

AMERICAN ZETTLER, INC.

**Thermistor
Temperature Sensors**



AMERICAN ZETTLER, INC.

www.azettler.com

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5/11/06

Thermistor Terminology

A thermistor temperature sensor is one kind of temperature sensor made from a thermistor. The resistance value of thermistor will vary as temperature changes. Most NTC (negative temperature coefficient) thermistors are made of metal oxides. Its resistance value will fall as the temperature rises.

1. Zero power resistance (R_T)

The resistance value of a thermistor measured at a specified temperature with a power dissipation low enough that any further decrease in power will result only in a negligible change in resistance.

2. Rated zero power resistance (R_{25})

The zero power resistance is measured under the standard temperature of 25°C.

3. B value (unit:K)

B value is a constant describing the physical characteristic of the NTC thermistor material, also called thermistor coefficient.

$$\text{That is: } B = 2.303 (T_2 \times T_1 / T_2 - T_1) \log R_{T1} / R_{T2}$$

R_{T1} -Resistance at Temperature T1

R_{T2} -Resistance at Temperature T2

B value is usually determined by zero-power resistance at 25°C and 85°C

4. Temperature Coefficient α_T

This is the ratio between the zero-power resistance change with temperature and the zero power resistance.

$$\text{That is: } \alpha_T = 1/R_T \times dR_T/dt = -B/T^2$$

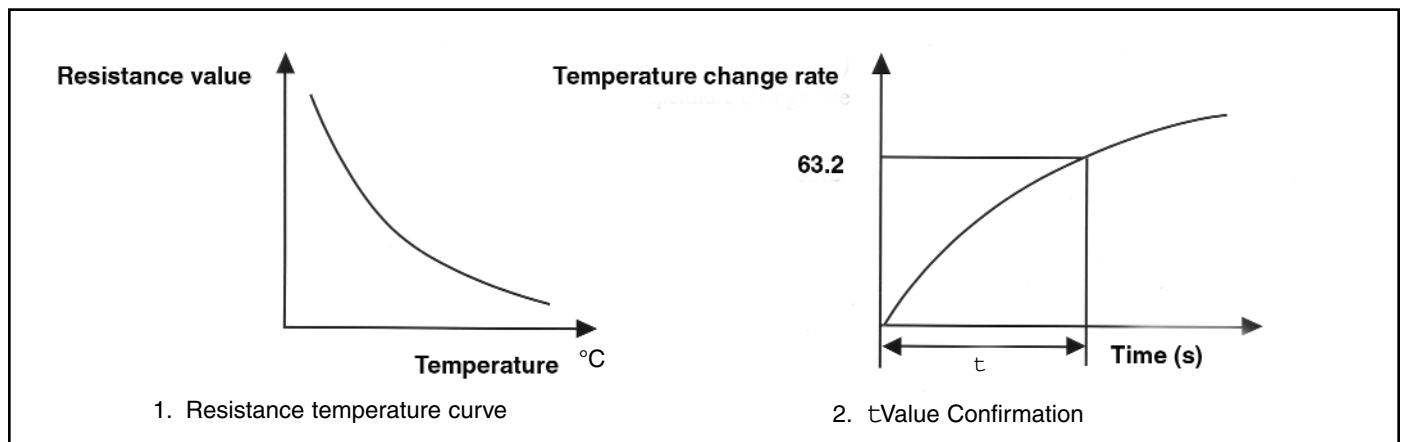
5. Dissipation constant δ (unit:mW/°C)

The ratio between the change in power dissipation in a thermistor and the resultant temperature change of the element.

