

SUBJECT: Instructions for Using Pneumatically-Powered Medication Nebulizers In-Line with the HT50's Patient Breathing Circuit



Any flow introduced into the HT50 patient breathing circuit from a source other than the ventilator cannot be controlled by the ventilator. If you use an external gas source to power a medication nebulizer placed inline with the patient breathing circuit, the HT50 has no control over and no way to monitor the extra flow. Following are the recommendations for adjusting the Newport HT50 ventilation and/or alarm settings to accommodate the delivery of medications inline with the patient breathing circuit using an external pneumatic gas source.

Volume Controlled Ventilation - Nebulizer Powered By an External Gas Source

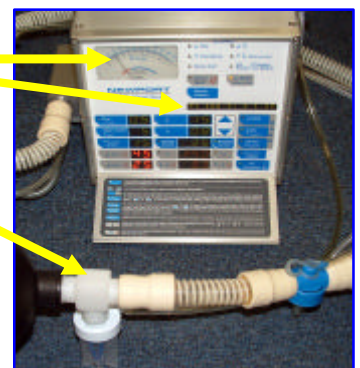
In volume controlled ventilation all flow entering the patient breathing circuit during the inspiratory time contributes to the patient's tidal volume. If extra flow is added from an external source, the patient's tidal volume will increase but this increase will not show up on the HT50's set tidal volume or monitored inspiratory tidal volume display.

Adjustments required:

- Tidal Volume
- Low Minute Volume Alarm

Follow these steps to ensure that the patient's mandatory breath, tidal volume remains unchanged during the administration of a nebulizer treatment powered by an external gas source:

1. Observe the patient's peak airway pressure before placing the nebulizer inline with the patient breathing circuit.
2. Secure the nebulizer inline with the breathing circuit.
3. Verify that the peak airway pressure has not changed after securing the nebulizer inline. If peak pressure has dropped, you have introduced a breathing circuit leak. A leak in a pressurized breathing circuit will decrease delivered tidal volume. Do not proceed before correcting a leak.



4. Press the \dot{V} button on the HT50 face panel to display inspiratory flow in the display window.



5. Gradually adjust the flow on the external gas source to the appropriate level for powering the medication nebulizer (in this case 8 L/min is used) while reducing the HT50's Volume Control (tidal volume) until the \dot{V} display drops by the amount that you set on the external gas source. Adjusting each in small steps will keep the patient's tidal volume relatively stable during adjustment.



6. Because the flowrate you have set on your external gas source is not necessarily the same amount of flow entering the breathing circuit (some nebulizer are made to deliver only a certain amount of flow), it is important to re-check the peak airway pressure after completing step 5 to make sure that the current peak airway pressure matches the peak pressure recorded before placing the nebulizer inline with the breathing circuit. This will minimize the chances of an inadvertent change in tidal volume delivery to the patient. It may be necessary to re-adjust the Volume Control (tidal volume) a little bit to bring the peak pressure/tidal volume back to normal.

7. Adjust the Low Minute Volume Alarm to accommodate the lower minute volume created by decreasing the tidal volume setting.

8. Remember that, although the Volume Control (tidal volume) display and tidal volume monitored and displayed in the message window will be lower during the treatment than it was prior to the treatment, the patient is still receiving the same volume because the difference is being made up by the external flow source.



9. Make sure to reverse the changes made to the Volume Control (tidal volume) and Low Minute Volume Alarm settings when the treatment is completed.

Pressure Controlled Ventilation - Nebulizer Powered By an External Gas Source

During pressure targeted breaths the HT50 controls airway pressure by managing delivered flow while keeping the exhalation valve closed.

If an external flow source is introduced into the breathing circuit in order to power a medication nebulizer the flow cannot be controlled by the HT50 but at the same time it contributes to the rise in pressure. Since the HT50 uses feedback from the pressure waveform in order to determine flow delivery during pressure control, the ventilator will lower flow delivery when external flow is added to the circuit during pressure control because the external flow is contributing to the pressure rise.

When the combined ventilator and external flows cause alveolar pressure to reach the user set target airway pressure delivered flow must cease or else airway pressure will rise above the user set target value. Since the HT50 cannot control the external flow, it is possible that it may also not be able to keep the airway pressure from rising above the target pressure during pressure targeted breaths.

So the result of adding a pneumatically powered nebulizer inline with the HT50 breathing circuit during pressure targeted breath delivery is three-fold:

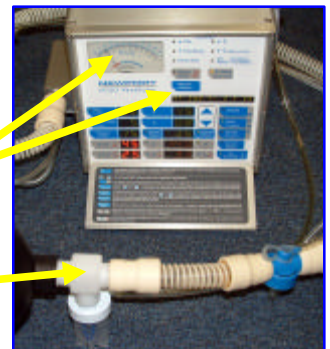
1. The ventilator will deliver a lower flow and therefore a lower tidal volume for each breath and this will result in a lower minute volume.
2. The ventilator may not be able to keep airway pressure from rising above the target pressure during inspiration. This "overshoot" of target pressure may result in truncating breath delivery. Truncating breath delivery may further decrease tidal volume delivery.
3. The patient's minute volume will be lower so the Low Minute Volume Alarm setting may need to be lowered to accommodate the change.

Adjustments required:

- Low Minute Volume Alarm

Follow these steps to minimize nuisance alarms during the administration of a nebulizer treatment powered by an external gas source:

1. Observe the peak airway pressure before placing the nebulizer inline with the patient breathing circuit.
2. Secure the nebulizer inline with the breathing circuit.



3. Verify that the peak airway pressure has not changed after securing the nebulizer inline. If peak pressure has dropped, you have introduced a breathing circuit leak. Do not proceed before correcting a leak.

4. Gradually adjust the flow on the external gas source to the appropriate level for powering the medication nebulizer.



5. Adjust the Low Minute Volume Alarm to accommodate the lower minute volume created by lower flow and therefore tidal volume delivery.



6. Remember that although the tidal volume and minute volume monitored and displayed in the message window will be lower during the treatment than it was prior to the treatment, the patient is still receiving the same volume because the difference is being made up by the external flow source.
7. Make sure to reverse the changes made to the Low Minute Volume Alarm settings when the treatment is completed.

If you have any questions about this information please contact Newport Clinical Marketing: 1.949.6423910 ext 218 or email: clinical@newportnmi.com.