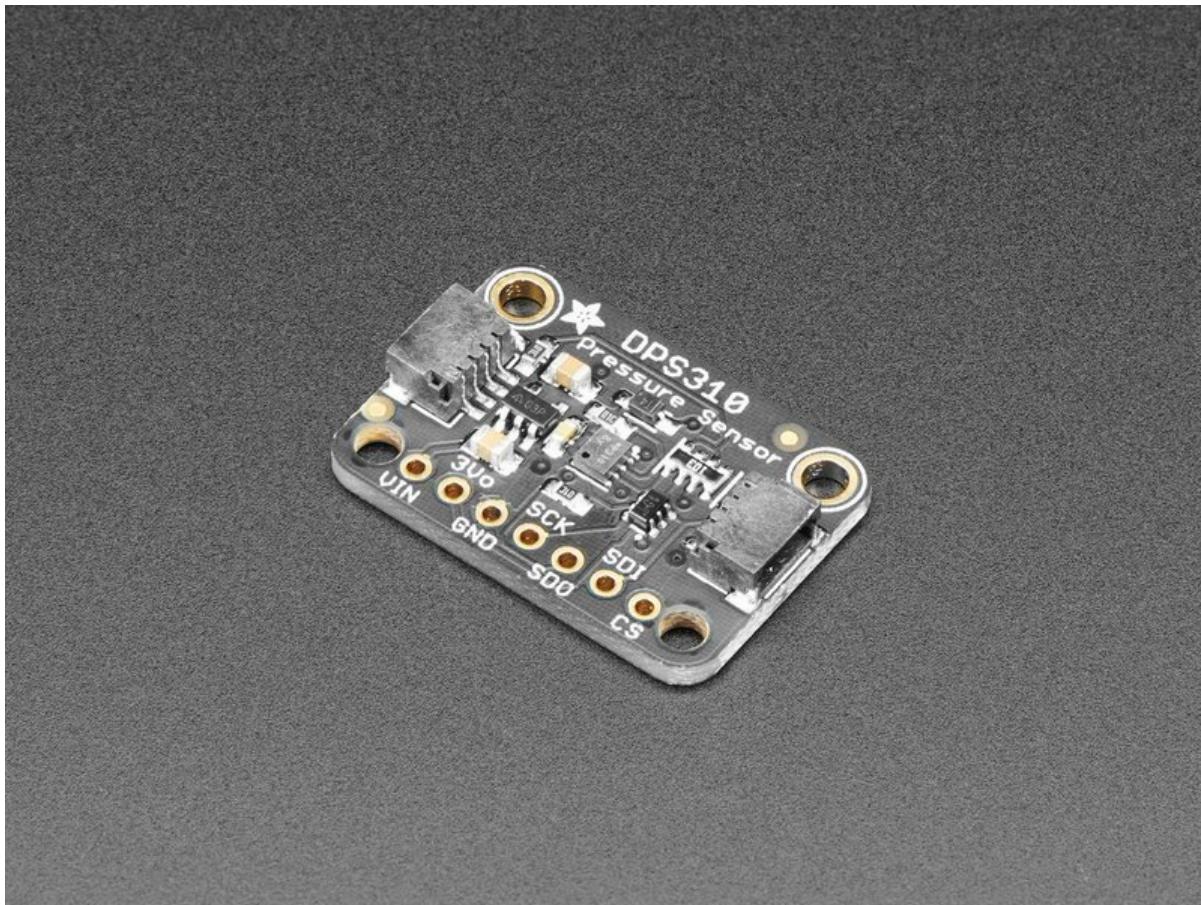




# Adafruit DPS310 Precision Barometric Pressure and Altitude Sensor

Created by Kattni Rembor



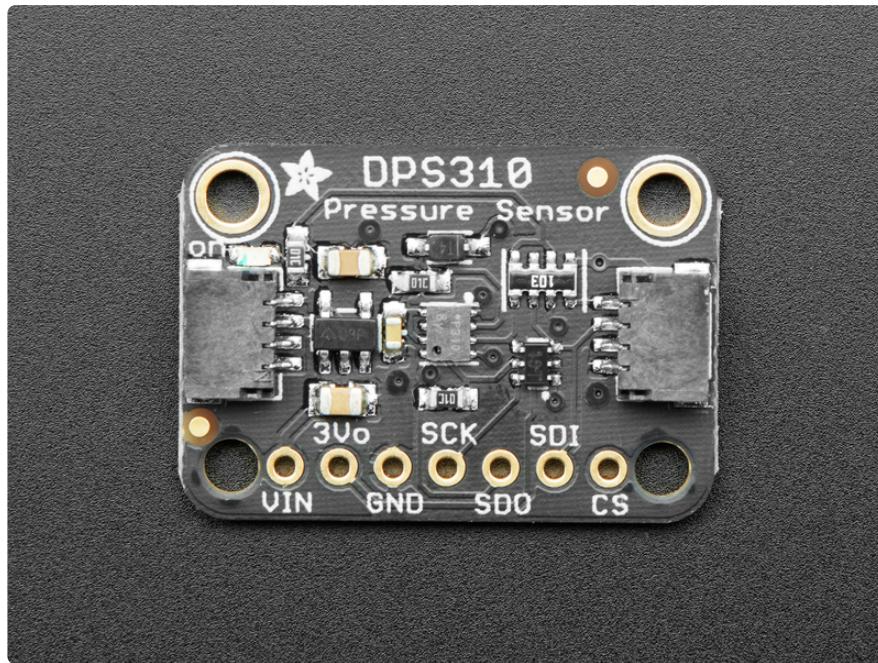
<https://learn.adafruit.com/adafruit-dps310-precision-barometric-pressure-sensor>