$$\text{That is: } \delta = \Delta P / \Delta T$$

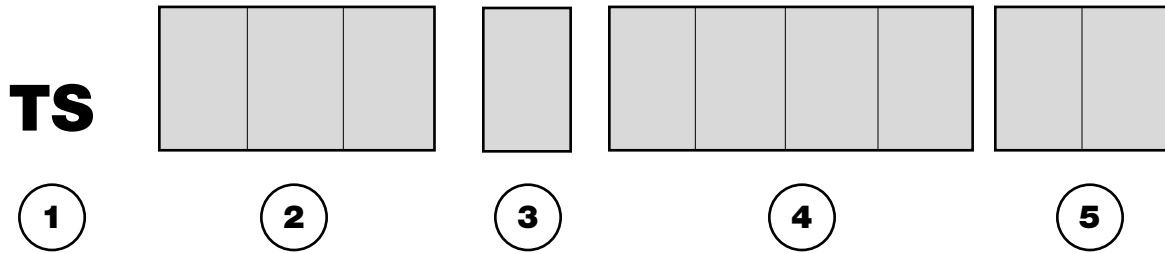
6. Thermal time constant τ (unit:seconds)

The time needed for a thermistor to vary its temperature by 63.2% of the total difference between its initial temperature and its final temperature when it is subjected to a temperature step function change under zero-power conditions.



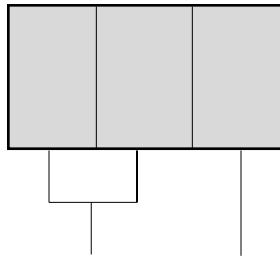
Introduction to our products

Ordering information:



① Thermistor Temperature Sensor

②



First two significant figures if rated zero-power resistance

Number of zero's (Example: 502 = 5000 ohms)

③

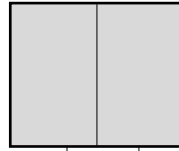
Precision	± 1%	± 2%	± 3%	± 5%	± 10%
Code	F	G	H	J	K

④

B value



5 Material



Outside packing and sealed material

Defined by customer if special part number is required

Material	Epoxy Resin	ABS Plastic	Copper	Aluminum	Stainless Steel
Code	R	P	C	A	S
Custom	1, 2, 3, etc.	1, 2, 3, etc.	1, 2, 3, etc.	1, 2, 3, etc.	1, 2, 3, etc.

Example: TS502F3470R
That is: Rated zero power resistance 5K, precision $\pm 1\%$, B value 3470K, the thermistor temperature sensors packed and sealed by epoxy resin.

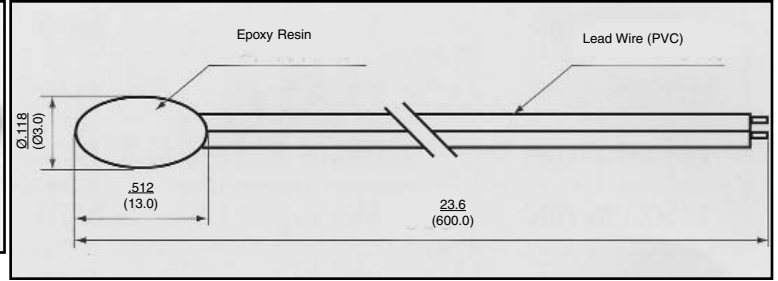
Specifications For Common Temperature Sensors

MODEL	Standard Resistance (R_{25})	B(25/50°C)	Operating Temperature Range
TS502F3470R	5K \bar{w}	3470	-40 - +105°C
TS103F3435R	10K \bar{w}	3435	-40 - +105°C
TS103F3470R	10K \bar{w}	3470	-40 - +105°C
TS502F3270R	5K \bar{w}	3270	-40 - +105°C
TS103F3380R	10K \bar{w}	3380	-40 - +105°C
TS103F3700R	10K \bar{w}	3700	-40 - +105°C
TS103F3700C	10K \bar{w}	3700	-40 - +250°C
TS202F3920P	2K \bar{w}	3920	-40 - +60°C
TS103F3950R	10K \bar{w}	3950	-40 - +100°C
TS203F3950C	20K \bar{w}	3950	-40 - +105°C
TS503F3950S	50K \bar{w}	3950	-40 - +200°C
TS503F4050R	50K \bar{w}	4050	-40 - +105°C
TS233F4200R	23K \bar{w}	4200	-40 - +105°C
TS553F4050P	55K \bar{w}	4050	-40 - +80°C
TS233F4200S	23K \bar{w}	4200	-40 - +125°C

Note: R_{25} & $B_{25/50}$ precision can be made according to customer's requirements.



