

# Safecast Air Kit v0.1 r4

## Mounting Components and Drilling Instructions

These instructions guide you through how to mount the Safecast Air parts into the Serpac case. This is the first version, so not everything is exact. As Beta testers, we look to you to offer ideas on how to improve the design and make this kit easier to build. Please provide all thoughts and feedback in the Safecast Air forum: <https://groups.google.com/forum/#!forum/safecast-air>

### TIME

~30-45 mins

### PARTS

4 standoffs

8 screws

1 Acrylic plate to mount the PCB

1 Acrylic plate with 12 holes used for airflow exhaust

5 two-sided adhesive foam strips

1 piece aluminum mesh

### TOOLS

Small Phillips screwdriver

Drill

5/16th bit (if you don't have this exact size, then we recommend going with a smaller bit and using that a couple of times to expand your holes)

Glue gun

Pen or Marker

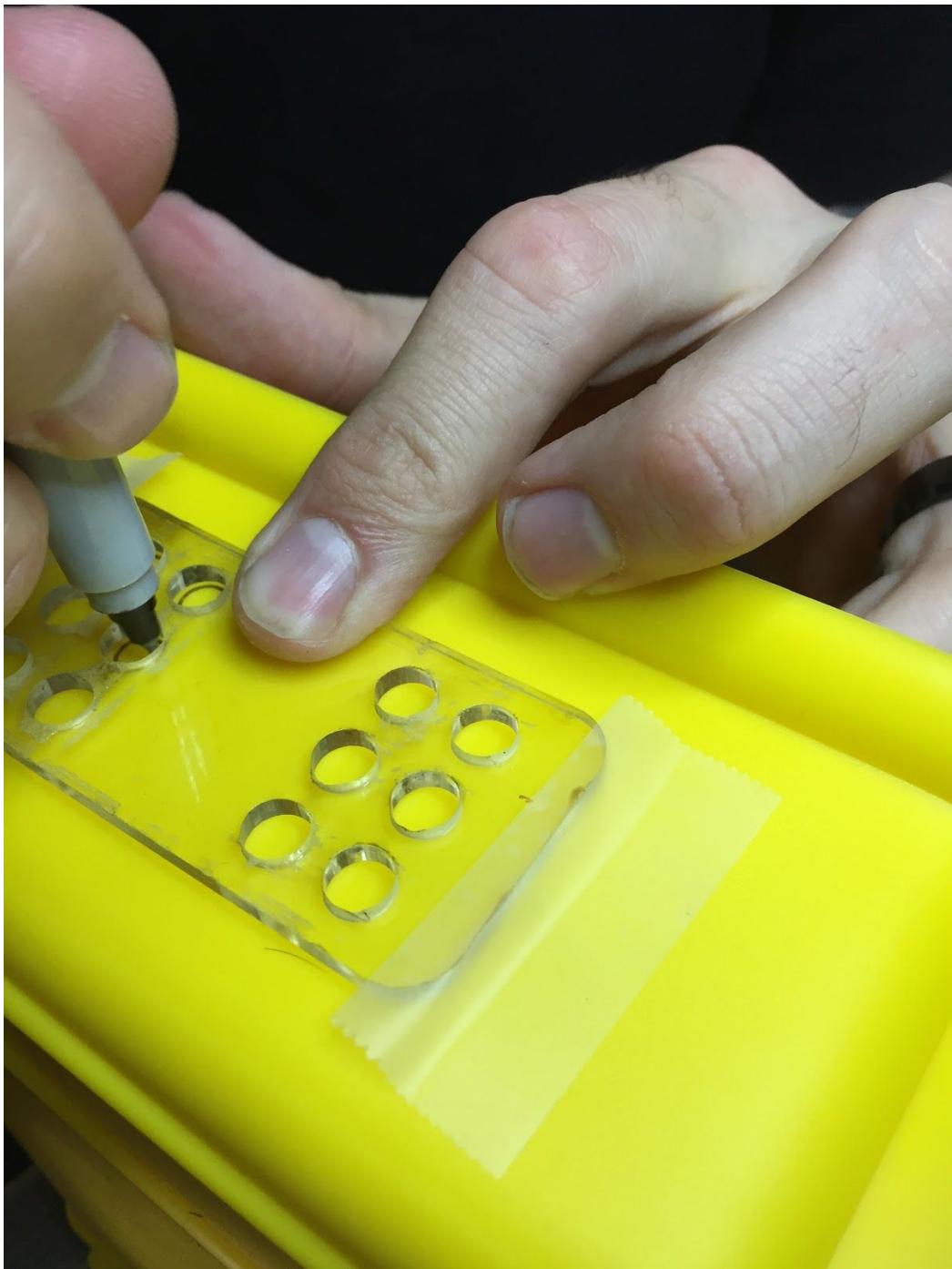
Scotch tape

### STEPS

Step 1 - Drill holes for air exhaust	2
Step 2 - Drill holes for air intake	6
Step 3 - Drill hole for USB cable	11
Step 4 - Mount Air Exhaust Plate	13
Step 5 - Mount Air Sensor	17
Step 6 - Before Mounting the PCB	19
Step 7 - Mount the PCB	20
Step 8 - Plug in USB / Seal the hole	22
Step 9 - Plug in Cables	25
Step 10 - Setup Air Kit Outside	26
Battery Powered	27

## Step 1 - Drill holes for air exhaust

Note: When we refer to the left and right side of the Serpac case: the case clasp is facing you. Place the *exhaust plate* on the right side of the case, in the middle, and trace the circles with your pen or marker. You can use scotch tape to temporarily hold the plate in place.





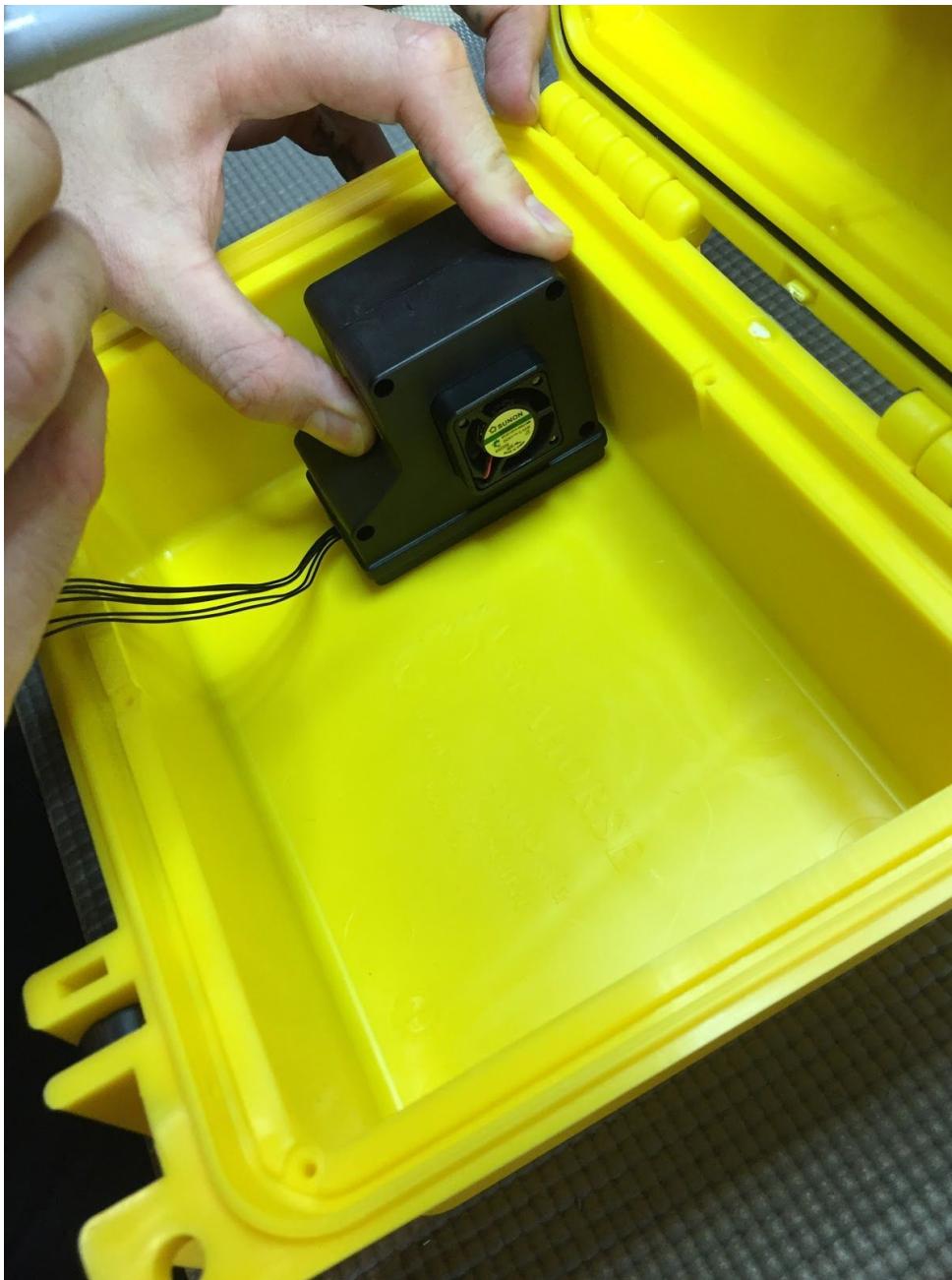




## Step 2 - Drill holes for air intake

Note, this is the least precise step of this process. If you have ideas on how to make it easier, please share!

Look at the left side of the case. Place the air sensor in the back left of the box with the intake port facing left.



Using your pen or marker, place a mark on the inside of the case where the middle of the port is.



Looking at the left outside of the case, hold the case up to the light and place a mark that matches the mark you made on the inside of the case. It's approximately 14 mm under the lip of the case. THIS IS APPROXIMATE. If you are able to capture the exact way to place this hole we will be grateful.





As you can see here, we made a couple of mistakes when drilling the hole for the air intake port. It's most important to make sure that the air sensor port will fit through the hole, the sensor will be secure in the case and that the lid will close. We plugged the unused 'oops' holes with hot glue. Do not fill the air sensor intake port with glue!



## Step 3 - Drill hole for USB cable

The drill bit that we suggest using for the other holes isn't big enough for the head of the USB cable so we suggest drilling two holes side by side.



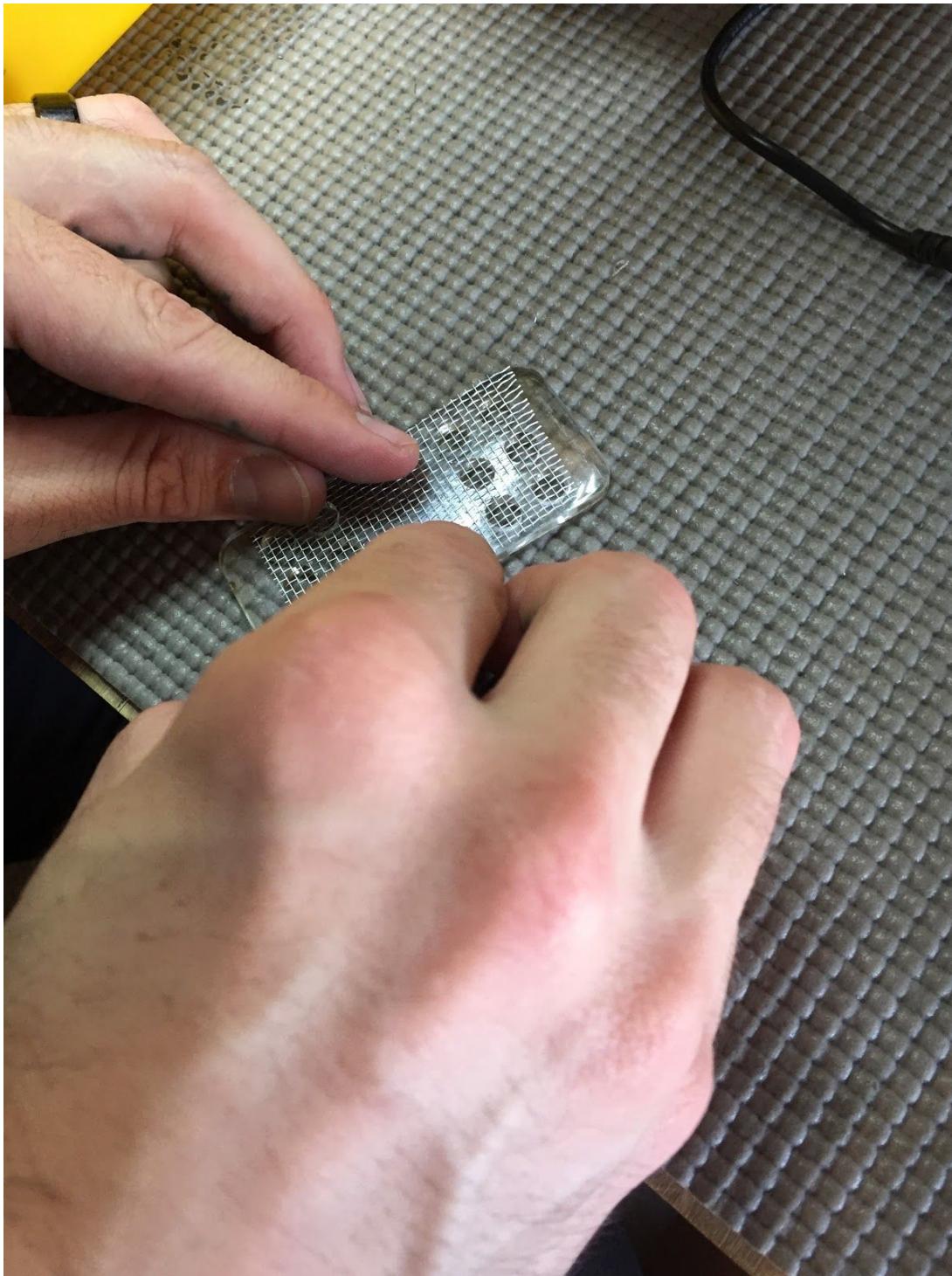
Check that the USB head will fit through the hole.



## Step 4 - Mount Air Exhaust Plate

Cut the aluminum mesh so it's the same size as the acrylic exhaust plate. Please be careful as it's sharp metal.





Place a couple dabs of glue or strong double sided tape on the plate. Be sure to avoid the holes  
Glue on the aluminum mesh.

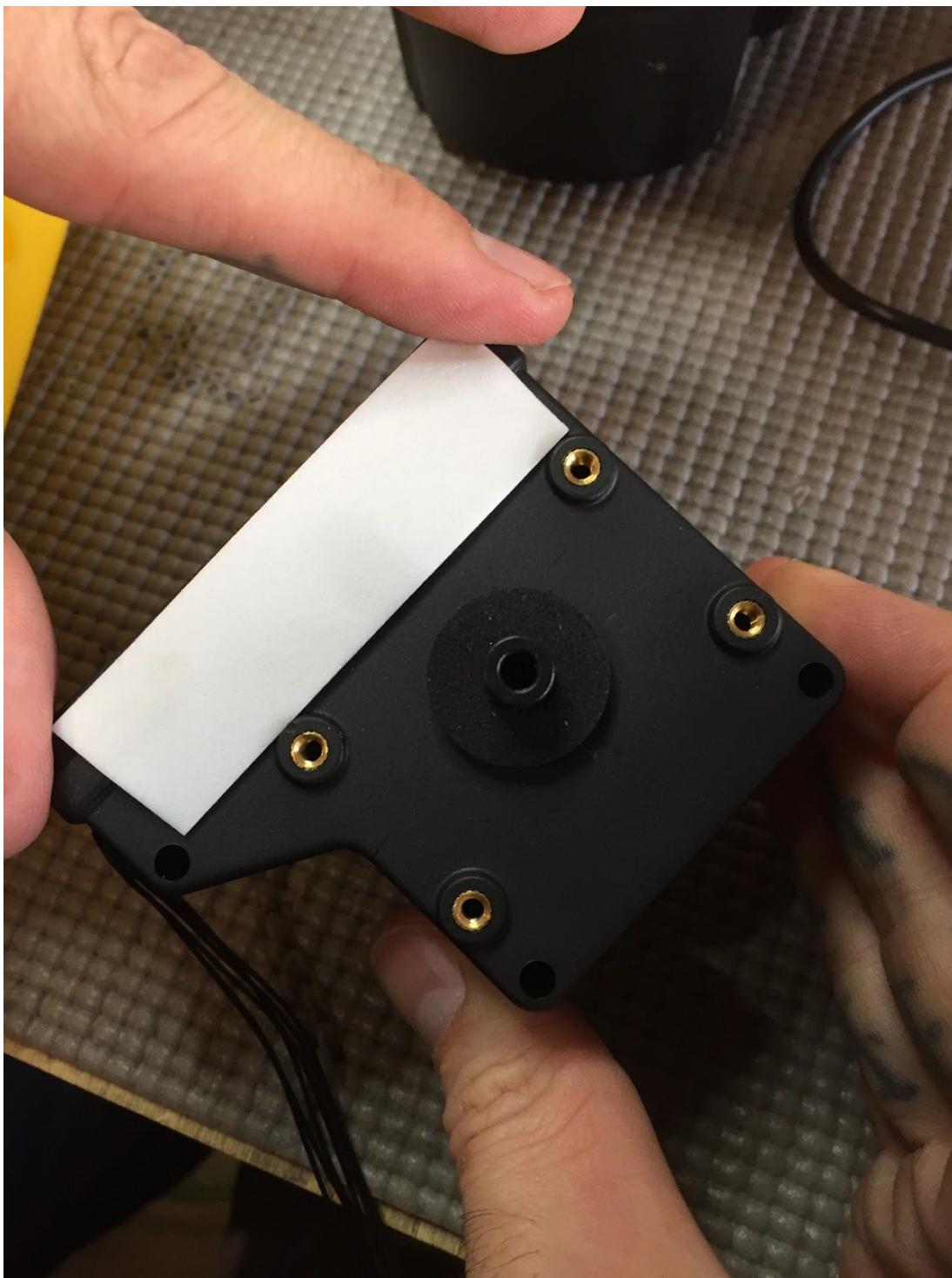


Line up the holes of the plate with the holes on the case (with the mesh between the case and the plate). Press firmly to hold in place. This is to keep bugs from getting in.



## Step 5 - Mount Air Sensor

Place a strip of double sided foam tape on the left side of the air sensor next to the intake port.



Place the air sensor in the case with the port poking through the hole. Firmly press the sensor against the inside wall of the case.

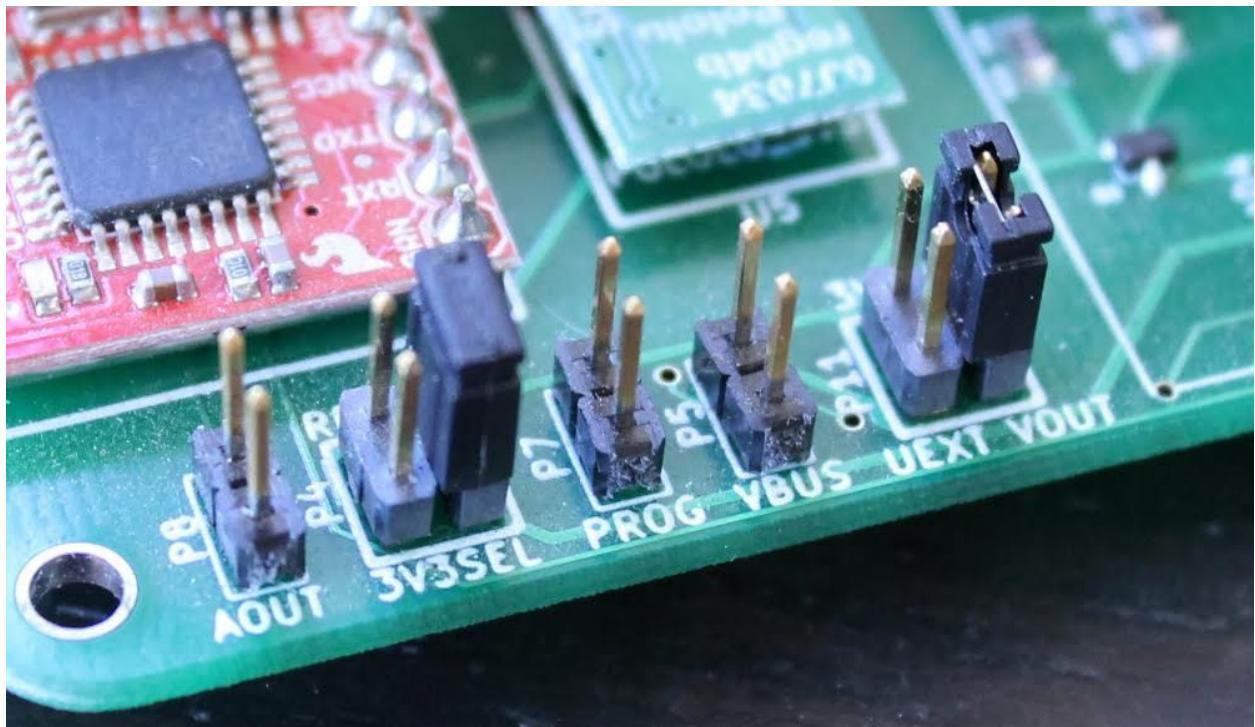


## Step 6 - Before Mounting the PCB

We included a couple of jumpers in your parts bag - those black square components.

Here's where to place them.

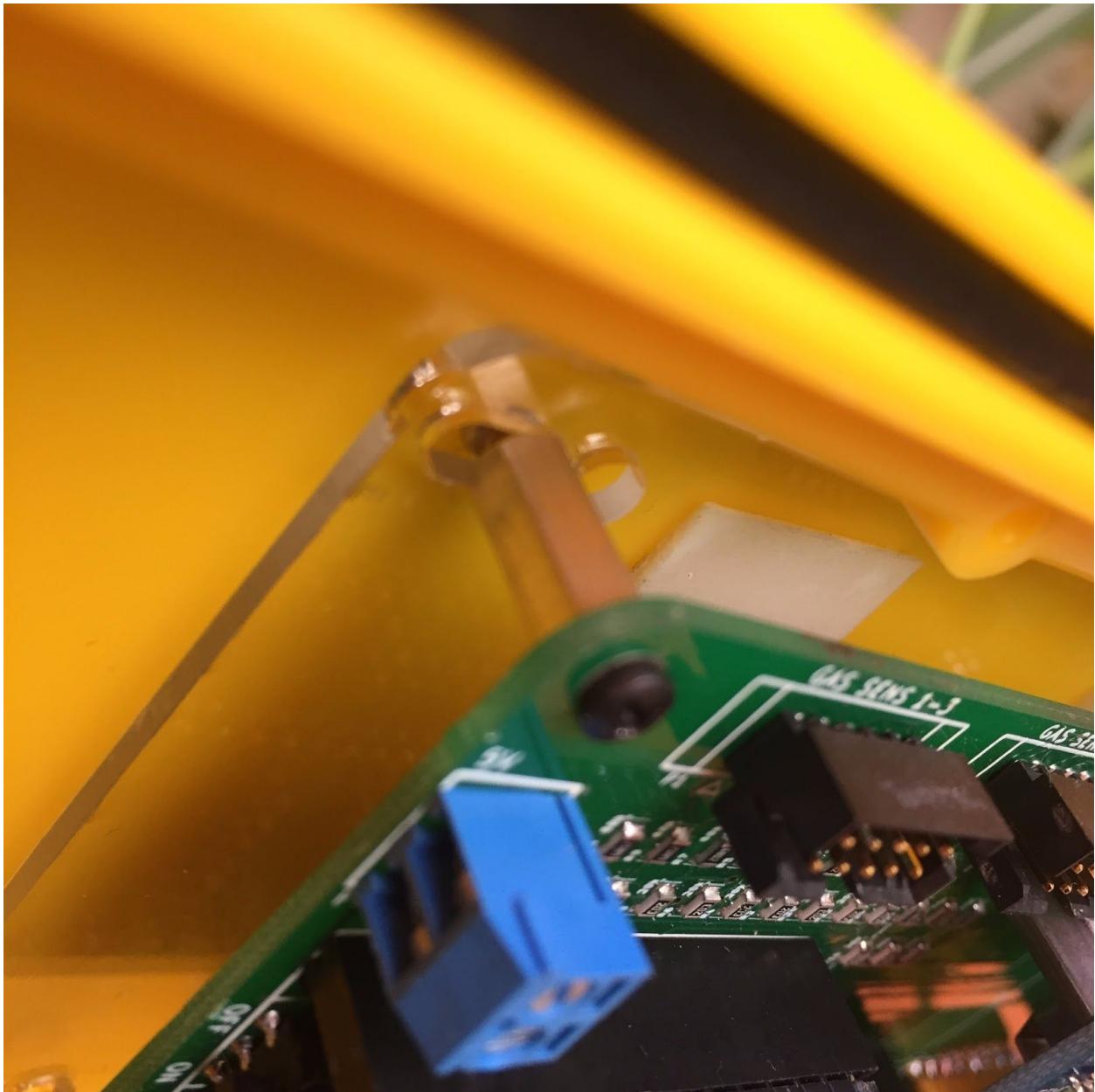
1. On the "UEXT VOUT" header selecting the 5V setting. This is need for the pull-ups on the SHT31 temperature & humidity sensor which are shared with I2C on the UEXT header.
2. On the 3VSEL header selecting a 3.3V voltage source - TNY

