RESMED

INTRODUCING RESMED'S

Home NIV Solutions

S9™ VPAP™ ST-A with iVAPS
S9™ VPAP™ ST

Why choose average
when you can choose intelligent?

iVAPS

ResMed Ventilation Solutions
Making quality of care easy

Now you can provide intelligent air through ResMed's intelligent Volume-Assured Pressure Support (iVAPS). A unique technology featured in the S9 VPAP ST-A, it adjusts to a patient's respiratory rate, targets alveolar ventilation and automatically adjusts pressure support as needed to accommodate each patient's unique needs, even as a their disease progresses.

Intelligent air improves treatment and streamlines setup

New iVAPS technology in the S9 VPAP ST-A simplifies the process of ensuring appropriate ventilation for the patient and reduces the need for frequent adjustments to therapy over time.

Protect every breath with ResMed Home NIV Solutions

ResMed presents its latest noninvasive ventilation (NIV) solutions for home care applications to help you easily and effectively treat even the most difficult hypoventilation patients. Together with our existing breath personalization technologies, the S9 VPAP ST-A and S9 VPAP ST allow you to overcome common titration and treatment challenges.

Titration challenges

NIV patients are often titrated in the sleep lab but are seen less often by technicians. This can cause titration uncertainties. Also, personnel turnover can make it more difficult to develop expertise in NIV titrations. Other challenges include:

- NIV patients being seen less frequently than OSA patients
- lung disease in addition to obstructed airway
- varying clinician background and training in respiratory care.

Treatment challenges

Although NIV is becoming more common, patients may still remain ineffectively treated. In fact, research shows that 40% of NIV patients experience asynchrony in 10% or more of their breaths.[1] This leads to:

- discomfort
- ineffective therapy
- treatment refusal.

S9 VPAP ST-A with iVAPS:

Premium home care NIV device optimized to treat the full range of patients with respiratory insufficiency using the latest automation technology—iVAPS.

S9 VPAP ST:

Home care NIV device with ResMed's leading synchronization technology, including Vsync and TiControl.™

S9 VPAP ST-A with iVAPS

INTELLIGENT. PERSONALIZED. AUTOMATIC.

ResMed presents its unique iVAPS therapy mode in the S9 VPAP ST-A, a premium home care NIV device optimized to treat the full breadth of patients with respiratory conditions. Easy to set up and highly automated, the S9 VPAP ST-A delivers quiet comfort and exceptional performance in the award-winning S9 platform for better patient outcomes.

S9 VPAP ST-A with iVAPS

iVAPS is cleared for patients weighing more than 66 lb (>30 kg).
S9 VPAP ST-A is cleared for patients weighing more than 30 lb (>13 kg).

What sets the S9 VPAP ST-A apart?

- iVAPS—automatic pressure support to meet an alveolar ventilation target ensures patients are adequately ventilated as their disease progresses or under varying conditions such as REM sleep
- Climate Control—optimal humidification for the higher pressures and demands of NIV patients
- High performance—pressures to 30 cm H_2O allow you to treat the full range of NIV patients with a small, portable device
- Pediatric clearance—The S9 VPAP ST-A is FDA cleared to treat pediatric patients weighing more than 30 lb (>13 kg) and available in a child-friendly design. iVAPS is cleared for patients weighing more than 66 lb (>30kg).

S9 VPAP ST-A delivers comfort and performance

Together with ResMed's enhanced Easy-Breathe motor and superior Climate Control humidification system, the S9 VPAP ST-A with iVAPS makes it easier than ever to ensure appropriate ventilation in varying conditions by offering:

- extra assurance with a backup rate (iBR) in the absence of spontaneous effort to initiate the breath (except in CPAP and S modes)
- added security of audio and visual alarms
- quick and easy setup with out-of-the-box therapy performance.

The S9 VPAP ST-A is FDA cleared to treat pediatric patients weighing more than 30 lb (>13 kg).

iVAPS is cleared for patients weighing more than 66 lb (>30kg).

Who is the S9 VPAP ST-A with iVAPS suitable for?

