

# RESMED

## VPAP™ Service Manual

VPAP Auto 25

VPAP ST

VPAP S

VPAP IV ST

VPAP IV

S8 Auto 25



English

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# 1 How to use this manual

Each of the sections in this manual have been written with a specific purpose in mind. Use this guide to help you find the material which is relevant to your task at the moment.

- 2 Introduction** – Gives a brief overview of the current VPAP™ range.
- 3 General inspection and servicing** – Gives the procedures to help you examine a flow generator which has been brought into a service centre. The general inspection procedures should be performed before any other work is done on the flow generator.
- 4 Operator safety and static precautions** – Provides safety advice and lists procedures to be followed whenever PCBs are removed from the flow generator. These procedures minimize the chance of ICs being damaged by static electricity.
- 5 Replacing major subassemblies** – Highlights points to note when replacing subassemblies, reassembling the flow generator and indications of when recalibration is necessary.
- 6 Replacement parts** – Shows labelled pictures and part numbers of all the spare parts and subassemblies available from ResMed.
- 7 Calibration procedures** – Procedures to follow after a fault has been isolated to a PCB, the blower or the flow meter, and the part has been replaced. Follow these procedures to calibrate the unit. Once calibrated, restore the owner's individual settings.
- 8 Troubleshooting guide** – Gives you a way to quickly locate the problem and fix it if you know the symptoms of a faulty machine.
- 9 System specifications** – Lists electrical and mechanical specifications of the flow generator and air tubing.
- 10 Recommended maintenance schedule** – Provides a brief description of the maintenance which the owner of the flow generator should carry out.

Some countries require all medical equipment to have a periodic service to confirm that the equipment is in good working order. Section 3, "*General inspection and servicing*" may be used in this situation.

**Appendix A: Service Request Form** - Fill out this form if you need to return a device to ResMed for servicing.

**Appendix B: Operational diagram** - Provides a pictorial representation of the flow generator function.

**Note:** *Schematics of all PCBs in these flow generators are available to authorised service centres. To order, please contact your local ResMed office.*

This manual contains special terms and icons that appear in the margins to draw your attention to specific and important information.

- Warning alerts you to possible injury.
- Caution explains special measures for the safe and effective servicing of the device.
- Note is an informative or helpful note.

## 2 Introduction

This manual is a guide to servicing and repairing the following VPAP devices:

- VPAP Auto 25
- VPAP S
- VPAP ST
- S8 Auto 25
- VPAP IV
- VPAP IV ST

It is written for ResMed distributors, and gives instructions for replacing subassemblies and for recalibration as appropriate. Work at the component level will normally be carried out by ResMed.

### Intended users of this manual

Before attempting any repair work, please ensure that you:

- are familiar with the operating manual and the clinical manual for the product
- have suitable electrical and mechanical training to satisfy the requirements of the relevant regulatory authorities
- use the correct antistatic procedures described in this manual

Use only approved ResMed parts and never use parts that have failed, show excessive wear, have been contaminated, or are ineffective for their intended use.

### Nasal CPAP

Nasal Positive Airway Pressure systems are used to treat obstructive sleep apnea (OSA), a disorder that causes a physical obstruction in a person's airway while sleeping. The principle of treatment is that filtered air is delivered by a flow generator through flexible tubing to a nasal mask worn by the patient while sleeping. The flow generator maintains a positive pressure in the patient's airway which acts as a pneumatic splint, preventing the airway from collapsing during sleep.

### Features of the VPAP range

These devices provide continuous positive airway pressure (CPAP; in CPAP mode) and bilevel pressure support to patients with OSA.

The operating modes are as follows:

Mode	VPAP Auto 25	VPAP S	VPAP ST	S8 Auto 25	VPAP IV	VPAP IV ST
CPAP	✓	✓	✓	✓	✓	✓
VAuto	✓		✓	✓		
S (Spontaneous)	✓	✓	✓		✓	✓
S/T (Spontaneous/Timed)			✓			✓
T (Timed)			✓			✓

**Note:** Schematics of all PCBs in this flow generator are available to authorised service centres. To order, please contact your local ResMed office.

# 3 General inspection and servicing

## Instructions for general inspection procedures

Carry out the procedures on the following pages to confirm that the VPAP is in good electrical and mechanical condition. These tests will highlight any major mechanical or electrical problem with the unit.

### Equipment required

- ResMed Service Software 1.20, available from the Technical Services website.

*Note: Ensure you check the Technical Services website to confirm the latest version of service software available for use with this product.*

- ResScan USB adaptor and cable (ResMed part #22203)
- Oxygen side port connector
- Straight adaptor
- Calibration cap
- Air tubing connector

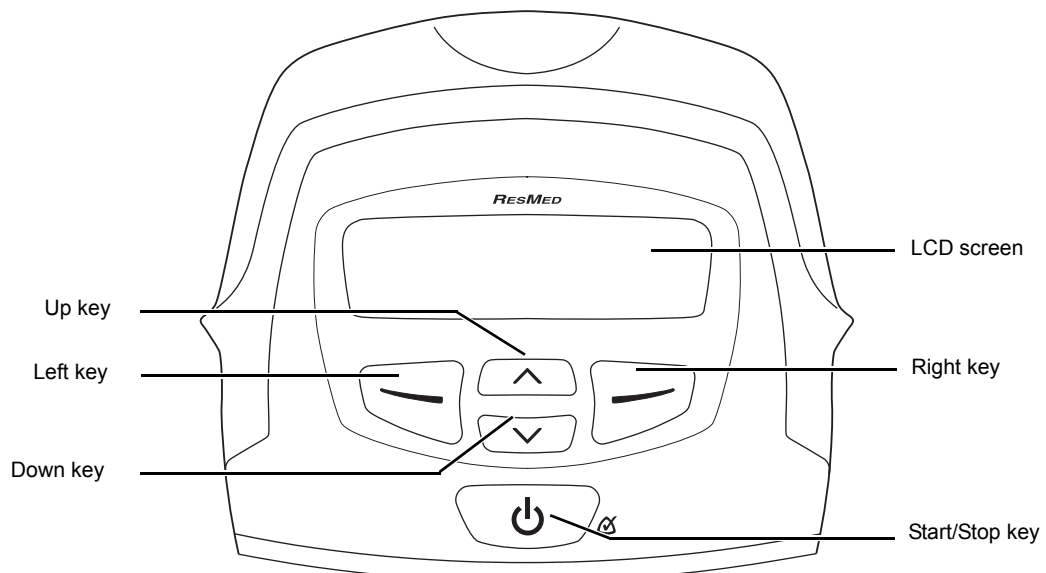
*Note: The above four items are contained in the Service accessories kit (#19919) - this kit includes S9 adapter and USB cable, oxygen sideport connector, straight adaptor, calibration cap and air tubing connector.*

- DC/DC converter 24V/50W (ResMed part# 26932)
- H4i docking station
- Data card
- 2 metre air hose (ResMed part # 14961)
- Manometer (0-40 cm H<sub>2</sub>O range)
- Calibrated flow meter with flow regulation valve

*Note: The flow meter must be capable of measuring air flows ranging from 0 - 180 L/min with an accuracy of 3% or better over this range.*

- A computer running Windows XP or Vista (32-bit).

### Function keys



## 1 Clean the flow generator

Before servicing the unit it should be wiped down using a lint free cloth and a cleaning agent with a high alcohol content, e.g. isopropyl alcohol.

### Warning



When using a cleaning agent with a high alcohol content refer to the appropriate Material Safety Data Sheet to ensure safe handling of the cleaning agent.

Remove any stains from the cases. When removing any stains from the flow generator or mask system use soap or detergent-based cleaning solutions. Remove excess and wipe dry after use.

**Do not** use thinners, trichlorethylene, bleach or other solvents. **Do not** apply oil to any component of the flow generator.

## 2 Record clinical settings

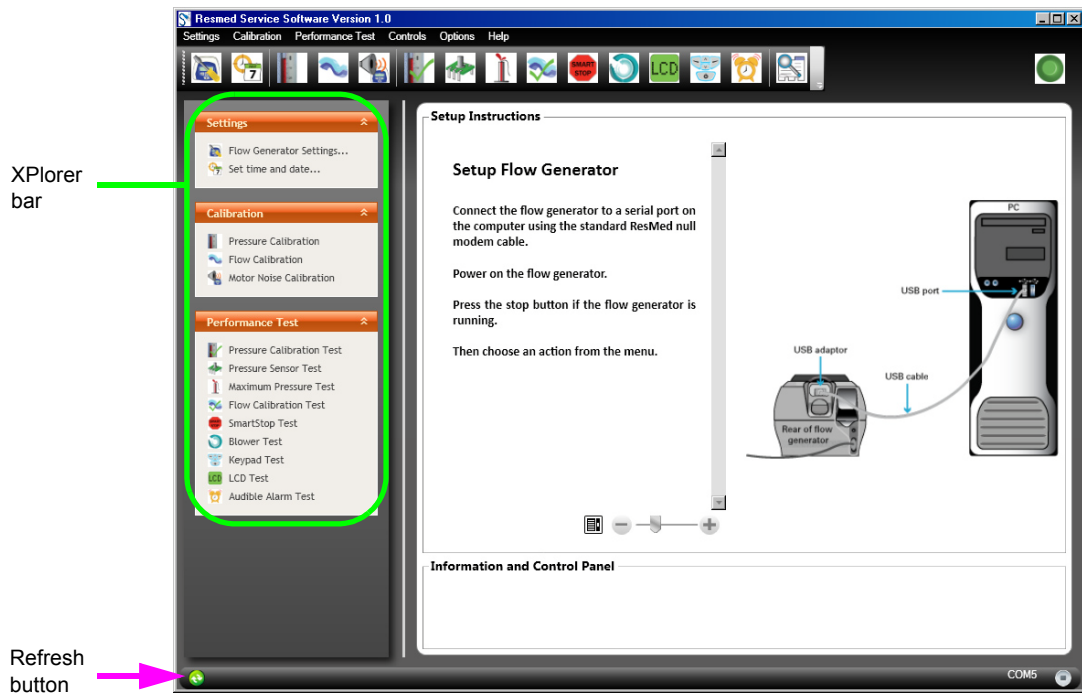
- 1 If applicable, remove the front muffler assembly.
- 2 With the unit unplugged from the wall, remove the data card module.
- 3 Connect the ResScan USB adaptor to the flow generator. Press upwards and hold the button on the adaptor, while pushing it onto the unit.




- 4 Turn on the flow generator and allow it to complete the self test.
- 5 Connect the flow generator to the PC via the USB cable.



- Open the ResMed service software. The following window will appear:

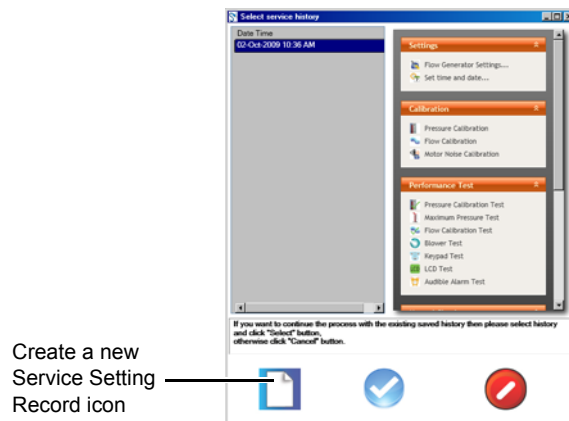


- Press the Refresh button (as indicated above) to enable the service software to recognise the flow generator.
- The flow generator details will then be displayed at the bottom of the screen beside the Refresh button. The calibration and tests in the Xplorer bar at the left of the screen will also change to indicate the procedures specific for that product.
- Select Flow Generator Settings... in the Xplorer bar, or click on the Flow Generator Setting Dialog icon  at the top of the screen.
- Note: It will take a few seconds for the flow generator settings to be displayed.*
- The flow generator settings will be displayed as shown below:



- Select *Save to Database* in the Xplorer bar.

- 13 The service history dialog will then be displayed if the unit has existing records in the application database. (If there are no existing records, proceed to step 14.) Click on the Create a new Service Setting Record icon to start a new session, or select an existing session from the service history displayed:



- 14 The following window will then appear:



- 15 At this point, you can select the name of the service agent handling the device and enter the Service Record (SR) and Repair numbers, so that this information will be included with the flow generator settings details.

*Note:* To enter new service agent details, click on the image in the "Select service agent" window. A cursor will then appear in the "Service Agent" field, and the name can be entered.

*Once the service agent details are entered, any service agent names entered for that device will be available for selection in the drop down menu.*

*If an existing session was selected, the "Select service agent" window will already be populated.*

## Warning



If the clinical settings cannot be recorded, select the appropriate product code for the product. In the XPlorer bar, click on "Read default settings", then click on "Reload to flow generator". Notify the patient, so they can have their settings reloaded.

- 16 Click on the **Select** button once the details have been entered.
- 17 The software will then return to the settings screen.
- 18 Turn off the flow generator and disconnect the serial adapter.
- 19 Refit the data card module.

### 3 External examination

- 1 Visually examine the flow generator for external damage such as:
  - deformation or cracking of the upper or lower cases
  - damaged components such as the mains power inlet
  - damage to the interface panel or bottom decal

If either of the outside cases are fractured and require replacement, take particular care in inspecting all other components within the cases for damage.

### 4 Internal examination (if necessary)

#### Warning



The VPAP range uses an isolated power supply, however, it is recommended that isolation transformers are also used for added safety while working with the cases opened up and power switched on.

Remove the top case and chassis lid by following the instructions given in **Section 5 Replacing major subassemblies**. Inspect the flow generator for the following, recording any irregularities:

- The main PCB is seated correctly
- The blower assembly is seated correctly
- The flow meter is seated correctly
- The power supply PCB is seated correctly

Inspect the unit for the following, recording any irregularities:

- all mechanical components are seated correctly
- all electrical components are mounted correctly and secured in position
- there are no loose terminals, loose wires or incomplete insulation on electrical components or connections
- there are no loose pieces of wire or other objects trapped in the PCB

Use an antistatic cloth or brush to remove dust or dirt from components and from the insides of the flow generator case.

Repair or replace any missing or damaged external components. Rectify any problems either identified by the user or noted during servicing. Should any major components such as the blower assembly, the flow meter or the main PCB require replacement the flow generator should be recalibrated and tested after the assembly has been replaced. Follow the procedures in **Section 7 Calibration procedures** to calibrate the unit, then repeat tests 6-17 in **Section 3 General inspection and servicing**.

Reassemble the flow generator.

#### Caution



Printed circuit boards can be damaged by static electricity. Please read the instructions in **Section 4 Operator safety and static precautions** before attempting to replace any PCBs.

Thread cutting screws are used throughout the flow generator. When replacing a thread cutting screw, turn the screw anti-clockwise until it fits into the previously cut thread. Otherwise the original thread may be stripped out.

### 5 Replace the air filter

- 1 Remove the filter cover from the flow generator.
- 2 Replace the air filter, with the blue side of the filter material facing out from the unit.

#### Caution



Only use genuine ResMed spare parts, because the filter affects the flow characteristics of the flow generator, which in turn affects the pressure supplied to the patient.

## 6 DC power test

- 1 Turn off the flow generator at the mains.
- 2 Connect the DC/DC converter into the flow generator.
- 3 Connect the converter to a DC power source (12V battery or bench top power supply capable of supplying 3 amps or more).
- 4 Turn on the unit and confirm that the unit powers up.
- 5 Turn off the unit, remove the DC/DC converter, and reconnect it to mains power.

## 7 H4i test

The VPAP range is designed to integrate with the H4i heated humidifier to form a single flow generator with humidification unit. The flow generator automatically detects the H4i docking station when it is connected to the flow generator.

### Warning

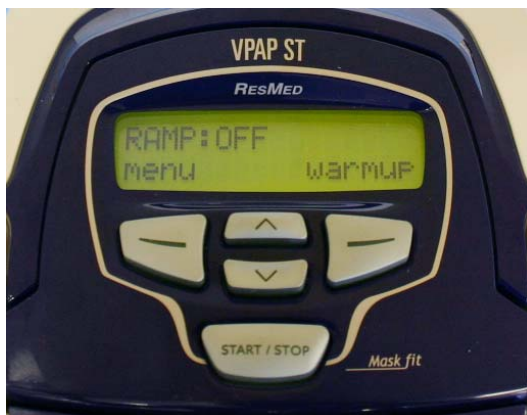
The H4i can reach a maximum temperature of 85°C.



- 1 Switch off the flow generator.
- 2 Remove the power outlet plug from the front of the unit.
- 3 Attach the H4i to the flow generator, as shown below:

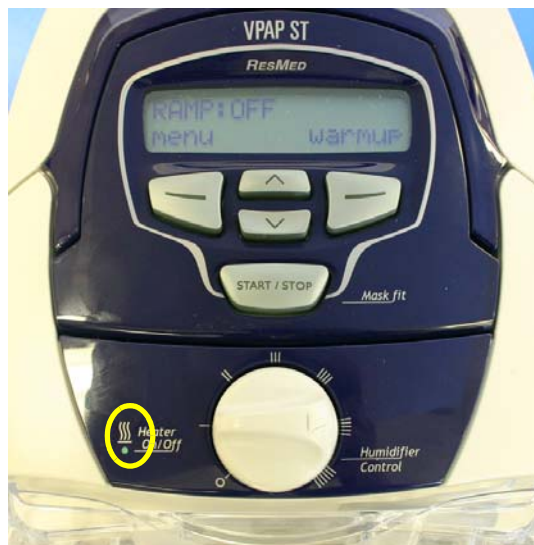


- 4 Switch on the flow generator and observe the LCD screen. After a Welcome message is displayed, the LCD should display the warm-up feature prompt. If the Mask fit screen is displayed, press the Right key to exit.



