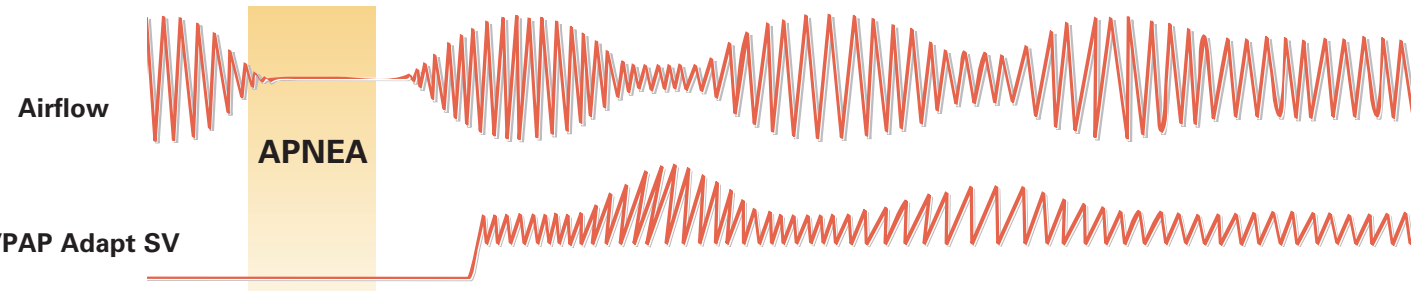
ResMed

VPAP® Adapt SV and Adaptive Servo-Ventilation

Technology Fact Sheet



VPAP Adapt SV RESPONDS TO APNEA BY INCREASING SUPPORT

VPAP® Adapt SV and Adaptive Servo-Ventilation

With its advanced Adaptive-Servo Ventilation (ASV) algorithm, the ResMed VPAP Adapt SV provides ventilatory support to rapidly treat all forms of central sleep apnea (CSA), mixed apnea and periodic breathing, commonly known as Cheyne-Stokes respiration (CSR).

The ASV algorithm delivers customized therapy

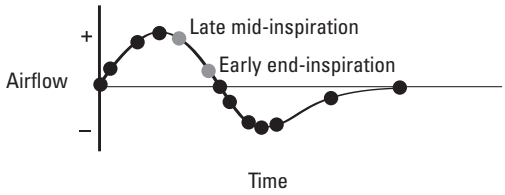
Ventilation to a moving target

To determine the degree of pressure support needed, the ASV algorithm continuously calculates a target ventilation. Based on respiratory rate and tidal volume, the target is 90% of the patient's recent average ventilation—that means that ventilation can vary gradually and naturally over the course of the night.

Patient/machine synchronization

The algorithm uses three factors to achieve synchronization between pressure support and the patient's breathing.

1. The patient's own recent average respiratory rate—including the ratio of inspiration to expiration and the length of any expiratory pause.
2. The instantaneous direction, magnitude, and rate of change of the patient's airflow, which are measured at a series of set points during each breath.
3. A backup respiratory rate of 15 breaths per minute.



Delivered ventilation is matched to patient respiration via a series of set points identified in each breath.

To ensure ventilatory support is synchronized to the patient's effort, the VPAP Adapt SV relies on factors one and two. When a central apnea/hypopnea occurs, support initially continues to reflect the patient's recent breathing pattern. However, as the apnea/hypopnea persists, the device increasingly uses the backup respiratory rate.

Minimal support during stable breathing

The ASV algorithm starts working even before central sleep apnea events occur, from the moment the patient lies down, puts on the mask and switches on the VPAP Adapt SV.

So long as ventilation is at or above the target:

- the magnitude of the pressure support remains minimal—the default minimum value of 3 cm H_20 provides enough support to do about half the work of breathing.

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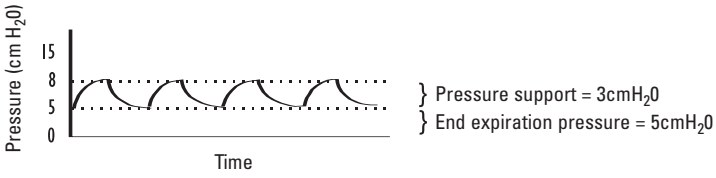


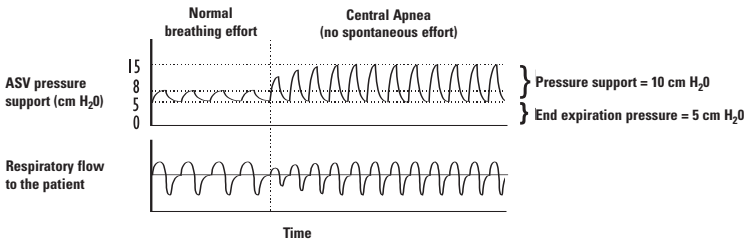
Comfortable, minimal pressure support when breathing is stable

- the underlying end expiration pressure (EEP) is clinician adjustable from 5 to 10 cm H_20, helps reduce obstructive events and can also reduce central events.

