



HAMILTON-MR1

Intelligent Ventilation from ICU to MRI



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Intelligent Ventilation since 1983



HAMILTON MEDICAL
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Intelligent Ventilation from ICU to MRI

HAMILTON-MR1 – The MRI Conditional ventilator

The HAMILTON-MR1 guarantees uncompromised continuous ventilation care from the ICU to the MRI scanner and back. Its reliability and high performance, with advanced lung-protective strategies and patient-adaptive modes, make the HAMILTON-MR1 the ideal choice for any critical care department that needs to transport ventilated patients to the MRI department.

- MRI Conditional (up to 50 mT)
- Integrated TeslaSpy gaussmeter
- Adult, pediatric, and neonatal ventilation
- More than 9 h of battery operating time
- Independent air supply
- Advanced ventilation modes including ASV - Adaptive Support Ventilation



You can take your patients from the ICU down to the MRI suite and not have to change a thing about the ventilation, even when they are on an advanced mode. That is a true advantage because you are not risking lung de-recruitment and a patient setback, which would keep him in the hospital longer and make it more uncomfortable for him.

Dr. Thomas Berlin, Director of Respiratory Care
Florida Hospital Orlando, Orlando (FL), USA

Perfectly adapted

Integrated gaussmeter for more safety

Positioning a medical device too close to the MRI scanner can have fatal consequences. The integrated gaussmeter, TeslaSpy, continuously monitors the magnetic field and gives you an audible and visual signal if you are getting too close. For maximum safety, TeslaSpy continues monitoring even when the ventilator is switched off.

Close to the patient

The HAMILTON-MR1 is the first ventilator able to be used at a magnetic field strength of 50 mT (equivalent to 1m distance for a 3T static magnetic field scanner), without creating any MR image artifacts.

Ideal for clinical transport

The small and rugged housing of the HAMILTON-MR1 makes it easy to handle and optimal for clinical transport. With its integrated turbine, full range of modes, and powerful internal batteries, the HAMILTON-MR1 accompanies your patient from the ICU to MRI and back, providing uncompromised ventilation in a compact design.



Optimal performance

From neonates to adults

The HAMILTON-MR1 provides a tidal volume range of 20 ml – 2000 ml, or optionally 2 ml – 300 ml for neonates. This allows for the effective, safe, and lung-protective ventilation of all patient groups, from neonates to adults. The HAMILTON-MR1 is the first MR-compatible ventilator that has been optimized for neonatal ventilation.

Optimal synchronization

The IntelliTrig function automatically adjusts the inspiratory and expiratory trigger sensitivity to potential leaks and ensures optimal synchronization with the patient's breathing pattern. This is achieved both for invasively and noninvasively ventilated patients.

The right ventilation mode for your patient

The HAMILTON-MR1 offers modern and classic ventilation modes for both invasive and noninvasive ventilated patients. This guarantees that before, during, and after the MRI procedure, your patients receive the same high level of ventilation care as at the bedside.



Product overview

- 1 Integrated TeslaSpy
- 2 Patient interfaces & ports
- 3 Push & turn control knob
- 4 Ventilation Cockpit
- 5 360° visible alarm lamp
- 6 Power supply and connectors



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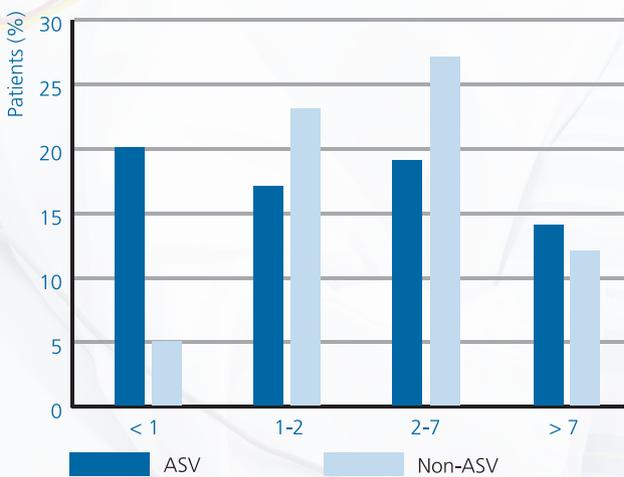
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Patients in the medical intensive care unit could be extubated earlier following the introduction of ASV.⁵

