ITS-90 Table for type B thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 0 | 0.000 | 0.000 | 0.000 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 | -0.002 | -0.002 | -0.002 |
| 10 | -0.002 | -0.002 | -0.002 | -0.002 | -0.002 | -0.002 | -0.002 | -0.002 | -0.003 | -0.003 | -0.003 |
| 20 | -0.003 | -0.003 | -0.003 | -0.003 | -0.003 | -0.002 | -0.002 | -0.002 | -0.002 | -0.002 | -0.002 |
| 30 | -0.002 | -0.002 | -0.002 | -0.002 | -0.002 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 | 0.000 |
| 40 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.002 | 0.002 | 0.002 |
| 50 | 0.002 | 0.003 | 0.003 | 0.003 | 0.004 | 0.004 | 0.004 | 0.005 | 0.005 | 0.006 | 0.006 |
| 60 | 0.006 | 0.007 | 0.007 | 0.008 | 0.008 | 0.009 | 0.009 | 0.010 | 0.010 | 0.011 | 0.011 |
| 70 | 0.011 | 0.012 | 0.012 | 0.013 | 0.014 | 0.014 | 0.015 | 0.015 | 0.016 | 0.017 | 0.017 |
| 80 | 0.017 | 0.018 | 0.019 | 0.020 | 0.020 | 0.021 | 0.022 | 0.022 | 0.023 | 0.024 | 0.025 |
| 90 | 0.025 | 0.026 | 0.026 | 0.027 | 0.028 | 0.029 | 0.030 | 0.031 | 0.031 | 0.032 | 0.033 |
| 100 | 0.033 | 0.034 | 0.035 | 0.036 | 0.037 | 0.038 | 0.039 | 0.040 | 0.041 | 0.042 | 0.043 |
| 110 | 0.043 | 0.044 | 0.045 | 0.046 | 0.047 | 0.048 | 0.049 | 0.050 | 0.051 | 0.052 | 0.053 |
| 120 | 0.053 | 0.055 | 0.056 | 0.057 | 0.058 | 0.059 | 0.060 | 0.062 | 0.063 | 0.064 | 0.065 |
| 130 | 0.065 | 0.066 | 0.068 | 0.069 | 0.070 | 0.072 | 0.073 | 0.074 | 0.075 | 0.077 | 0.078 |
| 140 | 0.078 | 0.079 | 0.081 | 0.082 | 0.084 | 0.085 | 0.086 | 0.088 | 0.089 | 0.091 | 0.092 |
| 150 | 0.092 | 0.094 | 0.095 | 0.096 | 0.098 | 0.099 | 0.101 | 0.102 | 0.104 | 0.106 | 0.107 |
| 160 | 0.107 | 0.109 | 0.110 | 0.112 | 0.113 | 0.115 | 0.117 | 0.118 | 0.120 | 0.122 | 0.123 |
| 170 | 0.123 | 0.125 | 0.127 | 0.128 | 0.130 | 0.132 | 0.134 | 0.135 | 0.137 | 0.139 | 0.141 |
| 180 | 0.141 | 0.142 | 0.144 | 0.146 | 0.148 | 0.150 | 0.151 | 0.153 | 0.155 | 0.157 | 0.159 |
| 190 | 0.159 | 0.161 | 0.163 | 0.165 | 0.166 | 0.168 | 0.170 | 0.172 | 0.174 | 0.176 | 0.178 |
| 200 | 0.178 | 0.180 | 0.182 | 0.184 | 0.186 | 0.188 | 0.190 | 0.192 | 0.195 | 0.197 | 0.199 |
| 210 | 0.199 | 0.201 | 0.203 | 0.205 | 0.207 | 0.209 | 0.212 | 0.214 | 0.216 | 0.218 | 0.220 |
| 220 | 0.220 | 0.222 | 0.225 | 0.227 | 0.229 | 0.231 | 0.234 | 0.236 | 0.238 | 0.241 | 0.243 |
| 230 | 0.243 | 0.245 | 0.248 | 0.250 | 0.252 | 0.255 | 0.257 | 0.259 | 0.262 | 0.264 | 0.267 |
| 240 | 0.267 | 0.269 | 0.271 | 0.274 | 0.276 | 0.279 | 0.281 | 0.284 | 0.286 | 0.289 | 0.291 |
| 250 | 0.291 | 0.294 | 0.296 | 0.299 | 0.301 | 0.304 | 0.307 | 0.309 | 0.312 | 0.314 | 0.317 |
| 260 | 0.317 | 0.320 | 0.322 | 0.325 | 0.328 | 0.330 | 0.333 | 0.336 | 0.338 | 0.341 | 0.344 |
| 270 | 0.344 | 0.347 | 0.349 | 0.352 | 0.355 | 0.358 | 0.360 | 0.363 | 0.366 | 0.369 | 0.372 |
| 280 | 0.372 | 0.375 | 0.377 | 0.380 | 0.383 | 0.386 | 0.389 | 0.392 | 0.395 | 0.398 | 0.401 |
| 290 | 0.401 | 0.404 | 0.407 | 0.410 | 0.413 | 0.416 | 0.419 | 0.422 | 0.425 | 0.428 | 0.431 |
| 300 | 0.431 | 0.434 | 0.437 | 0.440 | 0.443 | 0.446 | 0.449 | 0.452 | 0.455 | 0.458 | 0.462 |
| 310 | 0.462 | 0.465 | 0.468 | 0.471 | 0.474 | 0.478 | 0.481 | 0.484 | 0.487 | 0.490 | 0.494 |
| 320 | 0.494 | 0.497 | 0.500 | 0.503 | 0.507 | 0.510 | 0.513 | 0.517 | 0.520 | 0.523 | 0.527 |
| 330 | 0.527 | 0.530 | 0.533 | 0.537 | 0.540 | 0.544 | 0.547 | 0.550 | 0.554 | 0.557 | 0.561 |
| 340 | 0.561 | 0.564 | 0.568 | 0.571 | 0.575 | 0.578 | 0.582 | 0.585 | 0.589 | 0.592 | 0.596 |
| 350 | 0.596 | 0.599 | 0.603 | 0.607 | 0.610 | 0.614 | 0.617 | 0.621 | 0.625 | 0.628 | 0.632 |
| 360 | 0.632 | 0.636 | 0.639 | 0.643 | 0.647 | 0.650 | 0.654 | 0.658 | 0.662 | 0.665 | 0.669 |
| 370 | 0.669 | 0.673 | 0.677 | 0.680 | 0.684 | 0.688 | 0.692 | 0.696 | 0.700 | 0.703 | 0.707 |
| 380 | 0.707 | 0.711 | 0.715 | 0.719 | 0.723 | 0.727 | 0.731 | 0.735 | 0.738 | 0.742 | 0.746 |
| 390 | 0.746 | 0.750 | 0.754 | 0.758 | 0.762 | 0.766 | 0.770 | 0.774 | 0.778 | 0.782 | 0.787 |
| 400 | 0.787 | 0.791 | 0.795 | 0.799 | 0.803 | 0.807 | 0.811 | 0.815 | 0.819 | 0.824 | 0.828 |
| 410 | 0.828 | 0.832 | 0.836 | 0.840 | 0.844 | 0.849 | 0.853 | 0.857 | 0.861 | 0.866 | 0.870 |
| 420 | 0.870 | 0.874 | 0.878 | 0.883 | 0.887 | 0.891 | 0.896 | 0.900 | 0.904 | 0.909 | 0.913 |
| 430 | 0.913 | 0.917 | 0.922 | 0.926 | 0.930 | 0.935 | 0.939 | 0.944 | 0.948 | 0.953 | 0.957 |
| 440 | 0.957 | 0.961 | 0.966 | 0.970 | 0.975 | 0.979 | 0.984 | 0.988 | 0.993 | 0.997 | 1.002 |
| 450 | 1.002 | 1.007 | 1.011 | 1.016 | 1.020 | 1.025 | 1.030 | 1.034 | 1.039 | 1.043 | 1.048 |
| 460 | 1.048 | 1.053 | 1.057 | 1.062 | 1.067 | 1.071 | 1.076 | 1.081 | 1.086 | 1.090 | 1.095 |
| 470 | 1.095 | 1.100 | 1.105 | 1.109 | 1.114 | 1.119 | 1.124 | 1.129 | 1.133 | 1.138 | 1.143 |
| 480 | 1.143 | 1.148 | 1.153 | 1.158 | 1.163 | 1.167 | 1.172 | 1.177 | 1.182 | 1.187 | 1.192 |
| 490 | 1.192 | 1.197 | 1.202 | 1.207 | 1.212 | 1.217 | 1.222 | 1.227 | 1.232 | 1.237 | 1.242 |
| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

ITS-90 Table for type B thermocouple

Thermoelectric Voltage in mV

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 500 | 1.242 | 1.247 | 1.252 | 1.257 | 1.262 | 1.267 | 1.272 | 1.277 | 1.282 | 1.288 | 1.293 |
| 510 | 1.293 | 1.298 | 1.303 | 1.308 | 1.313 | 1.318 | 1.324 | 1.329 | 1.334 | 1.339 | 1.344 |
| 520 | 1.344 | 1.350 | 1.355 | 1.360 | 1.365 | 1.371 | 1.376 | 1.381 | 1.387 | 1.392 | 1.397 |
| 530 | 1.397 | 1.402 | 1.408 | 1.413 | 1.418 | 1.424 | 1.429 | 1.435 | 1.440 | 1.445 | 1.451 |
| 540 | 1.451 | 1.456 | 1.462 | 1.467 | 1.472 | 1.478 | 1.483 | 1.489 | 1.494 | 1.500 | 1.505 |
| 550 | 1.505 | 1.511 | 1.516 | 1.522 | 1.527 | 1.533 | 1.539 | 1.544 | 1.550 | 1.555 | 1.561 |
| 560 | 1.561 | 1.566 | 1.572 | 1.578 | 1.583 | 1.589 | 1.595 | 1.600 | 1.606 | 1.612 | 1.617 |
| 570 | 1.617 | 1.623 | 1.629 | 1.634 | 1.640 | 1.646 | 1.652 | 1.657 | 1.663 | 1.669 | 1.675 |
| 580 | 1.675 | 1.680 | 1.686 | 1.692 | 1.698 | 1.704 | 1.709 | 1.715 | 1.721 | 1.727 | 1.733 |
| 590 | 1.733 | 1.739 | 1.745 | 1.750 | 1.756 | 1.762 | 1.768 | 1.774 | 1.780 | 1.786 | 1.792 |
| 600 | 1.792 | 1.798 | 1.804 | 1.810 | 1.816 | 1.822 | 1.828 | 1.834 | 1.840 | 1.846 | 1.852 |
| 610 | 1.852 | 1.858 | 1.864 | 1.870 | 1.876 | 1.882 | 1.888 | 1.894 | 1.901 | 1.907 | 1.913 |
| 620 | 1.913 | 1.919 | 1.925 | 1.931 | 1.937 | 1.944 | 1.950 | 1.956 | 1.962 | 1.968 | 1.975 |
| 630 | 1.975 | 1.981 | 1.987 | 1.993 | 1.999 | 2.006 | 2.012 | 2.018 | 2.025 | 2.031 | 2.037 |
| 640 | 2.037 | 2.043 | 2.050 | 2.056 | 2.062 | 2.069 | 2.075 | 2.082 | 2.088 | 2.094 | 2.101 |
| 650 | 2.101 | 2.107 | 2.113 | 2.120 | 2.126 | 2.133 | 2.139 | 2.146 | 2.152 | 2.158 | 2.165 |
| 660 | 2.165 | 2.171 | 2.178 | 2.184 | 2.191 | 2.197 | 2.204 | 2.210 | 2.217 | 2.224 | 2.230 |
| 670 | 2.230 | 2.237 | 2.243 | 2.250 | 2.256 | 2.263 | 2.270 | 2.276 | 2.283 | 2.289 | 2.296 |
| 680 | 2.296 | 2.303 | 2.309 | 2.316 | 2.323 | 2.329 | 2.336 | 2.343 | 2.350 | 2.356 | 2.363 |
| 690 | 2.363 | 2.370 | 2.376 | 2.383 | 2.390 | 2.397 | 2.403 | 2.410 | 2.417 | 2.424 | 2.431 |
| 700 | 2.431 | 2.437 | 2.444 | 2.451 | 2.458 | 2.465 | 2.472 | 2.479 | 2.485 | 2.492 | 2.499 |
| 710 | 2.499 | 2.506 | 2.513 | 2.520 | 2.527 | 2.534 | 2.541 | 2.548 | 2.555 | 2.562 | 2.569 |
| 720 | 2.569 | 2.576 | 2.583 | 2.590 | 2.597 | 2.604 | 2.611 | 2.618 | 2.625 | 2.632 | 2.639 |
| 730 | 2.639 | 2.646 | 2.653 | 2.660 | 2.667 | 2.674 | 2.681 | 2.688 | 2.696 | 2.703 | 2.710 |
| 740 | 2.710 | 2.717 | 2.724 | 2.731 | 2.738 | 2.746 | 2.753 | 2.760 | 2.767 | 2.775 | 2.782 |
| 750 | 2.782 | 2.789 | 2.796 | 2.803 | 2.811 | 2.818 | 2.825 | 2.833 | 2.840 | 2.847 | 2.854 |
| 760 | 2.854 | 2.862 | 2.869 | 2.876 | 2.884 | 2.891 | 2.898 | 2.906 | 2.913 | 2.921 | 2.928 |
| 770 | 2.928 | 2.935 | 2.943 | 2.950 | 2.958 | 2.965 | 2.973 | 2.980 | 2.987 | 2.995 | 3.002 |
| 780 | 3.002 | 3.010 | 3.017 | 3.025 | 3.032 | 3.040 | 3.047 | 3.055 | 3.062 | 3.070 | 3.078 |
| 790 | 3.078 | 3.085 | 3.093 | 3.100 | 3.108 | 3.116 | 3.123 | 3.131 | 3.138 | 3.146 | 3.154 |
| 800 | 3.154 | 3.161 | 3.169 | 3.177 | 3.184 | 3.192 | 3.200 | 3.207 | 3.215 | 3.223 | 3.230 |
| 810 | 3.230 | 3.238 | 3.246 | 3.254 | 3.261 | 3.269 | 3.277 | 3.285 | 3.292 | 3.300 | 3.308 |
| 820 | 3.308 | 3.316 | 3.324 | 3.331 | 3.339 | 3.347 | 3.355 | 3.363 | 3.371 | 3.379 | 3.386 |
| 830 | 3.386 | 3.394 | 3.402 | 3.410 | 3.418 | 3.426 | 3.434 | 3.442 | 3.450 | 3.458 | 3.466 |
| 840 | 3.466 | 3.474 | 3.482 | 3.490 | 3.498 | 3.506 | 3.514 | 3.522 | 3.530 | 3.538 | 3.546 |
| 850 | 3.546 | 3.554 | 3.562 | 3.570 | 3.578 | 3.586 | 3.594 | 3.602 | 3.610 | 3.618 | 3.626 |
| 860 | 3.626 | 3.634 | 3.643 | 3.651 | 3.659 | 3.667 | 3.675 | 3.683 | 3.692 | 3.700 | 3.708 |
| 870 | 3.708 | 3.716 | 3.724 | 3.732 | 3.741 | 3.749 | 3.757 | 3.765 | 3.774 | 3.782 | 3.790 |
| 880 | 3.790 | 3.798 | 3.807 | 3.815 | 3.823 | 3.832 | 3.840 | 3.848 | 3.857 | 3.865 | 3.873 |
| 890 | 3.873 | 3.882 | 3.890 | 3.898 | 3.907 | 3.915 | 3.923 | 3.932 | 3.940 | 3.949 | 3.957 |
| 900 | 3.957 | 3.965 | 3.974 | 3.982 | 3.991 | 3.999 | 4.008 | 4.016 | 4.024 | 4.033 | 4.041 |
| 910 | 4.041 | 4.050 | 4.058 | 4.067 | 4.075 | 4.084 | 4.093 | 4.101 | 4.110 | 4.118 | 4.127 |
| 920 | 4.127 | 4.135 | 4.144 | 4.152 | 4.161 | 4.170 | 4.178 | 4.187 | 4.195 | 4.204 | 4.213 |
| 930 | 4.213 | 4.221 | 4.230 | 4.239 | 4.247 | 4.256 | 4.265 | 4.273 | 4.282 | 4.291 | 4.299 |
| 940 | 4.299 | 4.308 | 4.317 | 4.326 | 4.334 | 4.343 | 4.352 | 4.360 | 4.369 | 4.378 | 4.387 |
| 950 | 4.387 | 4.396 | 4.404 | 4.413 | 4.422 | 4.431 | 4.440 | 4.448 | 4.457 | 4.466 | 4.475 |
| 960 | 4.475 | 4.484 | 4.493 | 4.501 | 4.510 | 4.519 | 4.528 | 4.537 | 4.546 | 4.555 | 4.564 |
| 970 | 4.564 | 4.573 | 4.582 | 4.591 | 4.599 | 4.608 | 4.617 | 4.626 | 4.635 | 4.644 | 4.653 |
| 980 | 4.653 | 4.662 | 4.671 | 4.680 | 4.689 | 4.698 | 4.707 | 4.716 | 4.725 | 4.734 | 4.743 |
| 990 | 4.743 | 4.753 | 4.762 | 4.771 | 4.780 | 4.789 | 4.798 | 4.807 | 4.816 | 4.825 | 4.834 |
| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

ITS-90 Table for type B thermocouple

Thermoelectric Voltage in mV

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1000 | 4.834 | 4.843 | 4.853 | 4.862 | 4.871 | 4.880 | 4.889 | 4.898 | 4.908 | 4.917 | 4.926 |
| 1010 | 4.926 | 4.935 | 4.944 | 4.954 | 4.963 | 4.972 | 4.981 | 4.990 | 5.000 | 5.009 | 5.018 |
| 1020 | 5.018 | 5.027 | 5.037 | 5.046 | 5.055 | 5.065 | 5.074 | 5.083 | 5.092 | 5.102 | 5.111 |
| 1030 | 5.111 | 5.120 | 5.130 | 5.139 | 5.148 | 5.158 | 5.167 | 5.176 | 5.186 | 5.195 | 5.205 |
| 1040 | 5.205 | 5.214 | 5.223 | 5.233 | 5.242 | 5.252 | 5.261 | 5.270 | 5.280 | 5.289 | 5.299 |
| 1050 | 5.299 | 5.308 | 5.318 | 5.327 | 5.337 | 5.346 | 5.356 | 5.365 | 5.375 | 5.384 | 5.394 |
| 1060 | 5.394 | 5.403 | 5.413 | 5.422 | 5.432 | 5.441 | 5.451 | 5.460 | 5.470 | 5.480 | 5.489 |
| 1070 | 5.489 | 5.499 | 5.508 | 5.518 | 5.528 | 5.537 | 5.547 | 5.556 | 5.566 | 5.576 | 5.585 |
| 1080 | 5.585 | 5.595 | 5.605 | 5.614 | 5.624 | 5.634 | 5.643 | 5.653 | 5.663 | 5.672 | 5.682 |
| 1090 | 5.682 | 5.692 | 5.702 | 5.711 | 5.721 | 5.731 | 5.740 | 5.750 | 5.760 | 5.770 | 5.780 |
| 1100 | 5.780 | 5.789 | 5.799 | 5.809 | 5.819 | 5.828 | 5.838 | 5.848 | 5.858 | 5.868 | 5.878 |
| 1110 | 5.878 | 5.887 | 5.897 | 5.907 | 5.917 | 5.927 | 5.937 | 5.947 | 5.956 | 5.966 | 5.976 |
| 1120 | 5.976 | 5.986 | 5.996 | 6.006 | 6.016 | 6.026 | 6.036 | 6.046 | 6.055 | 6.065 | 6.075 |
| 1130 | 6.075 | 6.085 | 6.095 | 6.105 | 6.115 | 6.125 | 6.135 | 6.145 | 6.155 | 6.165 | 6.175 |
| 1140 | 6.175 | 6.185 | 6.195 | 6.205 | 6.215 | 6.225 | 6.235 | 6.245 | 6.256 | 6.266 | 6.276 |
| 1150 | 6.276 | 6.286 | 6.296 | 6.306 | 6.316 | 6.326 | 6.336 | 6.346 | 6.356 | 6.367 | 6.377 |
| 1160 | 6.377 | 6.387 | 6.397 | 6.407 | 6.417 | 6.427 | 6.438 | 6.448 | 6.458 | 6.468 | 6.478 |
| 1170 | 6.478 | 6.488 | 6.499 | 6.509 | 6.519 | 6.529 | 6.539 | 6.550 | 6.560 | 6.570 | 6.580 |
| 1180 | 6.580 | 6.591 | 6.601 | 6.611 | 6.621 | 6.632 | 6.642 | 6.652 | 6.663 | 6.673 | 6.683 |
| 1190 | 6.683 | 6.693 | 6.704 | 6.714 | 6.724 | 6.735 | 6.745 | 6.755 | 6.766 | 6.776 | 6.786 |
| 1200 | 6.786 | 6.797 | 6.807 | 6.818 | 6.828 | 6.838 | 6.849 | 6.859 | 6.869 | 6.880 | 6.890 |
| 1210 | 6.890 | 6.901 | 6.911 | 6.922 | 6.932 | 6.942 | 6.953 | 6.963 | 6.974 | 6.984 | 6.995 |
| 1220 | 6.995 | 7.005 | 7.016 | 7.026 | 7.037 | 7.047 | 7.058 | 7.068 | 7.079 | 7.089 | 7.100 |
| 1230 | 7.100 | 7.110 | 7.121 | 7.131 | 7.142 | 7.152 | 7.163 | 7.173 | 7.184 | 7.194 | 7.205 |
| 1240 | 7.205 | 7.216 | 7.226 | 7.237 | 7.247 | 7.258 | 7.269 | 7.279 | 7.290 | 7.300 | 7.311 |
| 1250 | 7.311 | 7.322 | 7.332 | 7.343 | 7.353 | 7.364 | 7.375 | 7.385 | 7.396 | 7.407 | 7.417 |
| 1260 | 7.417 | 7.428 | 7.439 | 7.449 | 7.460 | 7.471 | 7.482 | 7.492 | 7.503 | 7.514 | 7.524 |
| 1270 | 7.524 | 7.535 | 7.546 | 7.557 | 7.567 | 7.578 | 7.589 | 7.600 | 7.610 | 7.621 | 7.632 |
| 1280 | 7.632 | 7.643 | 7.653 | 7.664 | 7.675 | 7.686 | 7.697 | 7.707 | 7.718 | 7.729 | 7.740 |
| 1290 | 7.740 | 7.751 | 7.761 | 7.772 | 7.783 | 7.794 | 7.805 | 7.816 | 7.827 | 7.837 | 7.848 |
| 1300 | 7.848 | 7.859 | 7.870 | 7.881 | 7.892 | 7.903 | 7.914 | 7.924 | 7.935 | 7.946 | 7.957 |
| 1310 | 7.957 | 7.968 | 7.979 | 7.990 | 8.001 | 8.012 | 8.023 | 8.034 | 8.045 | 8.056 | 8.066 |
| 1320 | 8.066 | 8.077 | 8.088 | 8.099 | 8.110 | 8.121 | 8.132 | 8.143 | 8.154 | 8.165 | 8.176 |
| 1330 | 8.176 | 8.187 | 8.198 | 8.209 | 8.220 | 8.231 | 8.242 | 8.253 | 8.264 | 8.275 | 8.286 |
| 1340 | 8.286 | 8.298 | 8.309 | 8.320 | 8.331 | 8.342 | 8.353 | 8.364 | 8.375 | 8.386 | 8.397 |
| 1350 | 8.397 | 8.408 | 8.419 | 8.430 | 8.441 | 8.453 | 8.464 | 8.475 | 8.486 | 8.497 | 8.508 |
| 1360 | 8.508 | 8.519 | 8.530 | 8.542 | 8.553 | 8.564 | 8.575 | 8.586 | 8.597 | 8.608 | 8.620 |
| 1370 | 8.620 | 8.631 | 8.642 | 8.653 | 8.664 | 8.675 | 8.687 | 8.698 | 8.709 | 8.720 | 8.731 |
| 1380 | 8.731 | 8.743 | 8.754 | 8.765 | 8.776 | 8.787 | 8.799 | 8.810 | 8.821 | 8.832 | 8.844 |
| 1390 | 8.844 | 8.855 | 8.866 | 8.877 | 8.889 | 8.900 | 8.911 | 8.922 | 8.934 | 8.945 | 8.956 |
| 1400 | 8.956 | 8.967 | 8.979 | 8.990 | 9.001 | 9.013 | 9.024 | 9.035 | 9.047 | 9.058 | 9.069 |
| 1410 | 9.069 | 9.080 | 9.092 | 9.103 | 9.114 | 9.126 | 9.137 | 9.148 | 9.160 | 9.171 | 9.182 |
| 1420 | 9.182 | 9.194 | 9.205 | 9.216 | 9.228 | 9.239 | 9.251 | 9.262 | 9.273 | 9.285 | 9.296 |
| 1430 | 9.296 | 9.307 | 9.319 | 9.330 | 9.342 | 9.353 | 9.364 | 9.376 | 9.387 | 9.398 | 9.410 |
| 1440 | 9.410 | 9.421 | 9.433 | 9.444 | 9.456 | 9.467 | 9.478 | 9.490 | 9.501 | 9.513 | 9.524 |
| 1450 | 9.524 | 9.536 | 9.547 | 9.558 | 9.570 | 9.581 | 9.593 | 9.604 | 9.616 | 9.627 | 9.639 |
| 1460 | 9.639 | 9.650 | 9.662 | 9.673 | 9.684 | 9.696 | 9.707 | 9.719 | 9.730 | 9.742 | 9.753 |
| 1470 | 9.753 | 9.765 | 9.776 | 9.788 | 9.799 | 9.811 | 9.822 | 9.834 | 9.845 | 9.857 | 9.868 |
| 1480 | 9.868 | 9.880 | 9.891 | 9.903 | 9.914 | 9.926 | 9.937 | 9.949 | 9.961 | 9.972 | 9.984 |
| 1490 | 9.984 | 9.995 | 10.007 | 10.018 | 10.030 | 10.041 | 10.053 | 10.064 | 10.076 | 10.088 | 10.099 |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|

ITS-90 Table for type B thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 1500 | 10.099 | 10.111 | 10.122 | 10.134 | 10.145 | 10.157 | 10.168 | 10.180 | 10.192 | 10.203 | 10.215 |
| 1510 | 10.215 | 10.226 | 10.238 | 10.249 | 10.261 | 10.273 | 10.284 | 10.296 | 10.307 | 10.319 | 10.331 |
| 1520 | 10.331 | 10.342 | 10.354 | 10.365 | 10.377 | 10.389 | 10.400 | 10.412 | 10.423 | 10.435 | 10.447 |
| 1530 | 10.447 | 10.458 | 10.470 | 10.482 | 10.493 | 10.505 | 10.516 | 10.528 | 10.540 | 10.551 | 10.563 |
| 1540 | 10.563 | 10.575 | 10.586 | 10.598 | 10.609 | 10.621 | 10.633 | 10.644 | 10.656 | 10.668 | 10.679 |
| 1550 | 10.679 | 10.691 | 10.703 | 10.714 | 10.726 | 10.738 | 10.749 | 10.761 | 10.773 | 10.784 | 10.796 |
| 1560 | 10.796 | 10.808 | 10.819 | 10.831 | 10.843 | 10.854 | 10.866 | 10.877 | 10.889 | 10.901 | 10.913 |
| 1570 | 10.913 | 10.924 | 10.936 | 10.948 | 10.959 | 10.971 | 10.983 | 10.994 | 11.006 | 11.018 | 11.029 |
| 1580 | 11.029 | 11.041 | 11.053 | 11.064 | 11.076 | 11.088 | 11.099 | 11.111 | 11.123 | 11.134 | 11.146 |
| 1590 | 11.146 | 11.158 | 11.169 | 11.181 | 11.193 | 11.205 | 11.216 | 11.228 | 11.240 | 11.251 | 11.263 |
| 1600 | 11.263 | 11.275 | 11.286 | 11.298 | 11.310 | 11.321 | 11.333 | 11.345 | 11.357 | 11.368 | 11.380 |
| 1610 | 11.380 | 11.392 | 11.403 | 11.415 | 11.427 | 11.438 | 11.450 | 11.462 | 11.474 | 11.485 | 11.497 |
| 1620 | 11.497 | 11.509 | 11.520 | 11.532 | 11.544 | 11.555 | 11.567 | 11.579 | 11.591 | 11.602 | 11.614 |
| 1630 | 11.614 | 11.626 | 11.637 | 11.649 | 11.661 | 11.673 | 11.684 | 11.696 | 11.708 | 11.719 | 11.731 |
| 1640 | 11.731 | 11.743 | 11.754 | 11.766 | 11.778 | 11.790 | 11.801 | 11.813 | 11.825 | 11.836 | 11.848 |
| 1650 | 11.848 | 11.860 | 11.871 | 11.883 | 11.895 | 11.907 | 11.918 | 11.930 | 11.942 | 11.953 | 11.965 |
| 1660 | 11.965 | 11.977 | 11.988 | 12.000 | 12.012 | 12.024 | 12.035 | 12.047 | 12.059 | 12.070 | 12.082 |
| 1670 | 12.082 | 12.094 | 12.105 | 12.117 | 12.129 | 12.141 | 12.152 | 12.164 | 12.176 | 12.187 | 12.199 |
| 1680 | 12.199 | 12.211 | 12.222 | 12.234 | 12.246 | 12.257 | 12.269 | 12.281 | 12.292 | 12.304 | 12.316 |
| 1690 | 12.316 | 12.327 | 12.339 | 12.351 | 12.363 | 12.374 | 12.386 | 12.398 | 12.409 | 12.421 | 12.433 |
| 1700 | 12.433 | 12.444 | 12.456 | 12.468 | 12.479 | 12.491 | 12.503 | 12.514 | 12.526 | 12.538 | 12.549 |
| 1710 | 12.549 | 12.561 | 12.572 | 12.584 | 12.596 | 12.607 | 12.619 | 12.631 | 12.642 | 12.654 | 12.666 |
| 1720 | 12.666 | 12.677 | 12.689 | 12.701 | 12.712 | 12.724 | 12.736 | 12.747 | 12.759 | 12.770 | 12.782 |
| 1730 | 12.782 | 12.794 | 12.805 | 12.817 | 12.829 | 12.840 | 12.852 | 12.863 | 12.875 | 12.887 | 12.898 |
| 1740 | 12.898 | 12.910 | 12.921 | 12.933 | 12.945 | 12.956 | 12.968 | 12.980 | 12.991 | 13.003 | 13.014 |
| 1750 | 13.014 | 13.026 | 13.037 | 13.049 | 13.061 | 13.072 | 13.084 | 13.095 | 13.107 | 13.119 | 13.130 |
| 1760 | 13.130 | 13.142 | 13.153 | 13.165 | 13.176 | 13.188 | 13.200 | 13.211 | 13.223 | 13.234 | 13.246 |
| 1770 | 13.246 | 13.257 | 13.269 | 13.280 | 13.292 | 13.304 | 13.315 | 13.327 | 13.338 | 13.350 | 13.361 |
| 1780 | 13.361 | 13.373 | 13.384 | 13.396 | 13.407 | 13.419 | 13.430 | 13.442 | 13.453 | 13.465 | 13.476 |
| 1790 | 13.476 | 13.488 | 13.499 | 13.511 | 13.522 | 13.534 | 13.545 | 13.557 | 13.568 | 13.580 | 13.591 |
| 1800 | 13.591 | 13.603 | 13.614 | 13.626 | 13.637 | 13.649 | 13.660 | 13.672 | 13.683 | 13.694 | 13.706 |
| 1810 | 13.706 | 13.717 | 13.729 | 13.740 | 13.752 | 13.763 | 13.775 | 13.786 | 13.797 | 13.809 | 13.820 |
| 1820 | 13.820 | | | | | | | | | | |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|

**********
* This section contains coefficients for type B thermocouples for
* the two subranges of temperature listed below. The coefficients
* are in units of °C and mV and are listed in the order of constant
* term up to the highest order. The equation is of the form
* E = sum(i=0 to n) c_i t^i.
*
* Temperature Range (°C)
* 0.000 to 630.615
* 630.615 to 1820.000
**********
name: reference function on ITS-90
type: B
temperature units: °C
emf units: mV
range: 0.000, 630.615, 6
0.000000000000E+00
-0.246508183460E-03
0.590404211710E-05
-0.132579316360E-08
0.156682919010E-11
-0.169445292400E-14
0.629903470940E-18
range: 630.615, 1820.000, 8
-0.389381686210E+01
0.285717474700E-01
-0.848851047850E-04
0.157852801640E-06
-0.168353448640E-09
0.111097940130E-12
-0.445154310330E-16
0.989756408210E-20
-0.937913302890E-24

**********
* This section contains coefficients of approximate inverse
* functions for type B thermocouples for the subranges of
* temperature and voltage listed below. The range of errors of
* the approximate inverse function for each subrange is also given.
* The coefficients are in units of °C and mV and are listed in
* the order of constant term up to the highest order.
* The equation is of the form t_90 = d_0 + d_1*E + d_2*E^2 + ...
*  + d_n*E^n,
* where E is in mV and t_90 is in °C.
*
*  Temperature  Voltage  Error
*  range  range  range
*  (°C)  (mV)  (° C)
*  250. to 700.  0.291 to 2.431  -0.02 to 0.03
*  700. to 1800.  2.431 to 13.820  -0.01 to 0.02
**********

Inverse coefficients for type B:

| | | |
|---|---|---|
| Temperature Range: | 250.<br>700. | 700.<br>1820. |
| Voltage Range: | 0.291<br>2.431 | 2.431<br>13.820 |
| | 9.8423321E+01 | 2.1315071E+02 |
| | 6.9971500E+02 | 2.8510504E+02 |
| | -8.4765304E+02 | -5.2742887E+01 |
| | 1.0052644E+03 | 9.9160804E+00 |
| | -8.3345952E+02 | -1.2965303E+00 |
| | 4.5508542E+02 | 1.1195870E-01 |
| | -1.5523037E+02 | -6.0625199E-03 |
| | 2.9886750E+01 | 1.8661696E-04 |
| | -2.4742860E+00 | -2.4878585E-06 |
| Error Range: | -0.02<br>0.03 | -0.01<br>0.02 |

ITS-90 Table for type E thermocouple

| °C | 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| -270 | -9.835 | | | | | | | | | | |
| -260 | -9.797 | -9.802 | -9.808 | -9.813 | -9.817 | -9.821 | -9.825 | -9.828 | -9.831 | -9.833 | -9.835 |
| -250 | -9.718 | -9.728 | -9.737 | -9.746 | -9.754 | -9.762 | -9.770 | -9.777 | -9.784 | -9.790 | -9.797 |
| -240 | -9.604 | -9.617 | -9.630 | -9.642 | -9.654 | -9.666 | -9.677 | -9.688 | -9.698 | -9.709 | -9.718 |
| -230 | -9.455 | -9.471 | -9.487 | -9.503 | -9.519 | -9.534 | -9.548 | -9.563 | -9.577 | -9.591 | -9.604 |
| -220 | -9.274 | -9.293 | -9.313 | -9.331 | -9.350 | -9.368 | -9.386 | -9.404 | -9.421 | -9.438 | -9.455 |
| -210 | -9.063 | -9.085 | -9.107 | -9.129 | -9.151 | -9.172 | -9.193 | -9.214 | -9.234 | -9.254 | -9.274 |
| -200 | -8.825 | -8.850 | -8.874 | -8.899 | -8.923 | -8.947 | -8.971 | -8.994 | -9.017 | -9.040 | -9.063 |
| -190 | -8.561 | -8.588 | -8.616 | -8.643 | -8.669 | -8.696 | -8.722 | -8.748 | -8.774 | -8.799 | -8.825 |
| -180 | -8.273 | -8.303 | -8.333 | -8.362 | -8.391 | -8.420 | -8.449 | -8.477 | -8.505 | -8.533 | -8.561 |
| -170 | -7.963 | -7.995 | -8.027 | -8.059 | -8.090 | -8.121 | -8.152 | -8.183 | -8.213 | -8.243 | -8.273 |
| -160 | -7.632 | -7.666 | -7.700 | -7.733 | -7.767 | -7.800 | -7.833 | -7.866 | -7.899 | -7.931 | -7.963 |
| -150 | -7.279 | -7.315 | -7.351 | -7.387 | -7.423 | -7.458 | -7.493 | -7.528 | -7.563 | -7.597 | -7.632 |
| -140 | -6.907 | -6.945 | -6.983 | -7.021 | -7.058 | -7.096 | -7.133 | -7.170 | -7.206 | -7.243 | -7.279 |
| -130 | -6.516 | -6.556 | -6.596 | -6.636 | -6.675 | -6.714 | -6.753 | -6.792 | -6.831 | -6.869 | -6.907 |
| -120 | -6.107 | -6.149 | -6.191 | -6.232 | -6.273 | -6.314 | -6.355 | -6.396 | -6.436 | -6.476 | -6.516 |
| -110 | -5.681 | -5.724 | -5.767 | -5.810 | -5.853 | -5.896 | -5.939 | -5.981 | -6.023 | -6.065 | -6.107 |
| -100 | -5.237 | -5.282 | -5.327 | -5.372 | -5.417 | -5.461 | -5.505 | -5.549 | -5.593 | -5.637 | -5.681 |
| -90 | -4.777 | -4.824 | -4.871 | -4.917 | -4.963 | -5.009 | -5.055 | -5.101 | -5.147 | -5.192 | -5.237 |
| -80 | -4.302 | -4.350 | -4.398 | -4.446 | -4.494 | -4.542 | -4.589 | -4.636 | -4.684 | -4.731 | -4.777 |
| -70 | -3.811 | -3.861 | -3.911 | -3.960 | -4.009 | -4.058 | -4.107 | -4.156 | -4.205 | -4.254 | -4.302 |
| -60 | -3.306 | -3.357 | -3.408 | -3.459 | -3.510 | -3.561 | -3.611 | -3.661 | -3.711 | -3.761 | -3.811 |
| -50 | -2.787 | -2.840 | -2.892 | -2.944 | -2.996 | -3.048 | -3.100 | -3.152 | -3.204 | -3.255 | -3.306 |
| -40 | -2.255 | -2.309 | -2.362 | -2.416 | -2.469 | -2.523 | -2.576 | -2.629 | -2.682 | -2.735 | -2.787 |
| -30 | -1.709 | -1.765 | -1.820 | -1.874 | -1.929 | -1.984 | -2.038 | -2.093 | -2.147 | -2.201 | -2.255 |
| -20 | -1.152 | -1.208 | -1.264 | -1.320 | -1.376 | -1.432 | -1.488 | -1.543 | -1.599 | -1.654 | -1.709 |
| -10 | -0.582 | -0.639 | -0.697 | -0.754 | -0.811 | -0.868 | -0.925 | -0.982 | -1.039 | -1.095 | -1.152 |
| 0 | 0.000 | -0.059 | -0.117 | -0.176 | -0.234 | -0.292 | -0.350 | -0.408 | -0.466 | -0.524 | -0.582 |

| °C | 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 |
|---|---|---|---|---|---|---|---|---|---|---|---|

ITS-90 Table for type E thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 0 | 0.000 | 0.059 | 0.118 | 0.176 | 0.235 | 0.294 | 0.354 | 0.413 | 0.472 | 0.532 | 0.591 |
| 10 | 0.591 | 0.651 | 0.711 | 0.770 | 0.830 | 0.890 | 0.950 | 1.010 | 1.071 | 1.131 | 1.192 |
| 20 | 1.192 | 1.252 | 1.313 | 1.373 | 1.434 | 1.495 | 1.556 | 1.617 | 1.678 | 1.740 | 1.801 |
| 30 | 1.801 | 1.862 | 1.924 | 1.986 | 2.047 | 2.109 | 2.171 | 2.233 | 2.295 | 2.357 | 2.420 |
| 40 | 2.420 | 2.482 | 2.545 | 2.607 | 2.670 | 2.733 | 2.795 | 2.858 | 2.921 | 2.984 | 3.048 |
| 50 | 3.048 | 3.111 | 3.174 | 3.238 | 3.301 | 3.365 | 3.429 | 3.492 | 3.556 | 3.620 | 3.685 |
| 60 | 3.685 | 3.749 | 3.813 | 3.877 | 3.942 | 4.006 | 4.071 | 4.136 | 4.200 | 4.265 | 4.330 |
| 70 | 4.330 | 4.395 | 4.460 | 4.526 | 4.591 | 4.656 | 4.722 | 4.788 | 4.853 | 4.919 | 4.985 |
| 80 | 4.985 | 5.051 | 5.117 | 5.183 | 5.249 | 5.315 | 5.382 | 5.448 | 5.514 | 5.581 | 5.648 |
| 90 | 5.648 | 5.714 | 5.781 | 5.848 | 5.915 | 5.982 | 6.049 | 6.117 | 6.184 | 6.251 | 6.319 |
| 100 | 6.319 | 6.386 | 6.454 | 6.522 | 6.590 | 6.658 | 6.725 | 6.794 | 6.862 | 6.930 | 6.998 |
| 110 | 6.998 | 7.066 | 7.135 | 7.203 | 7.272 | 7.341 | 7.409 | 7.478 | 7.547 | 7.616 | 7.685 |
| 120 | 7.685 | 7.754 | 7.823 | 7.892 | 7.962 | 8.031 | 8.101 | 8.170 | 8.240 | 8.309 | 8.379 |
| 130 | 8.379 | 8.449 | 8.519 | 8.589 | 8.659 | 8.729 | 8.799 | 8.869 | 8.940 | 9.010 | 9.081 |
| 140 | 9.081 | 9.151 | 9.222 | 9.292 | 9.363 | 9.434 | 9.505 | 9.576 | 9.647 | 9.718 | 9.789 |
| 150 | 9.789 | 9.860 | 9.931 | 10.003 | 10.074 | 10.145 | 10.217 | 10.288 | 10.360 | 10.432 | 10.503 |
| 160 | 10.503 | 10.575 | 10.647 | 10.719 | 10.791 | 10.863 | 10.935 | 11.007 | 11.080 | 11.152 | 11.224 |
| 170 | 11.224 | 11.297 | 11.369 | 11.442 | 11.514 | 11.587 | 11.660 | 11.733 | 11.805 | 11.878 | 11.951 |
| 180 | 11.951 | 12.024 | 12.097 | 12.170 | 12.243 | 12.317 | 12.390 | 12.463 | 12.537 | 12.610 | 12.684 |
| 190 | 12.684 | 12.757 | 12.831 | 12.904 | 12.978 | 13.052 | 13.126 | 13.199 | 13.273 | 13.347 | 13.421 |
| 200 | 13.421 | 13.495 | 13.569 | 13.644 | 13.718 | 13.792 | 13.866 | 13.941 | 14.015 | 14.090 | 14.164 |
| 210 | 14.164 | 14.239 | 14.313 | 14.388 | 14.463 | 14.537 | 14.612 | 14.687 | 14.762 | 14.837 | 14.912 |
| 220 | 14.912 | 14.987 | 15.062 | 15.137 | 15.212 | 15.287 | 15.362 | 15.438 | 15.513 | 15.588 | 15.664 |
| 230 | 15.664 | 15.739 | 15.815 | 15.890 | 15.966 | 16.041 | 16.117 | 16.193 | 16.269 | 16.344 | 16.420 |
| 240 | 16.420 | 16.496 | 16.572 | 16.648 | 16.724 | 16.800 | 16.876 | 16.952 | 17.028 | 17.104 | 17.181 |
| 250 | 17.181 | 17.257 | 17.333 | 17.409 | 17.486 | 17.562 | 17.639 | 17.715 | 17.792 | 17.868 | 17.945 |
| 260 | 17.945 | 18.021 | 18.098 | 18.175 | 18.252 | 18.328 | 18.405 | 18.482 | 18.559 | 18.636 | 18.713 |
| 270 | 18.713 | 18.790 | 18.867 | 18.944 | 19.021 | 19.098 | 19.175 | 19.252 | 19.330 | 19.407 | 19.484 |
| 280 | 19.484 | 19.561 | 19.639 | 19.716 | 19.794 | 19.871 | 19.948 | 20.026 | 20.103 | 20.181 | 20.259 |
| 290 | 20.259 | 20.336 | 20.414 | 20.492 | 20.569 | 20.647 | 20.725 | 20.803 | 20.880 | 20.958 | 21.036 |
| 300 | 21.036 | 21.114 | 21.192 | 21.270 | 21.348 | 21.426 | 21.504 | 21.582 | 21.660 | 21.739 | 21.817 |
| 310 | 21.817 | 21.895 | 21.973 | 22.051 | 22.130 | 22.208 | 22.286 | 22.365 | 22.443 | 22.522 | 22.600 |
| 320 | 22.600 | 22.678 | 22.757 | 22.835 | 22.914 | 22.993 | 23.071 | 23.150 | 23.228 | 23.307 | 23.386 |
| 330 | 23.386 | 23.464 | 23.543 | 23.622 | 23.701 | 23.780 | 23.858 | 23.937 | 24.016 | 24.095 | 24.174 |
| 340 | 24.174 | 24.253 | 24.332 | 24.411 | 24.490 | 24.569 | 24.648 | 24.727 | 24.806 | 24.885 | 24.964 |
| 350 | 24.964 | 25.044 | 25.123 | 25.202 | 25.281 | 25.360 | 25.440 | 25.519 | 25.598 | 25.678 | 25.757 |
| 360 | 25.757 | 25.836 | 25.916 | 25.995 | 26.075 | 26.154 | 26.233 | 26.313 | 26.392 | 26.472 | 26.552 |
| 370 | 26.552 | 26.631 | 26.711 | 26.790 | 26.870 | 26.950 | 27.029 | 27.109 | 27.189 | 27.268 | 27.348 |
| 380 | 27.348 | 27.428 | 27.507 | 27.587 | 27.667 | 27.747 | 27.827 | 27.907 | 27.986 | 28.066 | 28.146 |
| 390 | 28.146 | 28.226 | 28.306 | 28.386 | 28.466 | 28.546 | 28.626 | 28.706 | 28.786 | 28.866 | 28.946 |
| 400 | 28.946 | 29.026 | 29.106 | 29.186 | 29.266 | 29.346 | 29.427 | 29.507 | 29.587 | 29.667 | 29.747 |
| 410 | 29.747 | 29.827 | 29.908 | 29.988 | 30.068 | 30.148 | 30.229 | 30.309 | 30.389 | 30.470 | 30.550 |
| 420 | 30.550 | 30.630 | 30.711 | 30.791 | 30.871 | 30.952 | 31.032 | 31.112 | 31.193 | 31.273 | 31.354 |
| 430 | 31.354 | 31.434 | 31.515 | 31.595 | 31.676 | 31.756 | 31.837 | 31.917 | 31.998 | 32.078 | 32.159 |
| 440 | 32.159 | 32.239 | 32.320 | 32.400 | 32.481 | 32.562 | 32.642 | 32.723 | 32.803 | 32.884 | 32.965 |
| 450 | 32.965 | 33.045 | 33.126 | 33.207 | 33.287 | 33.368 | 33.449 | 33.529 | 33.610 | 33.691 | 33.772 |
| 460 | 33.772 | 33.852 | 33.933 | 34.014 | 34.095 | 34.175 | 34.256 | 34.337 | 34.418 | 34.498 | 34.579 |
| 470 | 34.579 | 34.660 | 34.741 | 34.822 | 34.902 | 34.983 | 35.064 | 35.145 | 35.226 | 35.307 | 35.387 |
| 480 | 35.387 | 35.468 | 35.549 | 35.630 | 35.711 | 35.792 | 35.873 | 35.954 | 36.034 | 36.115 | 36.196 |
| 490 | 36.196 | 36.277 | 36.358 | 36.439 | 36.520 | 36.601 | 36.682 | 36.763 | 36.843 | 36.924 | 37.005 |
| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

ITS-90 Table for type E thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 500 | 37.005 | 37.086 | 37.167 | 37.248 | 37.329 | 37.410 | 37.491 | 37.572 | 37.653 | 37.734 | 37.815 |
| 510 | 37.815 | 37.896 | 37.977 | 38.058 | 38.139 | 38.220 | 38.300 | 38.381 | 38.462 | 38.543 | 38.624 |
| 520 | 38.624 | 38.705 | 38.786 | 38.867 | 38.948 | 39.029 | 39.110 | 39.191 | 39.272 | 39.353 | 39.434 |
| 530 | 39.434 | 39.515 | 39.596 | 39.677 | 39.758 | 39.839 | 39.920 | 40.001 | 40.082 | 40.163 | 40.243 |
| 540 | 40.243 | 40.324 | 40.405 | 40.486 | 40.567 | 40.648 | 40.729 | 40.810 | 40.891 | 40.972 | 41.053 |
| 550 | 41.053 | 41.134 | 41.215 | 41.296 | 41.377 | 41.457 | 41.538 | 41.619 | 41.700 | 41.781 | 41.862 |
| 560 | 41.862 | 41.943 | 42.024 | 42.105 | 42.185 | 42.266 | 42.347 | 42.428 | 42.509 | 42.590 | 42.671 |
| 570 | 42.671 | 42.751 | 42.832 | 42.913 | 42.994 | 43.075 | 43.156 | 43.236 | 43.317 | 43.398 | 43.479 |
| 580 | 43.479 | 43.560 | 43.640 | 43.721 | 43.802 | 43.883 | 43.963 | 44.044 | 44.125 | 44.206 | 44.286 |
| 590 | 44.286 | 44.367 | 44.448 | 44.529 | 44.609 | 44.690 | 44.771 | 44.851 | 44.932 | 45.013 | 45.093 |
| 600 | 45.093 | 45.174 | 45.255 | 45.335 | 45.416 | 45.497 | 45.577 | 45.658 | 45.738 | 45.819 | 45.900 |
| 610 | 45.900 | 45.980 | 46.061 | 46.141 | 46.222 | 46.302 | 46.383 | 46.463 | 46.544 | 46.624 | 46.705 |
| 620 | 46.705 | 46.785 | 46.866 | 46.946 | 47.027 | 47.107 | 47.188 | 47.268 | 47.349 | 47.429 | 47.509 |
| 630 | 47.509 | 47.590 | 47.670 | 47.751 | 47.831 | 47.911 | 47.992 | 48.072 | 48.152 | 48.233 | 48.313 |
| 640 | 48.313 | 48.393 | 48.474 | 48.554 | 48.634 | 48.715 | 48.795 | 48.875 | 48.955 | 49.035 | 49.116 |
| 650 | 49.116 | 49.196 | 49.276 | 49.356 | 49.436 | 49.517 | 49.597 | 49.677 | 49.757 | 49.837 | 49.917 |
| 660 | 49.917 | 49.997 | 50.077 | 50.157 | 50.238 | 50.318 | 50.398 | 50.478 | 50.558 | 50.638 | 50.718 |
| 670 | 50.718 | 50.798 | 50.878 | 50.958 | 51.038 | 51.118 | 51.197 | 51.277 | 51.357 | 51.437 | 51.517 |
| 680 | 51.517 | 51.597 | 51.677 | 51.757 | 51.837 | 51.916 | 51.996 | 52.076 | 52.156 | 52.236 | 52.315 |
| 690 | 52.315 | 52.395 | 52.475 | 52.555 | 52.634 | 52.714 | 52.794 | 52.873 | 52.953 | 53.033 | 53.112 |
| 700 | 53.112 | 53.192 | 53.272 | 53.351 | 53.431 | 53.510 | 53.590 | 53.670 | 53.749 | 53.829 | 53.908 |
| 710 | 53.908 | 53.988 | 54.067 | 54.147 | 54.226 | 54.306 | 54.385 | 54.465 | 54.544 | 54.624 | 54.703 |
| 720 | 54.703 | 54.782 | 54.862 | 54.941 | 55.021 | 55.100 | 55.179 | 55.259 | 55.338 | 55.417 | 55.497 |
| 730 | 55.497 | 55.576 | 55.655 | 55.734 | 55.814 | 55.893 | 55.972 | 56.051 | 56.131 | 56.210 | 56.289 |
| 740 | 56.289 | 56.368 | 56.447 | 56.526 | 56.606 | 56.685 | 56.764 | 56.843 | 56.922 | 57.001 | 57.080 |
| 750 | 57.080 | 57.159 | 57.238 | 57.317 | 57.396 | 57.475 | 57.554 | 57.633 | 57.712 | 57.791 | 57.870 |
| 760 | 57.870 | 57.949 | 58.028 | 58.107 | 58.186 | 58.265 | 58.343 | 58.422 | 58.501 | 58.580 | 58.659 |
| 770 | 58.659 | 58.738 | 58.816 | 58.895 | 58.974 | 59.053 | 59.131 | 59.210 | 59.289 | 59.367 | 59.446 |
| 780 | 59.446 | 59.525 | 59.604 | 59.682 | 59.761 | 59.839 | 59.918 | 59.997 | 60.075 | 60.154 | 60.232 |
| 790 | 60.232 | 60.311 | 60.390 | 60.468 | 60.547 | 60.625 | 60.704 | 60.782 | 60.860 | 60.939 | 61.017 |
| 800 | 61.017 | 61.096 | 61.174 | 61.253 | 61.331 | 61.409 | 61.488 | 61.566 | 61.644 | 61.723 | 61.801 |
| 810 | 61.801 | 61.879 | 61.958 | 62.036 | 62.114 | 62.192 | 62.271 | 62.349 | 62.427 | 62.505 | 62.583 |
| 820 | 62.583 | 62.662 | 62.740 | 62.818 | 62.896 | 62.974 | 63.052 | 63.130 | 63.208 | 63.286 | 63.364 |
| 830 | 63.364 | 63.442 | 63.520 | 63.598 | 63.676 | 63.754 | 63.832 | 63.910 | 63.988 | 64.066 | 64.144 |
| 840 | 64.144 | 64.222 | 64.300 | 64.377 | 64.455 | 64.533 | 64.611 | 64.689 | 64.766 | 64.844 | 64.922 |
| 850 | 64.922 | 65.000 | 65.077 | 65.155 | 65.233 | 65.310 | 65.388 | 65.465 | 65.543 | 65.621 | 65.698 |
| 860 | 65.698 | 65.776 | 65.853 | 65.931 | 66.008 | 66.086 | 66.163 | 66.241 | 66.318 | 66.396 | 66.473 |
| 870 | 66.473 | 66.550 | 66.628 | 66.705 | 66.782 | 66.860 | 66.937 | 67.014 | 67.092 | 67.169 | 67.246 |
| 880 | 67.246 | 67.323 | 67.400 | 67.478 | 67.555 | 67.632 | 67.709 | 67.786 | 67.863 | 67.940 | 68.017 |
| 890 | 68.017 | 68.094 | 68.171 | 68.248 | 68.325 | 68.402 | 68.479 | 68.556 | 68.633 | 68.710 | 68.787 |
| 900 | 68.787 | 68.863 | 68.940 | 69.017 | 69.094 | 69.171 | 69.247 | 69.324 | 69.401 | 69.477 | 69.554 |
| 910 | 69.554 | 69.631 | 69.707 | 69.784 | 69.860 | 69.937 | 70.013 | 70.090 | 70.166 | 70.243 | 70.319 |
| 920 | 70.319 | 70.396 | 70.472 | 70.548 | 70.625 | 70.701 | 70.777 | 70.854 | 70.930 | 71.006 | 71.082 |
| 930 | 71.082 | 71.159 | 71.235 | 71.311 | 71.387 | 71.463 | 71.539 | 71.615 | 71.692 | 71.768 | 71.844 |
| 940 | 71.844 | 71.920 | 71.996 | 72.072 | 72.147 | 72.223 | 72.299 | 72.375 | 72.451 | 72.527 | 72.603 |
| 950 | 72.603 | 72.678 | 72.754 | 72.830 | 72.906 | 72.981 | 73.057 | 73.133 | 73.208 | 73.284 | 73.360 |
| 960 | 73.360 | 73.435 | 73.511 | 73.586 | 73.662 | 73.738 | 73.813 | 73.889 | 73.964 | 74.040 | 74.115 |
| 970 | 74.115 | 74.190 | 74.266 | 74.341 | 74.417 | 74.492 | 74.567 | 74.643 | 74.718 | 74.793 | 74.869 |
| 980 | 74.869 | 74.944 | 75.019 | 75.095 | 75.170 | 75.245 | 75.320 | 75.395 | 75.471 | 75.546 | 75.621 |
| 990 | 75.621 | 75.696 | 75.771 | 75.847 | 75.922 | 75.997 | 76.072 | 76.147 | 76.223 | 76.298 | 76.373 |
| 1000 | 76.373 | | | | | | | | | | |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

```
**********************************
* This section contains coefficients for type E thermocouples for
* the two subranges of temperature listed below.  The coefficients
* are in units of °C and mV and are listed in the order of constant
* term up to the highest order.  The equation is of the form
* E = sum(i=0 to n) c_i t^i.
*
*     Temperature Range (°C)
*        -270.000 to 0.000
*         0.000 to 1000.000
**********************************
name: reference function on ITS-90
type: E
temperature units: °C
emf units: mV
range:  -270.000,      0.000, 13
 0.000000000000E+00
 0.586655087080E-01
 0.454109771240E-04
-0.779980486860E-06
-0.258001608430E-07
-0.594525830570E-09
-0.932140586670E-11
-0.102876055340E-12
-0.803701236210E-15
-0.439794973910E-17
-0.164147763550E-19
-0.396736195160E-22
-0.558273287210E-25
-0.346578420130E-28
range:     0.000,   1000.000, 10
 0.000000000000E+00
 0.586655087100E-01
 0.450322755820E-04
 0.289084072120E-07
-0.330568966520E-09
 0.650244032700E-12
-0.191974955040E-15
-0.125366004970E-17
 0.214892175690E-20
-0.143880417820E-23
 0.359608994810E-27
```

```
**********************************
* This section contains coefficients of approximate inverse
* functions for type E thermocouples for the subranges of
* temperature and voltage listed below. The range of errors of
* the approximate inverse function for each subrange is also given.
* The coefficients are in units of °C and mV and are listed in
* the order of constant term up to the highest order.
* The equation is of the form t_90 = d_0 + d_1*E + d_2*E^2 + ...
*     + d_n*E^n,
* where E is in mV and t_90 is in °C.
*
*    Temperature        Voltage            Error
*      Range              range            range
*      (°C)               (mV)             (° C)
*    -200. to 0.       -8.825 to 0.000    -0.01 to 0.03
*     0. to 1000.       0.000 to 76.373   -0.02 to 0.02
**********************************************************
```

