

RESMED

Escape Auto™

POSITIVE AIRWAY PRESSURE DEVICE

H5i™

HEATED HUMIDIFIER

Clinical Guide

English



S9™ Series
More. Comfort.

S9[™] | Series
More. Comfort.

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Welcome

Thank you for choosing the S9 Escape Auto or H5i.

Before operating these devices, please read the entire Clinical and Information Guides.

S9 Escape Auto indications for use

The S9 Escape Auto self-adjusting system is indicated for the treatment of obstructive sleep apnoea (OSA) in patients weighing more than 30 kg. The S9 Escape Auto self-adjusting system is intended for home and hospital use.

S9 contraindications

Positive airway pressure therapy may be contraindicated in some patients with the following pre-existing conditions:

- severe bullous lung disease
- pneumothorax
- pathologically low blood pressure
- dehydration
- cerebrospinal fluid leak, recent cranial surgery, or trauma.

S9 adverse effects

Patients should report unusual chest pain, severe headache, or increased breathlessness to their prescribing physician. An acute upper respiratory tract infection may require temporary discontinuation of treatment.

The following side effects may arise during the course of therapy with these devices:

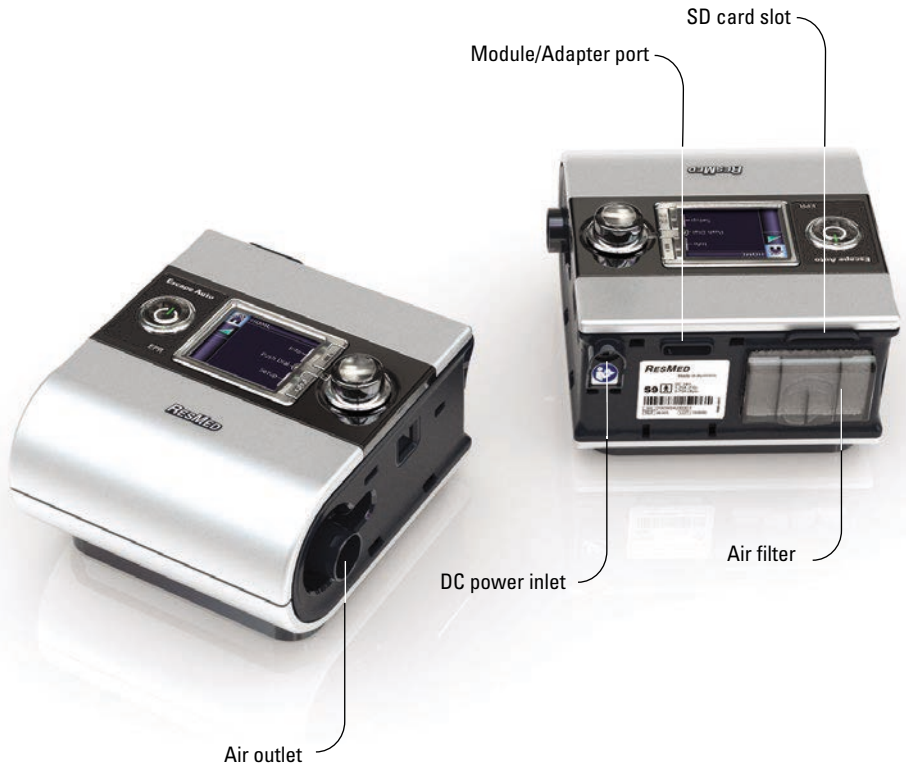
- drying of the nose, mouth, or throat
- nosebleed
- bloating
- ear or sinus discomfort
- eye irritation
- skin rashes.

H5i indications for use

The H5i is indicated for the humidification of the air delivered from a CPAP or bilevel device. The H5i is for use only as recommended by a physician. The H5i is intended for single patient re-use in the home environment and re-use in a hospital/institutional environment.

H5i contraindications

The H5i is contraindicated for use with patients whose upper (supraglottic) airway has been bypassed.



S9 at a glance

The S9 system comprises the following elements:

- S9 device
- SlimLine air tubing
- 90W power supply unit
- S9 travel bag
- SD card
- S9 SD card protective folder.

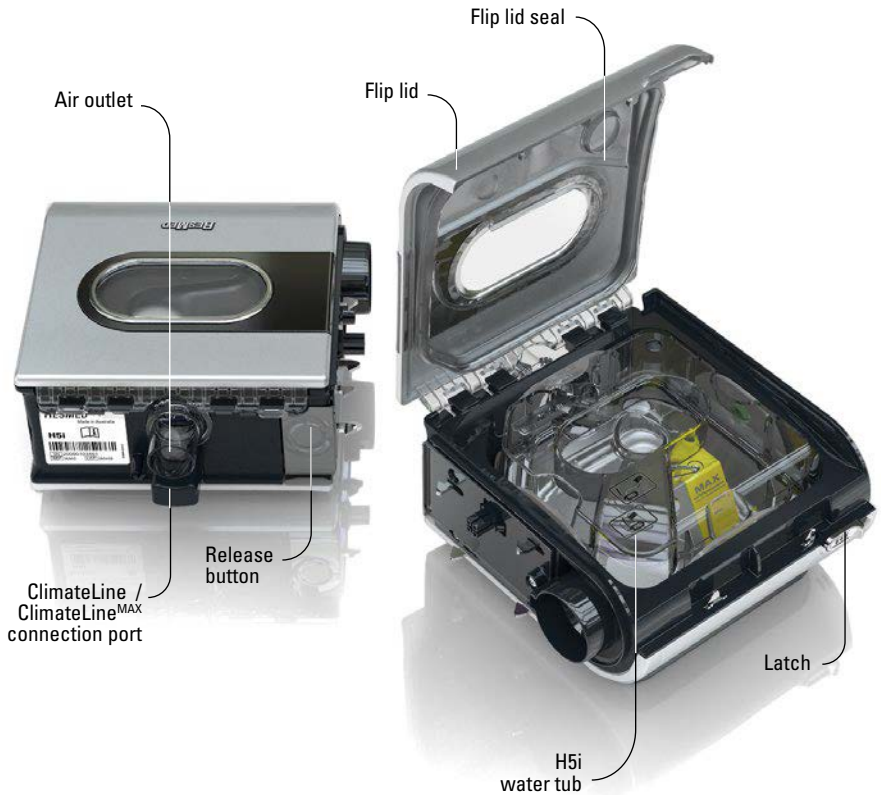
Optional components include:

- H5i heated humidifier
- Standard air tubing
- S9 Wireless Module
- S9 Oximeter Adapter
- 30W power supply unit (does not support H5i)
- Power Station II battery back
- DC/DC Converter 24V/90W.

