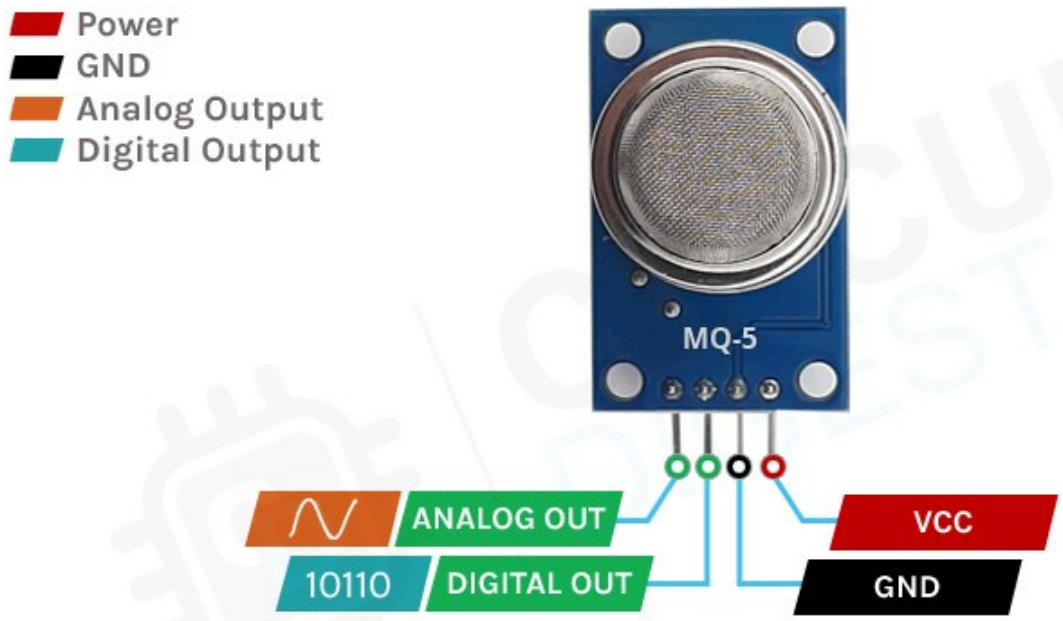
MQ5

Nowadays, natural gasses are everywhere. They are easy to transport and provide energy for various tasks in both household and industrial use. It also possesses a significant risk of fire if not handled carefully. This is where MQ-5 Combustible Gas Sensor comes into play. The MQ-5 Combustible Gas Sensor can detect LPG, H2, LPG, CH4, and CO.

MQ-5 Sensor Pinout



VCC :- To +ve of power supply

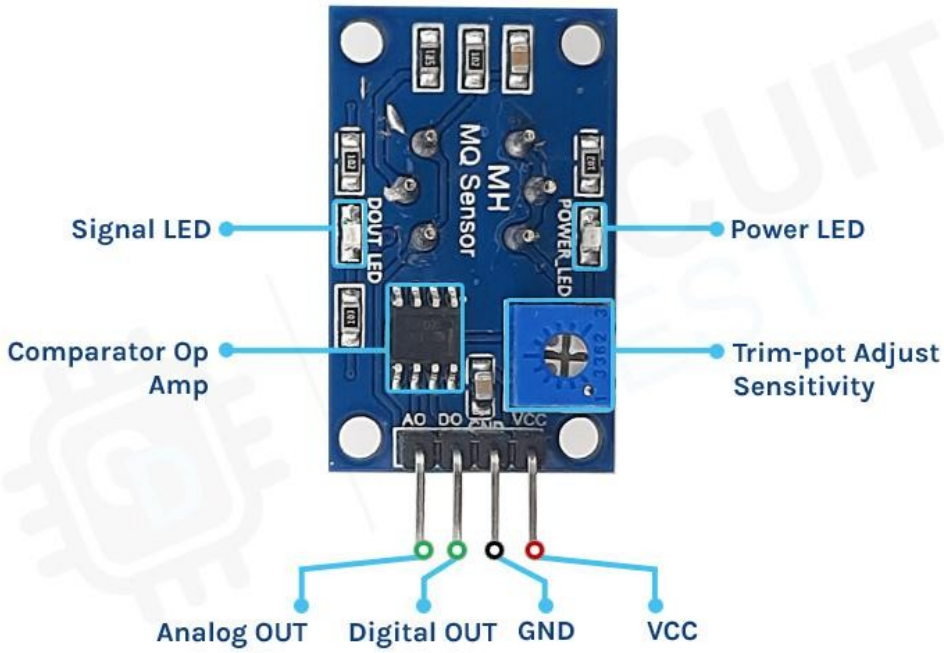
GND :- To -ve of power supply

DOUT :- Sensor data output in digital form

AOUT :- Sensor data output in analog form

MQ-5 Sensor Module – Parts

The MQ-5 Sensor is popular among beginners since it detects combustible gases in most Arduino projects. Likewise, these are low-cost, easy-to-use sensors with a wide detection range that may be reduced to modify sensitivity. The component markings for the MQ-5 Sensor are given below.