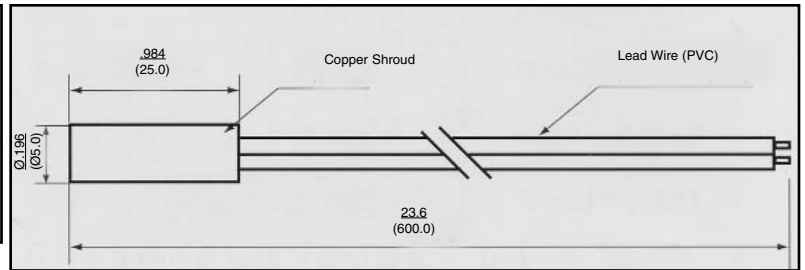
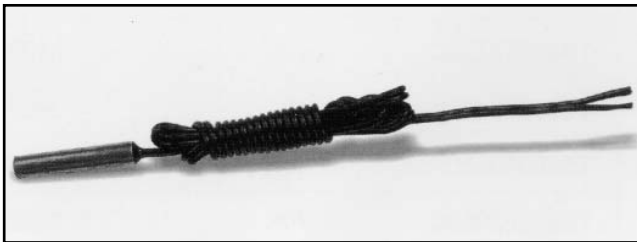
Temperature Sensors for Air Conditioners



Model TS502F3470R1

Thermal Time Constant: 10-12S

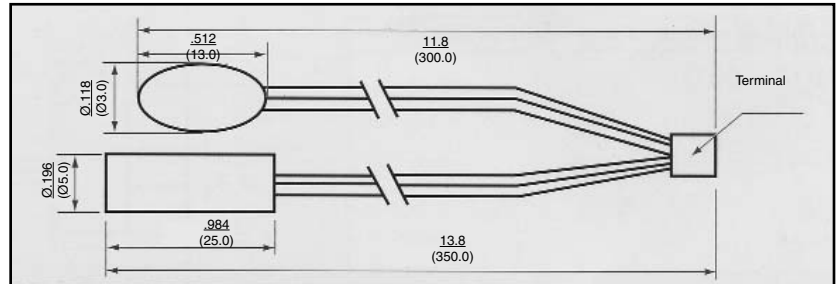
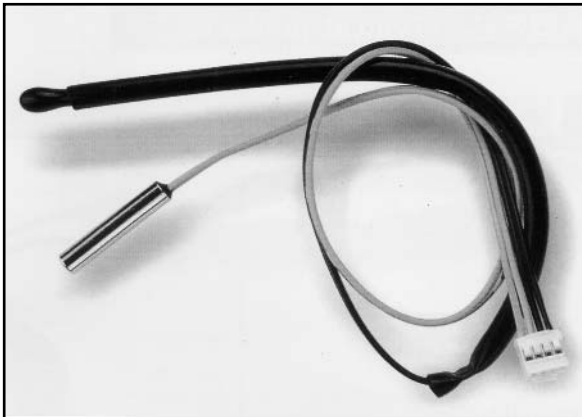
Operating Temperature: -20°C - 105°C



