ASV®

Adaptive Support Ventilation

Swiss Quality

HAMILTON MEDICAL

Intelligent Ventilation since 1983

We live for ventilation technology

We live for ventilation technology that helps caregivers improve the lives of their critically ill patients. We believe that innovation is essential to meet the demands of critical care. To us, innovation is about realizing visionary new ideas and continuously improving existing products, always keeping patient safety and ease of use in focus.

We learn from our customers and from multi-disciplinary experts. And we invest in long-term research and development. We develop Intelligent Ventilation solutions: devices and consumables for the ventilation of all critically ill patients – from neonates to adults.

Jens Hallek
President

Bob Hamilton
Member of the board

What is ASV?

Ventilation adapted to the patient

Hamilton Medical developed the Intelligent Ventilation mode Adaptive Support Ventilation® (ASV®) to make mechanical ventilation easier to use for the caregiver, and at the same time safer and more comfortable for the patient. Therefore, ASV employs lung-protective strategies and adjusts ventilation automatically – breath by breath, 24 hours a day, from intubation to extubation. ASV also encourages the patient to breathe spontaneously, thereby promoting early extubation.

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

The highest-ranking ventilation mode

ASV is a well-established mode in critical care since 1998 and has become a standard mode in many hospitals around the world. A recent publication named ASV and the next generation INTELLiVENT-ASV* as the highest-ranking ventilation modes on the market, based on technological capabilities related to the goal of patient safety, comfort, and liberation.[1]

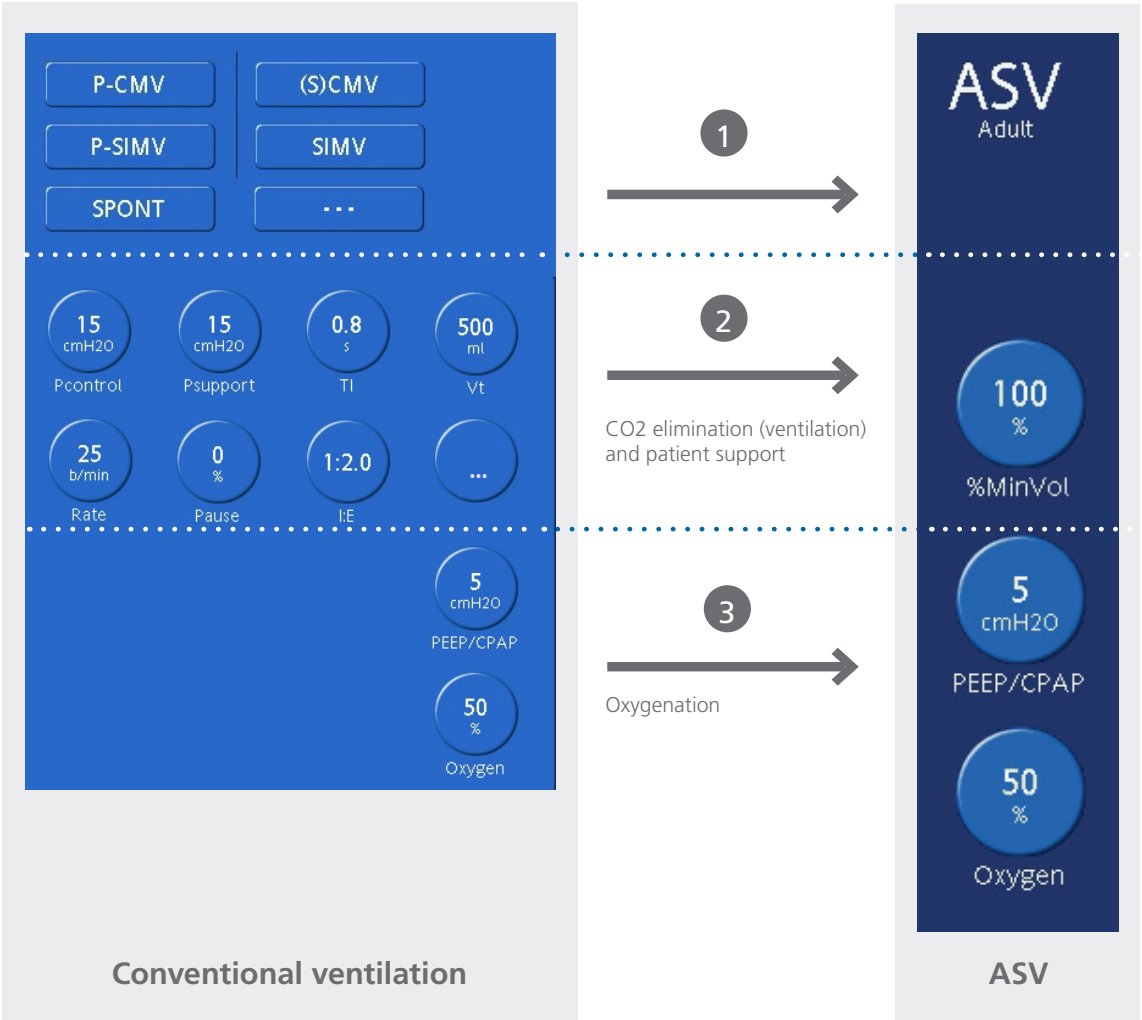
Criteria	INTELLiVENT-ASV	ASV	Smart-Care®	Auto-mode	NAVA®	PAV
Patient safety	6	3	1	3	0	0
Patient comfort	4	4	3	3	4	3
Liberation	3*	1	3	1	1	0
Points total	**13**	**8**	**7**	**7**	**5**	**3**