Travelling with the S9

When the patient travels with the S9 only:

- Advise the patient to pack the SlimLine or Standard air tubing as the ClimateLine or ClimateLine^{MAX} heated air tubing is not designed to connect directly to the S9 device.
- Advise the patient to purchase and travel with the approved power cord for the region where they will be using the S9 device.
- ResMed confirms that the S9 Escape Auto meets the Federal Aviation Administration (FAA) requirements (RTCA/DO-160, section 21, category M) for all phases of air travel.



H5i at a glance

The H5i system comprises the following elements:

- H5i heated humidifier
- H5i cleanable water tub
- ClimateLine heated air tubing (if sold as a Climate Control Kit).

Optional components include:

- ClimateLine heated air tubing
- ClimateLine^{MAX} heated air tubing
- H5i standard water tub.

Traveling with the H5i

When moving or traveling with your H5i:

- Ensure that the water tub is empty.
- Disconnect the H5i from the S9 by pressing the release button.

Operating information

The following table describes the operating modes available on the S9 Escape Auto.

| Mode | S9 Escape Auto |
|--|----------------|
| CPAP mode A fixed pressure is delivered with optional Expiratory Pressure Relief (EPR). EPR can help ease any discomfort that your patient experiences when breathing out during treatment. | ✓ |
| APAP mode APAP mode treats apnoeas up to 10 cm H ₂ O and does not differentiate between different types of apnoeas. The APAP algorithm automatically adjusts pressure in response to inspiratory flow limitation, snore and apnoea. | ✓ |

EPR technology

Designed to make therapy more comfortable, EPR maintains optimal treatment for the patient during inhalation and reduces the delivered mask pressure during exhalation. You can select EPR in CPAP or APAP modes.

EPR checklist

- ✓ You can set EPR to Off, Ramp Only, Full Time.
- ✓ You can select an EPR Level of Off, 1, 2, 3 cm H₂O or Patient (configurable by the patient).
- ✓ In CPAP mode you can set the EPR Inhale to Med or Fast.
- ✓ When EPR is enabled, the delivered pressure will not drop below a minimum pressure of 4 cm H₂O, regardless of the settings.

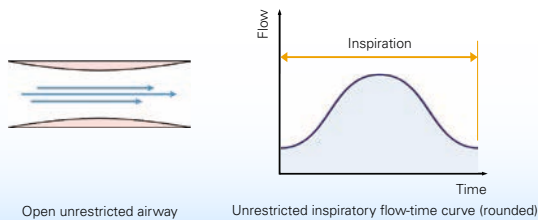
APAP technology

The treatment pressure required by your patient may vary due to changes in sleep state, body position and airway resistance.

The device analyses the state of your patient's upper airway on a breath-by-breath basis and delivers pressure within the allowed range according to the degree of obstruction. The APAP algorithm adjusts treatment pressure as a function of three parameters: inspiratory flow limitation, snore, and apnoea.

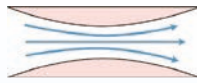
Normal airway

When your patient is breathing normally, the inspiratory flow measured by the device as a function of time shows a typically rounded curve for each breath.

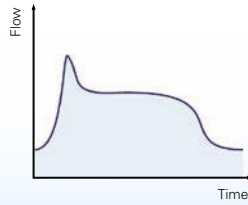


Flow limitation

As the upper airway begins to collapse, the shape of the inspiratory flow-time curve changes. The S9 recognises and treats traditional as well as less common flow-limited breath wave forms.



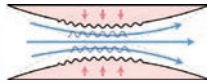
Silent partial airway obstruction



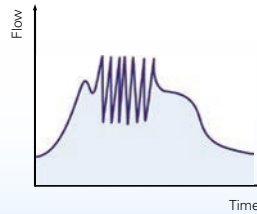
Flattened inspiratory flow-time curve (denoting partial obstruction)

Snore

Snoring is sound generated by vibrations of the walls of the upper airway. It is often preceded by flow limitation or a partial obstruction of the airway.



Noisy partial airway obstruction



Snore superimposed on inspiratory flow-time curve

Apnoeas

The APAP algorithm only treats apnoeas up to 10 cm H₂O and does not differentiate between different types of apnoeas.

An obstructive apnoea is when the upper airway becomes severely limited or completely obstructed. APAP generally prevents obstructive apnoeas from occurring by responding to flow limitation and snoring. If an obstructive apnoea occurs, the device will respond by increasing pressure.

The pressure will not rise above 10 cm H₂O when an apnoea is detected to prevent an inappropriate response to central apnoeas.

New to the S9 platform

Climate Control

S9 devices, when used in conjunction with the H5i and ClimateLine or ClimateLine^{MAX} heated air tubing, offer a feature called Climate Control.

Climate Control enables the automatic delivery of a constant value of absolute humidity to the patient's upper airway while protecting against rainout and allowing patients to select the air temperature that offers the most comfort for them.

Rainout protection

Rainout refers to the water or condensation that collects in the patient's tubing or mask. Rainout is a common side effect of using a humidifier due to the humidified air cooling as it travels down the tubing and into the mask. Rainout occurs when relative humidity, which is a measure of the air's capacity to hold water vapour, exceeds 100%.

Climate Control protects the patient from rainout by maintaining a target relative humidity of 80% as well as maintaining the temperature of the air delivered to the patient without compromising the amount of absolute humidity delivered.

Automatic constant humidity delivery

For each temperature setting, the Climate Control system delivers a constant amount of water vapour, or absolute humidity, to the patient's upper airway. The following table shows the target absolute humidity value that will be delivered to the mask for a selection of temperature settings.

| Temperature delivered to the mask | Target absolute humidity at the mask, Body Temperature Pressure Saturated (BTPS) |
|-----------------------------------|--|
| 16°C | 10 mg/L |
| 20°C | 12 mg/L |
| 24°C | 16 mg/L |
| 27°C | 19 mg/L |
| 30°C | 22 mg/L |

Automatic constant temperature delivery

The temperature sensor located at the mask end of the ClimateLine or ClimateLine^{MAX} heated air tube enables the system to automatically control the temperature of the air delivered to the patient. This ensures the temperature of the air delivered to the patient does not fall below the set minimum temperature, therefore maximising breathing comfort for the patient.

