

**BREAS**

# Vivo 45LS Product Overview

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# Vivo 45LS - Value Summary

The Vivo 45LS life support ventilator maximizes patient mobility and breathing comfort.

## PATIENT COMFORT

- Whisper Quiet operation (<30 dBA)
- eSync's patented inspiratory trigger minimizes uncomfortable auto-triggers caused by leaks and may promote increased compliance
- Vivo Auto-EPAP operates without oscillations, maneuvers, test breaths or test pulses.

## IMPROVED CLINICAL WORKFLOW

- Built-in Humidifier for NIV with heated wire circuit saves space and expense
- VAPS + AE Mode



## MOBILITY

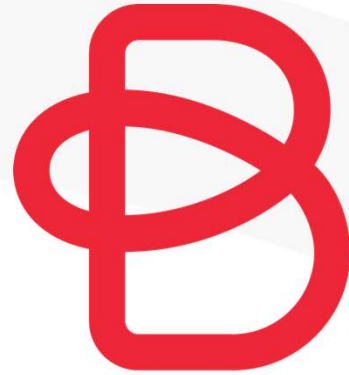
- Ultra-small and Lightweight
- Up to 24 hour + Battery Life

## PATIENT DATA PROMOTES INFORMED CLINICAL DECISIONS

- Remote connectivity to EveryWare
- Early interventions from monitoring of SpO2, FiO2, etCO2 and PtcCO2
- AHI Calculation

## GETTING PATIENTS HOME

- High Flow Nasal Therapy (HFNT)\*
- 3 easy-to-use profiles adapt to patient activities



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Vivo 45LS - Up Close



# Up Close – Key Features

- **Life support** device for patients > 5 kg
- Highly **compact** and **lightweight**
- **Comprehensive** modes of ventilation
  - Including **HFNT**<sup>◊</sup>
- Patented **“eSync”** trigger technology
- **Integrated** Humidifier<sup>◊</sup>
- **“Target Volume”** and **“Auto-EPAP”**<sup>◊</sup> algorithms
- **Passive, active** and **heated wire** circuits<sup>◊</sup>
- **Internal** battery with **“click-in”** battery
  - Extended battery life with **18-hour** Xpac
- Advanced **monitoring** capabilities
  - EtCO<sub>2</sub>, PtcCO<sub>2</sub>, SpO<sub>2</sub>, and FiO<sub>2</sub>
- **Compliance** Data with **AHI**<sup>◊</sup>
- **30 L/min**<sup>◊</sup> O<sub>2</sub> bleed-in





# Up Close

**Smart foldable carry handle**

**Remote connectivity**

Easy data access via cloud service applications for professionals, patients and caregivers.



**Large color screen**

Intuitive color interface for easy interaction.

**Small and light weight**

The compact design of the Vivo 45LS creates a very small footprint.



## Up Close

- On the go power with **2-hour** internal battery and a revolutionary designed internal “hot swappable” **5.5-hour** click-in battery offers **freedom** by combining long run-time and **compact design**





# Up Close

## Xpac by Breas: Powerful Patient Independence



### Low cost of ownership

- **Removable** batteries allow end of life replacement



### Intelligent LED Display

- Check charge and battery health **status**



### Patient Mobility

- Boost Vivo 45LS ventilator battery life to **> 25hrs**
- Charge in **< 4hrs**
- **Aircraft** certified
- Optional carry bag



# Up Close

## Adjustable air outlet

A swivel allows for adjustment of the air outlet

## Heated Wire Connection

Easy connection of heated wire circuit<sup>◇</sup> powered and controlled from the device

## Exhalation valve port

## Easy use with oxygen

Low pressure oxygen inlet.  $\text{FiO}_2$  inserted underneath the device. (30 L/min)<sup>◇</sup>

## 2-hour internal battery



CO<sub>2</sub> monitoring

SpO<sub>2</sub> monitoring

Remote start/stop

Nurse call / Remote alarm

USB  
Ethernet





# Up Close



**Heated wire single-limb circuit** ◊  
Passive smooth bore circuit helps provide comfortable non-invasive ventilation.

**Humidifier Water Chamber** ◊



# Up Close

## Vivo 45LS

Weight with click in battery for 7.5 hrs. operation: 6.8 lbs.

Size D W H:  
5.9" x 8.5" x 6.25"

Volume: 313 in<sup>3</sup>



## Trilogy EVO\*

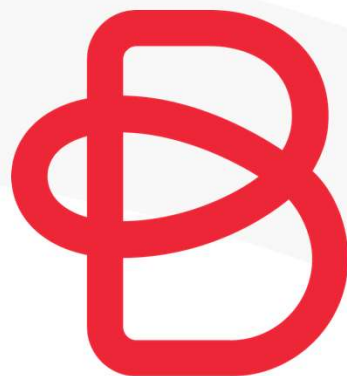
Weight with internal battery for 7.5 hrs. operation: 12.7 lbs.

Size D W H:  
6.8" x 11.25" x 9.65"

Volume: 738 in<sup>3</sup>

\* Philips EVO Data Sheet  
RRDPGH RB 10/1/19 PN 1139914

*Vivo 45LS is half the weight and size of the Trilogy EVO*



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# Humidifier / Heated Circuit



# Heated Circuit<sup>◇</sup> and Humidifier<sup>◇</sup>

## Why Humidification and Heated Circuit?



### Humidifier:

- **Prevents** dryness of airways
- **Reduces** secretions in the airways
- **Comfort** – increases the compliance



### Heated Circuit:

- **Prevents rainout** – preserves the humidified air all the way to the patient
- **Comfort** – keeps the air warm all the way up to the patient



# Heated Circuit<sup>◇</sup> and Humidifier<sup>◇</sup>

## Why Humidification and Heated Circuit?

### Heated Circuit:

- Distributes air from ventilator to a patient interface
- Includes a heated wire to remove condensed water 1.8m,
- 15mm heated wire circuit
- 26° to 30°C with 27°C default
- Will not run on battery
- Not for use with MPV or HFNT





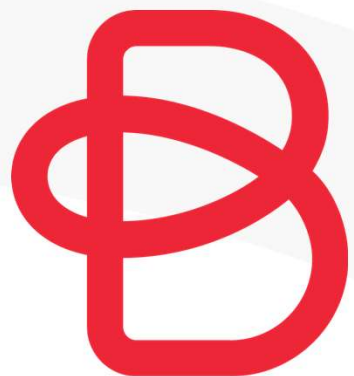
# Heated Circuit<sup>◇</sup> and Humidifier<sup>◇</sup>

## Why Humidification and Heated Circuit?



### Humidifier:

- Non-Invasive Use Only
- Delivers at least 12 mgH<sub>2</sub>O/liter with flow rate set to 50 L/min flow or > 10 mgH<sub>2</sub>O/liter flow
- Will not run on battery and will be OFF in standby
- Automatically detected upon insertion
- Holds 350 mL of water (No AUTOFEED SUPPORT)
- Designed to prevent water from going into the patient circuit from up to a 45-degree tilt
- Does not support HFNT.
- Mains power loss < 2 min will restart automatically. If > 2 min loss, must be restarted manually
- Useful life: 1 year with washing every 2.5 weeks with mild dish soap
- Conforms to ISO 80601-2-4:2021