1 Mireles-Cabodevila E. Respir Care. 2013 Feb;58(2):348-66. *Erratum in: Respir Care. 2013 Apr;58(4):e51.

One mode from intubation to extubation

Only three major controls

In conventional ventilation modes, the clinician sets ventilator controls such as tidal volume, pressure, respiratory rate, and expiratory and inspiratory time to achieve clinical targets, including a certain level of alveolar ventilation and oxygenation for the patient depending on the patient's activity. ASV makes ventilation easier by providing one mode for both active and passive intubated patients, and only three parameters to control ventilation as well as oxygenation.



How ASV works

Setting the target

Conventional ventilators are set manually and need constant assessment by the clinician. ASV automates this process, making it the world's first Intelligent Ventilation mode.

The clinician sets the target minute volume and the ventilator determines the combination of tidal volume and respiratory rate according to the respiratory mechanics of the patient.

1. Assess the patient's lung mechanics breath by breath.

ASV in passive patients

In passive patients, ASV is a volume-targeted pressure-controlled mode with automatic adjustment of inspiratory pressure, respiratory rate, and inspiratory/expiratory time ratio.

Maximum tidal volume is controlled by setting a maximum inspiratory pressure. Expiratory time is determined according to the expiratory time constant to prevent dynamic hyperinflation.

2. Optimize the tidal volume/ respiratory frequency combination breath by breath based on lung mechanics.

ASV in active patients

In spontaneously breathing patients, ASV is a volume-targeted pressure support mode with automatic adjustment of pressure support according to the spontaneous respiratory rate.

The automatic decrease of pressure support, when the patients recover their inspiratory strength, is very useful for weaning. ASV can also be used to perform a weaning trial before extubation.

3. Achieve optimum tidal volume/ respiratory frequency by automatically adjusting mandatory rate and inspiratory pressure

Ease of use

One mode for all

ASV can be used for almost all of your adult and pediatric intubated patients, including post-operative, COPD, and ARDS partients.[2, 3, 4, 5] It supports both active and passive patients, and automatically adjusts the level of support needed.

Visual decision support

Hamilton Medical's graphical user interface is recognized as one of the best in the field.[7] It gives clinicians an instant overview of critical parameters and patient status, providing valuable aid to clinical judgment.

Provide patient-centered care with fewer resources

ASV automatically and continuously adjusts respiratory rate, tidal volume, and inspiratory time depending on the patient's lung mechanics and effort. This eliminates the need for separate modes for passive and active patients, and reduces the number of controls that need to be set. Studies have shown that ASV requires fewer manipulations and generates fewer alarms than conventional modes.[2, 3, 6] This helps to shorten training periods and to decrease the workload for the clinical staff.

2 Celli P. Transplant Proc. 2014 Sep;46(7):2272-8. | 3 Sulzer CF. Anesthesiology. 2001 Dec;95(6):1339-45. | 4 Gruber PC. Anesthesiology. 2008 Jul;109(1):81-87. | 5 Kirakli C. Eur Respir J. 2011 Oct;38(4):774-80. | 6 Petter AH. Anesth Analg. 2003 Dec;97(6):1743-1750. | 7 Vignaux L. Intensive Care Med. 2009 Oct;35(10):1687-91.

"

What ASV does for us as therapists is it allows us to make sure that we are crafting the breath in the absolutely best possible way for that patient at that time.

Craig Jolly, RRT, Adult Clinical Education Coordinator
University Medical Center, Lubbock (TX), USA

Four steps - as simple as that

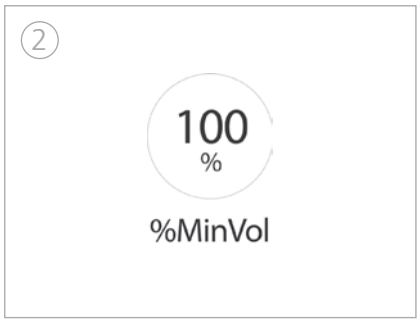
Step 1: Set patient height and gender

First you set the gender and height of the patient. The ventilator will then calculate the patient's ideal body weight.

