

MAQUET

VENTILATION
SERVO-i WITH NAVA
NEURALLY CONTROLLED VENTILATION

CRITICAL CARE



Pmean
(cmH₂O)

PEEP
(cmH₂O)

RR (b/min)

O₂
(%)

Ti/Ttot

MVe (l/min)

C

4.7

VTi
(ml)

280

VTe
(ml)

282

Edi peak
(μ V)

13

Edi min
(μ V)

0.8

NAVA level

1.2

Additional

EMPOWERING HUMAN EFFORT MAQUET – THE GOLD STANDARD



In the healthcare profession: it is a well known fact that the best interventions are those that interfere least with nature's own mechanisms.

The MAQUET philosophy is that technical innovation must promote and support the body's natural functions. The MAQUET mission is to provide clinicians with tools to amplify the patient's own recovery efforts.

SERVO-i is a platform that has been extended with an interactive ventilation therapy – NAVA (Neurally Adjusted Ventilatory Assist). An exciting technological breakthrough, NAVA lets patients assist with their own respiratory drive.

MAQUET – The Gold Standard.

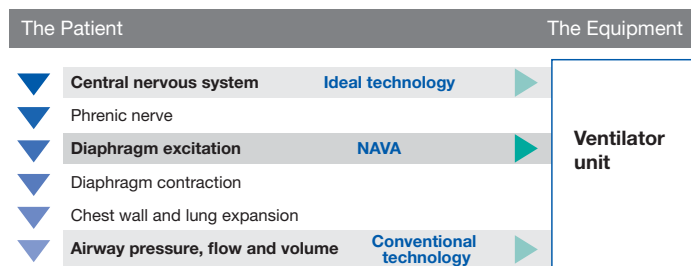
SERVO-i WITH NAVA BREAKTHROUGH TECHNOLOGY

NAVA: Neurally Adjusted Ventilatory Assist (NAVA) is a new approach to mechanical ventilation based on neural respiratory output.

The act of breathing depends on rhythmic discharge from the respiratory center of the brain. This discharge travels along the phrenic nerve, excites the diaphragm muscle cells, leading to muscle contraction and descent of the diaphragm dome. As a result, the pressure in the airway drops, causing an inflow of air into the lungs.

Conventional mechanical ventilators sense a patient effort by either a drop in airway pressure or a reversal in flow. This is the last reacting step in the chain of respiratory events, which makes a traditional ventilation system sensitive to hyperinflation, intrinsic PEEP and secondary triggering problems.

With NAVA, the electrical activity of the diaphragm (Edi) is captured, fed to the ventilator and used to assist the patient's breathing. As the ventilator and the diaphragm work with the same signal, mechanical coupling between the diaphragm and the ventilator is practically instantaneous.



Sinderby C et al. Nat Med 1999;5(12):1433-1436.

Neuro-Ventilatory Coupling: NAVA senses the electrical activity of the diaphragm (Edi), the earliest respiratory signal that can be detected. Conventional technology is limited to sensing patient effort at the final stage of the respiratory process.



NAVA senses activity in the diaphragm and responds by providing the requested level of ventilatory assist. The Edi signal is obtained by an electrode array mounted close to the distal tip of the Edi catheter. This catheter serves as a conventional nasogastric feeding tube.

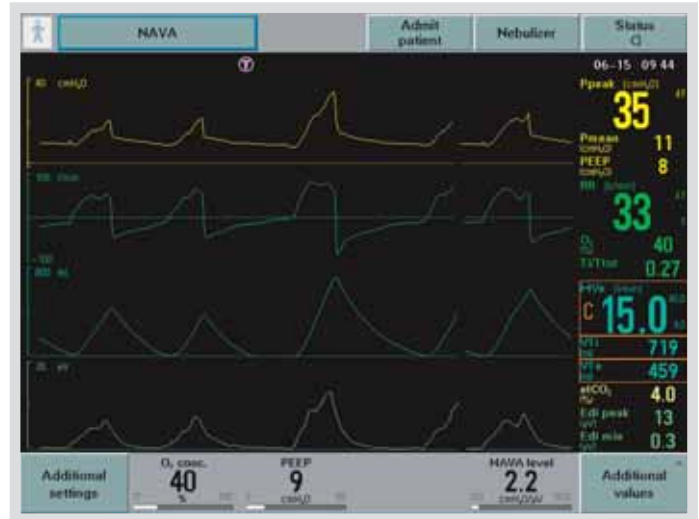


SERVO-i WITH NAVA BENEFITS

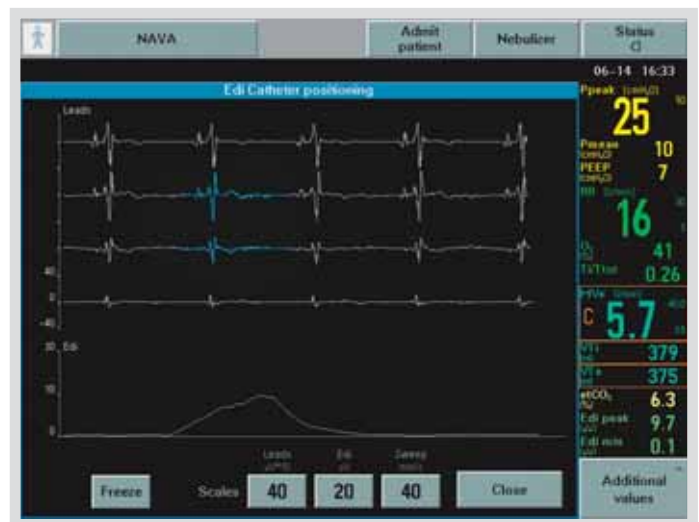
Improved synchrony: In NAVA, the ventilator is cycled-on as soon as neural inspiration starts. Moreover, the level of assistance provided during inspiration is determined by the patient’s own respiratory center demand. The same applies for the neural expiration phase – the ventilator cycles off inspiration the instant it is alerted to the onset of neural expiration. By utilizing the Edi signal, maintenance of synchrony between the patient and the ventilator is improved.

Unique monitoring capability: The Edi signal is a new unique parameter in mechanical ventilation. It can be used as a diagnostic tool to monitor the electrical activity of the diaphragm (Edi). In all ventilation modes, the Edi curve and its associated value can thus be used as a powerful monitoring tool, providing information on respiratory drive, volume requirements and the effect of the ventilatory settings, and to gain indications for sedation and weaning. All the trends and changes in the patient’s respiratory drive are recorded and saved.

In addition to the Edi signal, the Edi catheter picks up an esophageal ECG which can be displayed on the SERVO-i screen.



Synchrony in NAVA.



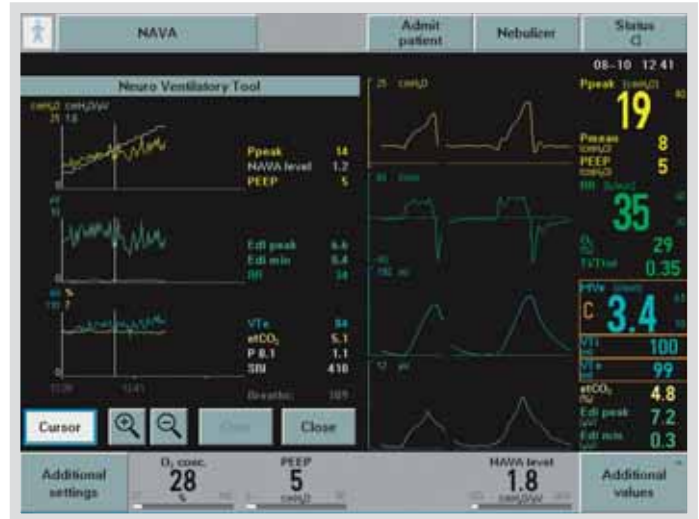
Esophageal ECG and Edi signal.

