



ResMed's ASV solutions:
managing your complex patients efficiently

ASV: therapy designed for complex patients

What is ASV therapy?

ASV (adaptive servo-ventilation) is a form of positive airway pressure therapy that delivers auto-adjusting pressure support. ASV helps to treat both obstructive and central respiratory events and maintains adequate ventilation in response to patients' changing needs.

Who is ASV therapy suitable for?

ASV is specially designed for individuals with central sleep-disordered breathing (SDB). Central SDB can occur in various forms, including:

- central sleep apnoea (CSA)
- complex sleep apnoea (CompSA)
- mixed sleep apnoea
- periodic breathing

Central SDB is frequently associated with cardiovascular diseases (e.g. coronary artery disease, stroke, heart failure, atrial fibrillation), the use of opioids, or PAP therapy. They can also arise spontaneously.

When can ASV therapy be prescribed?

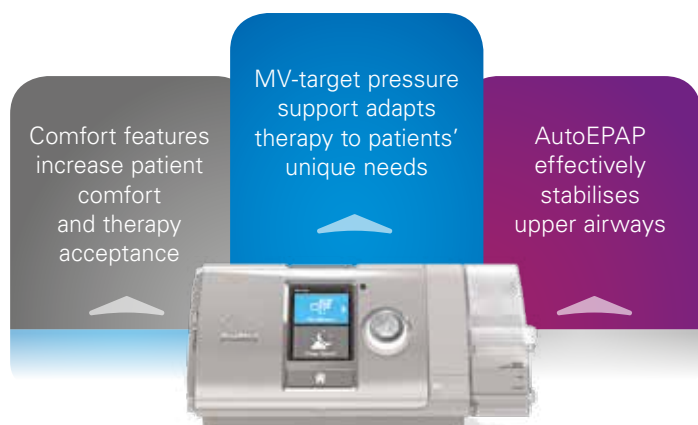
It can be challenging to treat patients with central SDB. Continuous positive airway pressure or automatic positive airway pressure (CPAP/APAP) therapy is often used as the treatment of first intention, but experience shows that CPAP/APAP does not consistently control apnoeas or improve symptoms.

As a result, some patients treated with CPAP/APAP remain symptomatic and this increases the risk of noncompliance and the likelihood that they will require multiple, resource-intensive interventions.

ASV is always an appropriate choice for treating most of these more complex patients, either as a first intention therapy or after an unsuccessful trial with other PAP therapies.

Why choose ResMed's ASV solutions?

ResMed's ASV solutions combine a unique ASV algorithm, PaceWave™, with a range of devices and data management tools. They are an easy and effective way to manage patients with central SDB from initial diagnosis through to long-term care.



Benefits provided by ResMed ASV devices featuring PaceWave

How prevalent is central SDB?



1.5%

of OSA (obstructive sleep apnoea) patients suffer from CompSA.¹

Up to 45%

of patients on opioids for chronic pain suffer from CSA or CompSA.²

5-12%

of ischemic and hemorrhagic stroke and transient ischemic attack (TIA) patients suffer from primarily central apnoeas.³