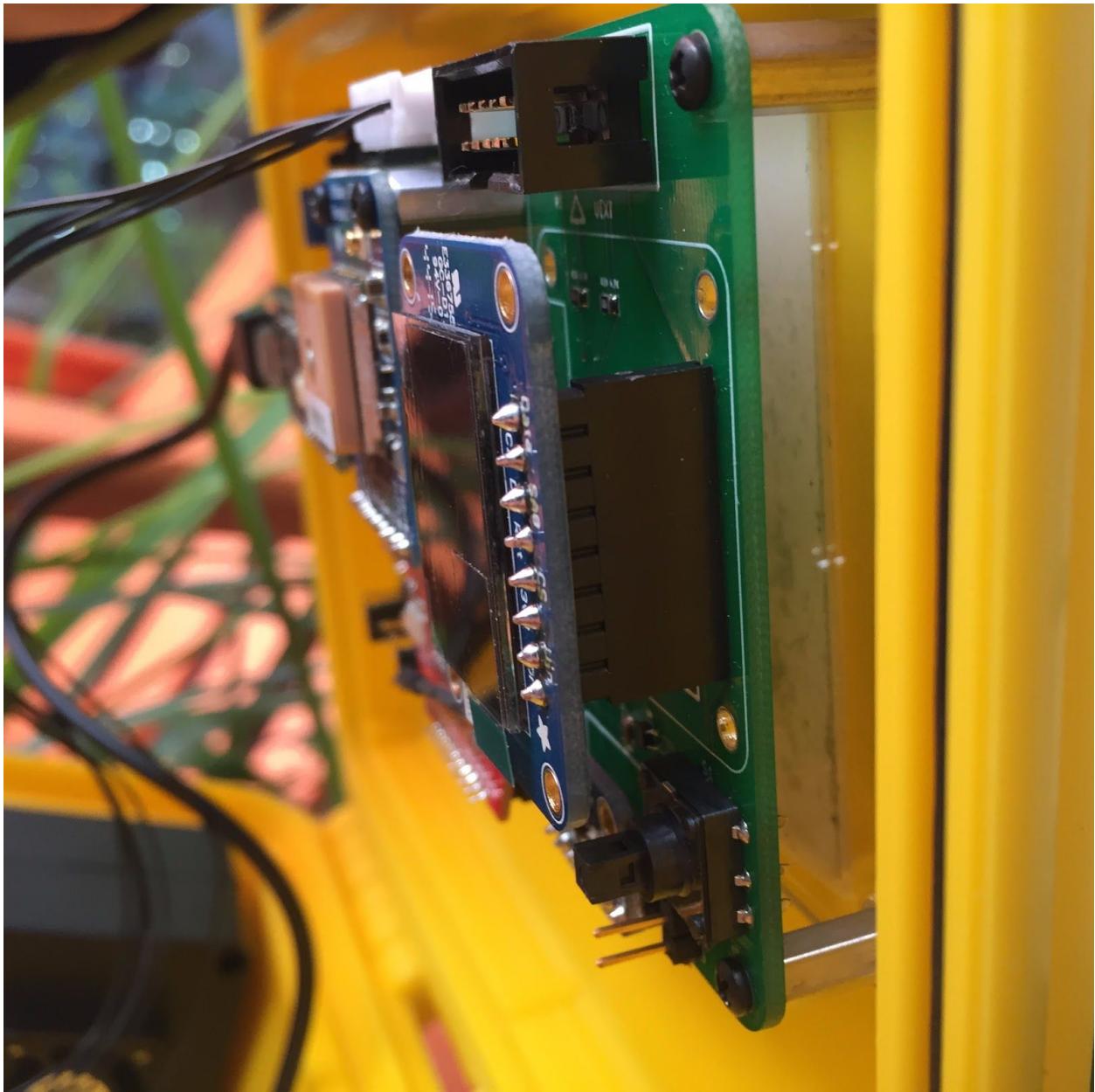


## Step 7 - Mount the PCB

Using the 4 standoffs and the 8 screws, mount the bottom of the PCB to the acrylic plate.

