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# Thermocouple Amplifier

**Version 2**

This circuit is based on the Analog Devices AD595 Thermocouple Amplifier. The nice thing about this chip is that it has on-board ice-point reference so there is no need to compensate for it. The output for these boards is 10mV per degree C. For instance, if you are measuring 15 degrees C, the output from this circuit will be 150 mV. –15 degrees C = -150 mV. If you use a DAC board with this, it must be able to handle these voltages.

This version requires 5VDC input. The use of a voltage inverter allows temperature measurements above and below 0 degrees Celsius (C) (32 degrees Fahrenheit (F)). Note: Most DAC boards provide a 5VDC output that can power this.

This board uses a Type K thermocouple.

**Miscellaneous Information:**

- For all thermocouples, the red wire connects to the negative terminal

**Specifications:**

- Input Power: 5VDC
- Output: 10 mV per $^{o}$C
- Temperature Range: above and below 0 $^{o}$C
- Thermocouple Type: Type K
- Board Dimensions: 1.7 x 2.0 inches

### Calibration

Following are the results of a calibration check that I performed on this circuit board. As you can see by the linear regression R-Value of 0.9997, there is almost a perfect linear correlation between temperature and millivolt output. For more precise results, one must use a polynomial equation that has been developed for the thermocouple type range used. For more information on that, go to: http://www.omega.com/temperature/Z/pdf/z198-201.pdf

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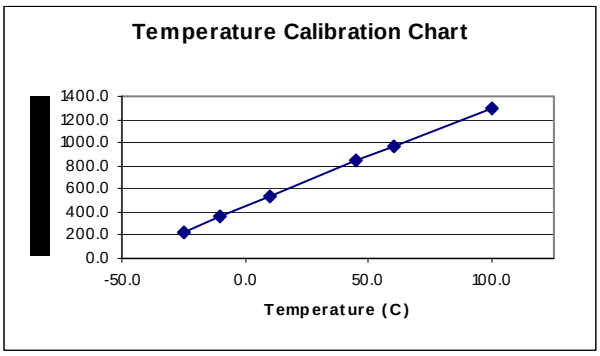
| Temp | MV | Est. |
|---|---|---|
| -25.0 | 224.5 | -26.0 |
| -10.0 | 360.2 | -10.2 |
| 10.0 | 538.0 | 10.6 |
| 45.0 | 843.0 | 46.2 |
| 60.0 | 970.0 | 61.0 |
| 100.0 | 1292.0 | 98.6 |

8.54 mv/1C

R-Value = 0.9997




As you can see from the above table, with this board you will get an output of about 8.54 mV per degrees C. The values in the Est. column are values that were calculated from the linear regression equation that was derived from the Temp and MV data. With that equation, the largest deviation (error) is 1.2 degrees C.

The equation that I used for this line is: Temp = (mV – 447.5945) / 8.5674

For more information on thermocouples, go to:
http://www.omega.com/temperature/Z/zsection.asp

**Disclaimer:**
These boards are designed for educational use only. In no circumstances should these circuit boards be used in critical situations where failure could mean injury or property damage.

For more information, contact us at:
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