Step 2: Set the target minute volume

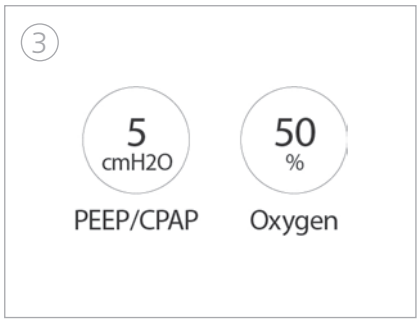
Determine the target minute volume in terms of percentage of normal minute volume. ASV sets a default target minute volume of 100%.

This equals a normal minute ventilation of 100 ml per kg per minute in adults and up to 300 ml per kg per minute in children. Depending on patient conditions, a higher minute volume might be necessary to reach an appropriate CO2 level.



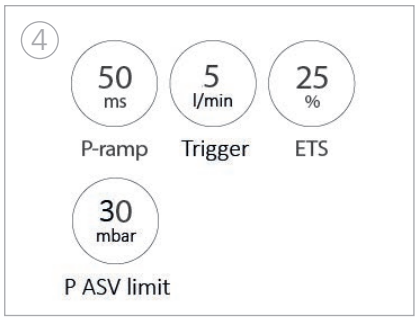
Step 3: Set oxygenation controls

Set PEEP and Oxygen values to provide appropriate oxygenation.



Step 4: Set controls for synchronization and lung protection

Define the values for pressure ramp, trigger, expiratory trigger, and maximum pressure limit. You can then start the ventilation.



Lung-protective ventilation

Guiding the patient toward the target

ASV continuously adjusts the settings to keep the patient within the target zone (red square), and guides the patient's current values (yellow cross) to the target point (green circle), for both active and passive patients. When the patient condition meets the target point, the patient is considered optimally ventilated according to ASV.

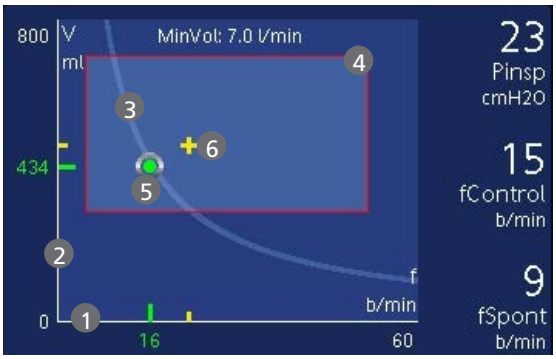
1. Horizontal axis for respiratory rate (f)
2. Vertical axis for tidal volume (Vt)
3. Minute volume curve
4. Safety frame defined by lung-protective rules
5. Target point, formed by intersection of target tidal volume and target rate
6. Current patient values, formed by intersection of measured tidal volume and current respiratory rate

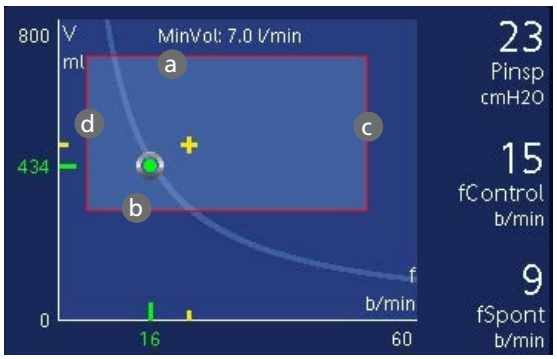
Applying lung-protective rules

This lung-protection strategy ensures the patient's safety while maintaining an operator-preset, minimum minute ventilation independent of the patient's activity.

ASV applies a lung-protective strategy to avoid

a. High tidal volumes and pressures
b. Low alveolar ventilation
c. Dynamic hyperinflation or breath stacking
d. Apnea





Assess readiness to wean

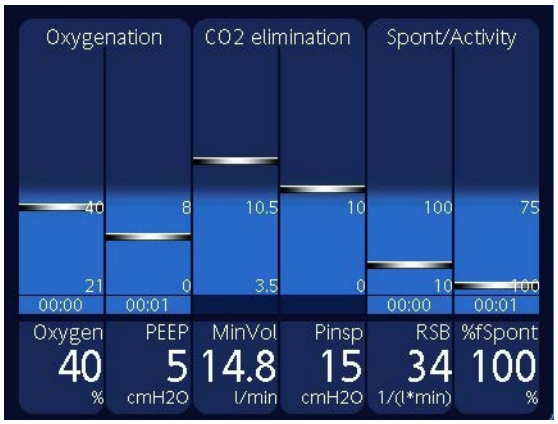
The Vent Status panel visualizes the dependence of the patient on the ventilator and indicates whether the patient might be ready for extubation.