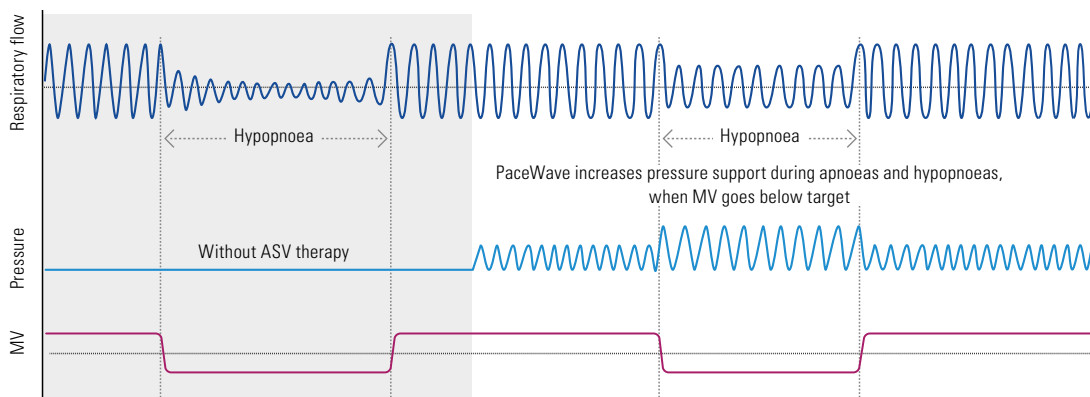


PaceWave technology personalises therapy

Treating patients affected by central SDB often requires a personalised approach. PaceWave provides therapy that responds rapidly to the needs of each individual patient.

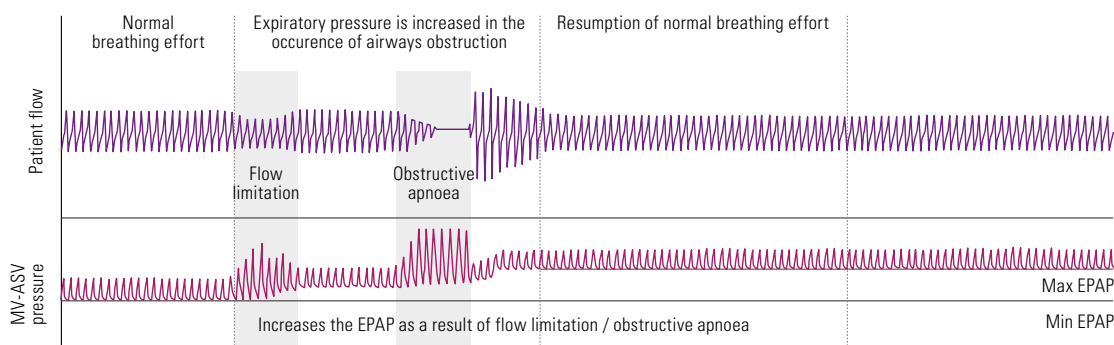
MV-target pressure support: physiological therapy to stabilise breathing

PaceWave keeps your patient's breathing stable and as close to their natural patterns as possible. It prevents under- and over-ventilation by treating apnoeas and hypopnoeas while reducing the risk of hyperpnoeas. It sets a suitable target minute ventilation for your patient: 90% of their most recent minute ventilation based on a three-minute moving average. When the patient's minute ventilation falls below the target, PaceWave automatically adjusts the inspiratory pressure to provide backup support. As the patient's breathing stabilises, the pressure is rapidly returned to the minimum required.



AutoEPAP to stabilise upper airways

PaceWave can treat obstructive events in the upper airway. In ASV mode, the EPAP level must be set manually. In ASVAuto mode, PaceWave responds automatically to obstructive events (apnoeas, flow limitation and snoring) by adjusting the expiratory pressure to support upper airway patency.



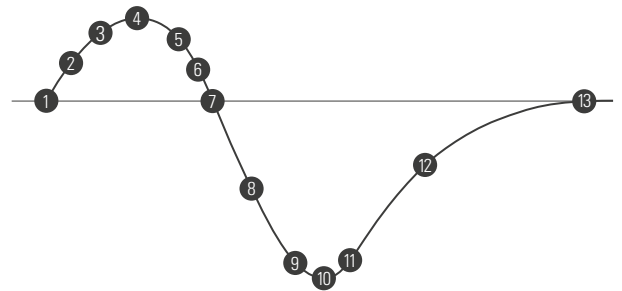


Comfort for compliance and success

Patient-device synchrony is essential to therapeutic comfort. All ResMed ASV devices offer PaceWave and additional features, such as Ramp, that optimise comfort for greater therapeutic compliance and success.