Last updated on 2024-06-03 03:02:21 PM EDT

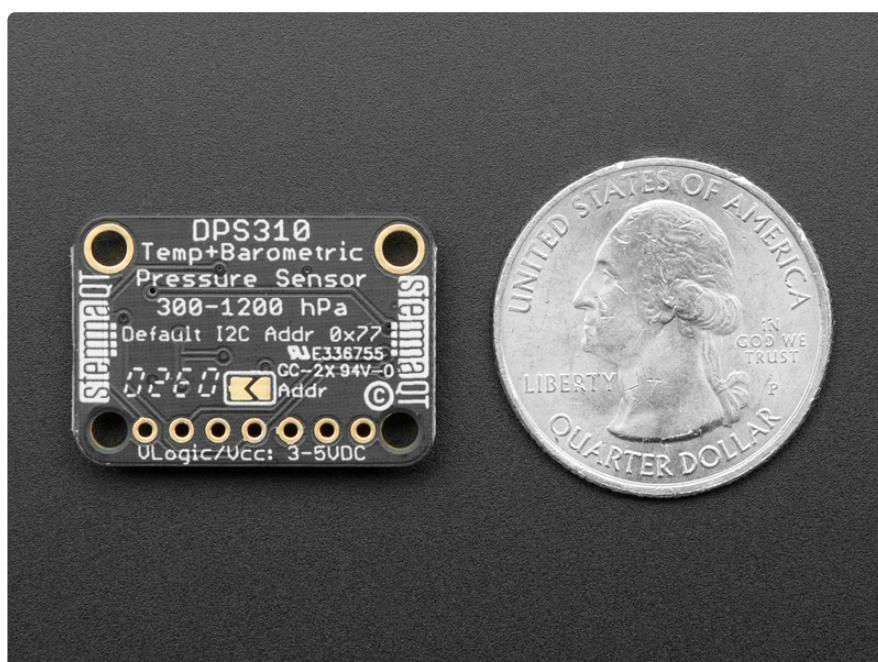
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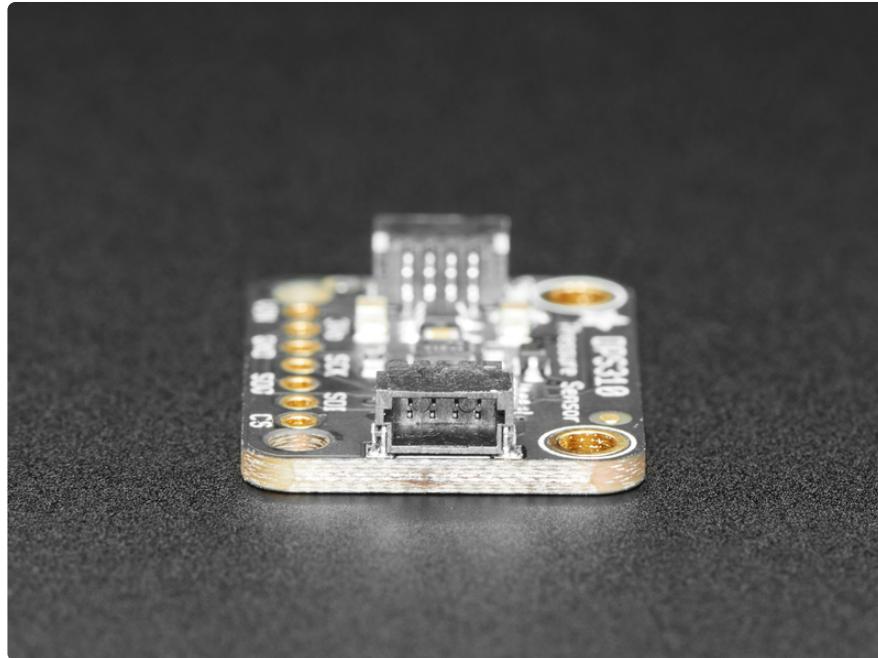
# Overview



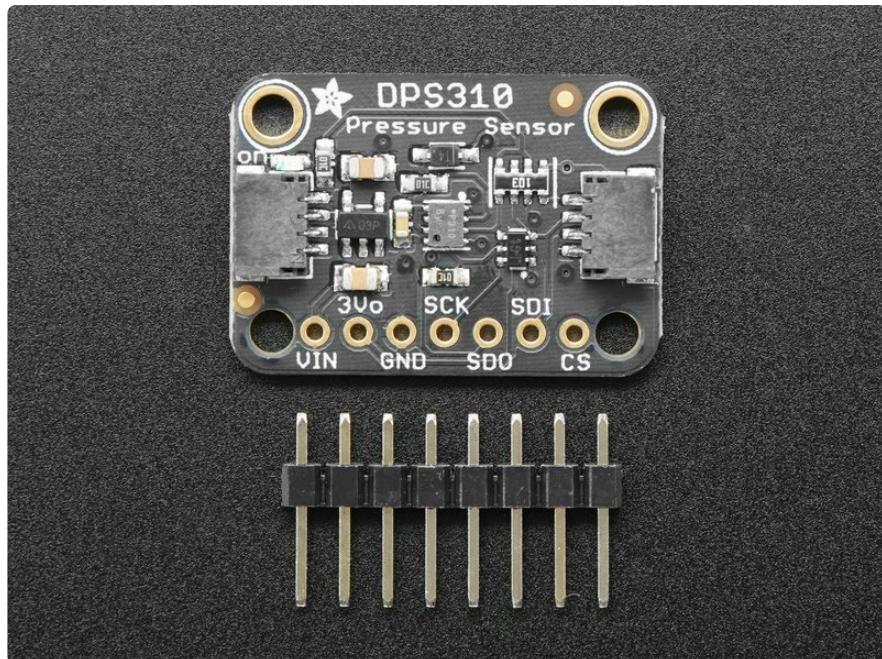
How high are you right now? If you had a precision altitude sensor, you would know for sure! The DPS310 sensor from Infineon is a high precision barometric sensor, perfect for measuring altitude changes with up to  $\pm 0.002$  hPa (or  $\pm 0.02$  m) precision in high precision mode and  $\pm 1$  hPa absolute accuracy. That means you can know your absolute altitude with 1 meter accuracy when you set the sea-level pressure, and measure changes in altitude with up to 2 cm precision. This makes it a great sensor for use in drones or other altitude-sensitive robots. This sensor would also do well in any environmental sensing kit, you can use it to predict weather system changes.



You can use this sensor with either I2C or SPI, so it's easy to integrate into projects. It also has a temperature sensor built in, with  $\pm 0.5^{\circ}\text{C}$  accuracy. For the lowest noise readings, set it up to take multiple measurements and perform a low-pass filter, that capability is built in! You can use it from 300 to 1200 hPa and in ambient temperature ranges from -40 to 85 °C.

