

S9™ Series

VPAP Auto™ / VPAP™ ST / VPAP™ S / VPAP™ Adapt / AutoSet™ CS

POSITIVE AIRWAY PRESSURE DEVICE

Data Management Guide

English

The following table shows where data from the S9 Series devices can be viewed. Data displayed in ResScan™ can be downloaded via:

- S9 USB adapter and cable, connected directly from the S9 Series device to the computer
- SD card.

Notes:

- Not all devices are available in all regions.
- Please refer to your S9 Series device Clinical Guide for further details.

Therapy Modes

Device	Mode					
	CPAP	S	ST	T	VAuto	ASV
S9 VPAP Auto	✓ ¹	✓ ²			✓	
S9 VPAP ST	✓	✓	✓	✓		
S9 VPAP S	✓ ¹	✓ ²				
S9 VPAP Adapt	✓					✓
S9 AutoSet CS	✓					✓

1. Available with the optional Expiratory Pressure Relief (EPR) in the US only.
2. Available with the comfort feature Easy-Breathe™ in the US only.

Viewing Data

Parameter	S9 Treatment screen	S9 Sleep Report screen		ResScan
		Standard	Advanced	
Type of Data	LIVE	STORED	STORED	STORED
Oxygen saturation (SpO ₂) (%) ¹	✓			✓
Leak (L/sec)	✓		✓	✓
Pulse rate (beats/min) ¹	✓			✓
I:E ratio ²	✓			✓
Inspiration time (Ti) (sec) ²	✓			
Ti Max (sec)	✓			
Ti Min (sec)	✓			
Pressure (cm H ₂ O)	✓			
Peak inspiratory pressure (cm H ₂ O) ⁵	✓			
Flow (L/min)				✓
Flow limitation (round to flat)				✓
Events				✓
Usage (hrs)				✓
Snore (quiet to loud)				✓
Period		✓	✓	
Days used			✓	✓
Days>4 hrs		✓	✓	✓
Avg. usage (hrs)		✓	✓	✓
Used Hrs		✓	✓	✓
Insp. Pressure (cm H ₂ O)			✓	✓

Parameter	S9 Treatment screen	S9 Sleep Report screen		ResScan
		Standard	Advanced	
Type of Data	LIVE	STORED	STORED	STORED
Exp. Pressure (cm H ₂ O)			✓	✓
Tidal volume (Vt) (L)	✓		✓	✓
Respiratory rate (RR) (breaths/min)	✓		✓	✓
Minute ventilation (MV) (L/min)	✓		✓	✓
AHI			✓	✓
Total AI			✓	✓
Central AI ³			✓	✓
Obstructive AI/Unknown AI ³				✓
ODI (desaturation events/hour) ¹				✓
%Spontaneous Triggering or Cycling ²	✓		✓	✓
Trigger/Cycle indicator ²	✓			
Pressure support (PS) (cm H ₂ O) ⁴	✓			
Target ventilation (TgMV) (L/min) ⁵	✓			

1. Only available if an oximeter is used with the S9 device.
2. Only available on S, ST and VAuto modes.
3. Only available in the S9 VPAP Auto and S9 VPAP S.
4. Only available on S, ST, T and ASV modes.
5. Only available in the S9 AutoSet CS and S9 VPAP Adapt.

ResScan Downloaded Data

Via S9 USB Adapter	Via SD Card
365 summary sessions	365 summary sessions 30 detailed sessions 7 high-rate detailed sessions

ResScan Review Screen Displays

Statistics	Summary Graphs	Detailed Graphs	Oximetry Statistics ¹
✓	✓	✓	✓

1. Only available if an oximeter is used with the S9 device.

ResScan Review Screen Display Descriptions

Parameter	Statistics	Summary Graphs	Detailed Graphs
Apnea Indices AHI	Shows the AHI for the selected sessions in the Data Browser.	Shows a vertical bar graph of the median AHI per hour.	Shows a cumulative total of the number of apneas and hypopneas that have occurred.
AHI/AI/OAI/ CAI/UAI	Shows the AHI, AI, HI, OAI, CAI and UAI for the selected sessions in the Data Browser.	Shows a vertical bar graph where the lower segment is the median AI per hour, and the upper segment is the median AHI per hour.	
Events			<p>Apneas are shown at the time they end. The duration of the apnea, in seconds, is displayed above the symbol.</p> <p>Apneas are represented by colored symbols, where the height of the symbol is proportional to the duration of the apnea. The type of apnea (obstructive, central, or unknown), is indicated by the symbol and its color. The duration of the apnea, in seconds, is displayed above the symbol</p> <p>Hypopneas are recorded and displayed after ten seconds.</p> <p>Hypopneas are represented by a blue rectangle.</p>

