



# HAMILTON-T1

Intelligent transport ventilation

**HAMILTON**  
**MEDICAL**

Intelligent Ventilation since 1983



KÜHLFACH

TAMED

WIDE

CAPNOMETRY  
MAXIMUS  
MEDICAL

# Intelligent transport ventilation

## HAMILTON-T1 - A fully featured intensive care ventilator for transport

The HAMILTON-T1 combines for the first time the functionality of a fully featured intensive care unit ventilator with the compactness and ruggedness required for transport. This is why the HAMILTON-T1 enables you to provide optimal ventilation therapy to all patient groups during transport, from the neonate to the adult. The HAMILTON-T1 provides:

- The performance of a fully featured intensive care unit ventilator
- Advanced ventilation modes including automated ventilation using ASV®
- Approvals and certificates for use in ambulances, helicopters and airplanes
- Tidal volumes from 20 ml to 2000 ml (optional from 2 ml to 300 ml for neonates)
- Independent from gas cylinders or compressors
- More than 9 hours of battery operating time without battery replacement



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We use the HAMILTON-T1 for intrahospital transport and transfers to other hospitals. This ensures that the patient receives the same quality of ventilation during transport as on the bedside.

Ralf Huth, Senior Physician Interdisciplinary Pediatric ICU  
Center for Pediatrics and Adolescent Medicine, Mainz, Germany

# Unlimited mobility

## Approved for all types of transport

The HAMILTON-T1 meets the transport standards EN 794-3 and ISO 10651-3 for emergency and transport ventilators, EN 1789 for ambulances and EN 13718-1 as well as RTCA/DO-160G for aircrafts. It reliably accompanies your patients to any destination either within or outside of the hospital, on the ground, at sea and in the air.

## Independent from compressed air

The integrated high-performance blower enables the HAMILTON-T1 to be completely independent from compressed air. This reduces weight and saves space, since you need neither gas cylinders nor a compressor. This allows even noninvasively ventilated patients to be transported successfully across greater distances.

## More than 9 hours of battery operating time

A battery operating time of more than 9 hours is provided by one integrated and one hot-swappable battery. The battery operating time can be prolonged indefinitely with additional hot-swappable batteries.

## Lightweight, compact and sturdy

The compact design and light weight of the HAMILTON-T1 make handling of the ventilator much easier. The water-resistant housing offers impact protection and a shock-resistant, anti-reflective display. This makes the HAMILTON-T1 a rugged and reliable companion.



# Optimal performance

## From neonates to adults

The HAMILTON-T1 provides a tidal volume range of 20 ml to 2000 ml, optional 2 ml to 300 ml for neonates. This allows for the effective, safe and lung-protective ventilation of all patient groups, from neonates to adults.

## 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 in invasively and noninvasively ventilated patients.

## High-precision measurement of pressure, volume and flow

The reliable and sturdy flow sensor precisely measures the pressure, volume and flow directly at the patient's airway opening. This provides the required sensitivity and response time and prevents dead space ventilation. Your patient is better synchronized and has less work of breathing as a result.

## Oxygen adjustable from 21% to 100%

The finely adjustable oxygen concentration enables you to resume the bedside settings one-to-one during transport. The adjustment to 21% even gives you the possibility to ventilate your patient with ambient air only.



## Product overview

- 1 Handle available in different styles
- 2 Patient interfaces & ports
- 3 Push & turn control knob
- 4 Ventilation Cockpit
- 5 360° visible alarm lamp
- 6 Worldwide compatible power supply (AC/DC)
- 7 Installation and mounting options (selection)
- 8 Hot-swappable battery
- 9 Transport rack with oxygen cylinder (optional)



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ASV has been very successfully used in clinical practice. Our crews who use ASV on a daily basis are very excited and report that the ventilator can almost be completely relied upon to do the job and the patient can be set up without a hurry.

Dr. Olivier Seiler, Deputy Medical Director until 2014  
Rega Air Ambulance, Zurich, Switzerland



# 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.<sup>1), 2)</sup>

## 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.<sup>3)</sup>

## Shortened ventilation time

Clinical studies show that

- ASV supports earliest possible spontaneous breathing by the patient <sup>4), 5)</sup>
- ASV shortens the ventilation time in various patient populations <sup>4), 5)</sup>

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 HAMILTON-T1 to allow intuitive operation and direct access to important settings. All Hamilton Medical ventilators are operated according to the same principle, which makes switching between different devices very easy.