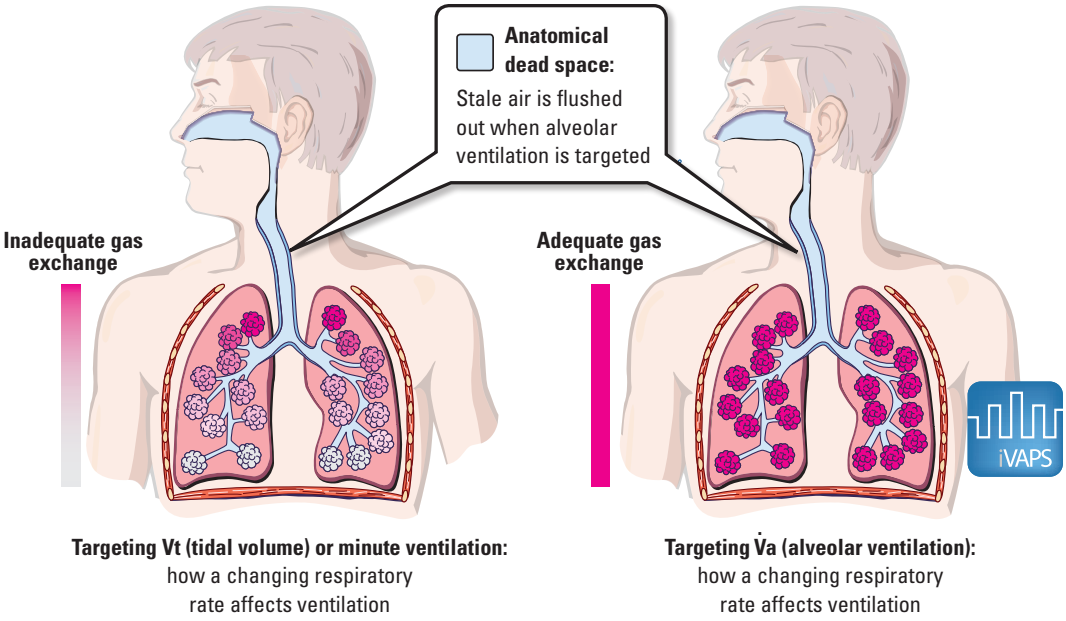
iVAPS is suitable for adults with respiratory insufficiency conditions such as:

Neuromuscular disease and restrictive conditions—iVAPS can maintain stable ventilation when respiratory effort fluctuates, especially during sleep

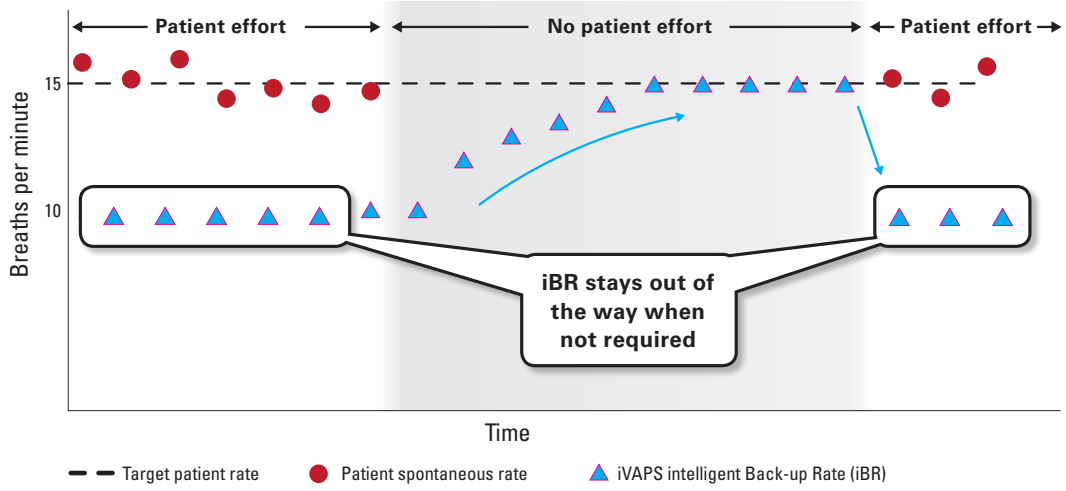
Chronic obstructive pulmonary disease—iVAPS may reduce the risk of hyperinflation associated with increased respiratory rate, as compared to therapy targeting tidal volume

