Using Anesthesia Machines as ICU ventilators
## Specific to use at BIDMC

A. SETUP

Insure manual ventilation device readily available – AMBU bag, PEEP valve, HMEF filter and Kelly Clamp

1. *Connect/Check Central Gas Supplies*
- Check Line pressure – 45 psi or better o Full E-cylinders of oxygen and air as backup
- Remove nitrous oxide hoses and cylinders
- Vaporizers →Remove or drain (if not used for sedation)
- Scavenging (White or purple outlet-depends on location)
    o If not using the inhaled anesthetics – not necessary
    o If performing volatile sedation – necessary
2. *Configure machine with disposables Breathing Circuit o Filters*
- HMEF on airway, gas sampling on machine side
- Second filter on the expiratory limb if possible.
- Large (3 Liter) Reservoir Bag
- Connect circuit to Gas analyzer for oxygen and carbon dioxide (use filter)
3. *Perform Self-Test (q24hrs, but can be extended to q72hrs if needed)*
- Compliance measurement essential – do not change disposables after this
- Confirm no errors
- Check alarms, set limits, set to max volume (Defaults are not appropriate for ICU pts).
- Set APL valve to 0 cmH20

Prevention of Contamination

- Use both an HME (Y piece) and a viral filter (Expiratory limb)
- Gas sampling attached on the machine side of the HME filter
  - Use of HME filter plus antiviral filter should be effective
  - Should not need to decontaminate internal components

Gas Sampling

HMEF   Viral Filter
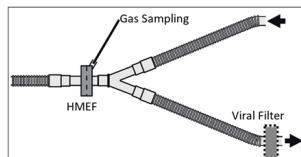
Preferred Filter Configuration
VFE > 99.99% for each filter. Gas sampling on machine side of filter. (Courtesy Draeger Medical)

B. INITIATE THERAPY

1. Fresh Gas Flow Options
- Option 1: Low fresh gas flow to conserve oxygen (**not recommended for COVID pts→ clogs filters**)
    o Preserves humidity
    o CO2 Absorbent must be available and maintained
    o Inspired CO2 Alarm must be set to 5 mmHg
- Option 2: Fresh gas flow => minute ventilation (1x – 1.5x MVV)
    o No CO2 Absorbent needed (increase FGF if Inspired CO2 present)
2. Setting Oxygen Concentration on Electronic Flowmeters
    i. Air/oxygen mix needed for delivered O2 concentration (see table)
3. Set Ventilator →Ventilation Mode & Settings
    1. Rate
    2. Volume
    3. I:E Ratio
    4. PEEP
4. Start Ventilator.

FIO2 Table.

	Oxygen to Air Ratio	Oxygen flow for 5 L/min total	Air flow for 5 L/min total
21%	0 to 1	0.0	5.0
25%	0.06 to 1	0.3	4.7
30%	0.13 to 1	0.6	4.4
35%	0.21 to 1	0.9	4.1
40%	0.31 to 1	1.2	3.8
50%	0.59 to 1	1.9	3.1
60%	0.99 to 1	2.5	2.5
80%	3 to 1	3.8	1.3
100%	1 to 0	5.0	0.0