Inverse coefficients for type E:

| | | |
|---|---|---|
| Temperature Range: | -200.<br>0. | 0.<br>1000. |
| Voltage Range: | -8.825<br>0.000 | 0.000<br>76.373 |
| | 0.0000000E+00 | 0.0000000E+00 |
| | 1.6977288E+01 | 1.7057035E+01 |
| | -4.3514970E-01 | -2.3301759E-01 |
| | -1.5859697E-01 | 6.5435585E-03 |
| | -9.2502871E-02 | -7.3562749E-05 |
| | -2.6084314E-02 | -1.7896001E-06 |
| | -4.1360199E-03 | 8.4036165E-08 |
| | -3.4034030E-04 | -1.3735879E-09 |
| | -1.1564890E-05 | 1.0629823E-11 |
| | 0.0000000E+00 | -3.2447087E-14 |
| Error Range: | -0.01<br>0.03 | -0.02<br>0.02 |

ITS-90 Table for type J thermocouple

| °C | 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| -210 | -8.095 | | | | | | | | | | |
| -200 | -7.890 | -7.912 | -7.934 | -7.955 | -7.976 | -7.996 | -8.017 | -8.037 | -8.057 | -8.076 | -8.095 |
| -190 | -7.659 | -7.683 | -7.707 | -7.731 | -7.755 | -7.778 | -7.801 | -7.824 | -7.846 | -7.868 | -7.890 |
| -180 | -7.403 | -7.429 | -7.456 | -7.482 | -7.508 | -7.534 | -7.559 | -7.585 | -7.610 | -7.634 | -7.659 |
| -170 | -7.123 | -7.152 | -7.181 | -7.209 | -7.237 | -7.265 | -7.293 | -7.321 | -7.348 | -7.376 | -7.403 |
| -160 | -6.821 | -6.853 | -6.883 | -6.914 | -6.944 | -6.975 | -7.005 | -7.035 | -7.064 | -7.094 | -7.123 |
| -150 | -6.500 | -6.533 | -6.566 | -6.598 | -6.631 | -6.663 | -6.695 | -6.727 | -6.759 | -6.790 | -6.821 |
| -140 | -6.159 | -6.194 | -6.229 | -6.263 | -6.298 | -6.332 | -6.366 | -6.400 | -6.433 | -6.467 | -6.500 |
| -130 | -5.801 | -5.838 | -5.874 | -5.910 | -5.946 | -5.982 | -6.018 | -6.054 | -6.089 | -6.124 | -6.159 |
| -120 | -5.426 | -5.465 | -5.503 | -5.541 | -5.578 | -5.616 | -5.653 | -5.690 | -5.727 | -5.764 | -5.801 |
| -110 | -5.037 | -5.076 | -5.116 | -5.155 | -5.194 | -5.233 | -5.272 | -5.311 | -5.350 | -5.388 | -5.426 |
| -100 | -4.633 | -4.674 | -4.714 | -4.755 | -4.796 | -4.836 | -4.877 | -4.917 | -4.957 | -4.997 | -5.037 |
| -90 | -4.215 | -4.257 | -4.300 | -4.342 | -4.384 | -4.425 | -4.467 | -4.509 | -4.550 | -4.591 | -4.633 |
| -80 | -3.786 | -3.829 | -3.872 | -3.916 | -3.959 | -4.002 | -4.045 | -4.088 | -4.130 | -4.173 | -4.215 |
| -70 | -3.344 | -3.389 | -3.434 | -3.478 | -3.522 | -3.566 | -3.610 | -3.654 | -3.698 | -3.742 | -3.786 |
| -60 | -2.893 | -2.938 | -2.984 | -3.029 | -3.075 | -3.120 | -3.165 | -3.210 | -3.255 | -3.300 | -3.344 |
| -50 | -2.431 | -2.478 | -2.524 | -2.571 | -2.617 | -2.663 | -2.709 | -2.755 | -2.801 | -2.847 | -2.893 |
| -40 | -1.961 | -2.008 | -2.055 | -2.103 | -2.150 | -2.197 | -2.244 | -2.291 | -2.338 | -2.385 | -2.431 |
| -30 | -1.482 | -1.530 | -1.578 | -1.626 | -1.674 | -1.722 | -1.770 | -1.818 | -1.865 | -1.913 | -1.961 |
| -20 | -0.995 | -1.044 | -1.093 | -1.142 | -1.190 | -1.239 | -1.288 | -1.336 | -1.385 | -1.433 | -1.482 |
| -10 | -0.501 | -0.550 | -0.600 | -0.650 | -0.699 | -0.749 | -0.798 | -0.847 | -0.896 | -0.946 | -0.995 |
| 0 | 0.000 | -0.050 | -0.101 | -0.151 | -0.201 | -0.251 | -0.301 | -0.351 | -0.401 | -0.451 | -0.501 |

| °C | 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 |
|---|---|---|---|---|---|---|---|---|---|---|---|

ITS-90 Table for type J thermocouple

Thermoelectric Voltage in mV

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.000 | 0.050 | 0.101 | 0.151 | 0.202 | 0.253 | 0.303 | 0.354 | 0.405 | 0.456 | 0.507 |
| 10 | 0.507 | 0.558 | 0.609 | 0.660 | 0.711 | 0.762 | 0.814 | 0.865 | 0.916 | 0.968 | 1.019 |
| 20 | 1.019 | 1.071 | 1.122 | 1.174 | 1.226 | 1.277 | 1.329 | 1.381 | 1.433 | 1.485 | 1.537 |
| 30 | 1.537 | 1.589 | 1.641 | 1.693 | 1.745 | 1.797 | 1.849 | 1.902 | 1.954 | 2.006 | 2.059 |
| 40 | 2.059 | 2.111 | 2.164 | 2.216 | 2.269 | 2.322 | 2.374 | 2.427 | 2.480 | 2.532 | 2.585 |
| 50 | 2.585 | 2.638 | 2.691 | 2.744 | 2.797 | 2.850 | 2.903 | 2.956 | 3.009 | 3.062 | 3.116 |
| 60 | 3.116 | 3.169 | 3.222 | 3.275 | 3.329 | 3.382 | 3.436 | 3.489 | 3.543 | 3.596 | 3.650 |
| 70 | 3.650 | 3.703 | 3.757 | 3.810 | 3.864 | 3.918 | 3.971 | 4.025 | 4.079 | 4.133 | 4.187 |
| 80 | 4.187 | 4.240 | 4.294 | 4.348 | 4.402 | 4.456 | 4.510 | 4.564 | 4.618 | 4.672 | 4.726 |
| 90 | 4.726 | 4.781 | 4.835 | 4.889 | 4.943 | 4.997 | 5.052 | 5.106 | 5.160 | 5.215 | 5.269 |
| 100 | 5.269 | 5.323 | 5.378 | 5.432 | 5.487 | 5.541 | 5.595 | 5.650 | 5.705 | 5.759 | 5.814 |
| 110 | 5.814 | 5.868 | 5.923 | 5.977 | 6.032 | 6.087 | 6.141 | 6.196 | 6.251 | 6.306 | 6.360 |
| 120 | 6.360 | 6.415 | 6.470 | 6.525 | 6.579 | 6.634 | 6.689 | 6.744 | 6.799 | 6.854 | 6.909 |
| 130 | 6.909 | 6.964 | 7.019 | 7.074 | 7.129 | 7.184 | 7.239 | 7.294 | 7.349 | 7.404 | 7.459 |
| 140 | 7.459 | 7.514 | 7.569 | 7.624 | 7.679 | 7.734 | 7.789 | 7.844 | 7.900 | 7.955 | 8.010 |
| 150 | 8.010 | 8.065 | 8.120 | 8.175 | 8.231 | 8.286 | 8.341 | 8.396 | 8.452 | 8.507 | 8.562 |
| 160 | 8.562 | 8.618 | 8.673 | 8.728 | 8.783 | 8.839 | 8.894 | 8.949 | 9.005 | 9.060 | 9.115 |
| 170 | 9.115 | 9.171 | 9.226 | 9.282 | 9.337 | 9.392 | 9.448 | 9.503 | 9.559 | 9.614 | 9.669 |
| 180 | 9.669 | 9.725 | 9.780 | 9.836 | 9.891 | 9.947 | 10.002 | 10.057 | 10.113 | 10.168 | 10.224 |
| 190 | 10.224 | 10.279 | 10.335 | 10.390 | 10.446 | 10.501 | 10.557 | 10.612 | 10.668 | 10.723 | 10.779 |
| 200 | 10.779 | 10.834 | 10.890 | 10.945 | 11.001 | 11.056 | 11.112 | 11.167 | 11.223 | 11.278 | 11.334 |
| 210 | 11.334 | 11.389 | 11.445 | 11.501 | 11.556 | 11.612 | 11.667 | 11.723 | 11.778 | 11.834 | 11.889 |
| 220 | 11.889 | 11.945 | 12.000 | 12.056 | 12.111 | 12.167 | 12.222 | 12.278 | 12.334 | 12.389 | 12.445 |
| 230 | 12.445 | 12.500 | 12.556 | 12.611 | 12.667 | 12.722 | 12.778 | 12.833 | 12.889 | 12.944 | 13.000 |
| 240 | 13.000 | 13.056 | 13.111 | 13.167 | 13.222 | 13.278 | 13.333 | 13.389 | 13.444 | 13.500 | 13.555 |
| 250 | 13.555 | 13.611 | 13.666 | 13.722 | 13.777 | 13.833 | 13.888 | 13.944 | 13.999 | 14.055 | 14.110 |
| 260 | 14.110 | 14.166 | 14.221 | 14.277 | 14.332 | 14.388 | 14.443 | 14.499 | 14.554 | 14.609 | 14.665 |
| 270 | 14.665 | 14.720 | 14.776 | 14.831 | 14.887 | 14.942 | 14.998 | 15.053 | 15.109 | 15.164 | 15.219 |
| 280 | 15.219 | 15.275 | 15.330 | 15.386 | 15.441 | 15.496 | 15.552 | 15.607 | 15.663 | 15.718 | 15.773 |
| 290 | 15.773 | 15.829 | 15.884 | 15.940 | 15.995 | 16.050 | 16.106 | 16.161 | 16.216 | 16.272 | 16.327 |
| 300 | 16.327 | 16.383 | 16.438 | 16.493 | 16.549 | 16.604 | 16.659 | 16.715 | 16.770 | 16.825 | 16.881 |
| 310 | 16.881 | 16.936 | 16.991 | 17.046 | 17.102 | 17.157 | 17.212 | 17.268 | 17.323 | 17.378 | 17.434 |
| 320 | 17.434 | 17.489 | 17.544 | 17.599 | 17.655 | 17.710 | 17.765 | 17.820 | 17.876 | 17.931 | 17.986 |
| 330 | 17.986 | 18.041 | 18.097 | 18.152 | 18.207 | 18.262 | 18.318 | 18.373 | 18.428 | 18.483 | 18.538 |
| 340 | 18.538 | 18.594 | 18.649 | 18.704 | 18.759 | 18.814 | 18.870 | 18.925 | 18.980 | 19.035 | 19.090 |
| 350 | 19.090 | 19.146 | 19.201 | 19.256 | 19.311 | 19.366 | 19.422 | 19.477 | 19.532 | 19.587 | 19.642 |
| 360 | 19.642 | 19.697 | 19.753 | 19.808 | 19.863 | 19.918 | 19.973 | 20.028 | 20.083 | 20.139 | 20.194 |
| 370 | 20.194 | 20.249 | 20.304 | 20.359 | 20.414 | 20.469 | 20.525 | 20.580 | 20.635 | 20.690 | 20.745 |
| 380 | 20.745 | 20.800 | 20.855 | 20.911 | 20.966 | 21.021 | 21.076 | 21.131 | 21.186 | 21.241 | 21.297 |
| 390 | 21.297 | 21.352 | 21.407 | 21.462 | 21.517 | 21.572 | 21.627 | 21.683 | 21.738 | 21.793 | 21.848 |
| 400 | 21.848 | 21.903 | 21.958 | 22.014 | 22.069 | 22.124 | 22.179 | 22.234 | 22.289 | 22.345 | 22.400 |
| 410 | 22.400 | 22.455 | 22.510 | 22.565 | 22.620 | 22.676 | 22.731 | 22.786 | 22.841 | 22.896 | 22.952 |
| 420 | 22.952 | 23.007 | 23.062 | 23.117 | 23.172 | 23.228 | 23.283 | 23.338 | 23.393 | 23.449 | 23.504 |
| 430 | 23.504 | 23.559 | 23.614 | 23.670 | 23.725 | 23.780 | 23.835 | 23.891 | 23.946 | 24.001 | 24.057 |
| 440 | 24.057 | 24.112 | 24.167 | 24.223 | 24.278 | 24.333 | 24.389 | 24.444 | 24.499 | 24.555 | 24.610 |
| 450 | 24.610 | 24.665 | 24.721 | 24.776 | 24.832 | 24.887 | 24.943 | 24.998 | 25.053 | 25.109 | 25.164 |
| 460 | 25.164 | 25.220 | 25.275 | 25.331 | 25.386 | 25.442 | 25.497 | 25.553 | 25.608 | 25.664 | 25.720 |
| 470 | 25.720 | 25.775 | 25.831 | 25.886 | 25.942 | 25.998 | 26.053 | 26.109 | 26.165 | 26.220 | 26.276 |
| 480 | 26.276 | 26.332 | 26.387 | 26.443 | 26.499 | 26.555 | 26.610 | 26.666 | 26.722 | 26.778 | 26.834 |
| 490 | 26.834 | 26.889 | 26.945 | 27.001 | 27.057 | 27.113 | 27.169 | 27.225 | 27.281 | 27.337 | 27.393 |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

ITS-90 Table for type J thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 500 | 27.393 | 27.449 | 27.505 | 27.561 | 27.617 | 27.673 | 27.729 | 27.785 | 27.841 | 27.897 | 27.953 |
| 510 | 27.953 | 28.010 | 28.066 | 28.122 | 28.178 | 28.234 | 28.291 | 28.347 | 28.403 | 28.460 | 28.516 |
| 520 | 28.516 | 28.572 | 28.629 | 28.685 | 28.741 | 28.798 | 28.854 | 28.911 | 28.967 | 29.024 | 29.080 |
| 530 | 29.080 | 29.137 | 29.194 | 29.250 | 29.307 | 29.363 | 29.420 | 29.477 | 29.534 | 29.590 | 29.647 |
| 540 | 29.647 | 29.704 | 29.761 | 29.818 | 29.874 | 29.931 | 29.988 | 30.045 | 30.102 | 30.159 | 30.216 |
| 550 | 30.216 | 30.273 | 30.330 | 30.387 | 30.444 | 30.502 | 30.559 | 30.616 | 30.673 | 30.730 | 30.788 |
| 560 | 30.788 | 30.845 | 30.902 | 30.960 | 31.017 | 31.074 | 31.132 | 31.189 | 31.247 | 31.304 | 31.362 |
| 570 | 31.362 | 31.419 | 31.477 | 31.535 | 31.592 | 31.650 | 31.708 | 31.766 | 31.823 | 31.881 | 31.939 |
| 580 | 31.939 | 31.997 | 32.055 | 32.113 | 32.171 | 32.229 | 32.287 | 32.345 | 32.403 | 32.461 | 32.519 |
| 590 | 32.519 | 32.577 | 32.636 | 32.694 | 32.752 | 32.810 | 32.869 | 32.927 | 32.985 | 33.044 | 33.102 |
| 600 | 33.102 | 33.161 | 33.219 | 33.278 | 33.337 | 33.395 | 33.454 | 33.513 | 33.571 | 33.630 | 33.689 |
| 610 | 33.689 | 33.748 | 33.807 | 33.866 | 33.925 | 33.984 | 34.043 | 34.102 | 34.161 | 34.220 | 34.279 |
| 620 | 34.279 | 34.338 | 34.397 | 34.457 | 34.516 | 34.575 | 34.635 | 34.694 | 34.754 | 34.813 | 34.873 |
| 630 | 34.873 | 34.932 | 34.992 | 35.051 | 35.111 | 35.171 | 35.230 | 35.290 | 35.350 | 35.410 | 35.470 |
| 640 | 35.470 | 35.530 | 35.590 | 35.650 | 35.710 | 35.770 | 35.830 | 35.890 | 35.950 | 36.010 | 36.071 |
| 650 | 36.071 | 36.131 | 36.191 | 36.252 | 36.312 | 36.373 | 36.433 | 36.494 | 36.554 | 36.615 | 36.675 |
| 660 | 36.675 | 36.736 | 36.797 | 36.858 | 36.918 | 36.979 | 37.040 | 37.101 | 37.162 | 37.223 | 37.284 |
| 670 | 37.284 | 37.345 | 37.406 | 37.467 | 37.528 | 37.590 | 37.651 | 37.712 | 37.773 | 37.835 | 37.896 |
| 680 | 37.896 | 37.958 | 38.019 | 38.081 | 38.142 | 38.204 | 38.265 | 38.327 | 38.389 | 38.450 | 38.512 |
| 690 | 38.512 | 38.574 | 38.636 | 38.698 | 38.760 | 38.822 | 38.884 | 38.946 | 39.008 | 39.070 | 39.132 |
| 700 | 39.132 | 39.194 | 39.256 | 39.318 | 39.381 | 39.443 | 39.505 | 39.568 | 39.630 | 39.693 | 39.755 |
| 710 | 39.755 | 39.818 | 39.880 | 39.943 | 40.005 | 40.068 | 40.131 | 40.193 | 40.256 | 40.319 | 40.382 |
| 720 | 40.382 | 40.445 | 40.508 | 40.570 | 40.633 | 40.696 | 40.759 | 40.822 | 40.886 | 40.949 | 41.012 |
| 730 | 41.012 | 41.075 | 41.138 | 41.201 | 41.265 | 41.328 | 41.391 | 41.455 | 41.518 | 41.581 | 41.645 |
| 740 | 41.645 | 41.708 | 41.772 | 41.835 | 41.899 | 41.962 | 42.026 | 42.090 | 42.153 | 42.217 | 42.281 |
| 750 | 42.281 | 42.344 | 42.408 | 42.472 | 42.536 | 42.599 | 42.663 | 42.727 | 42.791 | 42.855 | 42.919 |
| 760 | 42.919 | 42.983 | 43.047 | 43.111 | 43.175 | 43.239 | 43.303 | 43.367 | 43.431 | 43.495 | 43.559 |
| 770 | 43.559 | 43.624 | 43.688 | 43.752 | 43.817 | 43.881 | 43.945 | 44.010 | 44.074 | 44.139 | 44.203 |
| 780 | 44.203 | 44.267 | 44.332 | 44.396 | 44.461 | 44.525 | 44.590 | 44.655 | 44.719 | 44.784 | 44.848 |
| 790 | 44.848 | 44.913 | 44.977 | 45.042 | 45.107 | 45.171 | 45.236 | 45.301 | 45.365 | 45.430 | 45.494 |
| 800 | 45.494 | 45.559 | 45.624 | 45.688 | 45.753 | 45.818 | 45.882 | 45.947 | 46.011 | 46.076 | 46.141 |
| 810 | 46.141 | 46.205 | 46.270 | 46.334 | 46.399 | 46.464 | 46.528 | 46.593 | 46.657 | 46.722 | 46.786 |
| 820 | 46.786 | 46.851 | 46.915 | 46.980 | 47.044 | 47.109 | 47.173 | 47.238 | 47.302 | 47.367 | 47.431 |
| 830 | 47.431 | 47.495 | 47.560 | 47.624 | 47.688 | 47.753 | 47.817 | 47.881 | 47.946 | 48.010 | 48.074 |
| 840 | 48.074 | 48.138 | 48.202 | 48.267 | 48.331 | 48.395 | 48.459 | 48.523 | 48.587 | 48.651 | 48.715 |
| 850 | 48.715 | 48.779 | 48.843 | 48.907 | 48.971 | 49.034 | 49.098 | 49.162 | 49.226 | 49.290 | 49.353 |
| 860 | 49.353 | 49.417 | 49.481 | 49.544 | 49.608 | 49.672 | 49.735 | 49.799 | 49.862 | 49.926 | 49.989 |
| 870 | 49.989 | 50.052 | 50.116 | 50.179 | 50.243 | 50.306 | 50.369 | 50.432 | 50.495 | 50.559 | 50.622 |
| 880 | 50.622 | 50.685 | 50.748 | 50.811 | 50.874 | 50.937 | 51.000 | 51.063 | 51.126 | 51.188 | 51.251 |
| 890 | 51.251 | 51.314 | 51.377 | 51.439 | 51.502 | 51.565 | 51.627 | 51.690 | 51.752 | 51.815 | 51.877 |
| 900 | 51.877 | 51.940 | 52.002 | 52.064 | 52.127 | 52.189 | 52.251 | 52.314 | 52.376 | 52.438 | 52.500 |
| 910 | 52.500 | 52.562 | 52.624 | 52.686 | 52.748 | 52.810 | 52.872 | 52.934 | 52.996 | 53.057 | 53.119 |
| 920 | 53.119 | 53.181 | 53.243 | 53.304 | 53.366 | 53.427 | 53.489 | 53.550 | 53.612 | 53.673 | 53.735 |
| 930 | 53.735 | 53.796 | 53.857 | 53.919 | 53.980 | 54.041 | 54.102 | 54.164 | 54.225 | 54.286 | 54.347 |
| 940 | 54.347 | 54.408 | 54.469 | 54.530 | 54.591 | 54.652 | 54.713 | 54.773 | 54.834 | 54.895 | 54.956 |
| 950 | 54.956 | 55.016 | 55.077 | 55.138 | 55.198 | 55.259 | 55.319 | 55.380 | 55.440 | 55.501 | 55.561 |
| 960 | 55.561 | 55.622 | 55.682 | 55.742 | 55.803 | 55.863 | 55.923 | 55.983 | 56.043 | 56.104 | 56.164 |
| 970 | 56.164 | 56.224 | 56.284 | 56.344 | 56.404 | 56.464 | 56.524 | 56.584 | 56.643 | 56.703 | 56.763 |
| 980 | 56.763 | 56.823 | 56.883 | 56.942 | 57.002 | 57.062 | 57.121 | 57.181 | 57.240 | 57.300 | 57.360 |
| 990 | 57.360 | 57.419 | 57.479 | 57.538 | 57.597 | 57.657 | 57.716 | 57.776 | 57.835 | 57.894 | 57.953 |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

ITS-90 Table for type J thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 1000 | 57.953 | 58.013 | 58.072 | 58.131 | 58.190 | 58.249 | 58.309 | 58.368 | 58.427 | 58.486 | 58.545 |
| 1010 | 58.545 | 58.604 | 58.663 | 58.722 | 58.781 | 58.840 | 58.899 | 58.957 | 59.016 | 59.075 | 59.134 |
| 1020 | 59.134 | 59.193 | 59.252 | 59.310 | 59.369 | 59.428 | 59.487 | 59.545 | 59.604 | 59.663 | 59.721 |
| 1030 | 59.721 | 59.780 | 59.838 | 59.897 | 59.956 | 60.014 | 60.073 | 60.131 | 60.190 | 60.248 | 60.307 |
| 1040 | 60.307 | 60.365 | 60.423 | 60.482 | 60.540 | 60.599 | 60.657 | 60.715 | 60.774 | 60.832 | 60.890 |
| 1050 | 60.890 | 60.949 | 61.007 | 61.065 | 61.123 | 61.182 | 61.240 | 61.298 | 61.356 | 61.415 | 61.473 |
| 1060 | 61.473 | 61.531 | 61.589 | 61.647 | 61.705 | 61.763 | 61.822 | 61.880 | 61.938 | 61.996 | 62.054 |
| 1070 | 62.054 | 62.112 | 62.170 | 62.228 | 62.286 | 62.344 | 62.402 | 62.460 | 62.518 | 62.576 | 62.634 |
| 1080 | 62.634 | 62.692 | 62.750 | 62.808 | 62.866 | 62.924 | 62.982 | 63.040 | 63.098 | 63.156 | 63.214 |
| 1090 | 63.214 | 63.271 | 63.329 | 63.387 | 63.445 | 63.503 | 63.561 | 63.619 | 63.677 | 63.734 | 63.792 |
| 1100 | 63.792 | 63.850 | 63.908 | 63.966 | 64.024 | 64.081 | 64.139 | 64.197 | 64.255 | 64.313 | 64.370 |
| 1110 | 64.370 | 64.428 | 64.486 | 64.544 | 64.602 | 64.659 | 64.717 | 64.775 | 64.833 | 64.890 | 64.948 |
| 1120 | 64.948 | 65.006 | 65.064 | 65.121 | 65.179 | 65.237 | 65.295 | 65.352 | 65.410 | 65.468 | 65.525 |
| 1130 | 65.525 | 65.583 | 65.641 | 65.699 | 65.756 | 65.814 | 65.872 | 65.929 | 65.987 | 66.045 | 66.102 |
| 1140 | 66.102 | 66.160 | 66.218 | 66.275 | 66.333 | 66.391 | 66.448 | 66.506 | 66.564 | 66.621 | 66.679 |
| 1150 | 66.679 | 66.737 | 66.794 | 66.852 | 66.910 | 66.967 | 67.025 | 67.082 | 67.140 | 67.198 | 67.255 |
| 1160 | 67.255 | 67.313 | 67.370 | 67.428 | 67.486 | 67.543 | 67.601 | 67.658 | 67.716 | 67.773 | 67.831 |
| 1170 | 67.831 | 67.888 | 67.946 | 68.003 | 68.061 | 68.119 | 68.176 | 68.234 | 68.291 | 68.348 | 68.406 |
| 1180 | 68.406 | 68.463 | 68.521 | 68.578 | 68.636 | 68.693 | 68.751 | 68.808 | 68.865 | 68.923 | 68.980 |
| 1190 | 68.980 | 69.037 | 69.095 | 69.152 | 69.209 | 69.267 | 69.324 | 69.381 | 69.439 | 69.496 | 69.553 |
| 1200 | 69.553 | | | | | | | | | | |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|

```
***********************************
* This section contains coefficients for type J thermocouples for
* the two subranges of temperature listed below.  The coefficients
* are in units of °C and mV and are listed in the order of constant
* term up to the highest order.  The equation is of the form
* E = sum(i=0 to n) c_i t^i.
*
*     Temperature Range (°C)
*        -210.000 to 760.000
*         760.000 to 1200.000
***********************************
name: reference function on ITS-90
type: J
temperature units: °C
emf units: mV
range:  -210.000,    760.000,  8
 0.000000000000E+00
 0.503811878150E-01
 0.304758369300E-04
-0.856810657200E-07
 0.132281952950E-09
-0.170529583370E-12
 0.209480906970E-15
-0.125383953360E-18
 0.156317256970E-22
range:   760.000,   1200.000,  5
 0.296456256810E+03
-0.149761277860E+01
 0.317871039240E-02
-0.318476867010E-05
 0.157208190040E-08
-0.306913690560E-12
```

```
**********************************
* This section contains coefficients of approximate inverse
* functions for type J thermocouples for the subranges of
* temperature and voltage listed below. The range of errors of
* the approximate inverse function for each subrange is also given.
* The coefficients are in units of °C and mV and are listed in
* the order of constant term up to the highest order.
* The equation is of the form t_90 = d_0 + d_1*E + d_2*E^2 + ...
*     + d_n*E^n,
* where E is in mV and t_90 is in °C.
*
*    Temperature        Voltage            Error
*      range              range            range
*      (°C)               (mV)             (° C)
*    -210. to 0.      -8.095 to 0.000    -0.05 to 0.03
*     0. to 760.       0.000 to 42.919   -0.04 to 0.04
*     760. to 1200     42.919 to 69.553  -0.04 to 0.03
*****************************************************
Inverse coefficients for type J:

Temperature  -210.             0.           760.
  Range:        0.           760.          1200.

  Voltage   -8.095          0.000         42.919
  Range:     0.000         42.919         69.553

         0.0000000E+00  0.000000E+00 -3.11358187E+03
         1.9528268E+01  1.978425E+01  3.00543684E+02
        -1.2286185E+00 -2.001204E-01 -9.94773230E+00
        -1.0752178E+00  1.036969E-02  1.70276630E-01
        -5.9086933E-01 -2.549687E-04 -1.43033468E-03
        -1.7256713E-01  3.585153E-06  4.73886084E-06
        -2.8131513E-02 -5.344285E-08  0.00000000E+00
        -2.3963370E-03  5.099890E-10  0.00000000E+00
        -8.3823321E-05  0.000000E+00  0.00000000E+00

  Error      -0.05          -0.04          -0.04
  Range:      0.03           0.04           0.03
```

