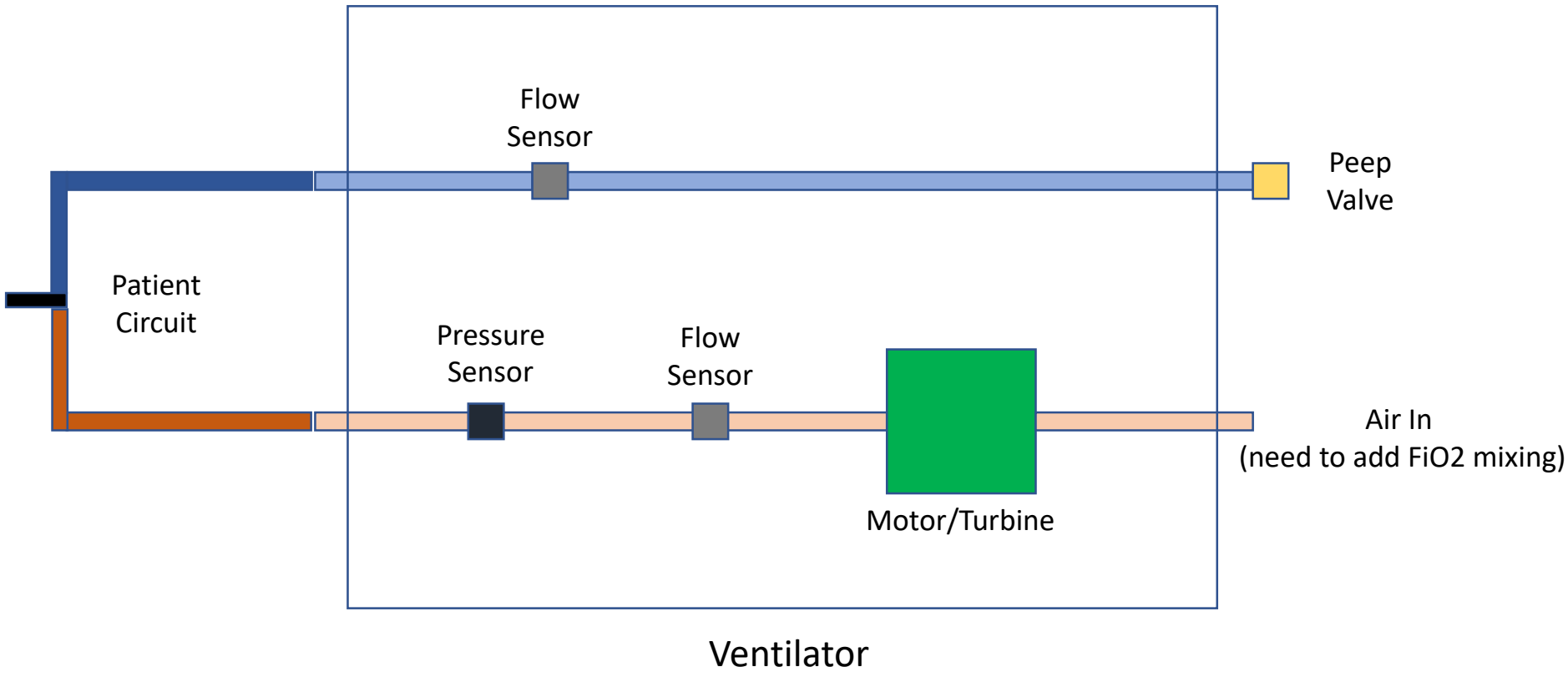
TurboVent:

A turbine-based ventilator design

Simple Idea → Few Parts

- Brushless DC Motor + Drive Electronics
- Turbine Impeller + Enclosure
- Pressure Sensor
- 2 Flow Sensors
- PEEP Valve
- Processor + Software
- User Interface

Overall Circuit Diagram



Motor/Impeller Requirements

- Brushless DC motor (BLDC) for controllability.
- Small, to enable quick response (motor diameter 15mm – 25mm).
- To deliver required pressure/volume:
  - High Speed: EG. 50,000 – 60,000 RPM
  - High Power
- High speed requirements lead to impeller balance issues?

Candidate Motors

- Maxon ECX SPEED 19mm motor
  - Manufacturer has confirmed availability
- Nidec-copal TF037E micro-blower
  - Availability unknown, this includes impeller, and would simplify design work
- Hoover OnePwr Blade Max vacuum blower
  - Would include impeller, simplifying design
  - Commercial product would ensure availability of sufficient numbers
  - Would require cooperation from a large company

Other parts

- NXP Differential Pressure Sensor: https://www.nxp.com/docs/en/data-sheet/MPXV7002.pdf
- B&B AccuTach PneumoTach Flow Sensor: http://bandb-medical.com/accutach-pneumotach-flow-sensor/
- Superior Sensing Pressure Sensor: https://www.digikey.com/product-detail/en/superior-sensor-technology-inc/HV120-SM02-R/2232-HV120-SM02-RCT-ND/10647412
- Carefusion Airlife Adjustable PEEP Valve: https://www.medicaleshop.com/carefusion-airlife-adjustable-peep-valves-with-22mm-i-d-connection-and-22mm-adapter-each.html?source=ppc&gclid=Cj0KCQjwjoH0BRD6ARIsAEWO9DsOjHAKk43FBICgp7WY_prjf86tJY5z1SeKZmH2RDHQzL2ptbB0cqwaAmGIEALw_wcB