Sainsmart Figaro Sensor PCB Assembly Fix and Connection to Arduino UNO

The Figaro Sensor (4-Pin) (e.g. TGS 2611) PCB Assembly from Sainsmart has been shipped from the factory, with the Sensor incorrectly soldered to the PCB. A quick internet search shows pictures of ALL 4-pin Figaro sensors to be soldered this way (i.e. INCORRECT). If the PCB is connected to an Arduino, as received form the factory, it will not work correctly. This document describes a fix for this problem, and shows how to connect it to an Arduino (Sainsmart) UNO for testing.

Problem Description

The Figaro sensor, (TGS2611), PCB assembly was received from Sainsmart and connected to a UNO (see later in the document for full instructions and code on how to connect this up), with the Analog Output from the Sensor monitored. A constant High Value of ~4.74V was measured on the Output and no change in the Output was detected when the sensor was exposed to Organic Vapours. Upon investigation, it was discovered the Figaro Sensor is incorrectly soldered to the PCB. The PCB the sensor comes soldered onto is a generic PCB which is primarily used for the **6-Pin** MQ (and Figaro) type sensors. For these 6-pin sensors, the heater pins are in the central location of the PCB. The **4-Pin** Sensor therefore needs to be moved so the heater pins are in the central position. This also explains the constant value of 4.74V on the output, as this is the constant voltage through the Heater.

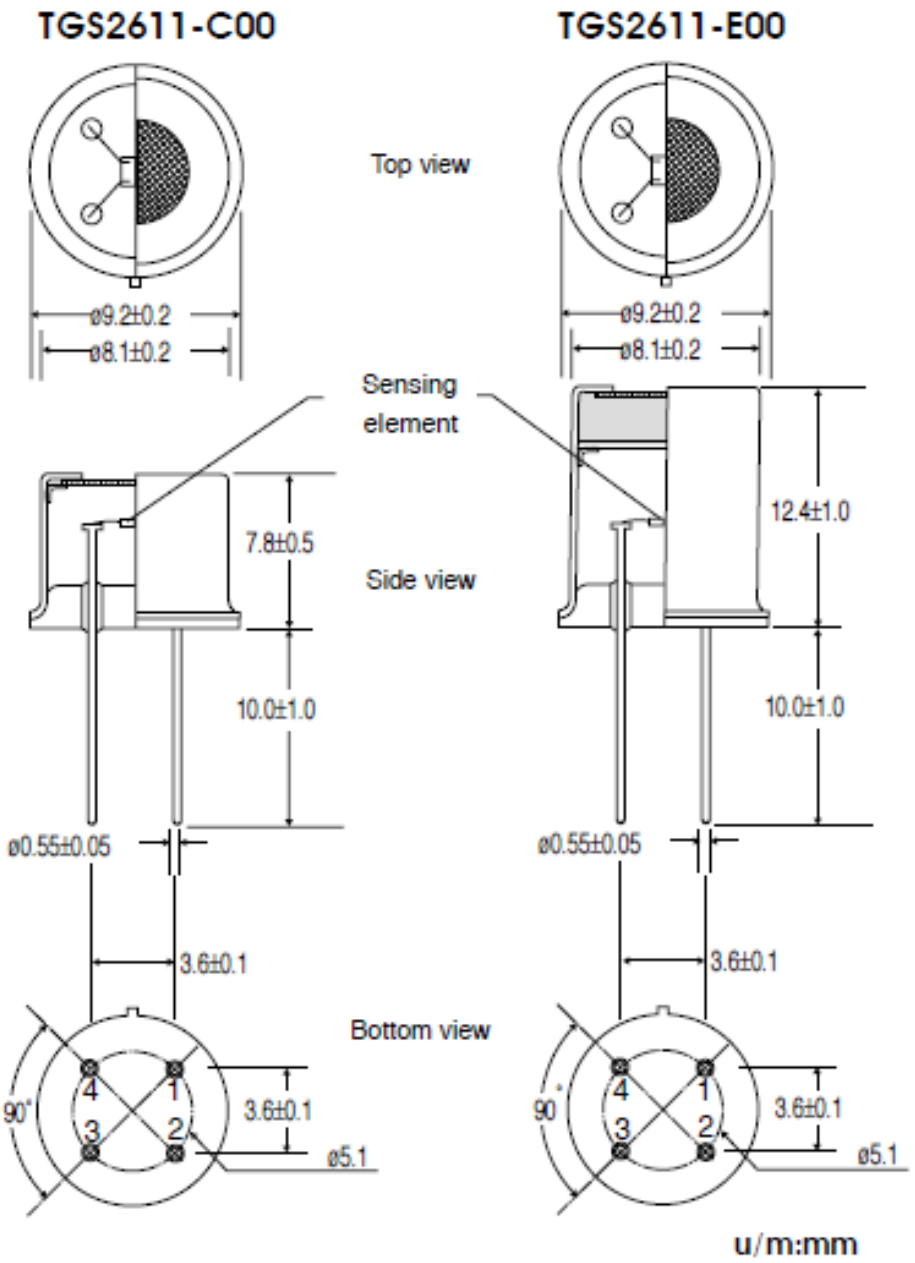
Fix

The Heater Pins (1 and 4) of the **4-Pin** sensor should be moved to the central positions of the PCB. These are the Pins on the **NOTCH** side of the Sensor. The Sensor Electrode Pins should be in the outer positions of the PCB. See the diagram below for Pin numbers of the Figaro 4-Pin sensor – full datasheets can be found here: www.figarosensor.com/gaslist.html.

This involves de-soldering the sensor, moving it to the correct position and then re-soldering. If you are new to soldering take care not to heat the sensor legs too much as this can damage the sensor element.

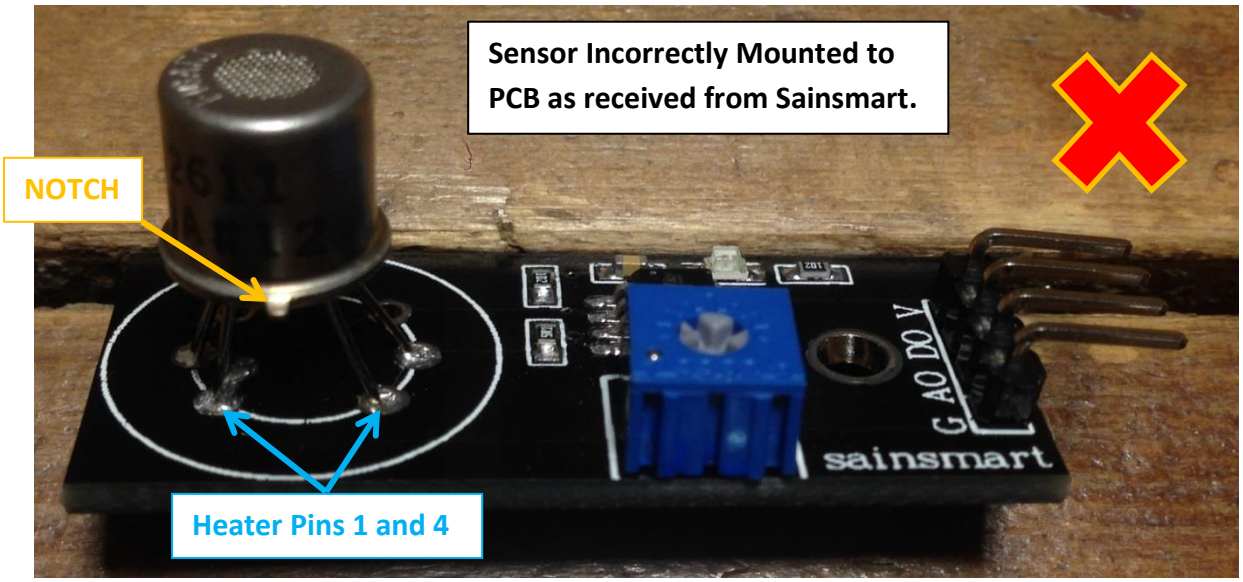
See below for pictures of how the sensor should be soldered.