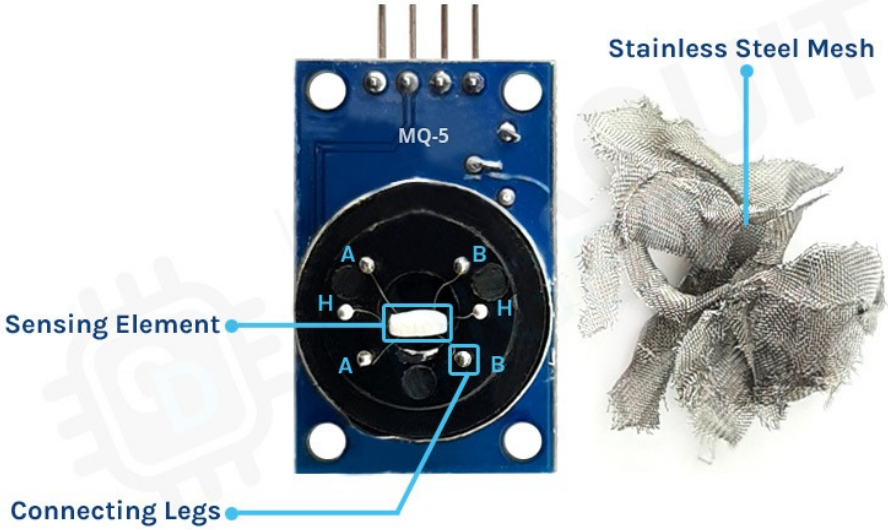
There are four pins on the MQ-5 Sensor Module, two of which are for **VCC** and **GND**. Like other basic sensor modules, the remaining two pins output **analog (AOUT)** and **digital (DOUT)** signals simultaneously. Since the module operates at **5V with 0.1% precision**, it is powered using a **5V supply** compatible with the STM32 board.

The analog signal from the MQ-5 sensor is connected to the STM32's **ADC input pin** (e.g., **PA0**) to measure gas concentration. The digital output (DOUT), generated by an onboard **op-amp comparator**, is connected to a **GPIO input pin** (e.g., **PA1**) on the STM32 to detect when the gas level exceeds the threshold set using the onboard potentiometer. The STM32 reads both analog and digital signals for monitoring gas levels.

How Does the MQ-5 Sensor Module Work?

To effectively detect combustible Gas, the MQ-5 Sensor requires a heating element. Putting a heating source close to combustible Gas, on the other hand, may be harmful. As a result, the Sensor has an anti-explosion network made up of two thin layers of stainless steel mesh, as seen in the illustration below. A heating element is included in this stainless steel mesh.

Only gaseous components from the environment travel through this mesh structure, which protects against dust and other suspended particles. We can see that the Sensor comprises two main components when we disassemble it. The heating element is composed of nichrome wire, while the detecting element is platinum wire with a tin dioxide covering. The mesh decapped from the real Sensor is shown below.



This is what the Sensor looks like when the mesh is removed. As you can see in the above image, we cut the stainless steel mesh and positioned it on the side of the Sensor. The previously mentioned sensing feature is now evident as well. The star-shaped pins on the Sensor are made by attaching the actual detecting and heating element to the Sensor's six legs. The black Bakelite base of the Sensor, which promotes heat conductivity, can also be observed.

Preheat Time for MQ-5 Sensor:

Working with a combustible gas sensor like this necessitates a warmup or stabilization phase before the instrument can work properly. The datasheet for the module indicates that it requires a 24-hour warmup time. Is this implying that it must be switched on for 24 hours before being used?

The answer to this question is NO. To obtain the standard performance values listed in the datasheet, you must run it constantly for 24 hours. After 24 hours, it was evaluated in their lab. If you want to keep inside the limitations, you'll have to stick to the 24-hour preheating time. Given the Sensor's small size, thermal equilibrium will almost certainly be achieved within 30 minutes. And reaching within a few percent of the datasheet's values would likely take a few minutes.

If you want a precise gas concentration measurement, a 24-hour warm-up time is required. You'll also need a reliable sensor calibration and a mechanism to account for other factors such as temperature, humidity, and so on.

The MQ-5 Sensor can detect and quantify gas concentrations in PPM. It's important to remember that sensing the vapor and measuring its concentration in PPM are not the same thing. The main focus of this article is on observing increases in gas levels and concentration. If you want to calculate the gas level in PPM accurately, the method is slightly different; still, we'll go through it briefly.