Automatic adjustment

The H5i and ClimateLine or ClimateLine^{MAX} heated tubing are controlled by the Climate Control algorithm to deliver constant humidity and temperature outputs. The system adjusts automatically to changes in:

- ambient room temperature and humidity values
- flow due to pressure changes
- flow due to mask or mouth leak.

S9 Essentials

S9 Essentials is designed to make device interaction and menu navigation easier for patients. If enabled, S9 Essentials disables the Info and Setup functionality so that patients can simply start and stop therapy and adjust ramp, humidification and Climate Control. S9 Essentials can be enabled via Clinical Setup > Options > Access.

Sleep quality

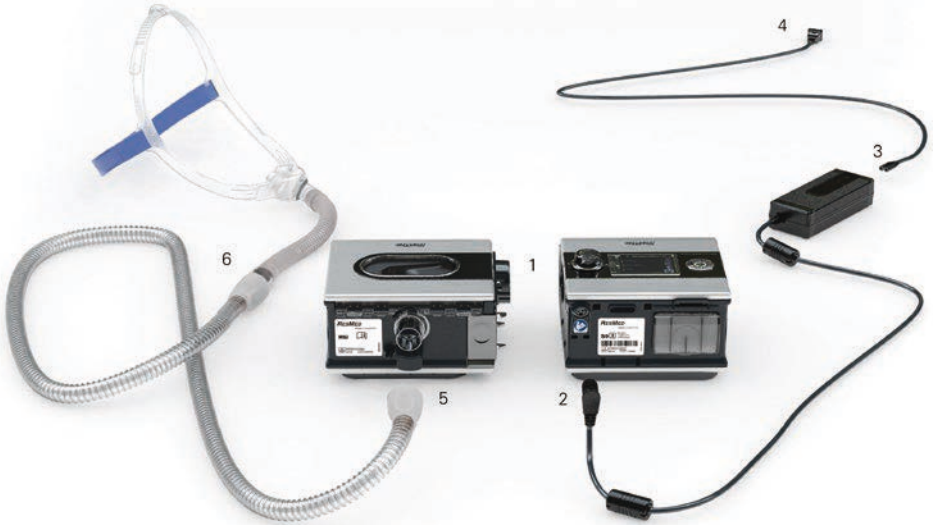
Designed to promote compliance, the Sleep Quality indicator allows the patient to actively engage in their own therapy by identifying usage and AHI information.

Ramp

Ramp is designed to make the beginning of treatment more comfortable.

In CPAP mode during ramp time, the pressure increases from a low pressure to the prescribed treatment pressure.

In APAP mode, ramp time defines the period during which the pressure gradually increases from a lower more comfortable start pressure to the minimum treatment pressure before the auto-adjusting algorithm commences.



Setup

1. Align your H5i with your S9 and push them together until they click into place.
2. Connect the DC plug of the power supply unit to the rear of the S9.
3. Connect the power cord to the power supply unit.
4. Plug the other end of the power cord into the power outlet.
5. Connect one end of the air tubing firmly onto the air outlet.
6. Connect the assembled mask system to the free end of air tubing.

Notes:

- Always ensure that the S9 and H5i are placed on a stable, level surface for proper operation.
- Place the power supply unit away from the H5i to allow for adequate ventilation.

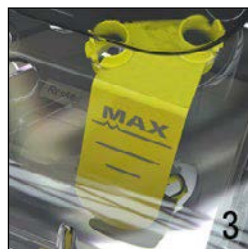
Mask and tubing setup

- For more information on assembling the mask see the mask user guide.
- If your patient is using a full face mask ensure that the “Full Face” setting is selected. If your patient is using a nasal pillows mask ensure that the “Pillows” setting is selected. If your patient is using a nasal mask ensure that the “Nasal” setting is selected with the exception of the Ultra Mirage mask which should use the “Nasal Ultra” setting.
- For a complete list of recommended masks and their settings go to www.resmed.com on the **Products** page under **Service & Support**. If you do not have internet access, please contact your ResMed representative.
- The S9 device is compatible with the following tubing:

| Tube | Specifications | Settings |
|--|----------------|---|
| SlimLine Length: 1.8 m Inner diameter: 15 mm | | Default setting |
| Standard Length: 2 m Inner diameter: 19 mm | | If using the standard tubing, adjust the tube setting in the Patient Setup or Clinical Setup menus. |
| ClimateLine Length: 2 m Inner diameter: 15 mm | Heated | Automatically detected |
| ClimateLine^{MAX} Length: 1.9 m Inner diameter: 19 mm | Heated | Automatically detected |

Filling the water tub

1. Slide the latch and lift open the flip lid.
2. Remove the water tub.
3. Fill the water tub (through the centre hole) with water up to the maximum water level mark (380 mL).
4. Return the water tub to the H5i.
5. Close the flip lid ensuring that it clicks into place.



S9 basics



Start/Stop button
Starts or stops treatment.

Home menu

LCD screen

Escape Auto

EPR

Setup menu*
Allows you to make changes to settings.

Info menu*
Allows you to view your sleep statistics.

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Push Dial
Turning the dial allows you to scroll through the menu and change settings. Pushing the dial allows you to enter into a menu and confirm your choice.

Key



Home



Ramp



Start/Stop
Power Save mode (hold for 3 sec)



Push Dial



Setup menu



Info menu



Advanced Info menu (hold for 3 sec)



Clinical Setup menu (hold for 3 sec)

Backlight





When treatment is being delivered, the backlight (including the Start/Stop button) automatically turns off after 30 seconds, otherwise it turns off after 3 minutes.

* The Info and Setup menus are disabled if S9 Essentials is enabled.

Navigating the menus

In general, to navigate the menus:



1. Turn  until the parameter you require is displayed in blue.
2. Press . The selection is highlighted in orange.
3. Turn  until you see the setting that you require.
4. Press  to confirm your choice. The screen returns to blue.

About the menus

There are three menus that are designed to help you to navigate to where you want to go. They are:

1. **Home** menu—for day to day adjustments.
2. **Info** menu—provides sleep quality information.
3. **Setup** menu—where settings can be adjusted.



Home menu

The Home menu shows you and your patient what features are currently activated, and the accessories that are connected to the device.



Ramp—displayed when the Max Ramp function is activated in the Clinical Setup menu.



Humidity Level—displayed when the H5i is connected.



Climate Control—displayed when both the H5i and the ClimateLine or ClimateLine^{MAX} heated air tube are connected and when Climate Control is activated in the Clinical Setup menu.