- 5 Turn the control dial to five (IIIII).

- 6 Press the Right key to start the H4i warming up. Ensure the light (circled) on the humidifier turns on to indicate the unit is warming.



**Note:** It may be difficult to determine if the humidifier light is on in a brightly lit room.

- 7 Press the Right key again to stop the warm-up feature.
- 8 Switch off the flow generator and remove the H4i docking station.

**Warning** The heater plate will be extremely hot.



- 9 Switch on the flow generator and observe the LCD screen. Confirm that the warm-up feature prompt is not displayed on the screen.

## 8 Data card test

- 1 With the flow generator switched on, insert the data card into the flow generator, as shown below:



- 2 The LCD should briefly display the message:

**CARD INSERTED**  
Please wait


- 3 Wait for the prompt to remove the card.
- 4 Remove the data card and confirm that the unit returns to the Standby screen.
- 5 Turn off the unit and disconnect it from the mains power.
- 6 Remove the data card module.

## 9 Pressure calibration test



### Caution



Make sure the flow generator has been warmed up for at least 15 minutes before proceeding with the remaining tests.

- 1 With the unit still switched off, remove the data card module and refit the ResScan USB adaptor, with USB cable attached.
- 2 Turn on the unit and allow it to complete the self test.
- 3 Return to the service software and press the Record button .
- 4 The following screen will then appear, indicating the existing service records for the flow generator.




- 5 The most recently created record (the flow generator settings recorded earlier) will be highlighted.
- 6 Click on the Select button  to continue recording the service results to the same record.
- 7 The "Select service agent screen", as shown on page 9, will appear once again.
- 8 Select the name of the service agent and enter the SR number.
- 9 All calibration and tests, including tests completed without service software are then listed in the Xplorer bar.
- 10 Select Pressure calibration test in the Xplorer bar, or click on the Perform the pressure calibration test icon .

*Note:* At the top of the screen at the beginning of each procedure is an alert reminding you to reload the clinical settings to the unit after completing the necessary test and calibration procedure. Click the OK button once you have read the alert.




- 11 Set up the test equipment as instructed by the test software.
- 12 Select **Next** and follow the steps as instructed.
- 13 If the flow generator fails this test, repeat the pressure calibration, ensuring the test set-up is correct.

## 10 Maximum pressure test

- 1 Select Maximum pressure test in the Xplorer bar, or click on the Perform the Maximum pressure test icon .
- 2 The test set-up remains the same as the pressure calibration test.
- 3 Select **Next** and follow the steps as instructed.


If the flow generator fails this test, follow the procedures outlined in **Section 7 Calibration procedures** to do a full recalibration of the flow generator, ensuring the equipment set-up is correct.

## 11 Flow calibration test

- 1 Select Flow calibration test in the Xplorer bar, or click on the Perform the flow calibration test icon .
- 2 Set up the test equipment as instructed by the test software.
- 3 Select **Next** and follow the steps as instructed.


If the flow generator fails this test, follow the procedures outlined in **Section 7 Calibration procedures** to do a full recalibration of the flow generator, ensuring the equipment set-up is correct.

## 12 Blower test

- 1 Select Blower test in the Xplorer bar, or click on the Perform the blower test icon .
- 2 Set up the test equipment as instructed by the test software.
- 3 Select **Next** and follow the steps as instructed.


If the flow generator fails this test, repeat the pressure calibration, ensuring the test set-up is correct. If the unit continues to fail, refer to **Section 7 Troubleshooting guide**.

## 13 Keypad test

- 1 Select Keypad test in the Xplorer bar, or click on the Perform the keypad test icon .
- 2 The test set-up remains the same as the blower test.
- 3 Select **Next** and follow the steps as instructed.


If the flow generator fails this test, refer to **Section 8 Troubleshooting guide**.

## 14 LCD test

- 1 Select LCD test in the Xplorer bar, or click on the Perform the LCD test icon .
- 2 Follow the steps as instructed.

If the flow generator fails this test, refer to **Section 7 Troubleshooting guide**.

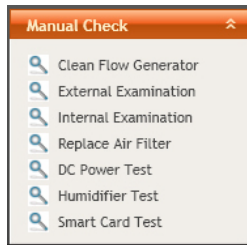
## 15 Audible alarm test

- 1 Select Audible alarm test in test in the Xplorer bar, or click on the Perform the audible alarm test icon .
- 2 Set up the test equipment as instructed by the test software.
- 3 Select **Next** and follow the steps as instructed.

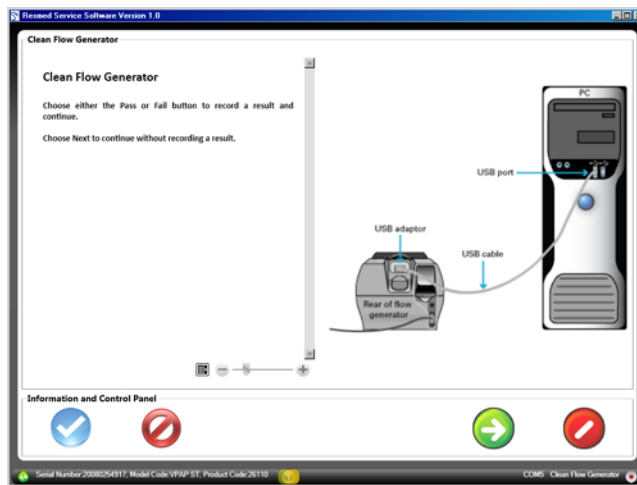
If the flow generator fails this test, refer to **Section 8 Troubleshooting guide**.

## 16 Finalise manual check results

In the XPlorer bar at the left of the screen, all tests that are completed without the service software are listed under the title "Manual Check".




- 1 Click on the name of each manual check. A screen such as that shown below will be displayed:

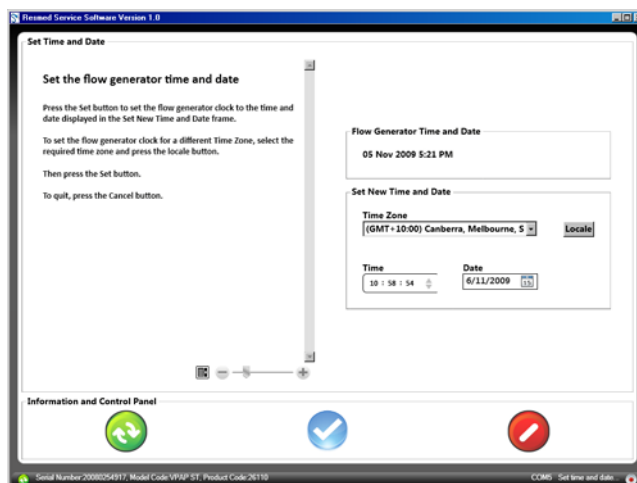


For each manual check, indicate whether the unit passed or failed.

## 17 Set clock


*Note:* Ensure that the PC used to service the flow generator is set to the correct date and time prior to pressing the Set time and date icon.

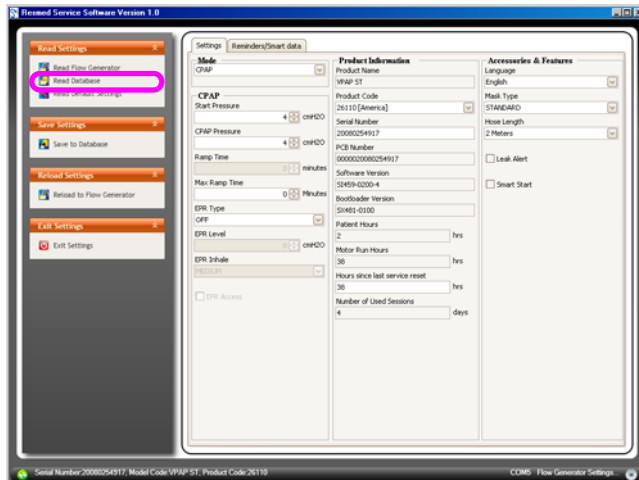
- 1 Select Set time and date... in the XPlorer bar, or click on the Read and adjust flow generator clock icon .
- 2 The following window will appear:




- 3 Select the appropriate time zone for the owner of the flow generator, then press the **Locale** button.
- 4 Press the Select button to set the flow generator time and date.