Synchronising therapy with each and every breath

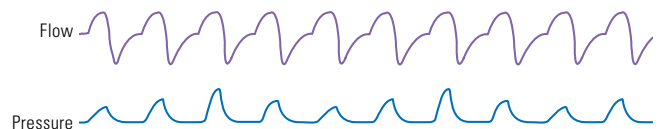
PaceWave precisely measures your patient's respiratory rate and airflow in real-time. PaceWave tracks a set of 13 predefined points to create a high-resolution breath map, then uses this information to predict and adapt the pressure delivered to match your patient's spontaneous breathing patterns and workload.



Additional features for enhanced comfort

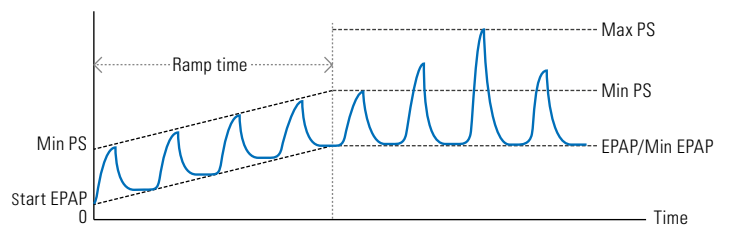
Easy-Breathe waveform

The patented Easy-Breathe waveform intelligently recreates both the inspiratory and expiratory cycles within your patient's breath. As a result, their therapy more closely matches their natural breathing patterns.



Ramp

The Ramp feature helps patients ease into treatment by delivering low pressure at the start of the therapy session then gradually increasing the pressure to the prescribed level. The increase occurs after a programmed amount of time, by which point the patient should have fallen asleep.



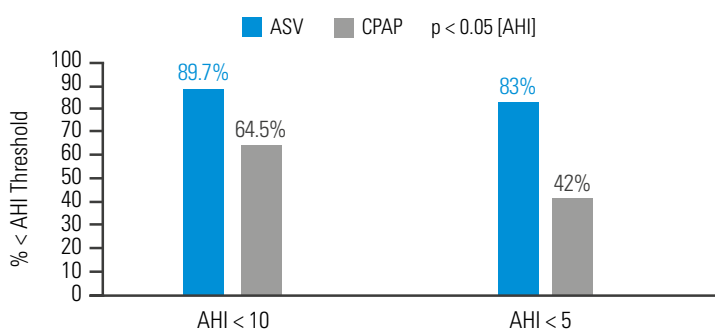
ASV: a proven solution for central SDB

Compared to other forms of PAP therapy, ASV offers significant benefits for the treatment of central SDB*. This has been demonstrated in multiple clinical trials across various patient types.

ASV better than CPAP at controlling respiratory events in patients with CompSA

In an intention-to-treat analysis, success (apnoea-hypopnoea index [AHI] < 10) at 90 days of therapy was achieved in 89.7% of patients treated with ASV versus 64.5% of participants treated with CPAP.⁴

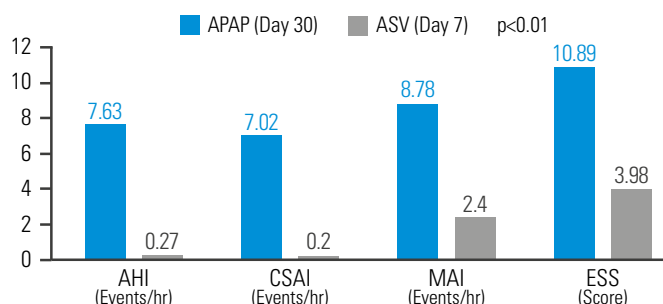
[N = 66, prospective randomised trial]



ASV decreases residual sleepiness after APAP therapy in patients with mixed sleep apnoea

After 30 days of APAP treatment, ASV provided a further reduction (compared to baseline) of 12.9% in AHI, 48.5% in central sleep apnoea index (CSAI), 26.1% in micro-arousal index (MAI), and 37.9% in Epworth Sleepiness Scale (ESS) score at similar mean pressure.⁵

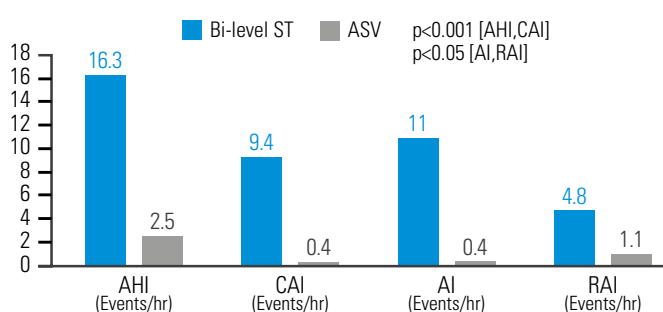
[N = 42, sequential study]



ASV better than bi-level ST at reducing respiratory events in opioid-induced CSA

In opioid-induced CSA, ASV therapy reduced AHI by 84.7%, central apnoea index (CAI) by 95.7%, apnoea index (AI) by 96.4%, and respiratory arousal index (RAI) by 77.1% when compared to bi-level ST. Respiratory parameters were normalised in 83.3% of patients on ASVAuto but only 33.3% of patients on bi-level ST.⁶

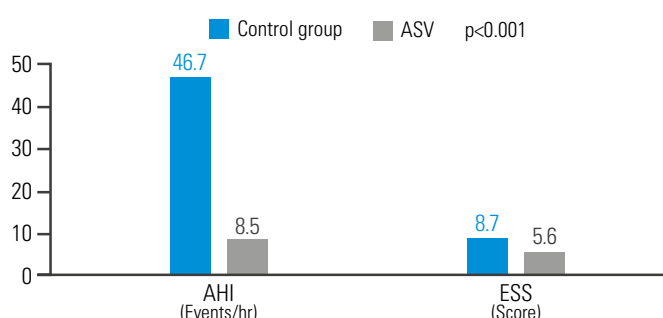
[N = 18, prospective, randomised crossover polysomnography study]



ASV improves AHI and ESS in post-acute ischemic stroke patients

ASV therapy improved outcomes for post-acute ischemic stroke patients with CSA, reducing AHI by 81.8% and ESS by 35.6%.⁷

[N = 15, single centre retrospective analysis]