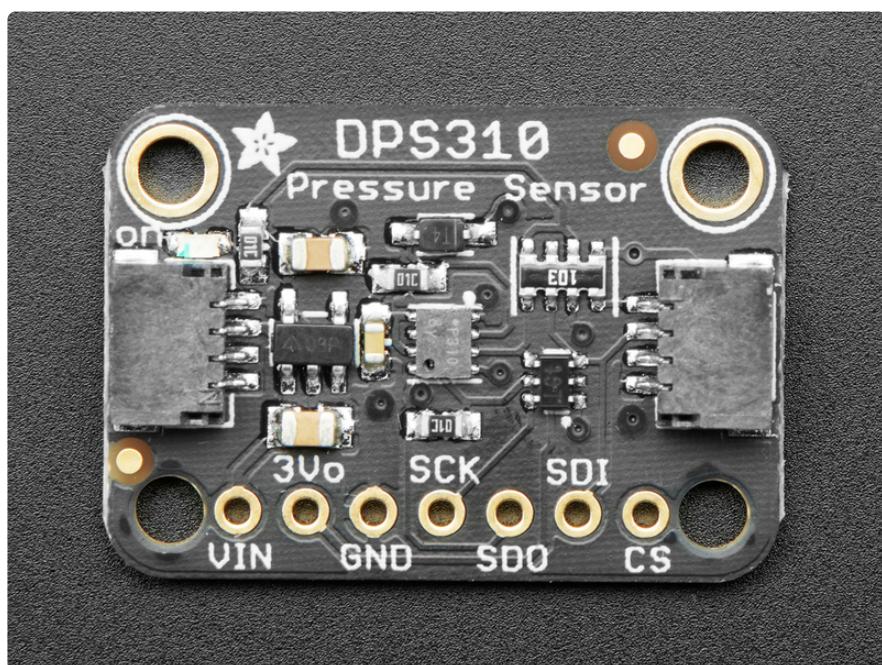


To make life easier, so you can focus on your important work, we've taken the sensor and put it onto a breakout PCB along with support circuitry to let you use it with 3.3V (Feather/Raspberry Pi) or 5V (Arduino/ Metro328) logic levels. Additionally, since it speaks I2C, you can easily connect it up with two wires (plus power and ground!). We've even included [SparkFun qwiic](https://adafru.it/Fpw) (<https://adafru.it/Fpw>) compatible [STEMMA QT](https://adafru.it/Ft4) (<https://adafru.it/Ft4>) connectors for the I2C bus so **you don't even need to solder!** Just wire up to your favorite microcontroller and you can use our CircuitPython/Python or [Arduino drivers](https://adafru.it/IFR) (<https://adafru.it/IFR>) to easily interface with the DPS310.



---

## Pinouts



## Power Pins

- **Vin** - this is the power pin. Since the sensor chip uses 3 VDC, we have included a voltage regulator on board that will take 3-5VDC and safely convert it down. To power the board, give it the same power as the logic level of your microcontroller - e.g. for a 5V microcontroller like Arduino, use 5V
- **3Vo** - this is the 3.3V output from the voltage regulator, you can grab up to 100mA from this if you like

- **GND** - common ground for power and logic

## I2C Logic Pins:

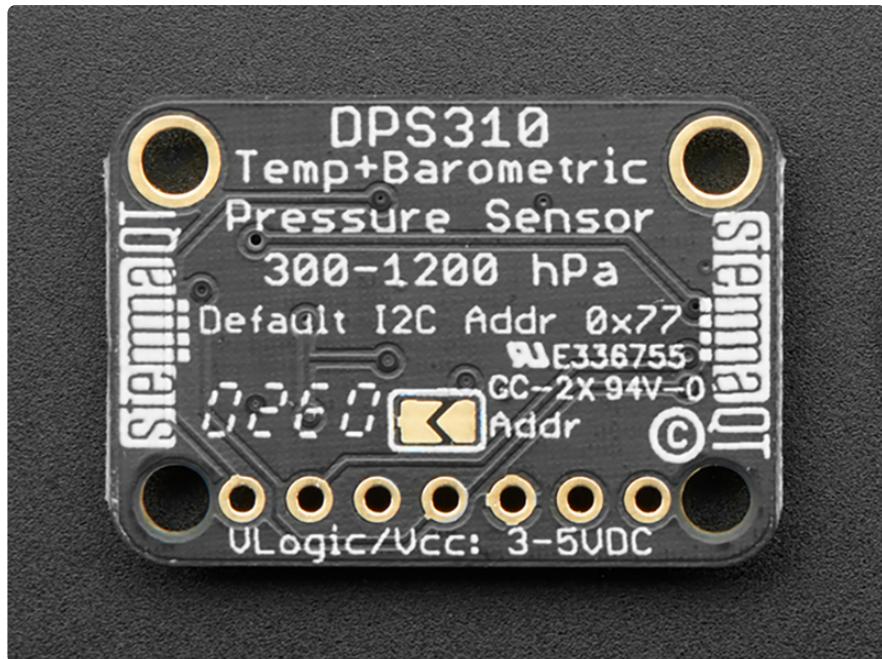
- **SCK** - This is also the I2C **clock pin SCL**, connect to your microcontroller's I2C clock line. This pin is level shifted so you can use 3-5V logic, and there's a **10K pullup** on this pin.
- **SDI** - This is also the I2C **data pin SDA**, connect to your microcontroller's I2C data line. This pin is level shifted so you can use 3-5V logic, and there's a **10K pullup** on this pin.
- **SDO** - This is also the I2C address pin **ADR**. Pulling this pin **low to GND** or bridging the solder jumper on the back will change the I2C address from **0x77** to **0x76**
- [STEMMA QT](https://adafru.it/Ft4) (<https://adafru.it/Ft4>) - These connectors allow you to connect to dev boards with **STEMMA QT** connectors or to other things with [various associated accessories](https://adafru.it/Ft6) (<https://adafru.it/Ft6>)

## SPI Logic pins:

All pins going into the breakout have level shifting circuitry to make them 3-5V logic level safe. Use whatever logic level is on **Vin!**

- **SCK** - The **SPI Clock** pin, it's an input to the chip
- **SDO** - The **Serial Data Out / Microcontroller In Sensor Out**, for data sent from the DPS310 to your processor.
- **SDI** - The **Serial Data In / Microcontroller Out Sensor In** pin, for data sent from your processor to the DPS310
- **CS** - The **Chip Select** pin, drop it low to start an SPI transaction. Its an input to the chip

If you want to connect multiple DPS310's to one microcontroller, have them share the **SDI**, **SDO** and **SCK** pins. Then assign each one a unique **CS** pin.



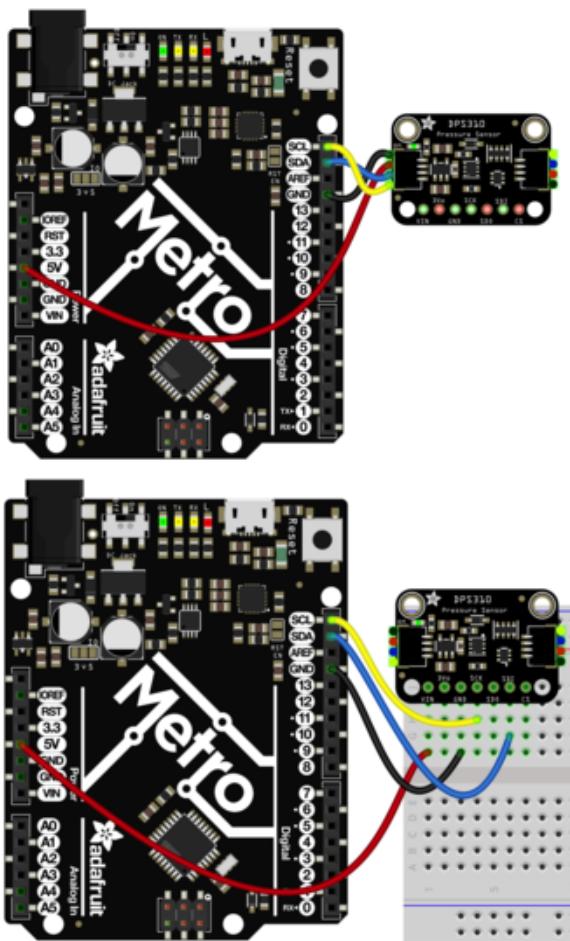
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## Arduino

### I2C Wiring

Use this wiring if you want to connect via I2C interface

By default, the I2C address is **0x77**. If you add a jumper from **DDO** to **GND** the address will change to **0x76**



Connect **board VIN (red wire)** to **Arduino 5V** if you are running a **5V** board Arduino (Uno, etc.). If your board is **3V**, connect to that instead.

Connect **board GND (black wire)** to **Arduino GND**

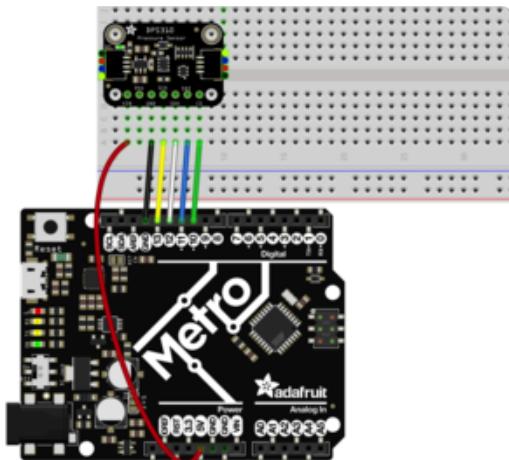
Connect **board SCL (yellow wire)** to **Arduino SCL**

Connect **board SDA (blue wire)** to **Arduino SDA**

The final results should resemble the illustration above, showing an Adafruit Metro development board.

## SPI Wiring

Since this is a SPI-capable sensor, we can use hardware or 'software' SPI. To make wiring identical on all microcontrollers, 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. 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.

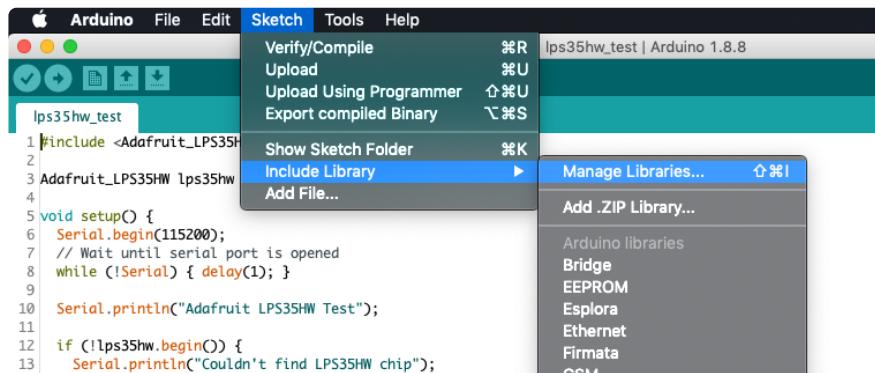
Connect the **SDI** pin to **Digital #11** but any pin can be used later.

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 others.

## Library Installation

You can install the **Adafruit DPS310 Library** for Arduino using the Library Manager in the Arduino IDE.



Click the **Manage Libraries ...** menu item, search for **Adafruit DPS310** and select the **Adafruit DPS310** library:



Then follow the same process for the **Adafruit BusIO** library.



Finally follow the same process for the **Adafruit Unified Sensor** library:



## Load Example

Open up **File -> Examples -> Adafruit DPS310 -> dps310\_simpletest** 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.

```
if (! dps.begin_I2C()) { // Can pass in I2C address here  
//if (! dps.begin_SPI(DPS310_CS)) { // If you want to use SPI
```

Once you upload the code and open the Serial Monitor (**Tools->Serial Monitor**) at **115200** baud, you will see the current configuration printed, followed by the pressure, and temperature measurements. You should see something similar to this:

```
DPS310  
DPS OK!  
Temperature = 20.65 *C  
Pressure = 1021.17 hPa  
  
Temperature = 20.65 *C  
Pressure = 1021.17 hPa
```

Carefully pressing on the small port on the top of the sensor will change the pressure and temperature readings. Give it a try and see how it works!

## Example Code

```
// This example shows how to read temperature/pressure  
  
#include <Adafruit_DPS310.h>  
  
Adafruit_DPS310 dps;  
  
// Can also use SPI!  
#define DPS310_CS 10  
  
void setup() {  
  Serial.begin(115200);
```

```
while (!Serial) delay(10);

Serial.println("DPS310");
if (! dps.begin_I2C()) { // Can pass in I2C address here
//if (! dps.begin_SPI(DPS310_CS)) { // If you want to use SPI
    Serial.println("Failed to find DPS");
    while (1) yield();
}
Serial.println("DPS OK!");

dps.configurePressure(DPS310_64HZ, DPS310_64SAMPLES);
dps.configureTemperature(DPS310_64HZ, DPS310_64SAMPLES);
}

void loop() {
    sensors_event_t temp_event, pressure_event;

    while (!dps.temperatureAvailable() || !dps.pressureAvailable()) {
        return; // wait until there's something to read
    }

    dps.getEvents(&temp_event, &pressure_event);
    Serial.print(F("Temperature = "));
    Serial.print(temp_event.temperature);
    Serial.println(" *C");

    Serial.print(F("Pressure = "));
    Serial.print(pressure_event.pressure);
    Serial.println(" hPa");

    Serial.println();
}
```

---

## Arduino Docs

[Arduino Docs \(https://adafru.it/ICC\)](https://adafru.it/ICC)

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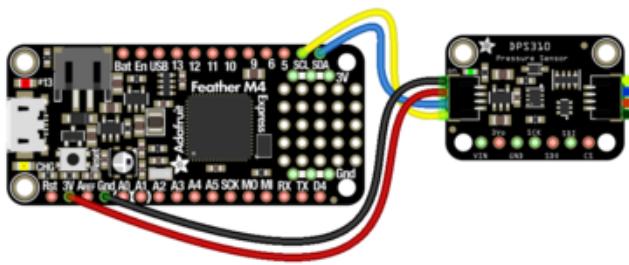
## Python & CircuitPython

It's easy to use the DPS310 sensor with CircuitPython or Python and the [Adafruit CircuitPython DPS310 \(https://adafru.it/IFS\)](https://adafru.it/IFS) library. This library will allow you to easily write Python code that reads the barometric pressure, altitude and more from the sensor.

You can use this sensor with any CircuitPython microcontroller board or with a computer that has GPIO and Python [thanks to Adafruit\\_Blinka, our CircuitPython-for-Python compatibility library \(https://adafru.it/BSN\)](https://adafru.it/BSN).

## CircuitPython Microcontroller Wiring

First wire up a DSM310 breakout to your board exactly as shown below. Here's an example of wiring a Feather M4 to the sensor with I2C:



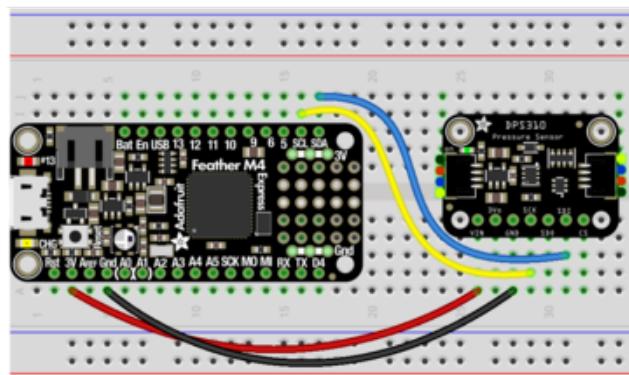
fritzing

Board 3V to sensor VIN (red wire)

Board GND to sensor GND (black wire)

Board SCL to sensor SCK/SCL (yellow wire)

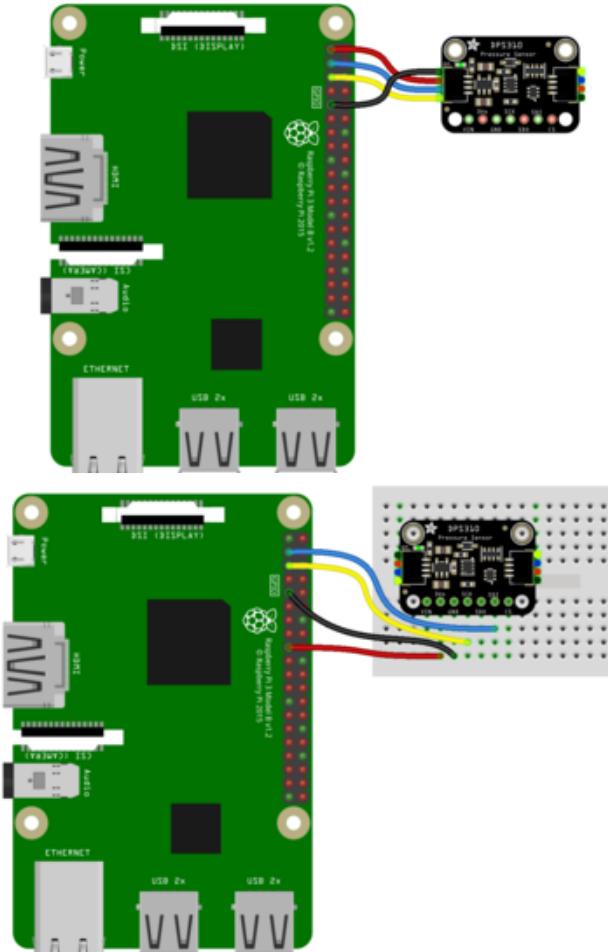
Board SDA to sensor SDI/SDA (blue wire)



## Python Computer Wiring

Since there's dozens of Linux computers/boards you can use, we will show wiring for Raspberry Pi. For other platforms, [please visit the guide for CircuitPython on Linux to see whether your platform is supported \(<https://adafruit.it/BSN>\)](#).

Here's the Raspberry Pi wired to the sensor using I2C:



Pi 3V to sensor VCC (red wire)  
 Pi GND to sensor GND (black wire)  
 Pi SCL to sensor SCL/SCL (yellow wire)  
 Pi SDA to sensor SDI/SDA (blue wire)

## CircuitPython Installation of DPS310 Library

You'll need to install the [Adafruit CircuitPython DPS310](https://adafru.it/IFS) (<https://adafru.it/IFS>) library on your CircuitPython board.

First make sure you are running the [latest version of Adafruit CircuitPython](https://adafru.it/Amd) (<https://adafru.it/Amd>) for your board.

Next you'll need to install the necessary libraries to use the hardware--carefully follow the steps to find and install these libraries from [Adafruit's CircuitPython library bundle](https://adafru.it/ENC) (<https://adafru.it/ENC>). Our CircuitPython starter guide has [a great page on how to install the library bundle](https://adafru.it/ABU) (<https://adafru.it/ABU>).

For non-express boards like the Trinket M0 or Gemma M0, you'll need to manually install the necessary libraries from the bundle:

- `adafruit_dps310`
- `adafruit_bus_device`

- `adafruit_register`

Before continuing make sure your board's `lib` folder has the `adafruit_dps310`, `adafruit_bus_device`, and `adafruit_register` files and folders copied over.

Next [connect to the board's serial REPL](https://adafru.it/Awz) (<https://adafru.it/Awz>) so you are at the CircuitPython `>>>` prompt.

## Python Installation of DPS310 Library

You'll need to install the `Adafruit_Blinka` library that provides the CircuitPython support in Python. This may also require enabling I2C on your platform and verifying you are running Python 3. [Since each platform is a little different, and Linux changes often, please visit the CircuitPython on Linux guide to get your computer ready](#) (<https://adafru.it/BSN>)!

Once that's done, from your command line run the following command:

- `sudo pip3 install adafruit-circuitpython-dps310`

If your default Python is version 3 you may need to run 'pip' instead. Just make sure you aren't trying to use CircuitPython on Python 2.x, it isn't supported!

## CircuitPython & Python Usage

To demonstrate the usage of the sensor we'll initialize it and read the barometric pressure measurements from the board's Python REPL.