Obesity hypoventilation—when compared to standard pressure support therapy, iVAPS can compensate for changes in respiratory mechanics, such as during nocturnal position changes

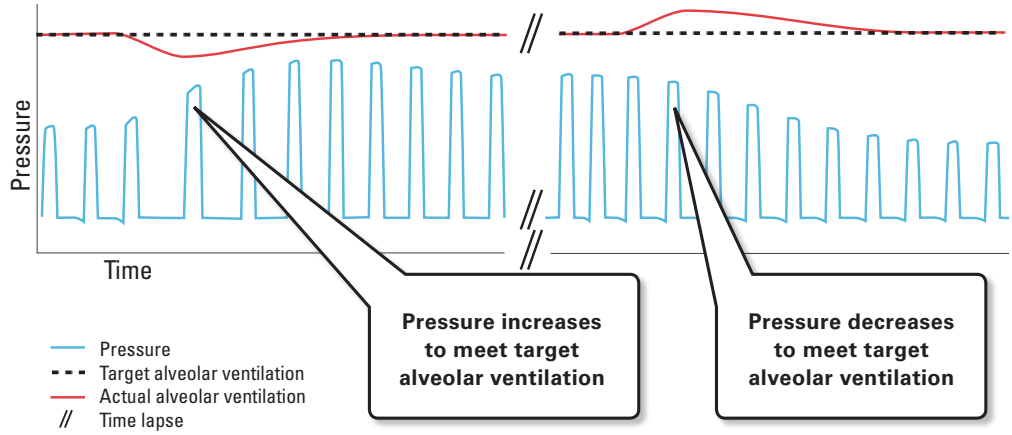
iVAPS targets alveolar ventilation, accounting for anatomical dead space to ventilate the patient more effectively.



iBR maximizes the patient's opportunity to breathe spontaneously before bringing the patient back to target if backup breaths are required



Automatically changing pressure support and iBR to maintain alveolar ventilation



Intelligent

Alveolar ventilation and an iBR for efficacy, synchrony and comfort

- Unlike other ventilation modes that only target tidal volume, iVAPS targets alveolar ventilation, accounting for anatomical dead space to ventilate the patient more effectively.
- Because conducting airways do not participate in gas exchange, the volume they contain is considered dead space. It is important to account for this to better meet the patient's needs.
- iVAPS also provides an iBR when necessary, maximizing the opportunity for the patient to spontaneously trigger the device. So even during events such as an apnea, the iBR quickly normalizes synchrony. Setting the backup rate is simple. Just enter the patient's spontaneous breath rate and iBR does the rest.

Personalized

Easy setup with personalized Learn Targets technology

- The Learn Targets feature gives clinicians a new option for setting up NIV and can be used to reduce the complexity and time required to set up a patient—particularly a neuromuscular patient.
- iVAPS is convenient and saves time by minimizing the need for constant manual adjustment, while enabling clinicians to review and accept or change, recommended target settings.
- iVAPS uses the Learn Targets feature to suit individual patients in two ways:
  - Learns the patient's alveolar ventilation and then sets targets accordingly
  - Learns the patient's spontaneous respiratory rate and uses it as input for the iBR

Automatic

Automatic pressure support and an iBR for the patient's changing needs

- iVAPS automatically adjusts the level of pressure support to achieve and maintain the target alveolar ventilation.
- It adapts to the patient's changing requirements by constantly monitoring the patient's actual alveolar ventilation in relation to target alveolar ventilation, and the patient's actual respiratory rate in relation to the target rate.
- As a patient's ventilation changes, such as during different stages of sleep, the rapid, yet gentle response is quick enough to maintain stable alveolar ventilation and smooth enough to minimize sleep disruption.
- Clinical trials show that iVAPS improves daytime blood gases and nocturnal oxygenation and increases compliance.[4-5]

Why is alveolar ventilation important?