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Breas Auto-EPAP<sup>◇</sup>

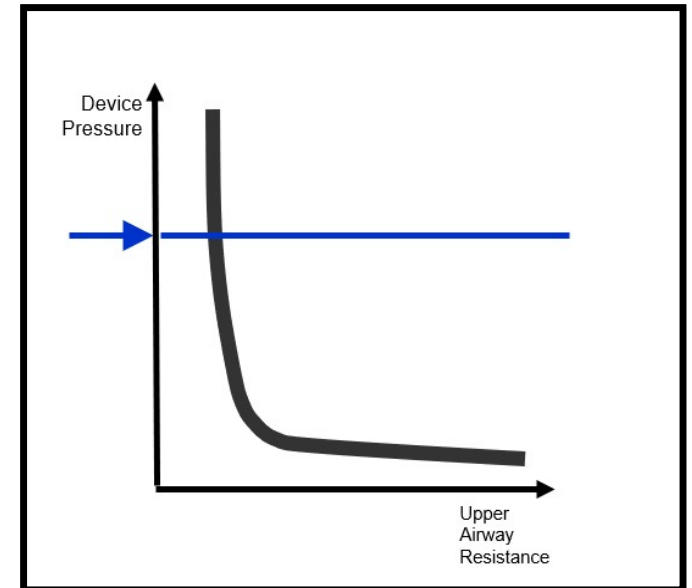


# Breas Auto-EPAP<sup>®</sup>

**Important to know!**

The upper airway resistance

- Is **unknown** for the patient receiving therapy
- **Changes** many times during night. (e.g., with sleep stage or position)
- The algorithm **should not** assume that there are consistent respiratory mechanics from night to night and within a single night
- Therefore, the algorithm needs to **adapt** the EPAP pressure **continuously** throughout the night to meet the demand of the upper airway







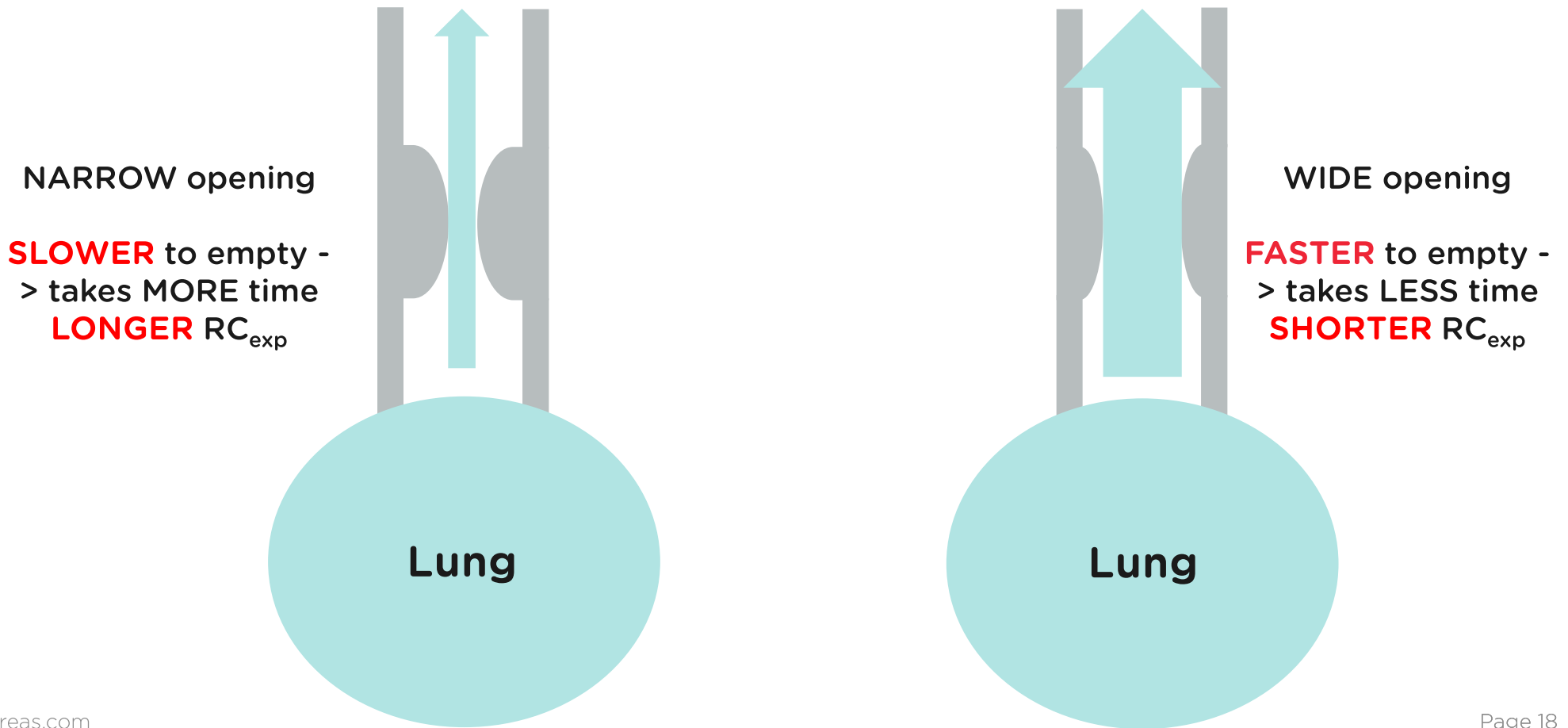
# Breas Auto-EPAP<sup>◇</sup> – General Description

## How will the algorithm check outcomes?

- We create a **simple scoring system** for each EPAP trial to determine which is the **preferred EPAP** at that time.
  - This **eliminates** the need for complex rules to determine what is normal/abnormal
  - This **eliminates** the risk of mistakes by mis-classification
- Breas Auto-EPAP<sup>◇</sup> **detects changes** in **resistance** and **airway patency** by evaluating the Expiratory Time Constant ( $RC_{exp}$ )



# Breas Auto-EPAP<sup>◇</sup> - General Description





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So, the  $RC_{exp}$  can be used as a surrogate to determine how open or narrow the Upper Airway is at a particular time under a particular Pressure



# Breas Auto-EPAP<sup>◇</sup> – General Description

## Important to know!

- We don't look for an absolute accurate number, but use a **winner / loser** strategy

The algorithm asks the question...



Is the “emptying time” **faster, slower** or the **same** compared to the previous measurement?





# Breas Auto-EPAP<sup>◇</sup>

## What:

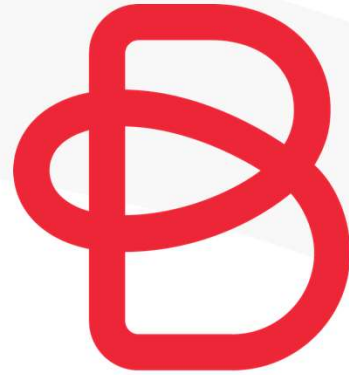
- It is an algorithm that is designed to avoid airway collapse
- Breas Auto-EPAP<sup>◇</sup> looks for the best EPAP continuously whereas other systems are reactive and wait until after the event to increase EPAP

## How:

- By looking at upper airway resistance through the calculation of  $RC_{exp}$
- By using the lowest EPAP that creates optimal  $RC_{exp}$

## Advantages:

- Can be used **with** or **without** Target Volume
- Has **no need for maneuvers or FOT** that can disturb the patient
- Designed to **prevent** and to **react**



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# High Flow Nasal Therapy



# What is HFNT<sup>◇</sup>? - Set up



Modified from: Nishimura Journal of Intensive Care (2015) 3:15



# HFNT<sup>◇</sup> – Vivo 45LS specs

Integrated Humidifier	No
Flow Range	4 - 60 L/min
Max O2 Input	30L/min
FiO2 Measurement	Yes
SPO2 Measurement	Yes
Alarms	Blocked and Disconnected Circuit, SpO2, FiO2





