

MQ-7 Gas Sensor: What It Is and How It Works

What is the MQ-7 Gas Sensor?

The **MQ-7** is a gas sensor designed primarily for **carbon monoxide (CO) detection**. It is widely used in **air quality monitoring systems, industrial safety applications, and smart home projects**. The sensor detects the concentration of CO in the air and provides an **analog voltage output** that varies with the gas concentration.

How Does the MQ-7 Gas Sensor Work?

The MQ-7 sensor works based on a **heated metal oxide semiconductor (SnO₂)** that changes its resistance when it comes into contact with **carbon monoxide (CO)**. The sensor has an internal heater that cycles between **two temperature levels**, which is critical for accurate CO detection:

Dual Heating Cycle Mechanism

The MQ-7 sensor requires a unique **cycling operation** between two different heating voltages:

1. **High Temperature Mode (5V for 60 seconds)**
 - At high temperatures, the sensor cleans itself by burning off residual gases.
2. **Low Temperature Mode (1.5V for 90 seconds)**
 - At low temperatures, the sensor reacts to **carbon monoxide (CO)** and provides a measurable output.

This dual heating cycle makes MQ-7 **different from other MQ-series sensors**, which usually work at a constant voltage.

Detected Gases and Sensitivity

Gas	Sensitivity Level
Carbon Monoxide (CO)	High
Hydrogen (H ₂)	Medium
Methane (CH ₄)	Low
LPG, Alcohol	Low

Why is Calibration Needed?

Calibration is essential for accurate CO measurement because:

1. **Sensor Variability:** Each sensor may have slight variations in sensitivity.
2. **Environmental Factors:** Temperature, humidity, and other gases affect sensor response.
3. **Baseline Correction:** The sensor's resistance drifts over time, requiring recalibration.
4. **Gas Concentration Accuracy:** The raw sensor output needs to be **mapped to real ppm (parts per million) values**.

To calibrate:

- Expose the sensor to **clean air** and record the baseline value.
- Use a **known CO concentration** to determine the sensor's response curve.

Applications of MQ-7

- **Carbon Monoxide Detectors** for homes and vehicles
- **Air Quality Monitoring** in industrial zones
- **Gas Leakage Detection** in factories and laboratories
- **Smart IoT-based Gas Sensors** for smart home automation

Conclusion

The **MQ-7 sensor** is a specialized gas sensor designed primarily for detecting **carbon monoxide (CO)**. Its unique **dual heating cycle operation** makes it different from other MQ sensors. Proper **calibration and heating cycle control** are essential for accurate readings. It is widely used in **CO detectors, air quality monitors, and industrial gas sensing applications**.

[Interfacing MQ-7 Smoke Gas Sensor Module with Arduino](#)

[Interface the MQ7 carbon mono-oxide\(CO\) Gas Sensor with Arduino](#)

[Arduino CO Monitor Using MQ-7 Sensor](#)

[CO \(Carbon Monoxide\) Gas Sensor Using the Arduino Uno](#)

[Electronic nose](#)

[Hazardous Gas Monitor](#)