

VALLEYCARE
OLIVE VIEW-UCLA MEDICAL CENTER/HEALTH CENTERS
RESPIRATORY CARE SERVICES – NICU
POLICY & PROCEDURE

NUMBER: 1711
VERSION: 1

SUBJECT/TITLE: **SENSORMEDICS 3100A VENTILATOR**

POLICY: The SensorMedics ventilator is the responsibility of the NICU respiratory therapist, who will set-up, maintain and make adjustments to the ventilator. Ventilated patients will have full patient monitoring, pulse oximetry, and analyzed FI02. ETCO2 monitoring is not available.

PURPOSE: Ventilation of the critically ill NICU patient

DEPARTMENTS: **RESPIRATORY CARE SERVICES**

DEFINITIONS: The SensorMedics 3100A is a High Frequency Oscillatory Ventilator (HFOV). The 3100A provides lung protection by inflating the lung with a continuous distending pressure and superimposing very small pressure and volume swings (rapid rate ventilation using low pressure).

PROCEDURE: **Initial Set-up**

- A physician's order must be verified in the patient's chart.
- The order should include the Amp, MAP, Hz, FI02 and the % TI.
- Follow the operating manual of the SensorMedics 3100A for calibration and set up.

SET-UP

Connect air and oxygen source gases from the back of the unit to:

1. Oxygen line to the external Bird blender oxygen input fitting.
2. Air line to the external Bird blender air input fitting and the oscillator "Air Cooling" input connector.
3. Connect patient circuit and external neonatal humidifier to the 3100A.
4. Connect all color-coded patient circuit control lines and the clear pressure sense line (see circuit schematic).

Calibrating the Patient Circuit

Circuit calibration and performance check is specified on the side panel of the machine, and must be performed on the ventilator prior to patient connection.

1. Turn on source gas and set Bias Flow to 20 lpm.
2. Set the Mean Pressure Adjust and Mean Pressure Limit to maximum

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(fully clockwise).

3. Push in and hold **RESET** while observing Mean Pressure digital readout.
4. Adjust Patient Circuit Calibration screw on right side of control module to achieve a mean pressure between 39 and 43 cmH₂O.
5. Release reset button.

Patient Connection

1. Connect the patient to the ventilator and initiate vent settings.
2. Observe for adequate chest wiggle and adjust AMP as necessary, doctor's order is required.
3. Record the procedure and parameters on the ventilator sheet.
4. Ventilators will be checked and charted at least every 2 hours.
5. Set, check and assure alarm settings are appropriate and audible for all equipment used on your patient.

Indications

HFOV is indicated for ventilatory support and treatment of respiratory failure, HMD, PIE, and barotrauma in neonates when conventional ventilation has failed.

Contraindications and Adverse Reactions

While there are no proven contraindications to HFOV, side effects may include:

- Gas trapping
- IVH.
- Impairment of cardiovascular function

Parameters on HFOV

Amplitude (AMP)

- The amplitude is tidal volume
- The setting is determined by observing the patient to see how much chest excursion/movement occurs with oscillation. This setting should be enough to vibrate or "wiggle" the thorax from the nipple line to the umbilicus.

Initial Settings:

- Selecting the initial amplitude may be determined by evaluating the patient's last PIP.
- Settings are changed by 1-2cm H₂O until adequate amplitude (per ABG findings) is reached.

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Changes in the amplitude may require
Adjustment of the mean airway pressure.

Frequency (Hz)

- The frequency, is similar to the rate, is measured in hertz (Hz). To calculate the exact rate multiply the number of hertz times 60.
- Hz is ventilation.

Initial Settings:

- 15 Hz for preterm infants.
- 10 Hz for post term infants.

Mean Airway Pressure (MAP)

- The mean airway pressure controls oxygenation.
- Adjustments with MAP are .5 to 2 cm H₂O increments.
- Optimal pressures are desired at all times with high frequency ventilation. Optimal pressures can be defined as the amount of pressure necessary to ventilate adequately and maintain a normal PaCO₂.

Initial Settings:

The initial mean airway pressure should be set approximately 1-3 cmH₂O over the patients mean on the conventional ventilator.

FIO₂ Initial Settings:

The FIO₂ should match the same as on conventional ventilation or be adjusted to meet the patient's gestational age requirements.

- This parameter controls oxygenation.
- An initial FiO₂ is selected to optimize pulmonary vascular resistance while the ventilator is opening the lungs.

IT (Inspiratory Time)

The IT range is 0.3-0.5 seconds.

Bias Flow

The flow setting range is 15-20 l/m.

Alarms

The setting of the \overline{Paw} alarms for the maximum and minimum is 2 above and 2 below the set MAP.

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CXR Findings

- A CXR is to be completed 1 hour after HFOV is initiated.
- Repeat CXR's are indicated until stability of the lungs is noted.
- Optimal inflation is 8-9 ribs expansion.

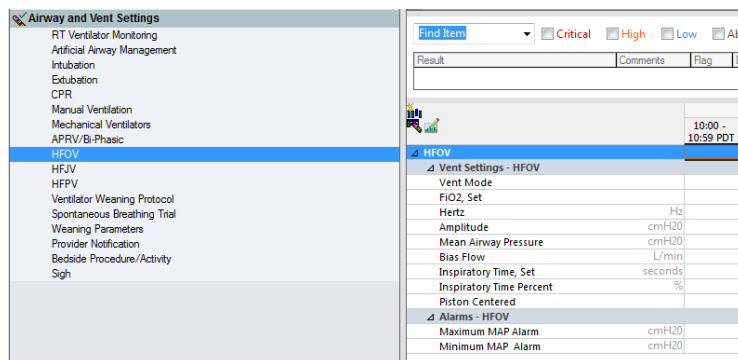
Weaning

Wean to conventional ventilation when all the following conditions have been satisfied:

- The MAP (Paw) has been weaned to 10-12 cm H2O or enough to maintain optimum lung volume. Rapidly reducing the Paw can cause alveolar collapse. Paw should be reduced slowly (0.5 to 2 cm H2O) while closely following pulmonary status with arterial blood gases and X-ray prior to extubation.
- FIO2 been reduced until well below 0.50 with O2 saturation within the parameters for patient gestational age.
- Arterial blood gases have been stabilized within desired ranges.
- Underlying pulmonary disease has been treated.