## 18 Reload clinical settings

- 1 Click on the Record button to close the current session.
- 2 Select Flow Generator Settings... in the XPlorer bar, or click on the Flow Generator Setting Dialog icon  at the top of the screen.
- 3 The flow generator settings will be displayed.
- 4 Select Read database, as shown below:

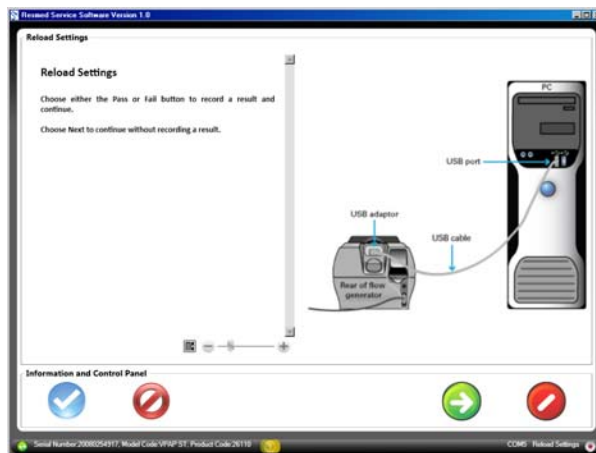


- 5 All recorded sessions for the unit will be displayed. Ensure the most recent session (in which the clinical settings and results were recorded) is highlighted, then click the Select button .



- 6 The screen will then be repopulated with the original settings. Select Reload to flow generator in the Xplorer bar to load the settings back into the unit.
- 7 Once complete, exit the settings screen.
- 8 Once again, press the Record button and ensure the most recent session (in which the clinical settings and results were recorded) is highlighted, then click on the Select button .
- 9 Click on Reload settings at the bottom of the Xplorer bar.

10 The following window will be displayed:



- 11 Click on the Select button to indicate that the clinical settings were successfully reloaded into the flow generator.
- 12 Press the Record button if you did not need to fill out the product problem report or print out the test results.

## 19 Fill out product problem report

- 1 If the flow generator needs to be returned to a ResMed service centre, fill out the **ResMed Service Request Form** in Appendix A of this manual, and send it to your regional ResMed office along with the flow generator.
- 2 Once again, click on the Record button and open the session just completed.
- 3 At the bottom of the Xplorer bar select Complete Problem Report and click on the Pass button to indicate that problem report was completed.
- 4 Click the Record button to finish the session.

## 4 Operator safety and static precautions

### Warning



Prior to disassembly or assembly, make sure that the power is not connected to the flow generator.

Integrated circuits (ICs) within the various PCBs can be badly damaged by electrostatic discharge or transient voltages. The following procedures are recommended to avoid component damage:

- 1 Work benches where handling and repairs are done must have surfaces of suitable conducting material connected via a 1 M $\Omega$  resistor to an electrical ground.
- 2 The area under and also in front of the work bench must be coated with a suitable conductive floor paint, or alternatively covered with a conductive floor mat. The conductive paint coating or floor mat must be connected to an electrical ground.
- 3 Soldering irons or solder baths must be at the same reference (ground) potential as the work bench.
- 4 A wrist strap must be worn by service personnel working at the bench. The wrist strap must have a conductive lead (1 M $\Omega$ ) connected to the bench surface. Alternatively, a heel grounding strap to ground the operator to the floor may be used. (Such a wrist or heel strap should not create an electrical hazard for the wearer).
- 5 Handling of ICs should be kept to a minimum. If handling is required, avoid directly touching the leads. The recommended procedure is to first touch the container in which the ICs are stored, or the PCB in which they are mounted, before touching the ICs. Service personnel should take every precaution that the items will see the same reference potential when moved.
- 6 All ICs and PCB assemblies containing ICs should be stored in antistatic bags until use.
- 7 Service personnel should wear clothing which minimizes the build up of static charges. Cotton is preferable to wool or synthetic fibres.
- 8 Service personnel should avoid electrostatic build up through the movement of air over plastic material.
- 9 Plastic materials should wherever possible be kept away from the ICs as they develop and maintain high levels of static charge.
- 10 Low humidity increases potential static problems. Maintaining humidity levels above 60% is one of the most effective ways to guard against static handling problems.

## 5 Replacing major subassemblies

This section contains brief instructions and points to be aware of as you replace major subassemblies and reassemble the flow generator.

### Caution



When the main PCB, flow meter or motor is replaced, the flow generator must be recalibrated and tested. Follow the procedures in **Section 7 Calibration procedures** to calibrate the unit, then repeat tests 6-17 in **Section 3 General inspection and servicing**.

Printed circuit boards can be damaged by static electricity. Please read the instructions in **Section 4 Operator safety and static precautions** before attempting to replace any PCBs.

Thread cutting screws are used throughout the flow generator. When replacing a thread cutting screw, turn the screw anti-clockwise until it fits into the previously cut thread, otherwise the original thread may be stripped out.

### Outer components of the VPAP range



**Rear view**



## Opening the flow generator

### Remove the filter

- 1 Take hold of the lower end of the air filter cover and pull it away from the unit.



- 2 Pull the filter out from the flow generator.

### Remove the top case

- 1 Turn the unit upside down and undo the four screws indicated below, using a Torx 10 screwdriver.

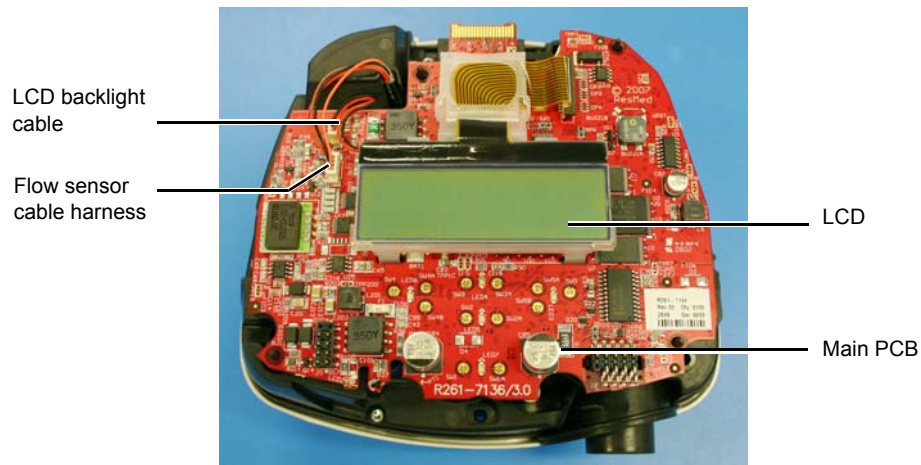


- 2 Grasp both the top and bottom case at the rear of the unit, and prise them apart. Alternatively, lift upwards on the handle to remove the top case.

**Note:** A great deal of force may be required to separate the cases.



3 With the top case removed the main PCB and LCD are now visible.



## Replacing the main PCB

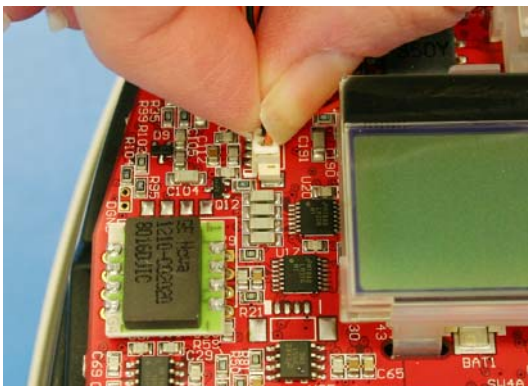
**Note:** Before replacing the main PCB ensure the clinical settings for the unit have been saved.

### Caution

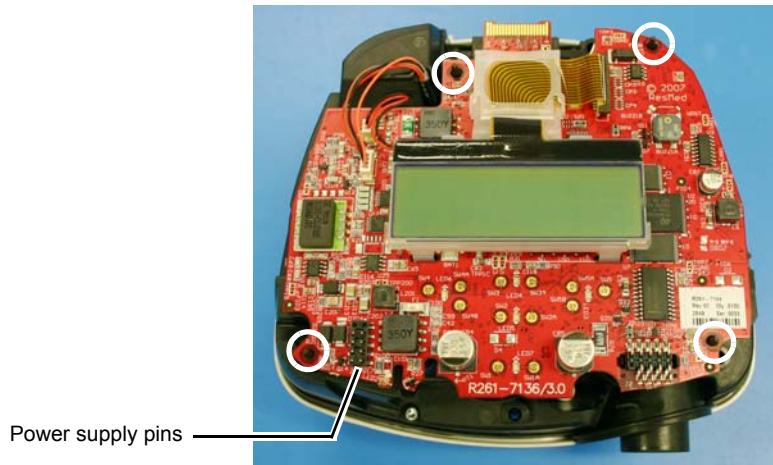


When the main PCB, flow meter or motor is replaced, the flow generator must be recalibrated and tested. Follow the procedures in **Section 7 Calibration procedures** to calibrate the unit, then repeat tests 6-17 in **Section 3 General inspection and servicing**.