ITS-90 Table for type K thermocouple

| °C | 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| -270 | -6.458 | | | | | | | | | | |
| -260 | -6.441 | -6.444 | -6.446 | -6.448 | -6.450 | -6.452 | -6.453 | -6.455 | -6.456 | -6.457 | -6.458 |
| -250 | -6.404 | -6.408 | -6.413 | -6.417 | -6.421 | -6.425 | -6.429 | -6.432 | -6.435 | -6.438 | -6.441 |
| -240 | -6.344 | -6.351 | -6.358 | -6.364 | -6.370 | -6.377 | -6.382 | -6.388 | -6.393 | -6.399 | -6.404 |
| -230 | -6.262 | -6.271 | -6.280 | -6.289 | -6.297 | -6.306 | -6.314 | -6.322 | -6.329 | -6.337 | -6.344 |
| -220 | -6.158 | -6.170 | -6.181 | -6.192 | -6.202 | -6.213 | -6.223 | -6.233 | -6.243 | -6.252 | -6.262 |
| -210 | -6.035 | -6.048 | -6.061 | -6.074 | -6.087 | -6.099 | -6.111 | -6.123 | -6.135 | -6.147 | -6.158 |
| -200 | -5.891 | -5.907 | -5.922 | -5.936 | -5.951 | -5.965 | -5.980 | -5.994 | -6.007 | -6.021 | -6.035 |
| -190 | -5.730 | -5.747 | -5.763 | -5.780 | -5.797 | -5.813 | -5.829 | -5.845 | -5.861 | -5.876 | -5.891 |
| -180 | -5.550 | -5.569 | -5.588 | -5.606 | -5.624 | -5.642 | -5.660 | -5.678 | -5.695 | -5.713 | -5.730 |
| -170 | -5.354 | -5.374 | -5.395 | -5.415 | -5.435 | -5.454 | -5.474 | -5.493 | -5.512 | -5.531 | -5.550 |
| -160 | -5.141 | -5.163 | -5.185 | -5.207 | -5.228 | -5.250 | -5.271 | -5.292 | -5.313 | -5.333 | -5.354 |
| -150 | -4.913 | -4.936 | -4.960 | -4.983 | -5.006 | -5.029 | -5.052 | -5.074 | -5.097 | -5.119 | -5.141 |
| -140 | -4.669 | -4.694 | -4.719 | -4.744 | -4.768 | -4.793 | -4.817 | -4.841 | -4.865 | -4.889 | -4.913 |
| -130 | -4.411 | -4.437 | -4.463 | -4.490 | -4.516 | -4.542 | -4.567 | -4.593 | -4.618 | -4.644 | -4.669 |
| -120 | -4.138 | -4.166 | -4.194 | -4.221 | -4.249 | -4.276 | -4.303 | -4.330 | -4.357 | -4.384 | -4.411 |
| -110 | -3.852 | -3.882 | -3.911 | -3.939 | -3.968 | -3.997 | -4.025 | -4.054 | -4.082 | -4.110 | -4.138 |
| -100 | -3.554 | -3.584 | -3.614 | -3.645 | -3.675 | -3.705 | -3.734 | -3.764 | -3.794 | -3.823 | -3.852 |
| -90 | -3.243 | -3.274 | -3.306 | -3.337 | -3.368 | -3.400 | -3.431 | -3.462 | -3.492 | -3.523 | -3.554 |
| -80 | -2.920 | -2.953 | -2.986 | -3.018 | -3.050 | -3.083 | -3.115 | -3.147 | -3.179 | -3.211 | -3.243 |
| -70 | -2.587 | -2.620 | -2.654 | -2.688 | -2.721 | -2.755 | -2.788 | -2.821 | -2.854 | -2.887 | -2.920 |
| -60 | -2.243 | -2.278 | -2.312 | -2.347 | -2.382 | -2.416 | -2.450 | -2.485 | -2.519 | -2.553 | -2.587 |
| -50 | -1.889 | -1.925 | -1.961 | -1.996 | -2.032 | -2.067 | -2.103 | -2.138 | -2.173 | -2.208 | -2.243 |
| -40 | -1.527 | -1.564 | -1.600 | -1.637 | -1.673 | -1.709 | -1.745 | -1.782 | -1.818 | -1.854 | -1.889 |
| -30 | -1.156 | -1.194 | -1.231 | -1.268 | -1.305 | -1.343 | -1.380 | -1.417 | -1.453 | -1.490 | -1.527 |
| -20 | -0.778 | -0.816 | -0.854 | -0.892 | -0.930 | -0.968 | -1.006 | -1.043 | -1.081 | -1.119 | -1.156 |
| -10 | -0.392 | -0.431 | -0.470 | -0.508 | -0.547 | -0.586 | -0.624 | -0.663 | -0.701 | -0.739 | -0.778 |
| 0 | 0.000 | -0.039 | -0.079 | -0.118 | -0.157 | -0.197 | -0.236 | -0.275 | -0.314 | -0.353 | -0.392 |
| °C | 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 |

ITS-90 Table for type K thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 0 | 0.000 | 0.039 | 0.079 | 0.119 | 0.158 | 0.198 | 0.238 | 0.277 | 0.317 | 0.357 | 0.397 |
| 10 | 0.397 | 0.437 | 0.477 | 0.517 | 0.557 | 0.597 | 0.637 | 0.677 | 0.718 | 0.758 | 0.798 |
| 20 | 0.798 | 0.838 | 0.879 | 0.919 | 0.960 | 1.000 | 1.041 | 1.081 | 1.122 | 1.163 | 1.203 |
| 30 | 1.203 | 1.244 | 1.285 | 1.326 | 1.366 | 1.407 | 1.448 | 1.489 | 1.530 | 1.571 | 1.612 |
| 40 | 1.612 | 1.653 | 1.694 | 1.735 | 1.776 | 1.817 | 1.858 | 1.899 | 1.941 | 1.982 | 2.023 |
| 50 | 2.023 | 2.064 | 2.106 | 2.147 | 2.188 | 2.230 | 2.271 | 2.312 | 2.354 | 2.395 | 2.436 |
| 60 | 2.436 | 2.478 | 2.519 | 2.561 | 2.602 | 2.644 | 2.685 | 2.727 | 2.768 | 2.810 | 2.851 |
| 70 | 2.851 | 2.893 | 2.934 | 2.976 | 3.017 | 3.059 | 3.100 | 3.142 | 3.184 | 3.225 | 3.267 |
| 80 | 3.267 | 3.308 | 3.350 | 3.391 | 3.433 | 3.474 | 3.516 | 3.557 | 3.599 | 3.640 | 3.682 |
| 90 | 3.682 | 3.723 | 3.765 | 3.806 | 3.848 | 3.889 | 3.931 | 3.972 | 4.013 | 4.055 | 4.096 |
| 100 | 4.096 | 4.138 | 4.179 | 4.220 | 4.262 | 4.303 | 4.344 | 4.385 | 4.427 | 4.468 | 4.509 |
| 110 | 4.509 | 4.550 | 4.591 | 4.633 | 4.674 | 4.715 | 4.756 | 4.797 | 4.838 | 4.879 | 4.920 |
| 120 | 4.920 | 4.961 | 5.002 | 5.043 | 5.084 | 5.124 | 5.165 | 5.206 | 5.247 | 5.288 | 5.328 |
| 130 | 5.328 | 5.369 | 5.410 | 5.450 | 5.491 | 5.532 | 5.572 | 5.613 | 5.653 | 5.694 | 5.735 |
| 140 | 5.735 | 5.775 | 5.815 | 5.856 | 5.896 | 5.937 | 5.977 | 6.017 | 6.058 | 6.098 | 6.138 |
| 150 | 6.138 | 6.179 | 6.219 | 6.259 | 6.299 | 6.339 | 6.380 | 6.420 | 6.460 | 6.500 | 6.540 |
| 160 | 6.540 | 6.580 | 6.620 | 6.660 | 6.701 | 6.741 | 6.781 | 6.821 | 6.861 | 6.901 | 6.941 |
| 170 | 6.941 | 6.981 | 7.021 | 7.060 | 7.100 | 7.140 | 7.180 | 7.220 | 7.260 | 7.300 | 7.340 |
| 180 | 7.340 | 7.380 | 7.420 | 7.460 | 7.500 | 7.540 | 7.579 | 7.619 | 7.659 | 7.699 | 7.739 |
| 190 | 7.739 | 7.779 | 7.819 | 7.859 | 7.899 | 7.939 | 7.979 | 8.019 | 8.059 | 8.099 | 8.138 |
| 200 | 8.138 | 8.178 | 8.218 | 8.258 | 8.298 | 8.338 | 8.378 | 8.418 | 8.458 | 8.499 | 8.539 |
| 210 | 8.539 | 8.579 | 8.619 | 8.659 | 8.699 | 8.739 | 8.779 | 8.819 | 8.860 | 8.900 | 8.940 |
| 220 | 8.940 | 8.980 | 9.020 | 9.061 | 9.101 | 9.141 | 9.181 | 9.222 | 9.262 | 9.302 | 9.343 |
| 230 | 9.343 | 9.383 | 9.423 | 9.464 | 9.504 | 9.545 | 9.585 | 9.626 | 9.666 | 9.707 | 9.747 |
| 240 | 9.747 | 9.788 | 9.828 | 9.869 | 9.909 | 9.950 | 9.991 | 10.031 | 10.072 | 10.113 | 10.153 |
| 250 | 10.153 | 10.194 | 10.235 | 10.276 | 10.316 | 10.357 | 10.398 | 10.439 | 10.480 | 10.520 | 10.561 |
| 260 | 10.561 | 10.602 | 10.643 | 10.684 | 10.725 | 10.766 | 10.807 | 10.848 | 10.889 | 10.930 | 10.971 |
| 270 | 10.971 | 11.012 | 11.053 | 11.094 | 11.135 | 11.176 | 11.217 | 11.259 | 11.300 | 11.341 | 11.382 |
| 280 | 11.382 | 11.423 | 11.465 | 11.506 | 11.547 | 11.588 | 11.630 | 11.671 | 11.712 | 11.753 | 11.795 |
| 290 | 11.795 | 11.836 | 11.877 | 11.919 | 11.960 | 12.001 | 12.043 | 12.084 | 12.126 | 12.167 | 12.209 |
| 300 | 12.209 | 12.250 | 12.291 | 12.333 | 12.374 | 12.416 | 12.457 | 12.499 | 12.540 | 12.582 | 12.624 |
| 310 | 12.624 | 12.665 | 12.707 | 12.748 | 12.790 | 12.831 | 12.873 | 12.915 | 12.956 | 12.998 | 13.040 |
| 320 | 13.040 | 13.081 | 13.123 | 13.165 | 13.206 | 13.248 | 13.290 | 13.331 | 13.373 | 13.415 | 13.457 |
| 330 | 13.457 | 13.498 | 13.540 | 13.582 | 13.624 | 13.665 | 13.707 | 13.749 | 13.791 | 13.833 | 13.874 |
| 340 | 13.874 | 13.916 | 13.958 | 14.000 | 14.042 | 14.084 | 14.126 | 14.167 | 14.209 | 14.251 | 14.293 |
| 350 | 14.293 | 14.335 | 14.377 | 14.419 | 14.461 | 14.503 | 14.545 | 14.587 | 14.629 | 14.671 | 14.713 |
| 360 | 14.713 | 14.755 | 14.797 | 14.839 | 14.881 | 14.923 | 14.965 | 15.007 | 15.049 | 15.091 | 15.133 |
| 370 | 15.133 | 15.175 | 15.217 | 15.259 | 15.301 | 15.343 | 15.385 | 15.427 | 15.469 | 15.511 | 15.554 |
| 380 | 15.554 | 15.596 | 15.638 | 15.680 | 15.722 | 15.764 | 15.806 | 15.849 | 15.891 | 15.933 | 15.975 |
| 390 | 15.975 | 16.017 | 16.059 | 16.102 | 16.144 | 16.186 | 16.228 | 16.270 | 16.313 | 16.355 | 16.397 |
| 400 | 16.397 | 16.439 | 16.482 | 16.524 | 16.566 | 16.608 | 16.651 | 16.693 | 16.735 | 16.778 | 16.820 |
| 410 | 16.820 | 16.862 | 16.904 | 16.947 | 16.989 | 17.031 | 17.074 | 17.116 | 17.158 | 17.201 | 17.243 |
| 420 | 17.243 | 17.285 | 17.328 | 17.370 | 17.413 | 17.455 | 17.497 | 17.540 | 17.582 | 17.624 | 17.667 |
| 430 | 17.667 | 17.709 | 17.752 | 17.794 | 17.837 | 17.879 | 17.921 | 17.964 | 18.006 | 18.049 | 18.091 |
| 440 | 18.091 | 18.134 | 18.176 | 18.218 | 18.261 | 18.303 | 18.346 | 18.388 | 18.431 | 18.473 | 18.516 |
| 450 | 18.516 | 18.558 | 18.601 | 18.643 | 18.686 | 18.728 | 18.771 | 18.813 | 18.856 | 18.898 | 18.941 |
| 460 | 18.941 | 18.983 | 19.026 | 19.068 | 19.111 | 19.154 | 19.196 | 19.239 | 19.281 | 19.324 | 19.366 |
| 470 | 19.366 | 19.409 | 19.451 | 19.494 | 19.537 | 19.579 | 19.622 | 19.664 | 19.707 | 19.750 | 19.792 |
| 480 | 19.792 | 19.835 | 19.877 | 19.920 | 19.962 | 20.005 | 20.048 | 20.090 | 20.133 | 20.175 | 20.218 |
| 490 | 20.218 | 20.261 | 20.303 | 20.346 | 20.389 | 20.431 | 20.474 | 20.516 | 20.559 | 20.602 | 20.644 |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

ITS-90 Table for type K thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 500 | 20.644 | 20.687 | 20.730 | 20.772 | 20.815 | 20.857 | 20.900 | 20.943 | 20.985 | 21.028 | 21.071 |
| 510 | 21.071 | 21.113 | 21.156 | 21.199 | 21.241 | 21.284 | 21.326 | 21.369 | 21.412 | 21.454 | 21.497 |
| 520 | 21.497 | 21.540 | 21.582 | 21.625 | 21.668 | 21.710 | 21.753 | 21.796 | 21.838 | 21.881 | 21.924 |
| 530 | 21.924 | 21.966 | 22.009 | 22.052 | 22.094 | 22.137 | 22.179 | 22.222 | 22.265 | 22.307 | 22.350 |
| 540 | 22.350 | 22.393 | 22.435 | 22.478 | 22.521 | 22.563 | 22.606 | 22.649 | 22.691 | 22.734 | 22.776 |
| 550 | 22.776 | 22.819 | 22.862 | 22.904 | 22.947 | 22.990 | 23.032 | 23.075 | 23.117 | 23.160 | 23.203 |
| 560 | 23.203 | 23.245 | 23.288 | 23.331 | 23.373 | 23.416 | 23.458 | 23.501 | 23.544 | 23.586 | 23.629 |
| 570 | 23.629 | 23.671 | 23.714 | 23.757 | 23.799 | 23.842 | 23.884 | 23.927 | 23.970 | 24.012 | 24.055 |
| 580 | 24.055 | 24.097 | 24.140 | 24.182 | 24.225 | 24.267 | 24.310 | 24.353 | 24.395 | 24.438 | 24.480 |
| 590 | 24.480 | 24.523 | 24.565 | 24.608 | 24.650 | 24.693 | 24.735 | 24.778 | 24.820 | 24.863 | 24.905 |
| 600 | 24.905 | 24.948 | 24.990 | 25.033 | 25.075 | 25.118 | 25.160 | 25.203 | 25.245 | 25.288 | 25.330 |
| 610 | 25.330 | 25.373 | 25.415 | 25.458 | 25.500 | 25.543 | 25.585 | 25.627 | 25.670 | 25.712 | 25.755 |
| 620 | 25.755 | 25.797 | 25.840 | 25.882 | 25.924 | 25.967 | 26.009 | 26.052 | 26.094 | 26.136 | 26.179 |
| 630 | 26.179 | 26.221 | 26.263 | 26.306 | 26.348 | 26.390 | 26.433 | 26.475 | 26.517 | 26.560 | 26.602 |
| 640 | 26.602 | 26.644 | 26.687 | 26.729 | 26.771 | 26.814 | 26.856 | 26.898 | 26.940 | 26.983 | 27.025 |
| 650 | 27.025 | 27.067 | 27.109 | 27.152 | 27.194 | 27.236 | 27.278 | 27.320 | 27.363 | 27.405 | 27.447 |
| 660 | 27.447 | 27.489 | 27.531 | 27.574 | 27.616 | 27.658 | 27.700 | 27.742 | 27.784 | 27.826 | 27.869 |
| 670 | 27.869 | 27.911 | 27.953 | 27.995 | 28.037 | 28.079 | 28.121 | 28.163 | 28.205 | 28.247 | 28.289 |
| 680 | 28.289 | 28.332 | 28.374 | 28.416 | 28.458 | 28.500 | 28.542 | 28.584 | 28.626 | 28.668 | 28.710 |
| 690 | 28.710 | 28.752 | 28.794 | 28.835 | 28.877 | 28.919 | 28.961 | 29.003 | 29.045 | 29.087 | 29.129 |
| 700 | 29.129 | 29.171 | 29.213 | 29.255 | 29.297 | 29.338 | 29.380 | 29.422 | 29.464 | 29.506 | 29.548 |
| 710 | 29.548 | 29.589 | 29.631 | 29.673 | 29.715 | 29.757 | 29.798 | 29.840 | 29.882 | 29.924 | 29.965 |
| 720 | 29.965 | 30.007 | 30.049 | 30.090 | 30.132 | 30.174 | 30.216 | 30.257 | 30.299 | 30.341 | 30.382 |
| 730 | 30.382 | 30.424 | 30.466 | 30.507 | 30.549 | 30.590 | 30.632 | 30.674 | 30.715 | 30.757 | 30.798 |
| 740 | 30.798 | 30.840 | 30.881 | 30.923 | 30.964 | 31.006 | 31.047 | 31.089 | 31.130 | 31.172 | 31.213 |
| 750 | 31.213 | 31.255 | 31.296 | 31.338 | 31.379 | 31.421 | 31.462 | 31.504 | 31.545 | 31.586 | 31.628 |
| 760 | 31.628 | 31.669 | 31.710 | 31.752 | 31.793 | 31.834 | 31.876 | 31.917 | 31.958 | 32.000 | 32.041 |
| 770 | 32.041 | 32.082 | 32.124 | 32.165 | 32.206 | 32.247 | 32.289 | 32.330 | 32.371 | 32.412 | 32.453 |
| 780 | 32.453 | 32.495 | 32.536 | 32.577 | 32.618 | 32.659 | 32.700 | 32.742 | 32.783 | 32.824 | 32.865 |
| 790 | 32.865 | 32.906 | 32.947 | 32.988 | 33.029 | 33.070 | 33.111 | 33.152 | 33.193 | 33.234 | 33.275 |
| 800 | 33.275 | 33.316 | 33.357 | 33.398 | 33.439 | 33.480 | 33.521 | 33.562 | 33.603 | 33.644 | 33.685 |
| 810 | 33.685 | 33.726 | 33.767 | 33.808 | 33.848 | 33.889 | 33.930 | 33.971 | 34.012 | 34.053 | 34.093 |
| 820 | 34.093 | 34.134 | 34.175 | 34.216 | 34.257 | 34.297 | 34.338 | 34.379 | 34.420 | 34.460 | 34.501 |
| 830 | 34.501 | 34.542 | 34.582 | 34.623 | 34.664 | 34.704 | 34.745 | 34.786 | 34.826 | 34.867 | 34.908 |
| 840 | 34.908 | 34.948 | 34.989 | 35.029 | 35.070 | 35.110 | 35.151 | 35.192 | 35.232 | 35.273 | 35.313 |
| 850 | 35.313 | 35.354 | 35.394 | 35.435 | 35.475 | 35.516 | 35.556 | 35.596 | 35.637 | 35.677 | 35.718 |
| 860 | 35.718 | 35.758 | 35.798 | 35.839 | 35.879 | 35.920 | 35.960 | 36.000 | 36.041 | 36.081 | 36.121 |
| 870 | 36.121 | 36.162 | 36.202 | 36.242 | 36.282 | 36.323 | 36.363 | 36.403 | 36.443 | 36.484 | 36.524 |
| 880 | 36.524 | 36.564 | 36.604 | 36.644 | 36.685 | 36.725 | 36.765 | 36.805 | 36.845 | 36.885 | 36.925 |
| 890 | 36.925 | 36.965 | 37.006 | 37.046 | 37.086 | 37.126 | 37.166 | 37.206 | 37.246 | 37.286 | 37.326 |
| 900 | 37.326 | 37.366 | 37.406 | 37.446 | 37.486 | 37.526 | 37.566 | 37.606 | 37.646 | 37.686 | 37.725 |
| 910 | 37.725 | 37.765 | 37.805 | 37.845 | 37.885 | 37.925 | 37.965 | 38.005 | 38.044 | 38.084 | 38.124 |
| 920 | 38.124 | 38.164 | 38.204 | 38.243 | 38.283 | 38.323 | 38.363 | 38.402 | 38.442 | 38.482 | 38.522 |
| 930 | 38.522 | 38.561 | 38.601 | 38.641 | 38.680 | 38.720 | 38.760 | 38.799 | 38.839 | 38.878 | 38.918 |
| 940 | 38.918 | 38.958 | 38.997 | 39.037 | 39.076 | 39.116 | 39.155 | 39.195 | 39.235 | 39.274 | 39.314 |
| 950 | 39.314 | 39.353 | 39.393 | 39.432 | 39.471 | 39.511 | 39.550 | 39.590 | 39.629 | 39.669 | 39.708 |
| 960 | 39.708 | 39.747 | 39.787 | 39.826 | 39.866 | 39.905 | 39.944 | 39.984 | 40.023 | 40.062 | 40.101 |
| 970 | 40.101 | 40.141 | 40.180 | 40.219 | 40.259 | 40.298 | 40.337 | 40.376 | 40.415 | 40.455 | 40.494 |
| 980 | 40.494 | 40.533 | 40.572 | 40.611 | 40.651 | 40.690 | 40.729 | 40.768 | 40.807 | 40.846 | 40.885 |
| 990 | 40.885 | 40.924 | 40.963 | 41.002 | 41.042 | 41.081 | 41.120 | 41.159 | 41.198 | 41.237 | 41.276 |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

ITS-90 Table for type K thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 1000 | 41.276 | 41.315 | 41.354 | 41.393 | 41.431 | 41.470 | 41.509 | 41.548 | 41.587 | 41.626 | 41.665 |
| 1010 | 41.665 | 41.704 | 41.743 | 41.781 | 41.820 | 41.859 | 41.898 | 41.937 | 41.976 | 42.014 | 42.053 |
| 1020 | 42.053 | 42.092 | 42.131 | 42.169 | 42.208 | 42.247 | 42.286 | 42.324 | 42.363 | 42.402 | 42.440 |
| 1030 | 42.440 | 42.479 | 42.518 | 42.556 | 42.595 | 42.633 | 42.672 | 42.711 | 42.749 | 42.788 | 42.826 |
| 1040 | 42.826 | 42.865 | 42.903 | 42.942 | 42.980 | 43.019 | 43.057 | 43.096 | 43.134 | 43.173 | 43.211 |
| 1050 | 43.211 | 43.250 | 43.288 | 43.327 | 43.365 | 43.403 | 43.442 | 43.480 | 43.518 | 43.557 | 43.595 |
| 1060 | 43.595 | 43.633 | 43.672 | 43.710 | 43.748 | 43.787 | 43.825 | 43.863 | 43.901 | 43.940 | 43.978 |
| 1070 | 43.978 | 44.016 | 44.054 | 44.092 | 44.130 | 44.169 | 44.207 | 44.245 | 44.283 | 44.321 | 44.359 |
| 1080 | 44.359 | 44.397 | 44.435 | 44.473 | 44.512 | 44.550 | 44.588 | 44.626 | 44.664 | 44.702 | 44.740 |
| 1090 | 44.740 | 44.778 | 44.816 | 44.853 | 44.891 | 44.929 | 44.967 | 45.005 | 45.043 | 45.081 | 45.119 |
| 1100 | 45.119 | 45.157 | 45.194 | 45.232 | 45.270 | 45.308 | 45.346 | 45.383 | 45.421 | 45.459 | 45.497 |
| 1110 | 45.497 | 45.534 | 45.572 | 45.610 | 45.647 | 45.685 | 45.723 | 45.760 | 45.798 | 45.836 | 45.873 |
| 1120 | 45.873 | 45.911 | 45.948 | 45.986 | 46.024 | 46.061 | 46.099 | 46.136 | 46.174 | 46.211 | 46.249 |
| 1130 | 46.249 | 46.286 | 46.324 | 46.361 | 46.398 | 46.436 | 46.473 | 46.511 | 46.548 | 46.585 | 46.623 |
| 1140 | 46.623 | 46.660 | 46.697 | 46.735 | 46.772 | 46.809 | 46.847 | 46.884 | 46.921 | 46.958 | 46.995 |
| 1150 | 46.995 | 47.033 | 47.070 | 47.107 | 47.144 | 47.181 | 47.218 | 47.256 | 47.293 | 47.330 | 47.367 |
| 1160 | 47.367 | 47.404 | 47.441 | 47.478 | 47.515 | 47.552 | 47.589 | 47.626 | 47.663 | 47.700 | 47.737 |
| 1170 | 47.737 | 47.774 | 47.811 | 47.848 | 47.884 | 47.921 | 47.958 | 47.995 | 48.032 | 48.069 | 48.105 |
| 1180 | 48.105 | 48.142 | 48.179 | 48.216 | 48.252 | 48.289 | 48.326 | 48.363 | 48.399 | 48.436 | 48.473 |
| 1190 | 48.473 | 48.509 | 48.546 | 48.582 | 48.619 | 48.656 | 48.692 | 48.729 | 48.765 | 48.802 | 48.838 |
| 1200 | 48.838 | 48.875 | 48.911 | 48.948 | 48.984 | 49.021 | 49.057 | 49.093 | 49.130 | 49.166 | 49.202 |
| 1210 | 49.202 | 49.239 | 49.275 | 49.311 | 49.348 | 49.384 | 49.420 | 49.456 | 49.493 | 49.529 | 49.565 |
| 1220 | 49.565 | 49.601 | 49.637 | 49.674 | 49.710 | 49.746 | 49.782 | 49.818 | 49.854 | 49.890 | 49.926 |
| 1230 | 49.926 | 49.962 | 49.998 | 50.034 | 50.070 | 50.106 | 50.142 | 50.178 | 50.214 | 50.250 | 50.286 |
| 1240 | 50.286 | 50.322 | 50.358 | 50.393 | 50.429 | 50.465 | 50.501 | 50.537 | 50.572 | 50.608 | 50.644 |
| 1250 | 50.644 | 50.680 | 50.715 | 50.751 | 50.787 | 50.822 | 50.858 | 50.894 | 50.929 | 50.965 | 51.000 |
| 1260 | 51.000 | 51.036 | 51.071 | 51.107 | 51.142 | 51.178 | 51.213 | 51.249 | 51.284 | 51.320 | 51.355 |
| 1270 | 51.355 | 51.391 | 51.426 | 51.461 | 51.497 | 51.532 | 51.567 | 51.603 | 51.638 | 51.673 | 51.708 |
| 1280 | 51.708 | 51.744 | 51.779 | 51.814 | 51.849 | 51.885 | 51.920 | 51.955 | 51.990 | 52.025 | 52.060 |
| 1290 | 52.060 | 52.095 | 52.130 | 52.165 | 52.200 | 52.235 | 52.270 | 52.305 | 52.340 | 52.375 | 52.410 |
| 1300 | 52.410 | 52.445 | 52.480 | 52.515 | 52.550 | 52.585 | 52.620 | 52.654 | 52.689 | 52.724 | 52.759 |
| 1310 | 52.759 | 52.794 | 52.828 | 52.863 | 52.898 | 52.932 | 52.967 | 53.002 | 53.037 | 53.071 | 53.106 |
| 1320 | 53.106 | 53.140 | 53.175 | 53.210 | 53.244 | 53.279 | 53.313 | 53.348 | 53.382 | 53.417 | 53.451 |
| 1330 | 53.451 | 53.486 | 53.520 | 53.555 | 53.589 | 53.623 | 53.658 | 53.692 | 53.727 | 53.761 | 53.795 |
| 1340 | 53.795 | 53.830 | 53.864 | 53.898 | 53.932 | 53.967 | 54.001 | 54.035 | 54.069 | 54.104 | 54.138 |
| 1350 | 54.138 | 54.172 | 54.206 | 54.240 | 54.274 | 54.308 | 54.343 | 54.377 | 54.411 | 54.445 | 54.479 |
| 1360 | 54.479 | 54.513 | 54.547 | 54.581 | 54.615 | 54.649 | 54.683 | 54.717 | 54.751 | 54.785 | 54.819 |
| 1370 | 54.819 | 54.852 | 54.886 | | | | | | | | |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|

```
**********************************
* This section contains coefficients for type K thermocouples for
* the two subranges of temperature listed below.  The coefficients
* are in units of °C and mV and are listed in the order of constant
* term up to the highest order.  The equation below 0 °C is of the form
* E = sum(i=0 to n) c_i t^i.
*
* The equation above 0 °C is of the form
* E = sum(i=0 to n) c_i t^i + a0 exp(a1 (t - a2)^2).
*
*     Temperature Range (°C)
*        -270.000 to 0.000
*         0.000 to 1372.000
**********************************
name: reference function on ITS-90
type: K
temperature units: °C
emf units: mV
range: -270.000, 0.000, 10
  0.000000000000E+00
  0.394501280250E-01
  0.236223735980E-04
 -0.328589067840E-06
 -0.499048287770E-08
 -0.675090591730E-10
 -0.574103274280E-12
 -0.310888728940E-14
 -0.104516093650E-16
 -0.198892668780E-19
 -0.163226974860E-22
range: 0.000, 1372.000, 9
 -0.176004136860E-01
  0.389212049750E-01
  0.185587700320E-04
 -0.994575928740E-07
  0.318409457190E-09
 -0.560728448890E-12
  0.560750590590E-15
 -0.320207200030E-18
  0.971511471520E-22
 -0.121047212750E-25
exponential:
 a0 =  0.118597600000E+00
 a1 = -0.118343200000E-03
 a2 =  0.126968600000E+03
```

```
**********************************
* This section contains coefficients of approximate inverse
* functions for type K thermocouples for the subranges of
* temperature and voltage listed below. The range of errors of
* the approximate inverse function for each subrange is also given.
* The coefficients are in units of °C and mV and are listed in
* the order of constant term up to the highest order.
* The equation is of the form t_90 = d_0 + d_1*E + d_2*E^2 + ...
*     + d_n*E^n,
* where E is in mV and t_90 is in °C.
*
*    Temperature        Voltage            Error
*      range              range            range
*      (°C)               (mV)             (° C)
*    -200. to 0.      -5.891 to 0.000    -0.02 to 0.04
*     0. to 500.      0.000 to 20.644    -0.05 to 0.04
*     500. to 1372.   20.644 to 54.886   -0.05 to 0.06
*****************************************************
Inverse coefficients for type K:

Temperature  -200.             0.           500.
  Range:        0.           500.          1372.

  Voltage   -5.891          0.000         20.644
  Range:     0.000         20.644         54.886

         0.0000000E+00  0.000000E+00 -1.318058E+02
         2.5173462E+01  2.508355E+01  4.830222E+01
        -1.1662878E+00  7.860106E-02 -1.646031E+00
        -1.0833638E+00 -2.503131E-01  5.464731E-02
        -8.9773540E-01  8.315270E-02 -9.650715E-04
        -3.7342377E-01 -1.228034E-02  8.802193E-06
        -8.6632643E-02  9.804036E-04 -3.110810E-08
        -1.0450598E-02 -4.413030E-05  0.000000E+00
        -5.1920577E-04  1.057734E-06  0.000000E+00
         0.0000000E+00 -1.052755E-08  0.000000E+00

  Error      -0.02          -0.05          -0.05
  Range:      0.04           0.04           0.06
```

