

HAMILTON·C3

Intelligent Ventilation



The big picture in Intelligent Ventilation

More safety for your patient

The world's population is growing. As people are getting older and sicker, the number of ventilated patients in the ICU increases^{1,2}. The estimated cost for intensive care and mechanical ventilation is expected to increase from 16 billion USD in 2003 to 60 billion USD by 2020³. The clinical impact will be significant. An increased number of older patients will lead to more complex patient care, while ICUs will be facing a lack of specialized staff⁴.

Get your ICU ready

The 2009 Vienna Declaration⁵ by the ESICM Executive Committee stresses the importance of quality and safety for patient care, especially when looking at future demographic changes. The declaration pledges to do what is necessary to provide safe ICU environments and to design safer and more efficient devices and drugs.

HAMILTON MEDICAL has the answer

As a manufacturer of ICU ventilators, we are committed to supporting this declaration. To do so, we follow the example of other high-risk industries such as aviation and nuclear power in embracing automation and user interface design.⁶

The HAMILTON-C3 provides you with:

- a 12.1 inch high-resolution widescreen display for more information at a glance
- its unique Ventilation Cockpit that is designed to improve safety through intuitive operation and monitoring
- proven closed-loop ventilation that automatically applies lung-protective strategies – reducing the risk of operator errors and promoting early weaning
- a single, versatile source of invasive and non-invasive ventilation for adults, pediatrics and neonatal ICUs, emergency and recovery rooms, subacute care, and intrafacility transport
- integrated turbine and hot-swappable batteries providing maximum mobility for up to 6.5 hours

¹ Needham DM, Bronskill SE, Calinawan JR, Sibbald WJ, Pronovost PJ, Laupacis A. Crit Care Med 2005 Mar;333:574-9.


² U.S. Census Bureau, Systems Support Division, Last Revised: July 14, 2009

³ Zilberberg M et al. BMC Health Services Research 2008;8:242

⁴ Prospects: The 2008 Revision. Committee on Quality of Healthcare in America. To Err is Human. Institute of Medicine, 1999. Angus D. JAMA 2000, Martin GS. CCM 2006, Poncet MC. AJRCCM 2007, Embriaco N. AJRCCM2007

⁵ <http://patientsafety.esicm.org/declaration.asp>

⁶ Richard JC, Kacmarek RM. Intensive Care Med. 2009 Oct;35(10):1662-3.



The HAMILTON-C3 was designed to provide Intelligent Ventilation, delivering:

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Ease of use
Visualizing complex information in an intuitive way



Improved patient outcome
Fully closed-loop ventilation promotes early weaning



Efficiency through innovation
Reduce the patient's time on the ventilator

Ease of use

In mechanical ventilation, monitoring means curves, numbers and more numbers. Conventional ventilation requires significant clinical expertise and numerous manual adjustments. This can be challenging and stressful since respiratory experts cannot be at the bedside all the time. Ventilators clearly need to be simpler to use so the clinician can concentrate on the patient, not the ventilator.

See and understand all important information at a glance

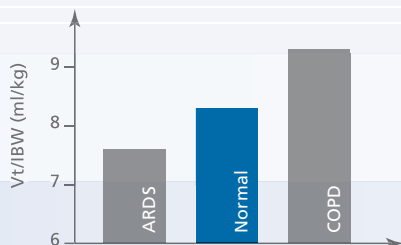
Our Unique Ventilation Cockpit on the HAMILTON-C3 reduces complexity by visually displaying the patient's respiratory mechanics, current condition and ventilation support in an intuitive way. The HAMILTON-C3 graphically displays this information on a single 12.1-inch high-resolution window, providing you with a continuous ventilation therapy "big picture".

Proven technology you can trust

The HAMILTON-C3 comes with ASV® – Adaptive Support Ventilation – technology which provides major improvements. Conventional modes require you to set numerous parameters. Closed-loop ventilation with ASV® adjusts ventilation settings automatically which reduces the risk of human error and improves patient safety.¹

Studies show that ASV®:

- ventilates virtually all intubated patients – whether active or passive – regardless of their lung disease²
- requires less user interaction, adapts to patient's breathing activity more frequently, and causes fewer alarms³
- adapts to changes in the patient's lung mechanics over time⁴

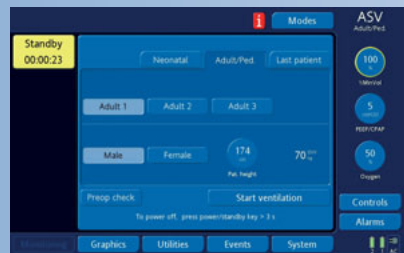


ASV adapts to lung mechanics by automatically applying lower tidal volumes in ARDS patients. The graph shows tidal volumes applied in ARDS patients over 7 days.⁴

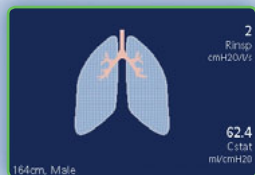
¹ Vignaux L, Tassaux D, Jolliet P. Intensive Care Med. 2009 Oct;35(10):1687-91
² Arnal JM, Durand-Gasselien J. Intensive Care Med. 2008 Jan;34(1):75-81.
³ Petter AH et al. Anesth Analg 2003;97:1743-50.
⁴ Adaptive support ventilation (ASV) automatically adapts a protective ventilation in ARDS patients. Arnal JM, Garcin F, Wysocki M, Corno G, Orlando A, Durand-Gasselien J. Intensive Care Med 2006;32 suppl 1: 0452



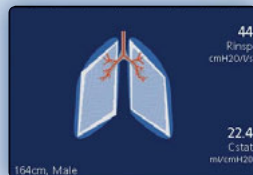
Simple ventilation setting
 Set your patient's height and gender, choose your ventilation mode and start ventilation with the optimal setting for controls and alarm limits.



HAMILTON·C3



Normal compliance and resistance



Low compliance (stiff lung) and high resistance

Understand lung mechanics

The Dynamic Lung expands and contracts in synchrony with actual breaths. It visualizes in real-time:

- tidal volume
- lung compliance
- resistance
- patient activity

Improved patient outcome and safety

In a root cause analysis of deaths or injuries related to long-term ventilation, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) found that inadequate briefing/training and failure to communicate between staff members were by far the most important causes.¹ As a leading manufacturer of ICU ventilators, transparent patient-centered care is of key importance at HAMILTON MEDICAL when developing new devices.

Increased safety of operation

The Ventilation Cockpit's 12.1-inch high-resolution wide-screen display plays a crucial role in simplifying the operation of the ventilator and the interpretation of monitored data. In addition, the specially designed alarm lamp at the top of the unit ensures that an alarming ventilator is immediately identified, visually, in addition to audibly².

HAMILTON MEDICAL ventilators are designed to achieve optimum patient compliance with the applied ventilation therapy. For example, reduced sounds and dimmable lights let the patient rest during the night. Optimal synchronization of breath delivery with patient efforts support early and weak patient activities. Monitoring and alarming are adapted to the challenges³ of non-invasive ventilation. The use of speaking-valves is possible, allowing the patient to communicate with the environment.

Lung protective strategies and patient comfort

HAMILTON MEDICAL's ASV[®] employs lung protective strategies to minimize complications from AutoPEEP and as a result,⁴ volutrauma/barotrauma. ASV also prevents apnea, tachypnea, excessive dead space ventilation, and excessively long breaths. ASV[®] promotes free breathing for patients in all ventilation modes and phases. It encourages spontaneous activity right from the start of ventilation and promotes weaning from first deployment.^{5,6}



¹ Preventing ventilator-related deaths and injuries. Jt Comm Perspect. 2002 Apr;22(4):14-5.

² Vignaux L, Tassaux D, Jolliet P. Intensive Care Med. 2009 Okt;35(10):1687-91

³ Tassaux D, P, Jolliet P. Crit Care Med. 2002 Apr;30(4):801-7.

⁴ Arnal JM, Durand-Gasselín J. Intensive Care Med. 2008 Jan;34(1):75-81.

⁵ Chen CW, Huang YC. Respir Care. 2011 Jul;56(7):976-83.

