

Temperature sensing element Ni 1000, $\alpha = 6.18 \cdot 10^{-3} \text{ }^\circ\text{C}^{-1}$

Basic technical parameters

Sensing element	Thin-film nickel resistor
Working temperature range	-60 °C to 250 °C *
Resistance at 0 °C	1000 Ω
Long-term resistance stability	0.1% after 1000 h at t = 250 °C
Recommended / maximum direct measuring current	Class A: 0.2 mA / 0.5 mA Class B: 0.3 mA / 0.8 mA

* The real range of working temperature of the sensor is given by the design and technology.

The temperature dependence of the sensing element resistance in the temperature range of -60 to 250 °C is expressed as follows:

$$R = 1000 (1 + At + Bt^2 + Ct^4 + Dt^6)$$

where: $A = 5.485 \cdot 10^{-3} \text{ }^\circ\text{C}^{-1}$ $C = 2.805 \cdot 10^{-11} \text{ }^\circ\text{C}^{-4}$
 $B = 6.650 \cdot 10^{-6} \text{ }^\circ\text{C}^{-2}$ $D = -2.00 \cdot 10^{-17} \text{ }^\circ\text{C}^{-6}$

Dependence of resistance on temperature in ohms [Ω]:

°C	0	-1	-2	-3	-4	-5	-6	-7	-8	-9
-60	695.2									
-50	742.6	737.8	733.0	728.2	723.4	718.7	714.0	709.3	704.6	699.9
-40	791.3	786.4	781.4	776.5	771.6	766.8	761.9	757.0	752.2	747.4
-30	841.5	836.4	831.3	826.3	821.2	816.2	811.2	806.2	801.2	796.3
-20	893.0	887.8	882.6	877.4	872.2	867.0	861.9	856.8	851.7	846.5
-10	945.8	940.5	935.1	929.8	924.5	919.2	913.9	908.7	903.4	898.2
0	1000.0	994.5	989.1	983.6	978.2	972.7	967.3	961.9	956.5	951.2

°C	0	1	2	3	4	5	6	7	8	9
0	1000.0	1005.5	1011.0	1016.5	1022.0	1027.6	1033.1	1038.7	1044.3	1049.9
10	1055.5	1061.1	1066.8	1072.4	1078.1	1083.8	1089.5	1095.2	1100.9	1106.6
20	1112.4	1118.1	1123.9	1129.7	1135.5	1141.3	1147.1	1153.0	1158.8	1164.7
30	1170.6	1176.5	1182.4	1188.3	1194.2	1200.2	1206.1	1212.1	1218.1	1224.1
40	1230.1	1236.1	1242.2	1248.2	1254.3	1260.4	1266.5	1272.6	1278.8	1284.9
50	1291.1	1297.2	1303.4	1309.6	1315.8	1322.0	1328.3	1334.5	1340.8	1347.1
60	1353.4	1359.7	1366.0	1372.4	1378.7	1385.1	1391.5	1397.9	1404.3	1410.8
70	1417.2	1423.7	1430.1	1436.6	1443.1	1449.7	1456.2	1462.8	1469.3	1475.9
80	1482.5	1489.1	1495.7	1502.4	1509.1	1515.7	1522.4	1529.1	1535.9	1542.6
90	1549.3	1556.1	1562.9	1569.7	1576.5	1583.4	1590.2	1597.1	1604.0	1610.9
100	1617.8	1624.7	1631.7	1638.6	1645.6	1652.6	1659.6	1666.7	1673.7	1680.8
110	1687.9	1695.0	1702.1	1709.3	1716.4	1723.6	1730.8	1738.0	1745.2	1752.5
120	1759.7	1767.0	1774.3	1781.6	1788.9	1796.3	1803.7	1811.1	1818.5	1825.9
130	1833.3	1840.8	1848.3	1855.8	1863.3	1870.9	1878.4	1886.0	1893.6	1901.2
140	1908.9	1916.5	1924.2	1931.9	1939.6	1947.4	1955.1	1962.9	1970.7	1978.5
150	1986.3	1994.2	2002.1	2010.0	2017.9	2025.9	2033.8	2041.8	2049.8	2057.8
160	2065.9	2074.0	2082.1	2090.2	2098.3	2106.5	2114.6	2122.8	2131.1	2139.3
170	2147.6	2155.9	2164.2	2172.5	2180.9	2189.3	2197.7	2206.1	2214.6	2223.0
180	2231.5	2240.0	2248.6	2257.2	2265.8	2274.4	2283.0	2291.7	2300.4	2309.1
190	2317.8	2326.6	2335.4	2344.2	2353.0	2361.9	2370.8	2379.7	2388.6	2397.6
200	2406.6	2415.6	2424.7	2433.7	2442.8	2451.9	2461.1	2470.3	2479.5	2488.7
210	2498.0	2507.2	2516.5	2525.9	2535.2	2544.6	2554.0	2563.5	2573.0	2582.5
220	2592.0	2601.6	2611.1	2620.8	2630.4	2640.1	2649.8	2659.5	2669.3	2679.1
230	2688.9	2698.7	2708.6	2718.5	2728.4	2738.4	2748.4	2758.4	2768.5	2778.6
240	2788.7	2798.8	2809.0	2819.2	2829.5	2839.7	2850.0	2860.4	2870.7	2881.1
250	2891.6									

Sensing element accuracy classes













Sensing elements are manufactured in two basic accuracy classes with tolerance fields expressed as follows:

	for t = -60 °C to 0 °C	for t = 0 °C to 250 °C
Class A	$\Delta T = \pm (0.2 + 0.014 * t)$ in °C	$\Delta T = \pm (0.2 + 0.0035 * t)$ in °C
Class B	$\Delta T = \pm (0.4 + 0.028 t)$ in °C	$\Delta T = \pm (0.4 + 0.0070 * t)$ in °C

| t | is the absolute value of temperature

Temperature [°C]	Resistance [Ω]	Class A		Class B	
		ΔT [°C]	ΔR [Ω]	ΔT [°C]	ΔR [Ω]
-30	841.5	± 0.62	± 3.16	± 1.24	± 6.32
0	1000.0	± 0.20	± 1.10	± 0.40	± 2.20
25	1141.3	± 0.29	± 1.67	± 0.58	± 3.34
50	1291.1	± 0.38	± 2.29	± 0.75	± 4.58
100	1617.8	± 0.55	± 3.79	± 1.10	± 7.59
150	1986.3	± 0.73	± 5.73	± 1.45	± 11.46
200	2406.6	± 0.90	± 8.10	± 1.80	± 16.20
250	2891.6	± 1.08	± 11.29	± 2.15	± 22.58

Application of sensing elements:

 Heating industry	 Heating systems	 Air-conditioning	 Alt. energy	 Rail vehicles	 Rubber industry	 Healthcare	 Gastronomy	 Engineering	 Custom manufacturing
 Chemical industry	 Science and research								