Model TS502F3470C1

Thermal Time Constant: 15-17S

Operating Temperature: -20°C - 105°C



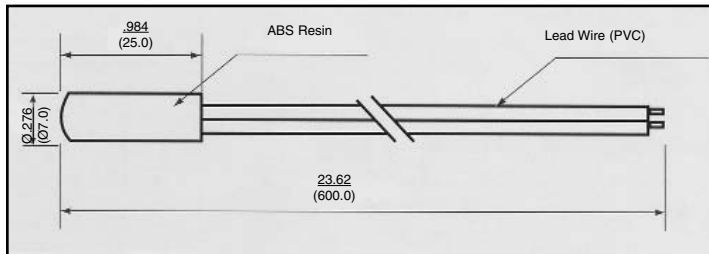
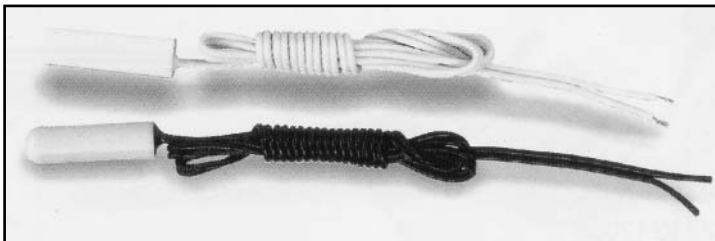
Model TS502F3470RC

Thermal Time Constant: 10-15S

Operating Temperature: -20°C - 105°C



Temperature Sensors for Refrigeration

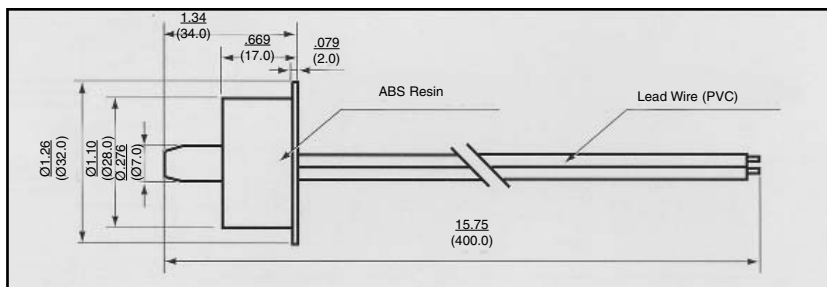
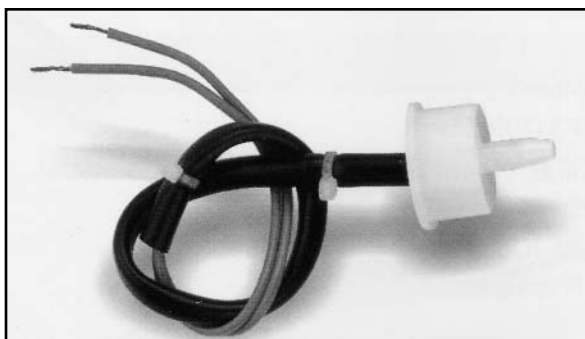


Model TS202F3920P1

Thermal Time Constant: 15-20S

Operating Temperature: -40°C - 60°C

Temperature Sensors for Washing Machines

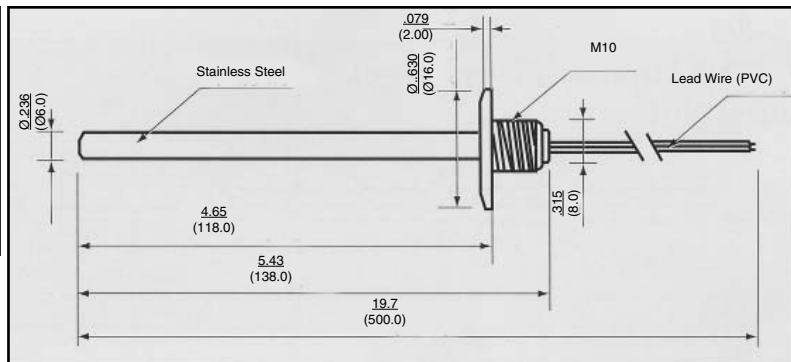
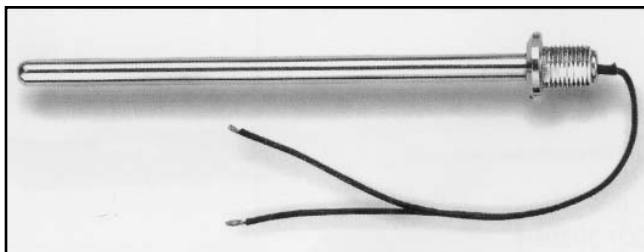