Support when it's needed

When a central hypopnea/apnea occurs and ventilation suddenly drops below the target:

- pressure support rapidly increases over a few breaths to keep ventilation at the target
- the default maximum pressure support value of 10 cm H_20 will fully ventilate a centrally apneic patient with an open airway and normal lungs.

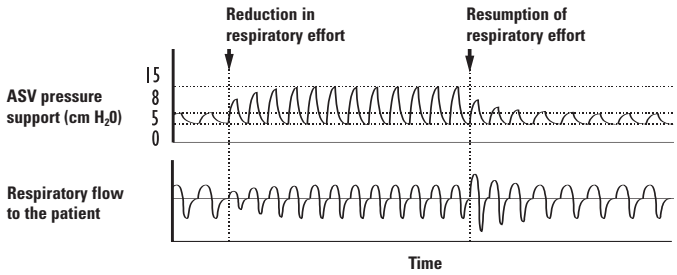


ASV algorithms respond to central hypopnea/apnea

Adaptive support when breathing resumes

As breathing resumes and total ventilation exceeds the target:

- pressure support is rapidly reduced back towards the minimum 3 cm H_20
- this reduces the likelihood of over-ventilation and hypocapnia, which can lead to vocal cord closure and further apneas.



ASV responds when breathing effort resumes

Why ASV instead of bilevel?

Most CSA/CSR patients have trouble tolerating conventional bilevel ventilatory support. The pressure must be adjusted to a constant high level to adequately support a patient during apnea/hypopnea. This leads to over-ventilation during periods of normal breathing or hyperpnea, which causes arousals and discomfort. It can even propagate more CSA events.

The ASV algorithm stabilizes patient breathing

By ventilating the patient appropriately during periods of hypopnea and apnea and reducing support during periods of hyperventilation and normal breathing, the ASV algorithm rapidly stabilizes breathing patterns and arterial blood gases and minimizes discomfort and arousals often associated with bilevel treatment.

ResMed Corp Poway CA USA +1 858 746 2400 or 1 800 424 0737 (toll free), ResMed Ltd North Ryde NSW Australia +61 2 9886 5000 or 1 800 658 189 (toll free). Offices in Austria, Finland, France, Germany, Japan, Malaysia, Netherlands, New Zealand, Singapore, Spain, Sweden, Switzerland, United Kingdom (see web site for details) Protected by patents: AU 691200, AU 697652, AU 702820, AU 709279, AU 724589, AU 730844, AU 731800, AU 736723, AU 734771, AU 750095, AU 750761, AU 756622, AU 761189, AU 2002306200, EP 0661071, JP 3635097, US 4944310, US 5199424, US 5245995, US 5522382, US 5704345, US 6029665, US 6138675, US 6152129, US 6240921, US 6279569, US 6363933, US 6367474, US 6398739, US 6425395, US 6502572, US 6532959, US 6591834, US 6659101, US 6945248, US 6951217. Other patents pending. Protected by design registrations: AU 147283, AU 147335, AU 147336, AU 157903, AU 157904, AU 157905, CH 128.709, CH 128.710, CH 128.711, CN 200330123689.X, CN 200330123691.7, CN 200330123690.2, EP 000111190, DE 40202007, DE 40202008, DE 40201723, DE 40202020, ES 153514, ES 153515, ES 153516, ES 153518, FR 02 1407, GB 3001791, GB 3001819, GB 3001820, GB 3001821, JP 1164087, JP 1164265, JP 1164266, JP 1164267, SE 75598, SE 75599, SE 75600, SE 75715, US D467335, US D468011, US D476077, US D477868, US D493520, US D493884, US D497203, US D498527. Other designs pending. VPAP Adapt SV is a trademark of ResMed Ltd and VPAP is registered in U.S. Patent and Trademark Office. 1010807/1 05 10