Parameter	Statistics	Summary Graphs	Detailed Graphs
Flow Limitation			Shown on a scale ranging from flat to round.
Flow			Shown as a blue trace.
I:E Ratio	Shows the maximum, 95th percentile and median statistics for the selected sessions in the Data Browser.	Shows the median statistics for single sessions.	Inspiratory ratio shown in purple. Expiratory ratio shown in blue. A red line provides a 33% or 1:2 ratio reference.
Leak	Shows the maximum, 95th percentile, and median statistics for the selected sessions in the Data Browser.	Shows the maximum, 95th percentile, and median statistics for single sessions.	Shown as a blue trace. A red line provides a reference level of the recommended maximum acceptable leak.
Minute Ventilation	Shows the maximum, 95th percentile, and median statistics for the selected sessions in the Data Browser.	Shows the maximum, 95th percentile, and median statistics for single sessions.	Shown as a blue trace.
Insp. Pressure / Exp. Pressure	Shows the maximum, 95th percentile, and median statistics for the selected sessions in the Data Browser.	Shows the maximum, 95th percentile, and median statistics for single sessions.	Inspiratory pressure shown as a blue trace. Expiratory pressure shown as a red trace.
Prescribed EPAP	Note: This is a setting—not a measured quantity.	Shows the prescribed EPAP for single sessions. Note: This is a setting—not a measured quantity.	
Prescribed Pressure	Note: This is a setting—not a measured quantity.	Shows set IPAP and set EPAP for single sessions. Note: This is a setting—not a measured quantity.	
Pressure			Shown as a blue trace. In VAuto, red lines provide a reference of the maximum IPAP and minimum EPAP settings. In ASV, red lines provide a reference of the EPAP and the maximum pressure settings.
Pulse Rate	Shows the maximum, 95th percentile and median statistics for the selected session in the Data Browser.		Shown as a blue trace.
Respiratory rate	Shows the maximum, 95th percentile and median statistics for the selected sessions in the Data Browser.	Shows the maximum, 95th percentile, and median statistics for single sessions.	Shown as a blue trace. Respiratory rate setting shown as a reference line in ST and T modes.
Snore			Shown on a scale ranging from quiet to loud.
Oxygen Saturation	Shows the maximum, 95th percentile and median statistics for the selected session in the Data Browser.		Shown as a blue trace. A red line provides the 90% reference level to assist identification of desaturations.
Usage	Total hours used, Daily usage, Used Days ≥ X:YY hours, Used Days < X:YY hours, Total days and % Used Days. Calculated for the sessions selected in the Data Browser.	Each period is shown as a solid bar. A hollow bar indicates a period of usage where the end-time is unknown. There is a limit on the maximum number of separate bars shown for a single session.	
Tidal Volume	Shows the maximum, 95th percentile and median statistics for the selected sessions in the Data Browser.	Shows the maximum, 95th percentile, and median statistics for single sessions.	Shown as a blue trace.

Parameter	Statistics	Summary Graphs	Detailed Graphs
% Spontaneous Cycled Breaths	Shows the percentage of spontaneous cycled breaths for the selected sessions in the Data Browser.	Shows the spontaneous cycled breaths percentage for single sessions.	
% Spontaneous Triggered Breaths	Shows the percentage of spontaneous triggered breaths for the selected sessions in the Data Browser.	Shows the spontaneous triggered breaths percentage for single sessions.	

