough, radiator, dishwasher, disinfector, washing machine, drying machine,middle-or-low-temperature drying box and constant temperature box

特点

采用全新工艺，产品性能稳定，可长期工作

电阻值与 B 值精度高，一致性好，可互换

灵敏度高，反应迅速

具有良好的绝缘密封性和抗机械碰撞，抗折弯能力，可靠性高

Characteristics

Adopting new technique, steady product performance, capability of long time operating

High precision of resistance and B value, good coherence,

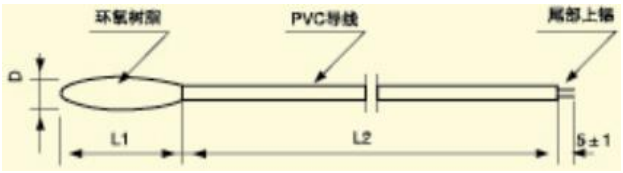
interchange capable.

Fast response, high delicacy

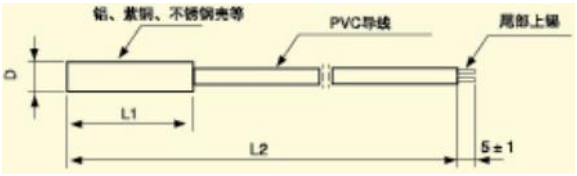
Good quality of insulationand package,high capability of colliding and bending resistance and high reliability.

常用品列举 Popular products

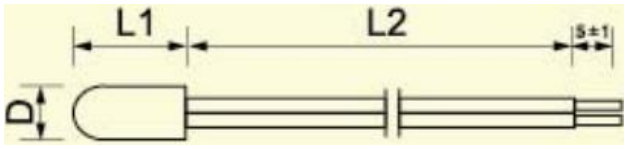
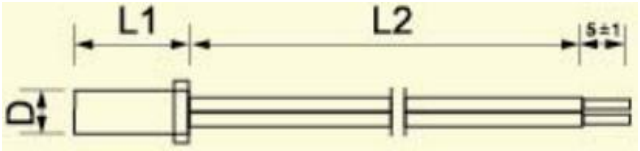
CWF1(环氧树脂包封)Packed with epoxy resin

外形尺寸（mm） Dimmension(mm)	代号 Code	S1	S2	S3	S4	性能 Function	主要用途 Main application
	D_{max}	4	5	6	7	防潮湿 绝缘性好 可靠性高 时间常数小 反应灵敏 Moisture-proof small time constant fast respond	家用空调 冰箱等 House hold air-conditioner refrigerate
	L_{1max}	16	16	16	16		
	线材	28#	26#	24#	22#		
	L_2	根据用户要求 According to customer's requirement					

CWF2(铝壳，铜壳，不锈钢封装)Packed with aluminum,copper, stainless stell etc

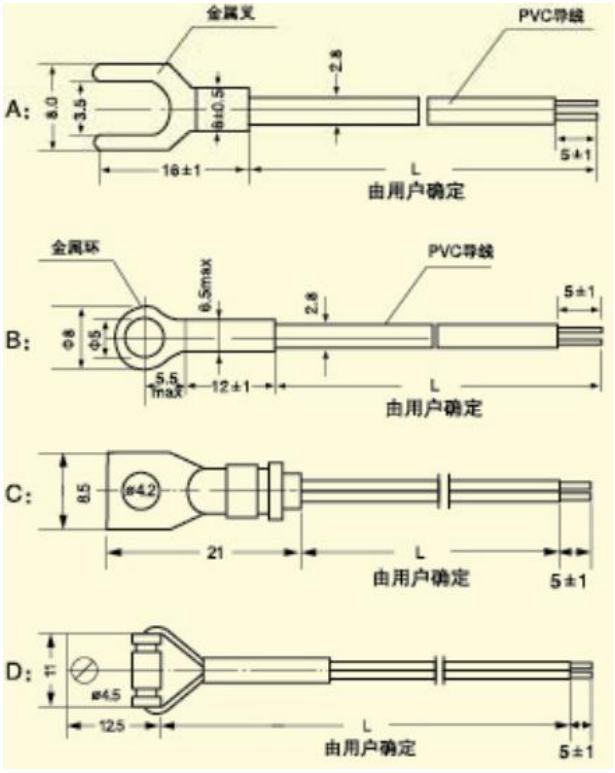
外形尺寸（mm） Dimmension(mm)	代号 Code	S1	S2	S3	S4	S5	S6	S7	性能 Function	主要用途 Main application
	D	4	5	5	5	6	6	6	防潮湿 耗散系数大 结构牢固可靠 稳定性高 Moisture-proof Large coefficient Excellent stability	各类空调，冰箱，热水器，饮水机，恒温箱等 House hold air-condition er, refrigerate heator
	L_1	20	20	25	30	20	25	30		
	L_2	根据用户要求 According to customer's requirement								