# FiO<sub>2</sub>

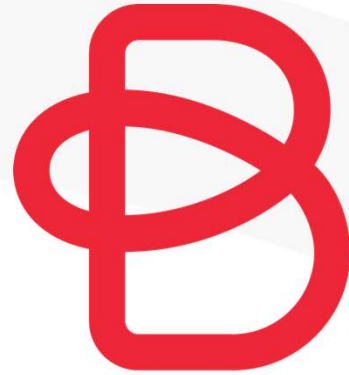
$$FiO_2 = \frac{([Total\ Flow - O_2\ flow] * 0.21) + O_2\ flow}{Total\ Flow}$$

HF	O <sub>2</sub> Flow L/min													
	1	2	3	4	5	6	7	8	9	10	15	20	25	30
<b>20</b>	25%	29%	33%	37%	41%	45%	49%	53%	57%	61%	80%	100%		
<b>25</b>	24%	27%	30%	34%	37%	40%	43%	46%	49%	53%	68%	84%	100%	
<b>30</b>	24%	26%	29%	32%	34%	37%	39%	42%	45%	47%	61%	74%	87%	100%
<b>35</b>	23%	26%	28%	30%	32%	35%	37%	39%	41%	44%	55%	66%	77%	89%
<b>40</b>	23%	25%	27%	29%	31%	33%	35%	37%	39%	41%	51%	61%	70%	80%
<b>45</b>	23%	25%	26%	28%	30%	32%	33%	35%	37%	39%	47%	56%	65%	74%
<b>50</b>	23%	24%	26%	27%	29%	30%	32%	34%	35%	37%	45%	53%	61%	68%
<b>55</b>	22%	24%	25%	27%	28%	30%	31%	32%	34%	35%	43%	50%	57%	64%
<b>60</b>	22%	24%	25%	26%	28%	29%	30%	32%	33%	34%	41%	47%	54%	61%



# Summary

- HFNT<sup>◇</sup> is a **fast-growing** application within respiratory care
- Applications are **wide**
  - Hospital, SNF, sub-acute and home care
- **Vivo 45LS** allows the user to choose between invasive / non-invasive ventilation, MPV and HFNT<sup>◇</sup> **without** the need of a different device
  - Cost efficient
  - Allows for intermittent usage of HFNT<sup>◇</sup> during breaks of NIV (eating, etc.)
  - Ease of Use



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# Target Volume



# Target Volume

- **What is Target Volume?**
  - Target Volume is a **feature** that **automatically** adjusts the delivered peak inspiratory pressure to **ensure** a **consistent** tidal volume delivery to the patient.
  - Target Volume can be **added** to PSV, PCV(A)

