Swarmer’s Microfloat Assembly Guide

A competent and care-free assembly process! Every Time!

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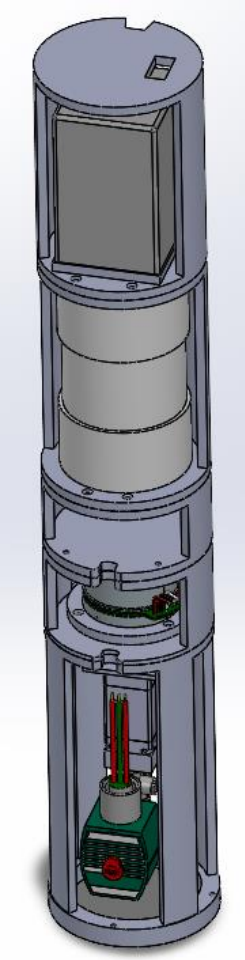
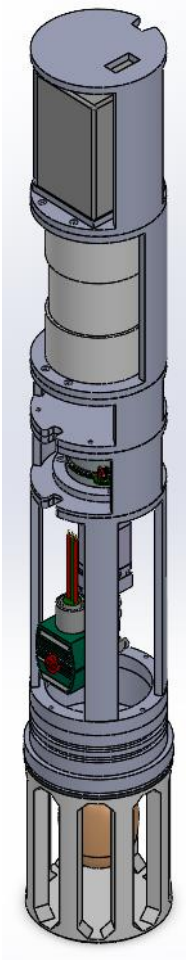
Assembly Overview

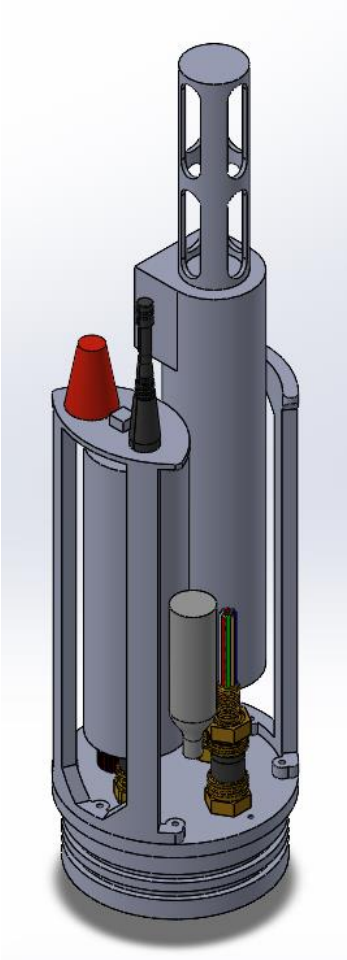
The Swarmer's child safe Microfloat design is divided into three unique subassemblies that are then combined into one complete overall assembly. These subassemblies in order of assembly include: the internal hardware subassembly, the bottom cap subassembly, and lastly the top cap subassembly. Each of these subassemblies will be covered in the correspondingly labeled sections below. Note that the order of operations is necessary to achieve a correctly assembled Microfloat, so deviation from the steps may cause improper sealing or a non-functional assembly.



Internal Subassembly



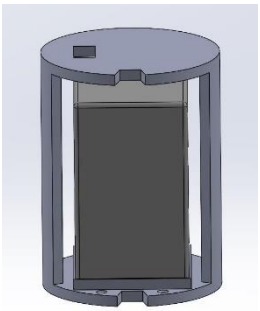
Bottom Cap Subassembly

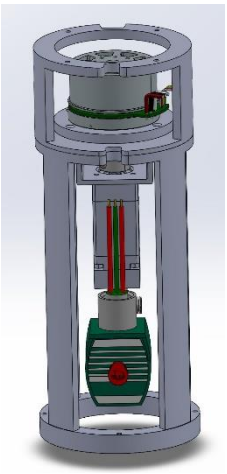


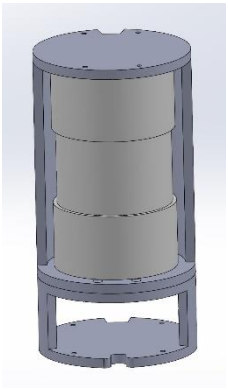
Top Cap Subassembly

Internal Hardware Subassembly:

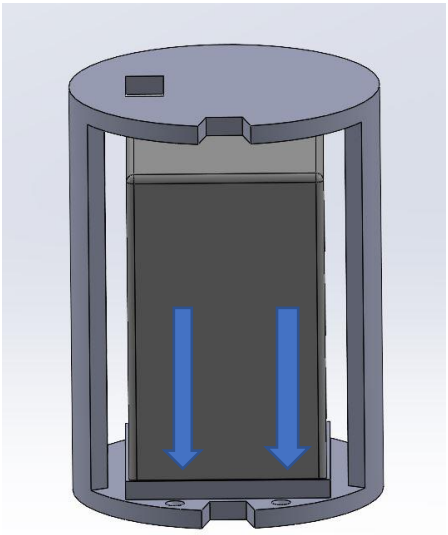
The internal subassembly consists of three stages. The first being the battery housing assembly, the second being the pump and motor housing, and the third is the reservoir housing.

Stage1: 

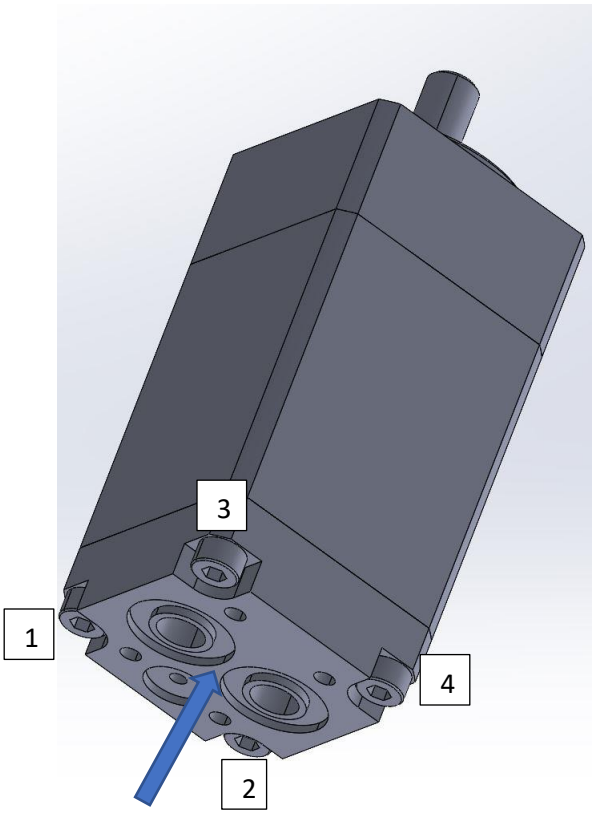
Stage 2: 

Stage 3: 

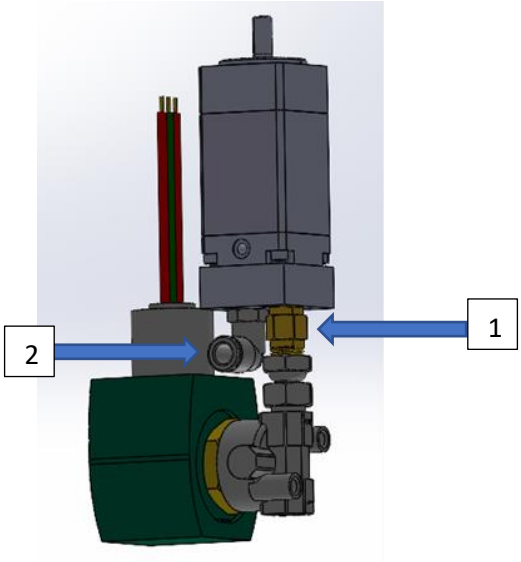
Stage 1: First take the battery and push the wires through the rectangular cutout located on top of the housing, and then slide the battery into the square holder located on the bottom inside face.



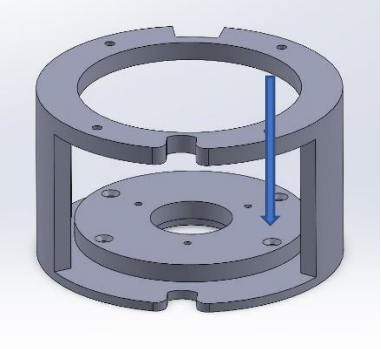
Stage 2: First assemble the pump and solenoid. To do this, tightly screw on the manifold onto the back face of the pump using 4 M3 screws (labeled 1-4 below). Make sure the two middle holes are aligned with the two outlets on the pump.



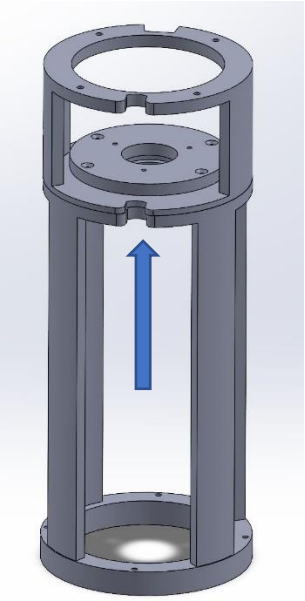
Next, attach the brass hex nipple (1) and the 0.25 push fitting (2) to the manifold using a wrench. After the fittings are attached, screw the solenoid onto the brass hex nipple.



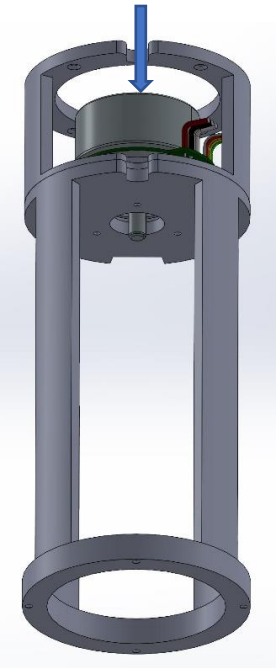
Then attach the motor plate to the motor housing using 4 30mm M3 screws.