Model TS553G4050P2

Thermal Time Constant: 20-25S

Operating Temperature: -40°C - 80°C

Temperature Sensors for Fluids



Model TS223G4200S1

Thermal Time Constant: 30-40S

Operating Temperature: -40°C - 125°C

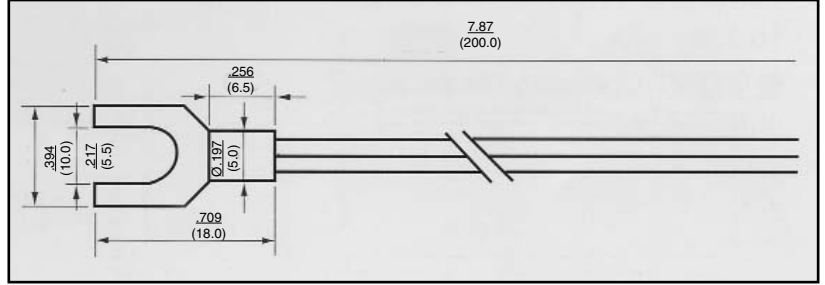
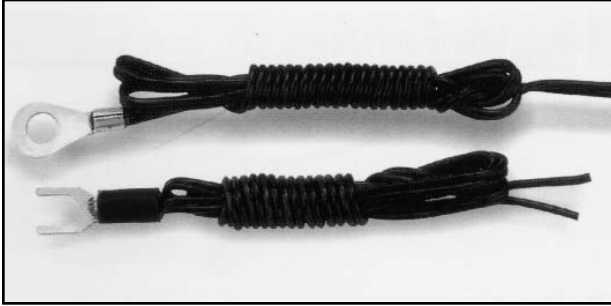


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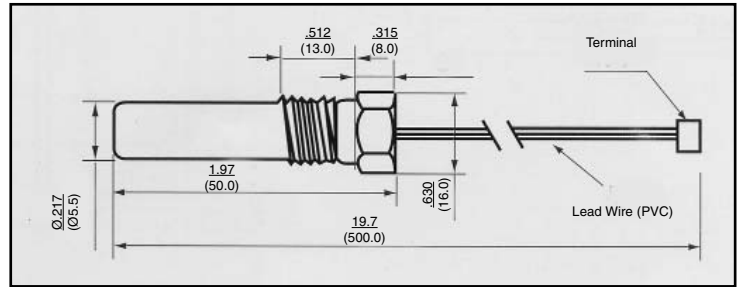
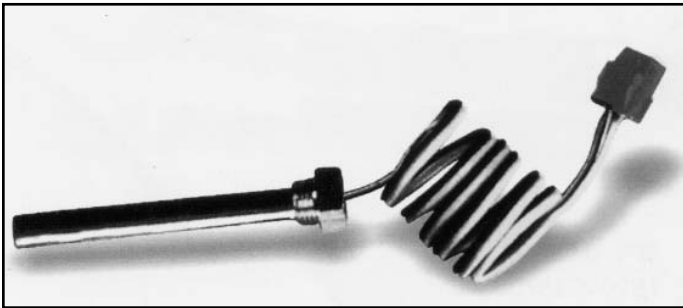
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Temperature Sensors for Surface Use



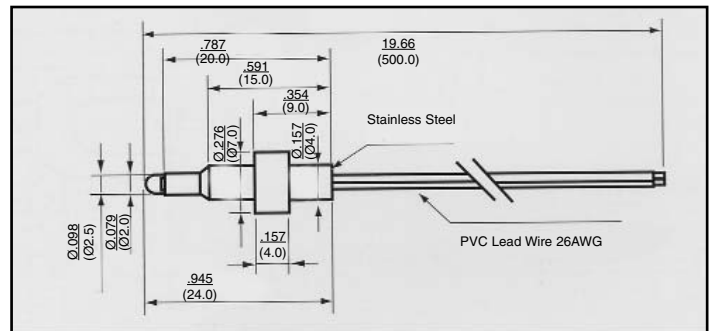
Model TS103H3700C3
 Thermal Time Constant: 10-20S
 Operating Temperature: -40°C - 250°C