SERVO-i WITH NAVA POTENTIAL BENEFITS

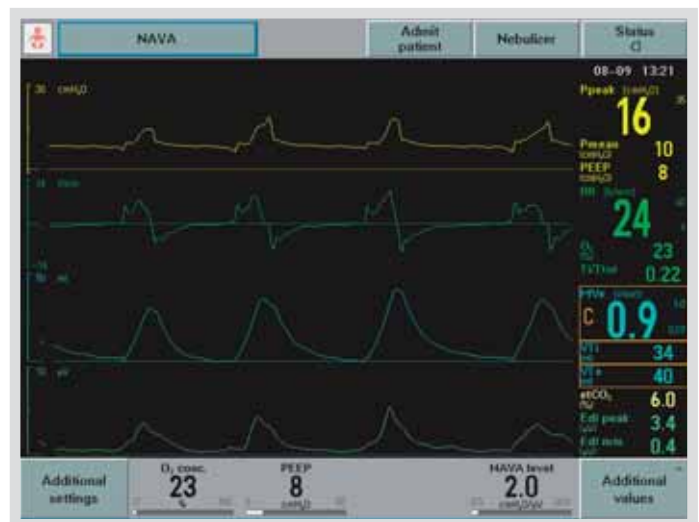
Lung protection: With NAVA the patient’s own respiratory demands determine the level of assistance. NAVA gives the opportunity to avoid over or under assistance of the patient.

Decision support for unloading and extubation: The Edi signal can be used as an indicator to set the support level from the ventilator, and to optimize unloading. As the patient’s condition improves, Edi amplitude decreases, resulting in a reduction in ventilator-delivered pressure. This pressure drop is an indicator to consider weaning and extubation.

Patient comfort: With NAVA, the respiratory muscles and the ventilator are driven by the same signal. The delivered assistance is matched to neural demands. This synchrony between patient and ventilator helps minimize patient discomfort and agitation, promoting spontaneous breathing and possible reduced sedation.



Neuro Ventilatory Tool.



The match between delivered assistance and neural demands.

SERVO-i WITH NAVA FOR INFANTS

Informed decisions: The Edi signal provides a tool that allows the clinicians to interpret the background of the chaotic breathing pattern so often seen in infant patients. The direct access to the respiratory center output gives prompt information on the effect of any intervention relating to ventilation of the lung. PEEP adjustment and the degree of unloading can now be based on informed decisions.



The decrease in pressure in this particular patient is clearly visible when switching from Pressure Support to Nava (shown in red). The green value shows respiratory rate.



SERVO-i WITH NAVA AT THE BEDSIDE

NAVA is as straightforward to use as it is technically advanced: The only equipment required in addition to a SERVO-i ventilator is NAVA software, an Edi module with cable and an Edi catheter. The same module can be used interchangeably with different SERVO-i units.

The Edi Catheter also functions as a nasogastric feeding tube, and comes in dimensions ranging from 6Fr–16Fr to cover all patient categories from neonatal to adult.



The NAVA upgrade kit installs simply on all SERVO-i ventilator configurations and is fully interchangeable with all SERVO-i units.



A range of Edi catheter sizes ensures optimized signal quality across all patient categories.

SERVO-i WITH NAVA EDI CATHETER APPLICATION

Easy application and connectivity: The NAVA Edi catheter is as simple to apply as any standard nasogastric tube. However, positioning of the Edi catheter takes on added importance to ensure a strong Edi signal and accurate readings.

With the Edi catheter inserted and positioned, all that remains is to plug the Edi module into the SERVO-i and connect the Edi catheter to its outlet. The esophageal ECG now showing on the SERVO-i screen can help confirm proper Edi catheter positioning.



The Edi catheter is inserted to the measured depth and positioned correctly.



With the catheter properly positioned, a prominent P-wave should be visible in the uppermost channel with a continued decline of P-wave amplitude in the lower leads.