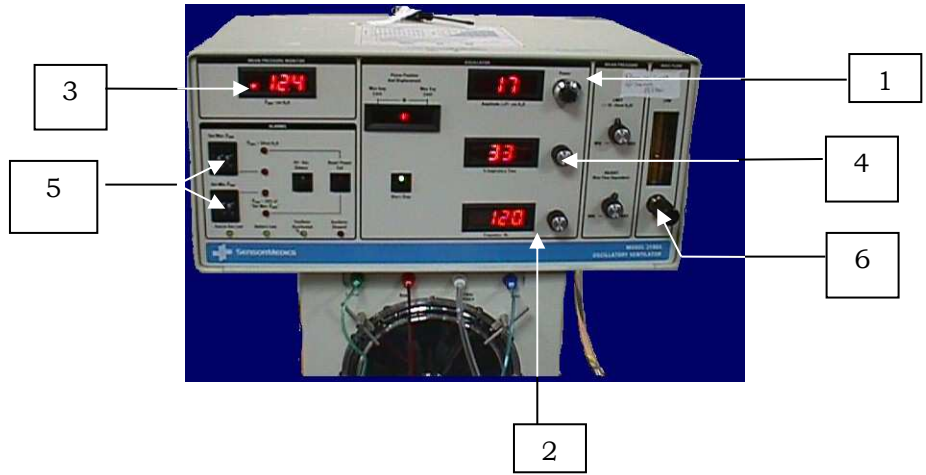
Charting

Charting is done on the Airway and Vent Settings / HFOV section of iView and I&O. Daily charting of high and low alarms are set, tested and audible.



Location of Controls

Front of Sensor Medics 3100A.



- 1. Amplitude (AMP).
- 2. Frequency (Hz).
- 3. Mean Airway Pressure (MAP).

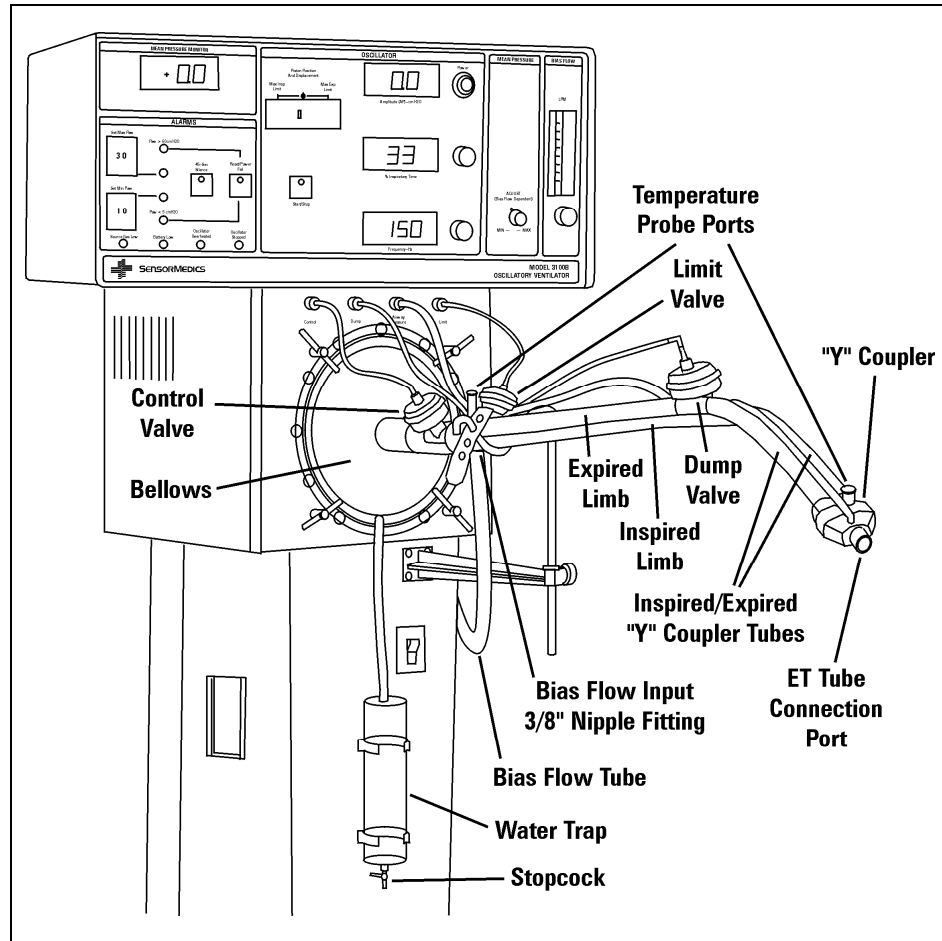
- 4. % TI (Inspiratory Time).
- 5. Alarms.
- 6. Bias Flow.

The SensorMedics Patient circuit

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Heated Humidifier

Gas being delivered to the patient should be humidified and warmed. The Hudson RCI Conchatherm 4 Heated Humidifier is used on the SensorMedics 3100A.

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References: 1) JCAHO, 7 rules of safety. 2) SensorMedics 3100A operators manual. 3) NICU & Normal Nursery Guidelines 2004.	
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