



Understanding Your Child's Ventilator (Breathing Machine) & Ventilator Settings

Your child requires the use of a mechanical ventilator to help him or her breathe due to problems from a lung disease, weak breathing muscles or the part of the nervous system that controls breathing. This can be overwhelming and very challenging at times. The goal of this guide is to help you, the caregiver, to understand how the ventilator is supporting your child, ideas to prevent complications and to maintain a safe environment in your home. This guide will also review things that can occasionally go wrong while your child is on the ventilator, and ways you may be able to fix these problems.

Ventilator: This is the term given to the device or machine that is assisting your child's breathing. Many people refer to the ventilator as the "breathing machine." There are many devices and machines that can provide breathing support for your child and your primary healthcare team in the hospital will select the one that is most appropriate. No matter what device is selected, they all share common settings and alarms that are reviewed below.

Types of Ventilation

1. Pressure Control Ventilation (PCV)

During pressure control ventilation, the ventilator delivers a pre-set amount of pressure with each breath. This pressure makes the lung expand and inspiration occurs. The size of each breath may be slightly different, and varies depending on the amount of pressure that is set.

2. Volume Control Ventilation

A pre-determined volume or amount of air is set on the breathing machine. This volume is delivered to your child and inflates the lungs during inspiration. The pressure used to deliver each breath may vary from breath to breath

3. Spontaneous Ventilation

- a. CPAP and Pressure support are used to assist the child who is able to breathe on his own.
- b. CPAP (Continuous Positive Airway Pressure)- is a pre-determined constant pressure applied to the airway to keep the lungs open. Your child has to breathe on his or her own like he or she normally would if off the breathing machine. The CPAP provides enough pressure to help him or her breathe a little more effectively
- c. Pressure Support- This mode also requires your child to breathe on his or her own. A high pressure and low pressure (CPAP) is set on the breathing machine to help your child breathe more effectively. The set pressure delivers a volume or an amount of air that help inflate the lungs a little more easily

Ventilator Settings

<u>Term</u>	<u>Explanation</u>
Breath Rate	The ventilator may be required to do some or all of the breathing for your child. In this instance, a respiratory rate will be set on the ventilator. The ventilator will deliver the pre-set number of breaths over 1-minute. Your child however may breath above and beyond this set rate if they are capable.
Tidal Volume	This is the amount of air that is used to inflate your child's lungs during one breath cycle.
Pressure Control	This is the amount of pressure that is used to inflate your child's lungs during one breath cycle.
Inspiratory Time (I-time)	During a normal breath, a certain amount of time is spent breathing in, and a certain amount of time breathing out. The I-time indicates how long the machine is set to "inhale" during the breath.
Pressure Support	This number will be displayed if your child is able to breathe on his/her own. This gives your child a set amount of pressure to assist when taking a breath. This may or may not be used depending on the mode of ventilation your child is receiving.
Sensitivity	This parameter is set to make it easy for your child to take a spontaneous breath. The lower the number, the easier it is for your child to take a breath on his/her own.
Positive End Expiratory Pressure (PEEP)	This is the pressure left in the airway at the end of every exhalation. It is important in keeping the breathing tubes open and preventing lung collapse.
Peak Inspiratory Pressure (PIP)	The highest amount of pressure recorded by the ventilator at the end of a mechanical breath.

Ventilator Suggestions

Ventilator Settings	Take a picture of the ventilator with settings. Keep a copy of the Respiratory Care Plan with current ventilator settings in travel bag.
Power Source	Keep A/C Adapter with you at all times. Plug ventilator in to a power source whenever you have access. Keep back up lithium battery charged and with you when you leave home. If using a power strip, make sure the power strip is plugged in and turned on.
Oxygen (if necessary)	Make sure oxygen is connected properly to the ventilator. Check portable oxygen tank to make sure it is full before leaving home. When at medical appointments, connect to oxygen source in the room whenever possible, to conserve oxygen in the portable tank.

Alarms/Troubleshooting

Alarm	Description	Cause	Action
High Pressure Limit	The high pressure limit should always be set on the ventilator. This is in place to make sure your child does not receive an excessive amount of pressure.	<ul style="list-style-type: none"> • Crying • Coughing • Mucus blocking the airway/trach • Excessive, hard breathing of your child • Bent/kinked ventilator Circuit • Water in ventilator tubing 	<ul style="list-style-type: none"> • Comfort child • Suction child • Remove child from ventilator and hand bag with Ambu bag • Change trach • Make sure the circuit is not bent/kinked or being stepped on • Remove water from circuit if necessary
Low Pressure Limit	The low pressure limit is designed to alarm when the ventilator is not supplying enough pressure to the patient to deliver the desired volumes.	<ul style="list-style-type: none"> • Trach out of stoma • Loose or disconnected circuit to the breathing machine • Small hole in the ventilator circuit • Leak around trach tube • Yawning 	<ul style="list-style-type: none"> • Replace the trach • Connect any part of the circuit that appears loose or disconnected • Reconnect the breathing circuit to the trach tube • Replace the circuit if it appears damaged • Check amount of water in cuff, add water to your child's trach tube cuff as ordered if they have a balloon (cuff)
Low Minute Volume	This alarm will occur when your child is not getting the delivered tidal volumes over one minute. This may also occur at the same time as the low pressure limit alarm or high pressure limit alarm. If it does not, it may indicate that your child needs suctioning.	<ul style="list-style-type: none"> • Trach out of stoma • Loose connections on any part of the circuit • Leak around trach tube • May occur when your child is sleeping • Mucus blocking the trach tube or airway • Coughing 	<ul style="list-style-type: none"> • Replace trach tube • Make sure the circuit is connected properly • Suction if necessary • Change trach • If your child having difficulty breathing, remove from vent and manually help breathing with Ambu bag • Change trach

When in doubt, use the Ambu for hand bagging