The six displayed parameters relate to the patient's ventilator dependence, including oxygenation, CO2 elimination, and patient activity.

The floating indicators moving up and down within the columns show the value for the given parameters, and are updated breath by breath.

When all indicators have reached the light-blue weaning zone, a timer starts, showing how long the patient has been in the weaning zone. Spontaneous breathing trials should now be considered.

You can define the weaning zone ranges to adapt them to the weaning protocol of your institution.



The floating indicators within the columns show the value for the given parameters – updated breath by breath.

When all indicators have reached the light blue weaning zone, spontaneous breathing trials should be considered.

More safety and comfort for your patients

Enhanced patient comfort

ASV measures the patient's lung mechanics and activity on a breath-by-breath basis and automatically adjusts ventilation, thereby always supporting the patient at the level currently needed. ASV ensures, via an optimal breathing pattern, that the patient receives the set minute volume, independent of the patient's activity.

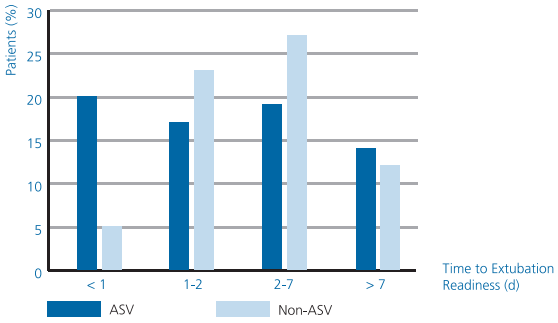
Lung-protective ventilation

ASV employs lung-protective strategies to minimize complications from AutoPEEP and volutrauma/ barotrauma. It also prevents apnea, tachypnea, dead space ventilation, and excessively large breaths.[8]

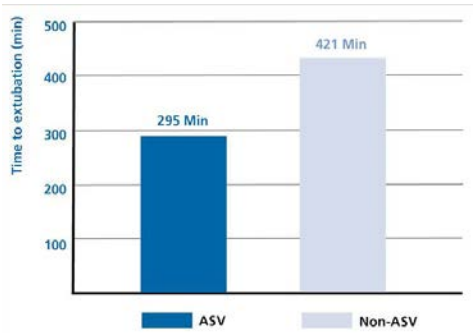
Decreased ventilation time

Within the rules of this lung-protective strategy, ASV encourages the patient to breathe spontaneously. According to several studies, ASV supports earliest possible spontaneous breathing by the patient [9, 10] and shortens the ventilation time in various patient populations [9, 10]

8 Sulemanji D. Anesthesiology. 2009 Oct;111(4):863-70. | 9 Kirakli C. Eur Respir J. 2011 Oct;38(4):774-80. | 10 Chen CW. Respir Care. 2011 Jul;56(7):976-83. | 11 Zhu F. Anesthesiology. 2015 Jan 7. [Epub ahead of print]



Patients in the medical intensive care unit could be extubated earlier following the introduction of ASV.[10]



ASV was associated with fewer manual ventilator changes and alarms, and lower airway pressure.[11]

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ASV in particular has proven its worth in everyday use. Our crews are highly enthusiastic about it. They say that they don’t have to worry about the ventilation and can focus on setting the patient up.

Dr. Olivier Seiler, Deputy Medical Director (till 2014)
Rega Air Ambulance, Zurich, Switzerland

Increase in efficiency

Reduction of treatment costs

It has been shown that the use of 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 up to 57,000 USD per case.[13]

Efficient ventilator management

Patients’ lung mechanics change constantly during ventilation. Clinicians, however, do not always have the time to monitor and adjust settings for each patient, minute by minute ~~and hour by hour~~. ASV helps by adapting to the changing conditions and needs of each patient,[14] from intubation to extubation.[15] This reduces the workload of clinicans and simultaneously ensures safe and comfortable ventilation for the patient.

Less time needed for training and education

ASV can reduce the time needed for standard settings and alarm management while maintaining ventilation quality[14, 16] This frees up time for other aspects of patient care.

12 Dasta JF et al. Critical Care Med. 2005 Jun;33:1266-71. | 13 Cocanour CS et al. Surg Infect. 2005 Spring;6:65-72. | 14 Iotti G et al. Intensive Care Med 2010;36:1371-9. | 15 Arnal JM et al. Intensive Care Med 08;34:75-81. | 16 Petter AH. Anesth Analg. 2003 Dec;97(6):1743-50

Download the ASV software simulation:
www.hamilton-medical.com/Landingpages/ASV

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