Temperature sensing elements Pt 500, α = 3.851·10^{-3} °C^{-1}

Basic technical parameters

Sensing element	Thin-film platinum resistor
Maximum range of working temperature	-200 to 800 °C *
Resistance at 0 °C	500 Ω
Long-term resistance stability	0.03 % after 1000 h at t = 400 °C
Recommended / max. direct measuring current	0.5mA / 1.5mA

[1)] The real range of working temperature of the sensor is given by the design and production technology of the temperature sensor.

The temperature dependence of the sensing element resistance is expressed as follows:

$R = 500\ (1 + At + Bt^2 + C\ (t-100)\ t^3)$ in a temperature range of -200 to 0 °C

$R = 500\ (1 + At + Bt^2)$ in a temperature range of 0 to 850 °C

where: $A = 3.9083.\ 10^{-3}\ °C^{-1}$ $B = -5.775.\ 10^{-7}\ °C^{-2}$ $C = -4.183.\ 10^{-12}\ °C^{-4}$

Dependence of resistance on temperature in ohms [Ω]:

°C	0	-1	-2	-3	-4	-5	-6	-7	-8	-9
-50	401.53									
-40	421.35	419.37	417.39	415.41	413.43	411.45	409.47	407.49	405.50	403.52
-30	441.11	439.14	437.16	435.19	433.21	431.24	429.26	427.29	425.31	423.33
-20	460.80	458.83	456.87	454.90	452.93	450.96	448.99	447.02	445.05	443.08
-10	480.43	478.47	476.51	474.55	472.58	470.62	468.66	466.69	464.73	462.77
0	500.00	498.05	496.09	494.13	492.18	490.22	488.26	486.31	484.35	482.39

°C	0	1	2	3	4	5	6	7	8	9
0	500.00	501.95	503.91	505.86	507.81	509.76	511.71	513.66	515.61	517.56
10	519.51	521.46	523.41	525.36	527.30	529.25	531.19	533.14	535.08	537.02
20	538.97	540.91	542.85	544.79	546.73	548.67	550.61	552.55	554.49	556.43
30	558.36	560.30	562.24	564.17	566.11	568.04	569.98	571.91	573.84	575.77
40	577.70	579.63	581.56	583.49	585.42	587.35	589.28	591.21	593.13	595.06
50	596.99	598.91	600.84	602.76	604.68	606.60	608.53	610.45	612.37	614.29
60	616.21	618.13	620.05	621.97	623.88	625.80	627.72	629.63	631.55	633.46
70	635.38	637.29	639.20	641.11	643.03	644.94	646.85	648.76	650.67	652.58
80	654.48	656.39	658.30	660.21	662.11	664.02	665.92	667.83	669.73	671.63
90	673.53	675.44	677.34	679.24	681.14	683.04	684.94	686.84	688.73	690.63
100	692.53	694.42	696.32	698.21	700.11	702.00	703.90	705.79	707.68	709.57
110	711.46	713.35	715.24	717.13	719.02	720.91	722.80	724.68	726.57	728.45
120	730.34	732.22	734.11	735.99	737.87	739.76	741.64	743.52	745.40	747.28
130	749.16	751.04	752.92	754.79	756.67	758.55	760.42	762.30	764.17	766.05
140	767.92	769.79	771.67	773.54	775.41	777.28	779.15	781.02	782.89	784.76
150	786.63	788.49	790.36	792.23	794.09	795.96	797.82	799.68	801.55	803.41
160	805.27	807.13	808.99	810.85	812.71	814.57	816.43	818.29	820.15	822.00
170	823.86	825.72	827.57	829.43	831.28	833.13	834.99	836.84	838.69	840.54
180	842.39	844.24	846.09	847.94	849.79	851.64	853.48	855.33	857.17	859.02
190	860.86	862.71	864.55	866.40	868.24	870.08	871.92	873.76	875.60	877.44
200	879.28	881.12	882.96	884.79	886.63	888.47	890.30	892.14	893.97	895.80
210	897.64	899.47	901.30	903.13	904.96	906.79	908.62	910.45	912.28	914.11
220	915.94	917.76	919.59	921.42	923.24	925.07	926.89	928.71	930.54	932.36
230	934.18	936.00	937.82	939.64	941.46	943.28	945.10	946.91	948.73	950.55
240	952.36	954.18	955.99	957.81	959.62	961.43	963.25	965.06	966.87	968.68
250	970.49	972.30	974.11	975.92	977.73	979.53	981.34	983.14	984.95	986.76
260	988.56	990.36	992.17	993.97	995.77	997.57	999.37	1001.17	1002.97	1004.77

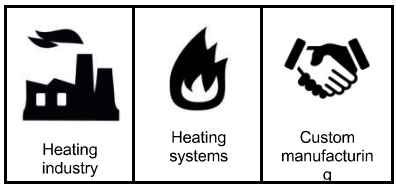
270	1006.57	1008.37	1010.17	1011.96	1013.76	1015.55	1017.35	1019.14	1020.94	1022.73
280	1024.52	1026.32	1028.11	1029.90	1031.69	1033.48	1035.27	1037.06	1038.85	1040.63
290	1042.42	1044.21	1045.99	1047.78	1049.56	1051.35	1053.13	1054.91	1056.69	1058.48
300	1060.26	1062.04	1063.82	1065.60	1067.38	1069.15	1070.93	1072.71	1074.49	1076.26
310	1078.04	1079.81	1081.59	1083.36	1085.13	1086.91	1088.68	1090.45	1092.22	1093.99
320	1095.76	1097.53	1099.30	1101.07	1102.83	1104.60	1106.37	1108.13	1109.90	1111.66
330	1113.42	1115.19	1116.95	1118.71	1120.47	1122.24	1124.00	1125.76	1127.51	1129.27
340	1131.03	1132.79	1134.55	1136.30	1138.06	1139.81	1141.57	1143.32	1145.08	1146.83
350	1148.58	1150.33	1152.08	1153.83	1155.58	1157.33	1159.08	1160.83	1162.58	1164.33
360	1166.07	1167.82	1169.56	1171.31	1173.05	1174.80	1176.54	1178.28	1180.02	1181.76
370	1183.51	1185.25	1186.99	1188.72	1190.46	1192.20	1193.94	1195.67	1197.41	1199.15
380	1200.88	1202.62	1204.35	1206.08	1207.82	1209.55	1211.28	1213.01	1214.74	1216.47
390	1218.20	1219.93	1221.66	1223.38	1225.11	1226.84	1228.56	1230.29	1232.01	1233.74
400	1235.46	1237.18	1238.91	1240.63	1242.35	1244.07	1245.79	1247.51	1249.23	1250.94
410	1252.66	1254.38	1256.10	1257.81	1259.53	1261.24	1262.96	1264.67	1266.38	1268.10
420	1269.81	1271.52	1273.23	1274.94	1276.65	1278.36	1280.07	1281.77	1283.48	1285.19
430	1286.89	1288.60	1290.31	1292.01	1293.71	1295.42	1297.12	1298.82	1300.52	1302.22
440	1303.92	1305.62	1307.32	1309.02	1310.72	1312.42	1314.11	1315.81	1317.51	1319.20
450	1320.90	1322.59	1324.28	1325.98	1327.67	1329.36	1331.05	1332.74	1334.43	1336.12
460	1337.81	1339.50	1341.19	1342.87	1344.56	1346.24	1347.93	1349.61	1351.30	1352.98
470	1354.67	1356.35	1358.03	1359.71	1361.39	1363.07	1364.75	1366.43	1368.11	1369.79
480	1371.46	1373.14	1374.82	1376.49	1378.17	1379.84	1381.52	1383.19	1384.86	1386.53
490	1388.20	1389.88	1391.55	1393.22	1394.88	1396.55	1398.22	1399.89	1401.56	1403.22
500	1404.89	1406.55	1408.22	1409.88	1411.54	1413.21	1414.87	1416.53	1418.19	1419.85
510	1421.51	1423.17	1424.83	1426.49	1428.15	1429.80	1431.46	1433.12	1434.77	1436.43
520	1438.08	1439.73	1441.39	1443.04	1444.69	1446.34	1447.99	1449.64	1451.29	1452.94
530	1454.59	1456.24	1457.88	1459.53	1461.18	1462.82	1464.47	1466.11	1467.76	1469.40
540	1471.04	1472.68	1474.32	1475.97	1477.61	1479.25	1480.88	1482.52	1484.16	1485.80
550	1487.44	1489.07	1490.71	1492.34	1493.98	1495.61	1497.24	1498.88	1500.51	1502.14
560	1503.77	1505.40	1507.03	1508.66	1510.29	1511.92	1513.55	1515.17	1516.80	1518.43
570	1520.05	1521.68	1523.30	1524.92	1526.55	1528.17	1529.79	1531.41	1533.03	1534.65
580	1536.27	1537.89	1539.51	1541.13	1542.74	1544.36	1545.98	1547.59	1549.21	1550.82
590	1552.43	1554.05	1555.66	1557.27	1558.88	1560.49	1562.10	1563.71	1565.32	1566.93
600	1568.54									

Sensing element accuracy classes

Temperature [°C]	Resistance [Ω]	Class AA		Class A		Class B		Class C	
		ΔT [°C]	ΔR [Ω]	ΔT [°C]	ΔR [Ω]	ΔT [°C]	ΔR [Ω]	ΔT [°C]	ΔR [Ω]
-50	401.53	-	-	-	-	± 0.55	± 1.09	± 1.10	± 2.18
-30	441.11	-	-	± 0.21	± 0.41	± 0.45	± 0.89	± 0.90	± 1.77
0	500.00	± 0.10	± 0.20	± 0.15	± 0.29	± 0.30	± 0.59	± 0.60	± 1.17
25	548.67	± 0.14	± 0.28	± 0.20	± 0.39	± 0.43	± 0.82	± 0.85	± 1.65
100	692.53	± 0.27	± 0.51	± 0.35	± 0.66	± 0.80	± 1.52	± 1.60	± 3.03
150	786.63	± 0.36	± 0.66	± 0.45	± 0.84	± 1.05	± 1.96	± 2.10	± 3.92
200	879.28	-	-	± 0.55	± 1.01	± 1.30	± 2.39	± 2.60	± 4.78
300	1060.26	-	-	± 0.75	± 1.34	± 1.80	± 3.21	± 3.60	± 6.41
400	1235.46	-	-	-	-	± 2.30	± 3.96	± 4.60	± 7.93
500	1404.89	-	-	-	-	± 2.80	± 4.66	± 5.60	± 9.33
600	1568.54	-	-	-	-	-	-	± 6.60	± 10.61

Note: According to EN 60 751, the above relationships only apply to temperature intervals given in the table.

Application of sensing elements:



Notes: