NTC thermistors for temperature measurement

Probe assemblies

Series/Type:	**L800/10k/A102**
Ordering code:	**B57800L0103A102**
Date:	2025-02-11
Version:	1

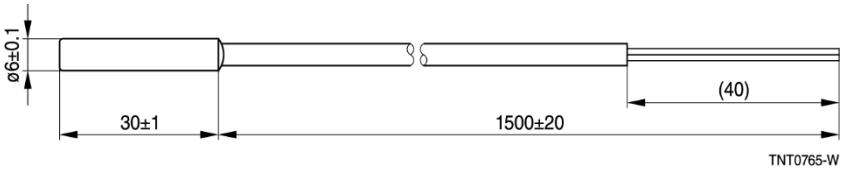
Applications

Temperature sensors that can be used in compressors of heat pump applications

Features

- NTC thermistor potted in copper case
- Maximum operating temperature of 150 °C
- Stranded XLPE copper wire AWG 26 with tin plated
- Epoxy resin encapsulation
- Lead free

Dimensional drawing



Dimensions in mm

Delivery Mode

Bulk

General technical data

Climatic category	(IEC 60068-1)		20/150/56	
Maximum power	(at 25 °C)	P_{25}	60	mW
Resistance tolerance		$\Delta R_R/R_R$	±1	%
Rated temperature		T_R	80	°C
Dissipation factor	(in air)	δ_{th}	approx. 7 [1]	mW/K
Thermal constant time	(in water)	τ_a	< 10 [1]	s
Test voltage	(t = 1 s)	V_{test}	1500 [2]	V AC

[1] Depends on mounting situation.
[2] 100% production test.

Electrical specification and ordering codes

R_{25} Ω	No. of R/T characteristic	$B_{25/100}$ K	Wire length in mm	Wire	Ordering code
10000	8016	3988 ±0.5%	1500 ±20	Stranded Cu wire AWG 26 with tin plated	B57800L0103A102

Reliability data

Test	Test conditions	$\Delta R_{25}/R_{25}$ (typical)	Remarks
Storage in dry heat	Storage at upper category temperature Temperature: 150 °C Medium: air Duration: 1000 hours	< 3%	
Storage in coldness	Storage at lower category temperature Temperature: –20 °C Medium: air Duration: 1000 hours	< 3%	
Storage in damp head, steady state	Temperature of air: 40 °C Relative humidity of air: 93% Medium: air Applied voltage 5 V DC with pre-resistor 6.8 kΩ Duration: 56 days	< 3%	
Rapid change of temperature	Lower test temperature: –20 °C (time: ~10 min) Upper test temperature: 150 °C (time: ~10 min) Time to change from lower to upper temperature: < 30 s Medium: air Applied voltage 5 V DC with pre-resistor 6.8 kΩ Number of cycles: 1000	< 3%	
Natural drop test	Drop the thermistor naturally 3 times from a height of 1.5 m on the stainless-steel plate surface.	< 1%	
Pull test	Secure the probe end to a solid surface and apply a 50 N (10 lb) minimum mass to the insulation jacket and both wire leads. Keep the weight on for 1 min.	< 1%	

R/T characteristics

R/T No.	**8016**	
T (°C)	$B_{25/100}$ = 3988 K	
	R_T/R_{25}	α (%K)
–20.0	9.707	5.8
–15.0	7.2929	5.6
–10.0	5.533	5.5
–5.0	4.2315	5.3
0.0	3.265	5.1
5.0	2.5388	5.0
10.0	1.99	4.8
15.0	1.5708	4.7
20.0	1.249	4.5
25.0	1.0000	4.4
30.0	0.8057	4.3
35.0	0.65313	4.1
40.0	0.5327	4.0
45.0	0.43687	3.9
50.0	0.3603	3.8
55.0	0.29862	3.7
60.0	0.2488	3.6
65.0	0.2083	3.5
70.0	0.1752	3.4
75.0	0.14814	3.3
80.0	0.1258	3.2
85.0	0.10723	3.2
90.0	0.09177	3.1
95.0	0.078852	3.0
100.0	0.068	2.9
105.0	0.058859	2.9
110.0	0.05112	2.8
115.0	0.044541	2.7
120.0	0.03893	2.7
125.0	0.03417	2.6
130.0	0.03009	2.5
135.0	0.026544	2.5
140.0	0.02348	2.4
145.0	0.020832	2.4
150.0	0.01853	2.3

