



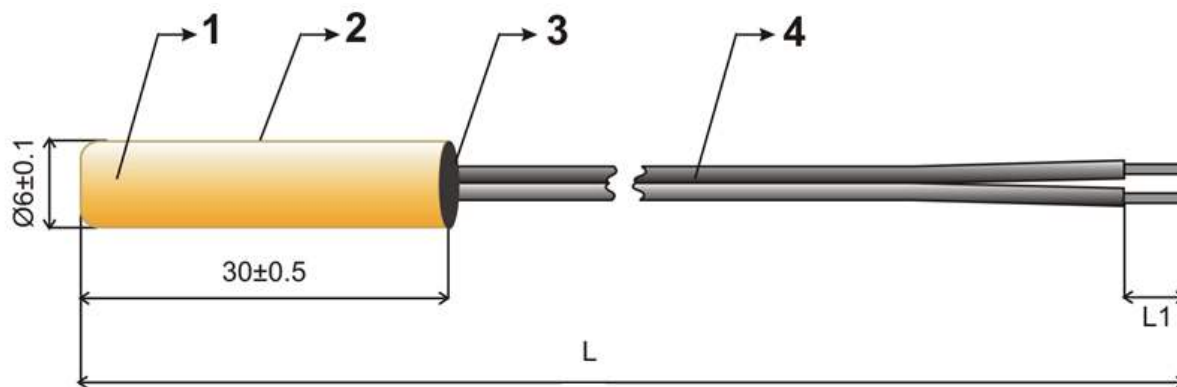
## **NTC thermistors for temperature measurement**

### NTC Probes

**Series/Type:** K800/10k/A1  
**Ordering code:** B57800K0103A001  
Date: 2009-07-09  
Version: 2

**Application Version**

Temperature sensor for heat pumps  
 NTC-thermistor soldered to black PVC-insulated twin wire AWG22 (12x Ø0.18 mm, heat proof up to 105°C) and coated with epoxy resin



L = 870 ± 10 mm  
 L1 = 4 ± 1 mm

dimensions in mm

No.	Item	Material	Property	Remarks
1	Thermistor	Ceramic	EPCOS NTC-wafer	coated
2	casing	copper	Ø6 x 30 mm	
3	casting	epoxy resin	flexible	black
4	Cable	PVC insulation	2x AWG 22 (12xØ0.18 mm)	black

**Ratings and characteristics**

Climatic category (IEC 60068-1)				: <b>30 / 100 / 56</b>
Lower category temperature			[°C]:	<b>-30</b>
Upper category temperature			[°C]:	<b>100</b>
Rated resistance $R_N$ // Tolerance	$R_N$		[Ω // %]:	<b>10000 // 1</b>
Rated temperature	$T_N$		[°C]:	<b>25</b>
B-value : $B_{(25/100)}$ // Tolerance	$B_N$		[K//%]:	<b>3988 // 1</b>
R/T-Curve no. // $R_{25}$			[n//Ω]:	<b>8016</b>
Max power rating at 25°C	$P_{25}$		[mW]:	<b>60 mW</b>
Thermal time constant (25°C → 85°C water)	$\tau_a$		[s]:	<b>approx. 8*</b>
Dissipation factor (in air)	$\delta_{th}$		[mW/K]:	<b>approx. 5*</b>
Thermal cooling time constant (in air)	$\tau_C$		[s]:	<b>approx. 50*</b>
Heat capacity	$C_{th}$		[mJ/K]:	<b>approx. 250*</b>
Insulation resistance	$R_{is}$		[MΩ]:	<b>&gt; 100 MΩ</b>
Voltage proof	$V_{is}$		[V <sub>AC</sub> ]:	<b>1500</b>

\*typical values

Remarks: --

## NTC-RESISTANCE-TEMPERATURE-CURVE

**R/T-Curve = 8016 / A01**
**R<sub>N</sub> at 25 °C = 10000 Ω ± 1.0 %**
**R at 25°C = 10000 Ω**
**B(25/100) = 3988 K ± 1.0 %**

Temp. [°C]	R Nom [Ω]	R Min [Ω]	R Max [Ω]	ΔR [±%]	ΔT [±°C]	α [%/K]
-40	336500	320419	352582	4,8	0,7	6,7
-35	242589	231867	253311	4,4	0,7	6,4
-30	177000	169786	184214	4,1	0,7	6,2
-25	130370	125487	135252	3,7	0,6	6,0
-20	97070	93743	100397	3,4	0,6	5,8
-15	72929	70652	75206	3,1	0,6	5,6
-10	55330	53765	56895	2,8	0,5	5,4
-5	42315	41237	43393	2,5	0,5	5,3
0	32650	31907	33393	2,3	0,4	5,1
5	25388	24877	25898	2,0	0,4	5,0
10	19900	19550	20250	1,8	0,4	4,8
15	15708	15470	15946	1,5	0,3	4,7
20	12490	12330	12650	1,3	0,3	4,5
<b>25</b>	<b>10000</b>	<b>9900</b>	<b>10100</b>	<b>1,0</b>	<b>0,2</b>	<b>4,4</b>
30	8057	7955	8159	1,3	0,3	4,3
35	6531	6434	6628	1,5	0,4	4,1
40	5327	5237	5417	1,7	0,4	4,0
45	4369	4286	4451	1,9	0,5	3,9
50	3603	3528	3678	2,1	0,5	3,8
55	2986	2918	3054	2,3	0,6	3,7
60	2488	2427	2549	2,5	0,7	3,6
65	2083	2028	2138	2,6	0,8	3,5
70	1752	1703	1801	2,8	0,8	3,4
75	1481	1437	1525	3,0	0,9	3,3
80	1258	1219	1297	3,1	1,0	3,2
85	1072	1037	1108	3,3	1,0	3,2
90	917,7	886,1	949,3	3,4	1,1	3,1
95	788,5	760,2	816,9	3,6	1,2	3,0
100	680,0	654,6	705,4	3,7	1,3	2,9
105	588,6	565,8	611,4	3,9	1,4	2,9
110	511,2	490,7	531,7	4,0	1,4	2,8
115	445,4	426,9	463,9	4,2	1,5	2,7
120	389,3	372,6	406,0	4,3	1,6	2,7
125	341,7	326,6	356,8	4,4	1,7	2,6