Run the following code to import the necessary modules and initialize the I2C connection with the sensor:

```
import time
import board
from adafruit_dps310.basic import DPS310

i2c = board.I2C()
dps310 = DPS310(i2c)
```

```
>>> import time  
>>> import board  
>>> from adafruit_dps310.basic import DPS310  
>>> i2c = board.I2C()  
>>> dps310 = DPS310(i2c)
```

Now you're ready to read values from the sensor using these properties:

- **pressure** - The barometric pressure in hPa
- **temperature** - The temperature in degrees C

For example to print the pressure and temperature values:

```
print("Temperature = %.2f *C"%dps310.temperature)  
print("Pressure = %.2f hPa"%dps310.pressure)
```

```
>>> print("Temperature = %.2f *C"%dps310.temperature)  
Temperature = 18.58 *C  
>>> print("Pressure = %.2f hPa"%dps310.pressure)  
Pressure = 1021.20 hPa
```

For more details, check out the [library documentation \(https://adafru.it>IDK\)](https://adafru.it>IDK).

That's all there is to using the DPS310 Precision Barometric Pressure Sensor with CircuitPython!

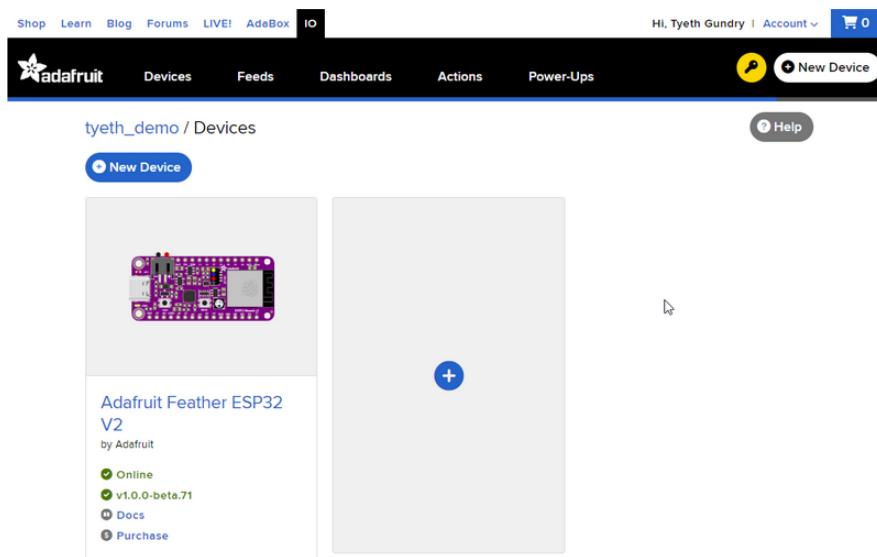
## Example Code

```
# SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries  
# SPDX-License-Identifier: MIT  
  
import time  
import board  
from adafruit_dps310.basic import DPS310  
  
i2c = board.I2C() # uses board.SCL and board.SDA  
# i2c = board.STEMMA_I2C() # For using the built-in STEMMA QT connector on a  
microcontroller  
dps310 = DPS310(i2c)  
  
while True:  
    print("Temperature = %.2f *C" % dps310.temperature)  
    print("Pressure = %.2f hPa" % dps310.pressure)  
    print("")  
    time.sleep(1.0)
```

## Python Docs

[Python Docs \(https://adafru.it>IDK\)](https://adafru.it>IDK)

# WipperSnapper



## What is WipperSnapper

WipperSnapper is a firmware designed to turn any WiFi-capable board into an Internet-of-Things device without programming a single line of code. WipperSnapper connects to [Adafruit IO](https://adafru.it/fsU) (<https://adafru.it/fsU>), a web platform designed ([by Adafruit!](https://adafru.it/Bo5) (<https://adafru.it/Bo5>)) to display, respond, and interact with your project's data.

Simply load the WipperSnapper firmware onto your board, add credentials, and plug it into power. Your board will automatically register itself with your Adafruit IO account.

From there, you can add components to your board such as buttons, switches, potentiometers, sensors, and more! Components are dynamically added to hardware, so you can immediately start interacting, logging, and streaming the data your projects produce without writing code.

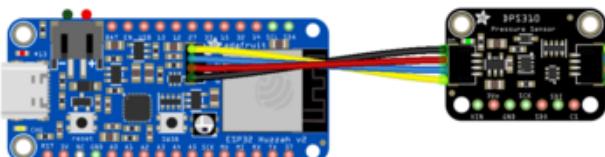
If you've never used WipperSnapper, click below to read through the quick start guide before continuing.

Quickstart: Adafruit IO  
WipperSnapper

<https://adafru.it/Vfd>

## Wiring

First, wire up a DPS310 to your board exactly as follows. Here is an example of the DPS310 wired to an [Adafruit ESP32 Feather V2](http://adafru.it/5400) (<http://adafru.it/5400>) using I2C [with a STEMMA QT cable \(no soldering required\)](http://adafru.it/4210) (<http://adafru.it/4210>)

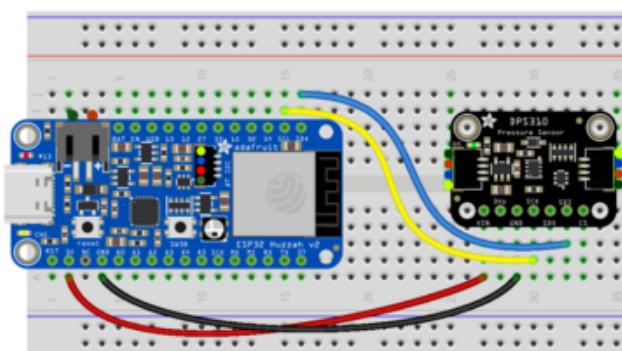


Board 3V to sensor VIN (red wire on STEMMA QT)

Board GND to sensor GND (black wire on STEMMA QT)

Board SCL to sensor SCL/SCK (yellow wire on STEMMA QT)

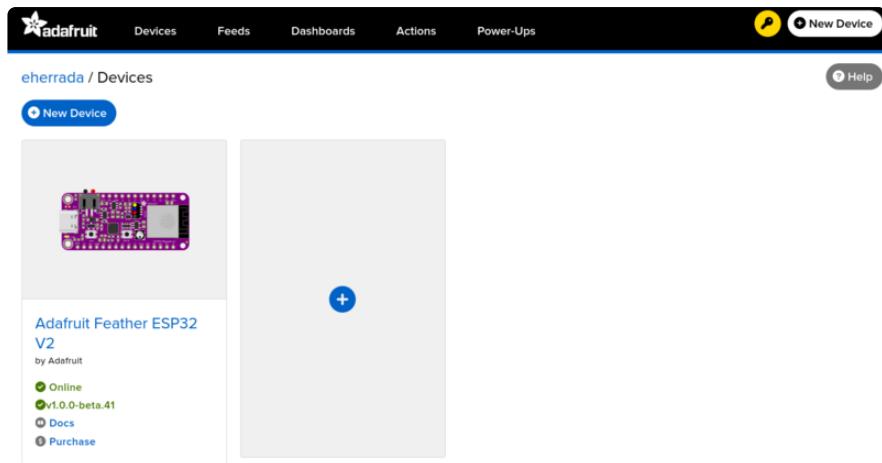
Board SDA to sensor SDA/SDI (blue wire on STEMMA QT)



## Usage

Connect your board to Adafruit IO Wippersnapper and [navigate to the Wippersnapper board list](https://adafru.it/TAu) (<https://adafru.it/TAu>).

