



HAMILTON-S1

The world's first Ventilation Autopilot





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INTELLiVENT-ASV is a complex mode with very advanced technology inside, but for the user it is very simple to handle.

Dr. Jean-Michel Arnal, Senior Intensivist
Intercommunal Hospital, Var Departement, Toulon, France

The world's first Ventilation Autopilot

HAMILTON-S1 - Intelligent Ventilation built in

The HAMILTON-S1 is the most advanced mechanical ventilator available today with a number of unique features: It is the first ventilator featuring the "Ventilation Autopilot" INTELLiVENT-ASV®. INTELLiVENT-ASV automatically controls the patient's ventilation and oxygenation based on targets set by the clinician and on physiologic input from the patient.

The HAMILTON-S1 includes the Protective Ventilation (P/V) Tool to assess recruitability, and to perform recruitment maneuvers.

The unique integrated cuff pressure controller, IntelliCuff®, continuously monitors and adjusts cuffed tracheal and tracheostomy tubes, providing real-time optimization of cuff pressure.

In addition to many other features, the HAMILTON-S1 includes Hamilton Medical's standardized Ventilation Cockpit user interface and the unique intelligent ventilation mode, Adaptive Support Ventilation (ASV®).

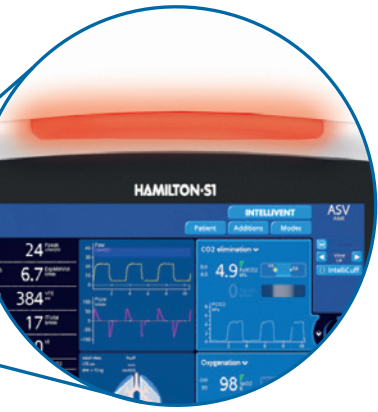
Your benefits

- ✓ Advanced ventilation modes including ASV and INTELLiVENT-ASV
- ✓ Automated cuff pressure controller IntelliCuff
- ✓ P/V Tool Pro for lung assessment and recruitment
- ✓ Transpulmonary pressure measurement
- ✓ High flow oxygen therapy
- ✓ Adult, pediatric, and neonatal ventilation

Product overview

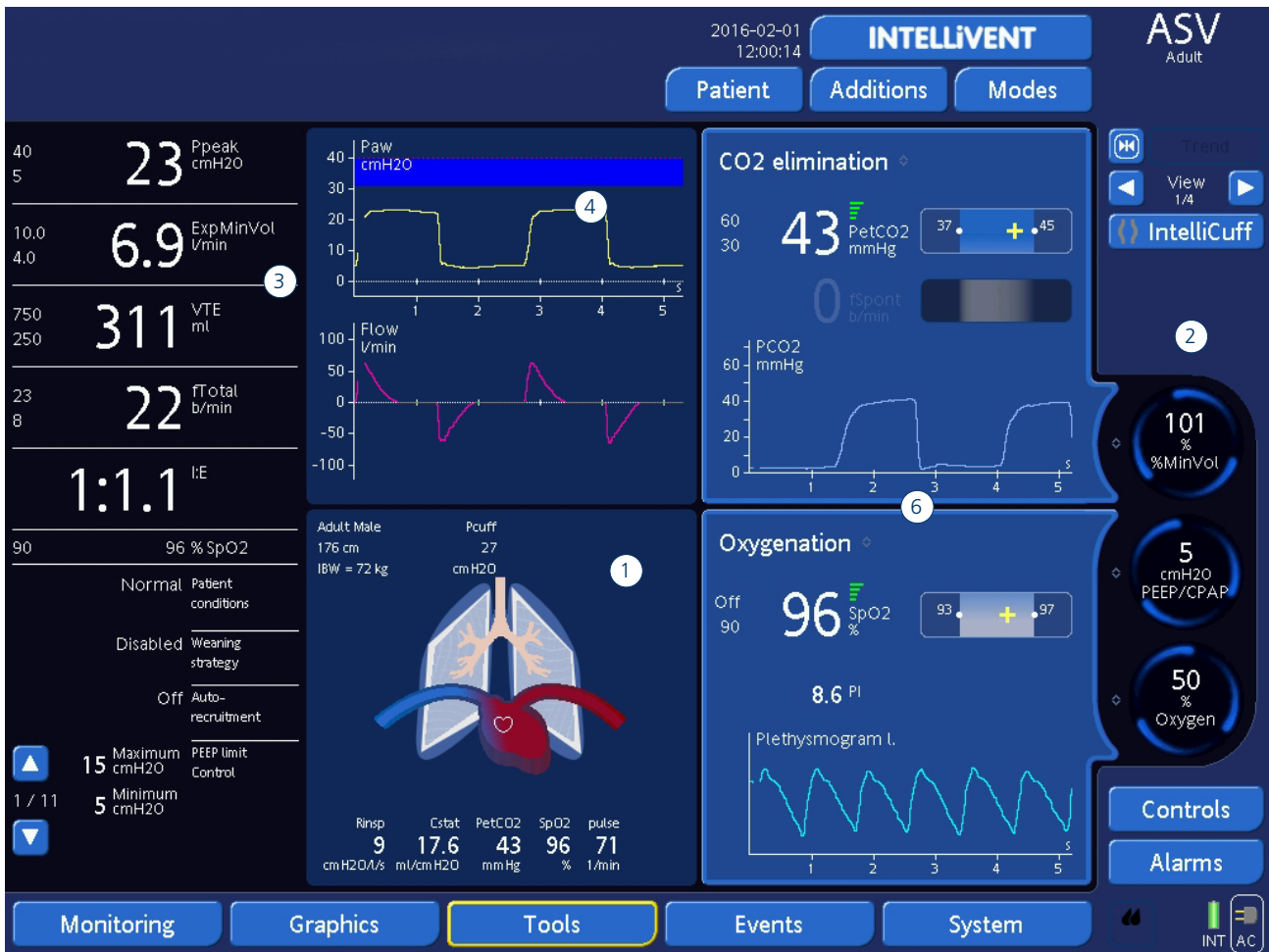
- 1 Flexible device configuration
- 2 Patient interfaces and ports
- 3 Press & turn control knob
- 4 Ventilation Cockpit
- 5 360° visible alarm lamp
- 6 Option modules
- 7 Control of the humidifier from the ventilator display
- 8 Multimedia interfaces





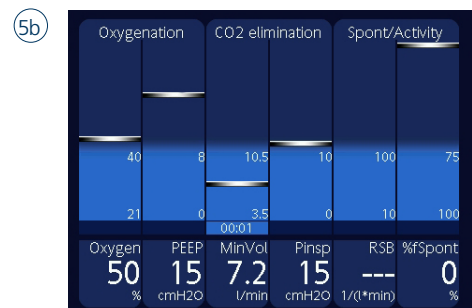
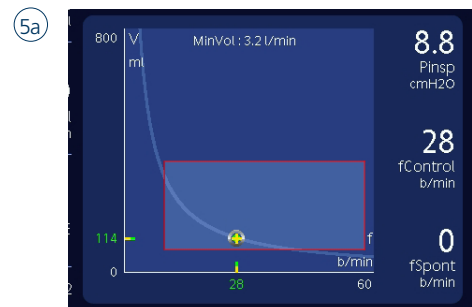
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The Ventilation Cockpit

- ① Dynamic Lung - Real-time display of lung compliance, resistance, breathing activity, SpO₂, and pulse rate
- ② Direct access to the most important settings
- ③ The most important configurable monitoring parameters
- ④ Configurable waveforms for flow, volume, pressure, SpO₂, PCO₂, FCO₂, Pes (Paux), Ptranspulm, and plethysmogram
- ⑤ Display options of the Ventilation Cockpit:
 - a) ASV Graph
 - b) Vent Status
 - c) Trends (not shown)
 - d) Loops (not shown)
- ⑥ CO₂ elimination and oxygenation window with patient status display



Ease of use

Intuitive operation

In close cooperation with users and ventilation experts, our engineers have designed the HAMILTON-S1's user interface 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 different devices very easy.

