Temperature vs. Resistance Tables for Resistance Temperature Detectors (RTD) [1]

This reference manual consists of reference tables that give temperature vs. resistance relationships for resistance temperature detectors for Platinum, Copper, Nickel, and Nickel-Iron sensors.

These tables give ohm values from one to three decimal places for each degree of temperature. Such tables are satisfactory for most industrial uses but may not be adequate for computer and similar applications. If greater precision is required, the reader should contact the manufacturer for equations which permit easy and unique generation of the temperature vs. resistance relationship.

[1] Temperature vs. resistance data in Tables 29 and 30 have been developed from ASTM E1137. All other temperature vs. resistance data in Tables 31 to 36 have been developed from wire manufacturers' data.

List of Tables

Following is a list of the resistance temperature detectors tables included in this reference manual.

Table	Type		alpha	Range
27	Limits of Error			
28	Classification of Tolerances			
29	Pt	Platinum	$\alpha=0.003\ 85$	(-200 to 660) °C
30	Pt	Platinum	$\alpha=0.003\ 85$	(-328 to 1220) °F
31	Pt	Platinum	$\alpha=0.003\ 92$	(-200 to 660) °C
32	Pt	Platinum	$\alpha=0.003\ 92$	(-328 to 1220) °F
33	Cu	Copper	$\alpha=0.004\ 27$	(-200 to 260) °C
34	Cu	Copper	$\alpha=0.004\ 27$	(-328 to 500) °F
35	Ni	Nickel	$\alpha=0.006\ 72$	(-80 to 260) °C
36	Ni	Nickel	$\alpha=0.006\ 72$	(-112 to 500) °F
37	Ni-Fe	Nickel-Iron	$\alpha=0.005\ 18$	(-200 to 204) °C
38	Ni-Fe	Nickel-Iron	$\alpha=0.005\ 18$	(-328 to 400) °F

Table 27 — Limits of Error for RTDs

Initial Tolerance @ 0 °C

Type	±0.01%	±0.03%	±0.06%	±0.1%	±0.12%	±0.2%	±0.5%
Pt	●5	●3	●A	●1	●B		
Cu						●	
Ni							●
Ni-Fe							●

1, 3, 5, A, B see Table 28

Table 28 — Classification of Initial Tolerances [2]

Use given equations to calculate tolerances at specified temperatures:

$$5 = \pm\,[\ 0.03 + 0.0017\,|\,t\,|\ ]\ °C$$
$$3 = \pm\,[\ 0.08 + 0.0017\,|\,t\,|\ ]\ °C$$
$$A = \pm\,[\ 0.15 + 0.0020\,|\,t\,|\ ]\ °C$$
$$1 = \pm\,[\ 0.26 + 0.0042\,|\,t\,|\ ]\ °C$$
$$B = \pm\,[\ 0.30 + 0.0050\,|\,t\,|\ ]\ °C$$

where:
$|\,t\,|$ = value of temperature without regard to sign, °C.

Note 2 — The equations represents values for 3 and 4-wire PRTs. Caution must be exercised with 2-wire PRTs due to lead resistance.

Figure 1 — Thermometrics Element Connections

2-wire single	2-wire dual	3-wire single	3-wire dual	4-wire single	4-wire dual