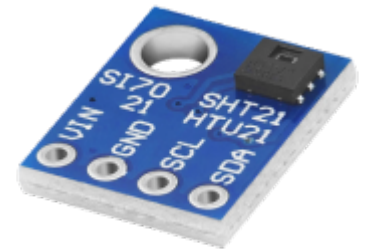


LamaPLC: HTU TE Connectivity temperature/humidity sensors with I²C communication

The HTUs are highly accurate, digital relative humidity and temperature sensors known for their low power consumption, I²C interface, and factory calibration.



Key Features

- **High Accuracy:**
 - **Humidity:** Typical accuracy of $\pm 2\%$ RH within the optimized range of 5% to 95% RH.
 - **Temperature:** Typical accuracy of $\pm 0.3^\circ\text{C}$ over an operating range of 0°C to 70°C .
- **Digital I²C Interface:** Uses the common I²C protocol for easy integration with most microcontrollers (e.g., Arduino, ESP32, Raspberry Pi), requiring only two data lines (SDA and SCL) in addition to power.
- **Low Power Consumption:** Designed for battery-powered and power-sensitive applications, with current consumption as low as $0.14\mu\text{A}$ in sleep mode.
- **Wide Operating Range:**
 - **Humidity:** 0% to 100% RH range.
 - **Temperature:** -40°C to 125°C range.
- **Selectable Resolution:** The resolution can be configured by the user, ranging from 8/12 bits for RH/T to a maximum of 12/14 bits for RH/T, allowing a trade-off between measurement speed and precision.
- **Fast Response Time:** Offers a typical humidity response time of 5 seconds.
- **Factory Calibrated & Linearized:** Each sensor is individually calibrated and provides a linearized digital signal, eliminating the need for complex calibration routines in the host device.
- **Integrated Fault Detection:** Includes a checksum (CRC) feature to improve communication reliability and an electronic identification code stored on the chip for traceability.
- **Protective Filter Option:** The HTU21D(F) variant includes an optional hydrophobic PTFE filter that protects the sensor from dust and water immersion, preserving performance in demanding environments.
- **Full Interchangeability:** No calibration is required when swapping sensors under standard conditions.



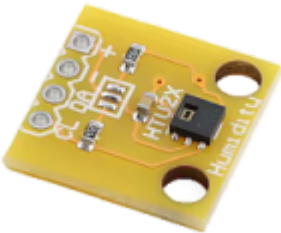
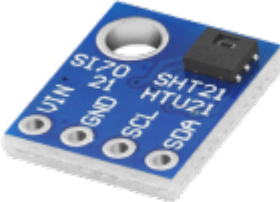

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Difference between HTU31D, HTU21D and HTU20D

The primary difference among the HTU20D, HTU21D, and HTU31D is an incremental improvement in accuracy, supply-voltage range, and power consumption as the model number increases. The sensors are largely interchangeable and use the same I²C communication protocol.

Specification	HTU20D	HTU21D	HTU31D
			
Similar types	SHT20, HTU20, Si702, GY-20 ¹	SHT21, HTU21, Si7021, GY-21, GY-213V, HDC1080 ²	SHT31, HTU31, Si7031, GY-31 ³
Humidity Accuracy (Typical)	±5% RH	±2% RH	±2% RH
Temperature Accuracy (Typical)	Not specified in source	±0.3°C	±0.2°C
Supply Voltage Range	1.5V - 3.6V	1.5V - 3.6V	3V - 5.5V
Power Consumption (Sleep)	Not specified	~0.14 µA	~0.14 µA (estimated based on similar operation)
Interface	I ² C	I ² C	I ² C
Filter Option	HTU20D(F) option available	HTU21D(F) option available	HTU31D(F) option available

¹: The SHT20, HTU20, Si702, GY-20 are different manufacturers' versions of essentially the same I²C digital humidity and temperature sensor chip, designed to be hardware- and software-compatible. The GY-20 is a generic breakout board that uses one of these chips.

²: The SHT21, HTU21, Si7021, GY-21, GY-213V, HDC1080 are very similar digital humidity and temperature sensor chips from different manufacturers (Sensirion, Measurement Specialties, and Silicon Labs, respectively), while the GY-21 is a generic breakout board that uses one of these chips. They are largely interchangeable in hardware and software for most general-purpose applications.

³: The SHT31, HTU31, Si7031, and GY-31 are high-accuracy digital temperature and humidity sensor chips from different manufacturers (Sensirion, TE Connectivity, and Silicon Labs, respectively) that are designed to be largely interchangeable. The GY-31 is a generic name for a breakout board that typically uses the SHT31 chip.

Arduino & HTU31D

To read the HTU31D, the most reliable method is to use the **Adafruit HTU31D** Library. Compared to

the older HTU21D, this sensor handles a wider voltage range (3V–5.5V) and offers even better precision.

Wiring (I²C)

- **VIN:** 3.3V or 5V
- **GND:** Ground
- **SCL:** Pin A5 (on Uno/Nano)
- **SDA:** Pin A4 (on Uno/Nano)
- **ADR Pin:** Leave disconnected for default address **0x40**. Connect to VIN for 0x41.

Arduino Example Code

Install the **Adafruit HTU31D** and **Adafruit BusIO** libraries via the Arduino Library Manager.

```
#include <Wire.h>
#include "Adafruit_HTU31D.h"

Adafruit_HTU31D htu = Adafruit_HTU31D();

void setup() {
  Serial.begin(115200);
  while (!Serial) delay(10);

  Serial.println("HTU31D test");

  if (!htu.begin(0x40)) { // Use 0x41 if ADR pin is tied to High
    Serial.println("Couldn't find sensor!");
    while (1);
  }
}

void loop() {
  sensors_event_t humidity, temp;

  // Get both temperature and humidity at once
  htu.getEvent(&humidity, &temp);

  Serial.print("Temp: ");
  Serial.print(temp.temperature);
  Serial.print(" C \t");

  Serial.print("Humidity: ");
  Serial.print(humidity.relative_humidity);
  Serial.println(" %");

  delay(1000);
}
```

Advanced Features

The HTU31D includes a built-in heater to dry the sensor if it accumulates condensation. You can toggle it in your code:

- `htu.enableHeater(true)`; Turn on heater
- `htu.enableHeater(false)`; Turn off heater

Resolution Settings

You can optimize for speed or precision using `htu.setResolutions(temp_res, hum_res)`.

- **Temperature:** 0.012°C to 0.04°C resolution.
- **Humidity:** 0.01% to 0.02% resolution.

I²C topics on lamaPLC

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• LamaPLC: AHT20 / BMP280 Modul	2026/04/23 21:52	bmp280 , aht20 , adafruit , temperature , humidity , pressure , sensor , arduino , code , i2c
• LamaPLC: APDS - Avago ALS and proximity detection sensors with I²C communication	2026/04/23 21:52	avago , apds-9900 , apds-9930 , apds-9960 , als , proximity , detection , gesture recognition , gesture , i2c , communication , sensor , arduino , code
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• LamaPLC: BMP/BME Bosch Temperature/Humidity/Pressure sensors with I²C communication	2026/04/23 21:52	bme280 , bme680 , bme688 , bmp180 , bmp280 , hw-611 , hw611 , bosch , temperature , humidity , pressure , sensor , arduino , i2c , communication , ai , cjmcu , volatile organic compounds , vocs , volatile sulfur compounds , vsocs , iaq
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• lamaPLC: INA226 - current/voltage/power monitor with I²C communication	2026/04/23 21:52	i2c , i c , communication , arduino , energy , power , current , monitor , sensor , ina226 , ina219 , ina
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