On this page, **select the Wippersnapper board you're using** to be brought to the board's interface page.



If you do not see your board listed here - you need [to connect your board to Adafruit IO](#) (<https://adafru.it/Vfd>) first.

## Adafruit Feather ESP32 V2

by Adafruit

**Online**

**v1.0.0-beta.70**

**Docs**

**Purchase**

## Adafruit Feather ESP32 V2

by Adafruit

**Online**

**v1.0.0-beta.68** [Update](#)



**Docs**

**Purchase**

On the device page, quickly **check that you're running the latest version of the WipperSnapper firmware**.

The device tile on the left indicates the version number of the firmware running on the connected board.

If the firmware version is green with a checkmark - continue with this guide.

If the firmware version is red with an "X" - [update to the latest WipperSnapper firmware](#) (<https://adafru.it/Vfd>) on your board before continuing.

Next, make sure the sensor is plugged into your board and click the **I2C Scan** button.

The screenshot shows the Adafruit IO WipperSnapper interface. At the top, there's a navigation bar with links for Devices, Feeds, Dashboards, Actions, and Power-Ups. Below the navigation bar, the path brubell / Devices / Adafruit Feather ESP32 V2 is displayed. There are three buttons at the top: 'New Component' (blue), 'I2C Scan' (blue with a red arrow pointing to it), and 'Device Settings' (grey). On the left, there's a thumbnail image of an Adafruit Feather ESP32 V2 board. To the right of the board is a large empty area with a blue '+' button. Below the board thumbnail, the text 'Adafruit Feather ESP32...' and 'Adafruit Feather ESP32 V2 by Adafruit' is visible.

You should see the DPS310's default I2C address of `0x77` pop up in the I2C scan list. If the jumper on the underside of the board is soldered, this address will be changed to `0x76`.

|    | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | a  | b  | c  | d  | e  | f  |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 10 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 20 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 30 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 40 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 50 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 60 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 70 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 77 |

## I don't see the sensor's I2C address listed!

First, double-check the connection and/or wiring between the sensor and the board.

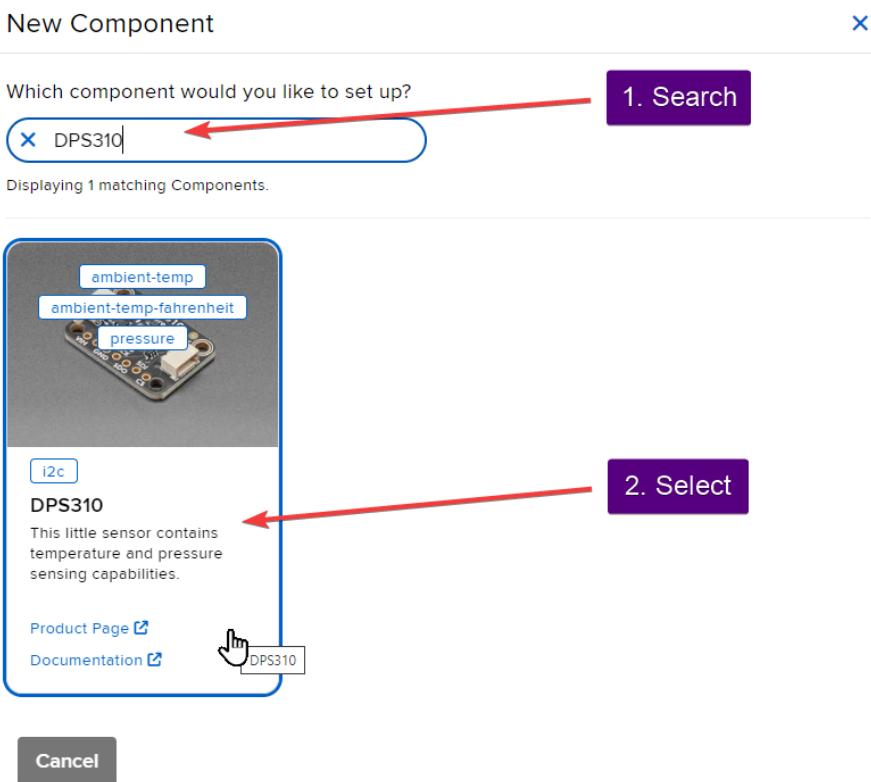
Then, reset the board and let it re-connect to Adafruit IO WipperSnapper.

With the sensor detected in an I2C scan, you're ready to add the sensor to your board.

Click the New Component button or the + button to bring up the component picker.



Adafruit IO supports a large amount of components. To quickly find your sensor, type **DPS310** into the search bar, then select the **DPS310** component.



On the component configuration page, the DPS310's sensor address should be listed along with the sensor's settings.

The **Send Every** option is specific to each sensor's measurements. This option will tell the Feather how often it should read from each of the DPS310's two sensors and send the data to Adafruit IO. Measurements can range from every 30 seconds to every 24 hours.

For this example, set the **Send Every** interval for each sensor to every 30 seconds.

### Create DPS310 Component

Select I<sup>2</sup>C Address:

0x77

Enable DPS310: Temperature Sensor?

Name:

DPS310: Temperature Sensor



Send Every:

Every 30 seconds

Enable DPS310: Pressure Sensor?