Temperature Sensors for Industrial Use



Model TS503G3950C2
 Thermal Time Constant: 15-20S
 Operating Temperature: -40°C - 150°C

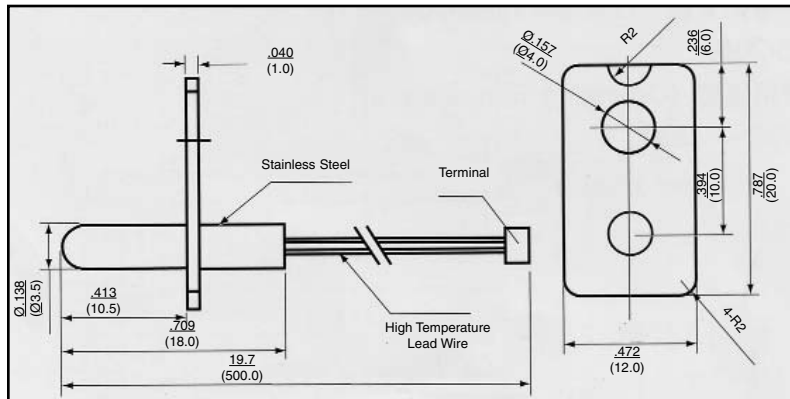
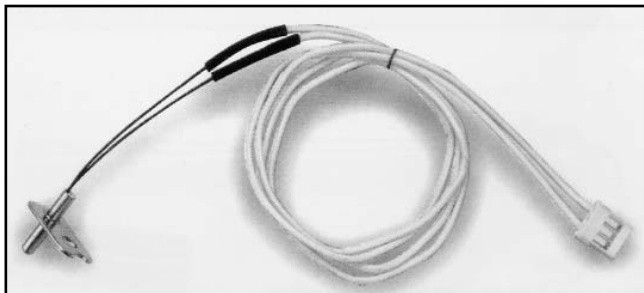
Temperature Sensors for Heaters



Model TS503G3950S2
 Thermal Time Constant: 10-15S
 Operating Temperature: -40°C - 200°C



Temperature Sensors for Microwave Ovens

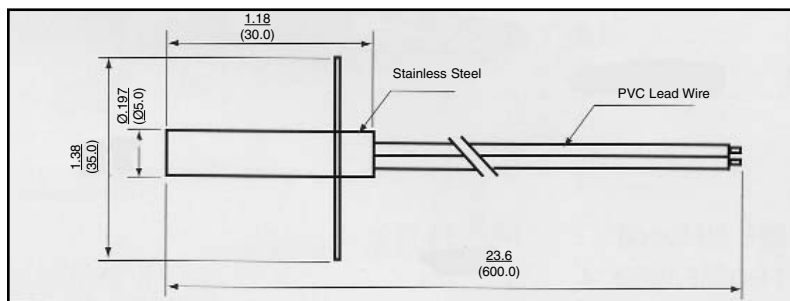
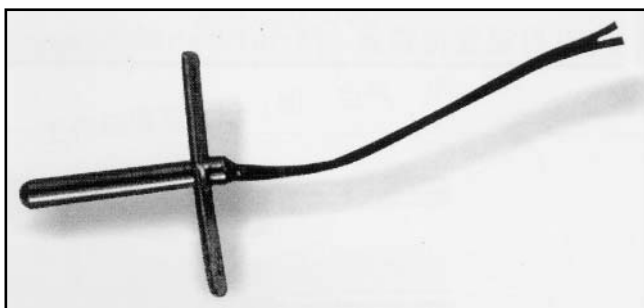