CWF3(塑料壳封装)Packed with plastic

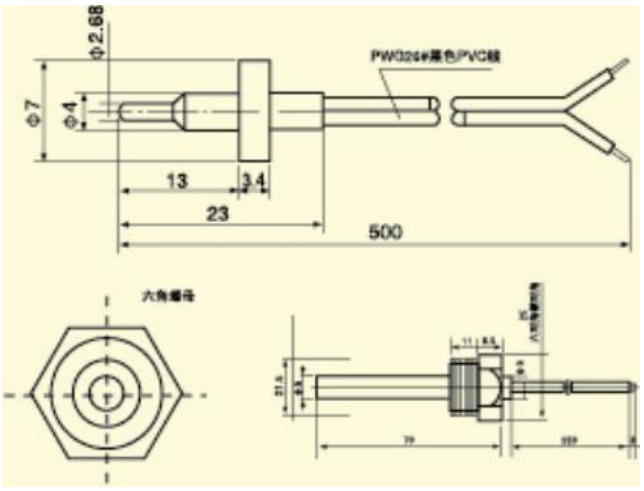
外形尺寸（mm） Dimmension(mm)	代号 Code	S1	S2	S3	S4	性能 Function	主要用途 Main application
	D	3.5	4	5	6	一致性好 耐温防潮性强 耐电压高 Moisture-proof Excellent coherence Voltage withstand	各类空调 电冰箱等 House hold air-conditioner refrigerate
	L_1	15	15	15	20		
	L_2	根据用户要求 According to customer's requirement					
	D	4	8	8			
	L_1	10	35	50			
	L_2	根据用户要求 According to customer's requirement					

CWF4(加固定金属片)Fixed sheet metal added

外形尺寸（mm） Dimmension	性能 Function	主要用途 Main application

	外形结构灵活，满足不同场合安装要求 It can be meet with different mount requirement because of agility dimmension	风扇控制，工业温控仪表 Fan contiol, industry meter

CWF5(特殊封装)special packed shape

外形尺寸（mm） Dimmension	性能 Function	主要用途 Main application
	时间常数小，反应快，使用灵活，可靠 Small time constant,fast respond, stability	用于高温环境，如热水器，咖啡壶及工业控温。 Applied in hi-temperature environment, heator,coffee oven, for example

主要技术参数 Main techno-parameter

产品型号 Part No.	标称电阻值 R25 Rated resistance R25		B 值(25/50℃) B Value(25/50℃)		耗散系数（mW/℃） Dissi,Coef.(mW/℃)	热时间常数（S） Thermal time Constant(s)	工作温度（℃） Operating Temp.(℃)
	范围（KΩ） Range(KΩ)	精度（%） Tolerance(%)	K	精度（%） Tolerance(%)			
CWF□□□3100	0.1～20	±1 ±2 ±3 ±5	3100	±1	≥2.2	≤70	-55～+125
CWF□□□3270	0.2～20		3270				
CWF□□□3380	0.5～50		3380				
CWF□□□3470	0.5～50		3470				
CWF□□□3600	1～100		3600				
CWF□□□3950	5～100		3950				
CWF□□□4000	5～100		4000				

CWF□□□4050	5～200		4050				
CWF□□□4150	10～250		4150				
CWF□□□4300	20～1000		4300				
CWF□□□4500	20～1000		4500				