



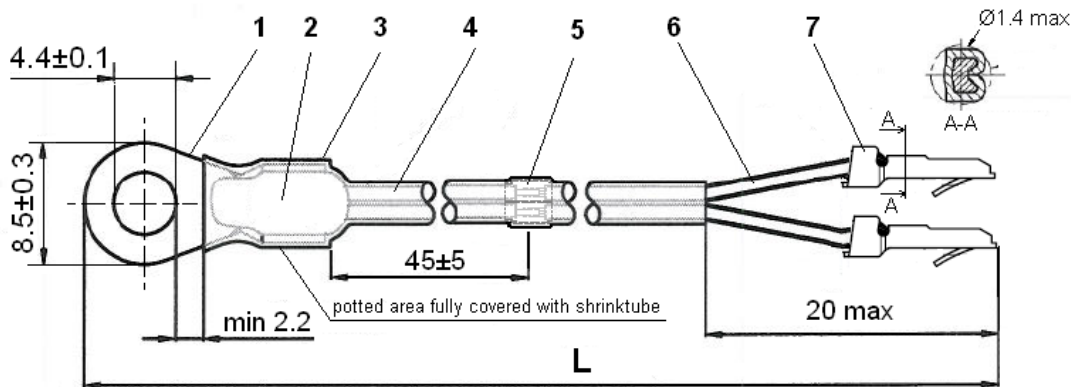
## **NTC thermistors for temperature measurement**

### **NTC Probes**

**Series/Type:** M703/10k/2%  
**Ordering code:** B57703M0103A025  
**Date:** 2009-09-08  
**Version:** 3

**Application** High-accuracy surface temperature measurement, e.g. on housings and pipes

**Version** Thermistor with Ag-plated Ni-wire AWG30 encapsulated in metal-tag case (material: brass, tinned) with extension wire Ag-plated Cu wire AWG26.



L = 220 +10/-5 mm

Dimensions in mm; Tolerances acc. to DIN ISO 2768-m unless otherwise specified

No.	Item	Material	Property	Remarks
1	Ringtongue	Brass, tinned	thickness 0.5 mm	
2	Thermistor	Ceramics	epoxy coated	S861/10k
3	Shrinktube	Polyolefine	Raychem CGPT	UL-file E35586
4	NTC wire	Ni, Ag-plated	AWG30; PTFE insulated	blue
5	Shrinktube	Polyolefine	Sumitube B2	UL-file E48762
6	Wire	Cu, Ag-plated	AWG26 (7x0.16); PTFE insul.	black
7	Contacts	Brass, tinned	Stocko RSB 7918.001 V 1,2-0,35	

**Ratings and characteristics**

Climatic category (IEC 60068-1)  
 Lower category temperature  
 Upper category temperature  
 Rated resistance  $R_N$  // Tolerance  
 Rated temperature  
 B-value :  $B_{(25/100)}$  // Tolerance  
 R/T-Curve no. //  $R_{25}$   
 Max power rating at 25°C  
 Dissipation factor (in air)  
 Thermal time constant (water)  
 Insulation resistance  
 Test voltage ( $t=1$  s)  
 (between NTC and metal-tag case)

: **40/125/56**  
 [°C]: **- 40**  
 [°C]: **+125**  
 $R_N$  [Ω // %]: **10000 // ±2**  
 $T_N$  [°C]: **25**  
 $B_N$  [K//%]: **3988 // ±1**  
 [n//Ω]: **8016**  
 $P_{25}$  [mW]: **150**  
 $\delta_{th}$  [mW/K]: **approx. 3.5 \***  
 $\tau_a$  [s]: **approx. 3 \***  
 $R_{is}$  [MΩ]: **> 100**  
 $V_{is}$  [V<sub>AC</sub>]: **2880 \*\***

\* typical values, depends on mounting situation  
 \*\* 100% production test with 2880 Vac/1s

**Remarks:** --

## NTC-RESISTANCE-TEMPERATURE-CURVE

**R/T-Curve = 8016 / A01**
**B(25/100) = 3988 K ± 1 %**
**R at 25°C = 10000 Ω**
**R<sub>N</sub> at 25 °C = 10000 Ω ± 2 %**

Temp. [°C]	R Nom [Ω]	R Min [Ω]	R Max [Ω]	ΔR [±%]	ΔT [±°C]	α [%/K]
-40	336500	317054	355947	5,8	0,9	6,7
-35	242589	229441	255737	5,4	0,8	6,4
-30	177000	168016	185984	5,1	0,8	6,2
-25	130370	124184	136556	4,7	0,8	6,0
-20	97070	92772	101368	4,4	0,8	5,8
-15	72929	69923	75936	4,1	0,7	5,6
-10	55330	53211	57449	3,8	0,7	5,4
-5	42315	40814	43816	3,5	0,7	5,3
0	32650	31581	33719	3,3	0,6	5,1
5	25388	24623	26152	3,0	0,6	5,0
10	19900	19351	20449	2,8	0,6	4,8
15	15708	15313	16103	2,5	0,5	4,7
20	12490	12205	12775	2,3	0,5	4,5
<b>25</b>	<b>10000</b>	<b>9800</b>	<b>10200</b>	<b>2,0</b>	<b>0,5</b>	<b>4,4</b>
30	8057	7874	8240	2,3	0,5	4,3
35	6531	6369	6694	2,5	0,6	4,1
40	5327	5184	5470	2,7	0,7	4,0
45	4369	4242	4495	2,9	0,7	3,9
50	3603	3492	3714	3,1	0,8	3,8
55	2986	2888	3084	3,3	0,9	3,7
60	2488	2402	2574	3,5	1,0	3,6
65	2083	2007	2159	3,6	1,0	3,5
70	1752	1685	1819	3,8	1,1	3,4
75	1481	1423	1540	4,0	1,2	3,3
80	1258	1206	1310	4,1	1,3	3,2
85	1072	1026	1118	4,3	1,4	3,2
90	917,7	876,9	958,5	4,4	1,4	3,1
95	788,5	752,3	824,7	4,6	1,5	3,0
100	680,0	647,8	712,2	4,7	1,6	2,9
105	588,6	559,9	617,3	4,9	1,7	2,9
110	511,2	485,6	536,8	5,0	1,8	2,8
115	445,4	422,5	468,4	5,2	1,9	2,7
120	389,3	368,7	409,9	5,3	2,0	2,7
125	341,7	323,2	360,2	5,4	2,1	2,6

**RELIABILITY DATA :**

Test	Test conditions	$\Delta R_{25}/R_{25}$ (typical)	Remarks
Storage in dry heat	Storage at upper category temperature Temperature: 125°C Duration: 1000 h	< 2 %	No visible damage
Storage in coldness	Storage at lower category temperature Temperature: -40°C Duration: 1000 h	< 2 %	No visible damage
Storage in damp, heat, steady state	Temperature of air: 40°C Relative humidity of air: 93 % Duration: 56 days	< 2 %	No visible damage
Rapid change of temperature in air	Lower test temperature: -40°C ( time: ~10 min) Upper test temperature: 80°C ( time: ~10 min) Time to change from lower to upper temperature: < 30 sec; Number of cycles: 10	< 2 %	No visible damage
Voltage proof test	2880 V <sub>AC</sub> ; 1 min (type tested)	--	No flash over
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  $-25^{\circ}\text{C} \dots +45^{\circ}\text{C}$ , 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 ( $\text{SO}_x$ , 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.
- Ensure that no significant thermo-mechanical stress occurs during operation due to the mounting situation. Fixtures must not overstress the sensor by an excessive mechanical preload.
- 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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