Humidity Level and Heated Tube—displayed when both the H5i and the ClimateLine or ClimateLine^{MAX} heated air tube are connected and when Climate Control is set to Manual in the Clinical Setup menu.



Changing settings via the Home menu

From the home menu, you can adjust or check the following features:



Ramp

Designed to make the beginning of treatment more comfortable for the patient, ramp time is the period during which the pressure increases from an initial pressure to the prescribed treatment pressure or minimum treatment pressure.



Humidity level

The patient can adjust their humidity level at any time to find the setting that is most comfortable for them.



Climate Control

When the ClimateLine or ClimateLine^{MAX} heated air tubing is connected and Climate Control is enabled, the patient can adjust the air temperature to find the setting that is most comfortable for them.

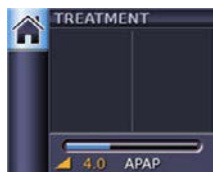
When set to Auto, Climate Control prevents rainout by maintaining 80% relative humidity in the delivered air. If Climate Control is set to Manual, Humidity Level and Heated Tube temperature can be set independently.

S9 Essentials

When S9 Essentials is enabled, the patient can simply start and stop therapy and adjust ramp, humidification and Climate Control.

Treatment screens

Depending on how the system has been configured, you will see one of the following screens when the device is running:



- ✓ Standard S9 without optional accessories



- ✓ H5i humidifier



- ✓ H5i humidifier
- ✓ ClimateLine or ClimateLine^{MAX} heated air tube
- ✓ Climate Control – Auto



- ✓ H5i humidifier
- ✓ ClimateLine or ClimateLine^{MAX} heated air tube
- ✓ Climate Control – Manual

Info menu

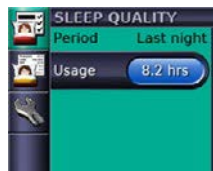
Designed to provide you with information about compliance, therapy and settings, the Info menu consists of: Standard Info menu; and Advanced Info menu.



Standard Info menu

From the Standard Info menu, patients can check their sleep quality, sleep report and service information. In Sleep Quality, data on previous usage (up to 365 days of data) can be viewed.

For Sleep Report, only the period can be changed—other values are for display only.



Advanced Info menu (Hold for 3 sec)

To access the Advanced Info menu, press and hold the Info and Setup buttons for three seconds. This provides patients with additional therapy settings and compliance information.

This screen provides the same options as shown on the Clinical Info menu on the following page.

Setup menu

The Setup menu consists of:

- **Patient Setup menu**—allows the patient to optimise comfort settings as well as make changes to the mask or tube type.
- **Clinical Setup menu**—allows the clinician to set all parameters and options pertaining to the patient's therapy.



Patient Setup menu

Only settings relevant to the patient are displayed in the Patient Setup menu. Depending on how the device has been customised via the Clinical Setup menu, the following screens can be viewed:



EPR Level—displayed if set to PATIENT in the Clinical Setup menu.

Tube—only displayed if ClimateLine or ClimateLine^{MAX} is not connected. If ClimateLine or ClimateLine^{MAX} is attached, no setting is required.

Climate Ctrl—only displayed if ClimateLine or ClimateLine^{MAX} is connected and also set to PATIENT in the Clinical Setup menu.

Mask—always available.



+ Clinical Setup menu (Hold for 3 sec)

There are four screens available from the Clinical Setup menu:

- **Settings**—displays parameters directly affecting the patient's therapy.
- **Options**—displays parameters affecting the patient's comfort, therapy feedback and compliance reporting.
- **Reminders**—displays parameters for accessories requiring replacement.
- **Configuration**—displays general device setting and resetting options.

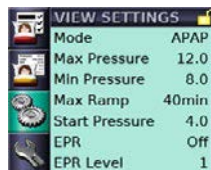
Clinical menus are identified by the yellow open lock shown in the top right corner.



Where further options exist on a screen, the blue scroll bar down the right of the screen (present on the first two screens above) indicates your position within these options.



Clinical Info menu (accessed from the Clinical Setup menu)



Reminder menu

You can use the Reminder menu to alert a patient to specific events, such as when to replace their mask (shown below) or when to insert an SD card. When a reminder is due, a message is displayed on the LCD and remains while the device is not delivering therapy. The backlight on the LCD flashes when a message is displayed.



If more than one reminder for a patient is scheduled for the same date, all scheduled reminders will be displayed.

Patients can clear each message by pressing any key (except the Start/Stop button).

You can access the Reminder menu from the Clinical Menu > Options.



Select the required reminder and change the settings as necessary.

For a list of each of the reminders available and their default settings, see the table on the next page.

Managing Climate Control

Designed to be ideal for most patients, Climate Control Auto enables the automatic delivery of a constant value of absolute humidity while protecting against rainout.

To allow for increased flexibility, Climate Control can be turned to Manual in either the Patient Setup (when enabled) or the Clinical Setup menus. Setting Climate Control to Manual disables the automatic control of humidity and allows the patient to set humidity and temperature levels independently. However, rainout protection is not provided when Climate Control is set to Manual.

| Mode | Humidity | | Temperature | |
|--|---|------------------|-----------------------------|------------------|
| | Setting range | Default settings | Setting range | Default settings |
| Climate Control – Auto | Climate Control | | | |
|  | Constant absolute humidity (depending on temperature setting) | – | Off, ¹ 16°C–30°C | 27°C |
| Climate Control – Manual | Humidity level | | Heated tube | |
|  | Off–6.0 (0.5 increments) | 3 | Off, 16°C–30°C | 27°C |

¹ When the temperature setting is set to Off the tube will not heat the air, nor will the humidifier heat the water to add humidity to the air.