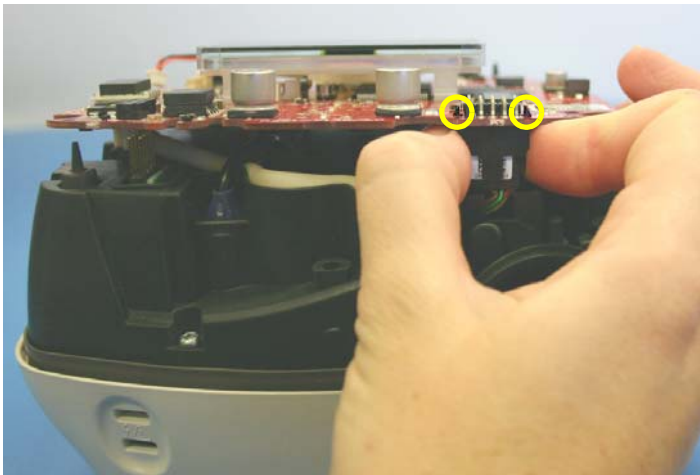
1 Disconnect the flow sensor cable harness from the main PCB.



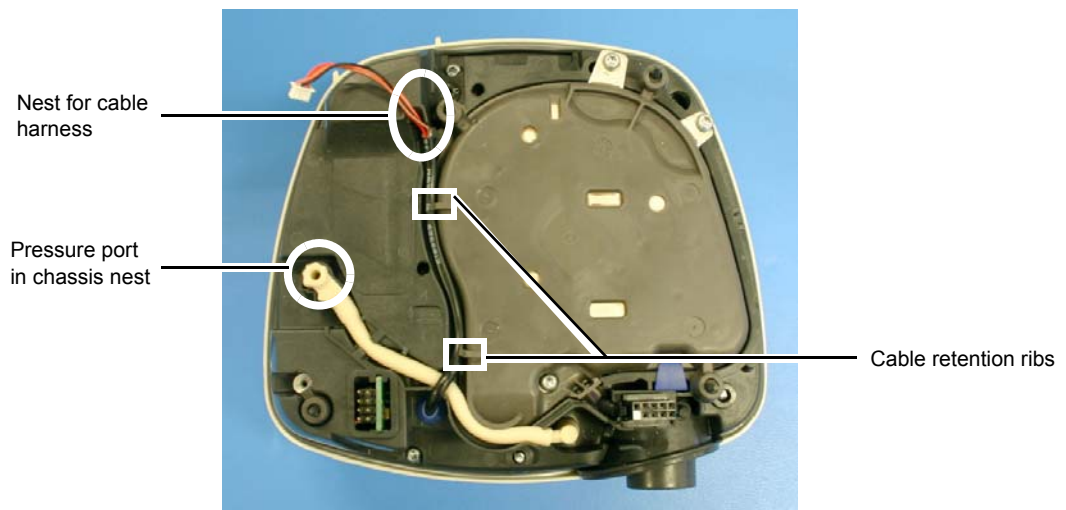
- 2 Lift upwards on the main PCB in order to disengage it from the PCB location pins (circled), and the power supply pins.

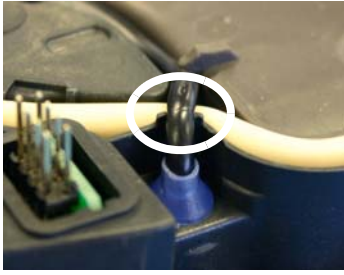


- 3 Pinch the sides of the motor connector to disconnect the tabs (circled) from the pcb. Continue to pull on the cable to disconnect the pins from the PCB.



- 4 Lay the sensor tube in the route shown below, ensuring the pressure port fitting sits in the chassis nest.
- 5 Insert the cable harness between the chassis cable pins and lay it in the route shown below, ensuring the harness sits under the cable retention ribs and lays in the nest indicated.






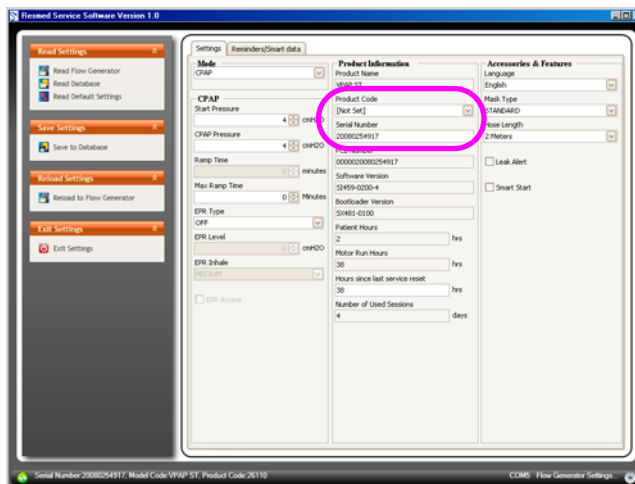
Cable harness between chassis cable pins

- 6 Remove the LCD following the instructions below.
- 7 Refit the LCD to the new main PCB.
- 8 Take the new main PCB and insert the motor connector into the PCB.
- 9 Engage the power supply pins and lower the main PCB onto the locating pins.
- 10 Once the main PCB has been refitted, reload the clinical settings and options by following the instructions "18 Reload clinical settings" on page 16.

## Installing the serial number

If the main PCB has been replaced the units serial number needs to be re-installed.

- 1 Connect the unit to the PC and open the service software.
- 2 Select Flow Generator Settings... in the XPlorer bar, or click on the Flow Generator Setting Dialog icon  at the top of the screen.
- 3 The flow generator settings screen will be displayed.
- 4 Enter the units serial number (found on the base of the unit) and select the appropriate product code.




- 5 Select Reload to Flow Generator in the Xplorer bar.
- 6 Exit the settings screen.
- 7 Click the Record button. Any existing records for the unit will be displayed on screen. Ensure the most recent record is highlighted.

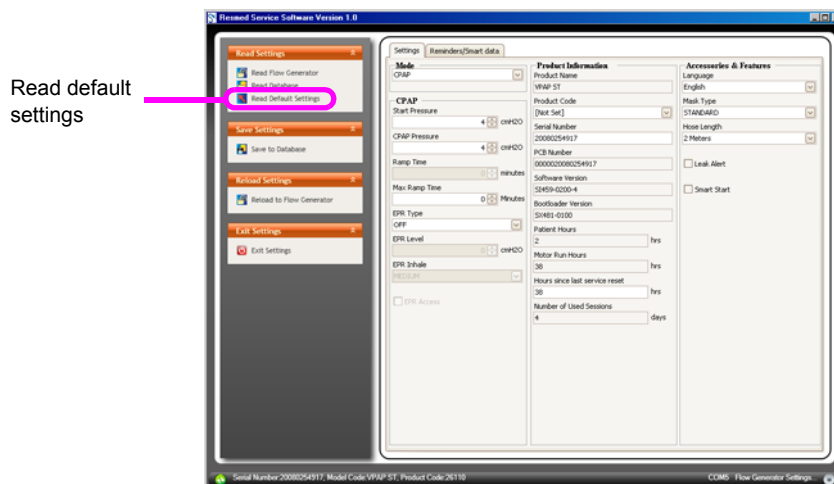
*Note: If no previously recorded session exists for the unit, proceed to "Units without a service history" on the following page.*


- 8 Complete the calibrations and tests required when the main PCB has been replaced.
- 9 Finally, reload the clinical settings to the unit following the procedures from “18 Reload clinical settings” on page 16.

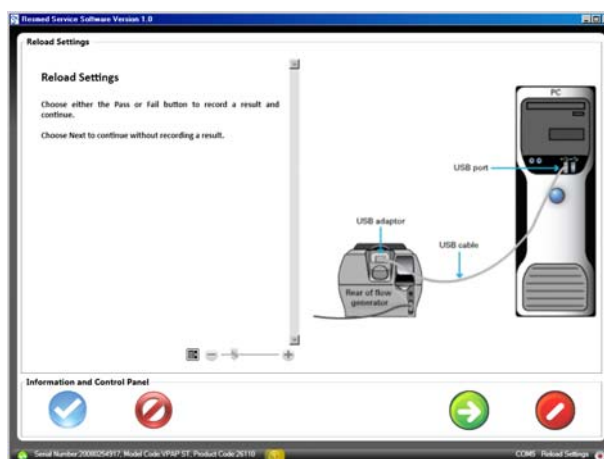
### Units without a service history


In those instances where no session has been previously recorded for a particular unit, or settings were unable to be downloaded due to a fault with the unit, the default settings will need to be loaded into the flow generator.