ITS-90 Table for type N thermocouple

| °C | 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| -270 | -4.345 | | | | | | | | | | |
| -260 | -4.336 | -4.337 | -4.339 | -4.340 | -4.341 | -4.342 | -4.343 | -4.344 | -4.344 | -4.345 | -4.345 |
| -250 | -4.313 | -4.316 | -4.319 | -4.321 | -4.324 | -4.326 | -4.328 | -4.330 | -4.332 | -4.334 | -4.336 |
| -240 | -4.277 | -4.281 | -4.285 | -4.289 | -4.293 | -4.297 | -4.300 | -4.304 | -4.307 | -4.310 | -4.313 |
| -230 | -4.226 | -4.232 | -4.238 | -4.243 | -4.248 | -4.254 | -4.258 | -4.263 | -4.268 | -4.273 | -4.277 |
| -220 | -4.162 | -4.169 | -4.176 | -4.183 | -4.189 | -4.196 | -4.202 | -4.209 | -4.215 | -4.221 | -4.226 |
| -210 | -4.083 | -4.091 | -4.100 | -4.108 | -4.116 | -4.124 | -4.132 | -4.140 | -4.147 | -4.154 | -4.162 |
| -200 | -3.990 | -4.000 | -4.010 | -4.020 | -4.029 | -4.038 | -4.048 | -4.057 | -4.066 | -4.074 | -4.083 |
| -190 | -3.884 | -3.896 | -3.907 | -3.918 | -3.928 | -3.939 | -3.950 | -3.960 | -3.970 | -3.980 | -3.990 |
| -180 | -3.766 | -3.778 | -3.790 | -3.803 | -3.815 | -3.827 | -3.838 | -3.850 | -3.862 | -3.873 | -3.884 |
| -170 | -3.634 | -3.648 | -3.662 | -3.675 | -3.688 | -3.702 | -3.715 | -3.728 | -3.740 | -3.753 | -3.766 |
| -160 | -3.491 | -3.506 | -3.521 | -3.535 | -3.550 | -3.564 | -3.578 | -3.593 | -3.607 | -3.621 | -3.634 |
| -150 | -3.336 | -3.352 | -3.368 | -3.384 | -3.400 | -3.415 | -3.431 | -3.446 | -3.461 | -3.476 | -3.491 |
| -140 | -3.171 | -3.188 | -3.205 | -3.221 | -3.238 | -3.255 | -3.271 | -3.288 | -3.304 | -3.320 | -3.336 |
| -130 | -2.994 | -3.012 | -3.030 | -3.048 | -3.066 | -3.084 | -3.101 | -3.119 | -3.136 | -3.153 | -3.171 |
| -120 | -2.808 | -2.827 | -2.846 | -2.865 | -2.883 | -2.902 | -2.921 | -2.939 | -2.958 | -2.976 | -2.994 |
| -110 | -2.612 | -2.632 | -2.652 | -2.672 | -2.691 | -2.711 | -2.730 | -2.750 | -2.769 | -2.789 | -2.808 |
| -100 | -2.407 | -2.428 | -2.448 | -2.469 | -2.490 | -2.510 | -2.531 | -2.551 | -2.571 | -2.592 | -2.612 |
| -90 | -2.193 | -2.215 | -2.237 | -2.258 | -2.280 | -2.301 | -2.322 | -2.344 | -2.365 | -2.386 | -2.407 |
| -80 | -1.972 | -1.995 | -2.017 | -2.039 | -2.062 | -2.084 | -2.106 | -2.128 | -2.150 | -2.172 | -2.193 |
| -70 | -1.744 | -1.767 | -1.790 | -1.813 | -1.836 | -1.859 | -1.882 | -1.905 | -1.927 | -1.950 | -1.972 |
| -60 | -1.509 | -1.533 | -1.557 | -1.580 | -1.604 | -1.627 | -1.651 | -1.674 | -1.698 | -1.721 | -1.744 |
| -50 | -1.269 | -1.293 | -1.317 | -1.341 | -1.366 | -1.390 | -1.414 | -1.438 | -1.462 | -1.485 | -1.509 |
| -40 | -1.023 | -1.048 | -1.072 | -1.097 | -1.122 | -1.146 | -1.171 | -1.195 | -1.220 | -1.244 | -1.269 |
| -30 | -0.772 | -0.798 | -0.823 | -0.848 | -0.873 | -0.898 | -0.923 | -0.948 | -0.973 | -0.998 | -1.023 |
| -20 | -0.518 | -0.544 | -0.569 | -0.595 | -0.620 | -0.646 | -0.671 | -0.696 | -0.722 | -0.747 | -0.772 |
| -10 | -0.260 | -0.286 | -0.312 | -0.338 | -0.364 | -0.390 | -0.415 | -0.441 | -0.467 | -0.492 | -0.518 |
| 0 | 0.000 | -0.026 | -0.052 | -0.078 | -0.104 | -0.131 | -0.157 | -0.183 | -0.209 | -0.234 | -0.260 |
| °C | 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 |

ITS-90 Table for type N thermocouple

Thermoelectric Voltage in mV

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.000 | 0.026 | 0.052 | 0.078 | 0.104 | 0.130 | 0.156 | 0.182 | 0.208 | 0.235 | 0.261 |
| 10 | 0.261 | 0.287 | 0.313 | 0.340 | 0.366 | 0.393 | 0.419 | 0.446 | 0.472 | 0.499 | 0.525 |
| 20 | 0.525 | 0.552 | 0.578 | 0.605 | 0.632 | 0.659 | 0.685 | 0.712 | 0.739 | 0.766 | 0.793 |
| 30 | 0.793 | 0.820 | 0.847 | 0.874 | 0.901 | 0.928 | 0.955 | 0.983 | 1.010 | 1.037 | 1.065 |
| 40 | 1.065 | 1.092 | 1.119 | 1.147 | 1.174 | 1.202 | 1.229 | 1.257 | 1.284 | 1.312 | 1.340 |
| 50 | 1.340 | 1.368 | 1.395 | 1.423 | 1.451 | 1.479 | 1.507 | 1.535 | 1.563 | 1.591 | 1.619 |
| 60 | 1.619 | 1.647 | 1.675 | 1.703 | 1.732 | 1.760 | 1.788 | 1.817 | 1.845 | 1.873 | 1.902 |
| 70 | 1.902 | 1.930 | 1.959 | 1.988 | 2.016 | 2.045 | 2.074 | 2.102 | 2.131 | 2.160 | 2.189 |
| 80 | 2.189 | 2.218 | 2.247 | 2.276 | 2.305 | 2.334 | 2.363 | 2.392 | 2.421 | 2.450 | 2.480 |
| 90 | 2.480 | 2.509 | 2.538 | 2.568 | 2.597 | 2.626 | 2.656 | 2.685 | 2.715 | 2.744 | 2.774 |
| 100 | 2.774 | 2.804 | 2.833 | 2.863 | 2.893 | 2.923 | 2.953 | 2.983 | 3.012 | 3.042 | 3.072 |
| 110 | 3.072 | 3.102 | 3.133 | 3.163 | 3.193 | 3.223 | 3.253 | 3.283 | 3.314 | 3.344 | 3.374 |
| 120 | 3.374 | 3.405 | 3.435 | 3.466 | 3.496 | 3.527 | 3.557 | 3.588 | 3.619 | 3.649 | 3.680 |
| 130 | 3.680 | 3.711 | 3.742 | 3.772 | 3.803 | 3.834 | 3.865 | 3.896 | 3.927 | 3.958 | 3.989 |
| 140 | 3.989 | 4.020 | 4.051 | 4.083 | 4.114 | 4.145 | 4.176 | 4.208 | 4.239 | 4.270 | 4.302 |
| 150 | 4.302 | 4.333 | 4.365 | 4.396 | 4.428 | 4.459 | 4.491 | 4.523 | 4.554 | 4.586 | 4.618 |
| 160 | 4.618 | 4.650 | 4.681 | 4.713 | 4.745 | 4.777 | 4.809 | 4.841 | 4.873 | 4.905 | 4.937 |
| 170 | 4.937 | 4.969 | 5.001 | 5.033 | 5.066 | 5.098 | 5.130 | 5.162 | 5.195 | 5.227 | 5.259 |
| 180 | 5.259 | 5.292 | 5.324 | 5.357 | 5.389 | 5.422 | 5.454 | 5.487 | 5.520 | 5.552 | 5.585 |
| 190 | 5.585 | 5.618 | 5.650 | 5.683 | 5.716 | 5.749 | 5.782 | 5.815 | 5.847 | 5.880 | 5.913 |
| 200 | 5.913 | 5.946 | 5.979 | 6.013 | 6.046 | 6.079 | 6.112 | 6.145 | 6.178 | 6.211 | 6.245 |
| 210 | 6.245 | 6.278 | 6.311 | 6.345 | 6.378 | 6.411 | 6.445 | 6.478 | 6.512 | 6.545 | 6.579 |
| 220 | 6.579 | 6.612 | 6.646 | 6.680 | 6.713 | 6.747 | 6.781 | 6.814 | 6.848 | 6.882 | 6.916 |
| 230 | 6.916 | 6.949 | 6.983 | 7.017 | 7.051 | 7.085 | 7.119 | 7.153 | 7.187 | 7.221 | 7.255 |
| 240 | 7.255 | 7.289 | 7.323 | 7.357 | 7.392 | 7.426 | 7.460 | 7.494 | 7.528 | 7.563 | 7.597 |
| 250 | 7.597 | 7.631 | 7.666 | 7.700 | 7.734 | 7.769 | 7.803 | 7.838 | 7.872 | 7.907 | 7.941 |
| 260 | 7.941 | 7.976 | 8.010 | 8.045 | 8.080 | 8.114 | 8.149 | 8.184 | 8.218 | 8.253 | 8.288 |
| 270 | 8.288 | 8.323 | 8.358 | 8.392 | 8.427 | 8.462 | 8.497 | 8.532 | 8.567 | 8.602 | 8.637 |
| 280 | 8.637 | 8.672 | 8.707 | 8.742 | 8.777 | 8.812 | 8.847 | 8.882 | 8.918 | 8.953 | 8.988 |
| 290 | 8.988 | 9.023 | 9.058 | 9.094 | 9.129 | 9.164 | 9.200 | 9.235 | 9.270 | 9.306 | 9.341 |
| 300 | 9.341 | 9.377 | 9.412 | 9.448 | 9.483 | 9.519 | 9.554 | 9.590 | 9.625 | 9.661 | 9.696 |
| 310 | 9.696 | 9.732 | 9.768 | 9.803 | 9.839 | 9.875 | 9.910 | 9.946 | 9.982 | 10.018 | 10.054 |
| 320 | 10.054 | 10.089 | 10.125 | 10.161 | 10.197 | 10.233 | 10.269 | 10.305 | 10.341 | 10.377 | 10.413 |
| 330 | 10.413 | 10.449 | 10.485 | 10.521 | 10.557 | 10.593 | 10.629 | 10.665 | 10.701 | 10.737 | 10.774 |
| 340 | 10.774 | 10.810 | 10.846 | 10.882 | 10.918 | 10.955 | 10.991 | 11.027 | 11.064 | 11.100 | 11.136 |
| 350 | 11.136 | 11.173 | 11.209 | 11.245 | 11.282 | 11.318 | 11.355 | 11.391 | 11.428 | 11.464 | 11.501 |
| 360 | 11.501 | 11.537 | 11.574 | 11.610 | 11.647 | 11.683 | 11.720 | 11.757 | 11.793 | 11.830 | 11.867 |
| 370 | 11.867 | 11.903 | 11.940 | 11.977 | 12.013 | 12.050 | 12.087 | 12.124 | 12.160 | 12.197 | 12.234 |
| 380 | 12.234 | 12.271 | 12.308 | 12.345 | 12.382 | 12.418 | 12.455 | 12.492 | 12.529 | 12.566 | 12.603 |
| 390 | 12.603 | 12.640 | 12.677 | 12.714 | 12.751 | 12.788 | 12.825 | 12.862 | 12.899 | 12.937 | 12.974 |
| 400 | 12.974 | 13.011 | 13.048 | 13.085 | 13.122 | 13.159 | 13.197 | 13.234 | 13.271 | 13.308 | 13.346 |
| 410 | 13.346 | 13.383 | 13.420 | 13.457 | 13.495 | 13.532 | 13.569 | 13.607 | 13.644 | 13.682 | 13.719 |
| 420 | 13.719 | 13.756 | 13.794 | 13.831 | 13.869 | 13.906 | 13.944 | 13.981 | 14.019 | 14.056 | 14.094 |
| 430 | 14.094 | 14.131 | 14.169 | 14.206 | 14.244 | 14.281 | 14.319 | 14.356 | 14.394 | 14.432 | 14.469 |
| 440 | 14.469 | 14.507 | 14.545 | 14.582 | 14.620 | 14.658 | 14.695 | 14.733 | 14.771 | 14.809 | 14.846 |
| 450 | 14.846 | 14.884 | 14.922 | 14.960 | 14.998 | 15.035 | 15.073 | 15.111 | 15.149 | 15.187 | 15.225 |
| 460 | 15.225 | 15.262 | 15.300 | 15.338 | 15.376 | 15.414 | 15.452 | 15.490 | 15.528 | 15.566 | 15.604 |
| 470 | 15.604 | 15.642 | 15.680 | 15.718 | 15.756 | 15.794 | 15.832 | 15.870 | 15.908 | 15.946 | 15.984 |
| 480 | 15.984 | 16.022 | 16.060 | 16.099 | 16.137 | 16.175 | 16.213 | 16.251 | 16.289 | 16.327 | 16.366 |
| 490 | 16.366 | 16.404 | 16.442 | 16.480 | 16.518 | 16.557 | 16.595 | 16.633 | 16.671 | 16.710 | 16.748 |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

ITS-90 Table for type N thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 500 | 16.748 | 16.786 | 16.824 | 16.863 | 16.901 | 16.939 | 16.978 | 17.016 | 17.054 | 17.093 | 17.131 |
| 510 | 17.131 | 17.169 | 17.208 | 17.246 | 17.285 | 17.323 | 17.361 | 17.400 | 17.438 | 17.477 | 17.515 |
| 520 | 17.515 | 17.554 | 17.592 | 17.630 | 17.669 | 17.707 | 17.746 | 17.784 | 17.823 | 17.861 | 17.900 |
| 530 | 17.900 | 17.938 | 17.977 | 18.016 | 18.054 | 18.093 | 18.131 | 18.170 | 18.208 | 18.247 | 18.286 |
| 540 | 18.286 | 18.324 | 18.363 | 18.401 | 18.440 | 18.479 | 18.517 | 18.556 | 18.595 | 18.633 | 18.672 |
| 550 | 18.672 | 18.711 | 18.749 | 18.788 | 18.827 | 18.865 | 18.904 | 18.943 | 18.982 | 19.020 | 19.059 |
| 560 | 19.059 | 19.098 | 19.136 | 19.175 | 19.214 | 19.253 | 19.292 | 19.330 | 19.369 | 19.408 | 19.447 |
| 570 | 19.447 | 19.485 | 19.524 | 19.563 | 19.602 | 19.641 | 19.680 | 19.718 | 19.757 | 19.796 | 19.835 |
| 580 | 19.835 | 19.874 | 19.913 | 19.952 | 19.990 | 20.029 | 20.068 | 20.107 | 20.146 | 20.185 | 20.224 |
| 590 | 20.224 | 20.263 | 20.302 | 20.341 | 20.379 | 20.418 | 20.457 | 20.496 | 20.535 | 20.574 | 20.613 |
| 600 | 20.613 | 20.652 | 20.691 | 20.730 | 20.769 | 20.808 | 20.847 | 20.886 | 20.925 | 20.964 | 21.003 |
| 610 | 21.003 | 21.042 | 21.081 | 21.120 | 21.159 | 21.198 | 21.237 | 21.276 | 21.315 | 21.354 | 21.393 |
| 620 | 21.393 | 21.432 | 21.471 | 21.510 | 21.549 | 21.588 | 21.628 | 21.667 | 21.706 | 21.745 | 21.784 |
| 630 | 21.784 | 21.823 | 21.862 | 21.901 | 21.940 | 21.979 | 22.018 | 22.058 | 22.097 | 22.136 | 22.175 |
| 640 | 22.175 | 22.214 | 22.253 | 22.292 | 22.331 | 22.370 | 22.410 | 22.449 | 22.488 | 22.527 | 22.566 |
| 650 | 22.566 | 22.605 | 22.644 | 22.684 | 22.723 | 22.762 | 22.801 | 22.840 | 22.879 | 22.919 | 22.958 |
| 660 | 22.958 | 22.997 | 23.036 | 23.075 | 23.115 | 23.154 | 23.193 | 23.232 | 23.271 | 23.311 | 23.350 |
| 670 | 23.350 | 23.389 | 23.428 | 23.467 | 23.507 | 23.546 | 23.585 | 23.624 | 23.663 | 23.703 | 23.742 |
| 680 | 23.742 | 23.781 | 23.820 | 23.860 | 23.899 | 23.938 | 23.977 | 24.016 | 24.056 | 24.095 | 24.134 |
| 690 | 24.134 | 24.173 | 24.213 | 24.252 | 24.291 | 24.330 | 24.370 | 24.409 | 24.448 | 24.487 | 24.527 |
| 700 | 24.527 | 24.566 | 24.605 | 24.644 | 24.684 | 24.723 | 24.762 | 24.801 | 24.841 | 24.880 | 24.919 |
| 710 | 24.919 | 24.959 | 24.998 | 25.037 | 25.076 | 25.116 | 25.155 | 25.194 | 25.233 | 25.273 | 25.312 |
| 720 | 25.312 | 25.351 | 25.391 | 25.430 | 25.469 | 25.508 | 25.548 | 25.587 | 25.626 | 25.666 | 25.705 |
| 730 | 25.705 | 25.744 | 25.783 | 25.823 | 25.862 | 25.901 | 25.941 | 25.980 | 26.019 | 26.058 | 26.098 |
| 740 | 26.098 | 26.137 | 26.176 | 26.216 | 26.255 | 26.294 | 26.333 | 26.373 | 26.412 | 26.451 | 26.491 |
| 750 | 26.491 | 26.530 | 26.569 | 26.608 | 26.648 | 26.687 | 26.726 | 26.766 | 26.805 | 26.844 | 26.883 |
| 760 | 26.883 | 26.923 | 26.962 | 27.001 | 27.041 | 27.080 | 27.119 | 27.158 | 27.198 | 27.237 | 27.276 |
| 770 | 27.276 | 27.316 | 27.355 | 27.394 | 27.433 | 27.473 | 27.512 | 27.551 | 27.591 | 27.630 | 27.669 |
| 780 | 27.669 | 27.708 | 27.748 | 27.787 | 27.826 | 27.866 | 27.905 | 27.944 | 27.983 | 28.023 | 28.062 |
| 790 | 28.062 | 28.101 | 28.140 | 28.180 | 28.219 | 28.258 | 28.297 | 28.337 | 28.376 | 28.415 | 28.455 |
| 800 | 28.455 | 28.494 | 28.533 | 28.572 | 28.612 | 28.651 | 28.690 | 28.729 | 28.769 | 28.808 | 28.847 |
| 810 | 28.847 | 28.886 | 28.926 | 28.965 | 29.004 | 29.043 | 29.083 | 29.122 | 29.161 | 29.200 | 29.239 |
| 820 | 29.239 | 29.279 | 29.318 | 29.357 | 29.396 | 29.436 | 29.475 | 29.514 | 29.553 | 29.592 | 29.632 |
| 830 | 29.632 | 29.671 | 29.710 | 29.749 | 29.789 | 29.828 | 29.867 | 29.906 | 29.945 | 29.985 | 30.024 |
| 840 | 30.024 | 30.063 | 30.102 | 30.141 | 30.181 | 30.220 | 30.259 | 30.298 | 30.337 | 30.376 | 30.416 |
| 850 | 30.416 | 30.455 | 30.494 | 30.533 | 30.572 | 30.611 | 30.651 | 30.690 | 30.729 | 30.768 | 30.807 |
| 860 | 30.807 | 30.846 | 30.886 | 30.925 | 30.964 | 31.003 | 31.042 | 31.081 | 31.120 | 31.160 | 31.199 |
| 870 | 31.199 | 31.238 | 31.277 | 31.316 | 31.355 | 31.394 | 31.433 | 31.473 | 31.512 | 31.551 | 31.590 |
| 880 | 31.590 | 31.629 | 31.668 | 31.707 | 31.746 | 31.785 | 31.824 | 31.863 | 31.903 | 31.942 | 31.981 |
| 890 | 31.981 | 32.020 | 32.059 | 32.098 | 32.137 | 32.176 | 32.215 | 32.254 | 32.293 | 32.332 | 32.371 |
| 900 | 32.371 | 32.410 | 32.449 | 32.488 | 32.527 | 32.566 | 32.605 | 32.644 | 32.683 | 32.722 | 32.761 |
| 910 | 32.761 | 32.800 | 32.839 | 32.878 | 32.917 | 32.956 | 32.995 | 33.034 | 33.073 | 33.112 | 33.151 |
| 920 | 33.151 | 33.190 | 33.229 | 33.268 | 33.307 | 33.346 | 33.385 | 33.424 | 33.463 | 33.502 | 33.541 |
| 930 | 33.541 | 33.580 | 33.619 | 33.658 | 33.697 | 33.736 | 33.774 | 33.813 | 33.852 | 33.891 | 33.930 |
| 940 | 33.930 | 33.969 | 34.008 | 34.047 | 34.086 | 34.124 | 34.163 | 34.202 | 34.241 | 34.280 | 34.319 |
| 950 | 34.319 | 34.358 | 34.396 | 34.435 | 34.474 | 34.513 | 34.552 | 34.591 | 34.629 | 34.668 | 34.707 |
| 960 | 34.707 | 34.746 | 34.785 | 34.823 | 34.862 | 34.901 | 34.940 | 34.979 | 35.017 | 35.056 | 35.095 |
| 970 | 35.095 | 35.134 | 35.172 | 35.211 | 35.250 | 35.289 | 35.327 | 35.366 | 35.405 | 35.444 | 35.482 |
| 980 | 35.482 | 35.521 | 35.560 | 35.598 | 35.637 | 35.676 | 35.714 | 35.753 | 35.792 | 35.831 | 35.869 |
| 990 | 35.869 | 35.908 | 35.946 | 35.985 | 36.024 | 36.062 | 36.101 | 36.140 | 36.178 | 36.217 | 36.256 |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|

ITS-90 Table for type N thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 1000 | 36.256 | 36.294 | 36.333 | 36.371 | 36.410 | 36.449 | 36.487 | 36.526 | 36.564 | 36.603 | 36.641 |
| 1010 | 36.641 | 36.680 | 36.718 | 36.757 | 36.796 | 36.834 | 36.873 | 36.911 | 36.950 | 36.988 | 37.027 |
| 1020 | 37.027 | 37.065 | 37.104 | 37.142 | 37.181 | 37.219 | 37.258 | 37.296 | 37.334 | 37.373 | 37.411 |
| 1030 | 37.411 | 37.450 | 37.488 | 37.527 | 37.565 | 37.603 | 37.642 | 37.680 | 37.719 | 37.757 | 37.795 |
| 1040 | 37.795 | 37.834 | 37.872 | 37.911 | 37.949 | 37.987 | 38.026 | 38.064 | 38.102 | 38.141 | 38.179 |
| 1050 | 38.179 | 38.217 | 38.256 | 38.294 | 38.332 | 38.370 | 38.409 | 38.447 | 38.485 | 38.524 | 38.562 |
| 1060 | 38.562 | 38.600 | 38.638 | 38.677 | 38.715 | 38.753 | 38.791 | 38.829 | 38.868 | 38.906 | 38.944 |
| 1070 | 38.944 | 38.982 | 39.020 | 39.059 | 39.097 | 39.135 | 39.173 | 39.211 | 39.249 | 39.287 | 39.326 |
| 1080 | 39.326 | 39.364 | 39.402 | 39.440 | 39.478 | 39.516 | 39.554 | 39.592 | 39.630 | 39.668 | 39.706 |
| 1090 | 39.706 | 39.744 | 39.783 | 39.821 | 39.859 | 39.897 | 39.935 | 39.973 | 40.011 | 40.049 | 40.087 |
| 1100 | 40.087 | 40.125 | 40.163 | 40.201 | 40.238 | 40.276 | 40.314 | 40.352 | 40.390 | 40.428 | 40.466 |
| 1110 | 40.466 | 40.504 | 40.542 | 40.580 | 40.618 | 40.655 | 40.693 | 40.731 | 40.769 | 40.807 | 40.845 |
| 1120 | 40.845 | 40.883 | 40.920 | 40.958 | 40.996 | 41.034 | 41.072 | 41.109 | 41.147 | 41.185 | 41.223 |
| 1130 | 41.223 | 41.260 | 41.298 | 41.336 | 41.374 | 41.411 | 41.449 | 41.487 | 41.525 | 41.562 | 41.600 |
| 1140 | 41.600 | 41.638 | 41.675 | 41.713 | 41.751 | 41.788 | 41.826 | 41.864 | 41.901 | 41.939 | 41.976 |
| 1150 | 41.976 | 42.014 | 42.052 | 42.089 | 42.127 | 42.164 | 42.202 | 42.239 | 42.277 | 42.314 | 42.352 |
| 1160 | 42.352 | 42.390 | 42.427 | 42.465 | 42.502 | 42.540 | 42.577 | 42.614 | 42.652 | 42.689 | 42.727 |
| 1170 | 42.727 | 42.764 | 42.802 | 42.839 | 42.877 | 42.914 | 42.951 | 42.989 | 43.026 | 43.064 | 43.101 |
| 1180 | 43.101 | 43.138 | 43.176 | 43.213 | 43.250 | 43.288 | 43.325 | 43.362 | 43.399 | 43.437 | 43.474 |
| 1190 | 43.474 | 43.511 | 43.549 | 43.586 | 43.623 | 43.660 | 43.698 | 43.735 | 43.772 | 43.809 | 43.846 |
| 1200 | 43.846 | 43.884 | 43.921 | 43.958 | 43.995 | 44.032 | 44.069 | 44.106 | 44.144 | 44.181 | 44.218 |
| 1210 | 44.218 | 44.255 | 44.292 | 44.329 | 44.366 | 44.403 | 44.440 | 44.477 | 44.514 | 44.551 | 44.588 |
| 1220 | 44.588 | 44.625 | 44.662 | 44.699 | 44.736 | 44.773 | 44.810 | 44.847 | 44.884 | 44.921 | 44.958 |
| 1230 | 44.958 | 44.995 | 45.032 | 45.069 | 45.105 | 45.142 | 45.179 | 45.216 | 45.253 | 45.290 | 45.326 |
| 1240 | 45.326 | 45.363 | 45.400 | 45.437 | 45.474 | 45.510 | 45.547 | 45.584 | 45.621 | 45.657 | 45.694 |
| 1250 | 45.694 | 45.731 | 45.767 | 45.804 | 45.841 | 45.877 | 45.914 | 45.951 | 45.987 | 46.024 | 46.060 |
| 1260 | 46.060 | 46.097 | 46.133 | 46.170 | 46.207 | 46.243 | 46.280 | 46.316 | 46.353 | 46.389 | 46.425 |
| 1270 | 46.425 | 46.462 | 46.498 | 46.535 | 46.571 | 46.608 | 46.644 | 46.680 | 46.717 | 46.753 | 46.789 |
| 1280 | 46.789 | 46.826 | 46.862 | 46.898 | 46.935 | 46.971 | 47.007 | 47.043 | 47.079 | 47.116 | 47.152 |
| 1290 | 47.152 | 47.188 | 47.224 | 47.260 | 47.296 | 47.333 | 47.369 | 47.405 | 47.441 | 47.477 | 47.513 |
| 1300 | 47.513 | | | | | | | | | | |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|

```
**********************************
* This section contains coefficients for type N thermocouples for
* the two subranges of temperature listed below.  The coefficients
* are in units of °C and mV and are listed in the order of constant
* term up to the highest order.  The equation is of the form
* E = sum(i=0 to n) c_i t^i.
*
*     Temperature Range (°C)
*        -270.000 to 0.000
*         0.000 to 1300.000
**********************************
name: reference function on ITS-90
type: N
temperature units: °C
emf units: mV
range:  -270.000,      0.000,  8
 0.000000000000E+00
 0.261591059620E-01
 0.109574842280E-04
-0.938411115540E-07
-0.464120397590E-10
-0.263033577160E-11
-0.226534380030E-13
-0.760893007910E-16
-0.934196678350E-19
range:     0.000,   1300.000, 10
 0.000000000000E+00
 0.259293946010E-01
 0.157101418800E-04
 0.438256272370E-07
-0.252611697940E-09
 0.643118193390E-12
-0.100634715190E-14
 0.997453389920E-18
-0.608632456070E-21
 0.208492293390E-24
-0.306821961510E-28
```

```
**********************************
* This section contains coefficients of approximate inverse
* functions for type N thermocouples for the subranges of
* temperature and voltage listed below. The range of errors of
* the approximate inverse function for each subrange is also given.
* The coefficients are in units of °C and mV and are listed in
* the order of constant term up to the highest order.
* The equation is of the form t_90 = d_0 + d_1*E + d_2*E^2 + ...
*     + d_n*E^n,
* where E is in mV and t_90 is in °C.
*
*    Temperature        Voltage            Error
*      range              range            range
*      (°C)               (mV)             (° C)
*    -200. to 0.      -3.990 to 0.000    -0.02 to 0.03
*     0. to 600.      0.000 to 20.613    -0.02 to 0.03
*     600. to 1300.   20.613 to 47.513   -0.04 to 0.02
*****************************************************
Inverse coefficients for type N:

Temperature  -200.             0.           600.
  Range:        0.           600.          1300.

  Voltage   -3.990          0.000         20.613
  Range:     0.000         20.613         47.513

         0.0000000E+00  0.00000E+00  1.972485E+01
         3.8436847E+01  3.86896E+01  3.300943E+01
         1.1010485E+00 -1.08267E+00 -3.915159E-01
         5.2229312E+00  4.70205E-02  9.855391E-03
         7.2060525E+00 -2.12169E-06 -1.274371E-04
         5.8488586E+00 -1.17272E-04  7.767022E-07
         2.7754916E+00  5.39280E-06  0.000000E+00
         7.7075166E-01 -7.98156E-08  0.000000E+00
         1.1582665E-01  0.00000E+00  0.000000E+00
         7.3138868E-03  0.00000E+00  0.000000E+00

  Error      -0.02          -0.02          -0.04
  Range:      0.03           0.03           0.02
```

