ALARM SETTING GUIDELINES

PURPOSE: To insure proper functioning of the mechanical ventilator at all times and to establish safe conditions for the patient while on mechanical life support. While patients are receiving mechanical ventilation the following guidelines for maintaining alarms shall be adhered to.

NOTE: If patient parameters vary due to inconsistent or rapidly changing patient efforts, ventilator alarms shall be set as close as possible to these guidelines, with documentation of such.

POLICY: 1. General Guide to Alarm Limits

A. Volume Alarms
   1. Low Exhaled Tidal Volume shall be maintained at 50% of the tidal volume delivered or spontaneous tidal volume.
   2. Low minute volume shall be maintained at 50% of the exhaled minute volume.
   3. High minute volume alarms shall be maintained at 50 to 100% above the exhaled minute volume.

B. Pressure Alarms
   1. Low inspiratory pressure alarms shall be set at:
      Adults 10 to 15 cmH2O below the peak inspiratory pressure generated on a consistent basis.
      Pediatrics 5 to 10 cmH2O below the peak inspiratory pressure generated on a consistent basis.
      NICU 3 cmH2O below the peak inspiratory pressure generated on a consistent basis.
   2. High pressure or pressure limits shall be maintained and set at:
      Adults 10 to 15 cmH2O above the peak inspiratory pressure generated on a consistent basis.
      Pediatrics 10 cmH2O above the peak inspiratory pressure generated on a consistent basis.
      NICU 5 cmH2O above the peak inspiratory pressure generated on a consistent basis.
   3. Low PEEP alarm shall be set at:
      NICU 2-3 cmH2O below the set PEEP.

C. Apnea Ventilation Parameters
   1. Apnea Interval shall be set to correspond to maximum acceptable apneic period.
   2. Tidal volume shall be set to deliver an acceptable volume or inspiratory pressure for each individual patient.
   3. Apnea oxygen delivery shall be 100% or appropriate for each patient.
   4. Apnea Respiratory rate shall be set at an acceptable rate to provide an acceptable minute volume for each individual patient.

2. Ventilator Specific Alarm Standards
Adult / Pediatric

A. Servo 300
   1. Shall have a properly set upper pressure limit.
   2. Shall have a properly set upper expired minute volume alarm.
   3. Shall have a properly set lower expired minute volume alarm.
   4. High continuous pressure alarm is automatically set at PEEP level +15 cm H2O for more than 15 seconds.
   5. Apnea alarm is automatically set at 20 sec in Adult range, 15 sec in pediatric range and 10 sec in neonatal range.

B. Servo-I
   1. Shall have a properly set upper pressure limit.
   2. Shall have a properly set upper expired minute volume alarm.
   3. Shall have a properly set lower expired minute volume alarm.
   4. High continuous pressure alarm is automatically set at PEEP level +15 cm H2O for more than 15 seconds.
   5. Shall have Apnea Ventilation Parameters properly set.

C. Puritan Bennett 840
   1. Shall have a properly set High Pressure limit (High circuit pressure).
   2. Shall have a properly set Low Exhaled Tidal Volume Alarm. (This is divided into mandatory exhaled tidal volume and spontaneous exhaled tidal volume).
   3. Shall have a properly set High Minute Volume Alarm.
   4. Shall have a properly set Low Exhaled Minute Volume Alarm.
   5. Shall have a properly set Circuit disconnect alarm. (This defaults at 75% disconnect sensitivity; alarm occurs if 75% of delivered volume is not returned to the ventilator).
   6. Shall have Apnea Ventilation Parameters properly set.

C. Puritan Bennett 7200
   1. Shall have a properly set High Pressure limit.
   2. Shall have a properly set Low Inspiratory pressure limit.
   3. Shall have a properly set Low Exhaled Tidal Volume Alarm.
   4. Shall have a properly set Low Exhaled Minute Volume Alarm.
   5. Shall have Apnea Ventilation Parameters properly set.

D. Sensormedics 3100B HFOV
   1. Shall have MAP alarm set at “+” or “-” 5 cmH2O of actual MAP.

E. Respironics BIPAP Vision
   1. Shall have a properly set High Pressure limit.
   2. Shall have a properly set Low Inspiratory pressure limit.
   3. Shall have a Low minute volume alarm set at 50% of the measured minute volume. (NOTE: The BIPAP Vision does not monitor exhaled volumes and is designed to operate with a large system leak. Measured volumes are estimates and may vary as leaks vary.)

NICU

F. Servo-I
   1. Shall have a properly set upper pressure limit.
   2. Shall have a properly set upper expired minute volume alarm.
3. Shall have a properly set lower expired minute volume alarm. When possible, set at 50% of exhaled minute volume. A wider range may be required in smaller babies with large ET-Tube leaks.
4. High continuous pressure alarm is automatically set at PEEP level +15 cm H2O for more than 15 seconds.
5. Shall have Apnea Ventilation Parameters properly set.
6. Shall have a properly set Low PEEP alarm.

G. Bird VIP
1. Shall have a properly set and maintained low pressure alarm.
2. Shall have a properly set and maintained low PEEP/CPAP alarm.
3. Shall have a properly set and maintained over-pressure relief valve (set at 5 cmH2) above PIP).
4. Shall have a properly set and maintained apnea interval alarm.
5. Shall have a properly set and maintained high breath rate alarm. (Bird Partner)
6. Shall have a properly set and maintained low minute volume alarm. (Bird Partner)
7. Shall have a properly set and maintained apnea interval alarm on the Bird Partner.

H. Sensormedics 3100A HFOV
1. Shall have MAP alarm set at “+” or “-” 3 cmH2O of actual MAP.

I. Bunnell HFJV
1. Internal “Loss of PIP” alarm is 25% below set point.
2. “High PIP” alarm is 5 cmH2O above set point.
3. “Cannot meet PIP” describes: PIP cannot be reached, or held stable, or maximum Servo pressure (19.6 psi) has been reached.

PROCEDURE FOR RESPONDING TO ACTIVE ALARMS:

1. The Respiratory Care Practitioner shall immediately respond to the bedside of any patient with an active ventilator alarm.
2. Quickly identify the current alarm. (Example; high volume, low volume, high inspiratory pressure, low inspiratory pressure.)
3. Assess the patient to identify any compromise from the alarm situation, such as:
   a. Decrease in SpO2.
   b. Increase or decrease in heart rate.
   c. Increase or decrease in blood pressure.
   d. Physical signs of respiratory distress.
4. If patient compromise is identified, remove the patient from the ventilator and bag with the manual resuscitation bag.
5. Troubleshoot the ventilator and patient system to identify the source of the alarm:
   a. High Volume
      - Patient may have increased spontaneous efforts. Consider patient’s condition. If appropriate, adjust high volume alarm.
      - If ventilating in a pressure mode, compliance or resistance may have improved. Consider decreasing the pressure parameters.
   b. Low Volume
      - Assess for circuit disconnect or leak.
      - If ventilating in a pressure mode, assess for increased resistance (secretions in patient airway, water condensate in circuit, decreases lung compliance or increased airways resistance).
   c. High Inspiratory Pressure
- If ventilating in a volume mode, assess ventilator circuit for occlusions. Assess patient for secretions in airway, decreased lung compliance or increased airways resistance. Also assess for patient-ventilator asynchrony.
- If ventilating in a pressure mode, assess for patient-ventilator asynchrony.

d. Low Inspiratory Pressure
- Assess for circuit disconnect or leaks.

6. Once the alarm condition is corrected, reset the alarm and verify proper ventilator function and assess patient for return to stable status.

REFERENCES: