Steinhart & Hart Equation for 10k Thermistors

The Steinhart and Hart equation is an empirical expression that has been determined to be the best mathematical expression for the resistance - temperature relationship of a negative temperature coefficient thermistor. It is usually found explicit in T where T is expressed in degrees Kelvin.

> **Steinhart - Hart Equation** $1/T = A + B(LnR) + C(LnR)^3$

Where T = Temperature in degrees Kelvin, LnR is the Natural Log of the measured resistance of the thermistor, A, B and C are constants.

The coefficients A, B and C are found by taking the resistance of the thermistor at three temperatures and solving three simultaneous equations.

E.g. $T_1 = 0°C$ when the resistance of a 10kohm thermistor R_1 is 32650 ohms
$T_2 = 50°C$ when the resistance of a 10kohm thermistor R_2 is 3603 ohms
$T_3 = 100°C$ when the resistance of a 10kohm thermistor R_3 is 678.3 ohms

$$1/T_1 = A + B(LnR_1) + C(LnR_1)^3$$
$$1/T_2 = A + B(LnR_2) + C(LnR_2)^3$$
$$1/T_3 = A + B(LnR_3) + C(LnR_3)^3$$

> **For a 10 kohm thermistor, the value of constants A, B and C are:**
>
> **A = 0.001125308852122**
> **B = 0.000234711863267**
> **C = 0.000000085663516**

Typical errors due to this calculation are shown below:

Resistance of 10k Thermistor	Calculated Temperature Degrees K	Calculated Temperature Deg C	Actual Temperature Deg C	Error Deg. C
177000	243.149	-30.001	-30	0.001
97070	253.148	-20.002	-20	0.002
55330	263.144	-10.006	-10	0.006
32650	273.150	0.000	0	0.000
19900	283.151	10.001	10	-0.001
12490	293.155	20.005	20	-0.005
8057	303.149	29.999	30	0.001
5327	313.148	39.998	40	0.002
3603	323.150	50.000	50	0.000
2488	333.164	60.014	60	-0.014
1752	343.178	70.028	70	-0.028