Name:

DPS310: Pressure Sensor

Send Every:

Every 30 seconds

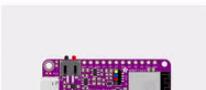
[◀ Previous Step](#) [Create Component](#)



Your device interface should now show the sensor components you created. After the interval you configured elapses, WipperSnapper will automatically read values from the sensor(s) and send them to Adafruit IO.

eherrada / Devices / Adafruit Feather ESP32 V2

New Component I<sup>2</sup>C Scan Device Settings



**DPS310: Pressure Sensor** dps310:pressure

Raw Value: 998.84

[Create Action](#) [Add to Dashboard](#)

**DPS310: Temperature Sensor** dps310:ambient-temp

Raw Value: 24.00

[Create Action](#) [Add to Dashboard](#)

Adafruit Feather ESP32 V2 by Adafruit

Online v1.0.0-beta.41 Docs Purchase

To view the data that has been logged from the sensor, click on the graph next to the sensor name.

eherrada / Devices / Adafruit Feather ESP32 V2

[New Component](#) [I2C Scan](#) [Device Settings](#)

DPS310: Pressure Sensor [dps310:pressure](#)

Create Action | Add to Dashboard

Raw Value: 998.70

DPS310: Temperature Sensor [dps310:ambient-temp](#)

Create Action | Add to Dashboard

Raw Value: 23.16

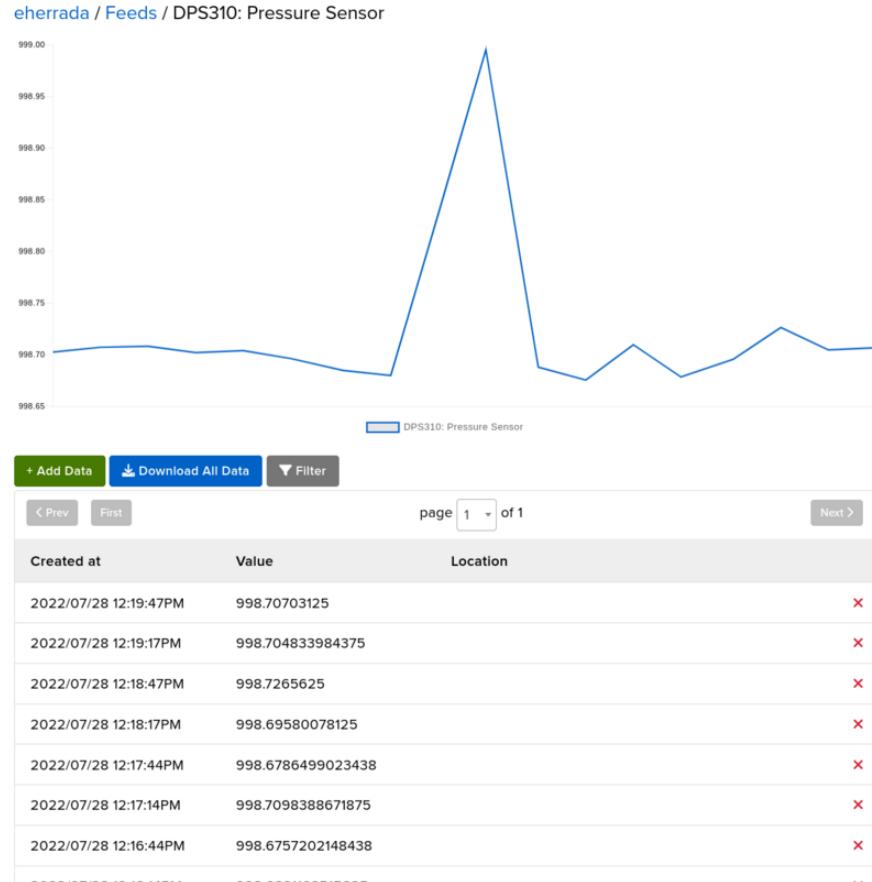
Adafruit Feather ESP32 V2 by Adafruit

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Report Bugs

Here you can see the feed history and edit things about the feed such as the name, privacy, webhooks associated with the feed and more. If you want to learn more about how feeds work, [check out this page \(<https://adafru.it/10aZ>\)](#).

The DPS310 has two sensors that each have their own feeds. In this picture, we're looking at the pressure sensor, but if you click on the graph icon for the different sensors you'll see their feed history.



For IO Free accounts, feed data is stored for a maximum of 30 days and there's a maximum of 10 feeds. In this guide, you created two feeds (one for each of the DPS310's sensors). If you'd like to store data for more than 30 days, increase the number of feeds (components) you can use with WipperSnapper, or increase your data rate to send more sensor measurements to Adafruit IO - [upgrade your account to Adafruit IO Plus](https://adafru.it/Eg3) (<https://adafru.it/Eg3>).

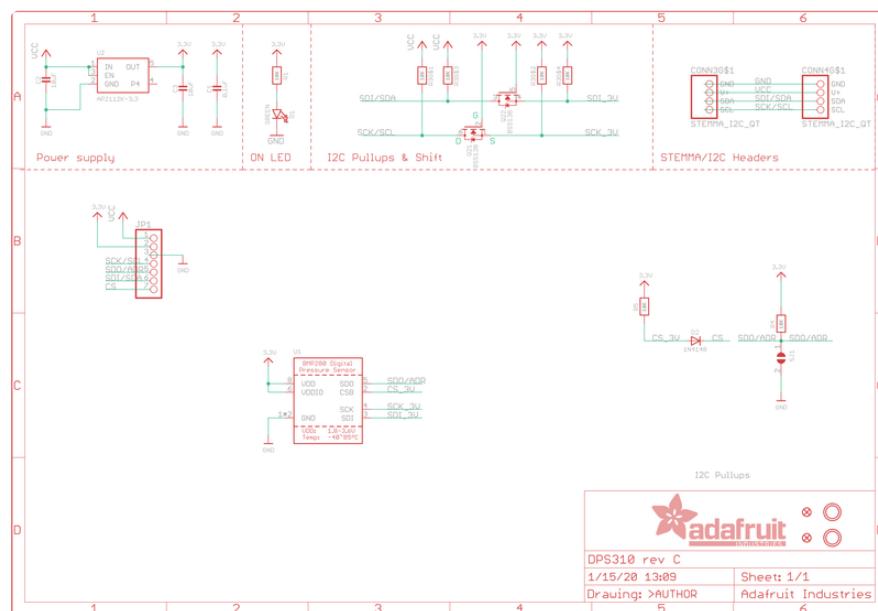
## Downloads

### Files

- [DPS310 Datasheet](https://adafru.it/IFT) (<https://adafru.it/IFT>)
- [EagleCAD files on GitHub](https://adafru.it/IFU) (<https://adafru.it/IFU>)
- [Fritzing object in Adafruit Fritzing Library](https://adafru.it/IFV) (<https://adafru.it/IFV>)

## Schematic

Note: The schematic includes the BMP280 because they are the exact same pinouts and dimensions.



# Fab Print