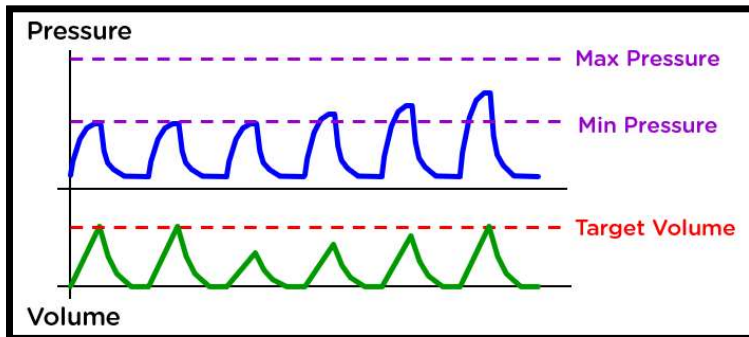




# Target Volume

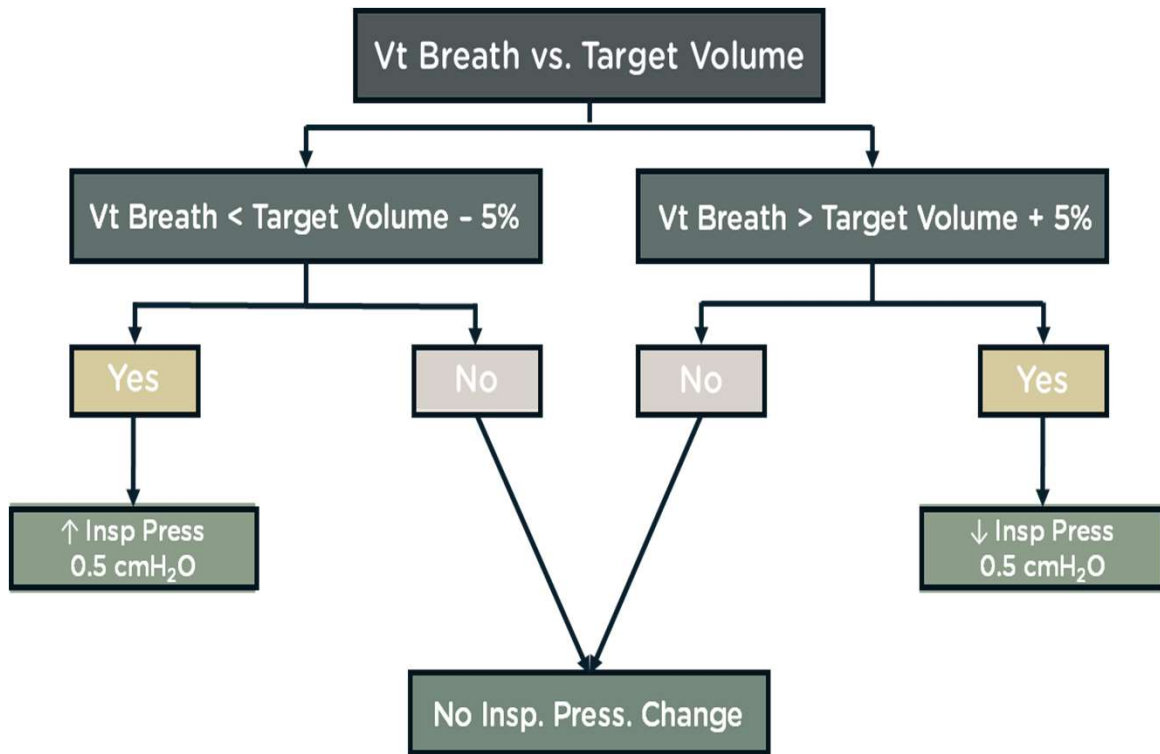
## • What is the Target Volume Principle?

- The delivered volume is calculated and compared to the set target volume on a **breath-by-breath** basis
- The delivered Insp. Pressure for the next breath will be increased depending on the difference between the calculated volume and the set target volume.  
**Automatic pressure adjustments** will be made in between two settable limits (Max Pressure and Min. Pressure) in order to deliver the optimal support to the patient.





# Target Volume





# Target Volume (TgV) vs. AVAPS

- **Target Volume** combines the **comfort** benefits of pressure-targeted ventilation with the **security** of a volume guarantee - a mode that has demonstrated effectiveness in treating **COPD** and **neuromuscular** patients

Average Volume Assured Pressure Support* AVAPS prescription example		Target Volume TgV prescription example	
Tidal Volume	8mL/kg IBW	Tidal Volume	8mL/kg IBW
IPAP Max Pressure	25cmH <sub>2</sub> O	Max Pressure	25cmH <sub>2</sub> O
IPAP Min Pressure	10cmH <sub>2</sub> O	Min Pressure	10cmH <sub>2</sub> O
AVAPS Rate	1 - 5 cmH <sub>2</sub> O per minute	"Fixed" Rate	0.5 cmH <sub>2</sub> O per breath

\* Trilogy 100 Patient Manual - REF1066819 - 3/10/2011



# Target Volume (TgV) vs. AVAPS

- **Comprehensive Comparison**
  - **Target Volume** can be used with **ALL CIRCUITS**, AVAPS only with leak (Passive) circuit
  - Breas uses the **same algorithm** for all devices vs. different settings in function of the 3 portfolio ranges (Dreamstation, A-series, Trilogy-series)
  - **TgV** is **faster** because it acts **breath-by-breath** (increase or decrease with  $0.5\text{cmH}_2\text{O}$ ) vs. acts over one minute in function of the delta pressure ( $5\text{cmH}_2\text{O}$  max)