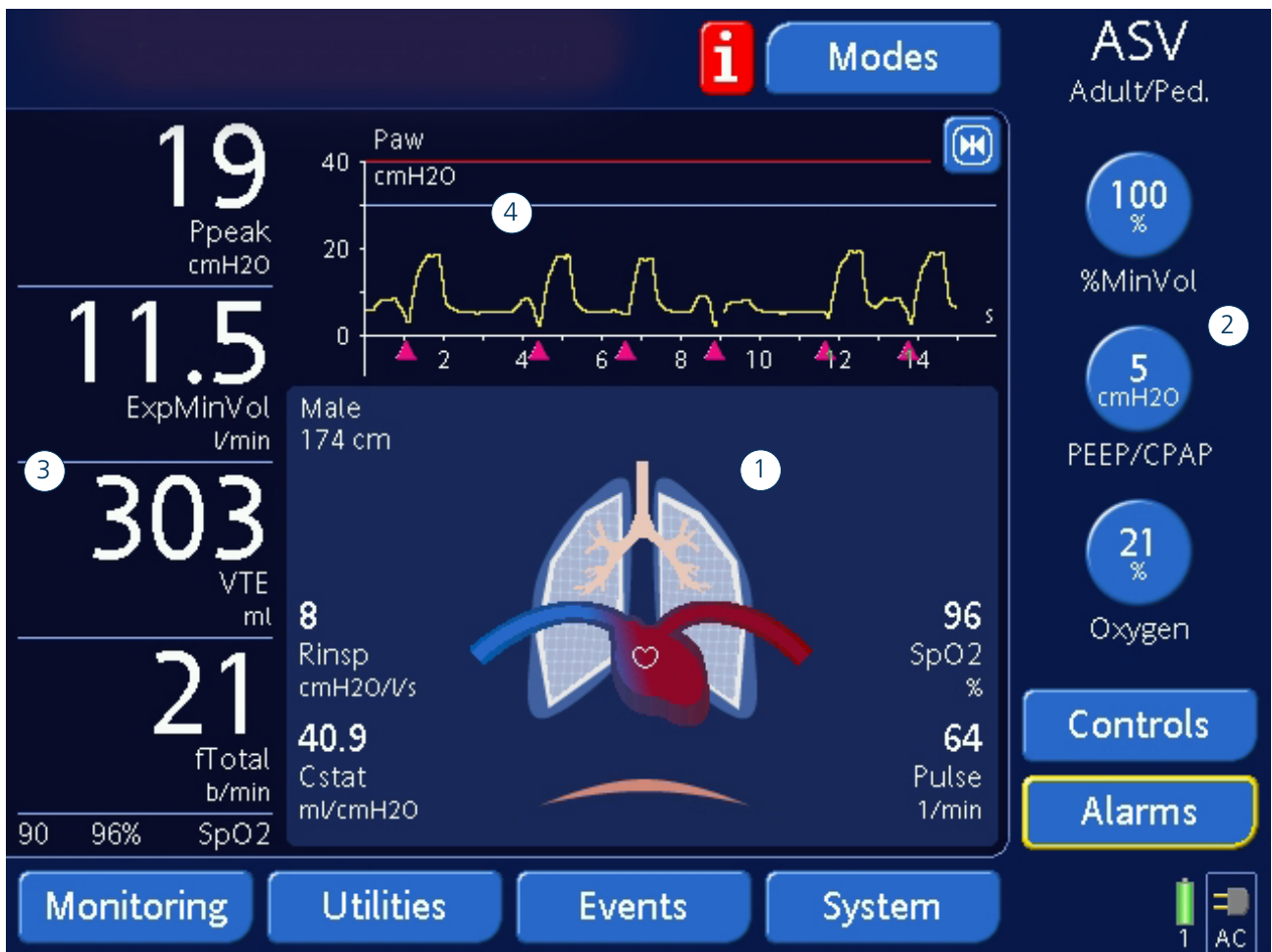
## Easy-to-understand monitoring

Ventilators display large amounts of monitoring data which are often difficult to interpret. The Ventilation Cockpit of 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 provides a reliable basis for therapy decisions.

## More time for your patient

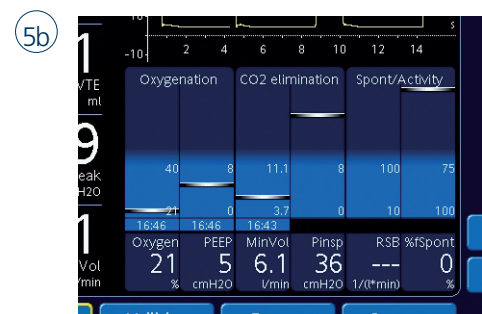
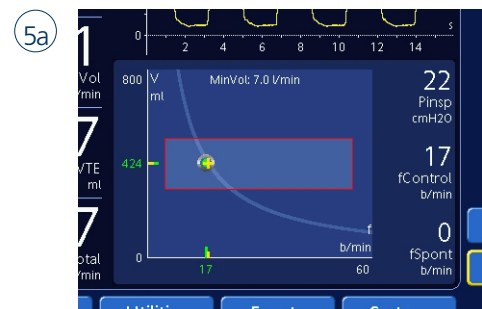
In ASV mode, the ventilator continuously adjusts to the patient's breathing activity. This means fewer user interactions are required and significantly less alarms go off. You therefore have more time for your patients.

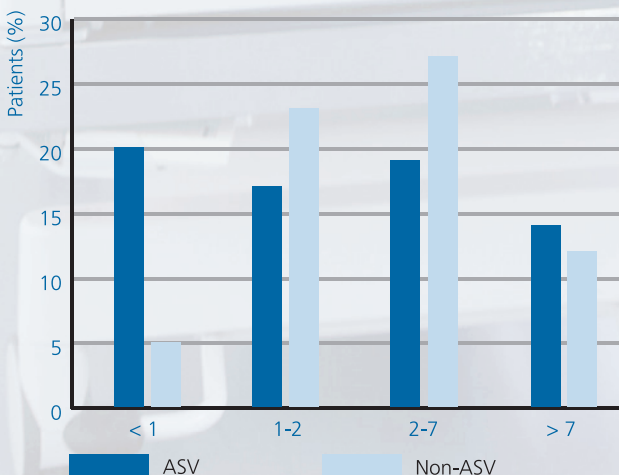




## The Ventilation Cockpit

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





Patients in the medical intensive care unit could be extubated earlier following the introduction of ASV.<sup>5)</sup>

Time to Extubation Readiness (d)

# Increased efficiency

## Integrated commercial considerations

Ventilators are capital goods that need to be evaluated for cost efficiency. Aspects 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 the cost price and the operating costs.

## Reduction of treatment costs

Each eliminated ventilation day significantly reduces treatments costs - on average by 1,500 USD, according to a study.<sup>1)</sup> 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 roughly 57,000 USD per case.<sup>2)</sup>

## Optimal utilization of human resources

Hamilton Medical ventilators, along with ASV, can reduce the time needed for standard settings and alarm management while maintaining ventilation quality.<sup>3), 4)</sup> This frees up time for other aspects of patient care. Thanks to the ease of operation, the consistent operating concept and the free e-learning offering from Hamilton Medical, the demand for education and training is also reduced.

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

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

# Perfection in every detail



## Operation via touchscreen or push & turn knob

You can operate the HAMILTON-T1 via the touchscreen or by using a single knob. Hard keys provide direct access to the most important functions.

## 360° visible alarm lamp

From a distance or in helicopters and aircrafts with a high noise level, the ventilator alarming is easily identified by the top-mounted alarm lamp.



## Quick start-up

Individual modes and numerous settings can be stored in up to three quick start-up settings. This saves you valuable time when you have a limited window to start ventilation.



## Use with night vision goggles (optional)

Thanks to the night vision option the HAMILTON-T1 can easily be used with night vision devices without affecting the pilot's visibility.

## Volumetric capnography (optional)

Proximal flow and CO<sub>2</sub> measurement enables the HAMILTON-T1 to perform up-to-date volumetric capnography. This provides an important basis for the assessment of ventilation quality and metabolic activity.



# Optimized performance for neonates (optional)

## Tidal volumes as low as 2ml

With tidal volumes as low as 2 ml, the HAMILTON-T1 provides effective, safe and lung-protective ventilation of even the smallest preterm infants.<sup>1)</sup> 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, because uncuffed tubes are being used. 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-T1 are 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.

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 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 every 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 the life easier for the caregivers
- Increase the efficiency

