

MQ-135 Gas Sensor: What It Is and How It Works

What Is the MQ-135 Gas Sensor?

The **MQ-135 gas sensor** is a widely used **air quality sensor** designed to detect a variety of harmful gases in the environment. It is commonly used for air pollution monitoring, indoor air quality checks, and industrial applications.

Gases Detected by MQ-135

The MQ-135 sensor is sensitive to multiple gases, including:

Gas	Detection Sensitivity
Ammonia (NH ₃)	High
Nitrogen oxides (NO _x)	High
Benzene (C ₆ H ₆)	High
Smoke	High
Alcohol (Ethanol)	Moderate
Carbon Dioxide (CO ₂)	Moderate

Key Features of MQ-135

- **Multi-gas detection** for air quality monitoring.
- **Analog output** for microcontrollers (Arduino, ESP8266, Raspberry Pi).
- **Operating voltage: 5V**
- **Preheating time: 1-2 minutes** for stable readings.
- **Low power consumption** and **long lifespan**.

Applications of MQ-135

- **Air quality monitoring** (e.g., detecting pollutants in indoor/outdoor environments).
- **CO₂ and smoke detection** in offices, homes, and industries.
- **Industrial safety systems** to detect harmful gases.
- **Smart cities and environmental monitoring systems**.

How Does the MQ-135 Work?

The MQ-135 sensor operates based on **metal oxide semiconductor (MOS) technology**, also known as **chemiresistor technology**.

1. Gas Detection Mechanism:

- The sensor's core component is a **tin dioxide (SnO_2) sensing layer**, which has a high resistance in clean air.
- When target gases (like NH_3 , NO_x , CO_2 , etc.) are present, they **chemically react** with the SnO_2 surface, **changing the sensor's resistance**.
- The sensor's **analog output voltage varies based on gas concentration**, which can be read using a microcontroller (e.g., Arduino).

2. Heating Element:

- The sensor includes an internal **heating element** that maintains an optimal operating temperature.
- The heater stabilizes the sensor's performance by ensuring accurate gas detection.

3. Output:

- The **analog output voltage** increases with higher gas concentrations.
- The value can be converted to **PPM (Parts Per Million)** for precise air quality analysis.

Summary

The **MQ-135** is a versatile gas sensor designed for **air quality monitoring**. It detects a variety of gases, including **ammonia (NH_3)**, **nitrogen oxides (NO_x)**, **carbon dioxide (CO_2)**, **benzene (C_6H_6)**, **alcohol (ethanol)**, and **smoke**. The sensor operates using **metal oxide semiconductor (MOS) technology**, where its resistance changes in the presence of target gases, producing an **analog output voltage** that corresponds to gas concentration.

[How To Use MQ-135 Gas Sensor](#)

[MQ-135 Sensor \(Carbon Dioxide and other gases\) usage with Arduino R4 Wi-Fi](#)

[ARDUINO-BASED AIR QUALITY MONITOR USING MQ135 SENSOR](#)

[Air Quality Monitoring and Alert System Using MQ135 Gas Sensor with Arduino Controller](#)

[MQ-135 Sensor \(\$\text{CO}_2\$, Benzene\) with Arduino | Sheekar Banerjee](#)

[MQ-135 Gas Sensor Module](#)

