AMETHERM
Circuit Protection Thermistors

Accu-Curve Precision Interchangeable Thermistors

ACCU-Curve Precision Thermistors

Ametherm manufactures precision resistance-temperature matched ACCU-CURVE™ thermistors. These devices offer interchangeability over a broad temperature range and eliminate the need to individually calibrate or provide circuit compensation for part variability. Accurate temperature measurement to ±0.2°C is available over the 0°C to 70°C temperature range. Standard ohmic values at 25°C range from 2,252 to 100,000 ohms.

ACCU-CURVE™ Selection Considerations

- Determine Resistance Value & Temperature Coefficient
- Review Power Dissipation
- Select Temperature Range
- Review Thermal Time Constant

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Applications

There are numerous ways of measuring temperature electronically. Improvements in thermistor technology, coupled with the introduction of integrated circuitry, have made precision temperature measurement systems very cost effective

Microprocessors, A/D converters, interface electronics and displays are readily available. Circuit designs with built-in thermistor resistance-temperature algorithms have gained wide spread acceptance in precision temperature metrology.

Ametherms's ACCU-CURVE™ style thermistors are used in many applications that require a high degree of accuracy and reliability. Some of the most popular applications of NTC ACCU-CURVE™ thermistors include:

- Temperature Measurement & Control
- Temperature Sensors

Interchangeable ACCU-CURVE™ NTC thermistors are usually selected when a high degree of measurement accuracy is required over a wide temperature range. By modifying the Alpha equation the resistance and temperature tolerances can be calculated for various temperature intervals.

Because thermistors are non-linear with respect to their resistance-temperature characteristics, Alpha therefore is non-linear across their resistance-temperature range. As an example, a thermistor material curve with an Alpha of -4.4%/°C @ 25°C will have an Alpha of -3.8%/°C @ 50°C. For practical applications we recommend that the standardized R/T curves be used.

Ametherm ACCU-CURVE™ thermistors can dissipate 1mW/°C. As a result, the possibility of error induced by excessive current flow, which would defeat the level of accuracy these devices are capable of representing, may exist in some circuits. To prevent this type of error, Ametherm recommends that circuit design engineers select the highest R value their circuit will tolerate for applications > 5 Volts to minimize any self-heating of the thermistor device. Refer to the ACCU-CURVE™ Specifications table for resistance values and temperature tolerances.

Ametherm offers two standard R/T curves, "C" & "W", with temperature coefficients of resistance of -4.4%/°C and -4.7%/°C, and Beta (ß) values of 3965°K and 4250°K. To determine the nominal resistance value of a thermistor at a specified temperature, multiply its resistance at 25°C value by the corresponding RT/R25 value for the desired temperature and applicable R-T curve from the ACCU-CURVE™.

Selection Considerations for NTC ACCU-CURVE™ Devices Interchangeable ACCU-CURVE™ NTC thermistors are usually selected when a high degree of measurement

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ACCU-CURVE™ Specifications

Resistance @ 25° C (ohms)	Temperature Tolerance from 0° C to 70° C			Color Code
	±0.2° C	±0.5° C	±1.0° C	
	Part Number	Part Number	Part Number	
2,252	ACC-001	ACC-011	ACC-021	Brown
3,000	ACC-002	ACC-012	ACC-022	Red
5,000	ACC-003	ACC-013	ACC-023	Orange
10,000	ACC-004	ACC-014	ACC-024	Yellow
30,000	ACW-005	ACW-015	ACW-025	Green
50,000	ACW-006	ACW-016	ACW-026	Blue
100,000	ACW-007	ACW-017	ACW-027	Violet

