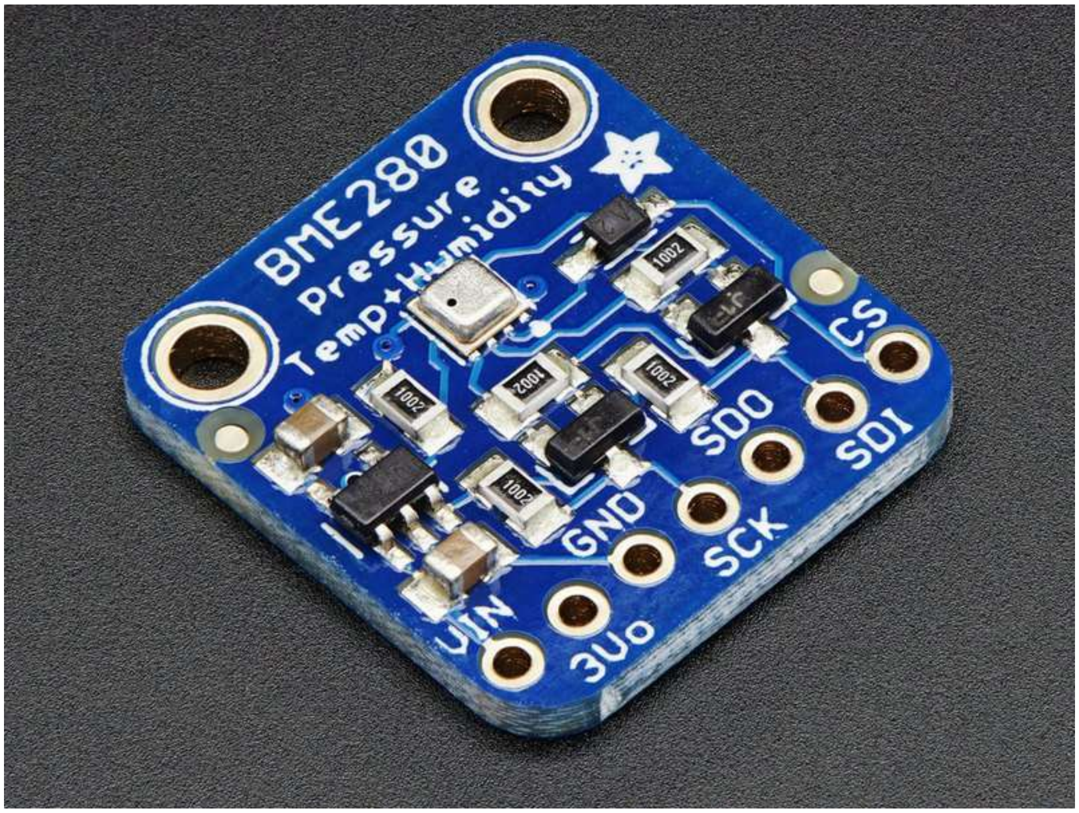

Adafruit BME280 Humidity + Barometric Pressure + Temperature Sensor Breakout

Buld your next weather and enviromental sensing system

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Contributors

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Feedback? Corrections?
ADAFRUIT PRODUCTS SENSORS / WEATHER

Wiring & Test

by lady ada

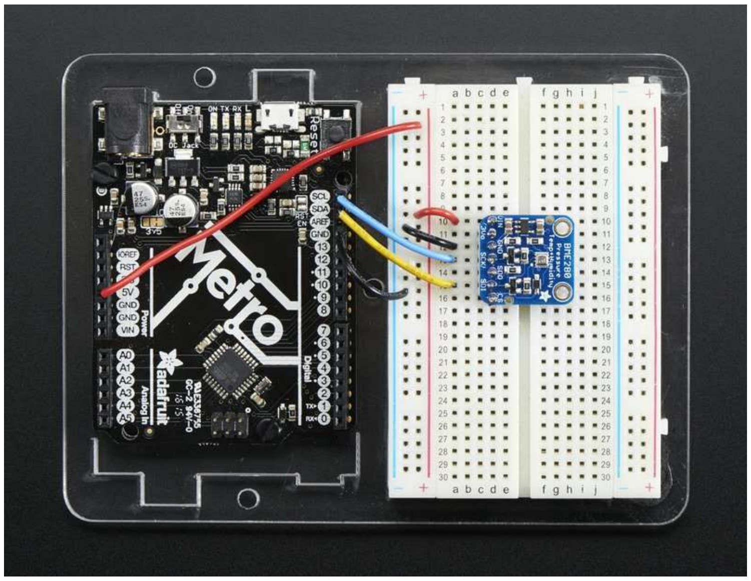
You can easily wire this breakout to any microcontroller, we'll be using an Arduino. For another kind of microcontroller, as long as you have 4 available pins it is possible to 'bit-bang SPI' or you can use two I2C pins, but usually those pins are fixed in hardware. Just check out the library, then port the code.