Updating Settings

Parameter	Mode						ResScan via S9 USB Adapter	ResScan via SD Card
	CPAP	S	ST	T	VAuto	ASV		
Therapy Mode	✓	✓	✓	✓	✓		✓	✓
Set Pressure (cm H ₂ O)	✓						✓	✓
Maximum IPAP (cm H ₂ O)					✓		✓	✓
Minimum EPAP (cm H ₂ O)					✓		✓	✓
Start Pressure (cm H ₂ O)	✓						✓	✓
Start EPAP (cm H ₂ O)		✓	✓	✓	✓		✓	✓
Ti Max (sec)		✓	✓		✓		✓	✓
Ti Min (sec)		✓	✓		✓		✓	✓
Ti (sec)				✓			✓	✓
Rise time (ms)		✓	✓	✓			✓	✓
IPAP (cm H ₂ O)		✓	✓	✓			✓	✓
EPAP (cm H ₂ O)		✓	✓	✓		✓	✓	✓
Trigger/cycle level		✓	✓		✓		✓	✓
Respiratory rate (breaths/min)			✓	✓			✓	✓
Pressure support (cm H ₂ O)					✓		✓	✓
Maximum pressure support (cm H ₂ O)						✓	✓	✓
Minimum pressure support (cm H ₂ O)						✓	✓	✓
Leak alert	✓	✓	✓	✓	✓	✓	✓	✓
Maximum Ramp Time (min)	✓	✓	✓	✓	✓		✓	✓
Ramp Time	✓	✓	✓	✓	✓	✓	✓	✓
Easy-Breathe		✓ ¹					✓	✓
AB filter	✓	✓	✓	✓	✓	✓	✓	✓
EPR	✓ ¹						✓	✓
EPR level	✓ ¹						✓	✓
EPR inhale	✓ ¹						✓	✓
Mask type	✓	✓	✓	✓	✓	✓	✓	✓
Tube type	✓	✓	✓	✓	✓	✓	✓	✓
Climate Control	✓	✓	✓	✓	✓	✓	✓	✓
Sleep Quality	✓	✓	✓	✓	✓	✓	✓	✓
SmartStart™	✓	✓	✓	✓	✓	✓	✓	✓
Language	✓	✓	✓	✓	✓	✓	✓	
Local Date and Time	✓	✓	✓	✓	✓	✓	✓	
Reminders	✓	✓	✓	✓	✓	✓	✓	✓

1. Only available in the S9 VPAP S and S9 VPAP Auto.

ResScan Detailed Graphs Specifications

Parameter	Resolution	Range	Sampling period (sec)
			via SD Card
Events (sec)	1	10–120 (apnea duration)	Aperiodic
AHI	1	0–120 (events per hour)	Aperiodic
Flow Limitation (round to flat)	n/a	Round to flat	2
Flow (L/min)	0.01	-120 to 180	25 Hz
Leak (L/sec)	0.02	0–5	2
Minute Ventilation (L/min)	0.125	0–30	2
Pressure	0.2	2–25	25 Hz
Pulse Rate (beats/min) ¹	1	18–300	1
Snore (quiet to loud)	n/a	Quiet to loud	2
SpO ₂ (%) ¹	1	0–100	1
Tidal volume (L)	0.02	0–4	2
Respiratory rate (breaths/min)	0.2	0–50	2
Inspiratory and Expiratory pressure (cm H ₂ O) ²	0.2	2–25	2

1. Only available if an oximeter is used with the S9 device.

2. For Germany, maximum pressure for the S9 VPAP ST is 22 cm H₂O.

Glossary

Apnea

An apnea is the temporary absence or cessation of breathing. An apnea is scored when there is reduction in breathing by 75% of the baseline breathing for at least 10 seconds.

ResScan shows three types of apneas:

- **Central Apnea**
A central apnea is an apnea during which the upper airway remains open.
- **Obstructive Apnea**
An obstructive apnea is an apnea during which there is a physical closing of the upper airway.
- **Unknown Apnea**
An unknown apnea is an apnea during which a leak higher than 30 L/min occurs, precluding accurate determination of whether the apnea is obstructive or central.

Apnea Indices

For all indices, the value shown for Statistics is the total number of events divided by Daily Usage.

- **AHI — Apnea–Hypopnea Index**
The total number of events is calculated by adding the number of apnea and hypopnea events.