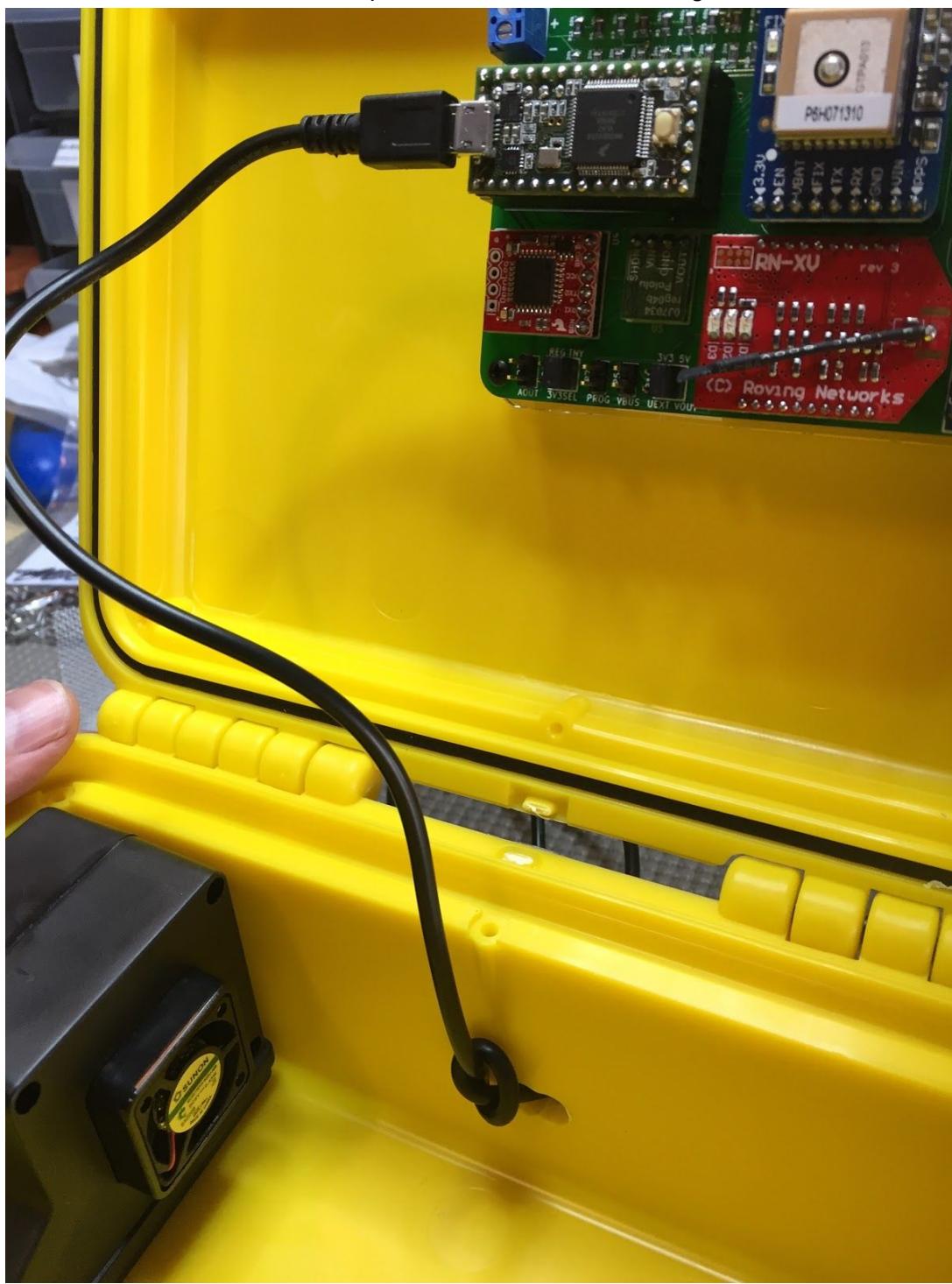
Stick a few pieces of the double sided foam tape to the bottom of the acrylic plate and then mount to the inside right of the case lid.





