

MQ135 GAS SENSOR

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The MQ135 gas sensor is commonly used for detecting various gases such as NH₃, NO, alcohol, benzene, smoke, and CO₂. It features a high sensitivity and a wide detection range, making it suitable for applications in air quality monitoring and safety systems.

Sensitive material of MQ135 gas sensor is SnO₂, which with lower conductivity in clean air. When target pollution gas exists, the sensor's conductivity gets higher along with the gas concentration rising.

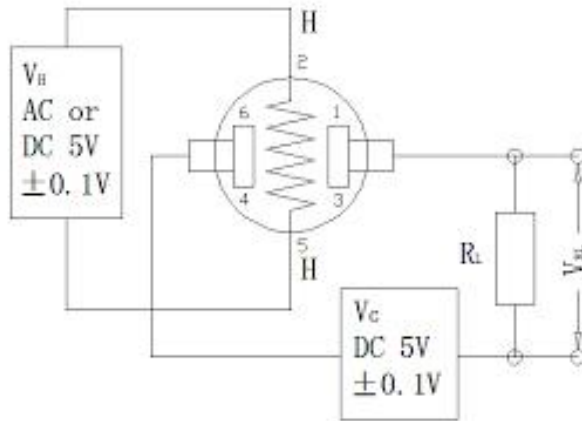
MQ135 gas sensor has high sensitivity to ammonia gas, sulfide, benzene series steam, also can monitor smoke and other toxic gases well.

A) Sensor Specifications

- **Operating Voltage** : 5V
- **Load Resistance (RL)** : Adjustable (typically 10K Ω)
- **Heater Resistance (RH)** : 33 Ω \pm 5%
- **Heater Current (IH)** : < 200mA
- **Heating Consumption** : < 800mW
- **Sensing Resistance (RS)** : 10K Ω to 60K Ω (clean air)
- **Preheat Time** : 24 hours

B) MQ-135 Sensor Features

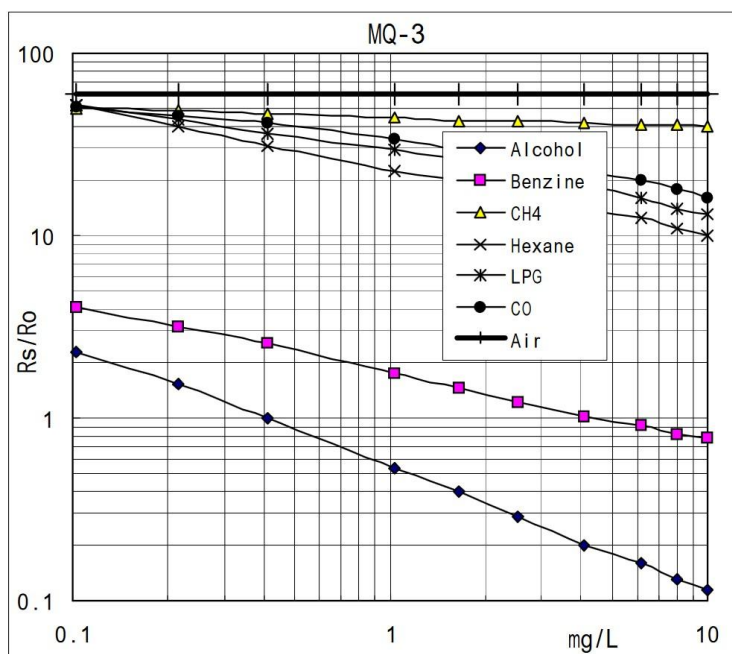
- Wide detecting scope
- Fast response and High sensitivity
- Stable and long life
- Operating Voltage is +5V
- Detect/Measure NH₃, NO, alcohol, Benzene, smoke, CO₂, etc.
- Analog output voltage: 0V to 5V
- Digital output voltage: 0V or 5V (TTL Logic)
- Preheat duration 20 seconds
- Can be used as a Digital or analog sensor
- The Sensitivity of Digital pin can be varied using the potentiometer



The above fig is the basic test circuit of MQ135. The sensor requires two voltage inputs: heater voltage (V_H) and circuit voltage (V_C). V_H is used to supply standard working temperature to the sensor and it can adopt DC or AC power, while V_{RL} is the voltage of load resistance R_L which is in series with sensor. V_C supplies the detect voltage to load resistance R_L and it should adopt DC power.

Freundlich Absorption Theorem Graph

The Freundlich absorption theorem describes the relationship between gas concentration and sensor resistance.



The graph typically plots

$$\log(R_o/R_s) = 1/n * \log(\text{Concentration}) + \log(K)$$

- **R_s** is the sensor resistance in the presence of gas.
- **R₀** is the sensor resistance in clean air.
- **n** and **K** are constants for each gas.

The ordinate is resistance ratio of the sensor (R_s/R_0), the abscissa is concentration of gases. R_s means resistance in target gas with different concentration, R_0 means resistance of sensor in clean air. All tests are finished under standard test conditions.

The Following conditions must be avoided

- 1) Water condensation
- 2) Used in high gas concentration
- 3) Long time storage
- 4) Long time exposed to adverse environment
- 5) Continual Vibrations
- 6) Concussion (If sensors meet strong concussion, it may lead its lead wire disconnected)
- 7) Exposed to organic silicon steam.
- 8) Exposed to highly corrosive gas.
- 9) Freezing Temperatures
- 10) Applying high voltage to the circuit.

References/Bibliographies.

- 1) MQ135 sensor study.([https://www.winsensor.com/d/files/PDF/Semiconductor%20Gas%20Sensor/MQ135%20\(Ver1.4\)%20-%20Manual.pdf](https://www.winsensor.com/d/files/PDF/Semiconductor%20Gas%20Sensor/MQ135%20(Ver1.4)%20-%20Manual.pdf))
- 2) MQ-135 - Gas Sensor for Air Quality(<https://components101.com/sensors/mq135-gas-sensor-for-air-quality>)