For graphs, the AHI count is incremented at the occurrence of every event and reset every hour.
- **AI – Apnea Index**
- **HI – Hypopnea Index**
- **CAI – Central Apnea Index**
- **OAI – Obstructive Apnea Index**
- **Total AI – Average total Apnea Index**
- **UAI – Unknown Apnea Index**

Avg. usage

Average number of hours per day the device has been used during the selected period.

Daily Usage

Daily Usage is total usage in a single session (a session starts at midday and finishes 24 hours later).

- **Average Daily Usage**
Average daily usage is the result of the sum of Daily Usage divided by Used Days, over a selected time period.
- **Median Daily Usage**
Median Daily Usage is the middle value for daily usage, where values for Daily Usage are listed from low to high, over a selected time period. While a few exceptionally high or low values can have a significant influence on an average measure, the median is typically more reflective of the true central tendency.

Days>4 hrs

Number of days the device has been used for more than 4 hours during the selected period or since the last compliance data was reset.

Days Used

Number of days the device has been used during the selected period or since the last compliance data was reset.

Events

An event is the occurrence of a residual apnea or hypopnea.

Expiratory pressure

Average expiratory pressure during the selected period (95th percentile for each day for periods >1 day is the average of the 95th percentiles).

Flow

Flow is an estimate of the airflow entering the lungs.

It is derived by taking the total flow and then removing the leak and mask vent flow components.

Flow Limitation

Flow Limitation is a measure of partial upper airway obstruction.

This measure is based on the shape of the inspiratory flow–time curve. A flat shape suggests upper airway obstruction.

Hypopnea

A hypopnea is an episode of shallow breathing during sleep. A hypopnea is scored when there is a reduction in breathing by 50% of baseline breathing with partial upper airway obstruction for 10 seconds or more. The event is scored after 10 seconds of the hypopnea.

I:E ratio

The ratio of inspiratory time to expiratory time.

Inspiratory pressure

Average inspiratory pressure during the selected period (95th percentile for each day for periods >1 day is the average of the 95th percentiles).

Leak

Leak is an estimate of the total rate of air escaping due to mouth and mask leaks.

It is derived by analysing the inspiratory and expiratory airflows, together with the expected mask vent flows.

High or changing leak rates may affect the accuracy of other measurements.

Minute Ventilation

Minute ventilation is the volume of air breathed in (or out) within any 60-second period.

Period

Time period set to a day, week, month (1, 3 or 6) and year to display available data.

Pulse Rate

The number of heart beats in a 60-second time frame. The pulse rate is calculated by an attached oximeter.

Respiratory Rate

The frequency of breathing expressed as the number of breaths per minute. The displayed rate is the average of the previous 5 breaths.

Snore Index

Snore index is a measure based on the amplitude of the pressure wave generated by a patient's snoring.

SpO₂

SpO₂ is a measure of the saturation of blood hemoglobin with oxygen, expressed as a percentage. The oxygen saturation is calculated by an attached oximeter.

Tidal Volume

Tidal volume is the volume of air inspired or expired in one respiratory cycle (breath).

Total Hours Used

Total hours used is the total patient usage over a selected time range.

Usage

Usage is the length of time that a patient receives therapy from the device.

The start and end times of the first ten individual periods of usage are available for each session when using ResScan.

Used Days

Used days is the total number of days during which daily usage exceeded the compliance threshold (X hours Y minutes).

Used Hrs

Number of hours the device has been used during the selected period or since the last compliance data reset.

% Spont T or % Spont C

Percentage of breaths that are spontaneously triggered or cycled, measured from the last 20 breaths.

% Used Days

% used days calculates the percentage of used days out of the total number of days selected.

Manufacturer: ResMed Ltd 1 Elizabeth Macarthur Drive Bella Vista NSW 2153 Australia **Distributed by:** ResMed Corp 9001 Spectrum Center Boulevard San Diego CA 92123 USA ResMed (UK) Ltd 96 Milton Park Abingdon Oxfordshire OX14 4RY UK See www.resmed.com for other ResMed locations worldwide.

ResScan, S9, VPAP and SmartStart are trademarks of ResMed Ltd, and S9, VPAP and SmartStart are registered in U.S. Patent and Trademark Office.

© 2011 ResMed Ltd. 368409/2 2011-03