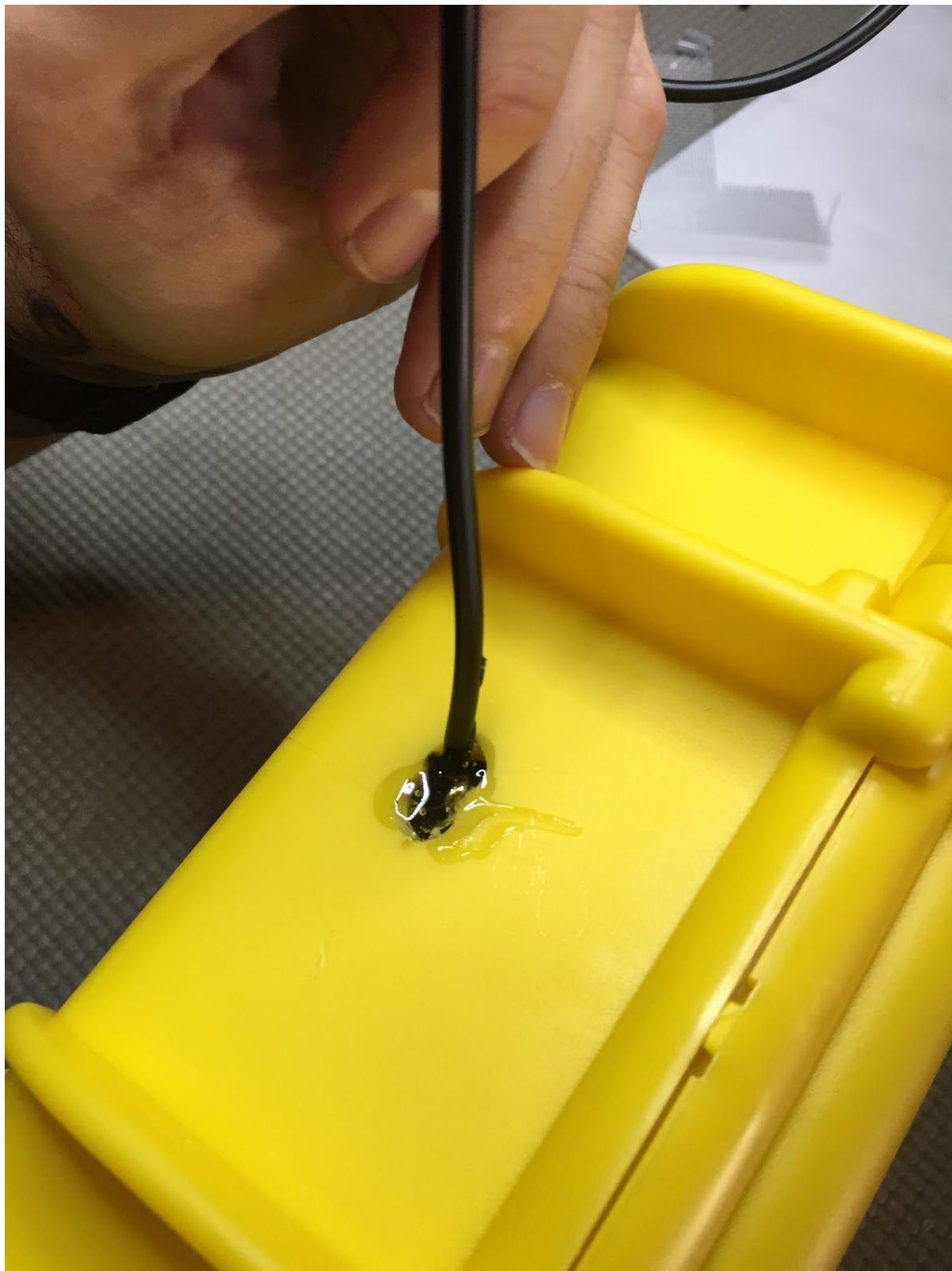
## Step 8 - Plug in USB / Seal the hole

Feed the USB cable through the hole and plug it into the Teensy board. Determine how much cord length is required to open and close the case. Unplug the cable and make a knot inside the case where the hole is. This will prevent the cable from sliding out.



Glue in the hole to create a seal.





## Step 9 - Plug in Cables

Plug your air sensor cable into the air sensor and the OPC-N2 header on the PCB. Plug the power cord into a wall. Check that everything boots up as expected. You should start to see readings in about 60 seconds. (See below if you want to use a battery instead of the power cord).



## Step 10 - Setup Air Kit Outside

Find an appropriate location outside that has access to a power outlet and is easily accessible and not stealable! Plug in the power. Check that it boots up and takes readings (PM 1.0, 2.5, 10, Humidity, Temperature) Close up the case.



# Battery Powered

You will notice that there is empty space in the bottom of the serpac case. That is on purpose...one it allows flexibility as the Beta team determines the best placement of the components and the second is to add additional components like a battery.

Note! Using a battery will be extra work for you because you'll need to charge them frequently.

Use a portable external battery pack for charging phones, etc.. They have their own recharging circuitry and just plug into the teensy's usb port. Here are two recommendations:

[https://www.amazon.com/gp/product/B00V9SLR0O/ref=oh\\_aui\\_detailpage\\_o05\\_s01?ie=UTF8&psc=1](https://www.amazon.com/gp/product/B00V9SLR0O/ref=oh_aui_detailpage_o05_s01?ie=UTF8&psc=1)

[https://www.amazon.com/gp/product/B00H8A2QY8/ref=oh\\_aui\\_detailpage\\_o05\\_s01?ie=UTF8&psc=1](https://www.amazon.com/gp/product/B00H8A2QY8/ref=oh_aui_detailpage_o05_s01?ie=UTF8&psc=1)

The larger 10400mAh battery will run the sensor for at least 24hr.

Some things to note. Because they are really chargers they require a minimum current draw. If the current draw is below this they will automatically shutdown after a period of time. The OPC-N2 particulate sensor has a pretty high current draw and is sufficient then on. However, the teensy by itself (no sensor attached) draws very little current and is below the minimum level. This is only an issue when trying to power the teensy without the OPC-N2 sensor.

Note, the PCB also has a 5V input. It is possible to battery + voltage regulator to this. Note, be careful not to attach power to this and the teensy's USB port at the same time unless you've cut the special trace on the bottom on the teensy. There are some notes here

[https://www.pjrc.com/teensy/external\\_power.html](https://www.pjrc.com/teensy/external_power.html).

For the most part the external battery/charging packs are the easiest. I generally Velcro them into the enclosure so they can be hot swapped. Buy two battery packs and then leave one charging while you use the device. Then swap when they are running low. They have LED indicators for the battery level.