Easy-to-understand monitoring

Ventilators display large amounts of data that is often difficult to interpret. The configurable touch screen display, referred to as the Ventilation Cockpit, consolidates the diverse monitoring data, and presents it numerically and in various graphic panels. These easy-to-understand views provide an at-a-glance overview of the patient's current ventilation status, and offer a reliable basis for therapy decisions.

More time for your patients

In ASV and INTELLiVENT-ASV modes, the ventilator continuously adjusts to the patient's lung condition and breathing activity. This means fewer user interactions are required¹⁾ and fewer alarms are generated²⁾, giving you more time for your patients.

1 Bejjers AJ. Intensive Care Med. 2014; May;40(5):752-3. | 2 Zhu F. Anesthesiology. 2015 Apr;122(4):832-40.

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

Hamilton Medical's intelligent ventilation modes, ASV and INTELLiVENT-ASV, automatically employ lung-protective strategies to minimize complications such as AutoPEEP and volutrauma/barotrauma. Within the rules of this lung-protective strategy, they encourage the patient to breathe spontaneously.

According to several studies, these intelligent ventilation modes help reduce ventilation time in various patient groups. They decrease work of breathing and improve patient-ventilator synchrony.

P/V Tool Pro offers you additional support to carry out your lung-protective ventilation strategy.

ASV decreases ventilation time

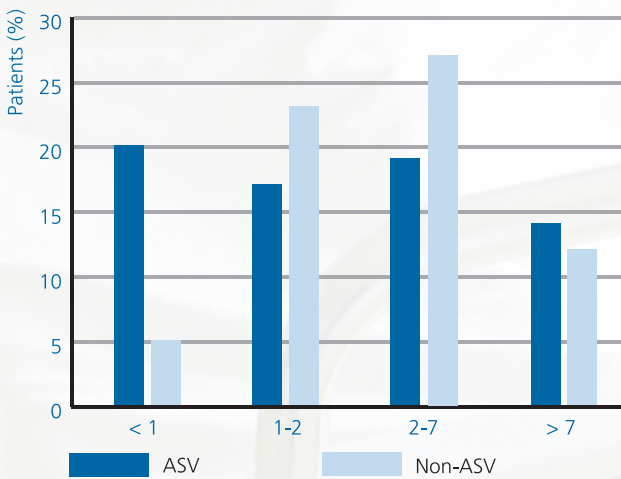
Publications show that

- ASV supports earliest possible spontaneous breathing by the patient^{3), 4)}
- ASV shortens ventilation time in various patient groups^{3), 4)}

INTELLiVENT-ASV is safe and efficient

Publications show that

- INTELLiVENT-ASV is first among all modes in terms of capabilities related to safety, comfort, and weaning⁵⁾
- INTELLiVENT-ASV was safe and efficient for post-cardiac surgery patients, and requires fewer interactions than conventional modes⁶⁾



Patients in the medical intensive care unit could be extubated earlier following the introduction of ASV.⁷⁾

Time to Extubation Readiness (d)



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We gain time by using INTELLiVENT-ASV, which we can use to accomplish other important tasks that take place in an ICU, such as taking care of the patients and providing essential medical care.

Laurent Buscemi, ICU Nurse
Intercommunal Hospital, Var Departement, France

Increase in efficiency

Integrated commercial considerations

Ventilators are capital goods that need to be evaluated for cost efficiency. Factors such as treatment costs and the use of human resources play an important role in this process. Assembled with an extensive standard equipment package that is easy to maintain, Hamilton Medical ventilators are an attractive investment with respect to purchase price and operating costs.

Reduction of treatment costs

Each eliminated ventilation day significantly reduces treatment costs – on average by 1,500 USD.¹⁾ It has been shown that the use of Hamilton Medical ventilators and ASV can reduce ventilation time. In addition, the ventilator is now 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 up to 57,000 USD per case.²⁾

Improved use of human resources

Hamilton Medical ventilators, along with ASV, can reduce the time needed for standard settings and alarm management while maintaining ventilation quality.^{3), 4)} This frees up time for other aspects of patient care. Thanks to ease of operation, consistent operating concepts across devices, and the free e-learning offerings from Hamilton Medical, the effort for education and training is also reduced.

One device for all applications

The HAMILTON-S1 makes life easier for caregivers by supporting a wide range of ventilation therapies from invasive and noninvasive to high flow oxygen therapy. The patient can stay on the same ventilator as long as respiratory support is needed.

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.

Intelligent ventilation solutions

ASV and INTELLiVENT-ASV: automated, lung-protective ventilation modes

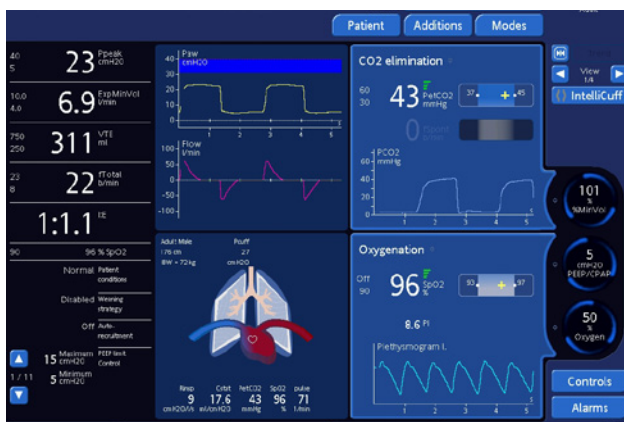
The HAMILTON-S1 features the intelligent ventilation mode ASV. ASV maintains an operator-set minute volume, and continuously determines respiratory rate, tidal volume, inspiratory pressure, and inspiratory time depending on the patient's lung mechanics and effort. ASV adapts ventilation breath-by-breath, 24 hours a day, from intubation to extubation.

The unique INTELLiVENT-ASV mode takes the proven concepts of ASV a step further: the clinician sets targets for PetCO₂ and SpO₂ for the patient. INTELLiVENT-ASV then automates the ventilator controls to reach these targets while taking into account physiologic inputs from the patient (PetCO₂, SpO₂, lung mechanics, spontaneous breaths). It automatically sets controls relevant to oxygenation (PEEP, oxygen) and ventilation (respiratory rate, tidal volume, inspiratory pressure, and inspiratory time).

Both ASV and INTELLiVENT-ASV automatically employ lung-protective strategies to minimize complications from AutoPEEP and volutrauma/barotrauma. Within the rules of this lung-protective strategy, ASV and INTELLiVENT-ASV encourage the patient to breathe spontaneously. In addition, INTELLiVENT-ASV provides a configurable automated weaning protocol (Quick Wean) including spontaneous breathing trials.

Protective ventilation with P/V Tool Pro

P/V Tool Pro allows an easy assessment of lung recruitability, and provides a simple and safe way to perform lung-recruitment maneuvers. In combination with transpulmonary pressure measurement, P/V Tool Pro allows you to more precisely assess lung recruitability and perform recruitment maneuvers in ARDS patients.



Ventilation Cockpit with INTELLiVENT-ASV



P/V Tool Pro window

Neonatal ventilation

Tidal volumes as low as 2 ml

With the neonatal option, the HAMILTON-S1 provides tidal volumes as low as 2 ml for an effective, safe, and lung-protective ventilation of 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, ensuring the required trigger sensitivity. This provides improved synchronization and less work of breathing.

Adaptive synchronization, even with uncuffed tubes

Leaks are one of the issues encountered in the ventilation of neonates, as a result of using uncuffed tubes. The IntelliTrig leak compensation function automatically adjusts the inspiratory and expiratory trigger sensitivity to potential leaks. This enables adaptive synchronization with the neonate's breathing pattern.

nCPAP - Automatic adaptation, fewer interventions

The HAMILTON-S1's nCPAP mode is designed in such a way 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.



