

COVID-19 NIV (NIPPV) ventilation with helmet for adult patients on Hamilton Medical ventilators

NOTE!

While the information contained herein is believed to be accurate, it does not represent an official recommendation from Hamilton Medical, nor may it substitute an opinion, assessment, or instructions provided by a trained healthcare professional.

NOTE!

Hamilton Medical ventilators must not be used for helmet CPAP therapy.

NOTE!

All Hamilton Medical ventilators are able to provide noninvasive ventilation through a helmet. The turbine-driven ventilators are able to provide higher continuous flow levels, and the air supply is fed by filtered room air (HEPA filter) with ambient humidity.



Step 1: Setup and preparation

- Use a low-compliance, **dual limb breathing circuit**, preferably with active humidification. **Do not use a coaxial circuit!**
- Insert a **bacterial/viral filter** at the inspiratory and expiratory port of the ventilator.
- If available, activate and prepare the **mainstream or sidestream CO2 sensor** with the necessary airway adapters.
- Carry out all the required **preoperational checks**.
- Connect the **flow sensor** directly to one of the helmet connection ports with a 22-mm ID connector or the calibration adapter.
- Close the **second helmet connection port** with a plug.

Step 2: Mode selections and alarm settings

- If available on your ventilator, select NIV mode.
- If there is no NIV option installed, consider using PCV+/PCMV.
- Adjust the alarm limits to avoid unnecessary alarms.



Step 3: Mode controls

ATTENTION! Two ventilated compartments in sequence = helmet + lungs.

Pressure ramp	Set to the fastest speed possible
PEEP	Target PEEP + 30%–50% Minimum PEEP = 10 cmH2O to increase helmet stiffness
Psupport	Target Psupport + 30%–50% Minimum Psupport = 12 cmH2O
Inspiratory trigger	Start with 2 l/min and maintain as low as possible
ETS	Start with default ETS of 25%, monitor for cycling asynchronies and adapt accordingly
TI max	Set to 1.5 s to avoid late cycling
Oxygen	Start with Oxygen = 60% and titrate based on SpO2 Note: Single gas source (100% oxygen) may limit peak flow capacities

Step 4: Monitoring

Tidal volume	Between 1,000 and 1,500 ml Note: ~ 50%–75% of the VT delivered is distributed to the helmet!
ExpMinVol	> 25 l/min to have sufficient CO2 washout Efficiency can be monitored with PCO2 monitoring inside the helmet - see Tips and tricks below.

Tips and tricks

- Measure partial pressure of CO2 inside the helmet (PCO2h) in a “silent” part of the helmet (e.g., place the sensor directly above the inflated collar) to detect CO2 rebreathing. Use a mainstream or sidestream CO2 sensor from the ventilator or the monitoring system. PCO2h should not be above 5 mmHg/0.6 kPa.
- If CO2 rebreathing is suspected, add a supplemental flow of > 10 l/min via the feeding/support port on the helmet.
- Increase pressurization by activating TRC (100%).