ITS-90 Table for type R thermocouple

| °C | 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| -50 | -0.226 | | | | | | | | | | |
| -40 | -0.188 | -0.192 | -0.196 | -0.200 | -0.204 | -0.208 | -0.211 | -0.215 | -0.219 | -0.223 | -0.226 |
| -30 | -0.145 | -0.150 | -0.154 | -0.158 | -0.163 | -0.167 | -0.171 | -0.175 | -0.180 | -0.184 | -0.188 |
| -20 | -0.100 | -0.105 | -0.109 | -0.114 | -0.119 | -0.123 | -0.128 | -0.132 | -0.137 | -0.141 | -0.145 |
| -10 | -0.051 | -0.056 | -0.061 | -0.066 | -0.071 | -0.076 | -0.081 | -0.086 | -0.091 | -0.095 | -0.100 |
| 0 | 0.000 | -0.005 | -0.011 | -0.016 | -0.021 | -0.026 | -0.031 | -0.036 | -0.041 | -0.046 | -0.051 |

| °C | 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 |
|---|---|---|---|---|---|---|---|---|---|---|---|

ITS-90 Table for type R thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 0 | 0.000 | 0.005 | 0.011 | 0.016 | 0.021 | 0.027 | 0.032 | 0.038 | 0.043 | 0.049 | 0.054 |
| 10 | 0.054 | 0.060 | 0.065 | 0.071 | 0.077 | 0.082 | 0.088 | 0.094 | 0.100 | 0.105 | 0.111 |
| 20 | 0.111 | 0.117 | 0.123 | 0.129 | 0.135 | 0.141 | 0.147 | 0.153 | 0.159 | 0.165 | 0.171 |
| 30 | 0.171 | 0.177 | 0.183 | 0.189 | 0.195 | 0.201 | 0.207 | 0.214 | 0.220 | 0.226 | 0.232 |
| 40 | 0.232 | 0.239 | 0.245 | 0.251 | 0.258 | 0.264 | 0.271 | 0.277 | 0.284 | 0.290 | 0.296 |
| 50 | 0.296 | 0.303 | 0.310 | 0.316 | 0.323 | 0.329 | 0.336 | 0.343 | 0.349 | 0.356 | 0.363 |
| 60 | 0.363 | 0.369 | 0.376 | 0.383 | 0.390 | 0.397 | 0.403 | 0.410 | 0.417 | 0.424 | 0.431 |
| 70 | 0.431 | 0.438 | 0.445 | 0.452 | 0.459 | 0.466 | 0.473 | 0.480 | 0.487 | 0.494 | 0.501 |
| 80 | 0.501 | 0.508 | 0.516 | 0.523 | 0.530 | 0.537 | 0.544 | 0.552 | 0.559 | 0.566 | 0.573 |
| 90 | 0.573 | 0.581 | 0.588 | 0.595 | 0.603 | 0.610 | 0.618 | 0.625 | 0.632 | 0.640 | 0.647 |
| 100 | 0.647 | 0.655 | 0.662 | 0.670 | 0.677 | 0.685 | 0.693 | 0.700 | 0.708 | 0.715 | 0.723 |
| 110 | 0.723 | 0.731 | 0.738 | 0.746 | 0.754 | 0.761 | 0.769 | 0.777 | 0.785 | 0.792 | 0.800 |
| 120 | 0.800 | 0.808 | 0.816 | 0.824 | 0.832 | 0.839 | 0.847 | 0.855 | 0.863 | 0.871 | 0.879 |
| 130 | 0.879 | 0.887 | 0.895 | 0.903 | 0.911 | 0.919 | 0.927 | 0.935 | 0.943 | 0.951 | 0.959 |
| 140 | 0.959 | 0.967 | 0.976 | 0.984 | 0.992 | 1.000 | 1.008 | 1.016 | 1.025 | 1.033 | 1.041 |
| 150 | 1.041 | 1.049 | 1.058 | 1.066 | 1.074 | 1.082 | 1.091 | 1.099 | 1.107 | 1.116 | 1.124 |
| 160 | 1.124 | 1.132 | 1.141 | 1.149 | 1.158 | 1.166 | 1.175 | 1.183 | 1.191 | 1.200 | 1.208 |
| 170 | 1.208 | 1.217 | 1.225 | 1.234 | 1.242 | 1.251 | 1.260 | 1.268 | 1.277 | 1.285 | 1.294 |
| 180 | 1.294 | 1.303 | 1.311 | 1.320 | 1.329 | 1.337 | 1.346 | 1.355 | 1.363 | 1.372 | 1.381 |
| 190 | 1.381 | 1.389 | 1.398 | 1.407 | 1.416 | 1.425 | 1.433 | 1.442 | 1.451 | 1.460 | 1.469 |
| 200 | 1.469 | 1.477 | 1.486 | 1.495 | 1.504 | 1.513 | 1.522 | 1.531 | 1.540 | 1.549 | 1.558 |
| 210 | 1.558 | 1.567 | 1.575 | 1.584 | 1.593 | 1.602 | 1.611 | 1.620 | 1.629 | 1.639 | 1.648 |
| 220 | 1.648 | 1.657 | 1.666 | 1.675 | 1.684 | 1.693 | 1.702 | 1.711 | 1.720 | 1.729 | 1.739 |
| 230 | 1.739 | 1.748 | 1.757 | 1.766 | 1.775 | 1.784 | 1.794 | 1.803 | 1.812 | 1.821 | 1.831 |
| 240 | 1.831 | 1.840 | 1.849 | 1.858 | 1.868 | 1.877 | 1.886 | 1.895 | 1.905 | 1.914 | 1.923 |
| 250 | 1.923 | 1.933 | 1.942 | 1.951 | 1.961 | 1.970 | 1.980 | 1.989 | 1.998 | 2.008 | 2.017 |
| 260 | 2.017 | 2.027 | 2.036 | 2.046 | 2.055 | 2.064 | 2.074 | 2.083 | 2.093 | 2.102 | 2.112 |
| 270 | 2.112 | 2.121 | 2.131 | 2.140 | 2.150 | 2.159 | 2.169 | 2.179 | 2.188 | 2.198 | 2.207 |
| 280 | 2.207 | 2.217 | 2.226 | 2.236 | 2.246 | 2.255 | 2.265 | 2.275 | 2.284 | 2.294 | 2.304 |
| 290 | 2.304 | 2.313 | 2.323 | 2.333 | 2.342 | 2.352 | 2.362 | 2.371 | 2.381 | 2.391 | 2.401 |
| 300 | 2.401 | 2.410 | 2.420 | 2.430 | 2.440 | 2.449 | 2.459 | 2.469 | 2.479 | 2.488 | 2.498 |
| 310 | 2.498 | 2.508 | 2.518 | 2.528 | 2.538 | 2.547 | 2.557 | 2.567 | 2.577 | 2.587 | 2.597 |
| 320 | 2.597 | 2.607 | 2.617 | 2.626 | 2.636 | 2.646 | 2.656 | 2.666 | 2.676 | 2.686 | 2.696 |
| 330 | 2.696 | 2.706 | 2.716 | 2.726 | 2.736 | 2.746 | 2.756 | 2.766 | 2.776 | 2.786 | 2.796 |
| 340 | 2.796 | 2.806 | 2.816 | 2.826 | 2.836 | 2.846 | 2.856 | 2.866 | 2.876 | 2.886 | 2.896 |
| 350 | 2.896 | 2.906 | 2.916 | 2.926 | 2.937 | 2.947 | 2.957 | 2.967 | 2.977 | 2.987 | 2.997 |
| 360 | 2.997 | 3.007 | 3.018 | 3.028 | 3.038 | 3.048 | 3.058 | 3.068 | 3.079 | 3.089 | 3.099 |
| 370 | 3.099 | 3.109 | 3.119 | 3.130 | 3.140 | 3.150 | 3.160 | 3.171 | 3.181 | 3.191 | 3.201 |
| 380 | 3.201 | 3.212 | 3.222 | 3.232 | 3.242 | 3.253 | 3.263 | 3.273 | 3.284 | 3.294 | 3.304 |
| 390 | 3.304 | 3.315 | 3.325 | 3.335 | 3.346 | 3.356 | 3.366 | 3.377 | 3.387 | 3.397 | 3.408 |
| 400 | 3.408 | 3.418 | 3.428 | 3.439 | 3.449 | 3.460 | 3.470 | 3.480 | 3.491 | 3.501 | 3.512 |
| 410 | 3.512 | 3.522 | 3.533 | 3.543 | 3.553 | 3.564 | 3.574 | 3.585 | 3.595 | 3.606 | 3.616 |
| 420 | 3.616 | 3.627 | 3.637 | 3.648 | 3.658 | 3.669 | 3.679 | 3.690 | 3.700 | 3.711 | 3.721 |
| 430 | 3.721 | 3.732 | 3.742 | 3.753 | 3.764 | 3.774 | 3.785 | 3.795 | 3.806 | 3.816 | 3.827 |
| 440 | 3.827 | 3.838 | 3.848 | 3.859 | 3.869 | 3.880 | 3.891 | 3.901 | 3.912 | 3.922 | 3.933 |
| 450 | 3.933 | 3.944 | 3.954 | 3.965 | 3.976 | 3.986 | 3.997 | 4.008 | 4.018 | 4.029 | 4.040 |
| 460 | 4.040 | 4.050 | 4.061 | 4.072 | 4.083 | 4.093 | 4.104 | 4.115 | 4.125 | 4.136 | 4.147 |
| 470 | 4.147 | 4.158 | 4.168 | 4.179 | 4.190 | 4.201 | 4.211 | 4.222 | 4.233 | 4.244 | 4.255 |
| 480 | 4.255 | 4.265 | 4.276 | 4.287 | 4.298 | 4.309 | 4.319 | 4.330 | 4.341 | 4.352 | 4.363 |
| 490 | 4.363 | 4.373 | 4.384 | 4.395 | 4.406 | 4.417 | 4.428 | 4.439 | 4.449 | 4.460 | 4.471 |
| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

ITS-90 Table for type R thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 500 | 4.471 | 4.482 | 4.493 | 4.504 | 4.515 | 4.526 | 4.537 | 4.548 | 4.558 | 4.569 | 4.580 |
| 510 | 4.580 | 4.591 | 4.602 | 4.613 | 4.624 | 4.635 | 4.646 | 4.657 | 4.668 | 4.679 | 4.690 |
| 520 | 4.690 | 4.701 | 4.712 | 4.723 | 4.734 | 4.745 | 4.756 | 4.767 | 4.778 | 4.789 | 4.800 |
| 530 | 4.800 | 4.811 | 4.822 | 4.833 | 4.844 | 4.855 | 4.866 | 4.877 | 4.888 | 4.899 | 4.910 |
| 540 | 4.910 | 4.922 | 4.933 | 4.944 | 4.955 | 4.966 | 4.977 | 4.988 | 4.999 | 5.010 | 5.021 |
| 550 | 5.021 | 5.033 | 5.044 | 5.055 | 5.066 | 5.077 | 5.088 | 5.099 | 5.111 | 5.122 | 5.133 |
| 560 | 5.133 | 5.144 | 5.155 | 5.166 | 5.178 | 5.189 | 5.200 | 5.211 | 5.222 | 5.234 | 5.245 |
| 570 | 5.245 | 5.256 | 5.267 | 5.279 | 5.290 | 5.301 | 5.312 | 5.323 | 5.335 | 5.346 | 5.357 |
| 580 | 5.357 | 5.369 | 5.380 | 5.391 | 5.402 | 5.414 | 5.425 | 5.436 | 5.448 | 5.459 | 5.470 |
| 590 | 5.470 | 5.481 | 5.493 | 5.504 | 5.515 | 5.527 | 5.538 | 5.549 | 5.561 | 5.572 | 5.583 |
| 600 | 5.583 | 5.595 | 5.606 | 5.618 | 5.629 | 5.640 | 5.652 | 5.663 | 5.674 | 5.686 | 5.697 |
| 610 | 5.697 | 5.709 | 5.720 | 5.731 | 5.743 | 5.754 | 5.766 | 5.777 | 5.789 | 5.800 | 5.812 |
| 620 | 5.812 | 5.823 | 5.834 | 5.846 | 5.857 | 5.869 | 5.880 | 5.892 | 5.903 | 5.915 | 5.926 |
| 630 | 5.926 | 5.938 | 5.949 | 5.961 | 5.972 | 5.984 | 5.995 | 6.007 | 6.018 | 6.030 | 6.041 |
| 640 | 6.041 | 6.053 | 6.065 | 6.076 | 6.088 | 6.099 | 6.111 | 6.122 | 6.134 | 6.146 | 6.157 |
| 650 | 6.157 | 6.169 | 6.180 | 6.192 | 6.204 | 6.215 | 6.227 | 6.238 | 6.250 | 6.262 | 6.273 |
| 660 | 6.273 | 6.285 | 6.297 | 6.308 | 6.320 | 6.332 | 6.343 | 6.355 | 6.367 | 6.378 | 6.390 |
| 670 | 6.390 | 6.402 | 6.413 | 6.425 | 6.437 | 6.448 | 6.460 | 6.472 | 6.484 | 6.495 | 6.507 |
| 680 | 6.507 | 6.519 | 6.531 | 6.542 | 6.554 | 6.566 | 6.578 | 6.589 | 6.601 | 6.613 | 6.625 |
| 690 | 6.625 | 6.636 | 6.648 | 6.660 | 6.672 | 6.684 | 6.695 | 6.707 | 6.719 | 6.731 | 6.743 |
| 700 | 6.743 | 6.755 | 6.766 | 6.778 | 6.790 | 6.802 | 6.814 | 6.826 | 6.838 | 6.849 | 6.861 |
| 710 | 6.861 | 6.873 | 6.885 | 6.897 | 6.909 | 6.921 | 6.933 | 6.945 | 6.956 | 6.968 | 6.980 |
| 720 | 6.980 | 6.992 | 7.004 | 7.016 | 7.028 | 7.040 | 7.052 | 7.064 | 7.076 | 7.088 | 7.100 |
| 730 | 7.100 | 7.112 | 7.124 | 7.136 | 7.148 | 7.160 | 7.172 | 7.184 | 7.196 | 7.208 | 7.220 |
| 740 | 7.220 | 7.232 | 7.244 | 7.256 | 7.268 | 7.280 | 7.292 | 7.304 | 7.316 | 7.328 | 7.340 |
| 750 | 7.340 | 7.352 | 7.364 | 7.376 | 7.389 | 7.401 | 7.413 | 7.425 | 7.437 | 7.449 | 7.461 |
| 760 | 7.461 | 7.473 | 7.485 | 7.498 | 7.510 | 7.522 | 7.534 | 7.546 | 7.558 | 7.570 | 7.583 |
| 770 | 7.583 | 7.595 | 7.607 | 7.619 | 7.631 | 7.644 | 7.656 | 7.668 | 7.680 | 7.692 | 7.705 |
| 780 | 7.705 | 7.717 | 7.729 | 7.741 | 7.753 | 7.766 | 7.778 | 7.790 | 7.802 | 7.815 | 7.827 |
| 790 | 7.827 | 7.839 | 7.851 | 7.864 | 7.876 | 7.888 | 7.901 | 7.913 | 7.925 | 7.938 | 7.950 |
| 800 | 7.950 | 7.962 | 7.974 | 7.987 | 7.999 | 8.011 | 8.024 | 8.036 | 8.048 | 8.061 | 8.073 |
| 810 | 8.073 | 8.086 | 8.098 | 8.110 | 8.123 | 8.135 | 8.147 | 8.160 | 8.172 | 8.185 | 8.197 |
| 820 | 8.197 | 8.209 | 8.222 | 8.234 | 8.247 | 8.259 | 8.272 | 8.284 | 8.296 | 8.309 | 8.321 |
| 830 | 8.321 | 8.334 | 8.346 | 8.359 | 8.371 | 8.384 | 8.396 | 8.409 | 8.421 | 8.434 | 8.446 |
| 840 | 8.446 | 8.459 | 8.471 | 8.484 | 8.496 | 8.509 | 8.521 | 8.534 | 8.546 | 8.559 | 8.571 |
| 850 | 8.571 | 8.584 | 8.597 | 8.609 | 8.622 | 8.634 | 8.647 | 8.659 | 8.672 | 8.685 | 8.697 |
| 860 | 8.697 | 8.710 | 8.722 | 8.735 | 8.748 | 8.760 | 8.773 | 8.785 | 8.798 | 8.811 | 8.823 |
| 870 | 8.823 | 8.836 | 8.849 | 8.861 | 8.874 | 8.887 | 8.899 | 8.912 | 8.925 | 8.937 | 8.950 |
| 880 | 8.950 | 8.963 | 8.975 | 8.988 | 9.001 | 9.014 | 9.026 | 9.039 | 9.052 | 9.065 | 9.077 |
| 890 | 9.077 | 9.090 | 9.103 | 9.115 | 9.128 | 9.141 | 9.154 | 9.167 | 9.179 | 9.192 | 9.205 |
| 900 | 9.205 | 9.218 | 9.230 | 9.243 | 9.256 | 9.269 | 9.282 | 9.294 | 9.307 | 9.320 | 9.333 |
| 910 | 9.333 | 9.346 | 9.359 | 9.371 | 9.384 | 9.397 | 9.410 | 9.423 | 9.436 | 9.449 | 9.461 |
| 920 | 9.461 | 9.474 | 9.487 | 9.500 | 9.513 | 9.526 | 9.539 | 9.552 | 9.565 | 9.578 | 9.590 |
| 930 | 9.590 | 9.603 | 9.616 | 9.629 | 9.642 | 9.655 | 9.668 | 9.681 | 9.694 | 9.707 | 9.720 |
| 940 | 9.720 | 9.733 | 9.746 | 9.759 | 9.772 | 9.785 | 9.798 | 9.811 | 9.824 | 9.837 | 9.850 |
| 950 | 9.850 | 9.863 | 9.876 | 9.889 | 9.902 | 9.915 | 9.928 | 9.941 | 9.954 | 9.967 | 9.980 |
| 960 | 9.980 | 9.993 | 10.006 | 10.019 | 10.032 | 10.046 | 10.059 | 10.072 | 10.085 | 10.098 | 10.111 |
| 970 | 10.111 | 10.124 | 10.137 | 10.150 | 10.163 | 10.177 | 10.190 | 10.203 | 10.216 | 10.229 | 10.242 |
| 980 | 10.242 | 10.255 | 10.268 | 10.282 | 10.295 | 10.308 | 10.321 | 10.334 | 10.347 | 10.361 | 10.374 |
| 990 | 10.374 | 10.387 | 10.400 | 10.413 | 10.427 | 10.440 | 10.453 | 10.466 | 10.480 | 10.493 | 10.506 |
| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

ITS-90 Table for type R thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 1000 | 10.506 | 10.519 | 10.532 | 10.546 | 10.559 | 10.572 | 10.585 | 10.599 | 10.612 | 10.625 | 10.638 |
| 1010 | 10.638 | 10.652 | 10.665 | 10.678 | 10.692 | 10.705 | 10.718 | 10.731 | 10.745 | 10.758 | 10.771 |
| 1020 | 10.771 | 10.785 | 10.798 | 10.811 | 10.825 | 10.838 | 10.851 | 10.865 | 10.878 | 10.891 | 10.905 |
| 1030 | 10.905 | 10.918 | 10.932 | 10.945 | 10.958 | 10.972 | 10.985 | 10.998 | 11.012 | 11.025 | 11.039 |
| 1040 | 11.039 | 11.052 | 11.065 | 11.079 | 11.092 | 11.106 | 11.119 | 11.132 | 11.146 | 11.159 | 11.173 |
| 1050 | 11.173 | 11.186 | 11.200 | 11.213 | 11.227 | 11.240 | 11.253 | 11.267 | 11.280 | 11.294 | 11.307 |
| 1060 | 11.307 | 11.321 | 11.334 | 11.348 | 11.361 | 11.375 | 11.388 | 11.402 | 11.415 | 11.429 | 11.442 |
| 1070 | 11.442 | 11.456 | 11.469 | 11.483 | 11.496 | 11.510 | 11.524 | 11.537 | 11.551 | 11.564 | 11.578 |
| 1080 | 11.578 | 11.591 | 11.605 | 11.618 | 11.632 | 11.646 | 11.659 | 11.673 | 11.686 | 11.700 | 11.714 |
| 1090 | 11.714 | 11.727 | 11.741 | 11.754 | 11.768 | 11.782 | 11.795 | 11.809 | 11.822 | 11.836 | 11.850 |
| 1100 | 11.850 | 11.863 | 11.877 | 11.891 | 11.904 | 11.918 | 11.931 | 11.945 | 11.959 | 11.972 | 11.986 |
| 1110 | 11.986 | 12.000 | 12.013 | 12.027 | 12.041 | 12.054 | 12.068 | 12.082 | 12.096 | 12.109 | 12.123 |
| 1120 | 12.123 | 12.137 | 12.150 | 12.164 | 12.178 | 12.191 | 12.205 | 12.219 | 12.233 | 12.246 | 12.260 |
| 1130 | 12.260 | 12.274 | 12.288 | 12.301 | 12.315 | 12.329 | 12.342 | 12.356 | 12.370 | 12.384 | 12.397 |
| 1140 | 12.397 | 12.411 | 12.425 | 12.439 | 12.453 | 12.466 | 12.480 | 12.494 | 12.508 | 12.521 | 12.535 |
| 1150 | 12.535 | 12.549 | 12.563 | 12.577 | 12.590 | 12.604 | 12.618 | 12.632 | 12.646 | 12.659 | 12.673 |
| 1160 | 12.673 | 12.687 | 12.701 | 12.715 | 12.729 | 12.742 | 12.756 | 12.770 | 12.784 | 12.798 | 12.812 |
| 1170 | 12.812 | 12.825 | 12.839 | 12.853 | 12.867 | 12.881 | 12.895 | 12.909 | 12.922 | 12.936 | 12.950 |
| 1180 | 12.950 | 12.964 | 12.978 | 12.992 | 13.006 | 13.019 | 13.033 | 13.047 | 13.061 | 13.075 | 13.089 |
| 1190 | 13.089 | 13.103 | 13.117 | 13.131 | 13.145 | 13.158 | 13.172 | 13.186 | 13.200 | 13.214 | 13.228 |
| 1200 | 13.228 | 13.242 | 13.256 | 13.270 | 13.284 | 13.298 | 13.311 | 13.325 | 13.339 | 13.353 | 13.367 |
| 1210 | 13.367 | 13.381 | 13.395 | 13.409 | 13.423 | 13.437 | 13.451 | 13.465 | 13.479 | 13.493 | 13.507 |
| 1220 | 13.507 | 13.521 | 13.535 | 13.549 | 13.563 | 13.577 | 13.590 | 13.604 | 13.618 | 13.632 | 13.646 |
| 1230 | 13.646 | 13.660 | 13.674 | 13.688 | 13.702 | 13.716 | 13.730 | 13.744 | 13.758 | 13.772 | 13.786 |
| 1240 | 13.786 | 13.800 | 13.814 | 13.828 | 13.842 | 13.856 | 13.870 | 13.884 | 13.898 | 13.912 | 13.926 |
| 1250 | 13.926 | 13.940 | 13.954 | 13.968 | 13.982 | 13.996 | 14.010 | 14.024 | 14.038 | 14.052 | 14.066 |
| 1260 | 14.066 | 14.081 | 14.095 | 14.109 | 14.123 | 14.137 | 14.151 | 14.165 | 14.179 | 14.193 | 14.207 |
| 1270 | 14.207 | 14.221 | 14.235 | 14.249 | 14.263 | 14.277 | 14.291 | 14.305 | 14.319 | 14.333 | 14.347 |
| 1280 | 14.347 | 14.361 | 14.375 | 14.390 | 14.404 | 14.418 | 14.432 | 14.446 | 14.460 | 14.474 | 14.488 |
| 1290 | 14.488 | 14.502 | 14.516 | 14.530 | 14.544 | 14.558 | 14.572 | 14.586 | 14.601 | 14.615 | 14.629 |
| 1300 | 14.629 | 14.643 | 14.657 | 14.671 | 14.685 | 14.699 | 14.713 | 14.727 | 14.741 | 14.755 | 14.770 |
| 1310 | 14.770 | 14.784 | 14.798 | 14.812 | 14.826 | 14.840 | 14.854 | 14.868 | 14.882 | 14.896 | 14.911 |
| 1320 | 14.911 | 14.925 | 14.939 | 14.953 | 14.967 | 14.981 | 14.995 | 15.009 | 15.023 | 15.037 | 15.052 |
| 1330 | 15.052 | 15.066 | 15.080 | 15.094 | 15.108 | 15.122 | 15.136 | 15.150 | 15.164 | 15.179 | 15.193 |
| 1340 | 15.193 | 15.207 | 15.221 | 15.235 | 15.249 | 15.263 | 15.277 | 15.291 | 15.306 | 15.320 | 15.334 |
| 1350 | 15.334 | 15.348 | 15.362 | 15.376 | 15.390 | 15.404 | 15.419 | 15.433 | 15.447 | 15.461 | 15.475 |
| 1360 | 15.475 | 15.489 | 15.503 | 15.517 | 15.531 | 15.546 | 15.560 | 15.574 | 15.588 | 15.602 | 15.616 |
| 1370 | 15.616 | 15.630 | 15.645 | 15.659 | 15.673 | 15.687 | 15.701 | 15.715 | 15.729 | 15.743 | 15.758 |
| 1380 | 15.758 | 15.772 | 15.786 | 15.800 | 15.814 | 15.828 | 15.842 | 15.856 | 15.871 | 15.885 | 15.899 |
| 1390 | 15.899 | 15.913 | 15.927 | 15.941 | 15.955 | 15.969 | 15.984 | 15.998 | 16.012 | 16.026 | 16.040 |
| 1400 | 16.040 | 16.054 | 16.068 | 16.082 | 16.097 | 16.111 | 16.125 | 16.139 | 16.153 | 16.167 | 16.181 |
| 1410 | 16.181 | 16.196 | 16.210 | 16.224 | 16.238 | 16.252 | 16.266 | 16.280 | 16.294 | 16.309 | 16.323 |
| 1420 | 16.323 | 16.337 | 16.351 | 16.365 | 16.379 | 16.393 | 16.407 | 16.422 | 16.436 | 16.450 | 16.464 |
| 1430 | 16.464 | 16.478 | 16.492 | 16.506 | 16.520 | 16.534 | 16.549 | 16.563 | 16.577 | 16.591 | 16.605 |
| 1440 | 16.605 | 16.619 | 16.633 | 16.647 | 16.662 | 16.676 | 16.690 | 16.704 | 16.718 | 16.732 | 16.746 |
| 1450 | 16.746 | 16.760 | 16.774 | 16.789 | 16.803 | 16.817 | 16.831 | 16.845 | 16.859 | 16.873 | 16.887 |
| 1460 | 16.887 | 16.901 | 16.915 | 16.930 | 16.944 | 16.958 | 16.972 | 16.986 | 17.000 | 17.014 | 17.028 |
| 1470 | 17.028 | 17.042 | 17.056 | 17.071 | 17.085 | 17.099 | 17.113 | 17.127 | 17.141 | 17.155 | 17.169 |
| 1480 | 17.169 | 17.183 | 17.197 | 17.211 | 17.225 | 17.240 | 17.254 | 17.268 | 17.282 | 17.296 | 17.310 |
| 1490 | 17.310 | 17.324 | 17.338 | 17.352 | 17.366 | 17.380 | 17.394 | 17.408 | 17.423 | 17.437 | 17.451 |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|