THE SERVO STORY PROMOTING PATIENT VENTILATORY RECOVERY

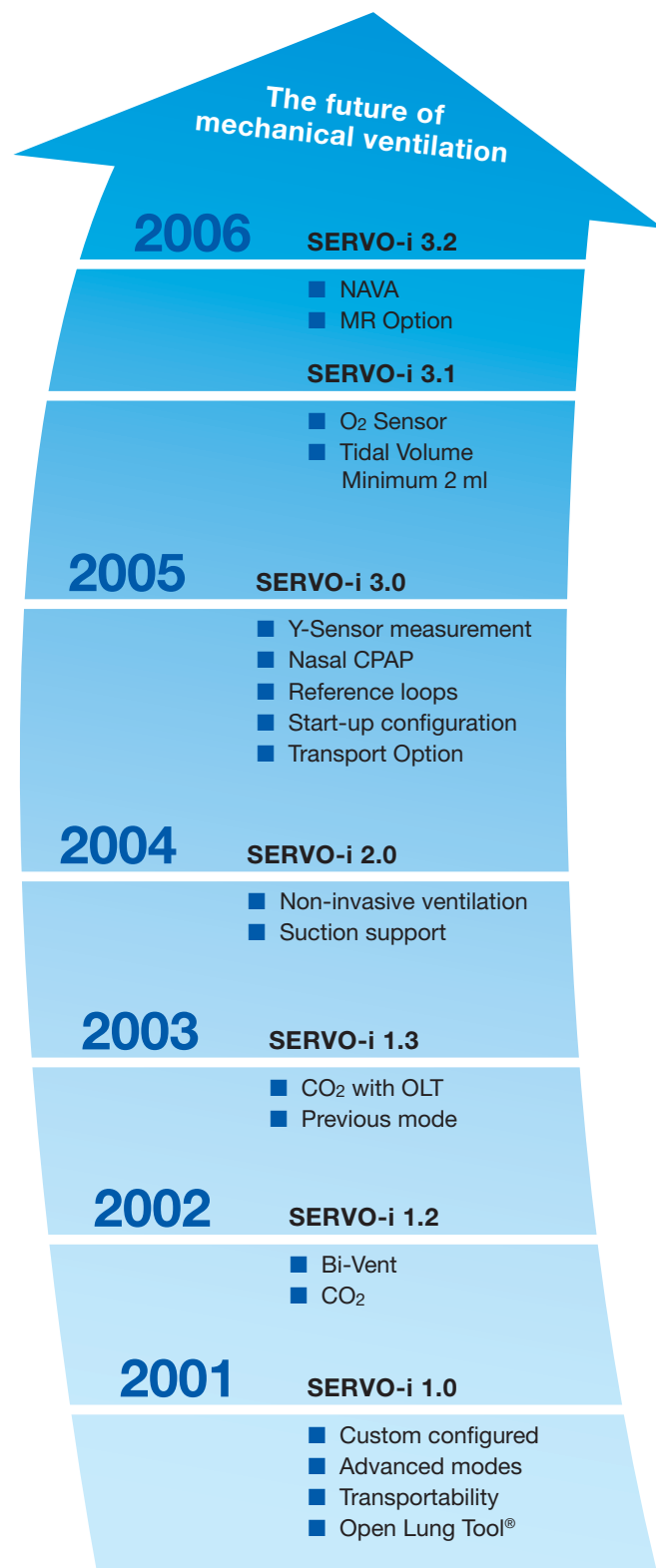
NAVA technology: The latest in a long line of SERVO innovations that promote a more natural recovery. Such as the Open Lung Tool, to guide a lung protective ventilation strategy. SERVO-i features for lung protection also include PRVC, Volume Support and Automode weaning tool. SERVO-i also has capabilities for inter-hospital transport and use during MR examinations.

Behind all these advances is a 30 year heritage of collaboration with intensive care physicians, as well as a commitment to investing in research and development. It's a longterm commitment.

SERVO-i with NAVA – Empowering human effort.

Existing SERVO-i machines can deliver the new NAVA treatment mode. This adaptability highlights the open design and scalability that lets SERVO-i evolve to exploit treatment advances.

MAKE THE MOST OF YOUR SERVO-i



Order information:

NAVA software SERVO-i	66 71 965
Edi Module 50Hz	66 72 330
Edi Module 60Hz	66 72 332

For information on the Edi Catheters,
 Datasheet Edi Catheter, art no 66 75 517

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