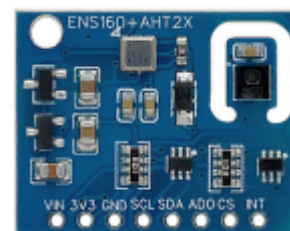


lamaPLC: ENS160 + AHT21 Air Quality Sensor - CO, ECO, TVOC, Temp & Humidity Module

The ENS160 + AHT21 Air Quality Module is a combined environmental sensor board that measures indoor air pollutants (VOCs, eCO₂, AQI) and climate conditions (Temperature, Humidity). It is a popular upgrade for older sensors like the CCS811 due to its integrated sensor fusion and automatic calibration.



- Detection of reducing (VOC) and oxidizing gases (such as NO₂)
- MOX supports up to 4 gas sensors
- Integrated sensor measurement and heater drive control
- Integrated pre-calibrated sensor fusion and automatic correction algorithm

Key Capabilities

- **ENS160 (Air Quality):** Uses Metal-Oxide (MOX) technology to detect reducing and oxidizing gases.
 - **Outputs:** Total Volatile Organic Compounds (TVOC), equivalent CO₂ (eCO₂), and Air Quality Index (AQI).
 - **Target Gases:** Ethanol, toluene, hydrogen, NO₂, and ozone.
- **AHT21 (Climate):** A high-precision digital temperature and humidity sensor.
 - **Temperature:** ±0.3 °C accuracy; range of -40 °C to +120 °C.
 - **Humidity:** ±2 % RH accuracy; range of 0 to 100 % RH.

Technical Specifications

Feature	Specification
Supply Voltage (VIN)	2.0V to 5.5V DC (Breakout boards often regulate to 3.3V)
Interface	I ² C (Standard) or SPI (ENS160 only)
I2C Addresses	ENS160: 0x53 (default) or 0x52 ; AHT21: 0x38
Warm-up Time	< 1 minute for immediate use; up to 1 An hour for full accuracy
Power Use	1.2 to 46 mW depending on operating mode

Pinout

Pin Name	Type	Description
VIN / VCC	Power	Power supply input. Usually supports 3.3V to 5V due to onboard regulators.
GND	Power	Ground connection.
SCL	I ² C	Serial Clock line for both ENS160 and AHT21.
SDA	I ² C	Serial Data line for both ENS160 and AHT21.
ADDR / ADO	Control	(Optional) I ² C address selection for ENS160. Connect to GND for 0x52 or VCC for 0x53.
INT	Output	(Optional) Interrupt pin; can signal when new data is ready.

Example Arduino code

To use the ENS160 + AHT21 module with Arduino, you'll typically need two libraries from the Arduino Library Manager: Adafruit ENS160 and Adafruit AHTX0.

Install Required Libraries

Open the Arduino IDE and install the following:

- Adafruit ENS160 Library
- Adafruit AHTX0 Library (works for both AHT20 and AHT21)
- Adafruit Unified Sensor (dependency for many Adafruit libraries)

This code initializes both sensors via I²C and prints climate and air quality data to the Serial Monitor every two seconds.

```
#include <Wire.h>
#include <Adafruit_ENS160.h>
#include <Adafruit_AHTX0.h>

Adafruit_ENS160 ens160;
Adafruit_AHTX0 aht;

void setup() {
  Serial.begin(115200);
  while (!Serial) delay(10); // Wait for Serial Monitor

  Serial.println("ENS160 + AHT21 Test");

  // Initialize AHT21 (Address 0x38)
  if (!aht.begin()) {
    Serial.println("Could not find AHT21 sensor!");
    while (1) delay(10);
  }
  Serial.println("AHT21 initialized.");

  // Initialize ENS160 (Address 0x53 or 0x52)
  // Most combo boards default to 0x53
  if (!ens160.begin(0x53)) {
    Serial.println("Could not find ENS160 sensor!");
    while (1) delay(10);
  }

  // Set operating mode: Standard (detecting)
  ens160.setMode(ENS160_OPMODE_STD);
  Serial.println("ENS160 initialized.");
}

void loop() {
  // 1. Read Climate Data from AHT21
```

```

sensors_event_t humidity, temp;
aht.getEvent(&humidity, &temp);

// 2. Feed Temperature/Humidity to ENS160 for better accuracy
ens160.setTempRH(temp.temperature, humidity.relative_humidity);

// 3. Read Air Quality Data from ENS160
if (ens160.available()) {
  Serial.print("Temp: "); Serial.print(temp.temperature); Serial.println("
C");
  Serial.print("Humidity: "); Serial.print(humidity.relative_humidity);
Serial.println(" %");

  Serial.print("AQI: "); Serial.println(ens160.getAQI());
  Serial.print("TVOC: "); Serial.print(ens160.getTVOC()); Serial.println("
ppb");
  Serial.print("eCO2: "); Serial.print(ens160.getECO2()); Serial.println("
ppm");
  Serial.println("-----");
}

delay(2000);
}

```

Usage Tips

- Baud Rate: Set your Serial Monitor to 115200 to match the code above.
- Warm-up: The ENS160 requires about 1 hour to achieve full accuracy, though it will start providing initial readings within 1 minute.
- Address Conflict: If the ENS160 is not found, try changing `ens160.begin(0x53)` to `ens160.begin(0x52)`.
- Library Alternatives: If the Adafruit library doesn't work for your specific breakout, the `DFRobot_ENS160` library is a highly compatible alternative.

I2C topics on lamaPLC

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