MANUFACTURING SPECIFICATIONS

1. For a full list of 3D-printed parts, please consult the “**BOM**” document in the “**3D Parts**” sheet.
2. For a full list of the laser-cut components please consult the “**BOM**” in the “**Laser-Cut**” sheet.
3. For a full-list of off-the-shelf components, please consult the “**BOM**” in the “**Off-the-Shelf**” sheet.

ASSEMBLY NOTE:

*For the full list of parts found in each sub-assembly, consult the “**BOM**” in the “**Sub-Assemblies**” Sheet

All the parts required for the sub-assemblies are included in the BOM. Before assembling, it is recommended that you compile all the parts for each sub-assembly. For more detailed views of the assembled components, please consult the full assemblies and sub-assemblies which are provided in the CAD files.

SUB-ASSEMBLIES

1. Structural-Assembly
2. Impeller-Assembly
3. Mixer-Assembly
4. Exhaust-Assembly
5. Oxygen-Assembly
6. Display-Control-Assembly

Note: The full assembly as well as the sub-assemblies are found in the provided CAD files. It is highly recommended to consult each of these sub-assemblies while assembling the ventilator. In this document we have provided an overview of the steps required to build the device, for clear schematics of the steps described in this guide please consult the individual CAD files and the assemblies.

STRUCTURAL-ASSEMBLY

The frame of the ventilator consists of 12 main aluminum extrusion tubes which are attached using T-slot brackets in conjunction with M5 screws. There is an additional aluminum extrusion tube which mounts to the base of the assembly also using T-slot brackets in conjunction with M5 screws. You can also mount rubber bumpers to the base extrusion.

Consult Frame CAD file

Included in the structural-assembly is the ventilator cover which should be laser-cut or milled. Full details of the panel profiles can be found in the CAD files provided. All acrylic side panels and floor panels should be fastened using a combination of gasket tape as well as M5 screws and M5 T-nuts.

Consult Side Panels CAD file

IMPELLER-ASSEMBLY

First insert M3 inserts into the motor mount. Then, attach the BLDC motor to the 3D-printed motor mount using M3 screws. Then locate the pump-housing through the shaft of the BLDC. You can now mount the impeller and then, using the fasteners provided in the BLDC kit, secure the impeller to the BLDC.

Consult Impeller Assembly CAD file

Proceed to add the curved adapter to the tube protruding from the pump-housing by first adding an o-ring in the internal slot of the pump-housing tube, then by snuggly mounting the curved adapter.

Consult internal assembly of the device

You can now mount the flow sensor to the curved adapter, again by adding an o-ring then snuggly pressing the flow sensor into the adapter. Next you can now attach the bottom of the filter housing to the flow sensor using an o-ring once again which fits into the internal slot. Before doing so, cut out a circle of the same diameter of the tube emanating from the bottom filter housing and insert it in on the cross, this is a check valve. To complete the impeller assembly, you can place the top of the filter housing over the hinge and fasten it to the bottom of the filter housing using a dowel rod. To ensure a tight fit, we have added a slot in the upper filter housing for an o-ring. Finally, you must attach the threaded inserts to the bottom of the filter housing and then using an M3 screw, attach the filter snap lock.

Consult the Filter Housing CAD file for more information

MIXER-ASSEMBLY

Several 3D-printed parts need to be mounted to the main housing. First attached the impeller assembly to the main housing using six M3 screws which tap into threaded inserts on the main housing. Then, attach the barbed adapter to the main housing using M3 screws tapped into the threaded inserts in the main body.

Consult Inlet Housing CAD file

OXYGEN-ASSEMBLY

The oxygen-assembly is constructed by first mounting a Nema 17 stepper motor to the stepper assembly which in turn allows it to control the needle valve for the flow of oxygen. To assemble the stepper assembly, first mount the stepper motor, the stepper adapter, then mount this sub-assembly to the needle valve using the stepper mount. M3 screws and M3 inserts in the available holes. The oxygen-assembly attaches to the mixer-assembly using an o-ring to form a tight seal and is locked in place using M3 screws and M3 inserts in the available holes.

Consult the Filter Housing CAD file for more information

EXHAUST-ASSEMBLY

First cut out a circular diaphragm from the rubber gasket which is of the same dimensions of the outer ring in the peep control valve. You will also need to cut out a rubber gasket for another check. Proceed to install the two gaskets on the bottom of the filter housing. You can now mount the top of the filter housing using the same procedure as described in the impeller assembly. Proceed to mount the bottom of the filter housing to the peep control valve making sure to include an o-ring. Finally screw on the bottom of the control valve.

Consult the Exhaust Assembly CAD files for more information

FINAL CONNECTIONS

Using a quarter inch tube connect the barbed adapter to the barbed adapted on the bottom section of the peep control valve. Also using a quarter inch tube, connect the input barb on the pressure sensor to the barb on the curved adapter.

Consult the internal assembly for more details