# Grove - Gas Sensor (MQ5) User Manual

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Wiki: http://seeedstudio.com/wiki/Twig_-_Gas_Sensor(MQ5)

Bazaar: http://www.seeedstudio.com/depot/Grove-Gas-SensorMQ5-p-938.html

## Document Revision History

| Revision | Date | Author | Description |
|---|---|---|---|
| 1.0 | Sep 22, 2015 | Jiankai.li | Create file |
| | | | |

## Contents

## *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*

# 1. Introduction

The Grove - Gas Sensor(MQ5) module is useful for gas leakage detecting(in home and industry). It can detect H2, LPG, CH4, CO, Alcohol. 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

- Wide detecting scope
- Stable and long life
- Fast response and High sensitivity

## 3. Application Ideas

- Gas leakage detecting
- Toys

# 4. Mechanic Dimensions

## 4.1 Electronic Characteristics

| Items | Parameter name | Min | Type | Max | Unit |
|---|---|---|---|---|---|
| System Characteristics | | | | | |
| VCC | Working Voltage | 4.9 | 5 | 5.1 | V |
| PH | Heating consumption | 0.5 | - | 800 | mW |
| RL | Load resistance | | can adjust | | |
| RH | Heater resistance | - | 31±10% | - | Ω |
| Rs | Sensing Resistance | 10 | - | 60 | kΩ |
| Scope | Sensing Resistance | 200 | - | 10000 | ppm |

# 5. Usage

## 5.1 Suggest Reading for Starter

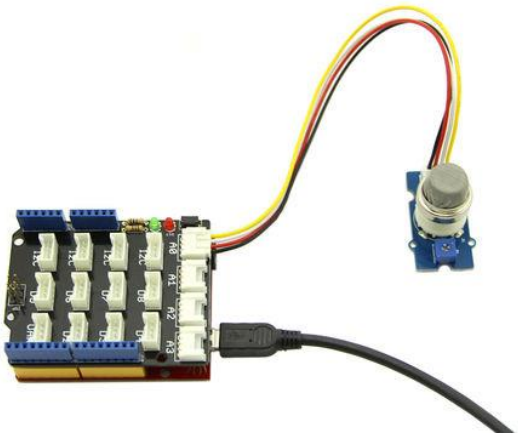
- Download Arduino and install Arduino driver
- Getting Started with Seeeduino
- How to choose a Gas Sensor
- What's LEL

## 5.2 Hardware Installation

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

| Arduino UNO | Gas Sensor |
|---|---|
| 5V | VCC |
| GND | GND |
| NC | NC |
| Analog A0 | SIG |

You can gain the present voltage through the SIG pin of 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-5 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.

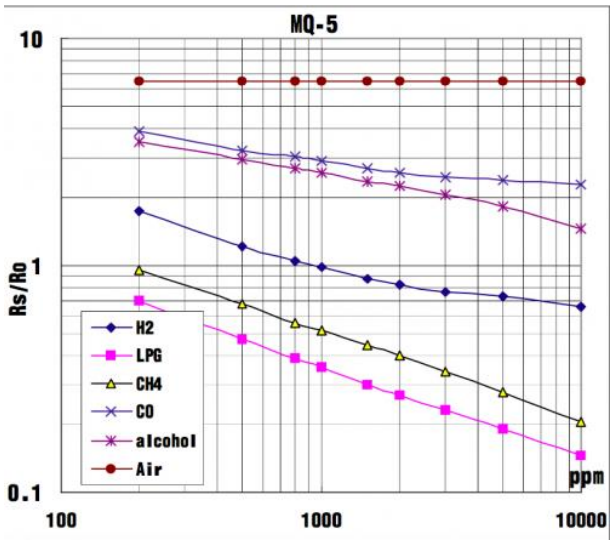
```
void setup() {
  Serial.begin(9600);
}

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 H2
  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/6.5; // The ratio of RS/R0 is 6.5 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 -*/
  ratio = RS_gas/R0;  // ratio = RS/R0
  /*-----------------------------------------------------------------------*/

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

  Serial.print("\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 200ppm and the maximum is 10000ppm, in a other word, we can get a concentration of gas between 0.02% and 1%. However, we can't provide a formula because the relation between ratio and concentration is nonlinear.

# 6. Version Tracker

| Revision | Descriptions | Release |
|---|---|---|
| v0.9b | Initial public release | 16,Aug,2011 |
| v1.4 | Replace some components | 27,Aug,2014 |

## 7. Resources

- File:Gas Sensor Eagle files.zip
- File:Gas Sensor Schematic.pdf
- File:MQ-5.pdf

# 8. Licensing

# Mouser Electronics

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