ITS-90 Table for type R thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 1500 | 17.451 | 17.465 | 17.479 | 17.493 | 17.507 | 17.521 | 17.535 | 17.549 | 17.563 | 17.577 | 17.591 |
| 1510 | 17.591 | 17.605 | 17.619 | 17.633 | 17.647 | 17.661 | 17.676 | 17.690 | 17.704 | 17.718 | 17.732 |
| 1520 | 17.732 | 17.746 | 17.760 | 17.774 | 17.788 | 17.802 | 17.816 | 17.830 | 17.844 | 17.858 | 17.872 |
| 1530 | 17.872 | 17.886 | 17.900 | 17.914 | 17.928 | 17.942 | 17.956 | 17.970 | 17.984 | 17.998 | 18.012 |
| 1540 | 18.012 | 18.026 | 18.040 | 18.054 | 18.068 | 18.082 | 18.096 | 18.110 | 18.124 | 18.138 | 18.152 |
| 1550 | 18.152 | 18.166 | 18.180 | 18.194 | 18.208 | 18.222 | 18.236 | 18.250 | 18.264 | 18.278 | 18.292 |
| 1560 | 18.292 | 18.306 | 18.320 | 18.334 | 18.348 | 18.362 | 18.376 | 18.390 | 18.404 | 18.417 | 18.431 |
| 1570 | 18.431 | 18.445 | 18.459 | 18.473 | 18.487 | 18.501 | 18.515 | 18.529 | 18.543 | 18.557 | 18.571 |
| 1580 | 18.571 | 18.585 | 18.599 | 18.613 | 18.627 | 18.640 | 18.654 | 18.668 | 18.682 | 18.696 | 18.710 |
| 1590 | 18.710 | 18.724 | 18.738 | 18.752 | 18.766 | 18.779 | 18.793 | 18.807 | 18.821 | 18.835 | 18.849 |
| 1600 | 18.849 | 18.863 | 18.877 | 18.891 | 18.904 | 18.918 | 18.932 | 18.946 | 18.960 | 18.974 | 18.988 |
| 1610 | 18.988 | 19.002 | 19.015 | 19.029 | 19.043 | 19.057 | 19.071 | 19.085 | 19.098 | 19.112 | 19.126 |
| 1620 | 19.126 | 19.140 | 19.154 | 19.168 | 19.181 | 19.195 | 19.209 | 19.223 | 19.237 | 19.250 | 19.264 |
| 1630 | 19.264 | 19.278 | 19.292 | 19.306 | 19.319 | 19.333 | 19.347 | 19.361 | 19.375 | 19.388 | 19.402 |
| 1640 | 19.402 | 19.416 | 19.430 | 19.444 | 19.457 | 19.471 | 19.485 | 19.499 | 19.512 | 19.526 | 19.540 |
| 1650 | 19.540 | 19.554 | 19.567 | 19.581 | 19.595 | 19.609 | 19.622 | 19.636 | 19.650 | 19.663 | 19.677 |
| 1660 | 19.677 | 19.691 | 19.705 | 19.718 | 19.732 | 19.746 | 19.759 | 19.773 | 19.787 | 19.800 | 19.814 |
| 1670 | 19.814 | 19.828 | 19.841 | 19.855 | 19.869 | 19.882 | 19.896 | 19.910 | 19.923 | 19.937 | 19.951 |
| 1680 | 19.951 | 19.964 | 19.978 | 19.992 | 20.005 | 20.019 | 20.032 | 20.046 | 20.060 | 20.073 | 20.087 |
| 1690 | 20.087 | 20.100 | 20.114 | 20.127 | 20.141 | 20.154 | 20.168 | 20.181 | 20.195 | 20.208 | 20.222 |
| 1700 | 20.222 | 20.235 | 20.249 | 20.262 | 20.275 | 20.289 | 20.302 | 20.316 | 20.329 | 20.342 | 20.356 |
| 1710 | 20.356 | 20.369 | 20.382 | 20.396 | 20.409 | 20.422 | 20.436 | 20.449 | 20.462 | 20.475 | 20.488 |
| 1720 | 20.488 | 20.502 | 20.515 | 20.528 | 20.541 | 20.554 | 20.567 | 20.581 | 20.594 | 20.607 | 20.620 |
| 1730 | 20.620 | 20.633 | 20.646 | 20.659 | 20.672 | 20.685 | 20.698 | 20.711 | 20.724 | 20.736 | 20.749 |
| 1740 | 20.749 | 20.762 | 20.775 | 20.788 | 20.801 | 20.813 | 20.826 | 20.839 | 20.852 | 20.864 | 20.877 |
| 1750 | 20.877 | 20.890 | 20.902 | 20.915 | 20.928 | 20.940 | 20.953 | 20.965 | 20.978 | 20.990 | 21.003 |
| 1760 | 21.003 | 21.015 | 21.027 | 21.040 | 21.052 | 21.065 | 21.077 | 21.089 | 21.101 | | |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|

```
**********************************
* This section contains coefficients for type R thermocouples for
* the two subranges of temperature listed below.  The coefficients
* are in units of °C and mV and are listed in the order of constant
* term up to the highest order.  The equation is of the form
* E = sum(i=0 to n) c_i t^i.
*
*     Temperature Range (°C)
*      -50.000 to 1064.180
*      1064.180 to 1664.500
*      1664.500 to 1768.100
**********************************
name: reference function on ITS-90
type: R
temperature units: °C
emf units: mV
range:   -50.000,   1064.180,  9
 0.000000000000E+00
 0.528961729765E-02
 0.139166589782E-04
-0.238855693017E-07
 0.356916001063E-10
-0.462347666298E-13
 0.500777441034E-16
-0.373105886191E-19
 0.157716482367E-22
-0.281038625251E-26
range:  1064.180,   1664.500,  5
 0.295157925316E+01
-0.252061251332E-02
 0.159564501865E-04
-0.764085947576E-08
 0.205305291024E-11
-0.293359668173E-15
range:  1664.500,   1768.100,  4
 0.152232118209E+03
-0.268819888545E+00
 0.171280280471E-03
-0.345895706453E-07
-0.934633971046E-14
```

```
**********************************
* This section contains coefficients of approximate inverse
* functions for type R thermocouples for the subranges of
* temperature and voltage listed below. The range of errors of
* the approximate inverse function for each subrange is also given.
* The coefficients are in units of °C and mV and are listed in
* the order of constant term up to the highest order.
* The equation is of the form t_90 = d_0 + d_1*E + d_2*E^2 + ...
*     + d_n*E^n,
* where E is in mV and t_90 is in °C.
*
*      Temperature        Voltage              Error
*         range             range               range
*         (°C)              (mV)                (° C)
*      -50. to 250.      -0.226 to 1.923    -0.02 to 0.02
*      250. to 1200.      1.923 to 13.228   -0.005 to 0.005
*     1064. to 1664.5    11.361 to 19.739   -0.0005 to 0.001
*    1664.5 to 1768.1    19.739 to 21.103    -0.001 to 0.002
**********************************************************
Inverse coefficients for type R:

Temperature   -50.           250.          1064.          1664.5
  Range:      250.          1200.          1664.5         1768.1

  Voltage   -0.226          1.923         11.361         19.739
  Range:     1.923         13.228         19.739         21.103

       0.0000000E+00  1.334584505E+01 -8.199599416E+01  3.406177836E+04
       1.8891380E+02  1.472644573E+02  1.553962042E+02 -7.023729171E+03
      -9.3835290E+01 -1.844024844E+01 -8.342197663E+00  5.582903813E+02
       1.3068619E+02  4.031129726E+00  4.279433549E-01 -1.952394635E+01
      -2.2703580E+02 -6.249428360E-01 -1.191577910E-02  2.560740231E-01
       3.5145659E+02  6.468412046E-02  1.492290091E-04  0.000000000E+00
      -3.8953900E+02 -4.458750426E-03  0.000000000E+00  0.000000000E+00
       2.8239471E+02  1.994710149E-04  0.000000000E+00  0.000000000E+00
      -1.2607281E+02 -5.313401790E-06  0.000000000E+00  0.000000000E+00
       3.1353611E+01  6.481976217E-08  0.000000000E+00  0.000000000E+00
      -3.3187769E+00  0.000000000E+00  0.000000000E+00  0.000000000E+00

  Error      -0.02          -0.005         -0.0005        -0.001
  Range:      0.02           0.005          0.001          0.002
```

ITS-90 Table for type S thermocouple

| °C | 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| -50 | -0.236 | | | | | | | | | | |
| -40 | -0.194 | -0.199 | -0.203 | -0.207 | -0.211 | -0.215 | -0.219 | -0.224 | -0.228 | -0.232 | -0.236 |
| -30 | -0.150 | -0.155 | -0.159 | -0.164 | -0.168 | -0.173 | -0.177 | -0.181 | -0.186 | -0.190 | -0.194 |
| -20 | -0.103 | -0.108 | -0.113 | -0.117 | -0.122 | -0.127 | -0.132 | -0.136 | -0.141 | -0.146 | -0.150 |
| -10 | -0.053 | -0.058 | -0.063 | -0.068 | -0.073 | -0.078 | -0.083 | -0.088 | -0.093 | -0.098 | -0.103 |
| 0 | 0.000 | -0.005 | -0.011 | -0.016 | -0.021 | -0.027 | -0.032 | -0.037 | -0.042 | -0.048 | -0.053 |

| °C | 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 |
|---|---|---|---|---|---|---|---|---|---|---|---|

SENSORTEC, INC.

ITS-90 Table for type S thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 0 | 0.000 | 0.005 | 0.011 | 0.016 | 0.022 | 0.027 | 0.033 | 0.038 | 0.044 | 0.050 | 0.055 |
| 10 | 0.055 | 0.061 | 0.067 | 0.072 | 0.078 | 0.084 | 0.090 | 0.095 | 0.101 | 0.107 | 0.113 |
| 20 | 0.113 | 0.119 | 0.125 | 0.131 | 0.137 | 0.143 | 0.149 | 0.155 | 0.161 | 0.167 | 0.173 |
| 30 | 0.173 | 0.179 | 0.185 | 0.191 | 0.197 | 0.204 | 0.210 | 0.216 | 0.222 | 0.229 | 0.235 |
| 40 | 0.235 | 0.241 | 0.248 | 0.254 | 0.260 | 0.267 | 0.273 | 0.280 | 0.286 | 0.292 | 0.299 |
| 50 | 0.299 | 0.305 | 0.312 | 0.319 | 0.325 | 0.332 | 0.338 | 0.345 | 0.352 | 0.358 | 0.365 |
| 60 | 0.365 | 0.372 | 0.378 | 0.385 | 0.392 | 0.399 | 0.405 | 0.412 | 0.419 | 0.426 | 0.433 |
| 70 | 0.433 | 0.440 | 0.446 | 0.453 | 0.460 | 0.467 | 0.474 | 0.481 | 0.488 | 0.495 | 0.502 |
| 80 | 0.502 | 0.509 | 0.516 | 0.523 | 0.530 | 0.538 | 0.545 | 0.552 | 0.559 | 0.566 | 0.573 |
| 90 | 0.573 | 0.580 | 0.588 | 0.595 | 0.602 | 0.609 | 0.617 | 0.624 | 0.631 | 0.639 | 0.646 |
| 100 | 0.646 | 0.653 | 0.661 | 0.668 | 0.675 | 0.683 | 0.690 | 0.698 | 0.705 | 0.713 | 0.720 |
| 110 | 0.720 | 0.727 | 0.735 | 0.743 | 0.750 | 0.758 | 0.765 | 0.773 | 0.780 | 0.788 | 0.795 |
| 120 | 0.795 | 0.803 | 0.811 | 0.818 | 0.826 | 0.834 | 0.841 | 0.849 | 0.857 | 0.865 | 0.872 |
| 130 | 0.872 | 0.880 | 0.888 | 0.896 | 0.903 | 0.911 | 0.919 | 0.927 | 0.935 | 0.942 | 0.950 |
| 140 | 0.950 | 0.958 | 0.966 | 0.974 | 0.982 | 0.990 | 0.998 | 1.006 | 1.013 | 1.021 | 1.029 |
| 150 | 1.029 | 1.037 | 1.045 | 1.053 | 1.061 | 1.069 | 1.077 | 1.085 | 1.094 | 1.102 | 1.110 |
| 160 | 1.110 | 1.118 | 1.126 | 1.134 | 1.142 | 1.150 | 1.158 | 1.167 | 1.175 | 1.183 | 1.191 |
| 170 | 1.191 | 1.199 | 1.207 | 1.216 | 1.224 | 1.232 | 1.240 | 1.249 | 1.257 | 1.265 | 1.273 |
| 180 | 1.273 | 1.282 | 1.290 | 1.298 | 1.307 | 1.315 | 1.323 | 1.332 | 1.340 | 1.348 | 1.357 |
| 190 | 1.357 | 1.365 | 1.373 | 1.382 | 1.390 | 1.399 | 1.407 | 1.415 | 1.424 | 1.432 | 1.441 |
| 200 | 1.441 | 1.449 | 1.458 | 1.466 | 1.475 | 1.483 | 1.492 | 1.500 | 1.509 | 1.517 | 1.526 |
| 210 | 1.526 | 1.534 | 1.543 | 1.551 | 1.560 | 1.569 | 1.577 | 1.586 | 1.594 | 1.603 | 1.612 |
| 220 | 1.612 | 1.620 | 1.629 | 1.638 | 1.646 | 1.655 | 1.663 | 1.672 | 1.681 | 1.690 | 1.698 |
| 230 | 1.698 | 1.707 | 1.716 | 1.724 | 1.733 | 1.742 | 1.751 | 1.759 | 1.768 | 1.777 | 1.786 |
| 240 | 1.786 | 1.794 | 1.803 | 1.812 | 1.821 | 1.829 | 1.838 | 1.847 | 1.856 | 1.865 | 1.874 |
| 250 | 1.874 | 1.882 | 1.891 | 1.900 | 1.909 | 1.918 | 1.927 | 1.936 | 1.944 | 1.953 | 1.962 |
| 260 | 1.962 | 1.971 | 1.980 | 1.989 | 1.998 | 2.007 | 2.016 | 2.025 | 2.034 | 2.043 | 2.052 |
| 270 | 2.052 | 2.061 | 2.070 | 2.078 | 2.087 | 2.096 | 2.105 | 2.114 | 2.123 | 2.132 | 2.141 |
| 280 | 2.141 | 2.151 | 2.160 | 2.169 | 2.178 | 2.187 | 2.196 | 2.205 | 2.214 | 2.223 | 2.232 |
| 290 | 2.232 | 2.241 | 2.250 | 2.259 | 2.268 | 2.277 | 2.287 | 2.296 | 2.305 | 2.314 | 2.323 |
| 300 | 2.323 | 2.332 | 2.341 | 2.350 | 2.360 | 2.369 | 2.378 | 2.387 | 2.396 | 2.405 | 2.415 |
| 310 | 2.415 | 2.424 | 2.433 | 2.442 | 2.451 | 2.461 | 2.470 | 2.479 | 2.488 | 2.497 | 2.507 |
| 320 | 2.507 | 2.516 | 2.525 | 2.534 | 2.544 | 2.553 | 2.562 | 2.571 | 2.581 | 2.590 | 2.599 |
| 330 | 2.599 | 2.609 | 2.618 | 2.627 | 2.636 | 2.646 | 2.655 | 2.664 | 2.674 | 2.683 | 2.692 |
| 340 | 2.692 | 2.702 | 2.711 | 2.720 | 2.730 | 2.739 | 2.748 | 2.758 | 2.767 | 2.776 | 2.786 |
| 350 | 2.786 | 2.795 | 2.805 | 2.814 | 2.823 | 2.833 | 2.842 | 2.851 | 2.861 | 2.870 | 2.880 |
| 360 | 2.880 | 2.889 | 2.899 | 2.908 | 2.917 | 2.927 | 2.936 | 2.946 | 2.955 | 2.965 | 2.974 |
| 370 | 2.974 | 2.983 | 2.993 | 3.002 | 3.012 | 3.021 | 3.031 | 3.040 | 3.050 | 3.059 | 3.069 |
| 380 | 3.069 | 3.078 | 3.088 | 3.097 | 3.107 | 3.116 | 3.126 | 3.135 | 3.145 | 3.154 | 3.164 |
| 390 | 3.164 | 3.173 | 3.183 | 3.192 | 3.202 | 3.212 | 3.221 | 3.231 | 3.240 | 3.250 | 3.259 |
| 400 | 3.259 | 3.269 | 3.279 | 3.288 | 3.298 | 3.307 | 3.317 | 3.326 | 3.336 | 3.346 | 3.355 |
| 410 | 3.355 | 3.365 | 3.374 | 3.384 | 3.394 | 3.403 | 3.413 | 3.423 | 3.432 | 3.442 | 3.451 |
| 420 | 3.451 | 3.461 | 3.471 | 3.480 | 3.490 | 3.500 | 3.509 | 3.519 | 3.529 | 3.538 | 3.548 |
| 430 | 3.548 | 3.558 | 3.567 | 3.577 | 3.587 | 3.596 | 3.606 | 3.616 | 3.626 | 3.635 | 3.645 |
| 440 | 3.645 | 3.655 | 3.664 | 3.674 | 3.684 | 3.694 | 3.703 | 3.713 | 3.723 | 3.732 | 3.742 |
| 450 | 3.742 | 3.752 | 3.762 | 3.771 | 3.781 | 3.791 | 3.801 | 3.810 | 3.820 | 3.830 | 3.840 |
| 460 | 3.840 | 3.850 | 3.859 | 3.869 | 3.879 | 3.889 | 3.898 | 3.908 | 3.918 | 3.928 | 3.938 |
| 470 | 3.938 | 3.947 | 3.957 | 3.967 | 3.977 | 3.987 | 3.997 | 4.006 | 4.016 | 4.026 | 4.036 |
| 480 | 4.036 | 4.046 | 4.056 | 4.065 | 4.075 | 4.085 | 4.095 | 4.105 | 4.115 | 4.125 | 4.134 |
| 490 | 4.134 | 4.144 | 4.154 | 4.164 | 4.174 | 4.184 | 4.194 | 4.204 | 4.213 | 4.223 | 4.233 |
| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

ITS-90 Table for type S thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| 500 | 4.233 | 4.243 | 4.253 | 4.263 | 4.273 | 4.283 | 4.293 | 4.303 | 4.313 | 4.323 | 4.332 |
| 510 | 4.332 | 4.342 | 4.352 | 4.362 | 4.372 | 4.382 | 4.392 | 4.402 | 4.412 | 4.422 | 4.432 |
| 520 | 4.432 | 4.442 | 4.452 | 4.462 | 4.472 | 4.482 | 4.492 | 4.502 | 4.512 | 4.522 | 4.532 |
| 530 | 4.532 | 4.542 | 4.552 | 4.562 | 4.572 | 4.582 | 4.592 | 4.602 | 4.612 | 4.622 | 4.632 |
| 540 | 4.632 | 4.642 | 4.652 | 4.662 | 4.672 | 4.682 | 4.692 | 4.702 | 4.712 | 4.722 | 4.732 |
| 550 | 4.732 | 4.742 | 4.752 | 4.762 | 4.772 | 4.782 | 4.793 | 4.803 | 4.813 | 4.823 | 4.833 |
| 560 | 4.833 | 4.843 | 4.853 | 4.863 | 4.873 | 4.883 | 4.893 | 4.904 | 4.914 | 4.924 | 4.934 |
| 570 | 4.934 | 4.944 | 4.954 | 4.964 | 4.974 | 4.984 | 4.995 | 5.005 | 5.015 | 5.025 | 5.035 |
| 580 | 5.035 | 5.045 | 5.055 | 5.066 | 5.076 | 5.086 | 5.096 | 5.106 | 5.116 | 5.127 | 5.137 |
| 590 | 5.137 | 5.147 | 5.157 | 5.167 | 5.178 | 5.188 | 5.198 | 5.208 | 5.218 | 5.228 | 5.239 |
| 600 | 5.239 | 5.249 | 5.259 | 5.269 | 5.280 | 5.290 | 5.300 | 5.310 | 5.320 | 5.331 | 5.341 |
| 610 | 5.341 | 5.351 | 5.361 | 5.372 | 5.382 | 5.392 | 5.402 | 5.413 | 5.423 | 5.433 | 5.443 |
| 620 | 5.443 | 5.454 | 5.464 | 5.474 | 5.485 | 5.495 | 5.505 | 5.515 | 5.526 | 5.536 | 5.546 |
| 630 | 5.546 | 5.557 | 5.567 | 5.577 | 5.588 | 5.598 | 5.608 | 5.618 | 5.629 | 5.639 | 5.649 |
| 640 | 5.649 | 5.660 | 5.670 | 5.680 | 5.691 | 5.701 | 5.712 | 5.722 | 5.732 | 5.743 | 5.753 |
| 650 | 5.753 | 5.763 | 5.774 | 5.784 | 5.794 | 5.805 | 5.815 | 5.826 | 5.836 | 5.846 | 5.857 |
| 660 | 5.857 | 5.867 | 5.878 | 5.888 | 5.898 | 5.909 | 5.919 | 5.930 | 5.940 | 5.950 | 5.961 |
| 670 | 5.961 | 5.971 | 5.982 | 5.992 | 6.003 | 6.013 | 6.024 | 6.034 | 6.044 | 6.055 | 6.065 |
| 680 | 6.065 | 6.076 | 6.086 | 6.097 | 6.107 | 6.118 | 6.128 | 6.139 | 6.149 | 6.160 | 6.170 |
| 690 | 6.170 | 6.181 | 6.191 | 6.202 | 6.212 | 6.223 | 6.233 | 6.244 | 6.254 | 6.265 | 6.275 |
| 700 | 6.275 | 6.286 | 6.296 | 6.307 | 6.317 | 6.328 | 6.338 | 6.349 | 6.360 | 6.370 | 6.381 |
| 710 | 6.381 | 6.391 | 6.402 | 6.412 | 6.423 | 6.434 | 6.444 | 6.455 | 6.465 | 6.476 | 6.486 |
| 720 | 6.486 | 6.497 | 6.508 | 6.518 | 6.529 | 6.539 | 6.550 | 6.561 | 6.571 | 6.582 | 6.593 |
| 730 | 6.593 | 6.603 | 6.614 | 6.624 | 6.635 | 6.646 | 6.656 | 6.667 | 6.678 | 6.688 | 6.699 |
| 740 | 6.699 | 6.710 | 6.720 | 6.731 | 6.742 | 6.752 | 6.763 | 6.774 | 6.784 | 6.795 | 6.806 |
| 750 | 6.806 | 6.817 | 6.827 | 6.838 | 6.849 | 6.859 | 6.870 | 6.881 | 6.892 | 6.902 | 6.913 |
| 760 | 6.913 | 6.924 | 6.934 | 6.945 | 6.956 | 6.967 | 6.977 | 6.988 | 6.999 | 7.010 | 7.020 |
| 770 | 7.020 | 7.031 | 7.042 | 7.053 | 7.064 | 7.074 | 7.085 | 7.096 | 7.107 | 7.117 | 7.128 |
| 780 | 7.128 | 7.139 | 7.150 | 7.161 | 7.172 | 7.182 | 7.193 | 7.204 | 7.215 | 7.226 | 7.236 |
| 790 | 7.236 | 7.247 | 7.258 | 7.269 | 7.280 | 7.291 | 7.302 | 7.312 | 7.323 | 7.334 | 7.345 |
| 800 | 7.345 | 7.356 | 7.367 | 7.378 | 7.388 | 7.399 | 7.410 | 7.421 | 7.432 | 7.443 | 7.454 |
| 810 | 7.454 | 7.465 | 7.476 | 7.487 | 7.497 | 7.508 | 7.519 | 7.530 | 7.541 | 7.552 | 7.563 |
| 820 | 7.563 | 7.574 | 7.585 | 7.596 | 7.607 | 7.618 | 7.629 | 7.640 | 7.651 | 7.662 | 7.673 |
| 830 | 7.673 | 7.684 | 7.695 | 7.706 | 7.717 | 7.728 | 7.739 | 7.750 | 7.761 | 7.772 | 7.783 |
| 840 | 7.783 | 7.794 | 7.805 | 7.816 | 7.827 | 7.838 | 7.849 | 7.860 | 7.871 | 7.882 | 7.893 |
| 850 | 7.893 | 7.904 | 7.915 | 7.926 | 7.937 | 7.948 | 7.959 | 7.970 | 7.981 | 7.992 | 8.003 |
| 860 | 8.003 | 8.014 | 8.026 | 8.037 | 8.048 | 8.059 | 8.070 | 8.081 | 8.092 | 8.103 | 8.114 |
| 870 | 8.114 | 8.125 | 8.137 | 8.148 | 8.159 | 8.170 | 8.181 | 8.192 | 8.203 | 8.214 | 8.226 |
| 880 | 8.226 | 8.237 | 8.248 | 8.259 | 8.270 | 8.281 | 8.293 | 8.304 | 8.315 | 8.326 | 8.337 |
| 890 | 8.337 | 8.348 | 8.360 | 8.371 | 8.382 | 8.393 | 8.404 | 8.416 | 8.427 | 8.438 | 8.449 |
| 900 | 8.449 | 8.460 | 8.472 | 8.483 | 8.494 | 8.505 | 8.517 | 8.528 | 8.539 | 8.550 | 8.562 |
| 910 | 8.562 | 8.573 | 8.584 | 8.595 | 8.607 | 8.618 | 8.629 | 8.640 | 8.652 | 8.663 | 8.674 |
| 920 | 8.674 | 8.685 | 8.697 | 8.708 | 8.719 | 8.731 | 8.742 | 8.753 | 8.765 | 8.776 | 8.787 |
| 930 | 8.787 | 8.798 | 8.810 | 8.821 | 8.832 | 8.844 | 8.855 | 8.866 | 8.878 | 8.889 | 8.900 |
| 940 | 8.900 | 8.912 | 8.923 | 8.935 | 8.946 | 8.957 | 8.969 | 8.980 | 8.991 | 9.003 | 9.014 |
| 950 | 9.014 | 9.025 | 9.037 | 9.048 | 9.060 | 9.071 | 9.082 | 9.094 | 9.105 | 9.117 | 9.128 |
| 960 | 9.128 | 9.139 | 9.151 | 9.162 | 9.174 | 9.185 | 9.197 | 9.208 | 9.219 | 9.231 | 9.242 |
| 970 | 9.242 | 9.254 | 9.265 | 9.277 | 9.288 | 9.300 | 9.311 | 9.323 | 9.334 | 9.345 | 9.357 |
| 980 | 9.357 | 9.368 | 9.380 | 9.391 | 9.403 | 9.414 | 9.426 | 9.437 | 9.449 | 9.460 | 9.472 |
| 990 | 9.472 | 9.483 | 9.495 | 9.506 | 9.518 | 9.529 | 9.541 | 9.552 | 9.564 | 9.576 | 9.587 |
| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