**RELIABILITY DATA :**

Test	Test conditions	$\Delta R_{25}/R_{25}$ (typical)	Remarks
Storage in dry heat IEC 60068-2-2	Storage at upper category temperature in air; temperature: 100°C; duration: 1000 h	< 2 %	No visible damage
Storage in coldness	Storage at lower category temperature in air; temperature: -30°C; duration: 1000 h	< 2 %	No visible damage
Storage in damp heat, steady state IEC 60068-2-78	Temperature of air: 40°C Relative humidity of air: 93 %; duration: 56 days	< 3 %	No visible damage
Rapid temperature cycling in air IEC 60068-2-14	Lower test temperature: -30°C Upper test temperature: 100°C Dwelling time: 15 minutes Number of cycles: 1000	< 3 %	No visible damage
Storage in water	Storage in water with total immersed head temperature: 80°C; duration: 1000 h	< 3%	No visible damage
Vibration test IEC 60068-2-6	Frequency range: 5 Hz to 500 Hz Amplitude: 7.5 mm / 2 g Linear sweep; X,Y and Z direction for 8 h each	< 3 %	No visible damage
Voltage proof	1500 V <sub>AC</sub> , 50 Hz, 1 sec	--	No flashover
Insulation test	The sensors are placed in a vessel containing metallic balls of 1 mm diameter (with total immersed head) The applied voltage is 500 V <sub>DC</sub>	--	ABOVE 100 MΩ

## Cautions and warnings

### Storage

- Store thermistors in original packaging only. Do not open the package prior to storage.
- Storage conditions in original packaging: storage temperature -25°C ...+45°C, relative humidity  $\leq$  75% annual mean, maximum 95%, dew precipitation is inadmissible.
- Do not store thermistors where they are exposed to heat or direct sunlight. Otherwise, the packing material may be deformed or components may stick together, causing problems during mounting.
- Avoid contamination of thermistor surface during storage, handling and processing.
- Avoid storage of thermistors in harmful environments like corrosive gases (SO<sub>x</sub>, Cl etc.)
- Use the components as soon as possible after opening the factory seals, i.e. the polyvinyl-sealed packages.
- Solder thermistors within the time specified after shipment from EPCOS.  
For leaded components this is 24 months.

### Handling

- NTC thermistors must not be dropped. Chip-offs or any other damage must not be caused during handling of NTCs.
- Do not touch components with bare hands. Gloves are recommended.
- Avoid contamination of thermistor surface during handling.

### Soldering

- Use resin-type flux or non-activated flux.
- Insufficient preheating may cause ceramic cracks.
- Rapid cooling by dipping in solvent is not recommended.
- Complete removal of flux is recommended.

## Mounting

- Ensure that no thermo-mechanical stress occurs due to production processes (curing or overmolding processes) when thermistors are sealed, potted or overmolded or during their subsequent operation. The maximum temperature of the thermistor must not be exceeded. Ensure that the materials used (sealing/potting compound and plastic material) are chemically neutral.
- Electrodes/contacts must not be scratched or damaged before/during/after the mounting process.
- Contacts and housing used for assembly with the thermistor must be clean before mounting.
- Ensure that adjacent materials are designed for operation at temperatures comparable to the surface temperature of the thermistor. Be sure that surrounding parts and materials can withstand the temperature.
- Avoid contamination of the thermistor surface during processing.
- The connections of sensors (e.g. cable end, wire end, plug terminal) may only be exposed to an environment with normal atmospheric conditions.
- Tensile forces on cables or leads must be avoided during mounting and operation.
- Bending or twisting of cables or leads directly on the thermistor body is not permissible.
- Avoid using chemical substances as mounting aids. It must be ensured that no water or other liquids enter the NTC thermistors (e.g. through plug terminals). In particular, water based substances (e.g. soap suds) must not be used as mounting aids for sensors.

## Operation

- Use thermistors only within the specified operating temperature range.
- Use thermistors only within the specified power range.
- Environmental conditions must not harm the thermistors. Only use the thermistors under normal atmospheric conditions or within the specified conditions.
- Contact of NTC thermistors with any liquids and solvents should be prevented. It must be ensured that no water enters the NTC thermistors (e.g. through plug terminals). For measurement purposes (checking the specified resistance vs. temperature), the component must not be immersed in water but in suitable liquids (e.g. Galden).
- Avoid dewing and condensation unless thermistor is specified for these conditions.
- Bending or twisting of cables and/or wires is not permissible during operation of the sensor in the application.
- Be sure to provide an appropriate fail-safe function to prevent secondary product damage caused by malfunction.

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