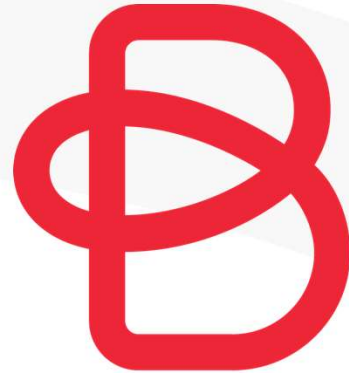
# Vivo 45LS - Independent Bench Study

- **Performance of three home ventilators for leak compensation**
  - Tidal volume (Vt) variation in a “target volume” mode
  - Device tidal volume variation with regards to specific lung conditions
  - Time to reach the set target volume
- **Measured Vt compared to the set Vt**
  - Same volume tested - 500mL
  - Normal, restrictive and obstructive lung conditions
  - Triggered and un-triggered breaths
  - 10 L/min, 20 L/min and 30 L/min “leak”

**“The Vivo 45LS had the best overall performance with regard to the most accurate average tidal volume and least variation in values”**



Johnathan Waugh, PhD, RRT, RPFT, FAARC, Liberty University



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# ”eSync” Technology



# “eSync” Technology

## Ensuring synchronization during ventilation

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau

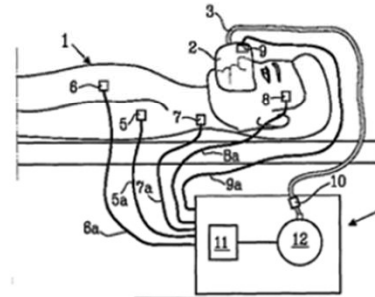


(43) International Publication Date  
19 January 2006 (19.01.2006)

PCT

(10) International Publication Number  
**WO 2006/005433 A1**

- (71) Applicant (for all designated States except US): BREAS MEDICAL AB [SE/SE]; Företagsvägen 1, S-435 33 Mölnlycke (SE).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): TIEDJE, Mikael [SE/SE]; Södra Ligården 2, S-425 30 Hisings Backa (SE).



(57) Abstract: A method and apparatus for facilitating breathing using a mechanical breathing gas ventilator is presented. The patient effort is deduced from a measured flow signal and analyzed with respect to the energy in the breathing system comprising the mechanical ventilator and the patient. When a predetermined energy threshold has been reached the ventilator responds to the breathing pattern change.



# “eSync” Technology

## Ensuring synchronization during ventilation

- eSync is a patented, **unique** inspiratory trigger technology
- eSync measures the **energy** of inspiratory effort on a breath-by-breath basis
- eSync is very **sensitive** to patient inspiratory effort
- eSync is **leak independent**
- eSync provides **comfortable, synchronous** ventilation



# “eSync” Technology

## Ensuring synchronization during ventilation

- **eSync’s** unique, patented algorithm senses patient inspiratory effort on a breath-by-breath basis by the measurement of **change of flow, L/sec<sup>2</sup>**
- While *traditional flow triggers* only use *flow, L/min*, **eSync** uses the ***change of flow, L/sec<sup>2</sup>*** to start a breath

	Traditional	eSync
Inspiratory Trigger Type	Flow, L/min	Change of Flow, L/sec <sup>2</sup>
Based on	Estimated Patient Flow	Measured Total Flow
Relies on "leak" calculation	Yes	No
Maximum Sensitivity	0.2 L/min	0.2 L/sec <sup>2</sup>
Leak Independent	No	Yes

***eSync is designed to provide sensitive, comfortable, synchronous ventilation, even in the presence of leak***