MQ-8 Gas Sensor: What It Is and How It Works

The **MQ-8 gas sensor** is a **hydrogen gas (H_2) sensor** designed to detect hydrogen leaks and measure hydrogen concentration in the air. It provides both **analog and digital outputs**, making it compatible with microcontrollers like **Arduino** and **ESP32**.

Features of MQ-8 Sensor

- **Detects hydrogen (H_2) gas**
- **High sensitivity and fast response time**
- **Analog output (A0) for precise gas concentration readings**
- **Digital output (D0) with an adjustable threshold via potentiometer**
- **Built-in heater for sensor stabilization**

How MQ-8 Works

1. Internal Structure

The MQ-8 sensor consists of:

- A **sensing material** (SnO_2 - Tin Dioxide)
- A **built-in heating element**
- An **electrode** to measure resistance changes

2. Working Principle

1. **In clean air** → The sensor has **high resistance** (few free electrons).
2. **When exposed to H_2 gas** → Hydrogen molecules reduce the **resistance of the sensing material**.
3. **The change in resistance** is converted into a **voltage output**.
4. The sensor outputs:
    - **Analog voltage** (proportional to gas concentration).
    - **Digital signal** (high or low based on threshold).

How to Use MQ-8 with Arduino

Wiring Diagram

MQ-8 Pin	Connection to Arduino
VCC	5V
GND	GND
A0	Analog Pin A0
D0	Digital Pin (Optional)

Why Calibration is Important?

Why Calibrate Gas Sensors?

- Gas sensors **change over time** due to aging, temperature, and humidity.
- **Factory calibration is generic**, but for precise measurements, you must **calibrate based on your environment**.
- Calibration improves **accuracy** and **reduces false positives**.

How to Calibrate the MQ-8 Sensor

1. **Warm up the sensor for at least 24 hours** before the first use.
2. **Take readings in fresh air** (should be stable and low).
3. **Expose the sensor to known concentrations of hydrogen gas** and record values.
4. **Adjust threshold based on real-world conditions**.

Gases Detected by MQ-8 Sensor

Gas	Sensitivity Level	Primary/Secondary Detection
Hydrogen (H_2)	High	Primary
LPG	Low	Secondary
Methane (CH_4)	Low	Secondary
Alcohol	Low	Secondary
Carbon Monoxide (CO)	Low	Secondary

Summary

- The **MQ-8 sensor detects hydrogen gas (H_2)** and gives **analog and digital outputs**.
- It works by measuring **resistance changes** in a tin dioxide (SnO_2) layer.
- **Calibration is essential** for accurate readings.
- Can be used with **Arduino, ESP32, or Raspberry Pi**.

Interface the MQ8 Hydrogen H2 Gas Sensor with Arduino

MQ-8 Sensor (Hydrogen Gases and other gases) usage with Arduino R4 Wi-Fi

ESP32 with multiple MQ Gas sensors getting unstable readings

MQ-8 hydrogen sensor calibration

A simple and low-cost integrative sensor system for methane and hydrogen measurement

How to make hydrogen gas sensor - Arduino and MQ8