- When the patient's respiratory rate changes, the set minute ventilation or tidal volume may not maintain the correct ventilation since neither account for the anatomical dead space in the patient's airway.
- Setting alveolar ventilation targets the patient's true ventilation requirements and represents a more accurate approach.
- Targeting alveolar ventilation offers two main advantages:
  - First, it's able to deliver the required ventilation at the alveoli, where gas exchange occurs, by taking into account and compensating for the portion of air that travels through the conducting airways.
  - Secondly, it maintains alveolar ventilation even with fluctuating respiratory rate.
- The ultimate result: better patient-device synchrony, more stable gas exchange and more effective ventilation.

More comfort and synchrony with S9 features in the S9 VPAP ST-A and ST

From setup to therapy management and monitoring, getting patients started and keeping them compliant is now easier and more intuitive than ever. Having ResMed's enhanced, high-quality VPAP devices available on the award-winning S9 platform means:

Synchronization technology protects every breath[2-3]

Vsync leak compensation

Vsync constantly monitors the flow so that if an unintentional mask leak occurs, the device can quickly compensate for the leak and maintain breathing synchrony.

TiControl™ accommodates patients' unique needs

Ti Max lets you set a maximum inspiratory time to reduce risk of intrinsic PEEP and missed patient effort. Ti Min ensures adequate time for gas exchange without having to increase the pressure setting.

Better synchrony

Set a rapid rise time and high cycle sensitivity to decrease inspiratory time and extend expiratory time for improved patient-ventilator synchrony for patients prone to intrinsic PEEP. Slower rise time, lower cycle sensitivity and adequate Ti Min ensure that patients with weak inspiratory effort have adequate time for gas exchange.

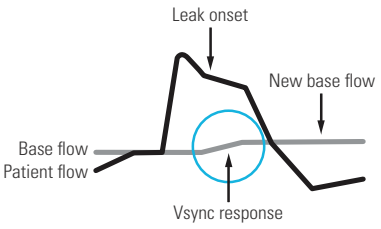
Adjustable Trigger Sensitivity

Supports patients with weak inspiratory efforts.

Adjustable Cycle Sensitivity

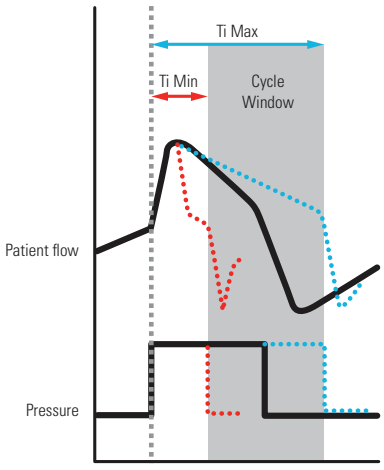
Helps synchronize breath termination based on varying patient needs.

Vsync



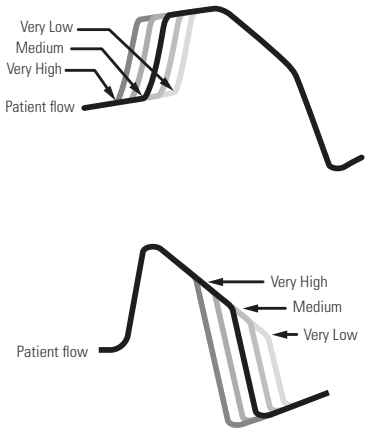
Vsync manages leaks and maintains patient-device synchrony by quickly compensating for leaks when a leak occurs. This results in more effective and comfortable treatment.[2-3]

TiControl



TiControl allows clinicians to manage the patient's inspiratory time according to their disease state. Ti Max can be helpful for patients with obstructive disease, whereas Ti Min may be helpful for patients with restrictive disease.

Trigger and Cycle Sensitivities



Adjustable Trigger and Cycle sensitivities allow further customization at the beginning and end of each inspiration, which further improves patient-device synchronization.

Better patient management

With real-time data viewable on the device, providing the best therapy for your patients is easier.
A range of data management options help you monitor patient progress.

