

# A quick guide to ventilator modes

Ventilator modes are the different ways a ventilator can be used to ventilate a patient. Ventilators either breathe for the patient - **mandatory modes** or support the patient to breathe for themselves - **spontaneous modes**. Each ventilator manufacturer uses a different names on for similar modes, which can make it difficult to understand which mode is being used and what the ventilator is doing. However, there are some universal principles that enable you to understand what the ventilator is doing by looking at the settings on the ventilator screen. This is a simplified guide only, and is meant as a quick reference make ventilators easier to understand.



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## Mandatory modes: breathing for the patient

**Mandatory modes** are used when a patient has severe respiratory failure, and needs the ventilator to take over to provide adequate tidal volumes and to rest them from the work of breathing. It is also used for patients lacking a respiratory drive – for example, deeply sedated or brain-injured patients, or to precisely control blood gases such as in traumatic brain injury. If a patient can do some of their own breathing they will usually have a **spontaneous mode** added to the mandatory mode to support them when they take breaths on their own.

## How do you identify a mandatory mode?

A mandatory mode will always have a set rate

### Frequency or rate



If the ventilator setting page shows a set frequency, then the ventilator will deliver that number of breaths each minute. These breaths will be delivered regardless of whether the patient is also breathing spontaneously.

These are mandatory breaths, and the ventilator is in a mandatory mode if there is no frequency set the ventilator is in a spontaneous mode

Usually when using a mandatory mode patients can also take spontaneous breaths. IPPV or CMV is the exception to this – no spontaneous effort is allowed and the patient can only do what is set by the ventilator. For this reason it is rarely used, as there is no real benefit to not allowing spontaneous breaths. **Start at 12-16, titrate to ABGs / response**

## How does it work?

The ventilator will deliver breaths to a patient either by pushing in each breath at a set pressure **pressure controlled ventilation** or by delivering a breath of a set size **volume controlled ventilation**

### Pressure controlled modes



If the ventilator settings screen shows an inspiratory pressure (P<sub>insp</sub>) then the ventilator will deliver gas at that pressure to the patient every time it delivers a mandatory breath.

This will be **pressure controlled ventilation**. Examples included PCV and BiPAP

The higher the number, the greater the pressure, and bigger the resulting breath. Tidal volume size should be monitored when using pressure controlled modes.

**Start at 15, titrate to tidal volumes of 5-7 mL /kg**

### Volume controlled modes



If the ventilator settings screen shows a set tidal volume (in mL) then the ventilator will deliver that volume of gas to the patient every time it delivers a mandatory breath.

This is known as **volume controlled ventilation**. Examples include VCV, SIMV and ACV

The bigger the volume the breath the greater the pressure required to deliver it. Peak airway pressures should be monitored when using volume controlled modes.

**Start at 5-7ML kg, aim peak airway pressures <30**

### Time cycling and i:e ratio



A breathing cycle consists of inspiration and expiration. During inspiration the ventilator pushes the breath into the patient. During expiration it does nothing; it just allows the patient to passively exhale. The proportion of time the ventilator spends in inspiration to expiration is the **i:e ratio**. In normal breathing this is 1:2 or 1:3

If the ventilator is set to a mandatory mode the breaths will be given at evenly spaced intervals throughout each minute, for example, if the rate is set to 12, each breath cycle will take 5 seconds. This is **time cycling**.

If the inspiratory time is increased there will be less time in the cycle available to breathe out. If insufficient time is allowed for breathing out the patient will "fight" the ventilator unless deeply sedated. Longer expiratory time allows more time for the patient to breathe out, or to take their own breaths if they are doing some of their own breathing.

<b>1:1</b>	inspiration : expiration	used to increase intrinsic PEEP in ARDS (consultant led)
<b>1:2 – 1:3</b>	inspiration : expiration	normal breathing at rates >12
<b>1:4</b>	inspiration : expiration	breathing at lower rates, particularly when weaning

# Ltv Ventilator Quick Guide For Caregivers

**Dean R. Hess, Neil R. MacIntyre, Shelley  
C. Mishoe, William F. Galvin**



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## **Table of Contents Ltv Ventilator Quick Guide For Caregivers**

1. Understanding the eBook Ltv Ventilator Quick Guide For Caregivers
  - The Rise of Digital Reading Ltv Ventilator Quick Guide For Caregivers
  - Advantages of eBooks Over Traditional Books
2. Identifying Ltv Ventilator Quick Guide For Caregivers
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Ltv Ventilator Quick Guide For Caregivers
  - User-Friendly Interface
4. Exploring eBook Recommendations from Ltv Ventilator Quick Guide For Caregivers
  - Personalized Recommendations

- Ltv Ventilator Quick Guide For Caregivers User Reviews and Ratings
- Ltv Ventilator Quick Guide For Caregivers and Bestseller Lists
- 5. Accessing Ltv Ventilator Quick Guide For Caregivers Free and Paid eBooks
  - Ltv Ventilator Quick Guide For Caregivers Public Domain eBooks
  - Ltv Ventilator Quick Guide For Caregivers eBook Subscription Services
  - Ltv Ventilator Quick Guide For Caregivers Budget-Friendly Options
- 6. Navigating Ltv Ventilator Quick Guide For Caregivers eBook Formats
  - ePub, PDF, MOBI, and More
  - Ltv Ventilator Quick Guide For Caregivers Compatibility with Devices
  - Ltv Ventilator Quick Guide For Caregivers Enhanced eBook Features
- 7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Ltv Ventilator Quick Guide For Caregivers
  - Highlighting and Note-Taking Ltv Ventilator Quick Guide For Caregivers
  - Interactive Elements Ltv Ventilator Quick Guide For Caregivers
- 8. Staying Engaged with Ltv Ventilator Quick Guide For Caregivers
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Ltv Ventilator Quick Guide For Caregivers
- 9. Balancing eBooks and Physical Books Ltv Ventilator Quick Guide For Caregivers
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Ltv Ventilator Quick Guide For Caregivers
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine Ltv Ventilator Quick Guide For Caregivers
  - Setting Reading Goals Ltv Ventilator Quick Guide For Caregivers
  - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Ltv Ventilator Quick Guide For Caregivers
  - Fact-Checking eBook Content of Ltv Ventilator Quick Guide For Caregivers

- Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
- 14. Embracing eBook Trends
  - Integration of Multimedia Elements
  - Interactive and Gamified eBooks

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