Neonatal ventilation with HAMILTON-S1



Fewer interventions and increased safety with nCPAP

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

High-end ventilation tools



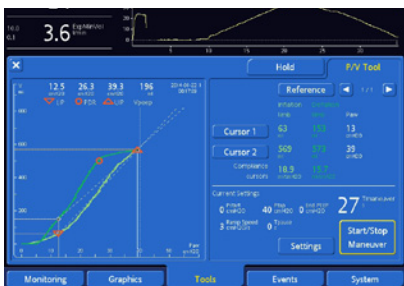
Automated ventilation with INTELLiVENT-ASV

INTELLiVENT-ASV is based on the proven Adaptive Support Ventilation mode. It continuously monitors patient conditions, and safely adjusts parameters to keep the patient within target ranges, with minimal clinician interaction, from intubation to extubation. INTELLiVENT-ASV also provides tools to promote early, automated weaning (Quick Wean).



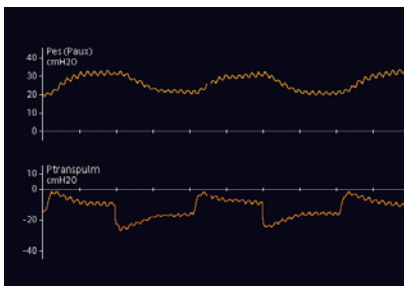
High flow oxygen therapy

To accommodate your patient's needs, the HAMILTON-S1 allows you to switch easily between any ventilation mode and high flow oxygen therapy. Using the same breathing circuit, you simply need to change the ventilation mode and the patient interface.



Assess lung recruitability and perform lung recruitment

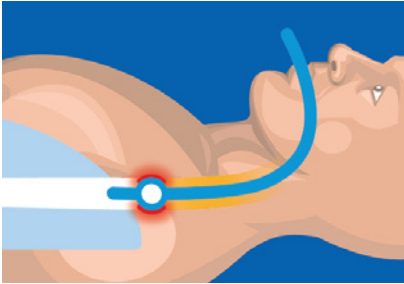
P/V Tool Pro provides a fully automatic maneuver that records the static pressure-volume curve quickly and easily at the bedside. P/V Tool Pro allows an easy assessment of lung recruitability, and provides a simple and safe way to perform lung-recruitment maneuvers.



Transpulmonary pressure measurement

The ventilator provides an auxiliary port to connect an esophageal balloon catheter and displays esophageal (Pes) and transpulmonary pressures (Ptranspulm). Transpulmonary pressure can be used in combination with the P/V Tool Pro to assess lung recruitability more precisely and perform recruitment maneuvers in ARDS patients.

High-end ventilation tools



Continuous cuff pressure management

IntelliCuff is a new noninvasive continuous cuff pressure controller integrated with the ventilator. IntelliCuff continuously monitors and adjusts set cuff pressure in real-time.



Volumetric capnography

Proximal flow and CO₂ measurement enables the HAMILTON-S1 to perform up-to-date volumetric capnography. This provides an important basis for the assessment of ventilation quality and metabolic activity. Alternatively the HAMILTON-S1 also offers sidestream CO₂ monitoring.



Integrated Aerogen® nebulizer (optional)

An integrated synchronized Aerogen nebulizer helps to conserve expensive medications. It improves drug delivery efficiency, and offers the potential to reduce drug and personnel costs associated with in-patient treatment, while maintaining the integrity of ventilator-dependent care.



SpO₂ measurement

The integration of the SpO₂ option with Hamilton Medical ventilators offers a new and innovative solution for noninvasive measurement. Hamilton Medical also provides a comprehensive portfolio of SpO₂ sensors.

Hamilton Medical

Intelligent Ventilation since 1983

In 1983 Hamilton Medical was founded with a vision: To develop intelligent ventilation solutions that make life easier for patients in critical care and 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 any situation

The ventilators from Hamilton Medical ventilate 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 to

- ✓ Increase the comfort and safety of your patients
- ✓ Make life easier for the caregivers
- ✓ Increase efficiency and return on investment

