

# **Automatic Transport Ventilators**

**“ICU Quality Ventilation  
on the Street”.**

# Ventilator Definition

**A ventilator is an automatic mechanical device designed to provide all or part of the work the body must produce to move gas into and out of the lungs.**



**Since the early 70's transport ventilators and automatic resuscitators have been a part of the pre-hospital environment arsenal**



**As ventilation techniques and patient treatments improved, so did the quality and capabilities of the available ventilators on the market**



**To facilitate simplicity in emergency situations small, hand held ventilators were developed to replace the manual resuscitator or BVM.**



**However, ventilation techniques and modes continued to improve, requiring more and more sophisticated ventilators to meet the ever-changing perspective of pulmonary physiology**



**Today's ATVs are sophisticated,  
can sometimes be complex to  
set up, yet provide ventilation  
quality that to a great extent  
mimic ICU ventilator  
performance**



# Requirements of Automatic Ventilators

Automatic ventilators require:

- 1) A stable attachment (interface) of the device to the patient,
- 2) A source of energy to drive the device,
- 3) A control system to make it perform appropriately, and
- 4) A means of monitoring the performance of the device and the condition of the patient.



# 1) Patient Interface.

## Positive Pressure Ventilators:

The ventilator delivers gas to the patient through a set of flexible tubes called a patient circuit. Depending on the design of the ventilator, this circuit can have one, two or more tubes. The circuit connects the ventilator to either an endotracheal or tracheostomy tube that extends into the patient's throat - **Invasive ventilation**

or a mask covering the mouth and nose or just the nose - **Noninvasive ventilation.**

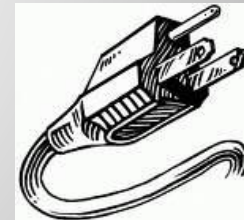
Each of these connections to the patient may have a balloon cuff associated with it to provide a seal - either inside the trachea for the tracheal tubes or around the mouth and nose for the masks.

## 2) Power Sources.

### Positive Pressure Ventilators

*There are two alternate power sources for positive pressure ventilators:*

- Electricity – This is used to run compressors of various types or



- Compressed gas - From either cylinders or built-in gas supply systems



### 3) Control System.

This assures that the breathing pattern produced by the ventilator is the one intended by the patient's caregiver.

It requires the setting of control parameters:

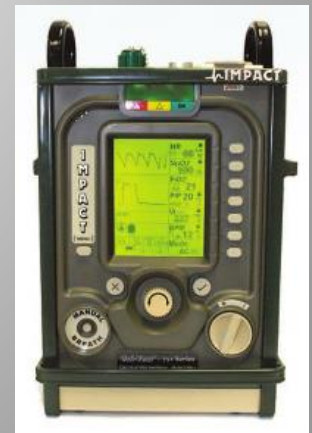
- the size of the breath,
- respiratory rate,
- inspiratory to expiratory ratio,
- gas flow rate,
- peak airway pressure
- inspiratory effort to trigger the ventilator



# Breath Types:

If the patient can control the timing and size of the breath, it is called a **spontaneous** breath.

If the ventilator has total control over the breathing pattern it is called a **mandatory** breath.



A particular pattern of spontaneous and mandatory breaths is referred to as a **mode** of ventilation.

Numerous modes, with a variety of names, have been developed to make ventilators produce breathing patterns that coordinate the machine's activity with the needs of the patient;



# Ventilator modes:

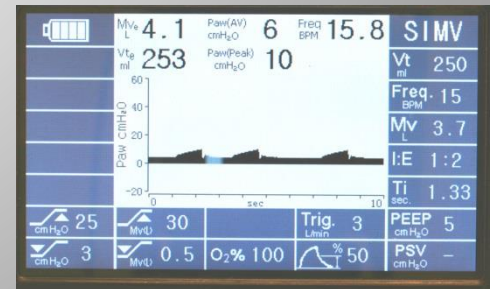
**ACV, SIMV, PCV, CMV, PSV,  
IPPV, BiLVL, BiPAP, CPAP ...**

**Many of these modes have both  
volume and pressure cycling  
capabilities**



## 4) Monitors

All modern ventilators have at least a pressure monitor measuring airway pressure. Many modern ventilators have sophisticated pressure, volume and flow sensors that produce signals both to control the ventilator's output (via feedback in the ventilator's control system) and to provide displays (with alarms).





# The “e” Ventilator Range

A new range of electro-pneumatic ventilators offering significant advantages over currently available products of this type.

- Half the weight of competitive devices
- Smaller footprint
- Up to 5 X longer battery operating time than other equivalent products
- Additional ventilation modes not found on other ventilators
- “Zero” drive gas consumption





**o\_two**<sup>TM</sup> controlled  
ventilation

**e500**



## **The e500 ventilators are:**

- Simple and quick to set up
- Provide 12, physiologically normal, tidal volumes/ventilation rate settings.
- Have a ventilation range for children over 15 Kg to large adults.
- Specifically designed for the demands of emergency resuscitation, rescue, and critical patient transport.

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ventilation

**e600**



## The e600 ventilators:

- Employ the same ease of use concept and simplicity of controls as our other models.
- Provide a range of volume ventilation modes.
- Have a ventilation range from infants to large adults.
- Give the healthcare multiple ventilation options to meet the patient's needs.



## **The e700 ventilators:**

- Provide all the features of the e600 with the addition of pressure ventilation modes.
- Provide the ventilation modes necessary to maintain continuity of care during patient transport.
- Truly emulate the ventilation options offered by standard intensive care ventilators.



