

Temperature sensing element Ni 1000, $\alpha = 5.000 \cdot 10^{-3} \text{ }^\circ\text{C}^{-1}$

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:

$$R = 1000 (1 + At + Bt^2 + Ct^3)$$

where: $A = 4.427 \cdot 10^{-3} \text{ }^\circ\text{C}^{-1}$ $B = 5.172 \cdot 10^{-6} \text{ }^\circ\text{C}^{-2}$ $C = 5.585 \cdot 10^{-9} \text{ }^\circ\text{C}^{-3}$

Dependence of resistance on temperature in ohms [Ω]:

°C	0	-1	-2	-3	-4	-5	-6	-7	-8	-9
-60	751.8									
-50	790.9	786.9	783.0	779.1	775.1	771.2	767.3	763.4	759.5	755.7
-40	830.8	826.8	822.8	818.8	814.7	810.7	806.8	802.8	798.8	794.8
-30	871.7	867.6	863.4	859.3	855.2	851.2	847.1	843.0	838.9	834.9
-20	913.5	909.3	905.0	900.8	896.7	892.5	888.3	884.1	880.0	875.8
-10	956.2	951.9	947.6	943.3	939.0	934.7	930.5	926.2	922.0	917.7
0	1000.0	995.6	991.2	986.8	982.4	978.0	973.6	969.3	964.9	960.6

°C	0	1	2	3	4	5	6	7	8	9
0	1000.0	1004.4	1008.9	1013.3	1017.8	1022.3	1026.7	1031.2	1035.7	1040.3
10	1044.8	1049.3	1053.9	1058.4	1063.0	1067.6	1072.2	1076.8	1081.4	1086.0
20	1090.7	1095.3	1100.0	1104.6	1109.3	1114.0	1118.7	1123.4	1128.1	1132.9
30	1137.6	1142.4	1147.1	1151.9	1156.7	1161.5	1166.3	1171.2	1176.0	1180.9
40	1185.7	1190.6	1195.5	1200.4	1205.3	1210.2	1215.1	1220.1	1225.0	1230.0
50	1235.0	1240.0	1245.0	1250.0	1255.0	1260.1	1265.1	1270.2	1275.3	1280.3
60	1285.4	1290.6	1295.7	1300.8	1306.0	1311.1	1316.3	1321.5	1326.7	1331.9
70	1337.1	1342.4	1347.6	1352.9	1358.2	1363.5	1368.8	1374.1	1379.4	1384.8
80	1390.1	1395.5	1400.9	1406.3	1411.7	1417.1	1422.5	1428.0	1433.4	1438.9
90	1444.4	1449.9	1455.4	1460.9	1466.5	1472.0	1477.6	1483.2	1488.8	1494.4
100	1500.0	1505.6	1511.3	1517.0	1522.6	1528.3	1534.0	1539.7	1545.5	1551.2
110	1557.0	1562.8	1568.5	1574.4	1580.2	1586.0	1591.8	1597.7	1603.6	1609.5
120	1615.4	1621.3	1627.2	1633.2	1639.1	1645.1	1651.1	1657.1	1663.1	1669.1
130	1675.2	1681.2	1687.3	1693.4	1699.5	1705.6	1711.8	1717.9	1724.1	1730.3
140	1736.5	1742.7	1748.9	1755.2	1761.4	1767.7	1774.0	1780.3	1786.6	1792.9
150	1799.3	1805.6	1812.0	1818.4	1824.8	1831.2	1837.7	1844.1	1850.6	1857.1
160	1863.6	1870.1	1876.7	1883.2	1889.8	1896.4	1902.9	1909.6	1916.2	1922.8
170	1929.5	1936.2	1942.9	1949.6	1956.3	1963.0	1969.8	1976.6	1983.4	1990.2
180	1997.0	2003.8	2010.7	2017.6	2024.5	2031.4	2038.3	2045.2	2052.2	2059.2
190	2066.1	2073.2	2080.2	2087.2	2094.3	2101.3	2108.4	2115.5	2122.7	2129.8
200	2137.0	2144.1	2151.3	2158.5	2165.8	2173.0	2180.3	2187.5	2194.8	2202.1
210	2209.5	2216.8	2224.2	2231.6	2239.0	2246.4	2253.8	2261.3	2268.7	2276.2
220	2283.7	2291.3	2298.8	2306.4	2313.9	2321.5	2329.1	2336.8	2344.4	2352.1
230	2359.8	2367.5	2375.2	2382.9	2390.7	2398.5	2406.2	2414.1	2421.9	2429.7
240	2437.6	2445.5	2453.4	2461.3	2469.2	2477.2	2485.2	2493.2	2501.2	2509.2
250	2517.3									

Sensing element accuracy classes

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

	for $-60\text{ °C} \leq t < 0\text{ °C}$	for $0\text{ °C} \leq t \leq 250\text{ °C}$
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 in °C

Temperature [°C]	Resistance [Ω]	Class A		Class B	
		ΔT [°C]	ΔR [Ω]	ΔT [°C]	ΔR [Ω]
-30	871.7	± 0.62	± 2.54	± 1.24	± 5.08
0	1000.0	± 0.20	± 0.88	± 0.40	± 1.76
25	1114.0	± 0.29	± 1.35	± 0.58	± 2.70
50	1235.0	± 0.38	± 1.87	± 0.75	± 3.75
100	1500.0	± 0.55	± 3.08	± 1.10	± 6.16
150	1799.3	± 0.73	± 4.57	± 1.45	± 9.14
200	2137.0	± 0.90	± 6.39	± 1.80	± 12.78
250	2517.3	± 1.08	± 8.71	± 2.15	± 17.42

Application of sensing elements:

