

We simplify major findings into brief, straightforward summaries to keep you in the loop.

## Insights into Enhancing EMS Practices with the O-Two e700 Ventilator

### Introduction

In emergency medical services (EMS), ensuring precise and efficient ventilation is essential for managing patients with respiratory distress, trauma, or acute medical conditions requiring ventilation support during transport. The O-Two e700 ventilator is designed to address the challenges of prehospital ventilation, combining portability, user-friendly operation, and advanced ventilation support to optimize airway management in EMS settings..

#### 1

### Portability and Durability



Weighing approximately 2.4 kg (5.3 lbs), including the battery, the e700 is lightweight and portable, making it ideal for the EMS dynamic environments. Despite its compact design, this ventilator is built for durability, ensuring consistent performance even under challenging transport conditions such as vibrations, temperature fluctuations, and rough handling. This makes it well-suited for the demands of EMS operations.

## Insights into Enhancing EMS Practices with the O-Two e700 Ventilator

2

### User-Friendly Interface



In emergencies where critically ill patients require ventilation support, setting up the ventilator quickly is crucial for effective patient management and improved outcomes. The e700 ventilator is designed to make this process easy and fast. The Quick Start function allows the ventilator to become fully operational in just five seconds once the appropriate patient size—infant, child, or adult—is selected. This rapid activation ensures that ventilation starts immediately when every second matters.

The ventilator features a single-screen interface that displays real-time ventilation parameters and waveforms, allowing EMS teams to quickly assess the patient's respiratory status without the need to navigate through multiple screens. This simplified design reduces setup time and enhances decision-making. Additionally, the adjustable screen brightness provides clear visibility in different environments, whether in bright emergency rooms or dimly lit transport settings.

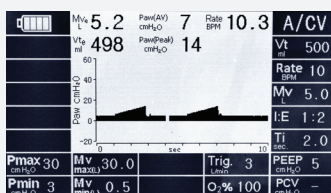
## Insights into Enhancing EMS Practices with the O-Two e700 Ventilator

### 3

## Versatile Ventilation Modes

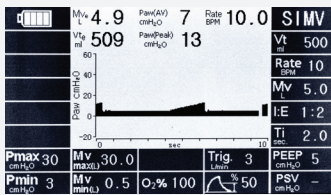
The e700 ventilator provides a range of invasive and non-invasive ventilation modes, offering preset respiratory support based on patient condition and clinical requirements.

### 3.1 Assist-Control Ventilation (A/CV)



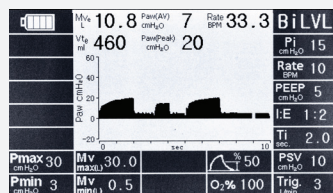
In this mode, the ventilator delivers mandatory breaths in either volume-controlled (VCV) or pressure-controlled (PCV) modes. In VCV, each breath delivers a preset tidal volume, maintaining alveolar ventilation despite fluctuations in lung compliance and airway resistance. In PCV, the ventilator applies a fixed inspiratory pressure, allowing tidal volume to vary in response to lung mechanics. Both modes support patient-triggered breaths, ensuring that spontaneous inspiratory efforts receive full ventilatory support.

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## 3.2 Synchronized Intermittent Mandatory Ventilation (SIMV)

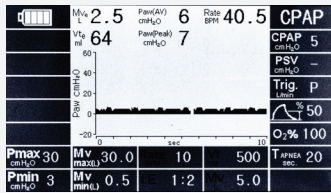
In this mode, the ventilator delivers mandatory breaths at a preset rate while allowing spontaneous breathing between ventilator-delivered breaths. The ventilator synchronizes mandatory breaths with patient effort to minimize breath-stacking and ventilator-patient asynchrony. If the patient does not initiate a breath within the trigger window, the ventilator provides a mandatory breath at the set parameters. Pressure Support Ventilation (PSV) can be applied to spontaneous breaths, offering additional inspiratory pressure to reduce respiratory effort and improve ventilation efficiency.



## 3.3 BiLevel Pressure Ventilation (BiLVL)

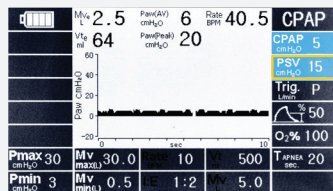
BiLVL, also known as Biphasic Positive Airway Pressure, is a pressure-controlled ventilation mode that allows for both mandatory and spontaneous breathing. It operates similarly to Synchronized Intermittent Mandatory Ventilation (SIMV) but delivers two different pressure levels—higher inspiratory pressure (Pi) and lower expiratory pressure (PEEP). In this mode, the ventilator provides pressure-controlled mandatory breaths at a preset respiratory rate (bpm). Spontaneous breathing is permitted between mandatory breaths, with the ventilator adjusting the timing of the spontaneous breathing window based on whether the patient triggers a breath before the start of the scheduled inspiratory phase (Ti). If no inspiratory effort is detected during the trigger period, the ventilator automatically initiates a mandatory breath at the end of the trigger window.

# Insights into Enhancing EMS Practices with the O-Two e700 Ventilator



## 3.4 Continuous Positive Airway Pressure (CPAP)

It maintains a constant positive airway pressure throughout the respiratory cycle, helping to maintain alveolar stability, support oxygenation, and improve functional residual capacity (FRC). CPAP is used in patients with spontaneous respiratory effort who require airway stabilization and oxygenation support without full mechanical ventilation. When combined with PSV, CPAP can provide additional inspiratory support (BiPAP), reducing the work of breathing and enhancing tidal volume during spontaneous efforts.



## 3.5 Expanding Non-Invasive Ventilation in EMS with BPAP

The e700 ventilator delivers BPAP therapy by combining CPAP (Continuous Positive Airway Pressure) and Pressure Support Ventilation (PSV), providing support during both inhalation and exhalation. This mode is particularly beneficial for patients who can initiate their breaths but require additional support during both phases to ensure adequate ventilation.

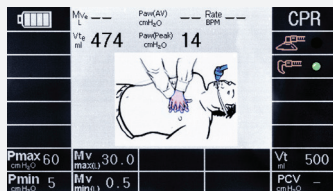
In BPAP mode, Expiratory Positive Airway Pressure (EPAP) helps maintain airway patency during exhalation, while Inspiratory Positive Airway Pressure (IPAP) assists with inhalation. To configure BPAP on the e700, the user first sets the CPAP (EPAP) level to manage exhalation pressure. Then, PSV is adjusted to determine the level of inspiratory support (IPAP).

# Insights into Enhancing EMS Practices with the O-Two e700 Ventilator



## 4

### Enhancing the quality of CPR



The e700 ventilator features a CPR ventilation mode with pre-set parameters aligned with American Heart Association (AHA) guidelines to support ventilation during cardiopulmonary resuscitation (CPR). This mode provides automated breath delivery and synchronized prompts, ensuring consistent ventilation for both mask ventilation and intubated patients without interrupting chest compressions.

By automating breath timing, and tidal volume, the CPR mode allows EMS providers to focus on delivering high-quality chest compressions and overall patient management. In CPR mode, the ventilator follows AHA-recommended compression-to-ventilation ratios. For patients receiving mask ventilation without an advanced airway, the device maintains a 30:2 ratio, providing two breaths following every 30 chest compressions. For intubated patients, the ventilator delivers ventilations at a rate of 10 breaths per minute (one breath every six seconds), allowing for continuous chest compressions without disruption, in line with best practices for managing an advanced airway.

## Insights into Enhancing EMS Practices with the O-Two e700 Ventilator

### 5 Flexible Oxygen Management:

# O<sub>2</sub>

In emergency medical services (EMS) transport, effective oxygen management is essential for patient care. The e700 ventilator offers the capability to deliver either 100% fractional inspired oxygen (FiO<sub>2</sub>) or 60% FiO<sub>2</sub>, providing flexibility based on the patient's needs during transport.

In critical situations, such as cardiac arrest or severe hypoxemia, initiating ventilation with 100% FiO<sub>2</sub> can rapidly restore oxygen levels and support organ function. This approach aligns with guidelines, such as those from the American Heart Association (AHA), which recommend 100% oxygen during cardiopulmonary resuscitation (CPR) to ensure adequate oxygen delivery when cardiac output is compromised.

Once the patient stabilizes or when less intensive support is required, transitioning to 60% FiO<sub>2</sub> helps maintain oxygenation while minimizing the risks associated with higher oxygen levels. The duration of EMS transports is typically short, lasting only minutes, or a few hours in remote areas. This makes 60% FiO<sub>2</sub> an effective and safe option, as it provides adequate oxygenation while avoiding the risks associated with prolonged exposure to high oxygen concentrations typically seen in intensive care unit (ICU) settings.

6

## Operational Efficiency



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The e700 ventilator is designed for extended use. Its long-lasting battery provides 18-24 hours of continuous operation, making it ideal for prolonged transports or environments with limited power availability. The battery can be charged while installed in the ventilator or removed for external charging, ensuring minimal downtime during continuous use.

Furthermore, the ventilator is self-contained and ready for immediate operation upon connection to a regulated oxygen supply (45 to 87 PSI) and a patient circuit.

Its low gas consumption optimizes oxygen usage, making it a practical choice for EMS teams working in resource-constrained environments where oxygen conservation is crucial.

For example, with an M-size oxygen cylinder (capacity of 3,540 litres), and the e700 set to the adult default setting (tidal volume = 500 ml, rate = 10 breaths per minute, 100% oxygen), the ventilator delivers a minute volume of 5 litres per minute ( $Mv=Vt \times RR$ ). This results in an operating time of approximately 708 minutes (or about 11.8 hours).



## Conclusion

For Emergency Medical Services (EMS) providers, the O-Two e700 ventilator enhances operational efficiency by delivering consistent and reliable respiratory support without unnecessary complexity. Its user-friendly design reduces the time required for device setup and adjustments, allowing EMS teams to focus on providing high-quality patient care during emergencies and transport.