ITS-90 Table for type S thermocouple3

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV5 | | | | | | |
| 1000 | 9.587 | 9.599 | 9.610 | 9.622 | 9.633 | 9.645 | 9.656 | 9.668 | 9.680 | 9.691 | 9.703 |
| 1010 | 9.703 | 9.714 | 9.726 | 9.737 | 9.749 | 9.761 | 9.772 | 9.784 | 9.795 | 9.807 | 9.819 |
| 1020 | 9.819 | 9.830 | 9.842 | 9.853 | 9.865 | 9.877 | 9.888 | 9.900 | 9.911 | 9.923 | 9.935 |
| 1030 | 9.935 | 9.946 | 9.958 | 9.970 | 9.981 | 9.993 | 10.005 | 10.016 | 10.028 | 10.040 | 10.051 |
| 1040 | 10.051 | 10.063 | 10.075 | 10.086 | 10.098 | 10.110 | 10.121 | 10.133 | 10.145 | 10.156 | 10.168 |
| 1050 | 10.168 | 10.180 | 10.191 | 10.203 | 10.215 | 10.227 | 10.238 | 10.250 | 10.262 | 10.273 | 10.285 |
| 1060 | 10.285 | 10.297 | 10.309 | 10.320 | 10.332 | 10.344 | 10.356 | 10.367 | 10.379 | 10.391 | 10.403 |
| 1070 | 10.403 | 10.414 | 10.426 | 10.438 | 10.450 | 10.461 | 10.473 | 10.485 | 10.497 | 10.509 | 10.520 |
| 1080 | 10.520 | 10.532 | 10.544 | 10.556 | 10.567 | 10.579 | 10.591 | 10.603 | 10.615 | 10.626 | 10.638 |
| 1090 | 10.638 | 10.650 | 10.662 | 10.674 | 10.686 | 10.697 | 10.709 | 10.721 | 10.733 | 10.745 | 10.757 |
| 1100 | 10.757 | 10.768 | 10.780 | 10.792 | 10.804 | 10.816 | 10.828 | 10.839 | 10.851 | 10.863 | 10.875 |
| 1110 | 10.875 | 10.887 | 10.899 | 10.911 | 10.922 | 10.934 | 10.946 | 10.958 | 10.970 | 10.982 | 10.994 |
| 1120 | 10.994 | 11.006 | 11.017 | 11.029 | 11.041 | 11.053 | 11.065 | 11.077 | 11.089 | 11.101 | 11.113 |
| 1130 | 11.113 | 11.125 | 11.136 | 11.148 | 11.160 | 11.172 | 11.184 | 11.196 | 11.208 | 11.220 | 11.232 |
| 1140 | 11.232 | 11.244 | 11.256 | 11.268 | 11.280 | 11.291 | 11.303 | 11.315 | 11.327 | 11.339 | 11.351 |
| 1150 | 11.351 | 11.363 | 11.375 | 11.387 | 11.399 | 11.411 | 11.423 | 11.435 | 11.447 | 11.459 | 11.471 |
| 1160 | 11.471 | 11.483 | 11.495 | 11.507 | 11.519 | 11.531 | 11.542 | 11.554 | 11.566 | 11.578 | 11.590 |
| 1170 | 11.590 | 11.602 | 11.614 | 11.626 | 11.638 | 11.650 | 11.662 | 11.674 | 11.686 | 11.698 | 11.710 |
| 1180 | 11.710 | 11.722 | 11.734 | 11.746 | 11.758 | 11.770 | 11.782 | 11.794 | 11.806 | 11.818 | 11.830 |
| 1190 | 11.830 | 11.842 | 11.854 | 11.866 | 11.878 | 11.890 | 11.902 | 11.914 | 11.926 | 11.939 | 11.951 |
| 1200 | 11.951 | 11.963 | 11.975 | 11.987 | 11.999 | 12.011 | 12.023 | 12.035 | 12.047 | 12.059 | 12.071 |
| 1210 | 12.071 | 12.083 | 12.095 | 12.107 | 12.119 | 12.131 | 12.143 | 12.155 | 12.167 | 12.179 | 12.191 |
| 1220 | 12.191 | 12.203 | 12.216 | 12.228 | 12.240 | 12.252 | 12.264 | 12.276 | 12.288 | 12.300 | 12.312 |
| 1230 | 12.312 | 12.324 | 12.336 | 12.348 | 12.360 | 12.372 | 12.384 | 12.397 | 12.409 | 12.421 | 12.433 |
| 1240 | 12.433 | 12.445 | 12.457 | 12.469 | 12.481 | 12.493 | 12.505 | 12.517 | 12.529 | 12.542 | 12.554 |
| 1250 | 12.554 | 12.566 | 12.578 | 12.590 | 12.602 | 12.614 | 12.626 | 12.638 | 12.650 | 12.662 | 12.675 |
| 1260 | 12.675 | 12.687 | 12.699 | 12.711 | 12.723 | 12.735 | 12.747 | 12.759 | 12.771 | 12.783 | 12.796 |
| 1270 | 12.796 | 12.808 | 12.820 | 12.832 | 12.844 | 12.856 | 12.868 | 12.880 | 12.892 | 12.905 | 12.917 |
| 1280 | 12.917 | 12.929 | 12.941 | 12.953 | 12.965 | 12.977 | 12.989 | 13.001 | 13.014 | 13.026 | 13.038 |
| 1290 | 13.038 | 13.050 | 13.062 | 13.074 | 13.086 | 13.098 | 13.111 | 13.123 | 13.135 | 13.147 | 13.159 |
| 1300 | 13.159 | 13.171 | 13.183 | 13.195 | 13.208 | 13.220 | 13.232 | 13.244 | 13.256 | 13.268 | 13.280 |
| 1310 | 13.280 | 13.292 | 13.305 | 13.317 | 13.329 | 13.341 | 13.353 | 13.365 | 13.377 | 13.390 | 13.402 |
| 1320 | 13.402 | 13.414 | 13.426 | 13.438 | 13.450 | 13.462 | 13.474 | 13.487 | 13.499 | 13.511 | 13.523 |
| 1330 | 13.523 | 13.535 | 13.547 | 13.559 | 13.572 | 13.584 | 13.596 | 13.608 | 13.620 | 13.632 | 13.644 |
| 1340 | 13.644 | 13.657 | 13.669 | 13.681 | 13.693 | 13.705 | 13.717 | 13.729 | 13.742 | 13.754 | 13.766 |
| 1350 | 13.766 | 13.778 | 13.790 | 13.802 | 13.814 | 13.826 | 13.839 | 13.851 | 13.863 | 13.875 | 13.887 |
| 1360 | 13.887 | 13.899 | 13.911 | 13.924 | 13.936 | 13.948 | 13.960 | 13.972 | 13.984 | 13.996 | 14.009 |
| 1370 | 14.009 | 14.021 | 14.033 | 14.045 | 14.057 | 14.069 | 14.081 | 14.094 | 14.106 | 14.118 | 14.130 |
| 1380 | 14.130 | 14.142 | 14.154 | 14.166 | 14.178 | 14.191 | 14.203 | 14.215 | 14.227 | 14.239 | 14.251 |
| 1390 | 14.251 | 14.263 | 14.276 | 14.288 | 14.300 | 14.312 | 14.324 | 14.336 | 14.348 | 14.360 | 14.373 |
| 1400 | 14.373 | 14.385 | 14.397 | 14.409 | 14.421 | 14.433 | 14.445 | 14.457 | 14.470 | 14.482 | 14.494 |
| 1410 | 14.494 | 14.506 | 14.518 | 14.530 | 14.542 | 14.554 | 14.567 | 14.579 | 14.591 | 14.603 | 14.615 |
| 1420 | 14.615 | 14.627 | 14.639 | 14.651 | 14.664 | 14.676 | 14.688 | 14.700 | 14.712 | 14.724 | 14.736 |
| 1430 | 14.736 | 14.748 | 14.760 | 14.773 | 14.785 | 14.797 | 14.809 | 14.821 | 14.833 | 14.845 | 14.857 |
| 1440 | 14.857 | 14.869 | 14.881 | 14.894 | 14.906 | 14.918 | 14.930 | 14.942 | 14.954 | 14.966 | 14.978 |
| 1450 | 14.978 | 14.990 | 15.002 | 15.015 | 15.027 | 15.039 | 15.051 | 15.063 | 15.075 | 15.087 | 15.099 |
| 1460 | 15.099 | 15.111 | 15.123 | 15.135 | 15.148 | 15.160 | 15.172 | 15.184 | 15.196 | 15.208 | 15.220 |
| 1470 | 15.220 | 15.232 | 15.244 | 15.256 | 15.268 | 15.280 | 15.292 | 15.304 | 15.317 | 15.329 | 15.341 |
| 1480 | 15.341 | 15.353 | 15.365 | 15.377 | 15.389 | 15.401 | 15.413 | 15.425 | 15.437 | 15.449 | 15.461 |
| 1490 | 15.461 | 15.473 | 15.485 | 15.497 | 15.509 | 15.521 | 15.534 | 15.546 | 15.558 | 15.570 | 15.582 |
| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

ITS-90 Table for type S thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV2 | | | | | | |
| 1500 | 15.582 | 15.594 | 15.606 | 15.618 | 15.630 | 15.642 | 15.654 | 15.666 | 15.678 | 15.690 | 15.702 |
| 1510 | 15.702 | 15.714 | 15.726 | 15.738 | 15.750 | 15.762 | 15.774 | 15.786 | 15.798 | 15.810 | 15.822 |
| 1520 | 15.822 | 15.834 | 15.846 | 15.858 | 15.870 | 15.882 | 15.894 | 15.906 | 15.918 | 15.930 | 15.942 |
| 1530 | 15.942 | 15.954 | 15.966 | 15.978 | 15.990 | 16.002 | 16.014 | 16.026 | 16.038 | 16.050 | 16.062 |
| 1540 | 16.062 | 16.074 | 16.086 | 16.098 | 16.110 | 16.122 | 16.134 | 16.146 | 16.158 | 16.170 | 16.182 |
| 1550 | 16.182 | 16.194 | 16.205 | 16.217 | 16.229 | 16.241 | 16.253 | 16.265 | 16.277 | 16.289 | 16.301 |
| 1560 | 16.301 | 16.313 | 16.325 | 16.337 | 16.349 | 16.361 | 16.373 | 16.385 | 16.396 | 16.408 | 16.420 |
| 1570 | 16.420 | 16.432 | 16.444 | 16.456 | 16.468 | 16.480 | 16.492 | 16.504 | 16.516 | 16.527 | 16.539 |
| 1580 | 16.539 | 16.551 | 16.563 | 16.575 | 16.587 | 16.599 | 16.611 | 16.623 | 16.634 | 16.646 | 16.658 |
| 1590 | 16.658 | 16.670 | 16.682 | 16.694 | 16.706 | 16.718 | 16.729 | 16.741 | 16.753 | 16.765 | 16.777 |
| 1600 | 16.777 | 16.789 | 16.801 | 16.812 | 16.824 | 16.836 | 16.848 | 16.860 | 16.872 | 16.883 | 16.895 |
| 1610 | 16.895 | 16.907 | 16.919 | 16.931 | 16.943 | 16.954 | 16.966 | 16.978 | 16.990 | 17.002 | 17.013 |
| 1620 | 17.013 | 17.025 | 17.037 | 17.049 | 17.061 | 17.072 | 17.084 | 17.096 | 17.108 | 17.120 | 17.131 |
| 1630 | 17.131 | 17.143 | 17.155 | 17.167 | 17.178 | 17.190 | 17.202 | 17.214 | 17.225 | 17.237 | 17.249 |
| 1640 | 17.249 | 17.261 | 17.272 | 17.284 | 17.296 | 17.308 | 17.319 | 17.331 | 17.343 | 17.355 | 17.366 |
| 1650 | 17.366 | 17.378 | 17.390 | 17.401 | 17.413 | 17.425 | 17.437 | 17.448 | 17.460 | 17.472 | 17.483 |
| 1660 | 17.483 | 17.495 | 17.507 | 17.518 | 17.530 | 17.542 | 17.553 | 17.565 | 17.577 | 17.588 | 17.600 |
| 1670 | 17.600 | 17.612 | 17.623 | 17.635 | 17.647 | 17.658 | 17.670 | 17.682 | 17.693 | 17.705 | 17.717 |
| 1680 | 17.717 | 17.728 | 17.740 | 17.751 | 17.763 | 17.775 | 17.786 | 17.798 | 17.809 | 17.821 | 17.832 |
| 1690 | 17.832 | 17.844 | 17.855 | 17.867 | 17.878 | 17.890 | 17.901 | 17.913 | 17.924 | 17.936 | 17.947 |
| 1700 | 17.947 | 17.959 | 17.970 | 17.982 | 17.993 | 18.004 | 18.016 | 18.027 | 18.039 | 18.050 | 18.061 |
| 1710 | 18.061 | 18.073 | 18.084 | 18.095 | 18.107 | 18.118 | 18.129 | 18.140 | 18.152 | 18.163 | 18.174 |
| 1720 | 18.174 | 18.185 | 18.196 | 18.208 | 18.219 | 18.230 | 18.241 | 18.252 | 18.263 | 18.274 | 18.285 |
| 1730 | 18.285 | 18.297 | 18.308 | 18.319 | 18.330 | 18.341 | 18.352 | 18.362 | 18.373 | 18.384 | 18.395 |
| 1740 | 18.395 | 18.406 | 18.417 | 18.428 | 18.439 | 18.449 | 18.460 | 18.471 | 18.482 | 18.493 | 18.503 |
| 1750 | 18.503 | 18.514 | 18.525 | 18.535 | 18.546 | 18.557 | 18.567 | 18.578 | 18.588 | 18.599 | 18.609 |
| 1760 | 18.609 | 18.620 | 18.630 | 18.641 | 18.651 | 18.661 | 18.672 | 18.682 | 18.693 | | |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|

```
**********************************
* This section contains coefficients for type S thermocouples for
* the two subranges of temperature listed below.  The coefficients
* are in units of °C and mV and are listed in the order of constant
* term up to the highest order.  The equation is of the form
* E = sum(i=0 to n) c_i t^i.
*
*     Temperature Range (°C)
*      -50.000 to 1064.180
*      1064.180 to 1664.500
*      1664.500 to 1768.100
**********************************
name: reference function on ITS-90
type: S
temperature units: °C
emf units: mV
range:   -50.000,   1064.180,  8
 0.000000000000E+00
 0.540313308631E-02
 0.125934289740E-04
-0.232477968689E-07
 0.322028823036E-10
-0.331465196389E-13
 0.255744251786E-16
-0.125068871393E-19
 0.271443176145E-23
range:  1064.180,   1664.500,  4
 0.132900444085E+01
 0.334509311344E-02
 0.654805192818E-05
-0.164856259209E-08
 0.129989605174E-13
range:  1664.500,   1768.100,  4
 0.146628232636E+03
-0.258430516752E+00
 0.163693574641E-03
-0.330439046987E-07
-0.943223690612E-14
```

```
**********************************
* This section contains coefficients of approximate inverse
* functions for type S thermocouples for the subranges of
* temperature and voltage listed below. The range of errors of
* the approximate inverse function for each subrange is also given.
* The coefficients are in units of °C and mV and are listed in
* the order of constant term up to the highest order.
* The equation is of the form t_90 = d_0 + d_1*E + d_2*E^2 + ...
*     + d_n*E^n,
* where E is in mV and t_90 is in °C.
*
*      Temperature        Voltage              Error
*         range             range               range
*         (°C)              (mV)                (° C)
*      -50. to 250.      -0.235 to 1.874     -0.02 to 0.02
*      250. to 1200.      1.874 to 11.950    -0.01 to 0.01
*     1064. to 1664.5    10.332 to 17.536    -0.0002 to 0.0002
*    1664.5 to 1768.1    17.536 to 18.693    -0.002 to 0.002
******************************************************
Inverse coefficients for type S:

Temperature   -50.           250.          1064.          1664.5
  Range:      250.          1200.          1664.5         1768.1

  Voltage   -0.235          1.874         10.332         17.536
  Range:     1.874         11.950         17.536         18.693

       0.00000000E+00  1.291507177E+01 -8.087801117E+01  5.333875126E+04
       1.84949460E+02  1.466298863E+02  1.621573104E+02 -1.235892298E+04
      -8.00504062E+01 -1.534713402E+01 -8.536869453E+00  1.092657613E+03
       1.02237430E+02  3.145945973E+00  4.719686976E-01 -4.265693686E+01
      -1.52248592E+02 -4.163257839E-01 -1.441693666E-02  6.247205420E-01
       1.88821343E+02  3.187963771E-02  2.081618890E-04  0.000000000E+00
      -1.59085941E+02 -1.291637500E-03  0.000000000E+00  0.000000000E+00
       8.23027880E+01  2.183475087E-05  0.000000000E+00  0.000000000E+00
      -2.34181944E+01 -1.447379511E-07  0.000000000E+00  0.000000000E+00
       2.79786260E+00  8.211272125E-09  0.000000000E+00  0.000000000E+00

  Error      -0.02          -0.01         -0.0002        -0.002
  Range:      0.02           0.01          0.0002         0.002
```

ITS-90 Table for type T thermocouple

| °C | 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermoelectric Voltage in mV | | | | | | |
| -270 | -6.258 | | | | | | | | | | |
| -260 | -6.232 | -6.236 | -6.239 | -6.242 | -6.245 | -6.248 | -6.251 | -6.253 | -6.255 | -6.256 | -6.258 |
| -250 | -6.180 | -6.187 | -6.193 | -6.198 | -6.204 | -6.209 | -6.214 | -6.219 | -6.223 | -6.228 | -6.232 |
| -240 | -6.105 | -6.114 | -6.122 | -6.130 | -6.138 | -6.146 | -6.153 | -6.160 | -6.167 | -6.174 | -6.180 |
| -230 | -6.007 | -6.017 | -6.028 | -6.038 | -6.049 | -6.059 | -6.068 | -6.078 | -6.087 | -6.096 | -6.105 |
| -220 | -5.888 | -5.901 | -5.914 | -5.926 | -5.938 | -5.950 | -5.962 | -5.973 | -5.985 | -5.996 | -6.007 |
| -210 | -5.753 | -5.767 | -5.782 | -5.795 | -5.809 | -5.823 | -5.836 | -5.850 | -5.863 | -5.876 | -5.888 |
| -200 | -5.603 | -5.619 | -5.634 | -5.650 | -5.665 | -5.680 | -5.695 | -5.710 | -5.724 | -5.739 | -5.753 |
| -190 | -5.439 | -5.456 | -5.473 | -5.489 | -5.506 | -5.523 | -5.539 | -5.555 | -5.571 | -5.587 | -5.603 |
| -180 | -5.261 | -5.279 | -5.297 | -5.316 | -5.334 | -5.351 | -5.369 | -5.387 | -5.404 | -5.421 | -5.439 |
| -170 | -5.070 | -5.089 | -5.109 | -5.128 | -5.148 | -5.167 | -5.186 | -5.205 | -5.224 | -5.242 | -5.261 |
| -160 | -4.865 | -4.886 | -4.907 | -4.928 | -4.949 | -4.969 | -4.989 | -5.010 | -5.030 | -5.050 | -5.070 |
| -150 | -4.648 | -4.671 | -4.693 | -4.715 | -4.737 | -4.759 | -4.780 | -4.802 | -4.823 | -4.844 | -4.865 |
| -140 | -4.419 | -4.443 | -4.466 | -4.489 | -4.512 | -4.535 | -4.558 | -4.581 | -4.604 | -4.626 | -4.648 |
| -130 | -4.177 | -4.202 | -4.226 | -4.251 | -4.275 | -4.300 | -4.324 | -4.348 | -4.372 | -4.395 | -4.419 |
| -120 | -3.923 | -3.949 | -3.975 | -4.000 | -4.026 | -4.052 | -4.077 | -4.102 | -4.127 | -4.152 | -4.177 |
| -110 | -3.657 | -3.684 | -3.711 | -3.738 | -3.765 | -3.791 | -3.818 | -3.844 | -3.871 | -3.897 | -3.923 |
| -100 | -3.379 | -3.407 | -3.435 | -3.463 | -3.491 | -3.519 | -3.547 | -3.574 | -3.602 | -3.629 | -3.657 |
| -90 | -3.089 | -3.118 | -3.148 | -3.177 | -3.206 | -3.235 | -3.264 | -3.293 | -3.322 | -3.350 | -3.379 |
| -80 | -2.788 | -2.818 | -2.849 | -2.879 | -2.910 | -2.940 | -2.970 | -3.000 | -3.030 | -3.059 | -3.089 |
| -70 | -2.476 | -2.507 | -2.539 | -2.571 | -2.602 | -2.633 | -2.664 | -2.695 | -2.726 | -2.757 | -2.788 |
| -60 | -2.153 | -2.186 | -2.218 | -2.251 | -2.283 | -2.316 | -2.348 | -2.380 | -2.412 | -2.444 | -2.476 |
| -50 | -1.819 | -1.853 | -1.887 | -1.920 | -1.954 | -1.987 | -2.021 | -2.054 | -2.087 | -2.120 | -2.153 |
| -40 | -1.475 | -1.510 | -1.545 | -1.579 | -1.614 | -1.648 | -1.683 | -1.717 | -1.751 | -1.785 | -1.819 |
| -30 | -1.121 | -1.157 | -1.192 | -1.228 | -1.264 | -1.299 | -1.335 | -1.370 | -1.405 | -1.440 | -1.475 |
| -20 | -0.757 | -0.794 | -0.830 | -0.867 | -0.904 | -0.940 | -0.976 | -1.013 | -1.049 | -1.085 | -1.121 |
| -10 | -0.383 | -0.421 | -0.459 | -0.496 | -0.534 | -0.571 | -0.608 | -0.646 | -0.683 | -0.720 | -0.757 |
| 0 | 0.000 | -0.039 | -0.077 | -0.116 | -0.154 | -0.193 | -0.231 | -0.269 | -0.307 | -0.345 | -0.383 |

°C 0 -1 -2 -3 -4 -5 -6 -7 -8 -9 -10

ITS-90 Table for type T thermocouple

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Thermoelectric Voltage in mV | | | | | | | | | | |
| 0 | 0.000 | 0.039 | 0.078 | 0.117 | 0.156 | 0.195 | 0.234 | 0.273 | 0.312 | 0.352 | 0.391 |
| 10 | 0.391 | 0.431 | 0.470 | 0.510 | 0.549 | 0.589 | 0.629 | 0.669 | 0.709 | 0.749 | 0.790 |
| 20 | 0.790 | 0.830 | 0.870 | 0.911 | 0.951 | 0.992 | 1.033 | 1.074 | 1.114 | 1.155 | 1.196 |
| 30 | 1.196 | 1.238 | 1.279 | 1.320 | 1.362 | 1.403 | 1.445 | 1.486 | 1.528 | 1.570 | 1.612 |
| 40 | 1.612 | 1.654 | 1.696 | 1.738 | 1.780 | 1.823 | 1.865 | 1.908 | 1.950 | 1.993 | 2.036 |
| 50 | 2.036 | 2.079 | 2.122 | 2.165 | 2.208 | 2.251 | 2.294 | 2.338 | 2.381 | 2.425 | 2.468 |
| 60 | 2.468 | 2.512 | 2.556 | 2.600 | 2.643 | 2.687 | 2.732 | 2.776 | 2.820 | 2.864 | 2.909 |
| 70 | 2.909 | 2.953 | 2.998 | 3.043 | 3.087 | 3.132 | 3.177 | 3.222 | 3.267 | 3.312 | 3.358 |
| 80 | 3.358 | 3.403 | 3.448 | 3.494 | 3.539 | 3.585 | 3.631 | 3.677 | 3.722 | 3.768 | 3.814 |
| 90 | 3.814 | 3.860 | 3.907 | 3.953 | 3.999 | 4.046 | 4.092 | 4.138 | 4.185 | 4.232 | 4.279 |
| 100 | 4.279 | 4.325 | 4.372 | 4.419 | 4.466 | 4.513 | 4.561 | 4.608 | 4.655 | 4.702 | 4.750 |
| 110 | 4.750 | 4.798 | 4.845 | 4.893 | 4.941 | 4.988 | 5.036 | 5.084 | 5.132 | 5.180 | 5.228 |
| 120 | 5.228 | 5.277 | 5.325 | 5.373 | 5.422 | 5.470 | 5.519 | 5.567 | 5.616 | 5.665 | 5.714 |
| 130 | 5.714 | 5.763 | 5.812 | 5.861 | 5.910 | 5.959 | 6.008 | 6.057 | 6.107 | 6.156 | 6.206 |
| 140 | 6.206 | 6.255 | 6.305 | 6.355 | 6.404 | 6.454 | 6.504 | 6.554 | 6.604 | 6.654 | 6.704 |
| 150 | 6.704 | 6.754 | 6.805 | 6.855 | 6.905 | 6.956 | 7.006 | 7.057 | 7.107 | 7.158 | 7.209 |
| 160 | 7.209 | 7.260 | 7.310 | 7.361 | 7.412 | 7.463 | 7.515 | 7.566 | 7.617 | 7.668 | 7.720 |
| 170 | 7.720 | 7.771 | 7.823 | 7.874 | 7.926 | 7.977 | 8.029 | 8.081 | 8.133 | 8.185 | 8.237 |
| 180 | 8.237 | 8.289 | 8.341 | 8.393 | 8.445 | 8.497 | 8.550 | 8.602 | 8.654 | 8.707 | 8.759 |
| 190 | 8.759 | 8.812 | 8.865 | 8.917 | 8.970 | 9.023 | 9.076 | 9.129 | 9.182 | 9.235 | 9.288 |
| 200 | 9.288 | 9.341 | 9.395 | 9.448 | 9.501 | 9.555 | 9.608 | 9.662 | 9.715 | 9.769 | 9.822 |
| 210 | 9.822 | 9.876 | 9.930 | 9.984 | 10.038 | 10.092 | 10.146 | 10.200 | 10.254 | 10.308 | 10.362 |
| 220 | 10.362 | 10.417 | 10.471 | 10.525 | 10.580 | 10.634 | 10.689 | 10.743 | 10.798 | 10.853 | 10.907 |
| 230 | 10.907 | 10.962 | 11.017 | 11.072 | 11.127 | 11.182 | 11.237 | 11.292 | 11.347 | 11.403 | 11.458 |
| 240 | 11.458 | 11.513 | 11.569 | 11.624 | 11.680 | 11.735 | 11.791 | 11.846 | 11.902 | 11.958 | 12.013 |
| 250 | 12.013 | 12.069 | 12.125 | 12.181 | 12.237 | 12.293 | 12.349 | 12.405 | 12.461 | 12.518 | 12.574 |
| 260 | 12.574 | 12.630 | 12.687 | 12.743 | 12.799 | 12.856 | 12.912 | 12.969 | 13.026 | 13.082 | 13.139 |
| 270 | 13.139 | 13.196 | 13.253 | 13.310 | 13.366 | 13.423 | 13.480 | 13.537 | 13.595 | 13.652 | 13.709 |
| 280 | 13.709 | 13.766 | 13.823 | 13.881 | 13.938 | 13.995 | 14.053 | 14.110 | 14.168 | 14.226 | 14.283 |
| 290 | 14.283 | 14.341 | 14.399 | 14.456 | 14.514 | 14.572 | 14.630 | 14.688 | 14.746 | 14.804 | 14.862 |
| 300 | 14.862 | 14.920 | 14.978 | 15.036 | 15.095 | 15.153 | 15.211 | 15.270 | 15.328 | 15.386 | 15.445 |
| 310 | 15.445 | 15.503 | 15.562 | 15.621 | 15.679 | 15.738 | 15.797 | 15.856 | 15.914 | 15.973 | 16.032 |
| 320 | 16.032 | 16.091 | 16.150 | 16.209 | 16.268 | 16.327 | 16.387 | 16.446 | 16.505 | 16.564 | 16.624 |
| 330 | 16.624 | 16.683 | 16.742 | 16.802 | 16.861 | 16.921 | 16.980 | 17.040 | 17.100 | 17.159 | 17.219 |
| 340 | 17.219 | 17.279 | 17.339 | 17.399 | 17.458 | 17.518 | 17.578 | 17.638 | 17.698 | 17.759 | 17.819 |
| 350 | 17.819 | 17.879 | 17.939 | 17.999 | 18.060 | 18.120 | 18.180 | 18.241 | 18.301 | 18.362 | 18.422 |
| 360 | 18.422 | 18.483 | 18.543 | 18.604 | 18.665 | 18.725 | 18.786 | 18.847 | 18.908 | 18.969 | 19.030 |
| 370 | 19.030 | 19.091 | 19.152 | 19.213 | 19.274 | 19.335 | 19.396 | 19.457 | 19.518 | 19.579 | 19.641 |
| 380 | 19.641 | 19.702 | 19.763 | 19.825 | 19.886 | 19.947 | 20.009 | 20.070 | 20.132 | 20.193 | 20.255 |
| 390 | 20.255 | 20.317 | 20.378 | 20.440 | 20.502 | 20.563 | 20.625 | 20.687 | 20.748 | 20.810 | 20.872 |
| 400 | 20.872 | | | | | | | | | | |

| °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|

```
***********************************
* This section contains coefficients for type T thermocouples for
* the two subranges of temperature listed below.  The coefficients
* are in units of °C and mV and are listed in the order of constant
* term up to the highest order.   The equation is of the form
* E = sum(i=0 to n) c_i t^i.
*
*     Temperature Range (°C)
*       -270.000 to 0.000
*        0.000 °C to 400.000
***********************************
name: reference function on ITS-90
type: T
temperature units: °C
emf units: mV
range:  -270.000,      0.000, 14
 0.0000000000000E+00
 0.387481063640E-01
 0.441944343470E-04
 0.118443231050E-06
 0.200329735540E-07
 0.901380195590E-09
 0.226511565930E-10
 0.360711542050E-12
 0.384939398830E-14
 0.282135219250E-16
 0.142515947790E-18
 0.487686622860E-21
 0.107955392700E-23
 0.139450270620E-26
 0.797951539270E-30
range:     0.000,    400.000,  8
 0.0000000000000E+00
 0.387481063640E-01
 0.332922278800E-04
 0.206182434040E-06
-0.218822568460E-08
 0.109968809280E-10
-0.308157587720E-13
 0.454791352900E-16
-0.275129016730E-19
```

```
**********************************
* This section contains coefficients of approximate inverse
* functions for type T thermocouples for the subranges of
* temperature and voltage listed below. The range of errors of
* the approximate inverse function for each subrange is also given.
* The coefficients are in units of °C and mV and are listed in
* the order of constant term up to the highest order.
* The equation is of the form t_90 = d_0 + d_1*E + d_2*E^2 + ...
*     + d_n*E^n,
* where E is in mV and t_90 is in °C.
*
*    Temperature        Voltage            Error
*      range              range            range
*      (°C)               (mV)             (° C)
*    -200. to 0.     -5.603 to 0.000    -0.02 to 0.04
*     .0 to 400.     0.000 to 20.872    -0.03 to 0.03
*****************************************************
Inverse coefficients for type T:

Temperature  -200.             0.
  Range:        0.           400.

  Voltage   -5.603          0.000
  Range:     0.000         20.872

         0.0000000E+00  0.000000E+00
         2.5949192E+01  2.592800E+01
        -2.1316967E-01 -7.602961E-01
         7.9018692E-01  4.637791E-02
         4.2527777E-01 -2.165394E-03
         1.3304473E-01  6.048144E-05
         2.0241446E-02 -7.293422E-07
         1.2668171E-03  0.000000E+00

  Error      -0.02          -0.03
  Range:      0.04           0.03
```