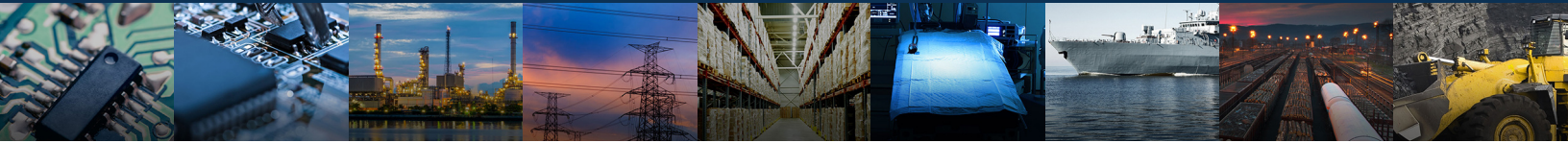




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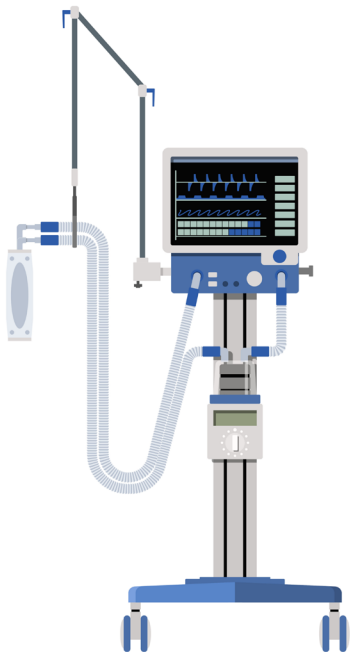


Powering: Mechanical Ventilators

How do power supplies help mechanical ventilators function?

What is a Mechanical Ventilator?

A mechanical ventilator, also known as a respirator, is a machine that supports breathing and is primarily used in hospitals. Ventilators help people breathe easier and are generally used for short periods of time, for example, during surgery when a patient is under anesthesia. Though large mechanical ventilators are found in a hospital setting, there are also smaller, more portable versions that can be used in the home and in ambulances.



Hospital Ventilator

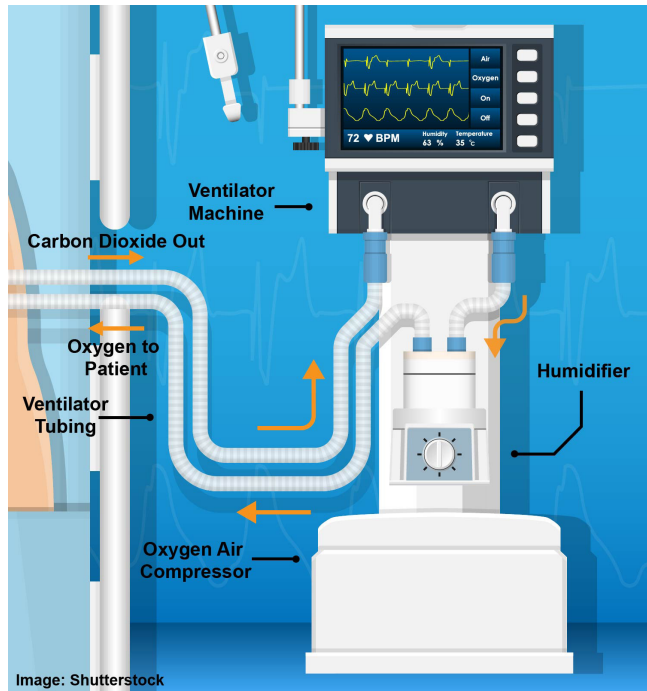


Portable Ventilator

images: shutterstock

How does a Mechanical Ventilator Work?

Simply put, ventilators remove carbon dioxide from the body and provide oxygen to aid with breathing. They use positive pressure to blow oxygen, or a mixture of gases, into the airways and lungs of a patient. They can also carry carbon dioxide out, or breathe out, for the patient. On a basic level, ventilator machines consist of breathing tubes and the ventilator itself. They can also include compressors, humidifiers, and heaters.

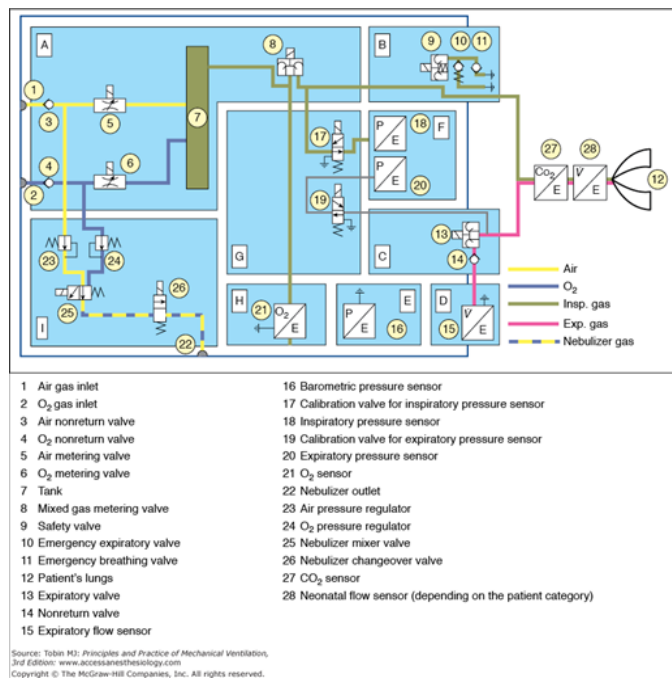


Mechanical Ventilator Components Diagram

Ventilators can be automated to “breathe” a certain number of times per minute, so that no operator intervention is needed. Three things are needed for this to happen. This includes some source of input energy to help drive the device, a way to convert that input energy into output energy in the form of pressure and flow that can regulate breaths, and lastly a way to monitor the condition of the patient as well as the performance of the device.

How to Power Supplies fit in?

Power supplies play a vital role to the functionality of mechanical ventilators. Ventilators typically get their power from electricity or from compressed gas. Electricity can be sourced from a wall outlet at 100-200VAC at 50/60Hz, or from 10-30VDC batteries. Batteries are usually used to power ventilators that are used for home care and transport. If compressed air is being used for power, it will usually be sourced from tanks or from hospital outlets.



Pneumatic Schematic of a Mechanical Ventilator

Power supplies aid in making sure that the air delivered to a patient is the proper temperature, humidity, and pressure. Gas from compressed tanks or from an outlet is usually at a much higher psi than a patient would need. Pressure of the oxygen needs to be reduced before it is delivered to a patient. It also needs to be warmed and humidified so lung tissue does not get dried out. If electricity is the power source, these processes could require the aid of compressors, humidifiers, or heaters that are run by power supplies. When compressed air is used, a flow valve can help regulate the pressure being delivered. Some of these valves contain microprocessors that can regulate the flow, pressure, and volume output of a ventilator.

[Explore Wall's Medical Power Supplies](#)

Sources:

1. "Ventilator/Ventilator Support." National Heart Lung and Blood Institute, U.S. Department of Health and Human Services, www.nhlbi.nih.gov/health-topics/ventilatorventilator-support.
2. Chatburn, Robert L., and Eduardo Mireles-Cabodevila.. "Chapter 3. Basic Principles of Ventilator Design." Principles and Practice of Mechanical Ventilation, 3e Ed. Martin J. Tobin. New York, NY: McGraw-Hill, 2013, <http://accessmedicine.mhmedical.com/content.aspx?bookid=520§ionid=41692239>.

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