Treatment screen and clinical setup menus



| Parameter | Mode | | Default | Range | Description |
|-------------------------|------|------|------------------------|--|--|
| | APAP | CPAP | | | |
| Treatment screen | | | | | |
| APAP | ✓ | | | | Shows the treatment pressure. |
| Min | | | 4 cm H ₂ O | | |
| Max | | | 20 cm H ₂ O | | |
| CPAP | | ✓ | | | Shows the set pressure. |
| Ramp | ✓ | ✓ | – | – | Orange icon shows that device is ramping up. |
| Settings | | | | | |
| Mode | ✓ | | – | – | Sets the therapy mode depending on what modes are available on the device. |
| Set pressure (CPAP) | | ✓ | 10 cm H ₂ O | 4–20 cm H ₂ O, 0.2 cm H ₂ O increments | Sets the fixed treatment pressure. |
| Max pressure | ✓ | | 20 cm H ₂ O | Min–20 cm H ₂ O, 0.2 cm H ₂ O increments | Sets the upper limit of treatment pressure. |
| Min pressure | ✓ | | 4 cm H ₂ O | 4–Max cm H ₂ O, 0.2 cm H ₂ O increments | Sets the lower limit of treatment pressure. |
| Max ramp | ✓ | ✓ | 30 minutes | Off–45 minutes, 5-minute increments | Limits the ramp times the patient may select. |
| Start pressure | ✓ | ✓ | 4 cm H ₂ O | 4–Min pressure (APAP mode), 4–Set pressure (CPAP mode), 0.2 cm H ₂ O increments | Sets the pressure at the start of ramp, up to fixed treatment pressure (CPAP) or minimum treatment pressure (APAP mode). |
| EPR | ✓ | ✓ | Ramp | Off / Ramp Only / Full Time | Sets when EPR is to occur. |
| EPR level | ✓ | ✓ | 1 | Off / 1 / 2 / 3 / Patient | Sets the EPR value. |
| Mask | ✓ | ✓ | Nasal | Pillows / Full Face / Nasal / Nasal Ultra | Selects the type of mask used by the patient. |
| Tube type | ✓ | ✓ | SlimLine | SlimLine / Standard | Selects the type of air tubing used by the patient. |


| Parameter | Mode | | Default | Range | Description |
|---------------------------|------|------|---------|-------------------------|---|
| | APAP | CPAP | | | |
| Options | | | | | |
| Climate Control | ✓ | ✓ | Auto | Auto / Manual / Patient | Sets the type of Climate Control. |
| EPR inhale | | ✓ | Med | Med / Fast | Sets the inhalation type. |
| Access | ✓ | ✓ | Full | Full / Limited | Enables or disables S9 Essentials—If set to Limited, the Info and Setup menu buttons are disabled. This means that the patient can simply start or stop therapy and adjust ramp, humidification or Climate Control. Combined button presses remain enabled. |
| Date | ✓ | ✓ | – | – | Sets the current date or time. If you set a new date or time that occurs in the past then an 'Invalid date/time, data exists for this period' message is displayed. |
| Time | ✓ | ✓ | – | – | Before this change can be made, erase the compliance data – available under the Configuration menu. |
| Configuration | | | | | |
| Restore factory defaults | ✓ | ✓ | – | – | Resets machine default settings (except for language, date and time). |
| Erase data | ✓ | ✓ | – | – | Allows the clinician to erase all data stored in the unit and SD card (except for machine hours). Settings, date and time are not affected. |
| Temperature units | ✓ | ✓ | °C | °F / °C | Sets temperature units. |
| Advanced Info menu | | | | | |
| Sleep quality | ✓ | ✓ | – | – | Displays the AHI and usage information. |
| View settings | ✓ | ✓ | – | – | Displays Mode, Pressure, Ramp, EPR, Mask, Tube type, Climate Control, and Sleep Quality settings. |

| Parameter | Modes | | Default | Range | Description |
|--|-------|------|---------|---|---|
| | APAP | CPAP | | | |
| Service | | | | | |
| SW | ✓ | ✓ | – | – | Displays the current software version. |
| Reminders | | | | | |
| Mask | ✓ | ✓ | 12 | Seven-day increments (starting from the current set date) with a recurrence period of one to 24 months. | A timed reminder to remind a patient when they need to replace their mask. |
| Water tub | ✓ | ✓ | Off | | A timed reminder to remind a patient when they need to replace their water tub. |
| Tube | ✓ | ✓ | Off | | A timed reminder to remind a patient when they need to replace their tubing. |
| Filter | ✓ | ✓ | 6 | | A timed reminder to remind a patient when to replace the air filter. |
| SD card | ✓ | ✓ | Off | | A timed reminder to remind a patient that they need to remove their SD card and return it to you, enabling you to establish compliance. |
| Service | ✓ | ✓ | 24 | | A timed reminder to remind a patient when to return the device for service. |
| Customised messages (Custom 1, Custom 2) | ✓ | ✓ | Off | | Customised reminders, eg, to return equipment or to phone a particular person or number. Custom reminder text can be up to 16 characters long, via PC application software. See your PC application manual for more information. |

Delivering therapy



1. Make sure the power is connected.
2. Adjust the ramp time or humidification level if required.
3. Instruct the patient to fit their mask as described in the mask user guide.
4. To start therapy, instruct the patient to press .
5. Instruct the patient to lie down and arrange the air tubing so that it is free to move if they turn in their sleep.
6. To stop treatment at any time, instruct the patient to press .

In order to assist the heater plate in cooling, your S9 device will continue to blow air for up to an hour after treatment has stopped. However, you can unplug the device from the power outlet at any time and allow the heater plate to cool without air flow or press  to enable Power Save mode.

Once therapy has started a treatment screen is displayed.

Note: *If power is interrupted during treatment, the device automatically restarts therapy when power is restored.*

Adding supplemental oxygen

Your S9 device is designed to be compatible with up to 4 L/min of supplemental oxygen.

At a fixed rate of supplemental oxygen flow, the inhaled oxygen concentration will vary, depending on the pressure settings, patient breathing pattern, mask selection, and the leak rate.

Notes:

- *Adding oxygen may affect the delivered pressure, and the accuracy of the displayed leak and minute ventilation.*
- *Before adding oxygen, familiarise yourself and your patient with the specific warnings relating to the use of supplemental oxygen. These can be found at the end of this guide.*

Data management

The SD card may be used to monitor patient usage as well as treatment pressure, and incidence of apnoeas and hypopnoeas. To assess the patient's progress, data for the last session may be compared to values for the last week, the last month, the last three months, the last six months, and the last year. The device stores usage and summary data for up to 365 sessions.

SD card

The SD card allows S9 devices to capture data. The S9 Escape Auto comes with the SD card already inserted and ready to be used.

Compliance data is also stored on the device, so if the card is lost, the data is not. You can also create new treatment settings and transfer them to the patient's device via the SD card.

S9 device settings are written to the SD card so that a ResMed PC application will present actual settings from the SD card rather than default values.



Removing the card

Before removing the card, instruct the patient to disconnect the S9 device from the power outlet.

To remove the card, instruct the patient to:



1. Push in the SD card to release it.
2. Remove the card.
3. Insert the card into the protective folder.
4. Send the protective folder back to you as instructed.