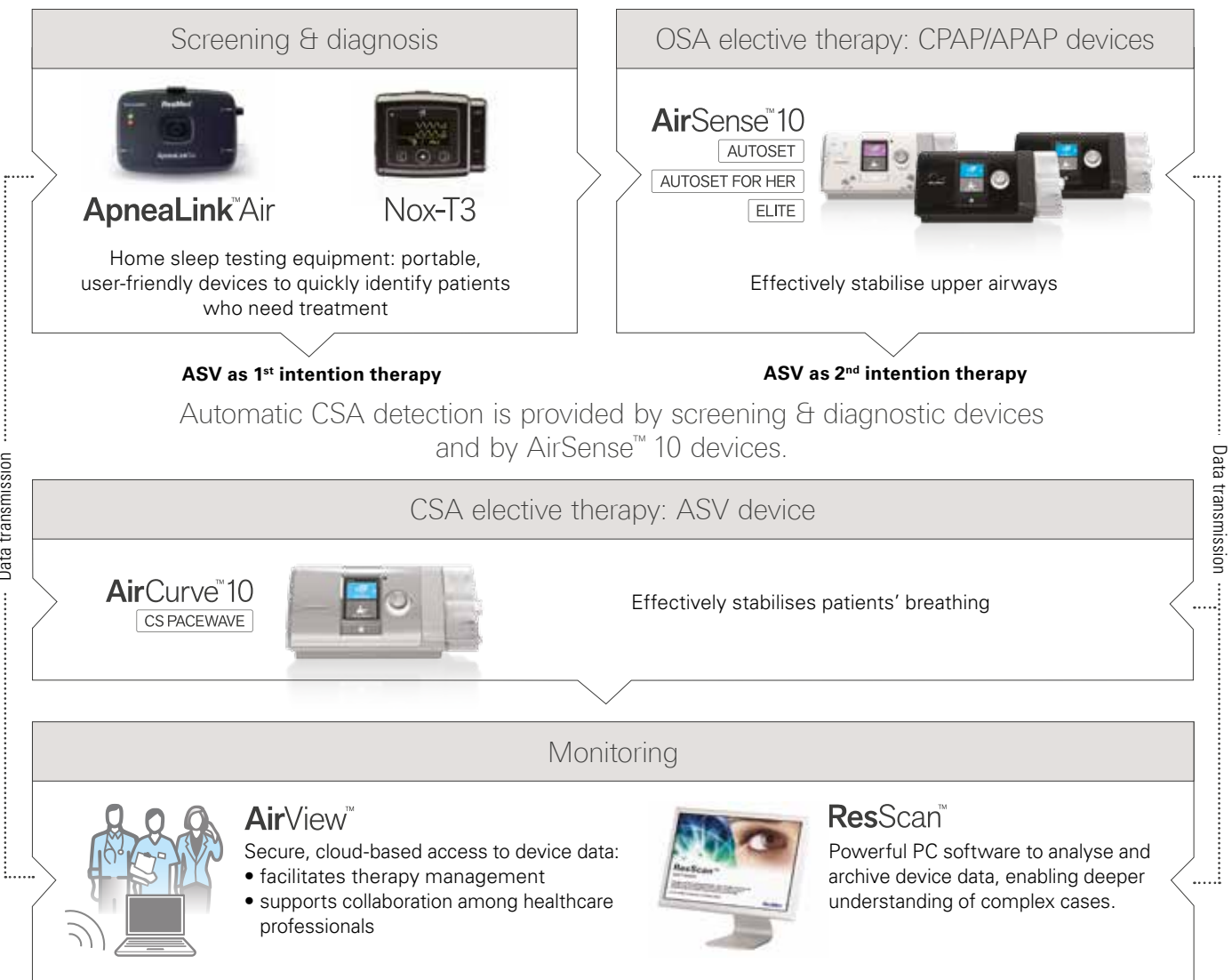


From initial diagnosis to long-term care

ResMed solutions make it easier to manage your most complex patients along the whole care pathway, from initial diagnosis to long-term care.

Screening and diagnostic devices, as well as the AirSense™ 10 platform, feature algorithms that automatically detect when patients are affected by central SDB.

ResMed devices and solutions support informed decision-taking by providing quick and easy access to relevant data and reports. Information can be securely stored and accessed on the cloud and via traditional PC software.



1 Javaheri S., Smith J., Chung E., The Prevalence and Natural History of Complex Sleep Apnea, *Journal of Clinical Sleep Medicine*, Vol.5, No. 3, 2009.
 2 Mogri M et al. Hypoxemia in patients on chronic opiate therapy with and without sleep apnea. *Sleep Breath*, 2009;13:49-57.
 3 Karin G. Johnson and Douglas C. Johnson. Frequency of Sleep Apnea in Stroke and TIA Patients: A Meta-analysis. *J Clin Sleep Med*, 2010;6(2):131-137.
 4 Morgenthaler et al. The Complex Sleep Apnea Resolution Study. *Sleep*, Vol. 37, No. 5, 2014.
 5 Su et al. Adaptive pressure support servoventilation: a novel treatment for residual sleepiness associated with central sleep apnea events. *Sleep Breath*, 2011;15:695-699.
 6 Cao et al. A Novel Adaptive Servoventilation (ASVAuto) for the Treatment of Central Sleep Apnea Associated with Chronic Use of Opioids. *Journal of Clinical Sleep Medicine*, Vol. 10, No. 8, 2014.
 7 Brill et al. Adaptive servo-ventilation as treatment of persistent central sleep apnea in post-acute ischemic stroke patients. *Sleep Medicine* 15, 2014;1309-1313.

*ASV therapy is contraindicated in patients with chronic, symptomatic heart failure (NYHA 2-4) with reduced left ventricular ejection fraction (LVEF ≤ 45%) and moderate to severe predominant central sleep apnoea.