- 1 Once the new serial number has been loaded into the flow generator, exit the Settings screen.
- 2 Begin a new recording session for the unit, and complete the calibrations and tests required when a main PCB is replaced.
- 3 Once the testing is complete, stop the recording.
- 4 Select Flow Generator Settings... in the XPlorer bar, or click on the Flow Generator Setting Dialog icon  at the top of the screen.
- 5 Select the appropriate product code for the unit from the drop down menu, then click on Read Default Settings.



- 6 The screen will then be populated with the units default settings.
- 7 Click on Reload to flow generator to load them into the unit.
- 8 Exit the Settings screen.
- 9 Once again, press the Record button and ensure the most recent session (in which the clinical settings and results were recorded) is highlighted, then click on the Select button .
- 10 Click on Reload settings at the bottom of the Xplorer bar.
- 11 The following window will be displayed:

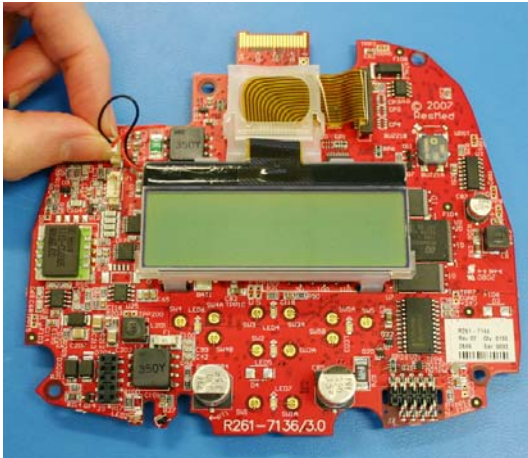


- 12 Click on the Select button  to indicate that the clinical settings were successfully reloaded into the flow generator.
- 13 Press the Record button if you did not need to fill out the product problem report or print out the test results.

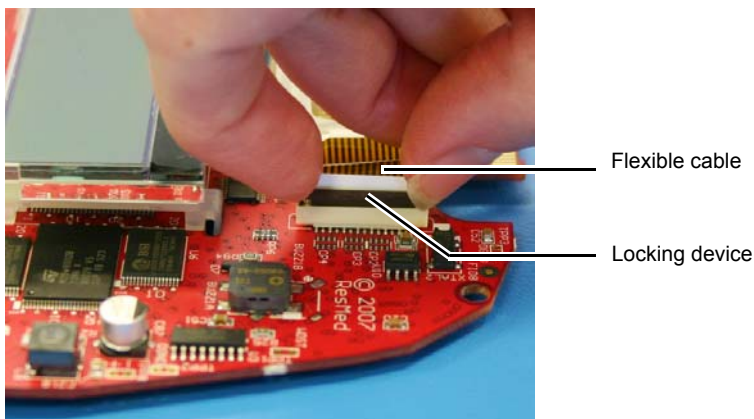
## Replacing the LCD

With the main PCB removed from the flow generator, the LCD can be replaced.

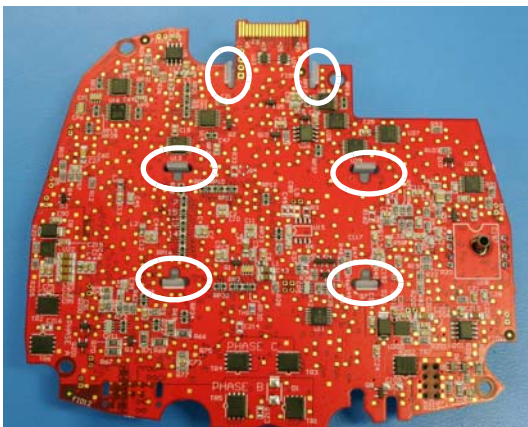
- 1 Disconnect the LCD backlight connector.



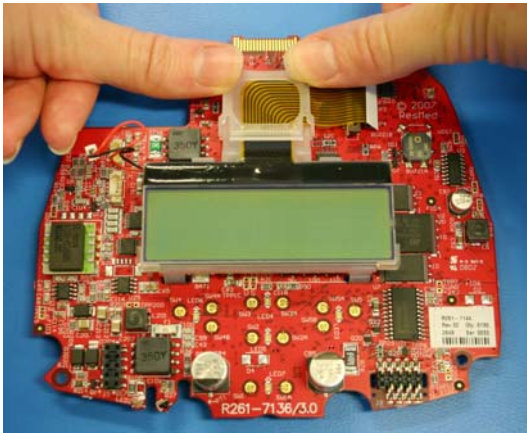
- 2 Unlock the locking device and remove the flexible cable.



- 3 Turn the main PCB upside down, and disengage the mounting snaps (circled) from the main PCB.



- 4 Take the new LCD and engage the rear mounting snaps, as shown below:



- 5 Engage the middle mounting snaps, then the front mounting snaps to the main PCB.
- 6 Relocate the flexible cable in the locking device.
- 7 Reconnect the LCD backlight connector.

## Replacing the motor

### Caution



When the main PCB, flow meter or motor is replaced, the flow generator must be recalibrated and tested. Follow the procedures in **Section 7 Calibration procedures** to calibrate the unit, then repeat tests 6-17 in **Section 3 General inspection and servicing**.

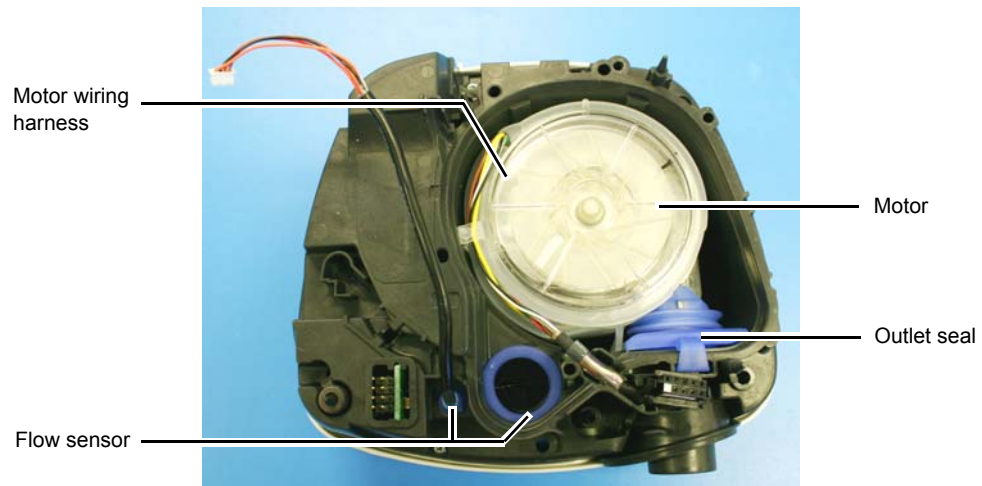
**Note:** *Whenever the chassis lid is removed, the lid needs to be replaced to ensure an effective seal with the chassis.*

- 1 With the main PCB removed the blower module assembly is visible.
- 2 Remove the three screws circled below:



- 3 Remove the sensor tube and release the cable harness from the cable retention ribs.
- 4 Pull upwards on the lid to remove it from the three locating posts.

- 5 The motor assembly is now visible.



- 6 Remove the motor assembly from the bottom case.

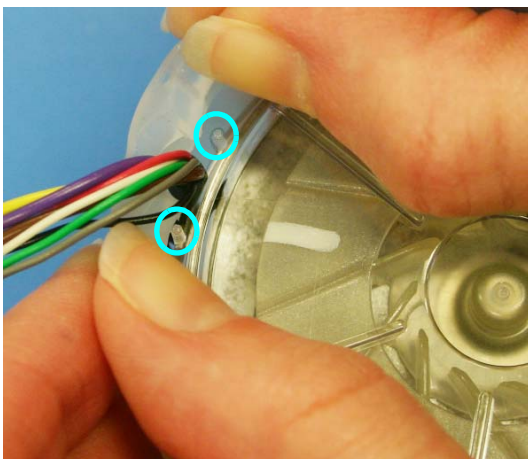
### Examining the motor

If the motor requires further examination, the silicone sleeve surrounding the motor can be removed, however, spare part motors will be supplied with the silicone sleeve.