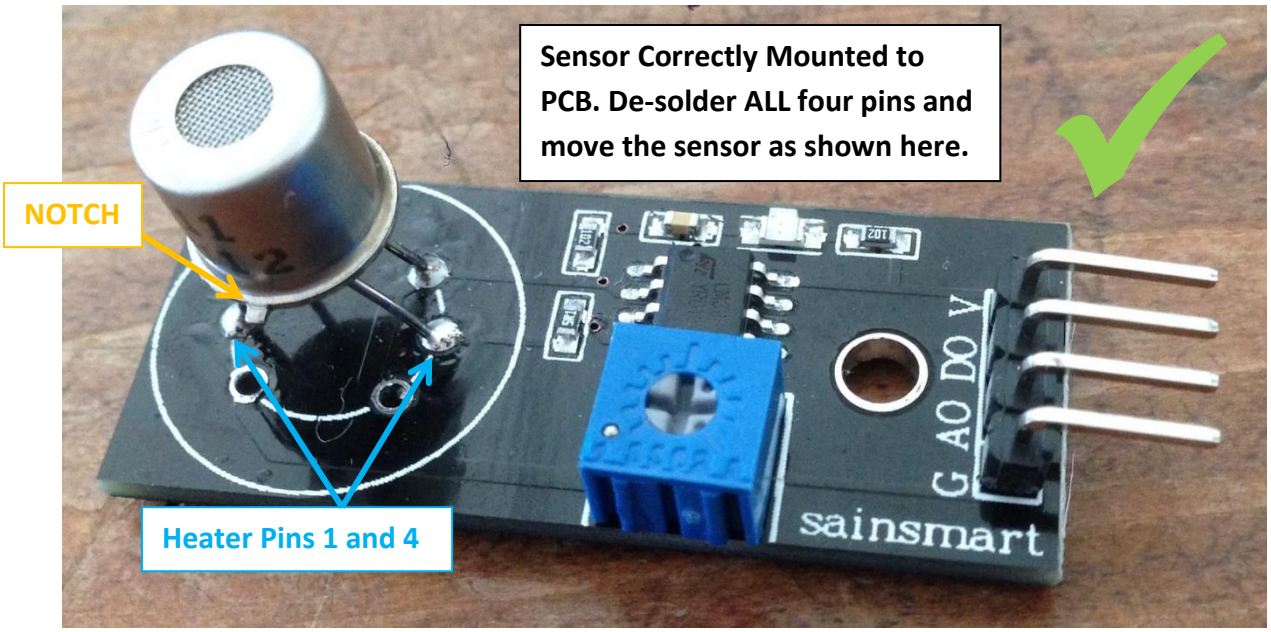
Structure and Dimensions:



Pin connection:

1: Heater
2: Sensor electrode (-)
3: Sensor electrode (+)
4: Heater


Sensor Incorrectly Mounted to PCB as received from Sainsmart.
NOTCH
Heater Pins 1 and 4
G AO DO V
sainsmart