- Summary, efficacy and usage data for up to 365 sessions
- 30 sessions of detailed efficacy and usage data on parameters such as leak, minute ventilation, tidal volume and oximetry
- High-resolution patient flow and pressure data for seven consecutive sessions

Optimal humidification

By using Climate Control, patients receive maximum comfort and optimal therapy at the desired level, regardless of ambient humidity changes. ResMed's H5i™ heated humidifier offers advanced humidification, which intelligently adjusts to deliver more humidity than other devices with less rainout. Plus, the ClimateLine™ tube now comes in 15 mm or 19 mm for extra flexibility.[6]

Quiet treatment for peaceful sleep

Patient needs are met quickly thanks to the ultra-quiet, enhanced Easy-Breathe motor, which reduces conducted and radiated noise.

Patient ease of use and therapy acceptance

The color LCD screen and intuitive menus of S9 VPAP devices make them simple to use and review therapy efficacy.

S9 VPAP ST: Dependable, traditional noninvasive ventilation

The VPAP ST device offers pressure support up to 25 cm H_2O. It's an ideal choice for reliable, cost-effective noninvasive ventilation, when alarms are not required. Powerful synchronization technologies enable patients to remain comfortable and well-ventilated, reducing the work of breathing. Vsync leak compensation and breath customization features ensure responsiveness to patients' every breath for better therapy outcomes.

S9 VPAP ST-A clinical settings — iVAPS mode

Primary Settings

PARAMETER	DEFAULTS	DESCRIPTION
Target $\dot{V}a$	5.2 L	Target alveolar ventilation ($\dot{V}a$) is the main parameter that iVAPS uses to determine the amount of pressure support required.
EPAP	4 cm H_2O	EPAP is the pressure delivered when the device is cycled into expiration.
Height	70 in	The patient's height or arm span is needed to determine dead space.
Target Patient Rate	15 bpm	Target patient rate is the reference point that iVAPS uses to determine the range for the backup rate. This should be set the same as the patient's actual respiratory rate (RR).

Synchronization Settings

PARAMETER	DEFAULTS	DESCRIPTION
Ti Max	2.0 seconds	Sets the maximum limit on the time the device spends in IPAP.
Ti Min	0.3 seconds	Sets the minimum limit on the time the device spends in IPAP.
Min PS	4 cm H_2O	Minimum pressure support in iVAPS mode.
Max PS	20 cm H_2O	Maximum pressure support in iVAPS mode.

S9 VPAP ST clinical settings — ST mode

Primary Settings

PARAMETER	DEFAULTS	DESCRIPTION
IPAP	10	Sets the pressure which will be delivered to the patient when the device is triggered into inspiration.
EPAP	4	Sets the pressure which will be delivered to the patient when the device is cycled into exhalation.
Resp. Rate	10	Sets the breaths per minute (BPM) or 'backup' rate.

Synchronization Settings

PARAMETER	DEFAULTS	DESCRIPTION
Ti Max	2.0	Sets the maximum limit on the time the device spends in IPAP.
Ti Min	0.3	Sets the minimum limit on the time the device spends in IPAP.
Rise Time	300	The time, in milliseconds, that it takes for the device to transition from EPAP to IPAP.
Trigger	Med	Sets the level of inspiratory flow above which the device changes from EPAP to IPAP.
Cycle	Med	Sets the level of inspiratory flow below which the device changes from IPAP to EPAP.

Order ResMed home NIV solutions therapy systems and accessories.

PRODUCT CODES

S9 VPAP ST-A	**36039**
S9 VPAP ST-A + H5i	**36049**
S9 VPAP ST-A + H5i + ClimateLine$^{MAX™}$	**36059**
S9 VPAP ST	**36008**
S9 VPAP ST + H5i	**36018**
S9 VPAP ST + H5i + ClimateLine	**36028**
H5i Heated Humidifier	**36900**
SlimLine™ Tube	**36810**
Standard Tube	**14987**
ClimateLine Tube	**36995**
ClimateLine$^{MAX™}$ Tube	**36997**
Oximeter Adapter	**36940**
S9 Complete Oximetry Kit	**369100**
DC/DC Converter 24V/90W	**36970**
ResMed Power Station (RPS) II	**24923**
RPS II DC Cable	**24961**
RPS II 90W Power Supply	**36821**
S9 SD Card Reader	**36931**

TECHNICAL SPECIFICATIONS — MODES AND PRESSURE RANGE

S9 VPAP ST-A: CPAP (Continuous Positive Airway Pressure), S (Spontaneous), T (Timed), ST (Spontaneous–Timed), iVAPS (intelligent Volume-Assured Pressure Support), PAC (Pressure Assist Control). Pressure IPAP: 4–30 cm H_2O EPAP: 3–25 cm H_2O. Range of alarms.