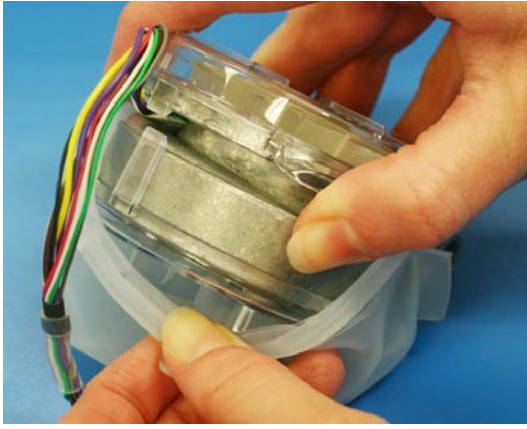
- 1 Remove the outlet seal.
- 2 Undo the clip holding the motor cable.



- 3 Lift the silicone sleeve up off the two locating posts (circled), next to the motor cable.



- 4 Pull the silicone sleeve away from the motor.



- 5 With the sleeve removed the impeller on the base is now visible.



- 6 Take the silicone sleeve and begin to refit it over the air outlet.
- 7 Ensure the sleeve sits in the channel surrounding the air outlet.

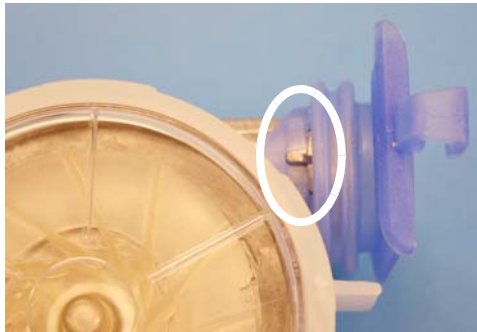


- 8 Refit the holes in the sleeve over the locating posts, next to the motor cable.
- 9 Clip the motor cable into place.

## Installing the motor

**Note:** If replacing the motor, ensure you also replace the chassis lid.

- 1 Take the new motor assembly and fit the outlet seal. Ensure the seal is engaged on the upper and lower tabs, as shown below:



Upper tab



Lower tab

- 2 Insert the new motor assembly into the bottom case, while guiding the outlet seal into the retaining slot.



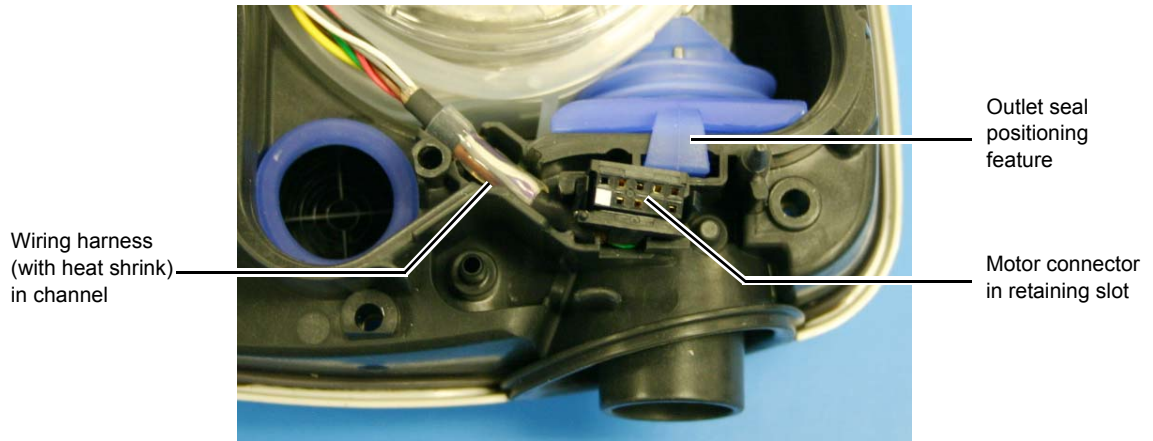
Retaining slot for outlet seal

- 3 Insert the outlet seal positioning feature into the chassis.

**Note:** Ensure the outlet seal is positioned correctly in the retaining slot, as shown below:



- 4 Locate the wiring harness in the channel, and the motor connector in the retaining slot, as shown below:

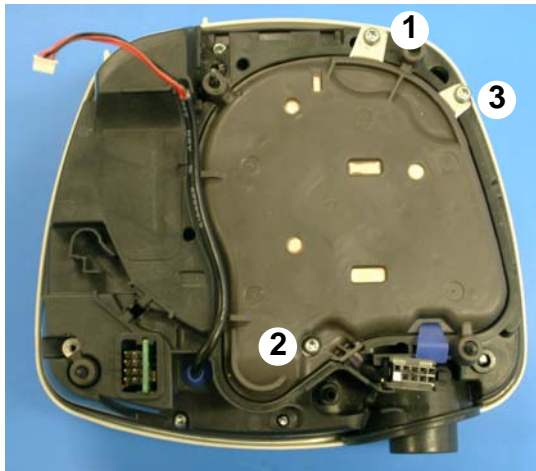


**Note:** Ensure the wiring harness has been fully inserted in the channel.

- 5 Install the new chassis lid.

**Note:** Whenever the chassis lid is removed, the lid needs to be replaced to ensure an effective seal with the chassis.

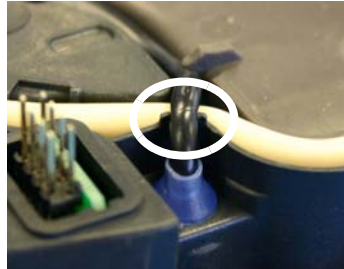
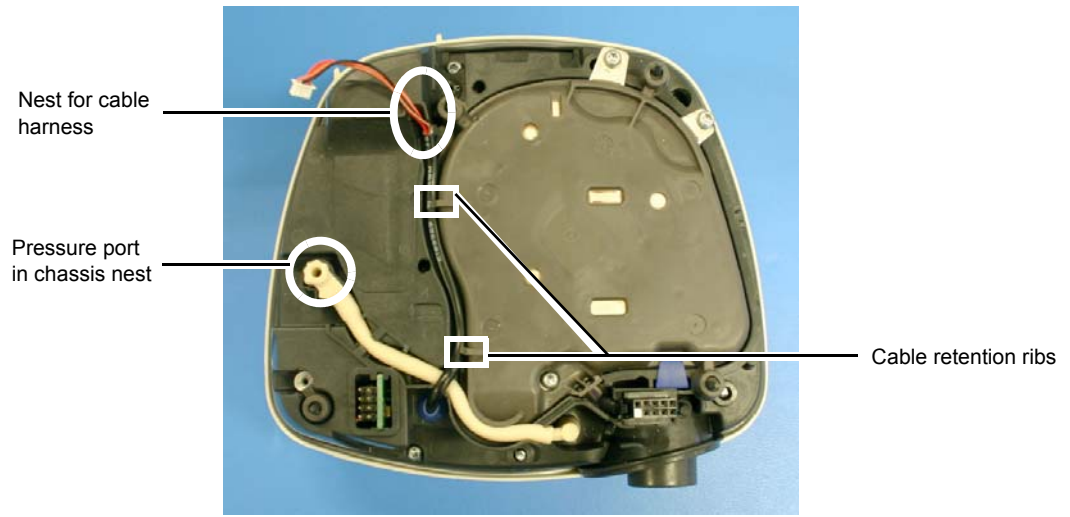
- 6 Install the screws removed earlier in the order shown below.



- 7 Gently pull the outlet seal tab to ensure a proper seal is formed around the outlet.



- 8 Reconnect the sensor tube to the pressure port above the chassis outlet.
- 9 Lay the sensor tube in the route shown below, ensuring the pressure port fitting sits in the chassis nest.
- 10 Insert the cable harness between the chassis cable pins and lay it in the route shown below, ensuring the harness sits under the cable retention ribs and lays in the nest indicated.



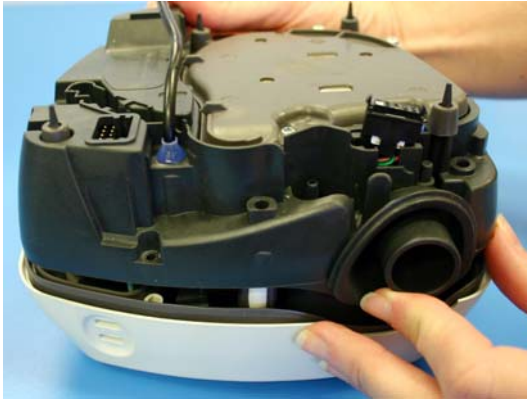
Cable harness between chassis cable pins

## Replacing the power supply

- 1 With the main PCB removed, remove the three screws (circled) which attach the blower module assembly to the bottom case.