Inserting the card

1. Remove the card from the protective folder.
2. Push the card into the S9 device until it clicks.
3. The following message is briefly displayed: **Reading SD card**

Notes:

- For more information on removing and inserting the card refer to the S9 SD Card Protective Folder provided with the device.
- Ask the patient to retain the S9 SD Card Protective Folder for future use.

Analysing the SD card data

To analyse the data, use a ResMed PC application to transfer data and settings between an S9 or an SD card and your personal computer. Refer to your PC application guide for more information about analysing the information on returned SD cards.

Data storage

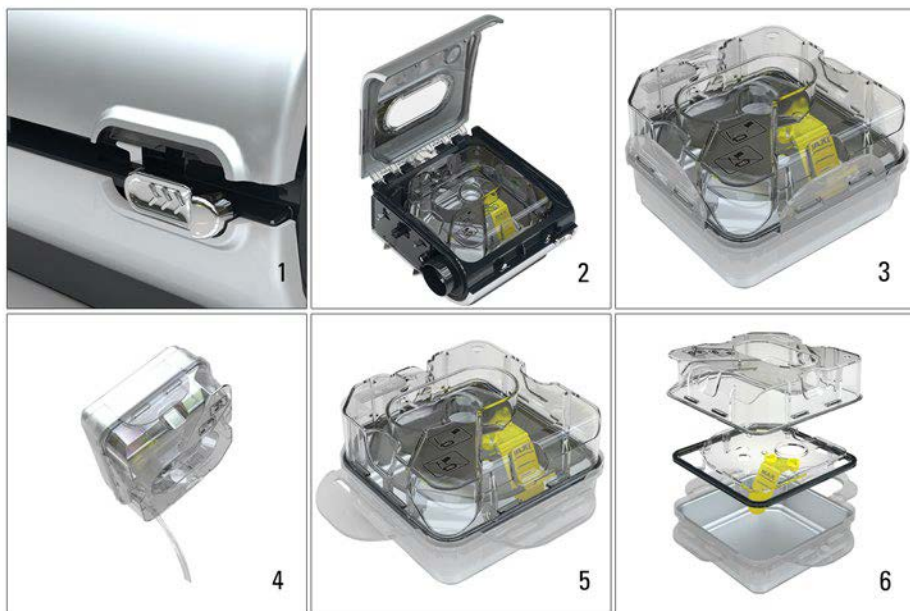
Designed to make data more easily available, the S9 SD card allows S9 devices to capture and store up to 365 sessions of therapy summary and compliance data.

Cleaning and maintenance

You should regularly carry out cleaning and maintenance as described in this section.

Disassembling the H5i

1. Slide the latch.
2. Lift open the flip lid.
3. Remove the water tub.
4. Discard any excess water from the water tub.
5. Unclip all four side latches.
6. Pull apart the tub lid, plate and base.



Daily

1. Disconnect the air tubing by pulling on the finger grips on the cuff. Hang it in a clean, dry place until next use.
2. Wash the disassembled tub lid, plate and base in warm water using a mild detergent.
3. Rinse thoroughly in clean water and allow them to dry away from direct sunlight.

Notes:

- The disassembled tub lid, plate and base may also be washed in a dishwasher on the delicate or glassware cycle (top shelf only).
- Do not hang the air tubing in direct sunlight as it may harden over time and eventually crack.
- Do not wash the air tubing in a washing machine or dishwasher.

Monthly

1. Wipe the exterior of the S9 and H5i with a damp cloth and mild detergent.
2. Check the air filter for holes and blockage by dirt or dust.
3. Peel the flip lid seal from the flip lid and wash it in warm water using a mild detergent.

Reassembling the H5i

1. Place the plate back onto the base ensuring that the maximum water level mark faces up.
2. Place the tub lid back onto the plate/base ensuring that the centre holes are aligned.
3. Clip all four side latches.
4. Fill the water tub and return the water tub to the H5i.
5. Close the flip lid ensuring that it clicks into place.



Maintenance checklist

- ✓ Inspect the H5i water tub and flip lid seal for wear and deterioration.
- ✓ Replace the water tub if any component is leaking or has become cracked, cloudy or pitted.
- ✓ Replace the flip lid seal if cracked or torn.
- ✓ Clean white powder deposits in the water tub by using a solution of one part household vinegar to 10 parts water.
- ✓ Inspect the maximum water level mark. If cleaning is required, remove by pinching and pushing out the locks from the plate. Wash in warm water using a mild detergent.

Reprocessing the H5i between patients

The H5i should be reprocessed when used between patients. Cleaning and disinfection instructions are available from the ResMed website, www.resmed.com under **Products** and **Service & Support**. If you do not have internet access, please contact your ResMed representative.

Replacing the air filter

Replace the air filter every six months (or more often if necessary).

1. Remove the air filter cover from the back of the S9 device.
2. Remove and discard the old filter.
3. Insert a new ResMed air filter ensuring that it is sitting flat in the air filter cover.
4. Replace the air filter cover.

Notes:

- Ensure the air filter and air filter cover are fitted at all times.
- Do not wash the air filter. The air filter is not washable or reusable.



The following filters are available for use with S9 devices:

| Filter | Efficiency |
|---|--|
| Standard (ASMB 160) | 88% at 7 micron |
| Hypo-allergenic (Air Safety Electret100 – electrostatic filter) | 89.8% at 0.5 micron, bacterial efficiency of 99.54%. |

Antibacterial filters

Antibacterial filters are not compatible with the ClimateLine, ClimateLine^{MAX} or SlimLine tubing but can be used with the Standard air tubing.

Antibacterial filters increase resistance in the air circuit and may affect accuracy of displayed and delivered pressure, particularly at high flows. ResMed recommends using a filter with a low impedance (eg, less than 2 cm H₂O at 60 L/min).