S9 VPAP ST: CPAP, S, T, ST. Pressure IPAP: 4–25 cm H_2O EPAP: 3–25 cm H_2O.

TECHNICAL SPECIFICATIONS — COMMON TO S9 VPAP ST-A AND S9 VPAP ST

Backup respiratory rate
5–50 bpm adjustable

TiControl
Ti Max 0.3–4 sec
Ti Min 0.1–Ti Max

Rise time
Min, 150–900 msec (approx.)

Dimensions (L x W x H)
ST-A: 6.0" x 6.8" x 3.4"
ST: 6.0" x 5.5" x 3.4"

Weight
ST-A: 2.30 lb (1.04 kg)
ST: 1.84 lb (0.83 kg)

Trigger
Five settings

Cycle
Five settings

Air filter
Electrostatic fiber mesh

Air outlet
22 mm taper, compatible with ISO 5356–1:2004

IEC 60601–1 classification
Class II (double insulation)
Type BF continuous operation

Power supply
90W power supply unit
AC 100–240V 50–60Hz, 2.2A
AC 115V 400Hz, 2.2A
90W DC/DC converter 12V, 24V

RESMED POWER STATION II

Battery technology
Lithium-ion

Recharge time
4 hours from fully empty to fully charged

Battery duration
Up to 9 hours per battery in S and ST modes at EPAP 5 cm H_2O, IPAP 15 cm H_2O and 20 bpm

Capacity
<100 Wh

Dimensions (L x W x H)
9.1" x 5.0" x 1.0"

Battery weight
2.0 lb (0.9 kg)

Power supply
Input range 100–240 V, 50–60 Hz, 1.0–1.5 A
Nominal for aircraft use 110 V, 400 Hz

S9 VPAP ST-A and H5i humidifier with Quattro™ FX full face mask

ResMed

Offer your patients an intelligent system that protects every breath

	S9 VPAP ST-A with iVAPS	S9 VPAP ST
	Premium home NIV device with iVAPS and alarms. Best choice for treating respiratory insufficiency conditions such as COPD, neuromuscular disease and obesity hypoventilation.	Home NIV device with Vsync and TiControl. Provides excellent breath customization and comfort.
iVAPS	✓	✗
Pressure to 30	✓	✗
Pediatric indication to 13 kg (30 lb)	✓	✗
Alarms	✓	✗
Climate Control	✓	✓
Color LCD with Live Ventilation Statistics	✓	✓
TiControl	✓	✓
Vsync Leak Compensation	✓	✓
Enhanced Easy-Breathe Motor Technology	✓	✓

Learn more about ResMed's S9 VPAP ST-A, ST and other NIV products at **ResMed.com/NIV.**

Combine S9 VPAP bilevels with ResMed's premium masks for a system that delivers more comfort and compliance.

1 Epstein. *Respir Care* 2011
2 Gentile MA. Cycling of the mechanical ventilator breath. *Respir Care* 2011
3 Berry et al. Best clinical practice for the sleep center adjustment of noninvasive positive pressure ventilation in stable chronic alveolar hypoventilation syndromes. *J Clin Sleep Med* 2010
4 Oscroft et al. A randomized crossover trial comparing volume-assured and pressure preset noninvasive ventilation in stable hypercapnic COPD. *COPD* 2010
5 Jaye et al. Autotitrating versus standard noninvasive ventilation: a randomized crossover trial. *Eur Respir J* 2009
6 Benjafield et al. Climate Control: Humidification with heated tube. ResMed Science Center 2010