I2C Wiring

Use this wiring if you want to connect via I2C interface

- Connect **Vin** to the power supply, 3-5V is fine. Use the same voltage that the microcontroller logic is based off of. For most Arduinos, that is 5V
- Connect **GND** to common power/data ground
- Connect the **SCL** pin to the I2C clock **SCL** pin on your Arduino. On an UNO & '328 based Arduino, this is also known as **A5**, on a Mega it is also known as **digital 21** and on a Leonardo/Micro, **digital 3**
- Connect the **SDA** pin to the I2C data **SDA** pin on your Arduino. On an UNO & '328 based Arduino, this is also known as **A4**, on a Mega it is also known as **digital 20** and on a Leonardo/Micro, **digital 2**

By default, the i2c address is 0x77. If you add a jumper from SDO to GND, the address will change to 0x76.

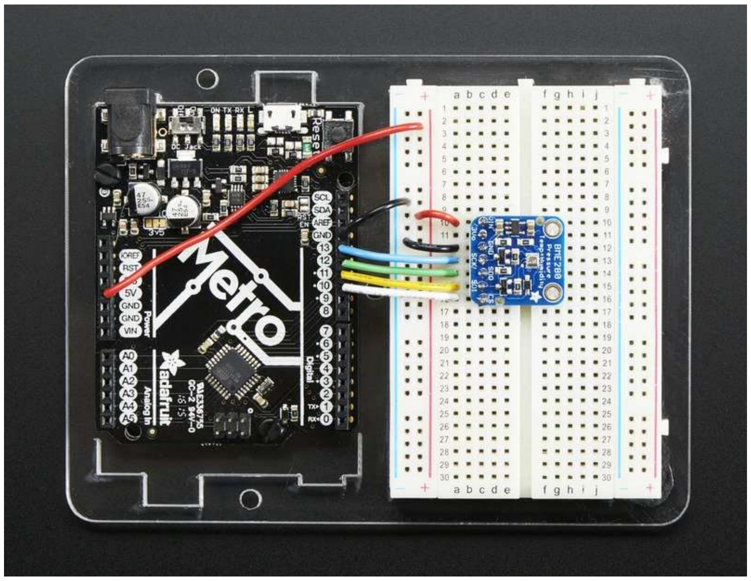


SPI Wiring

Since this is a SPI-capable sensor, we can use hardware or 'software' SPI. To make wiring identical on all Arduinos, we'll begin with 'software' SPI. The following pins should be used:

- Connect **Vin** to the power supply, 3V or 5V is fine. Use the same voltage that the microcontroller logic is based off of. For most Arduinos, that is 5V
- Connect **GND** to common power/data ground
- Connect the **SCK** pin to **Digital #13** but any pin can be used later
- Connect the **SDO** pin to **Digital #12** but any pin can be used later
- Connect the **SDI** pin to **Digital #11** but any pin can be used later
- Connect the **CS** pin **Digital #10** but any pin can be used later

Later on, once we get it working, we can adjust the library to use hardware SPI if you desire, or change the pins to other



Download Adafruit_BME280 library

To begin reading sensor data, you will need to download Adafruit_BME280 from our github repository. You can do that by visiting the github repo and manually downloading or, easier, just click this button to download the zip

Download Adafruit BME280 Library

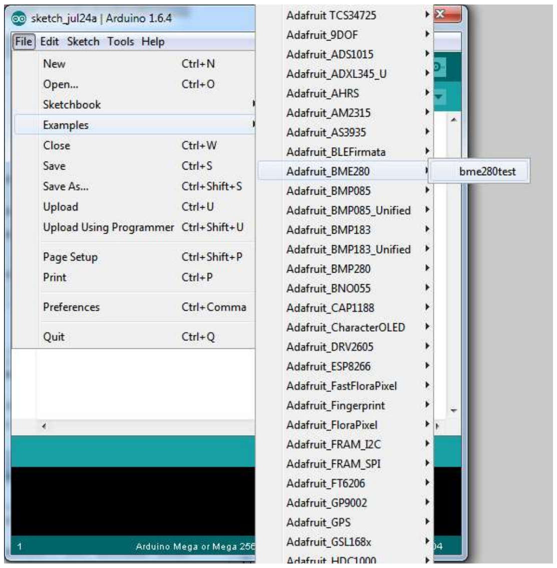
Rename the uncompressed folder **Adafruit_BME280** and check that the **Adafruit_BME280** folder contains **Adafruit_BME280.cpp** and **Adafruit_BME280.h**

Place the **Adafruit_BME280** library folder your **arduinosketchfolder/libraries/** folder.
You may need to create the **libraries** subfolder if its your first library. Restart the IDE.

