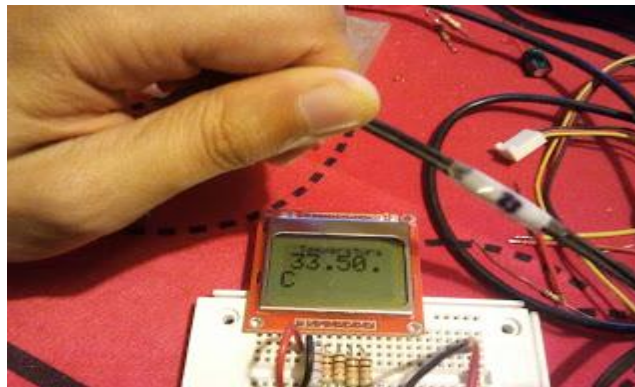


HOW TO USE A THERMISTOR OR TEMPERATURE SENSOR WITH ARDUINO: CODE FOR THE NTC/PTC TYPES



Checking the operation of the program

One of the most common applications of Arduino is an electronic temperature control via a simple thermistor (temperature sensor), for example if we want to activate a fan when the temperature rises to a certain value in a computer / engine, or activated by an relay a circulator motor in a boiler when we detect that the temperature is rising (and thus the fire is on), as we did in home boiler with AKO or Keld thermostats, only with Arduino will not only allow us to activate a device, but allowing us much more play, controlling and managing other parameters for our stove, such as temperature of the fumes, or air injected into the combustion chamber, etc, as already explained us Oscar Gonzalez in BricoGeek from a project from Xoel (from Asturias).

A thermistor (thermistors) is simply a resistor whose resistance varies as its temperature varies (though non-linearly); there are many kinds, but in this post talk about one NTC (Negative, whose resistance value decreases as the temperature increases), and measure different temperature ranges of -50 to + 99 ° C in this case. If we measure a higher temperature, we would need a thermocouple type K or J, but we'll see later.

But to use a thermistor whatever we can get, is not enough to measure the value of resistance and apply a rule of three, because as we said, is not a linear (but curved) value, with the biggest differences resistance with increasing temperature so hyperbolic.

To use a thermistor, or know their values (datasheet), or we have to approach them; according to the formula Steinhart-Hart, we have to find a value, called β (Beta) (so-called value of characteristic temperature of the material), and use it along with your formula to get the C to a given value. Here is very well explained , and this explained the Steinhart-Hart formula .

Although **it seems difficult to understand for those who give them bad math (like me), but do not worry**, in the end you have a program that you can use and just change the header data (values of two points, the resistance of your thermistor 25 and the actual value of your Arduino 5Vdc and little else) will be able to use it in your project without having to understand the formulas involved, but I prefer to

go into detail for those who like it as much as me "why of things. "

But how do we calculate the β value?

To obtain the value of β , using the Steinhart-Hart formula, give the values of resistance and temperature at two different points, as far as possible from each other, for greater accuracy. The formula tells us that β is equal to:

$$\beta_{25/100} = \frac{\ln \frac{R(100)}{R(25)}}{\frac{1}{T_{100}} - \frac{1}{T_{25}}}$$

Obtaining resistance values of 25 and 100 (for example), we get β

We can use ice to the temperature of 0 ° and boiling water on the fire for the 100, take the value of the thermistor resistance at those two points (waiting a few minutes until the resistance value is more or less stable, will be when the thermistor temperature has been reached).

Note: Please note that at higher altitudes, water boils at a lower temperature, may be 5 or 10 ° C difference, it is best to use a thermometer in turn calibrated to compare.

In my case I wanted to reuse a couple of AKO 14901 sensors, and obtaining the values of resistance with a tester that has given me 10330 ohms at 25 ° C was approx. (Or what is the same, 10K ohms):



I used a thermometer that had room to get closer to reality (and the same error as the same, because it is not calibrated, but it's something).



And as close to 100 ° C at 96 ° C approx. a resistance value of 970 ohms:



So if we get β , leave us (using google as a calculator):

Source: <http://crecimiento-sostenible.blogspot.in/2014/10/how-to-use-thermistor-or-temperature.html>