Technical specifications

| General technical specifications | |
|-----------------------------------|--|
| 90W power supply unit | Input range: 100–240V; 50–60Hz; 115V, 400Hz nominal for aircraft use; 70W (80VA) (typical power consumption); 110W (120VA) (maximum power consumption) |
| 30W power supply unit | Input range: 100–240V; 50–60Hz; 115V, 400Hz nominal for aircraft use; 20W (40VA) (typical power consumption); 36W (75VA) (maximum power consumption) |
| 90W DC/DC converter | Nominal inputs: 12V, 24V Typical power consumption: 70W Maximum power consumption: 110W |
| Operating temperature | +5°C to +35°C Note: <i>The air flow for breathing produced by this therapy device can be higher than the temperature of the room. Under extreme ambient temperature conditions (40°C) the device remains safe.</i> |
| Operating humidity | 10–95% non-condensing |
| Operating altitude | Sea level to 2,591 m |
| Storage and transport temperature | -20°C to +60°C |
| Storage and transport humidity | 10–95% non-condensing |
| Electromagnetic compatibility | Product complies with all applicable electromagnetic compatibility requirements (EMC) according to IEC60601-1-2:2007, for residential, commercial, and light industry environments. It is recommended that mobile communication devices are kept at least 1 m away from the device. Information regarding the electromagnetic emissions and immunity of these ResMed devices can be found on www.resmed.com , on the Products page under Service and Support. Click on the PDF file for your language. |
| Aircraft use | ResMed confirms that the S9 Escape Auto meets the Federal Aviation Administration (FAA) requirements (RTCA/DO-160, section 21, category M) for all phases of air travel. |
| EC 60601-1 classification | Class II (double insulation), Type BF |
| Measuring and display devices | |
| Pressure sensor: | Internally located at device outlet, analog gauge pressure type, -5 to 45 cm H ₂ O |
| Flow sensor: | Internally located at device inlet, digital mass flow type, -70 to 200 L/min |

| S9 technical specifications | |
|--|--|
| Operating pressure range | 4 to 20 cm H ₂ O |
| Maximum single fault steady state pressure | 30 cm H ₂ O if pressure exceeded for >6 sec 40 cm H ₂ O if pressure exceeded for >1 sec |
| Pressure measurement tolerance | ±0.5 cm H ₂ O ± 4% of the measured reading |
| Flow measurement tolerance | ±6 L/min or 10% of reading, whichever is greater, at 0 to 150 L/min positive flow |
| DECLARED DUAL-NUMBER NOISE EMISSION VALUES in accordance with ISO 4871:1996 | |
| Sound pressure level | |
| with SlimLine tube: | 24 dBA as measured according to ISO 17510-1:2002 26 dBA with uncertainty of 2 dBA as measured according to ISO 17510-1:2007 |
| with Standard tube: | 24 dBA as measured according to ISO 17510-1:2002 27 dBA with uncertainty of 2 dBA as measured according to ISO 17510-1:2007 |
| with either SlimLine tube or Standard tube and H5i: | 27 dBA as measured according to ISO 17510-1:2002 28 dBA with uncertainty of 2 dBA as measured according to ISO 17510-1:2007 |
| Sound power level | |
| with SlimLine tube: | 34 dBA with uncertainty of 2 dBA as measured according to ISO 17510-1:2007 |
| with Standard tube: | 35 dBA with uncertainty of 2 dBA as measured according to ISO 17510-1:2007 |
| with either SlimLine tube or Standard tube and H5i: | 36 dBA with uncertainty of 2 dBA as measured according to ISO 17510-1:2007 |
| Nominal dimensions (L x W x H) | 153 mm x 140 mm x 86 mm |
| Weight | 835 g |
| Housing construction | Flame retardant engineering thermoplastic |
| Supplemental oxygen | Recommended maximum supplemental oxygen flow: 4 L/min |
| Air filter | |
| Standard: | Polyester non-woven fiber |
| Hypoallergenic: | Acrylic and polypropylene fibers in a polypropylene carrier |
| Air outlet | The 22 mm conical air outlet complies with ISO 5356-1:2004 |

| H5i technical specifications | |
|-------------------------------------|---|
| Maximum heater plate temperature | 65°C |
| Temperature cut-out | 74°C |
| Maximum gas temperature at mask | ≤ 41°C |
| Nominal dimensions (L x W x H) | Docking station and water tub: 153 mm x 145 mm x 86 mm |
| Weight (standard water tub) | Docking station and unfilled water tub 0.69 kg |
| Weight (cleanable water tub) | Docking station and unfilled water tub 0.79 kg |
| Water capacity | To maximum fill line 380 mL |
| Docking station | Flame retardant engineering thermoplastic, aluminium |
| Cleanable water tub | Injection molded plastic, stainless steel and silicone seal |
| Standard water tub | Injection molded plastic, aluminium and elastomer seal |

Air tubing technical specifications

| | |
|--|---|
| ClimateLine heated air tubing | Flexible plastic and electrical components, 2 m, 15 mm inner diameter |
| ClimateLine ^{MAX} heated air tubing | Flexible plastic and electrical components, 1.9 m, 19 mm inner diameter |
| SlimLine air tubing | Flexible plastic, 1.8 m, 15 mm inner diameter |
| Standard air tubing | Flexible plastic, 2 m, 19 mm inner diameter |
| ClimateLine temperature cut-out | ≤ 41°C |

Notes:

- The manufacturer reserves the right to change these specifications without notice.
- The temperature and relative humidity settings displayed for Climate Control are not measured values.

Humidifier performance

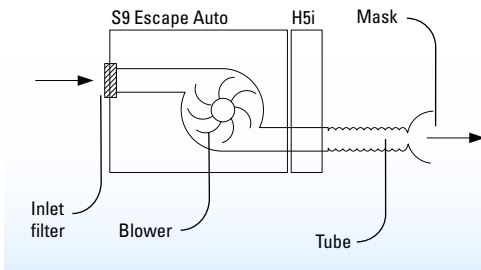
The following settings have been tested at 22°C ambient temperature:

| CPAP mask pressure cm H ₂ O | RH output % | | Nominal system output AH ¹ , BTPS ² | |
|--|-------------|-----------|---|-----------|
| | Setting 3 | Setting 6 | Setting 3 | Setting 6 |
| 4 | 90 | 100 | 10 | 18 |
| 10 | 95 | 100 | 11.5 | 21 |
| 20 | 95 | 100 | 11 | 18 |

¹ AH- Absolute Humidity in mg/L.

² BTPS- Body Temperature Pressure Saturated.

Pneumatic flow path



Flow (maximum) at set pressures

The following are measured at the end of the specified tubing:

| Pressure cm H ₂ O | S9 and Standard air tube L/min | S9 and SlimLine air tube L/min | S9, H5i and ClimateLine heated air tube L/min |
|---------------------------------|--------------------------------------|--------------------------------------|---|
| 4 | 198 | 178 | 167 |
| 8 | 189 | 171 | 159 |
| 12 | 180 | 164 | 142 |
| 16 | 170 | 156 | 137 |
| 20 | 155 | 140 | 115 |

Displayed values

| Value | Range | Accuracy | Display resolution |
|-------------------------------|-----------------------------|---|-------------------------|
| Pressure sensor at air outlet | | | |
| Pressure | 4 to 20 cm H ₂ O | ±0.5 cm H ₂ O (± 4% of measured value) | 0.1 cm H ₂ O |
| Flow derived value | | | |
| Leak | 0–200 L/min | * | 1 L/min |

* The displayed values are estimates. They are provided for trending purposes only.

