Grove - Gas Sensor (MQ3)

Release date : 9/20/2015

Version : 1.0

Wiki: http://www.seeedstudio.com/wiki/Grove_-_Gas_Sensor(MQ3)

### Document Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Author</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Sep 21, 2015</td>
<td>Victor.He</td>
<td>Create file</td>
</tr>
</tbody>
</table>


Contents

Document Revision History .............................................................................................................. 2
1. Introduction ................................................................................................................................. 2
2. Features ......................................................................................................................................... 3
3. Application Ideas ......................................................................................................................... 4
4. Mechanic Dimensions .................................................................................................................. 5
5. Usage ............................................................................................................................................... 6
   5.1 Suggest Reading for Starter ....................................................................................................... 6
   5.2 Hardware Installation .................................................................................................................. 6
   5.3 How to use .................................................................................................................................. 7
6. Support .......................................................................................................................................... 10
7. Version Tracker ............................................................................................................................ 11
8. Resources ....................................................................................................................................... 12
9. Licensing ....................................................................................................................................... 13
Disclaimer

For physical injuries and possessions loss caused by those reasons which are not related to product quality, such as operating without following manual guide, natural disasters or force majeure, we take no responsibility for that.

Under the supervision of Seeed Technology Inc., this manual has been compiled and published which covered the latest product description and specification. The content of this manual is subject to change without notice.

Copyright

The design of this product (including software) and its accessories is under tutelage of laws. Any action to violate relevant right of our product will be penalized through law. Please consciously observe relevant local laws in the use of this product.
1. Introduction

The Grove - Gas Sensor (MQ3) module is useful for gas leakage detecting (in home and industry). It can detect Alcohol, Benzine, CH4, Hexane, LPG, CO. Based on its fast response time, measurements can be taken as soon as possible. Also, the sensitivity can be adjusted by the potentiometer.
2. Features

- High sensitivity to alcohol and small sensitivity to Benzine
- Stable and long life
- Fast response and High sensitivity
3. Application Ideas

- They are suitable for alcohol checker, Breathalyser.
- Toys
### 4. Mechanic Dimensions

#### Electronic Characteristics

<table>
<thead>
<tr>
<th>Items</th>
<th>Parameter name</th>
<th>Min</th>
<th>Type</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VCC</td>
<td>Working Voltage</td>
<td>4.9</td>
<td>S</td>
<td>5.1</td>
<td>V</td>
</tr>
<tr>
<td>PH</td>
<td>Heating consumption</td>
<td>0.5</td>
<td>-</td>
<td>750</td>
<td>mW</td>
</tr>
<tr>
<td>RL</td>
<td>Load resistance</td>
<td>can adjust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RH</td>
<td>Heater resistance</td>
<td>-</td>
<td>33</td>
<td>-</td>
<td>Ω</td>
</tr>
<tr>
<td>Rs</td>
<td>Sensing Resistance</td>
<td>1</td>
<td>-</td>
<td>8</td>
<td>M Ω</td>
</tr>
<tr>
<td>Scope</td>
<td>Detecting Concentration</td>
<td>0.05</td>
<td>-</td>
<td>10</td>
<td>mg/L</td>
</tr>
</tbody>
</table>
5. Usage

5.1 Suggest Reading for Starter

- Download Arduino and install Arduino driver
- Getting Started with Seeeduino
- How to choose a Gas Sensor
- What's LEL

5.2 Hardware Installation

Grove products have an ecosystem and all have the same connector which can plug onto the Base Shield. Connect this module to the A0 port of the Base Shield, however, you can also connect the Gas sensor to the Arduino without the Base Shield by jumper wires.

<table>
<thead>
<tr>
<th>Arduino UNO</th>
<th>Gas Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V</td>
<td>VCC</td>
</tr>
<tr>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>Analog A0</td>
<td>SIG</td>
</tr>
</tbody>
</table>

You can gain the present voltage through the SIG pin of the sensor. The higher the concentration of the gas, the bigger the output voltage of the SIG pin. Sensitivity can be regulated by rotating the potentiometer. Please note the best preheat time of the sensor is above 24 hours. For the detailed information about the MQ-3 sensor please refer to the datasheet.
5.3 How to use

There’re two steps you need to do before getting the concentration of gas.

First, connect the module with Grove Shield using A0 like the picture above. And put the sensor in a clear air and use the program below.

```cpp
void setup() {
    Serial.begin(9600);
}

void loop() {
    float sensor_volt;
    float RS_air; // Get the value of RS via in a clear air
    float R0; // Get the value of R0 via in Alcohol
    float sensorValue;

    /*--- Get a average data by testing 100 times ---*/
    for(int x = 0 ; x < 100 ; x++)
    {
        sensorValue = sensorValue + analogRead(A0);
    }
    sensorValue = sensorValue/100.0;
    /*-----------------------------------------------*/

    sensor_volt = sensorValue/1024*5.0;
    RS_air = (5.0-sensor_volt)/sensor_volt; // omit *RL
    R0 = RS_air/70.0; // The ratio of RS/R0 is 70 in a clear air

    Serial.print("sensor_volt = ");
    Serial.print(sensor_volt);
    Serial.println("V");

    Serial.print("R0 = ");
    Serial.println(R0);
    delay(1000);
}
```

Then, open the monitor of Arduino IDE, you can see some data are printed, write down the value of R0 and you need to use it in the following program. During this step, you may pay a while time to test the value of R0.

Second, put the sensor in one gas where the environment you want to test in. However, don’t forget to replace the R0 below with value of R0 tested above.
void setup() {
    Serial.begin(9600);
}

void loop() {

    float sensor_volt;
    float RS_gas; // Get value of RS in a GAS
    float ratio; // Get ratio RS_GAS/RS_air
    int sensorValue = analogRead(A0);
    sensor_volt = (float)sensorValue/1024*5.0;
    RS_gas = (5.0-sensor_volt)/sensor_volt; // omit *RL

    // Replace the name "R0" with the value of R0 in the demo of First Test

    Serial.print("sensor_volt = ");
    Serial.println(sensor_volt);
    Serial.print("RS_ratio = ");
    Serial.println(RS_gas);
    Serial.print("Rs/R0 = ");
    Serial.println(ratio);

    Serial.println("\n\n");
    delay(1000);
}

Now, we can get the concentration of gas from the below figure
According to the figure, we can see that the minimum concentration we can test is 0.1mg/L and the maximum is 10mg/L. However, we can't provide a formula because the relation between ratio and concentration is nonlinear.

But also, we can convert mg/L to ppm, it may be convenient for us to watch the value.
6. Support

Ask questions on Seeed forum.
## 7. Version Tracker

<table>
<thead>
<tr>
<th>Revision</th>
<th>Descriptions</th>
<th>Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>v0.9b</td>
<td>Initial public release</td>
<td>16, Aug, 2011</td>
</tr>
<tr>
<td>v1.4</td>
<td>Replace some components</td>
<td>27, Aug, 2014</td>
</tr>
</tbody>
</table>
8. Resources

File: Gas Sensor Eagle files.zip
File: Gas Sensor Schematic.pdf
File: MQ-3.pdf
9. Licensing

This documentation is licensed under the Creative Commons Attribution-ShareAlike License 3.0 Source code and libraries are licensed under GPL/LGPL, see source code files for details.
Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Seeed Studio:
101020006