Model TS204G3870S3

Thermal Time Constant: 15-20S

Operating Temperature: -40°C - 300°C

Temperature Sensors for Dishwashers

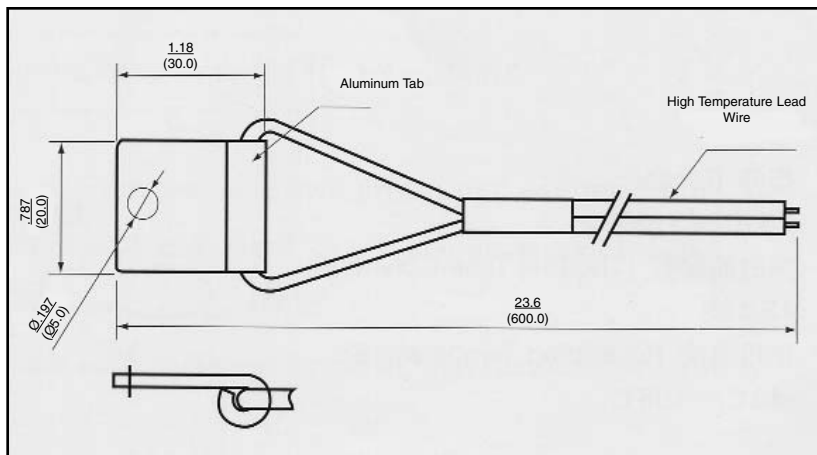
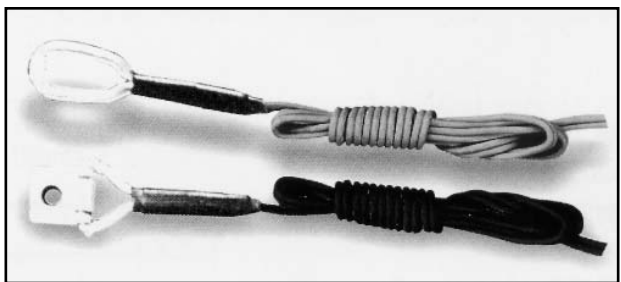


Model TS103F3380S4

Thermal Time Constant: 15-20S

Operating Temperature: -40°C - 150°C

Temperature Sensors for Cookers



Model TS104F3450A2

Thermal Time Constant: 15-20S

Operating Temperature: -40°C - 200°C



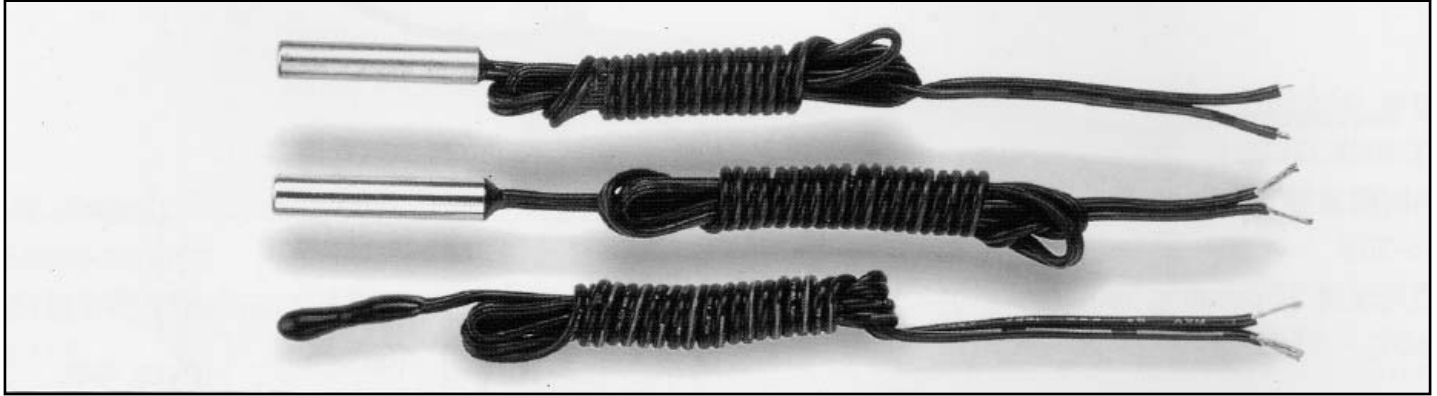
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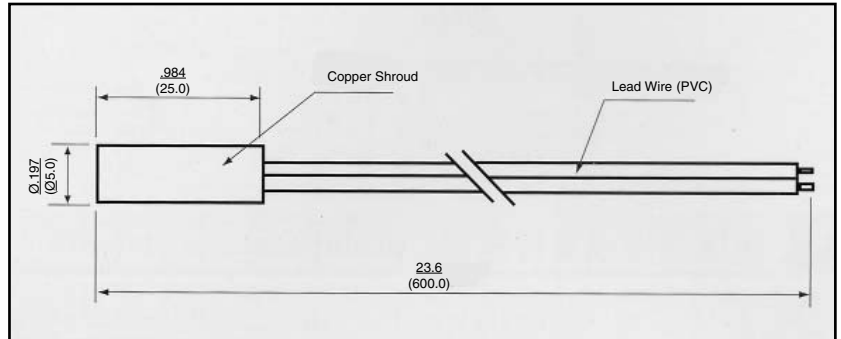
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Temperature Sensors for Automotive



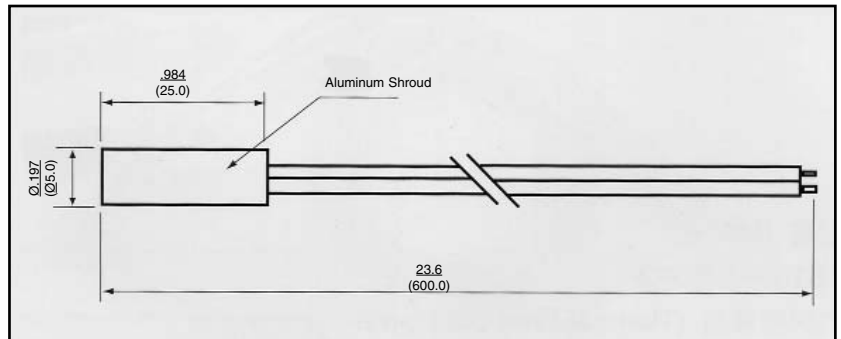
Model TS103F3950C4

Thermal Time Constant: 15-20S
 Operating Temperature: -40°C - 105°C



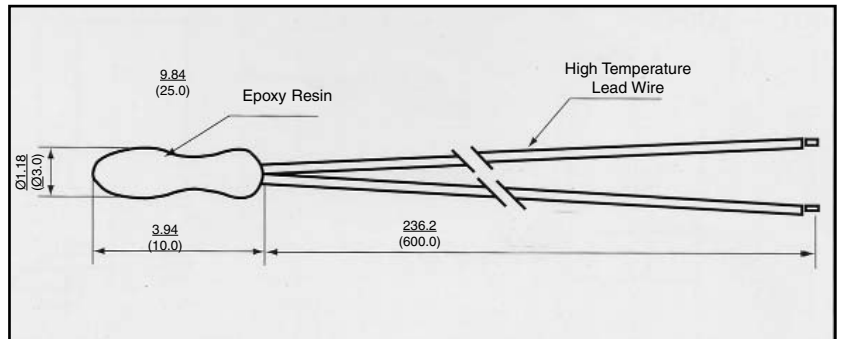
Model TS203F3400A1

Thermal Time Constant: 15-20S
 Operating Temperature: -40°C - 105°C



Model TS102G3100R2

Thermal Time Constant: 12-15S
 Operating Temperature: -40°C - 105°C



1. Special orders are welcome.
2. If the model required is not listed, please submit the following information so our engineers can determine the correct product for you:
 - a. Operating temperature range, working criteria and dielectric requirements for the sensor (i.e.: air, water, oil, etc.).
 - b. Required temperature reaction time (thermal time constant).
 - c. Outline size (include schematics).
3. For your convenience, we have our own processing equipment for the terminations. Link terminals can be processed and the guard sleeve can be assembled to your requirements.
4. We can develop temperature sensors with different types of specifications and outlines to meet your needs.