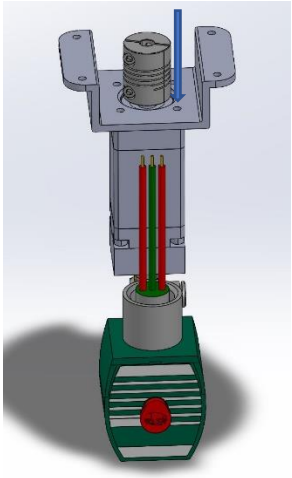
Then place the motor housing onto the pump housing using the same 4 30mm M3 screws.



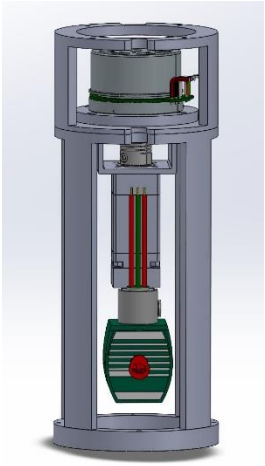
Then place the motor into the motor housing from the top. The motor is attached using 3 M4 screws from underneath.



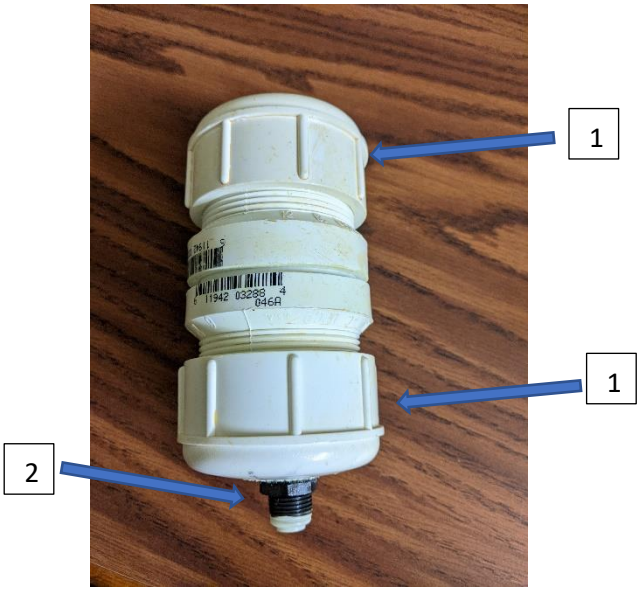
Attach the mounting bracket to the top of the pump using 4 M3 screws and attach the motor coupling onto the pump.



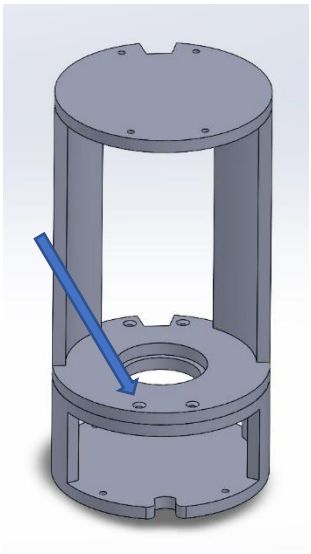
Attach the mounting bracket to the 4 30mm M3 screws that were used to connect the motor plate. After the bracket is pushed on completely, secure it with 4 M3 nuts. Then tighten the motor coupling onto the motor.



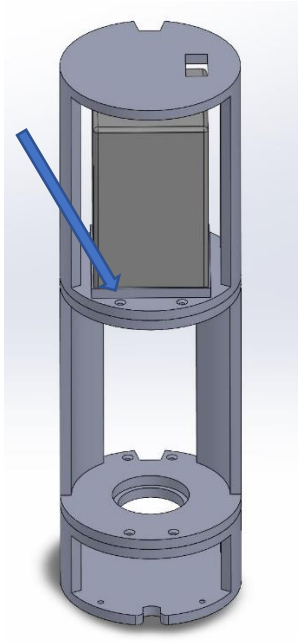
Stage 3: First cut a 1.5” length section of 2” pvc pipe. This section is cemented into place between two 2” pvc plugs. Onto these plugs, two 2” threaded caps are attached to close off the system (1). On the bottom of the reservoir, a ½” hole is drilled into the center of the bottom threaded cap. A ¼” through wall fitting is then cemented into the hole (2).



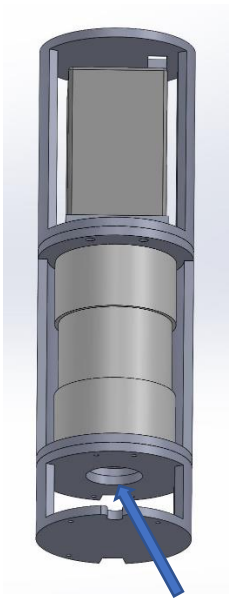
The reservoir housing and the spacing housing are then attached using 4 M3 screws.



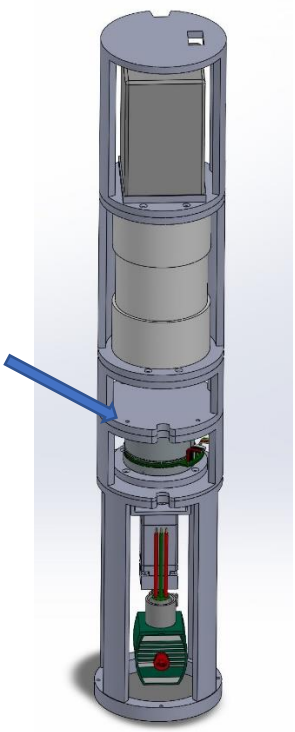
Final Assembly of Internal Housing: The battery housing is attached to the reservoir housing using 4 M3 screws. The reservoir is then filled with oil, and the hose is pushed into the bottom of the through fitting.



The reservoir is then placed into its housing, and the tube is pulled through the hole located in the bottom of the reservoir housing.



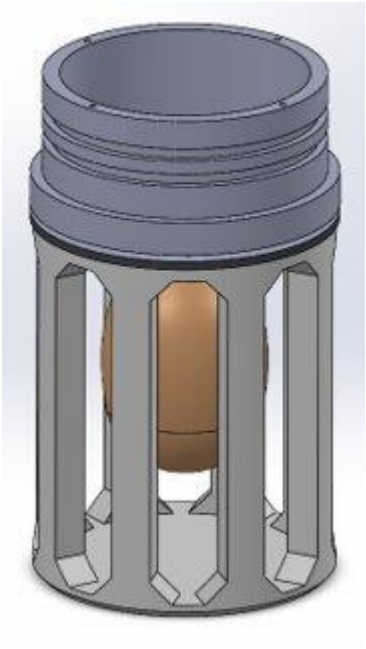
The spacing housing is then attached to the motor housing using 4 M3 screws.



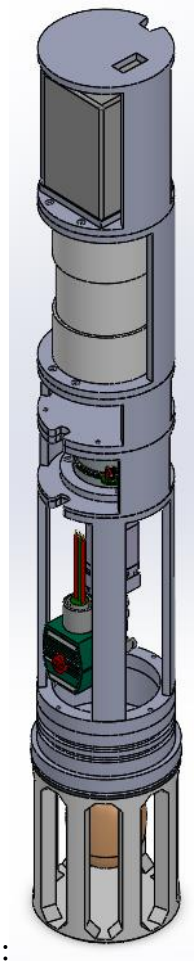
The tube from the reservoir is then attached to the push fitting located in the pump. The final step is a high-pressure hose is screwed into the solenoid.

Bottom Cap Subassembly:

The bottom cap subassembly has two stages of assembly: the first being the assembly of the bottom bellows and bellow cage to the bottom cap, and the second is connecting the internal hardware assembly to the bottom cap.

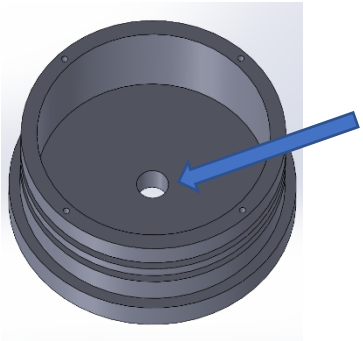


Stage 1:

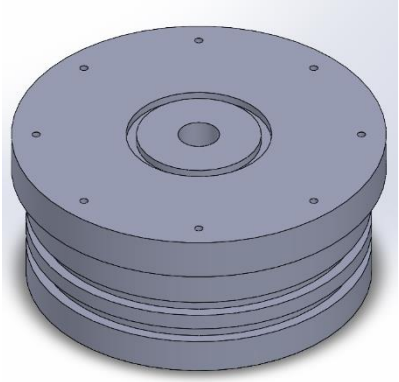


Stage 2:

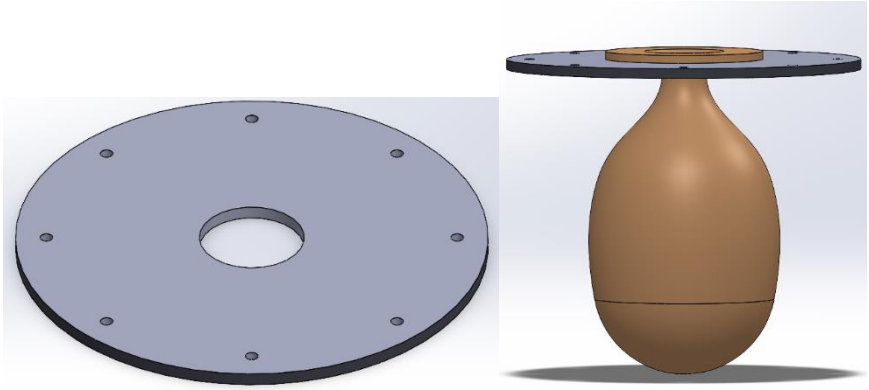
Stage 1: First take the ½" to 1/8” NPT adapter and wrap one to two layers of Teflon or PTFE tape around the threads. Insert into the inward face of the aluminum bottom cap and tighten as much as possible.



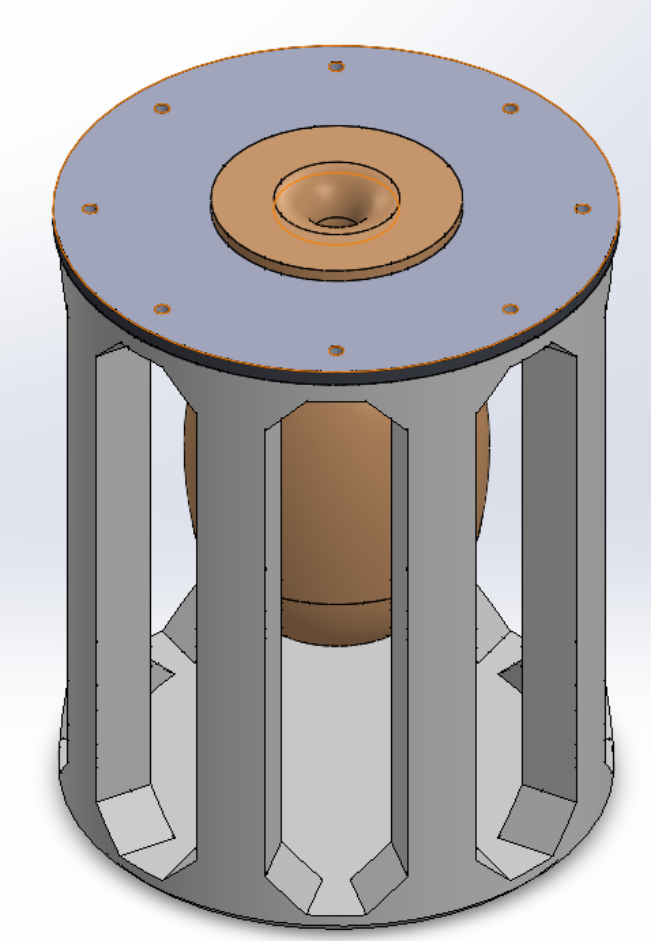
On the outward face of the cap, insert an O-ring into the groove around the NPT hole.



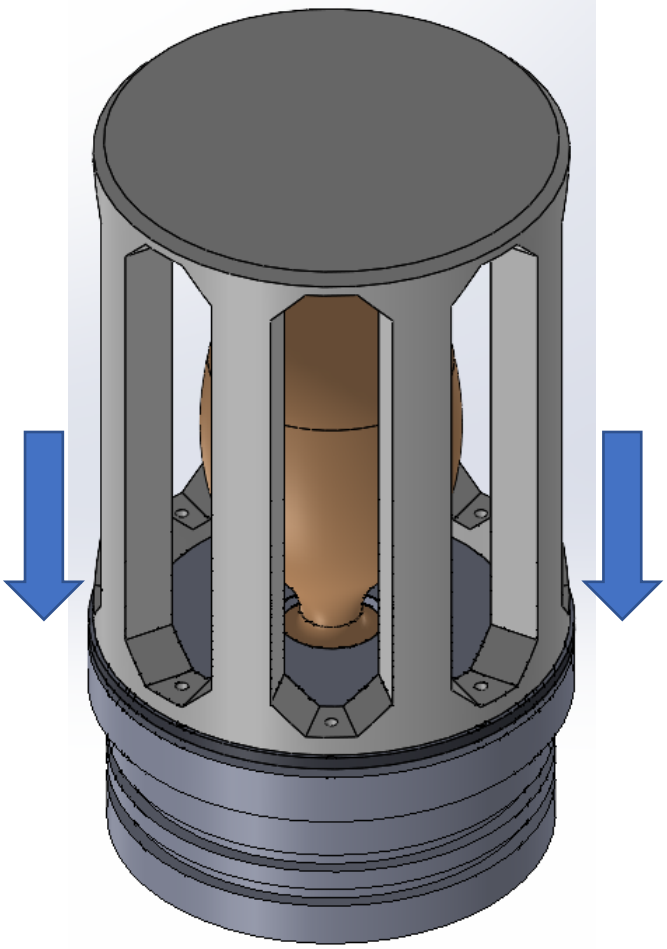
Next the bladder needs to be prepared for assembly. Carefully use a drill to remove the one way valve present in the rubber bladder. Now insert the bladder through the center hole of the water-jetted clamping plate. Pull the lip of the bladder as flush as possible against the plate to maximize usable volume.



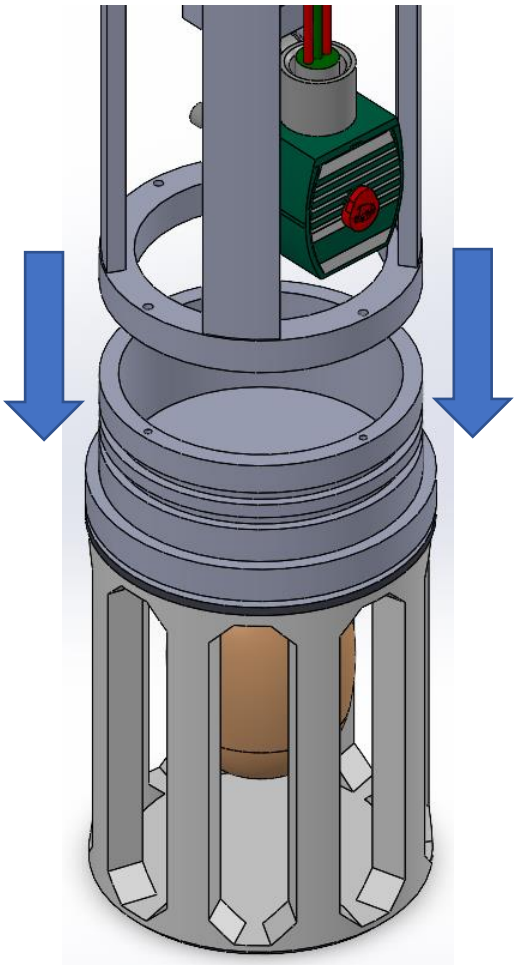
Align the holes of the water-jet plate with the holes of the bellows cage such that the bladder is now inside of the cage.



Insert screws through the holes of the cage pointing away from the bladder. Take this assembly and align the screws with the holes on the outer face of the bottom cap. Screw the holes in an alternating star pattern to achieve an equally distributed clamping force on the clamping plate. Some deformation near the center of the clamping plate is expected and desired for a quality seal. This concludes the assemblage of the bottom bellows.



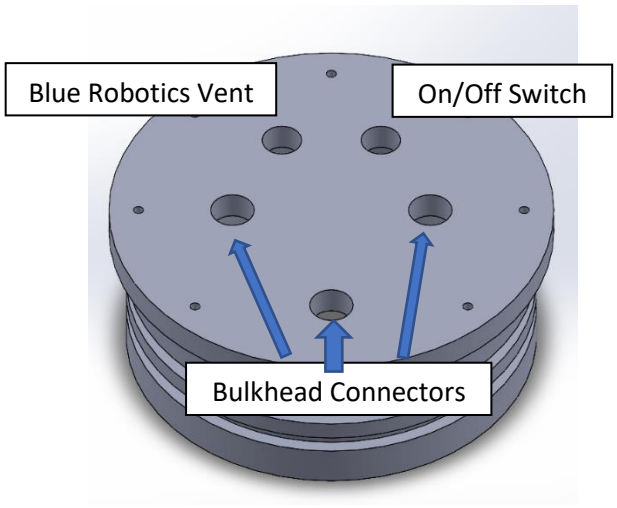
To proceed with the bottom cap assembly, it is suggested to grab a partner to assist with holding the recently assembled internal hardware assembly. Have your partner hold the internal assembly up for you during the following steps. Take the outlet hose from the solenoid and wrap one to two layers of Teflon or PTFE tape around the free end of the hose to obtain a good thread seal. Begin to screw the hose end into the ½" to 1/8” NPT adapter on the inside face of the bottom cap. Tighten the hose ens with a wrench to guarantee a good thread seal. Now, coil the hose upwards and align the holes of the 3d printed internal assembly cage to the corresponding holes on the bottom end cap.



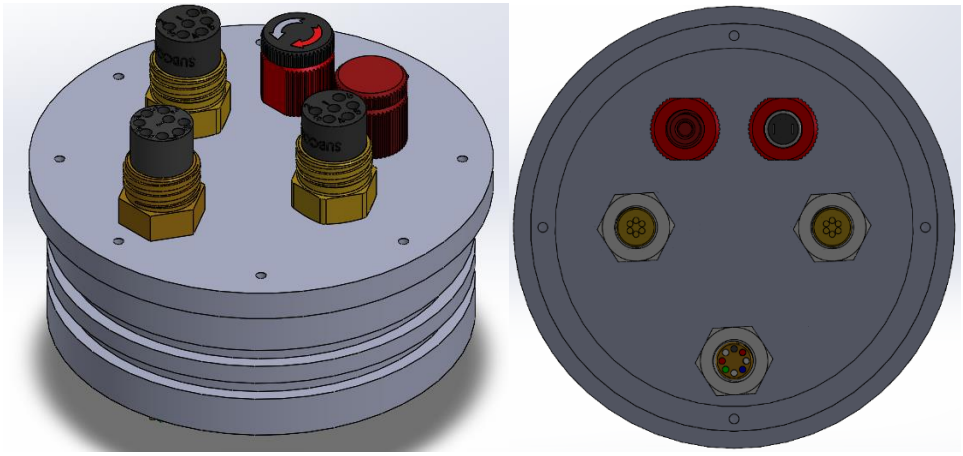
Use four m3 screws to secure the two components together. Congratulations, you have assembled the bottom cap subassembly!

Top Cap Subassembly:

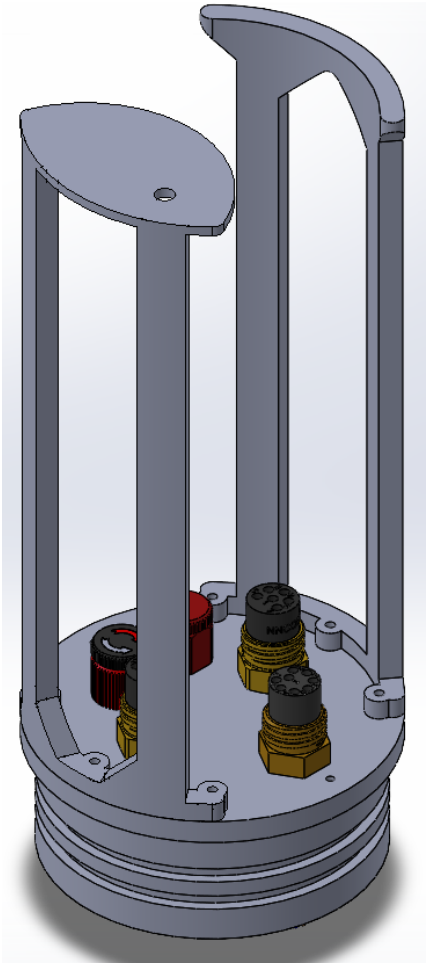
Thankfully, the top cap assembly requires less rigorous handling as opposed to the other subassemblies. Take the machined top end cap and insert the corresponding sensors and bulkheads connections into each of the machined holes as labeled in the figure below.



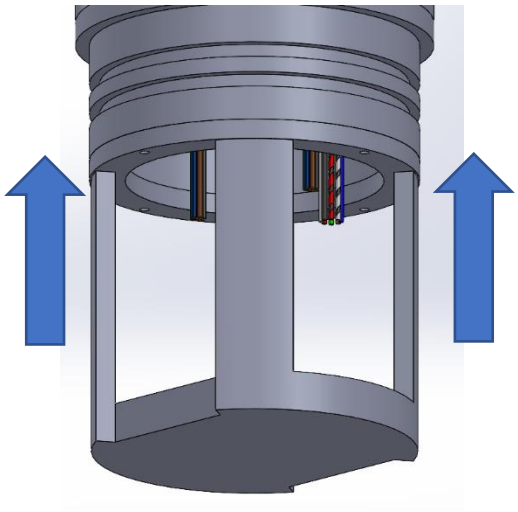
Use the corresponding nuts for each of these connections and tighten them with a wrench to ensure a water-tight seal. Note: Make sure that the o-rings for these connectors are in their respectively machined grooves otherwise there will not be a watertight seal.



Take the left and right handles and use m3 screws to secure them to the outward face of the top cap.



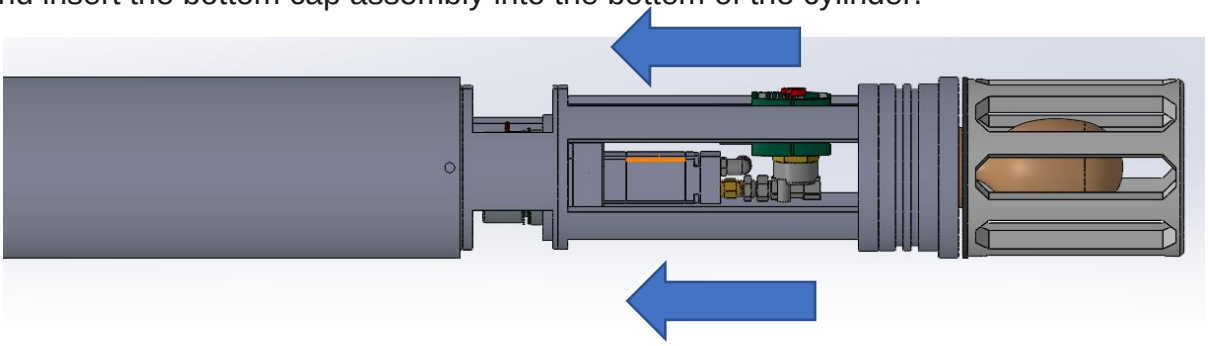
Lastly, take the electronics cage and align the screw holes along its top to the screw holes on the inward face of the top cap.



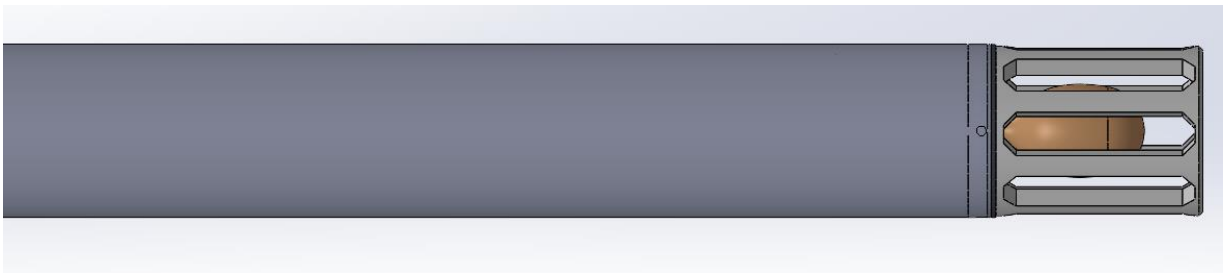
Congratulations, you have assembled the top cap subassembly!

Overall Assembly:

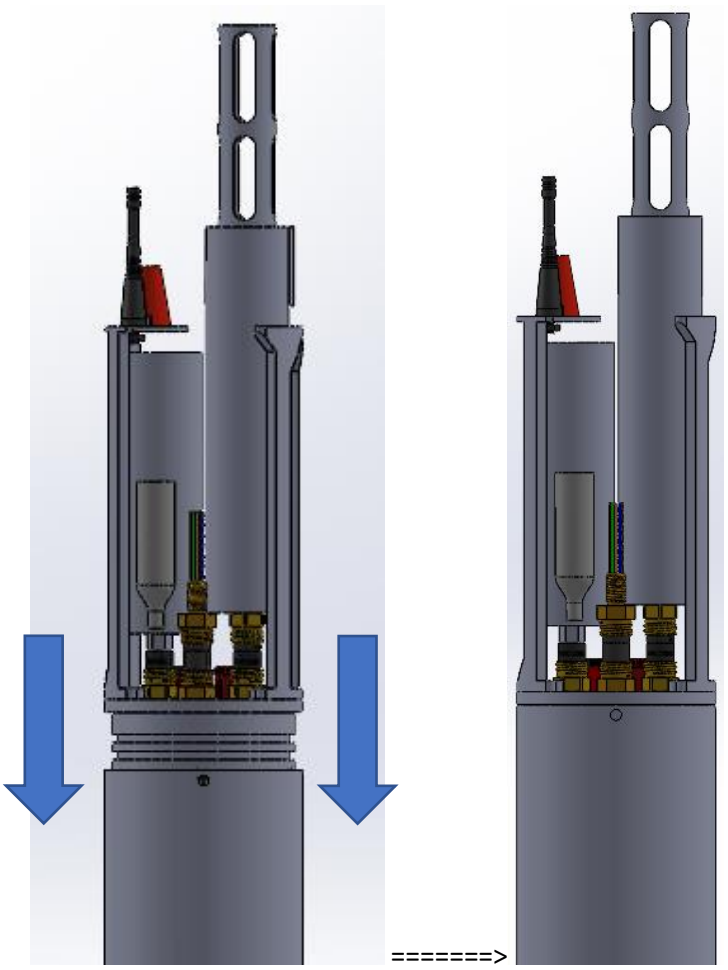
With all of the subassemblies completed, the final assembly stage is relatively simple to complete. Note that these next steps may require a second set of hands to prevent damaging components or potentially dropping various components. Lay the main cylinder on a stable flat surface and carefully turn the bottom cap subassembly with the internal hardware subassembly sideways. Have a helper hold the cylinder as you align and insert the bottom cap assembly into the bottom of the cylinder.



When the O-rings are about to engage, ensure that they are seating properly and do not lift out of their inset as you are inserting the bottom cap. Once the bottom cap assembly is flush with the bottom of the cylinder, screw the ¼-20 screws into the tapped holes on the side of the cylinder to secure the cap into place.



With the bottom assembly in place, you can now orient the Microfloat vertically on the floor as this will make inserting the top cap assembly easier. Like earlier, having someone hold the cylinder while inserting the top cap will make the assembly process easier. Additionally, this is the last time that you will have direct access to the microcontroller and electronics, so ensure that you have the desired code and configuration downloaded onto the microcontroller. With the top cap assembly in one hand, take the power leads and connect them to the battery power supply at the top of the hardware assembly already inside the cylinder. With this connection secured, you can now align and insert the top cap assembly as done before for the bottom cap assembly.



Ensure that the O-rings remain properly seated during the insertion process. Once the top assembly is flush with the top of the cylinder, secure it axially with ¼-20 screws in the tapped holes on the sides. Before placing into the water, check that the led flasher turns on when you screw in the on/off switch on the top of the unit. If the light turns on, then you have connected the electronics successfully.

Congratulations! You have completed assembly of the Swarmer’s Microfloat!!!