

Temperature Sensor TMP36

<http://learn.adafruit.com/tmp36-temperature-sensor/using-a-temp-sensor>

These sensors have little chips in them and while they're not that delicate, they do need to be handled properly. Be careful of static electricity when handling them and make sure the power supply is connected up correctly and is between 2.7 and 5.5V DC - so don't try to use a 9V battery!

They come in a "TO-92" package which means the chip is housed in a plastic hemi-cylinder with three legs. The legs can be bent easily to allow the sensor to be plugged into a breadboard. You can also solder to the pins to connect long wires. If you need to waterproof the sensor, you can see below for an Instructable for how to make an excellent case.

HARDWARE REQUIRED

Arduino board
TMP36
breadboard

CIRCUIT

This example code for Arduino shows a quick way to create a temperature sensor, it simply prints to the serial port what the current temperature is in both Celsius and Fahrenheit.

Unlike the FSR or photocell sensors we have looked at, the TMP36 and friends doesn't act like a resistor. Because of that, there is really only one way to read the temperature value from the sensor, and that is plugging the output pin directly into an Analog (ADC) input.

Remember that you can use anywhere between 2.7V and 5.5V as the power supply. For this example I'm showing it with a 5V supply but note that you can use this with a 3.3V supply just as easily. No matter what supply you use, the analog voltage reading will range from about 0V (ground) to about 1.75V.

If you're using a 5V Arduino, and connecting the sensor directly into an Analog pin, you can use these formulas to turn the 10-bit analog reading into a temperature:

Voltage at pin in millivolts = (reading from ADC) * (5000/1024)
This formula converts the number 0-1023 from the ADC into 0-5000mV (= 5V)

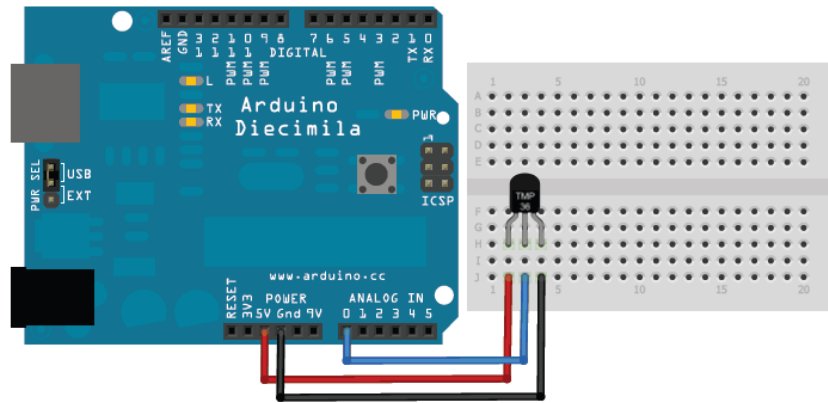
If you're using a 3.3V Arduino, you'll want to use this:

Voltage at pin in millivolts = (reading from ADC) * (3300/1024)

This formula converts the number 0-1023 from the ADC into 0-3300mV (= 3.3V)

Then, to convert millivolts into temperature, use this formula:
Centigrade temperature = [(analog voltage in mV) - 500] / 10

IMAGE



CODE

```
//TMP36 Pin Variables
int sensorPin = 0; //the analog pin the TMP36's Vout (sense) pin is connected to
//the resolution is 10 mV / degree centigrade with a
//500 mV offset to allow for negative temperatures

/*
 * setup() - this function runs once when you turn your Arduino on
 * We initialize the serial connection with the computer
 */

void setup()
{
    Serial.begin(9600); //Start the serial connection with the computer
                        //to view the result open the serial monitor
}

void loop()           // run over and over again
{
    //getting the voltage reading from the temperature sensor
    int reading = analogRead(sensorPin);

    // converting that reading to voltage, for 3.3v arduino use 3.3
    float voltage = reading * 5.0;
    voltage /= 1024.0;

    // print out the voltage
    Serial.print(voltage); Serial.println(" volts");

    // now print out the temperature
    float temperatureC = (voltage - 0.5) * 100 ;
    //converting from 10 mv per degree with 500 mv offset
    //to degrees ((voltage - 500mV) times 100)
    Serial.print(temperatureC); Serial.println(" degrees C");

    // now convert to Fahrenheit
    float temperatureF = (temperatureC * 9.0 / 5.0) + 32.0;
    Serial.print(temperatureF); Serial.println(" degrees F");

    delay(1000);           //waiting a second
}
```