ACCU-CURVE™ Resistance/Temperature Table

TEMP (°C)	"C" CURVES				"W" CURVES		
	2,252 ohm s @ 25°C	3,000 ohms @ 25°C	5,000 ohm s @ 25°C	10,000 ohm s @ 25°C	30,000 ohm s @ 25°C	50,000 ohm s @ 25°C	100,000 ohms @ 25°C
-40	75,780	100,950	168,250	336,500	1,204,600	2,007,700	4,015,500
-30	39,860	53,100	88,500	177,000	619,200	1,032,000	2,064,000
-20	21,860	29,121	48,535	97,070	331,030	551,720	110,3400
-10	12,460	16,599	27,665	55,330	183,560	305,940	611,870
0	7,352.8	9,795.0	16,325	32,650	105,310	175,510	351,020
10	4,481.5	5,970.0	9,950.0	19,900	62,354	103,920	207,850
20	2,812.8	3,747.0	6,245.0	12,490	38,022	63,370	126,740
25	2,252.0	3,000.0	5,000.0	10,000	30,000	50,000	100,000
30	1,814.4	2,417.1	4,028.5	8,057.0	23,827	39,711	79,422
40	1,199.6	1,598.1	2,663.3	5,327.0	15,314	25,524	51,048
50	811.40	1,080.9	1,801.5	3,603.0	10,077	16,795	33,591
60	560.30	746.40	1,244.0	2,488.0	6,777.1	11,295	22,590
70	394.55	525.60	876.00	1,752.0	4,650.5	7,750.9	15,502
80	282.63	376.50	627.50	1,255.0	3,251.2	5,418.7	10,837
90	206.13	274.59	457.65	915.30	2,312.3	3,853.9	7,707.7
100	152.75	203.49	339.15	678.30	1,670.8	2,784.6	5,569.3
110	114.92	153.09	255.15	510.30	1,224.9	2,041.5	4,082.9
120	87.671	116.79	194.65	389.30	909.99	1,516.7	3,033.3
130	67.770	90.279	150.47	300.93	684.31	1,140.5	2,281.0
140	52.983	70.581	117.64	235.27	520.30	867.16	1,734.3
150	41.881	55.791	92.985	185.97	399.56	665.94	1,331.9

The ACCU-CURVE™ device can also be supplied with 32 AWG solid Teflon insulated leads of 3, 6, 9 and 12 inches in length. contact Ametherm applications engineering for additional information. Warning: Use Heat sinks when soldering to Thermistor Leads.

ACCU-CURVE™ Resistance/Temperature Conversion Tables

ACCX-0XX	ACWX-0XX
"C" CURVE	"W" CURVE

TEMP. °C	RT/R25	TEMP. °C	RT/R25	TEMP. °C	RT/R25	TEMP. °C	RT/R25
0	3.265	36	0.6267	0	3.5102	36	0.6074
1	3.103	37	0.6017	1	3.3264	37	0.5814
2	2.950	38	0.5777	2	3.1532	38	0.5566
3	2.805	39	0.5547	3	2.9899	39	0.5330
4	2.669	40	0.5327	4	2.8360	40	0.5105
5	2.539	41	0.5117	5	2.6908	41	0.4891
6	2.417	42	0.4917	6	2.5539	42	0.4686
7	2.301	43	0.4727	7	2.4246	43	0.4492
8	2.192	44	0.4543	8	2.3026	44	0.4306
9	2.088	45	0.4370	9	2.1873	45	0.4129
10	1.990	46	0.4200	10	2.0785	46	0.3961
11	1.897	47	0.4040	11	1.9756	47	0.3800
12	1.809	48	0.3890	12	1.8784	48	0.3646
13	1.725	49	0.3743	13	1.7865	49	0.3499
14	1.646	50	0.3603	14	1.6995	50	0.3359
15	1.571	51	0.3467	15	1.6173	51	0.3225
16	1.500	52	0.3340	16	1.5395	52	0.3098
17	1.432	53	0.3217	17	1.4658	53	0.2976
18	1.368	54	0.3099	18	1.3961	54	0.2859
19	1.307	55	0.2986	19	1.3300	55	0.2748
20	1.249	56	0.2878	20	1.2674	56	0.2641
21	1.194	57	0.2774	21	1.2081	57	0.2539
22	1.142	58	0.2675	22	1.1519	58	0.2442
23	1.092	59	0.2579	23	1.0985	59	0.2348
24	1.045	60	0.2488	24	1.0480	60	0.2259
25	1.000	61	0.2400	25	1.0000	61	0.2174
26	0.9573	62	0.2316	26	0.9545	62	0.2092
27	0.9167	63	0.2235	27	0.9113	63	0.2014
28	0.8777	64	0.2157	28	0.8702	64	0.1939
29	0.8407	65	0.2083	29	0.8313	65	0.1867
30	0.8057	66	0.2011	30	0.7942	66	0.1798
31	0.7723	67	0.1942	31	0.7590	67	0.1732
32	0.7403	68	0.1876	32	0.7256	68	0.1669
33	0.7097	69	0.1813	33	0.6938	69	0.1608
34	0.6807	70	0.1752	34	0.6636	70	0.1550
35	0.6530			35	0.6348		

To determine the nominal resisteance value of a thermistor at a specified temperature, multiply its R_T/R_{25} value for the desired temperature and R-T curve from the table above by its nominal resistance at 25 °C.

More Information:

What is an NTC thermistor?