# o\_two™ controlled ventilation

## Specifications

### e500

### e600

### e700

|   |  |  |  |
|---|--|--|--|
| Power Source                              | Compressed Oxygen  | Compressed Oxygen  | Compressed Oxygen  |
| Circuit Control Source                    | Electric   | Electric   | Electric   |
| Ventilation modes                         | SIMV, CPAP,<br>Mask CPR (MCPR) and<br>Intubated CPR (ICPR)<br>Quick Start Mode | SIMV, A/C (VCV), CPAP,<br>Mask CPR (MCPR) and<br>Intubated CPR (ICPR)<br>Adult/Child/Infant Quick Start Mode | SIMV w/PSV, A/C (VCV, PCV),<br>BILVLI w/PSV, CPAP w/PSV,<br>Mask CPR (MCPR) and<br>Intubated CPR (ICPR)<br>Adult/Child/Infant Quick Start Mode |
| Patient Size Range                        | 15 Kg - Large Adult  | 7 kg to large adult  | 7 Kg to large Adult  |
| Ventilation Frequency                     | N/A  | 5 - 40   | 5 - 40   |
| Minute Volume (L)                         | N/A  | Calculated   | Calculated   |
| Tidal Volume (ml)                         | N/A  | 50 - 2000  | 50 - 2000  |
| Quick Start Mode Default VT/BPM           | 500/10   | Adult 500/10 Child 250/15 Infant 100/20  | Adult 500/10 Child 250/15 Infant 100/20  |
| Pre-set VT/BPM range                      | 100/20 to 650/10 (12 settings)   | N/A  | N/A  |
| Manually triggered Ventilation            | Yes  | Yes  | Yes  |
| I:E Ratio                                 | 1:2  | 1:4 to 2:1   | 1:4 to 2:1   |
| PEEP (cm H <sub>2</sub> O)                | 0 - 20   | 0 - 20   | 0 - 20   |
| CPAP (cm H <sub>2</sub> O)                | 0 - 20   | 0 - 20   | 0 - 20   |
| O <sub>2</sub> (%)                        | 60 or 100  | 60 or 100  | 60 or 100  |
| Pmax (cm H <sub>2</sub> O)                | 10 - 80  | 10 - 80  | 10 - 80  |
| Pmin (cm H <sub>2</sub> O)                | 0 - 20   | 0 - 20   | 0 - 20   |
| PSV or PCV (cm H <sub>2</sub> O)          | N/A  | N/A  | 4-40   |
| TI (sec.)                                 | N/A  | 0.3 - 8  | 0.3 - 8  |
| Trigger sensitivity (L/min)               | 3  | 3 - 15   | 3 - 15   |
| Inhalation Pressure (cm H <sub>2</sub> O) | N/A  | N/A  | 4-50   |
| Pressure Support Termination              | N/A  | N/A  | 20% - 80% of max. flow   |
| Apnea back up time (sec.)                 | 15 - 60  | 10-60  | 10-60  |
| Battery Operating time                    | 18 hours for default settings  | 18 hours for default settings  | 18 hours for default settings  |
| Built-in Battery charger                  | Yes  | Yes  | Yes  |
| A/C power adapter                         | 100-240VAC/ 19VDC, 3.5A  | 100-240VAC/ 19VDC, 3.5A  | 100-240VAC/ 19VDC, 3.5A  |
| Patient circuit                           | O-Two electronic ventilator circuit  | O-Two electronic ventilator circuit  | O-Two electronic ventilator circuit  |
| Mounting Bracket compatibility            | Multi-configuration bracket  | Multi-configuration bracket  | Multi-configuration bracket  |
| Display                                   | 4.3" Color TFT Screen  | 4.3" Color TFT Screen  | 4.3" Color TFT Screen  |
| Live monitoring                           | Vm, vt, Paw(AV), PAW(Peak), F,<br>BPM, Battery level                           | Vm, vt, Paw(AV), PAW(Peak), F,<br>BPM, Battery level   | Vm, vt, Paw(AV), PAW(Peak), F,<br>BPM, Battery level   |
| Real time waveform                        | Pressure / Flow  | Pressure / Flow  | Pressure / Flow  |
| DAY/NIGHT display mode                    | Yes  | Yes  | Yes  |
| Parameter settings                        | Multi Function Rotary Control  | Multi Function Rotary Control  | Multi Function Rotary Control  |
| Lock key function                         | Yes  | Yes  | Yes  |
| Pause function                            | Yes  | Yes  | Yes  |
| Alarms (Visual and Audible):              |  |  |  |
| Gas Supply Pressure, Pmax,                | Yes  | Yes  | Yes  |
| Pmin, Low Battery, BCI, Apnea             | Yes  | Yes  | Yes  |
| Audible silence                           | Yes, 120 second max  | Yes, 120 second max  | Yes, 120 second max  |
| Dimensions (mm)                           | 255 x 200 x 155  | 255 x 200 x 155  | 255 x 200 x 155  |
| Weight (approx) Kg:                       |  |  |  |
| with Battery (without Battery)            | 2.25 (1.60)  | 2.25 (1.60)  | 2.25 (1.60)  |

**o\_two**<sup>™</sup> controlled  
ventilation

A photograph of three medical professionals in white scrubs attending to a patient in a hospital bed. The scene is brightly lit, likely in an ICU or operating room. The text is overlaid on this image.

**O-TWO MEDICAL  
TECHNOLOGIES INC.**

**“Controlled Ventilation”**