

NTC Thermistor Assembly Solutions Custom Sensor Catalog

SEMITEC

Catalog No.112N



INDEX

This catalog contains a selection of representative products. Please contact us for your own custom sensor solution.

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We recommend to check below items before selecting a sensor

Purpose / environment

1) In what kind of device will it be used?

Device: (E.g.: Outside unit of air conditioning, inside of a refrigerator)

2) How will it be mounted?

Mounting: (E.g.: Mounted with holder on a pipe)

3) In what kind of environment will it be used?

Environment: (E.g.: Room temperature, max. temperature 180°C , etc.)

4) Are there other requirements regarding responsiveness, temperature accuracy, etc.?

Others: ()

Temperature

1) The temperature range in which the product or sensor is used is ()°C to ()°C .

2) Temperature to be measured or temperature to be controlled is ()°C to ()°C .

Characteristics

1) Desired resistance value (zero power resistance)

() kΩ ± () % at () °C

2) B Value (Calculated from the resistances at 2 temperature points)

() K ± () % Temperature () °C , () °C

3) Electrical performance

Withstand voltage () V () sec.

Insulation resistance () Ω

Basic thermistor characteristics & application circuit example

Resistance - Temperature characteristics

The relationship between resistance and temperature within a given temperature range is approximately as in the formula 1 below.

$$R_1 = R_2 \exp \left[B \left(\frac{1}{T_1} - \frac{1}{T_2} \right) \right] \quad (\text{Formula 1})$$

T_1, T_2 : Absolute temperature (K)

R_1, R_2 : Zero power resistance (Ω) at T_1, T_2

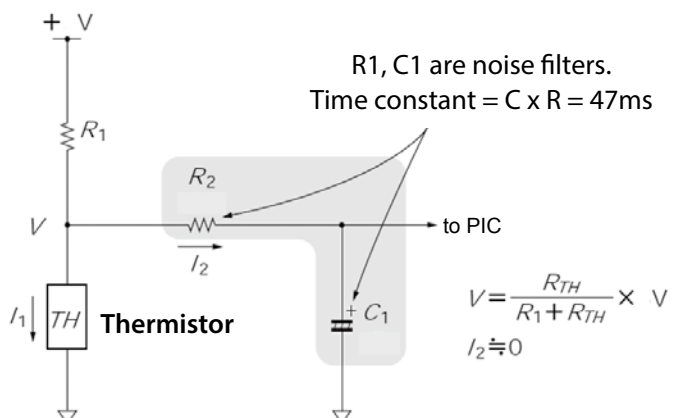
B : B value (K)

Temperature - Voltage conversion circuit

Put simply this is a circuit that converts the temperature of the thermistor into voltage. (R_2 and C_1 are noise filters)

For the thermistor R_T the voltage is measured in a voltage-dividing circuit R_{TH} using a Peripheral Interface Controller (below PIC).

The electric current to the PIC is minimal and can be ignored.

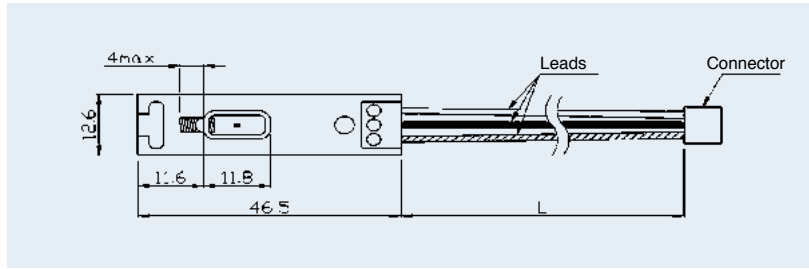


Printer / copy machine

1. NC sensor (non-contact)

Non contact sensor based on infrared detection that has very strong heat and dirt resistance.

Zero power resistance R_{180} : $7\text{ k}\Omega \pm 3\%$ Thermal time constant: approx. 1.3 sec.
 B value $B_{25/85}$: $3370\text{ K} \pm 1\%$ Breakdown voltage: AC 500 V 1 sec.
 Temperature range (except connector): -10 to 150°C Insulation resistance: DC 500 V 100 M Ω +
 Measurement temp. range: -10 to 260°C



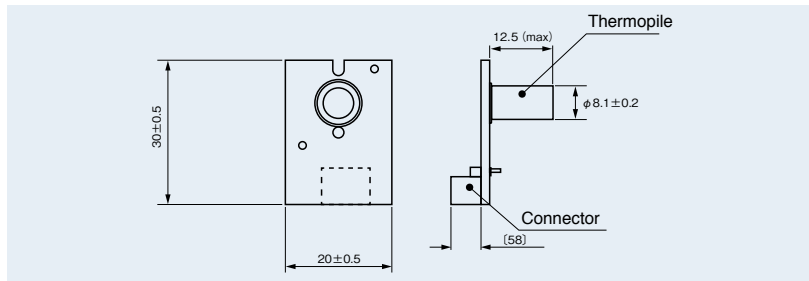
2. Thermopile module (non-contact)

Non contact sensor based on infrared detection that measures temperature easily and accurately.

Source voltage: 3.2 V to 6 V
 Output voltage: 0.2 V to 2.8 V
 Temperature range: -25 to 100°C
 Measurement temp. range: -20 to 250°C
 Thermal time constant: approx. 46 ms

Connector pin locations

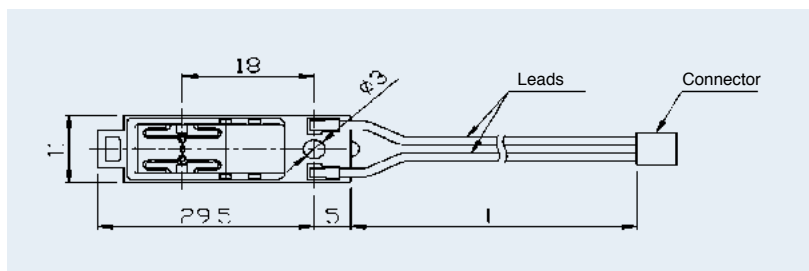
1	Output signal: V_{obj} (V)
2	Output signal: GND
3	Output signal: Power supply voltage : Vdd
4	Output signal: V_{tamb} (V)



3. HF-N sensor (non-contact)

Sensor that allows non contact measurement with conventional thermistor systems.