We also have a great tutorial on Arduino library installation at:
http://learn.adafruit.com/adafruit-all-about-arduino-libraries-install-use

Load Demo

Open up **File->Examples->Adafruit_BME280->bmp280test** and upload to your Arduino wired up to the sensor



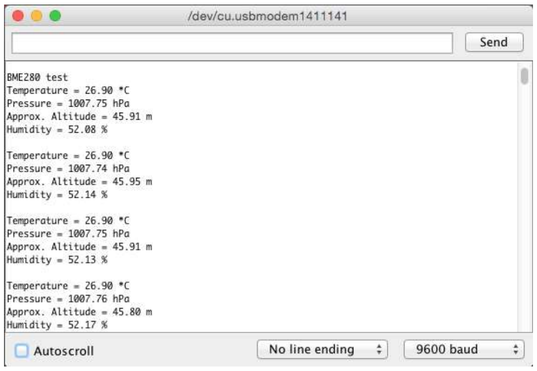
Depending on whether you are using I2C or SPI, change the pin names and comment or uncomment the following lines.

Copy Code

```
#define BME_SCK 13
#define BME_MISO 12
#define BME_MOSI 11
#define BME_CS 10

Adafruit_BME280 bme; // I2C
//Adafruit_BME280 bme(BME_CS); // hardware SPI
//Adafruit_BME280 bme(BME_CS, BME_MOSI, BME_MISO,  BME_SCK);
```

Once uploaded to your Arduino, open up the serial console at 9600 baud speed to see data being printed out



```
BME280 test
Temperature = 26.90 *C
Pressure = 1007.75 hPa
Approx. Altitude = 45.91 m
Humidity = 52.08 %

Temperature = 26.90 *C
Pressure = 1007.74 hPa
Approx. Altitude = 45.95 m
Humidity = 52.14 %

Temperature = 26.90 *C
Pressure = 1007.75 hPa
Approx. Altitude = 45.91 m
Humidity = 52.13 %

Temperature = 26.90 *C
Pressure = 1007.76 hPa
Approx. Altitude = 45.80 m
Humidity = 52.17 %
```

Autoscroll: unchecked; No line ending; 9600 baud

Temperature is calculated in degrees C, you can convert this to F by using the classic F = C * 9/5 + 32 equation.

Pressure is returned in the SI units of **Pascals**. 100 Pascals = 1 hPa = 1 millibar. Often times barometric pressure is reported in millibar or inches-mercury. For future reference 1 pascal =0.000295333727 inches of mercury, or 1 inch Hg = 3386.39 Pascal. So if you take the pascal value of say 100734 and divide by 3386.39 you'll get 29.72 inches-Hg.

You can also calculate Altitude. **However, you can only really do a good accurate job of calculating altitude if you know the hPa pressure at sea level for your location and day!** The sensor is quite precise but if you do not have the data updated for the current day then it can be difficult to get more accurate than 10 meters.

Library Reference

You can start out by creating a BME280 object with either software SPI (where all four pins can be any I/O) using

Copy Code

```
Adafruit_BME280 bme(BME_CS, BME_MOSI, BME_MISO,  BME_SCK);
```

Or you can use hardware SPI. With hardware SPI you *must* use the hardware SPI pins for your Arduino - and each arduino type has different pins! Check the SPI reference to see what pins to use.
In this case, you can use any CS pin, but the other three pins are fixed

Copy Code

```
Adafruit_BME280 bme(BME_CS); // hardware SPI
```

or I2C using the default I2C bus, no pins are assigned

Copy Code

```
Adafruit_BME280 bme; // I2C
```

Once started, you can initialize the sensor with

Copy Code

```
  if (!bme.begin()) {
    Serial.println("Could not find a valid BME280 sensor, check wiring!");
    while (1);
  }
```

begin() will return True if the sensor was found, and False if not. If you get a False value back, check your wiring!

Reading humidity, temperature and pressure is easy, just call:

Copy Code

```
bme.readTemperature()
bme.readPressure()
bme.readHumidity()
```

Temperature is always a floating point, in Centigrade. Pressure is a 32 bit integer with the pressure in Pascals. You may need to convert to a different value to match it with your weather report. Humidity is in % Relative Humidity

It's also possible to turn the BME280 into an altimeter. If you know the pressure at sea level, the library can calculate the current barometric pressure into altitude

Copy Code

```
bmp.readAltitude(seaLevelPressure)
```

However, you can only really do a good accurate job of calculating altitude if you know the hPa pressure at sea level for your location and day! The sensor is quite precise but if you do not have the data updated for the current day then it can be difficult to get more accurate than 10 meters.

Pass in the current sea level pressure in **hPa** - so the value will be somewhere around ~1000. You can also test with the generic 1013.25 value.

ASSEMBLY F.A.Q.
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