⁶ Jung B, Jaber S. Anesthesiology. 2010 Jun;112(6):1435-43.

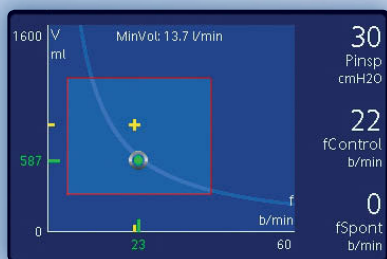
⁷ Gruber et al., Anesthesiology. 2008; 109:81-7



IntelliTrig

Changing breathing patterns or circuit leaks are a challenge in non-invasive ventilation. With the innovative IntelliTrig technology, the HAMILTON-C3 automatically responds to varying leaks and adapts sensitivity thresholds for optimal response to the patient's breath.

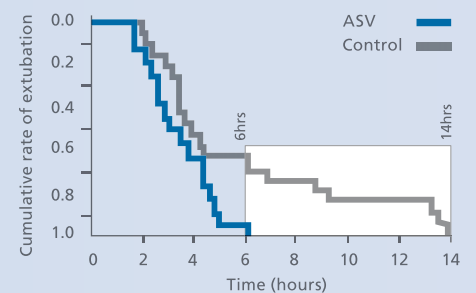
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Understand changes in the patient condition and how ASV reacts

The ASV Breathing Map shows how the adaptive lung controller is approaching its targets. It shows both the target and actual parameters for tidal volume, frequency, pressure, and minute ventilation.

Reduce time on the ventilator by over 50 %
ASV facilitates shorter times on the ventilator: 6 hours with ASV as compared to 14 hours with conventional ventilation.⁷



Efficiency through innovation

Intelligent Ventilation with ASV means fewer days on the ventilator and the use of less-invasive ventilation modes. As a result, clinicians can spend more time with their patients and ensure shorter stays in the ICU.

The HAMILTON-C3 lets you optimize clinical resources and skills while reducing cost of ownership and management overhead. Most importantly, it can help reduce the patient's time on the ventilator.

Know when to take the patient off the ventilator

The Ventilation Cockpit's Vent Status panel provides intuitive visualization of the most important parameters and settings related to patient-ventilator dependency. This innovation helps you decide when to take the patient off the ventilator. Studies have shown that notifying caregivers about the patient's recovery from respiratory failure can significantly reduce the duration and total cost of ventilation.¹

Start weaning at intubation

ASV, the closed-loop ventilation system, automatically promotes free breathing for patients in all ventilation modes and phases. It encourages spontaneous activity right from the start of ventilation and promotes weaning from first deployment. Studies show the results: shorter ventilation times (see graph on the previous page).^{2,3,4}

At the bedside or during transport: benefit from a double-duty solution

The HAMILTON-C3's compact design and independence from external power and air supplies allow for maximum mobility throughout the hospital.

¹ Ely EW, Baker AM, Dunagan DP, Burke HL, Smith AC, Kelly PT, Johnson MM, Browder RW, Bowton DL, Haponik EF. *N Engl J Med.* 1996 Dec 19;335(25):1864-9.

² Kirakli C, Ozkan. *Eur Respir J.* 2011 Oct;38(4):774-80.

³ Chen CW, Huang YC. *Respir Care.* 2011 Jul;56(7):976-83.

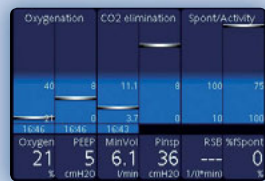
⁴ Cassina T, Chioléro R, Mauri R, Revelly JP. *J Cardiothorac Vasc Anesth.* 2003 Oct;17(5):571-5.

Ergonomic and intuitive humidification

With the HAMILTON-H900 humidifier, HAMILTON MEDICAL provides the optimal solution for conditioning patient's breathing air. The HAMILTON-H900 provides you with single-handed disposable replacement and wall heated smoothbore circuits to effectively prevent rainout.



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Highly dependent patient



Low dependency – consider taking the patient off the ventilator.

How to know when to take the patient off the ventilator?