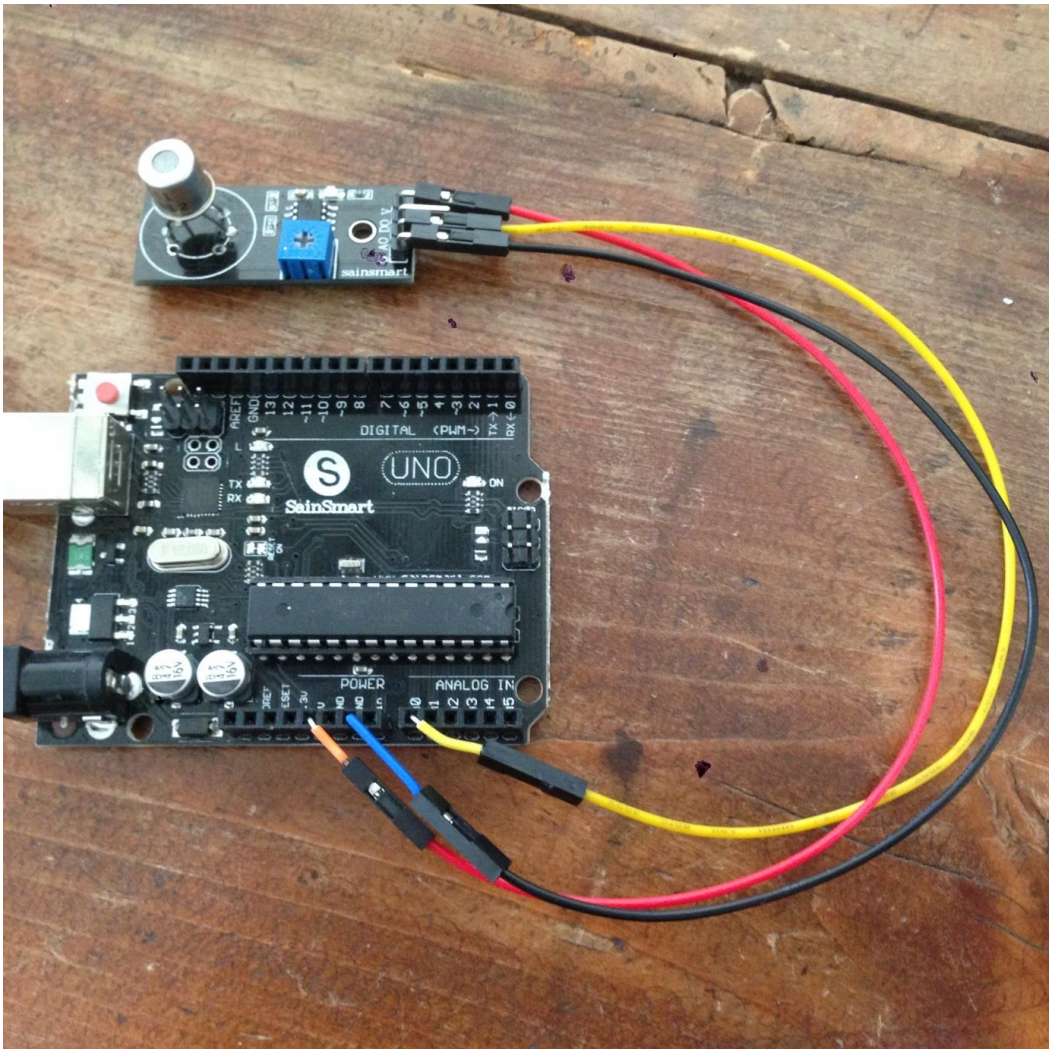

Sensor Correctly Mounted to PCB. De-solder ALL four pins and move the sensor as shown here.
NOTCH
Heater Pins 1 and 4
G AO DO V
sainsmart

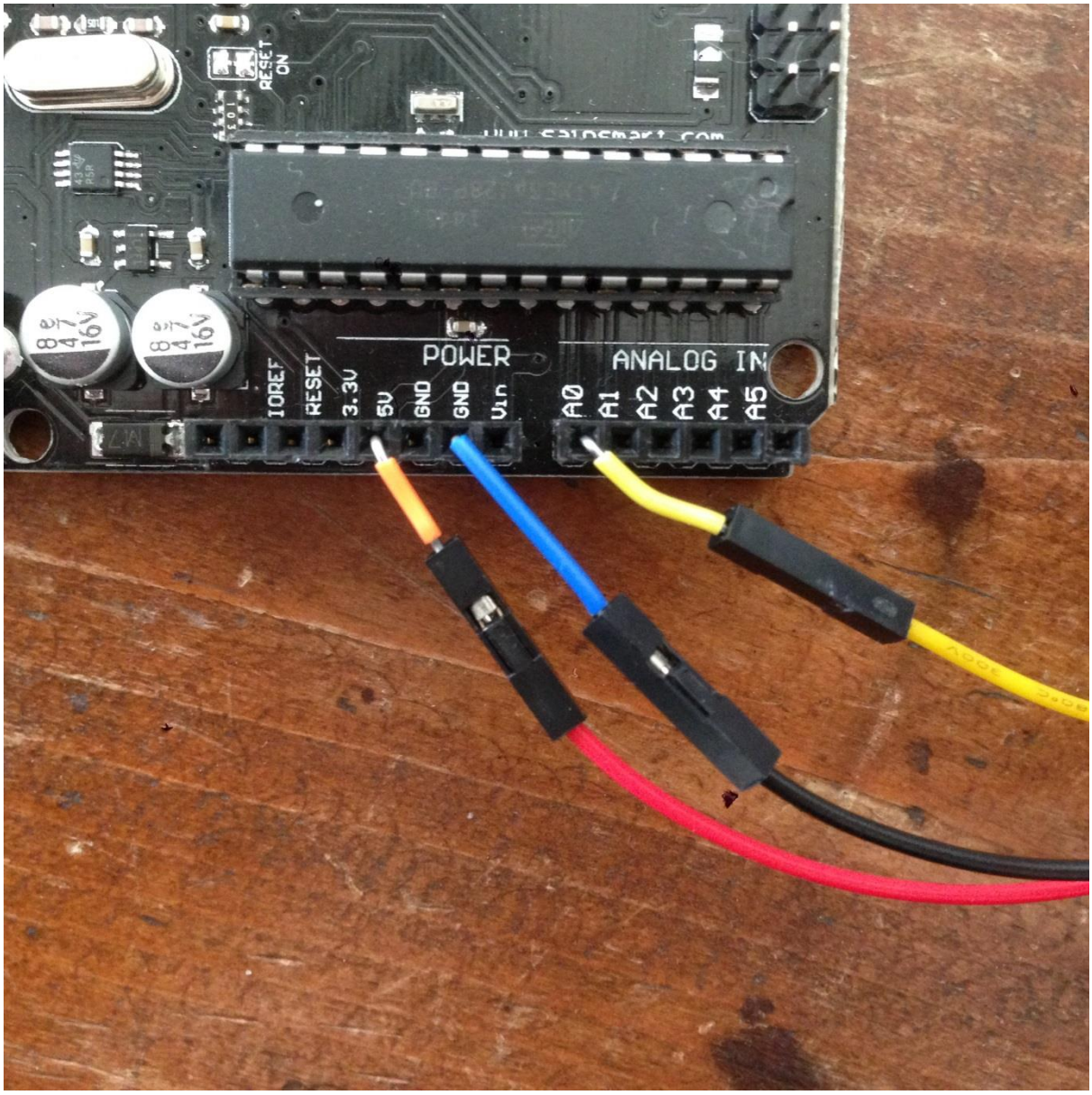
Connection to the Arduino (Sainsmart) Uno and Test

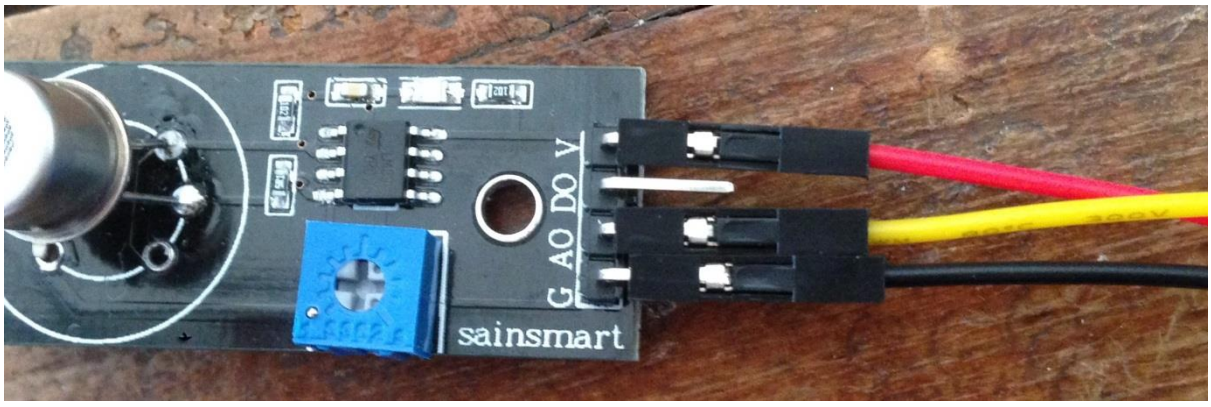
To measure the Analog Output of the Sensor, connect the Wiring as follows:

UNO	Sensor PCB
5V	V
GND	G
A0	AO

(Note: ‘DO’ on the Sensor PCB is the Digital Out – this can be adjusted to switch from Low to High, with the Trim Pot, when the Sensor is exposed to Solvent Vapour – this is not covered in this topic).




RESET
ON
POWER
ANALOG IN
IOREF
RESET
3.3V
5V
GND
GND
Vin
A0
A1
A2
A3
A4
A5


G AO DO V
sainsmart

Upload the following code to the UNO:

```
/*
  ReadAnalogVoltage
  Reads an analog input on pin 0, converts it to voltage, and prints the result to the serial monitor.
  Attach the center pin of a potentiometer to pin A0, and the outside pins to +5V and ground.

 This example code is in the public domain.
 */

// the setup routine runs once when you press reset:
void setup() {
  // initialize serial communication at 9600 bits per second:
  Serial.begin(9600);
}

// the loop routine runs over and over again forever:
void loop() {
  // read the input on analog pin 0:
  int sensorValue = analogRead(A0);
  // Convert the analog reading (which goes from 0 - 1023) to a voltage (0 - 5V):
  float voltage = sensorValue * (5.0 / 1023.0);
  // print out the value you read:
  Serial.println(voltage);
}
```

Now open ‘Serial Monitor’ in the Arduino Sketch software – you should see the Output value at around ~0.2V. Blow on the Sensor – you should see the value increase and then drop back down. Test with a solvent vapour held near the sensor – the value should increase greatly, >1V. When the solvent source is removed, the output should drop back to its baseline value. If this is the case, congratulations you now have a working sensor.

Thanks for reading – I hope this helps a few people out.