Zero power resistance R_{180} : $7\text{ k}\Omega \pm 5\%$
 B value $B_{25/85}$: $3370\text{ K} \pm 3\%$
 Temperature range (sensing part): -20 to 230°C

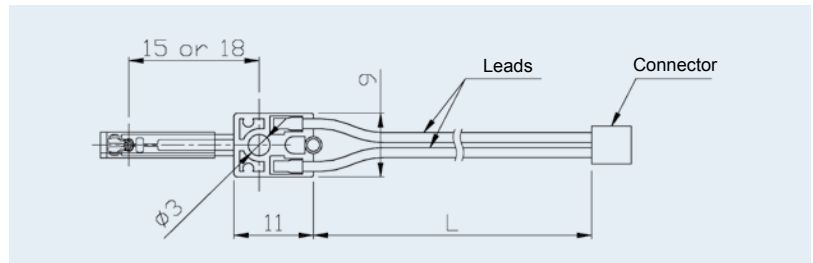


4. FS sensor

Low friction type sensor that reduces damage to the fuser roller to a minimum.

Zero power resistance R_{180} : $7\text{ k}\Omega \pm 5\%$
 B value $B_{25/85}$: $3370\text{ K} \pm 3\%$
 Temperature range (sensing part): -20 to 230°C

Thermal time constant: approx. 1.0 sec. (roller)
 Breakdown voltage: AC 600 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +

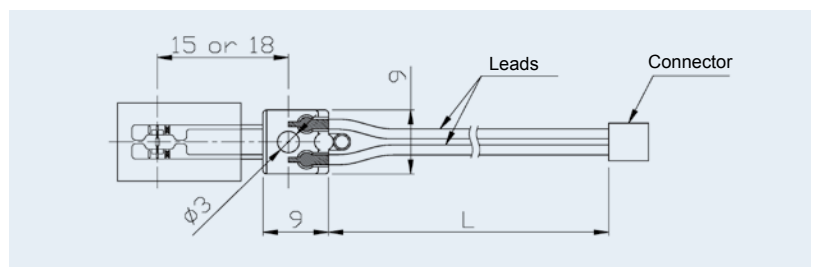


5. HF-H sensor

Fast response type temperature sensor that can quickly respond to temperature changes of the fuser roller.

Zero power resistance R_{180} : $7\text{ k}\Omega \pm 5\%$
 B value $B_{25/85}$: $3370\text{ K} \pm 3\%$
 Temperature range (sensing part): -20 to 230°C

Thermal time constant: approx. 0.7 sec. (roller)
 Breakdown voltage: AC 600 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +

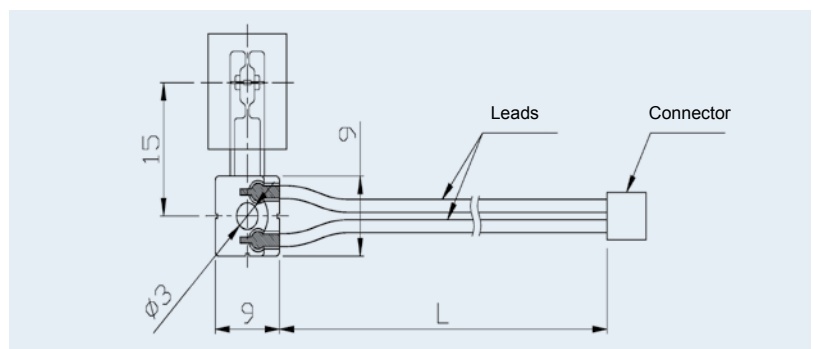


6. HF-L sensor

Space saving type of temperature sensor with lead wires parallel to the fuser roller.

Zero power resistance R_{180} : $7\text{ k}\Omega \pm 5\%$
 B value $B_{25/85}$: $3370\text{ K} \pm 3\%$
 Temperature range (sensing part): -20 to 230°C

Thermal time constant: approx. 1.0 sec. (roller)
 Breakdown voltage: AC 600 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +

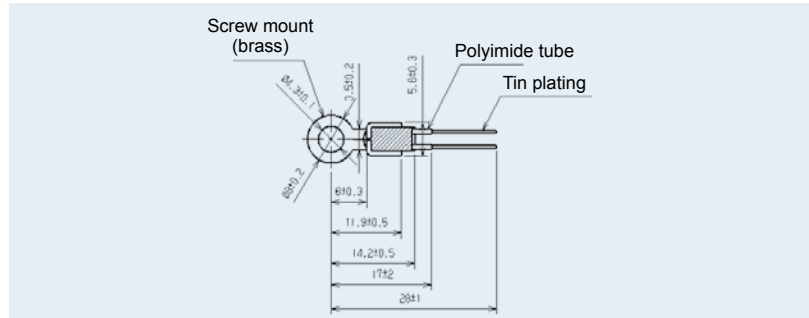


7. Eyelet (lug terminal) sensor

Screw mount type temperature sensor with very good heat conductivity that allows the sensing of high temperatures.

Zero power resistance R_{75} : 7.214 k Ω \pm 5%
 B value $B_{0/100}$: 3970 K \pm 2%
 Temperature range : - 40 to 130 $^{\circ}$ C

Thermal time constant: approx. 75 sec.
 Breakdown voltage: AC 600 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +

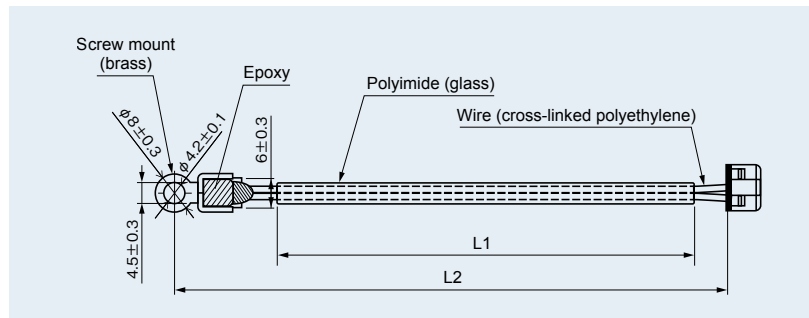


8. Eyelet (lug terminal) sensor

Screw mount type temperature sensor with very good heat conductivity that allows highly accurate sensing of high temperatures.

Zero power resistance R_{25} : 10.0 k Ω \pm 0.5%
 B value $B_{25/85}$: 3435 K \pm 0.5%
 Temperature range : - 40 to 125 $^{\circ}$ C

Thermal time constant: approx. 80 sec.
 Breakdown voltage: AC 1800 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +

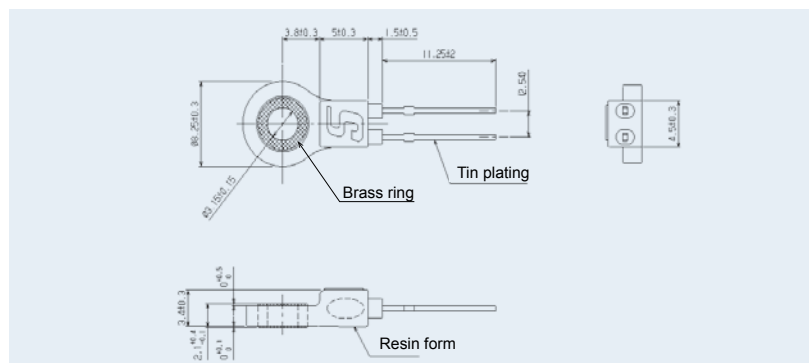


9. Eyelet (lug terminal) sensor

Temperature sensor that resists screw tension and can therefore be used for a long time.

Zero power resistance R_{25} : 2 k Ω \pm 1%
 B value $B_{25/85}$: 3182 K \pm 1%
 Temperature range: - 40 to 90 $^{\circ}$ C

Thermal time constant: approx. 80 sec.
 Breakdown voltage: AC 600 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +



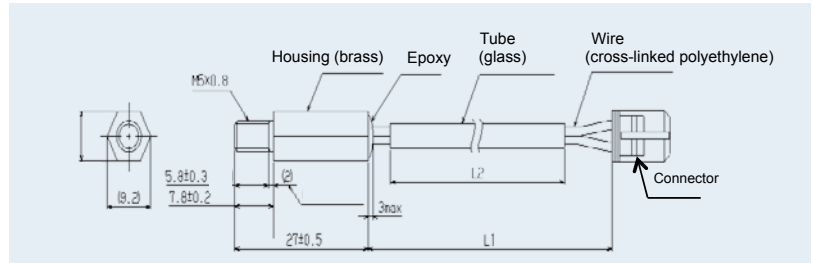
Motor

10. Screw housing sensor

Screw type temperature sensor with high accuracy and excellent climate resistance.

Zero power resistance R_{25} (except connector): $10.0\text{ k}\Omega \pm 0.5\%$
 B value $B_{25/85}$: $3435\text{ K} \pm 0.5\%$
 Temperature range: $-40\text{ to }150^\circ\text{C}$

Thermal time constant: approx. 298 sec.
 Breakdown voltage: AC 600 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +

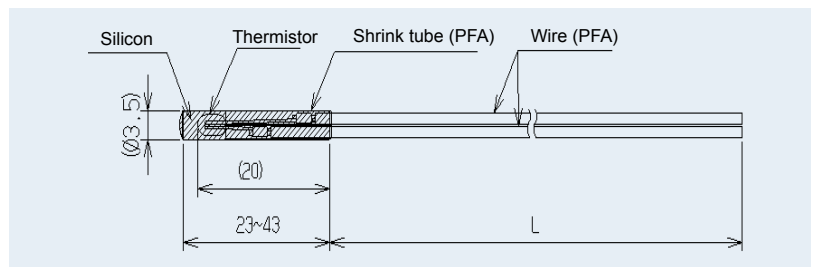


11. PTFE tube sensor

Temperature sensor with a thin tip and excellent responsiveness.

Zero power resistance R_{100} : $1.0\text{ k}\Omega \pm 5\%$
 B value $B_{0/100}$: $3387\text{ K} \pm 2\%$
 Temperature range: $-40\text{ to }250^\circ\text{C}$

Thermal time constant: approx. 7 sec. (oil)
 Breakdown voltage: AC 1200 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +



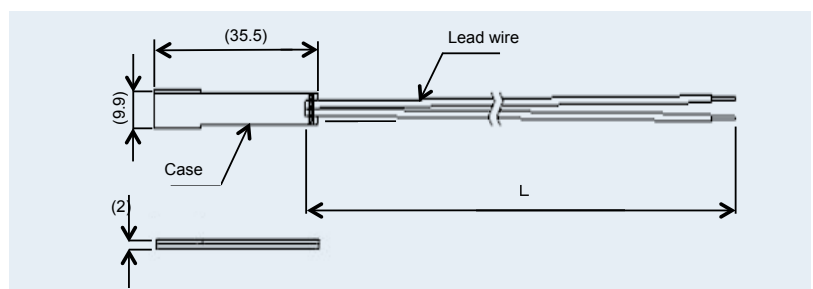
Battery / capacitor

12. Slim case sensor

Slim case sensor with high breakdown voltage that fits easily into narrow spaces.

Zero power resistance R_{25} : $10\text{ k}\Omega \pm 1\%$
 B value $B_{25/85}$: $3435\text{ K} \pm 1\%$
 Temperature range: $-20\text{ to }80^\circ\text{C}$

Thermal time constant: approx. 25 sec.
 Breakdown voltage: AC 2160 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +



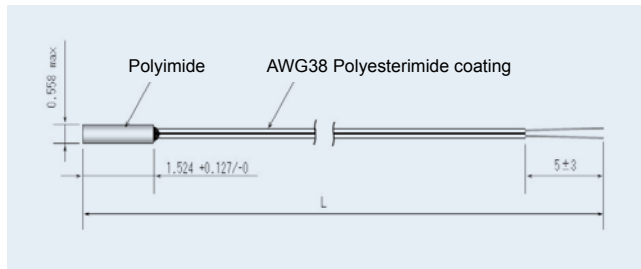
Catheter

13. F μ sensor

Miniature temperature sensor with fast response speed.



Zero power resistance R_{37} :
14.054 k Ω \pm 0.5%
B value $B_{0/50}$:
3454 K \pm 1%
Temperature range:
- 10 to 70°C



Thermal time constant: approx. 0.07 sec. (in water)

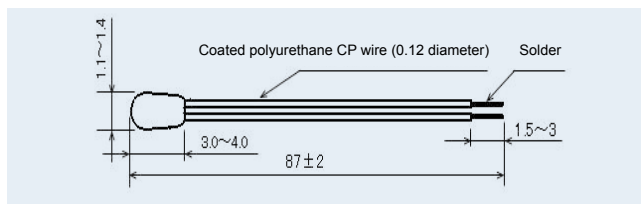
Thermometer / ear thermometer

14. 503ET-3H87U

Small and highly accurate sensor optimized for body temperature measurement.



Zero power resistance R_{37} :
29.614 to 30.264k Ω
Group temp. tolerance R_{37} :
 $R_{37} \pm 0.05\%$ / group
B value $B_{32/41}$:
3943 K \pm 0.5%
Temperature range:
- 40 to 100°C



R_{37} Group (A - U)

Group	R_{37} (k Ω) Min/Center/Max	Group	R_{37} (k Ω) Min/Center/Max
A	29.614/29.629/29.644	B	29.645/29.660/29.675
C	29.676/29.691/29.706	D	29.707/29.722/29.737
...
S	30.172/30.187/30.202	T	30.203/30.218/30.233
U	30.234/30.249/30.264		

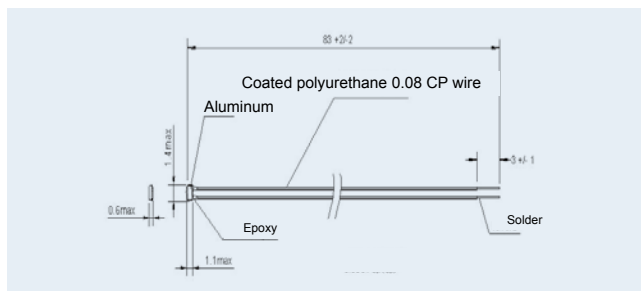
Thermal time constant: approx. 5 sec.

15. FT-ZM

Small temperature sensor with fast response speed optimized for measuring surface temperatures.



Zero power resistance R_{25} :
50.00 k Ω \pm 5%
B value $B_{25/85}$:
3435 K \pm 1%
Temperature range:
- 10 to 100°C



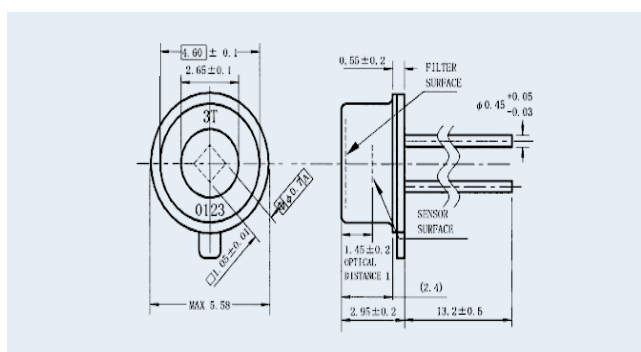
Thermal time constant: approx. 1.5 sec.

16. Thermopile

Non contact temperature sensor using infrared measuring.



Output voltage:
1.00 \pm 30 mV
Thermistor resistance:
 $R_{25} = 100$ k Ω \pm 3%
Thermistor B value:
3435 K \pm 0.7%
Temperature range:
- 20 to 100°C



Thermal time constant: approx. 15 msec.
Angle: $\pm 50^\circ$
Transparent wavelength band: Cut on 5 μ m

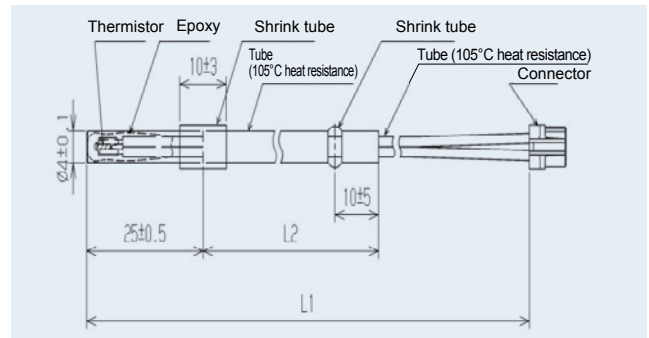
Air conditioning

17. Copper pipe sensor

Temperature sensor that is inserted into a copper pipe and can be used for a wide variety of purposes.



Zero power resistance R_{25} :
 $14.05 \text{ k}\Omega \pm 3\%$
 B value $B_{25/50}$:
 $4120 \text{ K} \pm 2\%$
 Temperature range:
 -20°C to 80°C



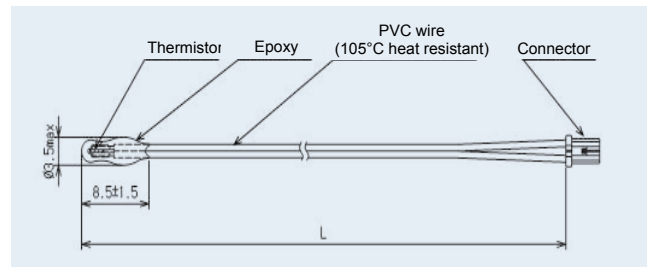
Thermal time constant: approx. 8 sec. (in stirred water)
 Breakdown voltage: AC 2200 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +

18. Epoxy-dipped sensor

Temperature sensor that has been dipped in epoxy resin and optimized for measuring room temperature.



Zero power resistance R_{25} :
 $10.0 \text{ k}\Omega \pm 3\%$
 B value $B_{25/50}$:
 $3950 \text{ K} \pm 2\%$
 Temperature range:
 -20°C to 80°C



Thermal time constant: approx. 5 sec. (in stirred water)
 Breakdown voltage: AC 2200 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +

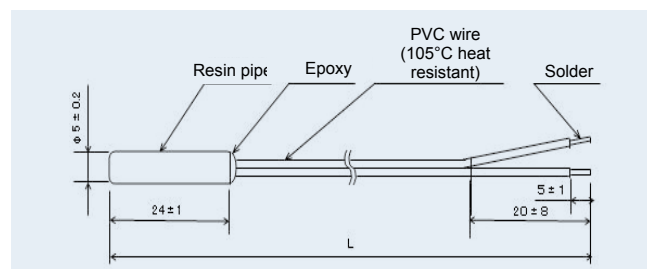
Refrigerator

19. Resin pipe sensor

Temperature sensor in a resin pipe that allows accurate measurement of low temperatures.



Zero power resistance R_{25} :
 $10.0 \text{ k}\Omega \pm 1\%$
 B value $B_{25/85}$:
 $3435 \text{ K} \pm 1\%$
 Temperature range:
 -30 to 90°C



Thermal time constant: approx. 20 sec.
 Breakdown voltage: AC 1800 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +

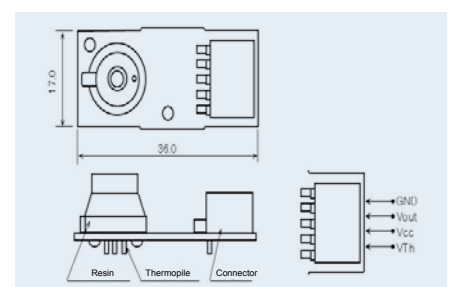
20. Thermopile module

Module version of the infrared based thermopile non contact sensor.



Measured temperature: $0^\circ\text{C} \pm 3.0^\circ\text{C}$
 Output voltage: 0.547 V to 3.453 V
 Measuring temp. range: -35°C to 35°C
 Temperature range: -35°C to 35°C

Response time: approx. 10 msec.
 Angle: type 55
 Rated voltage: $+5.5 \text{ V}$



Microwave oven

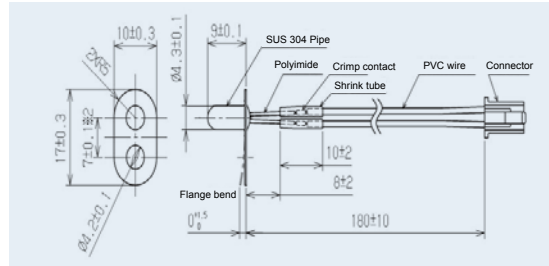
21. Flange pipe sensor

Easy to mount highly heat resistant temperature sensor with integrated flange.



Zero power resistance R_{50} : 4.367 k Ω \pm 5%
 B value $B_{0/100}$: 3450 K \pm 3%
 Temperature range: -30°C to 180°C
 (sensing part)

Thermal time constant: approx. 80 sec.
 Breakdown voltage: AC 1200 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +



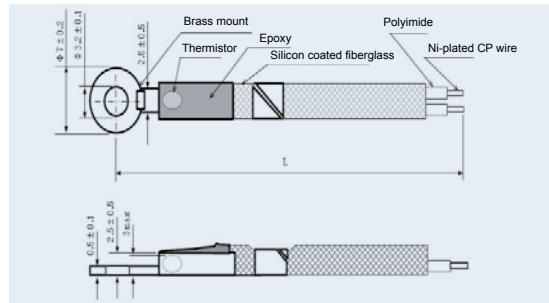
22. Eyelet (lug terminal) sensor

Highly heat resistant screw mount type temperature sensor with a metal terminal part.



Zero power resistance R_{75} : 7.241 k Ω \pm 7%
 B value $B_{0/100}$: 3970 K \pm 2%
 Temperature range: -20°C to 200°C

Thermal time constant: approx. 9 sec.
 (on hot plate at room temperature)
 Breakdown voltage: AC 1200 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +



Water heater / warm water toilet seat

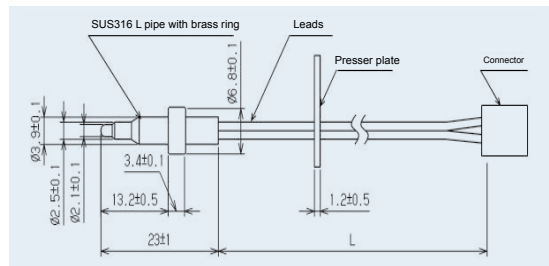
23. Stainless steel triple-staged pipe

Temperature sensor optimized for water temperature measurement with thin stainless steel pipe terminal for fast response speed.



Zero power resistance R_{50} : 17.60 k Ω \pm 3%
 B value $B_{0/100}$: 3970 K \pm 2%
 Temperature range: -20 to 120°C
 (except connector)

Thermal time constant : approx. 1 sec.
 (in stirred water)
 Breakdown voltage : AC 1200 V 1 sec.
 Insulation resistance : DC 500 V 100 M Ω +



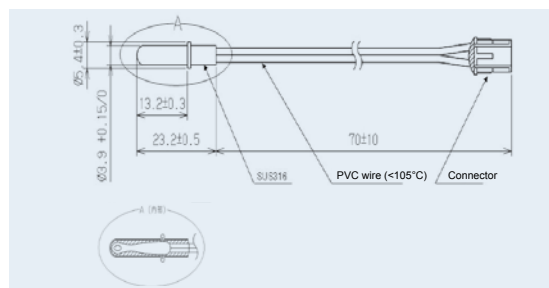
24. Stainless steel pipe sensor

Temperature sensor optimized for water temperature measurement that is inserted into a stainless steel pipe.



Zero power resistance R_{25} : 10 k Ω \pm 1%
 B value $B_{25/85}$: 3250 K \pm 1%
 Temperature range : -20 to 80°C

Thermal time constant: approx. 3.6 sec.
 (in stirred water)
 Breakdown voltage: AC 1500 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +



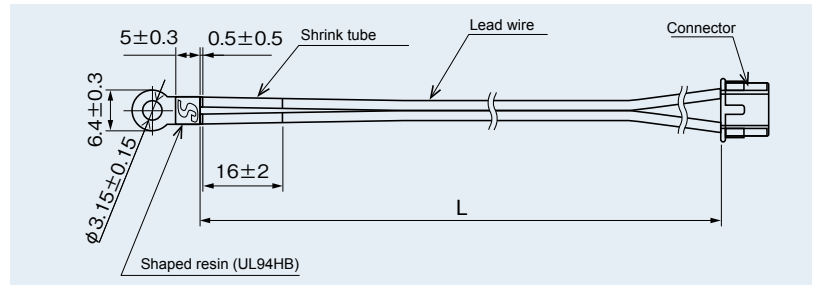
Power conditioner

25. Eyelet (lug terminal) sensor

Formed resin screw mount type temperature sensor with excellent insulation.

Zero power resistance R_{25} : $20.0 \text{ k}\Omega \pm 1\%$
 B value $B_{25/85}$: $4013 \text{ K} \pm 1\%$
 Temperature range: -40°C to 105°C

Thermal time constant: approx. 80 sec.
 Breakdown voltage: AC 2400 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +



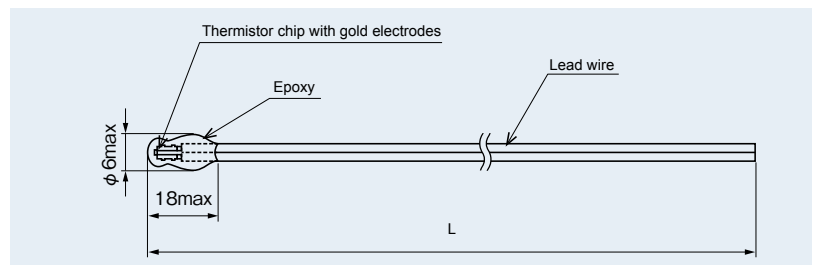
Rechargeable battery

26. Epoxy-dipped sensor (thermistor chip with gold electrodes)

Highly reliable temperature sensor that has been dipped in epoxy resin.

Zero power resistance R_{65} : $14.05 \text{ k}\Omega \pm 1.5\%$
 B value $B_{25/85}$: $4120 \text{ K} \pm 1\%$
 Temperature range: -30°C to 105°C

Thermal time constant: approx. 5 sec. (in stirred water)
 Breakdown voltage: AC 1800 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +



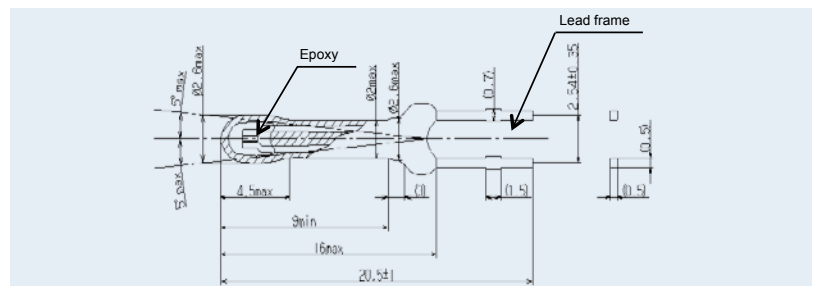
Fire alarm

27. Epoxy-dipped sensor

Highly responsive temperature sensor that has been dipped in epoxy resin.

Zero power resistance R_{25} : $226.0 \text{ k}\Omega \pm 3\%$
 B value $B_{25/85}$: $4021 \text{ K} \pm 1\%$
 Temperature range: -40 to 100°C

Thermal time constant: approx. 18 sec.
 Breakdown voltage: AC 600 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +



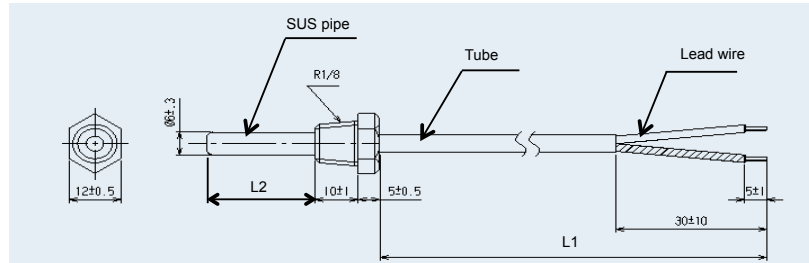
Liquid temperature measurement

28. Screw housing sensor

Screw type temperature sensor that can be used in water or oil tanks.

Zero power resistance R_{25} : 10.0 k Ω \pm 1%
 B value $B_{25/85}$: 3435 K \pm 1%
 Temperature range: -10°C to 105°C

Thermal time constant: approx. 20 sec. (in stirred water)
 Breakdown voltage: AC 1200 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +



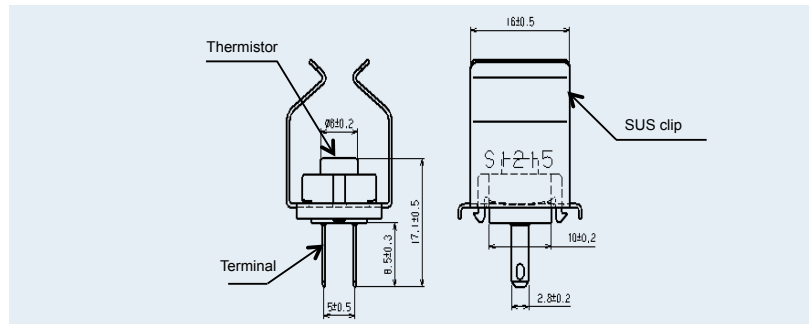
Pipe temperature measurement

29. Clip sensor

Temperature sensor that can be directly mounted to pipes and can be easily exchanged for maintenance.

Zero power resistance R_{85} : 1.075 k Ω \pm 3%
 B value $B_{25/85}$: 3969 K \pm 1%
 Temperature range: -20°C to 120°C

Thermal time constant: approx. 0.6 sec. (roller)
 Breakdown voltage: AC 600 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +



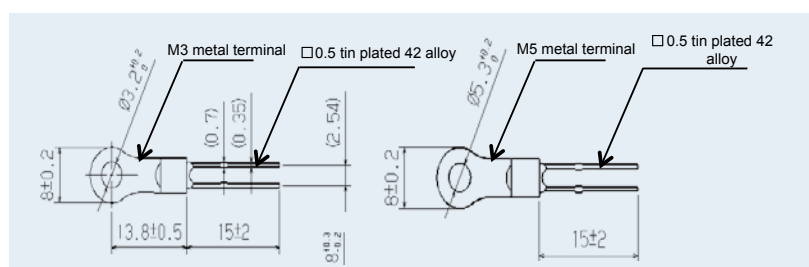
Heat sink

30. Eyelet (lug terminal) sensor

Temperature sensor that can easily be mounted using M3 or M5 screws.

Zero power resistance R_{25} : 10.0 k Ω \pm 0.5%
 B value $B_{25/85}$: 3976 K \pm 0.5%
 Temperature range: -50°C to 150°C

Thermal time constant: approx. 60 sec.
 Breakdown voltage: AC 600 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +

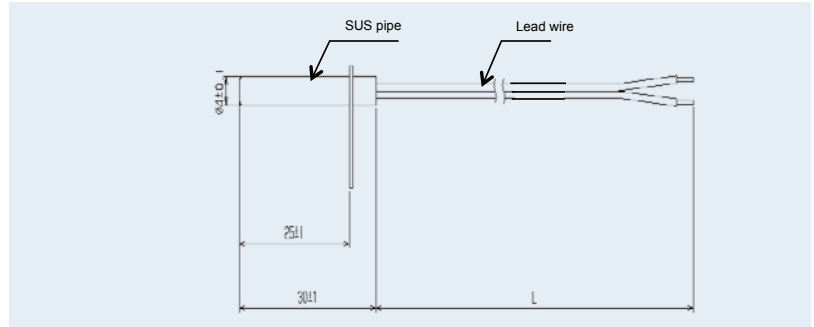


31. Flange pipe sensor

Easy to mount temperature sensor with integrated flange.

Zero power resistance R_{25} : $5.1 \text{ k}\Omega \pm 5\%$
 B value $B_{25/85}$: $3200 \text{ K} \pm 2\%$
 Temperature range: -10°C to 120°C

Thermal time constant: approx. 120 sec.
 Breakdown voltage: AC 1200 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +



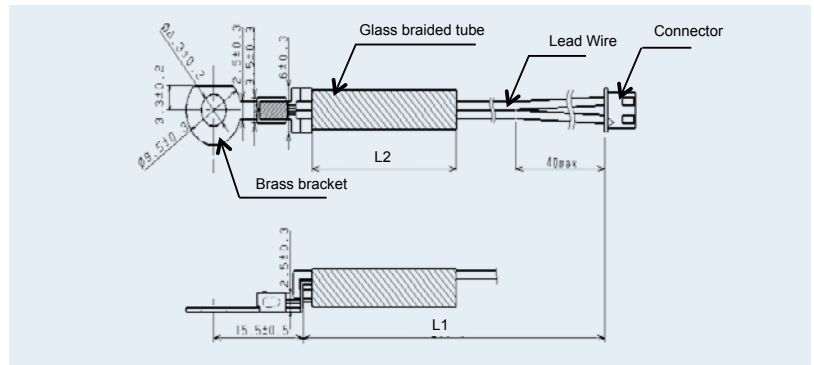
Heater temperature measurement

32. Eyelet (lug terminal) sensor

Highly heat resistant screw mount type temperature sensor with metal terminal.

Zero power resistance R_{100} : $3.3 \text{ k}\Omega \pm 2.5\%$
 B value $B_{0/100}$: $3970 \text{ K} \pm 2\%$
 Temperature range (except connector): -20°C to 180°C

Thermal time constant: approx. 78 sec.
 Breakdown voltage: AC 1200 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +

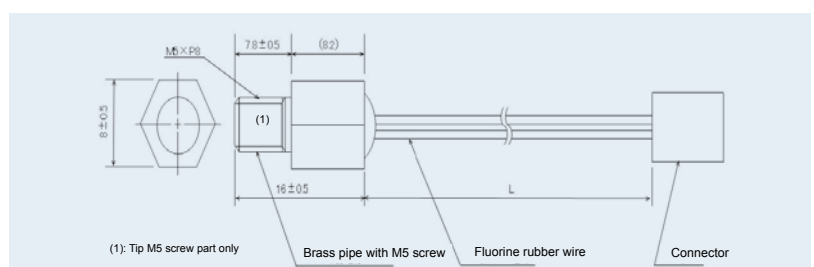


33. M5 screw housing sensor

Screw mount type temperature sensor that can be mounted directly to a heater block.

Zero power resistance R_{135} : $3.138 \text{ k}\Omega \pm 3\%$
 B value $B_{25/85}$: $3750 \text{ K} \pm 3\%$
 Temperature range: -50°C to 250°C

Thermal time constant: approx. 240 sec.
 Breakdown voltage: AC 600 V 1 sec.
 Insulation resistance: DC 500 V 100 M Ω +



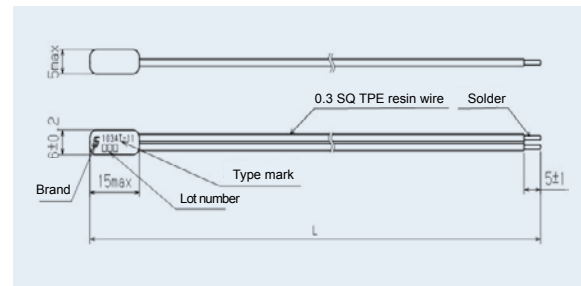
Standard Assembly Products

(All dimensions are in mm.)



Standard assembly A: xxxAT-11

Type	R ₂₅	B _{25/85}	Dissipation factor mW/°C	Thermal time constant s ¹	Max. power dissipation mW at 25°C	Temp. range °C
102AT-11	1.00kΩ ± 1%	3100K ± 1%	approx. 2.6	approx. 75	13	- 50°C to 90
202AT-11	2.00kΩ ± 1%	3182K ± 1%				
502AT-11	5.00kΩ ± 1%	3324K ± 1%				
103AT-11	10.0kΩ ± 1%	3435K ± 1%				- 50°C to 105
203AT-11	20.0kΩ ± 1%	4013K ± 1%				



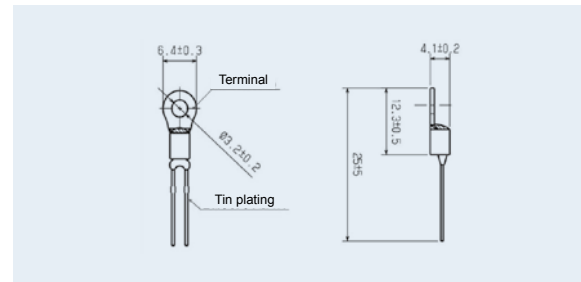
Breakdown voltage: AC 1200 V 1 sec.
Insulation resistance: DC 500 V 100 MΩ+



Standard assembly B: 103AT-2-34119

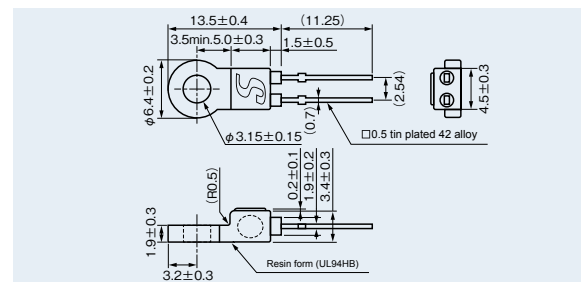
R ₂₅	B _{25/85}	Dissipation factor mW/°C	Thermal time constant s ¹	Max. power dissipation mW at 25°C	Temp. range °C
10.0kΩ ± 1%	3435K ± 1%	approx. 3.0	approx. 80	15	- 10°C to 105

Breakdown voltage : AC 600 V 1 sec.
Insulation resistance : DC 500 V 100 MΩ+



Standard assembly C: EC2F103A2-xxxxx

Type	R ₂₅	B _{25/85}	Resin color	Temp. range °C
EC2F102A2-71014	1kΩ ± 1%	3100K ± 1%	Light blue	- 40°C to 90°C
EC2F202A2-71048	2kΩ ± 1%	3182K ± 1%	Red	
EC2F502A2-40103	5kΩ ± 1%	3324K ± 1%	Gray	
EC2F103A2-40113	10kΩ ± 1%	3435K ± 1%	Black	
EC2F203A2-70030	20kΩ ± 1%	4013K ± 1%	Blue	
EC2F503A2-70456	50kΩ ± 1%	4060K ± 1%	White	
EC2F104A2-60109	100kΩ ± 1%	4665K ± 1%	Green	



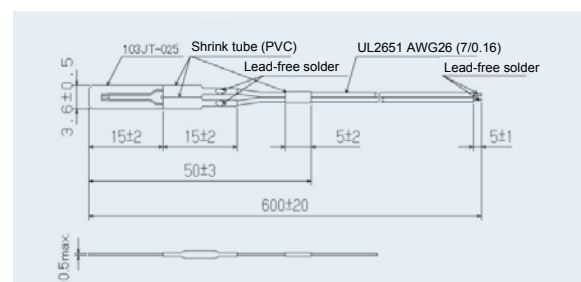
Dissipation factor: approx. 3.0 mW/°C
Thermal time constant: approx. 80 sec.
Breakdown voltage: AC 2400 V 1 sec.
Insulation resistance: DC 500 V 100 MΩ+



Standard assembly D: 103JT-025-600AY

R ₂₅	B _{25/85}	Dissipation factor mW/°C	Thermal time constant s ¹	Max. power dissipation mW at 25°C	Temp. range °C ³
10.0kΩ ± 1%	3435K ± 1%	approx. 0.7	approx. 5	3.5	- 30°C to 105°C