Cautions and warnings

Storage

- Store thermistors only in original packaging. Do not open the package prior to processing.
- Storage conditions in original packaging: storage temperature –25 °C ... +45 °C, relative humidity ≤ 75% annual mean, < 95% maximum 30 days per annum, 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_x, Cl etc).
- Use the components as soon as possible after opening the original packaging.
- Solder thermistors within the time specified after shipment from TDK Electronics AG.
- For leaded components this is 24 months, for SMD components with nickel barrier termination 12 months, for leadless components this is 12 months, for SMD components with AgPd termination 6 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.
- Washing processes may damage the product due to the possible static or cyclic mechanical loads (e.g. ultrasonic cleaning). They may cause cracks to develop on the product and its parts, which might lead to reduced reliability or lifetime.

Bending / twisting leads

A lead (wire) may be bent at a minimum distance of twice the wire’s diameter plus 4 mm from the component head or housing. When bending ensure the wire is mechanically relieved at the component head or housing. The bending radius should be at least 0.75 mm.

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.
- The use of no-clean solder products is recommended. In any case mild, non-activated fluxes should be used. Flux residues after soldering should be minimized.

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 shall 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. perfluoropolyethers such as 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.

This listing does not claim to be complete, but merely reflects the experience of TDK Electronics AG.

Symbols and terms

Symbol	English	German
A	Area	Fläche
AWG	American Wire Gauge	Amerikanische Norm für Drahtquerschnitte
B	B value	B-Wert
$B_{25/100}$	B value determined by resistance measurement at 25 °C and 100 °C	B-Wert, ermittelt durch Widerstandsmessungen bei 25 °C und 100 °C
C_{th}	Heat capacitance	Wärmekapazität
I	Current	Strom
N	Number (integer)	Anzahl (ganzzahliger Wert)
P_{25}	Maximum power at 25 °C	Maximale Leistung bei 25 °C
P_{diss}	Power dissipation	Verlustleistung
P_{el}	Electrical power	Elektrische Leistung
P_{max}	Maximum power within stated temperature range	Maximale Leistung im angegebenenTemperaturbereich
$\Delta R_B/R_B$	Resistance tolerance caused by spread of B value	Widerstandstoleranz, die durch die Streuung des B-Wertes verursacht wird
R_{ins}	Insulation resistance	Isolationswiderstand
R_P	Parallel resistance	Parallelwiderstand
R_R	Rated resistance	Nennwiderstand
$\Delta R_R/R_R$	Resistance tolerance	Widerstandstoleranz
R_S	Series resistance	Serienwiderstand
R_T	Resistance at temperature T (e.g. R_{25} = resistance at 25 °C)	Widerstand bei Temperatur T (z.B. R_{25} = Widerstand bei 25 °C)
T	Temperature	Temperatur
ΔT	Temperature tolerance	Temperaturtoleranz
t	Time	Zeit
T_A	Ambient temperature	Umgebungstemperatur
T_{max}	Upper category temperature	Obere Grenztemperatur (Kategorietemperatur)

Symbol	English	German
T_{min}	Lower category temperature	Untere Grenztemperatur (Kategorietemperatur)
T_{op}	Operating temperature	Betriebstemperatur
T_R	Rated temperature	Nenntemperatur
T_{surf}	Surface temperature	Oberflächentemperatur
V	Voltage	Spannung
V_{ins}	Insulation test voltage	Isolationsprüfspannung
V_{op}	Operating voltage	Betriebsspannung
V_{test}	Test voltage	Prüfspannung
α	Temperature coefficient	Temperaturkoeffizient
Δ	Tolerance, change	Toleranz, Änderung
δth	Dissipation factor	Wärmeleitwert
τ_c	Thermal cooling time constant	Thermische Abkühlzeitkonstante
τ_a	Thermal time constant	Thermische Zeitkonstante

Abbreviations / Notes

Symbol	English	German
SMD	Surface-mounted devices	Oberflächenmontierbares Bauelement
*	To be replaced by a number in ordering code, type designations etc.	Platzhalter für Zahl im Bestellnummerncode, oder für die Typenbezeichnung.
+	To be replaced by a letter.	Platzhalter für einen Buchstaben.
	All dimensions are given in mm.	Alle Maße sind in mm angegeben.
	The commas used in numerical values denote decimal points	Verwendete Kommas in Zahlenwerten bezeichnen Dezimalpunkte.

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Important notes

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