The Vent Status panel gives you a visual representation of 6 parameters related to patient-ventilator dependency, grouped into:

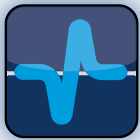
- oxygenation
- CO₂ elimination
- patient activity

Since the panel is user-configurable, it helps you enforce your ICU's weaning protocol.

A comprehensive ventilator

In addition to its unique features, the HAMILTON-C3 with ASV includes everything you expect from a state-of-the-art ventilation solution, including:

- a choice of manually and/or fully controlled modes for invasive and non-invasive ventilation
- an extensive monitoring package
- the ability to ventilate adult, pediatric, and neonatal patients



IntelliTrig

With the innovative IntelliTrig technology, the HAMILTON-C3 automatically responds to varying leaks and adapts sensitivity thresholds for optimal response to the patient's breathing pattern.



ASV

Adaptive Support Ventilation (ASV) is a closed loop mode based on a breath-by-breath "assess, optimize and achieve" concept:

1. Assess the patient's lung mechanics.
2. Optimize the tidal volume/respiratory frequency combination based on lung mechanics.
3. Achieve optimum tidal volume/respiratory frequency by automatically adjusting mandatory rate and inspiratory pressure applying lung-protective strategy rules.



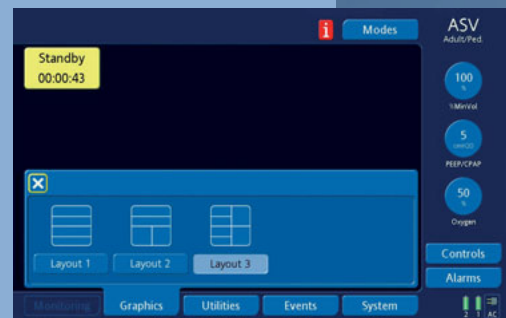
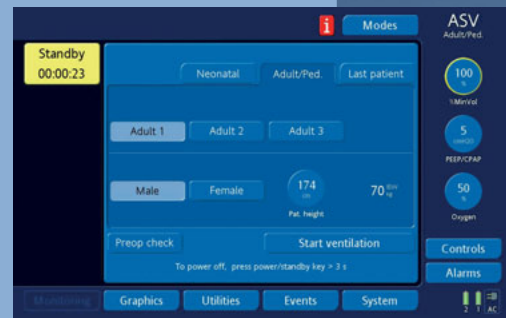
IntelliSync

Makes ventilation easier and more comfortable for the patient by automatically switching between controlled and spontaneous ventilation.

Available Options:

- Volumetric (Mainstream) CO₂
- Sidestream CO₂
- NeoNIV (nasal CPAP)
- TRC
- DuoPAP/APRV
- Non invasive ventilation

For a complete overview of all features, functions, simulation software and latest news, please refer to:
www.hamilton-medical.com/C3



Configurable Ventilation Cockpit

The Ventilation Cockpit lets you configure your patient's monitored data the way you want. You can choose from various layouts to display a combination of Intelligent Panels, including Dynamic Lung, Vent Status, and ASV target graphics, plus traditional waveforms.

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12.1-inch high resolution wide touchscreen and single-knob operation

You can operate the HAMILTON-C3 via the touchscreen or by using a single knob. Hard keys give direct access to the most important functions.

360° alarm lamp

You can immediately identify an alarming ventilator by the alarm lamp at the top – even when you are at a distance or when several devices are operated in the same room.

Serial interface for PDMS or patient monitor

The serial RS-232 interface provides a port connecting hospital monitors and Patient Data Management Systems (PDMS).

Extended battery backup option

With the extended battery option, your HAMILTON-C3 can run indefinitely on hot-swappable batteries. With 2 fully charged batteries independent operation of 6.5 hours can be achieved.

High-performance, ultra-quiet turbine

The turbine can deliver a flow of up to 240 l/min. The flow is precisely dosed by the inspiratory valve. Patented noise reduction allows you to use the HAMILTON-C3 even in an ultra-quiet environment.



Flexible device configuration

You can configure the device mounting ways to adapt the HAMILTON-C3 to your environment:

- on a standard trolley, with optional humidifier and O₂ cylinder mounts
- with an adaptable plate to any support you like

For further information about the HAMILTON-C3
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