Time to Extubation Readiness (d)

More safety and comfort for your patients

Enhanced patient comfort

Each Hamilton Medical ventilator features the intelligent ventilation mode ASV (Adaptive Support Ventilation). ASV measures the patient's lung mechanics and activity on a breath-by-breath basis and automatically adjusts ventilation, from intubation to extubation. ASV is well established in intensive care units and, as the standard mode for the transport of intubated patients since 1998 has been shown to improve patient/ventilator interaction.^{1), 2)}

Lung-protective ventilation

ASV ensures, via an optimal breathing pattern, that the patient receives the set minute volume, irrespective of the patient's activity. As part of this process, ASV employs lung-protective strategies to minimize complications from AutoPEEP and volutrauma/barotrauma. ASV also prevents apnea, tachypnea, excessive dead space ventilation, and excessively large breaths.³⁾

Decreased ventilation time

Clinical studies show that

- ASV supports earliest possible spontaneous breathing by the patient ^{4), 5)}
- ASV shortens the ventilation time in various patient populations ^{4), 5)}

1 Iotti GA. Intensive Care Med. 2010 Aug;36(8):1371-9.

2 Sulzer CF. Anesthesiology. 2001 Dec;95(6):1339-45.

3 Sulemanji D. Anesthesiology. 2009 Oct;111(4):863-70.

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

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

Ease of use

Intuitive operation

In close cooperation with users and ventilation experts, our engineers have designed the user interface of the ventilators to allow intuitive operation and direct access to important settings. All Hamilton Medical ventilators are operated according to the same principles, which makes switching between Hamilton Medical ventilators very easy.

Easy-to-understand monitoring

Ventilators display large amounts of monitoring data, which are often difficult to interpret. The Ventilation Cockpit on all Hamilton Medical ventilators consolidates the diverse monitoring data and converts it into visual displays. These easy-to-understand displays allow a quick overview of the patient's current ventilation status and provide a reliable basis for therapy decisions.

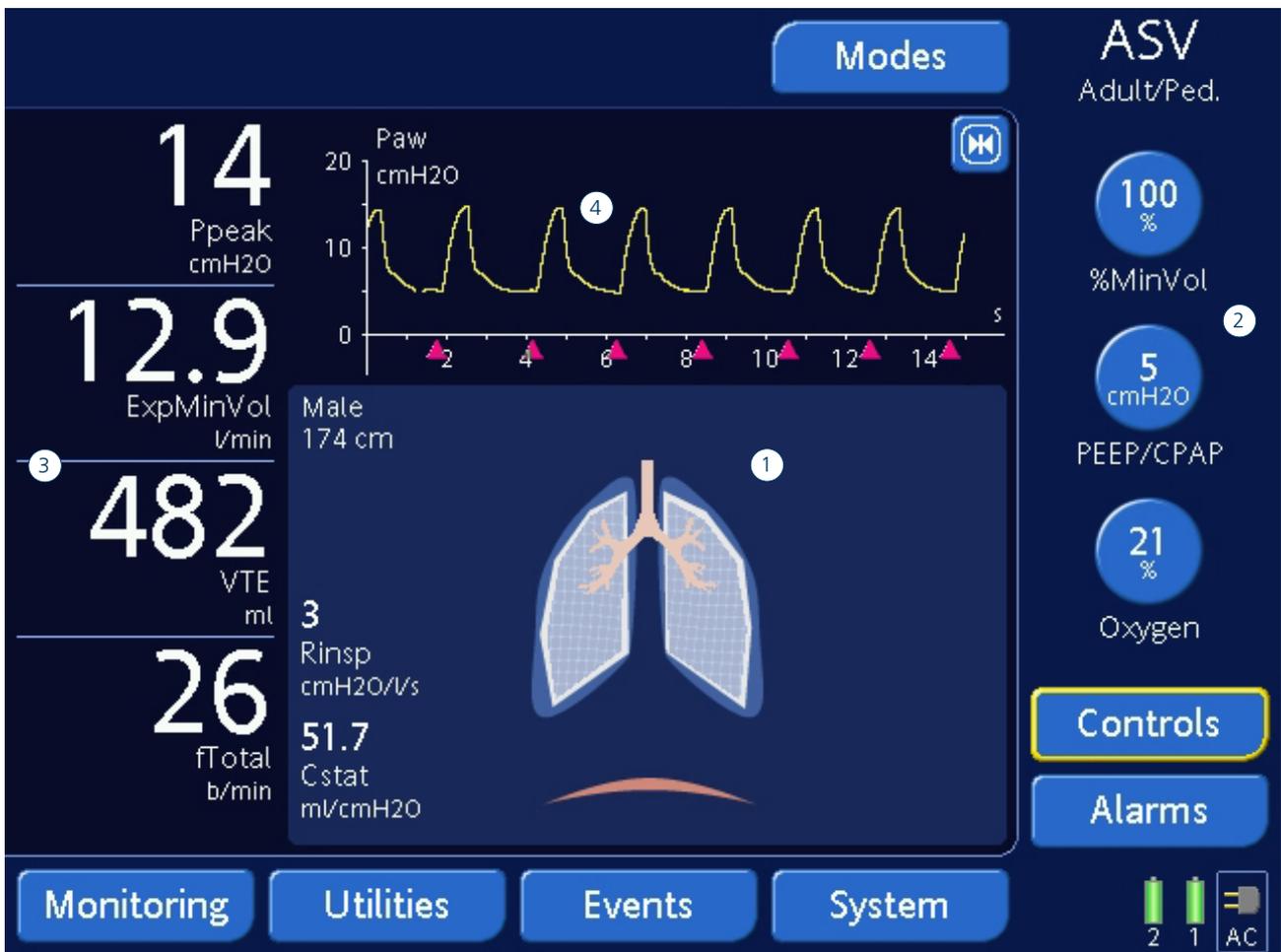
More time for your patient

ASV reduces the number of controls that need to be set because it dynamically adjusts respiratory rate, tidal volume, and inspiratory time depending on the patient's lung mechanics and effort. This also eliminates the need to switch from passive to active ventilation modes, and the patient can stay on this mode from intubation to extubation. Furthermore, studies have shown that ASV requires fewer manipulations and generates fewer alarms than conventional modes, which gives you more time for your patients.^{1) 2)}

1 Celli P. Transplant Proc. 2014 Aug 20 [Epub ahead of print] PMID 25150607.

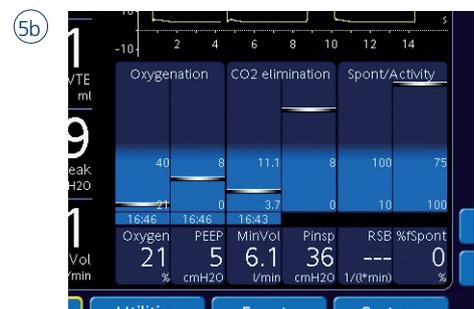
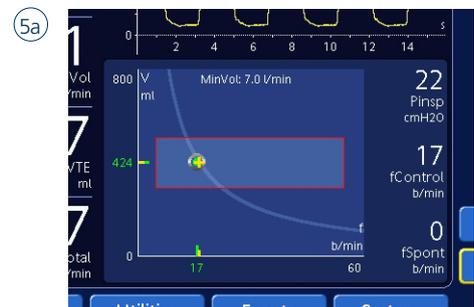
2 Sulzer CF. Anesthesiology. 2001 Dec;95(6):1339-45.





The Ventilation Cockpit

- ① Dynamic Lung - Real-time display of lung compliance, resistance, and breathing activity
- ② Direct access to the most important settings
- ③ The four most important monitoring parameters
- ④ Configurable waveforms for flow and pressure
- ⑤ Display options of the Ventilation Cockpit:
 - a) ASV Graph
 - b) Vent Status
 - c) Trends (not shown)
 - d) Loops (not shown)





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Until now, we ventilated our ICU patients during MRI scanning with an anesthesia ventilator. Therefore, we had to consult an anesthetist every time to handle the equipment. With the HAMILTON-MR1, we are now completely independent.

Dr. Adrian Wäckerlin, Head of Intensive Care
Cantonal Hospital Grisons, Chur, Switzerland

Increased efficiency

Reduction of treatment costs

Each ventilation day that is eliminated significantly reduces treatments costs – on average by 1,500 USD, according to one study.¹⁾ It has been shown that the use of Hamilton Medical ventilators and ASV can reduce ventilation time. This makes the ventilator available for the next patient much earlier. A shorter ventilation time also reduces the risk of ventilator associated pneumonia (VAP), which may result in costs of roughly 57,000 USD per case.²⁾

Optimal utilization of resources

Hamilton Medical ventilators, together with ASV, can reduce the time needed to adjust settings and manage alarms while maintaining ventilation quality.^{3), 4)} This frees up time for other aspects of patient care. Thanks to the ease of operation, consistent operating concepts, and free e-learning modules offered by Hamilton Medical, the efficiency of training is also improved.

Comprehensive standard functions

Important Intelligent Ventilation technologies such as Adaptive Support Ventilation, the advanced and platform-consistent Ventilation Cockpit, automatic leak compensation, and a wide range of monitoring capabilities are part of the standard package of each ventilator. Combined with easy maintenance and low operating costs, the HAMILTON-MR1 allows you to make efficient use of your financial resources.

1 Dasta JF et al. Critical Care Med. 2005 Jun;33:1266-71.

2 Cocanour CS et al. Surg Infect. 2005 Spring;6:65-72.

3 Iotti GA. Intensive Care Med. 2010 Aug;36(8):1371-9.

4 Petter AH. Anesth Analg. 2003 Dec;97(6):1743-50.

Perfection in every detail

Operation via touch screen or push & turn knob

You can operate the HAMILTON-MR1 via the touch screen or by using a single knob. Hard keys provide direct access to the most important functions.

Optimal alarm detection

Even from a distance or at high noise levels, the ventilator alarm is easily identified by the top-mounted 360° visible alarm lamp. The optional nurse call capability provides additional support for optimal alarm detection.

Usefull gadgets to make your life easier

The HAMILTON-MR1 trolley comes with an auto-lock brake, which locks the trolley wheels as soon as you let go of the handle to make sure it does not roll toward the MR scanner by accident. Two hooks on each side of the trolley to conveniently stow the breathing circuit and the oxygen hose are also included.



Optimized performance for neonates (optional)

Tidal volumes as low as 2 ml

With tidal volumes as low as 2 ml, the HAMILTON-MR1 provides effective, safe, and lung-protective ventilation for even the smallest preterm infants.¹⁾ The proximal flow sensor, specifically developed for neonates, precisely measures the pressure, volume, and flow directly at the infant's airway opening and, therefore, ensures the required trigger sensitivity. This provides improved synchronization and less work of breathing.

Optimal synchronization even with uncuffed tubes

Leaks are one of the biggest problems in the ventilation of neonates, due to the use of uncuffed tubes. The intelligent IntelliTrig leak compensation function automatically adjusts the inspiratory and expiratory trigger sensitivity to potential leaks. This enables optimal synchronization with the neonate's breathing pattern.

Hamilton Medical nCPAP - Fewer interventions, increased safety

The nCPAP modes of the HAMILTON-MR1 are designed such that you only need to set the desired CPAP pressure. The flow is subsequently adjusted automatically based on the patient condition and potential leaks. This prevents unintended peak pressures and guarantees highly efficient leak compensation. Flow adjustment occurs very rapidly due to near-patient pressure measurement and the high sensitivity of the measurement.

1) Volume-targeted versus pressure-limited ventilation in the neonate (Review), 2011 Morley CJ



Hamilton Medical

Intelligent Ventilation since 1983

In 1983, Hamilton Medical was founded with a vision: To develop intelligent ventilation solutions that make life safer for patients in critical care and easier for the people who care for them. Today, Hamilton Medical is a leading manufacturer of critical care ventilation solutions for a wide variety of patient populations, applications, and environments.

The right ventilation solution for every situation

Hamilton Medical ventilators provide ventilation solutions for all of your patients; in the intensive care unit, during an MRI procedure, and in all transport situations, from the neonate to the adult. Each of these ventilators is equipped with the same standardized user interface and uses the same Intelligent Ventilation technologies. This enables Hamilton Medical ventilators to help you:

- Increase the comfort and safety of your patients
- Make life easier for the caregivers
- Increase the efficiency of care



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