Pressure accuracy

| Maximum static pressure variation at 10 cm H ₂ O according to ISO 17510-1:2007: | | | |
|--|--|-------------|-------------|
| Without humidifier (SlimLine tube) | 9.76 cm H ₂ O to 9.87 cm H ₂ O | | |
| With H5i humidifier (SlimLine tube) | 9.78 cm H ₂ O to 9.88 cm H ₂ O | | |
| Maximum dynamic pressure variation according to ISO 17510-1:2007: | | | |
| Pressure (cm H ₂ O) | 10 BPM | 15 BPM | 20 BPM |
| | S9 and SlimLine tube without H5i / S9 and SlimLine tube with H5i | | |
| 4 | 0.22 / 0.20 | 0.28 / 0.29 | 0.47 / 0.53 |
| 8 | 0.23 / 0.19 | 0.32 / 0.29 | 0.41 / 0.42 |
| 12 | 0.22 / 0.21 | 0.35 / 0.29 | 0.41 / 0.45 |
| 16 | 0.22 / 0.23 | 0.41 / 0.33 | 0.44 / 0.50 |
| 20 | 0.24 / 0.27 | 0.37 / 0.34 | 0.48 / 0.50 |

Warnings and cautions

WARNINGS

- Read the entire manual before using the device.
- Use the device only as directed by your physician or healthcare provider.
- Use the device only for the intended use as described in this manual. Advice contained in this manual should not supersede instructions given by the prescribing physician.
- If you notice any unexplained changes in the performance of the device, if it is making unusual or harsh sounds, if the device or the power supply are dropped or mishandled, if water is spilled into the enclosure, or if the enclosure is broken, discontinue use and contact your ResMed Service Center.
- Beware of electrocution. Do not immerse the device, humidifier, power supply or power cord in water. In the event of a spill, disconnect the device from the power supply and let the parts dry. Always unplug the device before cleaning and make sure that all parts are dry before plugging in the device.
- Explosion hazard—do not use in the vicinity of flammable anesthetics.
- Make sure the power cord and plug are in good condition and the equipment is not damaged.
- Keep the power cord away from hot surfaces.
- The device should only be used with masks (and connectors¹) recommended by ResMed, or by a physician or respiratory therapist. A mask should not be used unless the device is turned on. Once the mask is fitted, ensure that the device is blowing air. The vent hole or holes associated with the mask should never be blocked.

Explanation: The device is intended to be used with special masks (or connectors) which have vent holes to allow continuous flow of air out of the mask. When the device is turned on and functioning properly, new air from the device flushes the exhaled air out through the mask vent holes. However, when the device is not operating, insufficient fresh air will be provided through the mask, and the exhaled air may be rebreathed. Rebreathing of exhaled air for longer than several minutes can, in some circumstances, lead to suffocation. This applies to most models of CPAP or bilevel devices.

- Oxygen supports combustion. Oxygen must not be used while smoking or in the presence of an open flame.
- Always ensure that the device is turned on and airflow generated before the oxygen supply is turned on. Always turn the oxygen supply off before the device is turned off, so that unused oxygen does not accumulate within the device enclosure and create a risk of fire.
- Do not leave long lengths of air tubing around the top of the patient's bed. It could twist around the patient's head or neck while they are sleeping.
- Do not use electrically conductive or antistatic air tubings.
- Do not use the air tubing if there are any visible signs of damage.
- Only ResMed air tubing and accessories should be used with the device. A different type of air tubing or accessory may alter the pressure you actually receive, reducing the effectiveness of the treatment.
- Only use the ResMed 90W or 30W power supply unit. Use the 90W power supply unit to power the system comprising the device, H5i, air tubing, DC/DC converter and battery pack. The 30W power supply unit is designed to power the device only and recommended for traveling.
- Only ResMed products are designed to be connected to the module connector port. Connecting other devices could damage the device.
- Blocking the air tubing and/or air inlet of the device while in operation could lead to overheating of the device.
- Do not operate the H5i if it is not working properly or if any part of the device or H5i has been dropped or damaged.

CAUTIONS

- Do not open the device enclosure. There are no user serviceable parts inside. Repairs and servicing should only be performed by an authorised ResMed service agent.
- Do not use bleach, chlorine, alcohol, or aromatic-based solutions, moisturising or antibacterial soaps or scented oils to clean the device, humidifier or air tubing. These solutions may cause damage and reduce the life of these products.
- Incorrect system setup may result in incorrect mask pressure reading. Ensure the system is correctly set up.

1 Ports may be incorporated into the mask or in connectors that are near the mask.

- Be careful not to place the device where it can be bumped or where someone is likely to trip over the power cord.
- Make sure the area around the device is dry and clean and clear of bedding, clothes or other objects that could block the air inlet or cover the power supply unit.
- Ensure that the device is protected against water if used outdoors. Enclose the device in the S9 travel bag for transport.
- The H5i should only be used with tubing or accessories recommended by ResMed. Connection of other delivery tubes or accessories could result in injury, or damage to the device.
- Do not open the H5i enclosure. There are no user serviceable parts inside. Repairs and servicing should only be performed by an authorised ResMed service agent.
- Do not overfill the water tub as water may enter the device and air tubing.
- Do not use any additives (eg, scented oils and perfumes). These may reduce the humidification output of the H5i and/or cause deterioration of the water tub materials.
- Take care when handling the H5i as the water/water tub may be hot. Allow 10 minutes for the heater plate and any excess water to cool.
- The H5i should only be connected or disconnected when the water tub is empty.
- Make sure that the water tub is empty before transporting the H5i.
- Do not operate the H5i on an aircraft as water may enter the device and air tubing during turbulence.
- Always place the H5i on a level surface below the level of the user to prevent the mask and tubing from filling with water.
- If liquids are inadvertently spilled into or on the H5i, unplug the device from the power outlet. Disconnect the H5i from the device and allow it to drain and dry before re-using.

S9TM | Series
More. Comfort.

368289/3 2012-10
S9 Escape Auto
H5i
CLINICAL
APAC ENG

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For patent information, see www.resmed.com/ip.

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