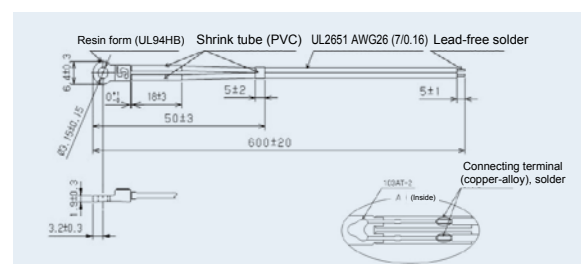
Breakdown voltage: AC 120 V 1 sec.
Insulation resistance: DC 100 V 100 MΩ+



Standard assembly E: EC2F103A2-40113-600AY

R ₂₅	B _{25/85}	Dissipation factor mW/°C	Thermal time constant s ¹	Max. power dissipation	Temp. range °C ³
10.0kΩ ± 1%	3435K ± 1%	approx. 3.0	approx. 80	15	- 30°C to 105°C

Breakdown voltage: AC 2400 V 1 sec.
Insulation resistance: DC 500 V 100 MΩ+



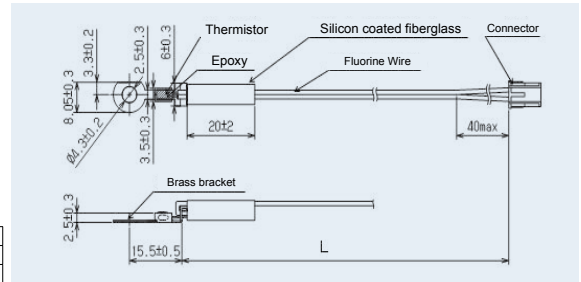


Standard assembly F: EF1M493NT-ASSY-1/2

R_{100}	$B_{0/100}$	Dissipation factor mW/°C	Thermal time constant s ¹	Max. power dissipation mW at 25°C	Temp. range ³ °C
3.3kΩ ± 2.5%	3970K ± 2%	approx. 2.2	approx. 78	11	-20°C to 180°C

Breakdown voltage: AC 1200 V 1 sec.
Insulation resistance: DC 500 V 100 MΩ+

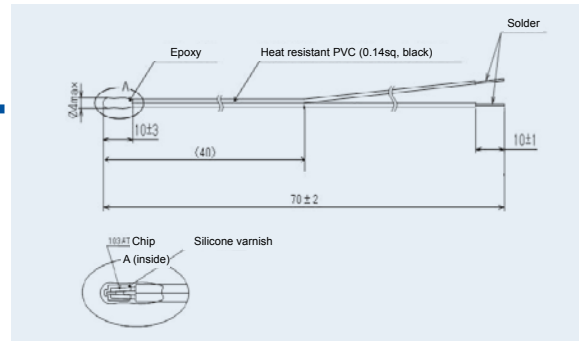
No	L	Connector
1	185 ± 5	XAP-02V(blue)
2	290 ± 10	XAP-02V(white)



Standard assembly H: ED5F103A2-ASSY-4

R_{25}	$B_{25/85}$	Dissipation factor mW/°C	Thermal time constant s ²	Max. power dissipation mW at 25°C	Temp. range °C
10.0kΩ ± 1%	3435K ± 1%	approx. 4.0	approx. 2	20	-30°C to 80°C

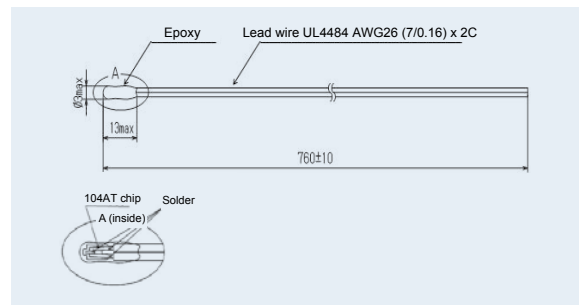
Breakdown voltage: AC 1500 V 1 sec.
Insulation resistance: DC 500 V 100 MΩ+



Standard assembly I: 104AT-4-ASSY-5

R_{25}	$B_{25/85}$	Dissipation factor mW/°C	Thermal time constant s ¹	Max. power dissipation mW at 25°C	Temp. range °C
100.0kΩ ± 1%	4261K ± 1%	approx. 4.0	approx. 35	20	-40°C to 90°C

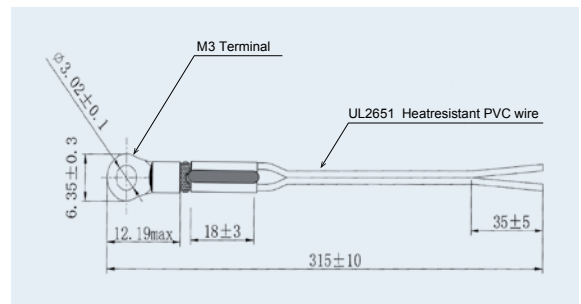
Breakdown voltage: AC 600 V 1 sec.
Insulation resistance: DC 500 V 100 MΩ+



EC1K103A2-17E011

R_{25}	$B_{25/85}$	Dissipation factor mW/°C	Thermal time constant s ¹	Max. power dissipation mW at 25°C	Temp. range °C
10.0kΩ ± 1%	3435K ± 1%	approx. 3.0	approx. 80	15	-30°C to +105°C

Breakdown voltage: AC 600 V 1 sec.
Insulation resistance: DC 500 V 100 MΩ+





■ Head Office: 7-7, Kinshi 1-chome, Sumida-ku, Tokyo 130-8512, Japan
Overseas Sales Section: TEL: +81-3-3621-2704 E-mail: overseas@mail.semitec.co.jp

■ USA : SEMITEC USA CORP. :TEL:+1-310-540-2330 FAX:+1-310-540-2331 E-mail: sales@semitec-usa.com

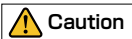
■ HONG KONG : SEMITEC (H.K.) CO.,LTD. : TEL:+852-2369-6773 FAX:+852-2739-2396 E-mail: semihk@netvigator.com

■ TAIWAN : SEMITEC TAIWAN CORP. : TEL:+886-2-2593-6622 FAX:+886-2-2593-0089 E-mail: sales@semitec.com.tw

■ KOREA : SEMITEC KOREA CO.,LTD. : TEL:+82-2-3281-1155 FAX:+82-2-3281-3338 E-mail: semitec@semiteckorea.com

■ SHANGHAI : SEMITEC SHANGHAI OFFICE : TEL:+86-21-5308-6000 FAX:+86-21-5830-5008 E-mail: sales@semitec-shanghai.com

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