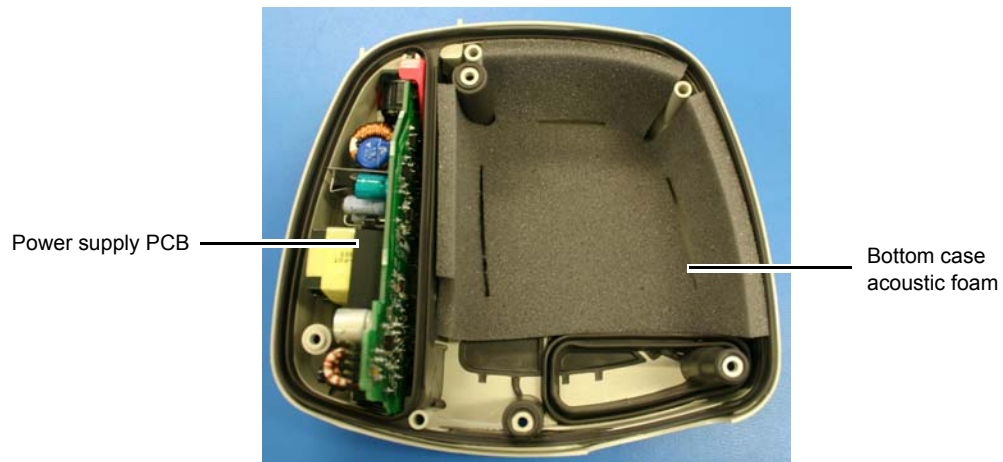


- 2 Lift upwards on the assembly to remove it from the bottom case.

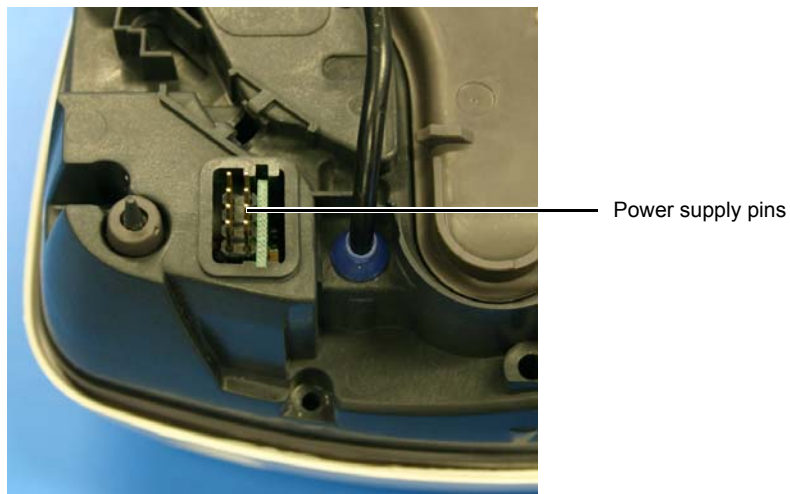


- 3 With the blower module assembly removed the power supply PCB can be replaced.

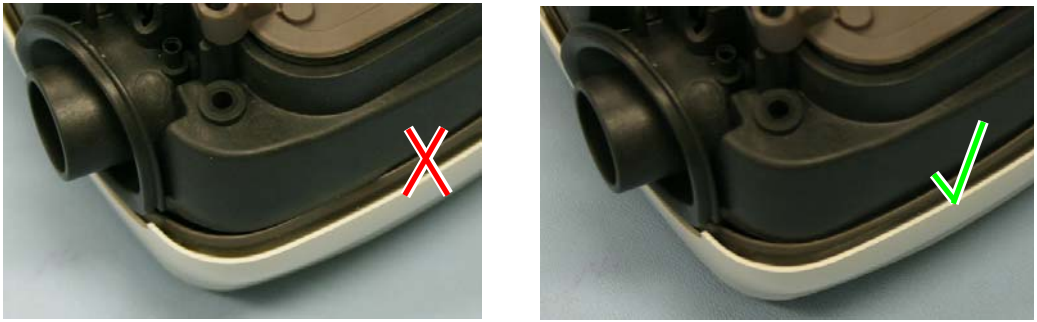
**Note:** At this point the bottom case acoustic foam can also be replaced.



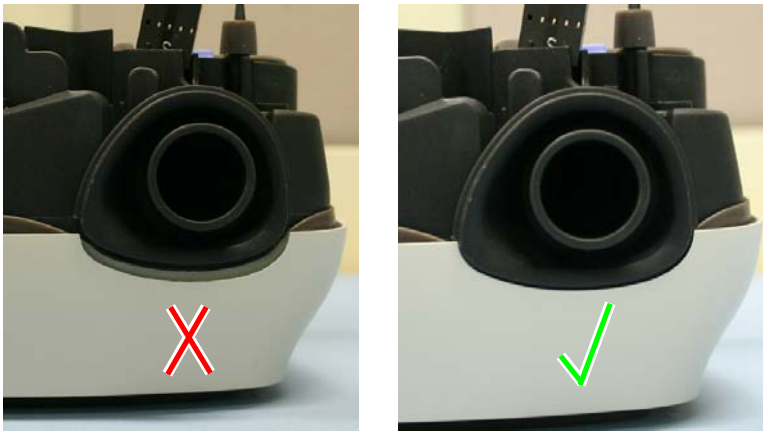
- 4 Lift the power supply PCB upwards to remove it from the bottom case.
- 5 Insert the new power supply PCB into the bottom case, ensuring it is correctly located in the mounting slots.
- 6 Carefully refit the blower module assembly, ensuring the power supply pins are not bent or damaged.



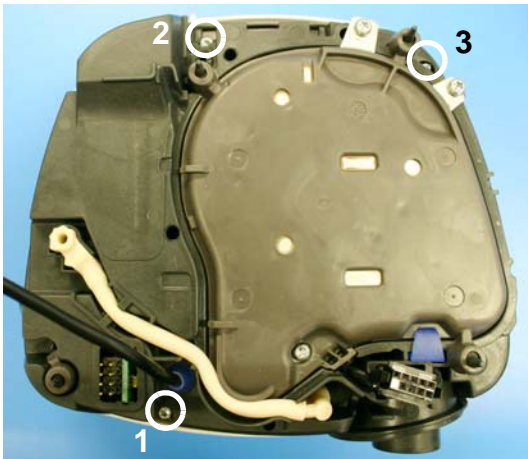
- 7 Ensure the bottom case seal is not caught between the assembly and the bottom case.



- 8 Ensure the blower module assembly is sitting correctly in the bottom case, with the base of the outlet flush to the bottom case, as shown below:



- 9 Install the three screws removed earlier in the following order:



## Replacing the flow sensor

### Caution



When the main PCB, flow meter or motor is replaced, the flow generator must be recalibrated and tested. Follow the procedures in **Section 7 Calibration procedures** to calibrate the unit, then repeat tests 6-17 in **Section 3 General inspection and servicing**.

With the blower module assembly removed from the bottom case, the flow sensor can be replaced.

- 1 Remove the chassis lid. The flow sensor is now visible.

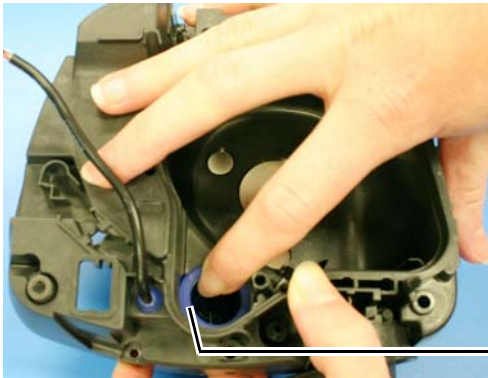
Motor chassis from above



Motor chassis underneath

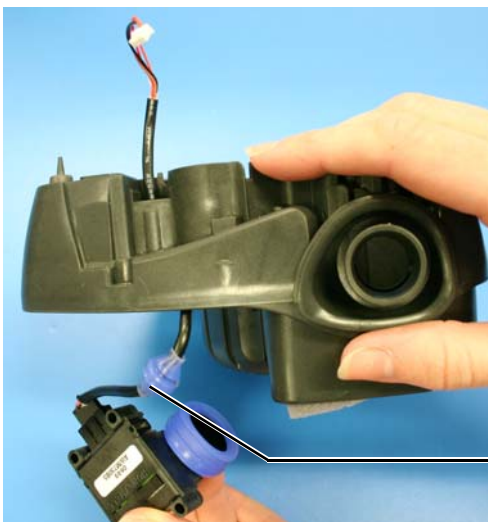


- 2 Push downwards on the flow sensor seal to disconnect it from the chassis.



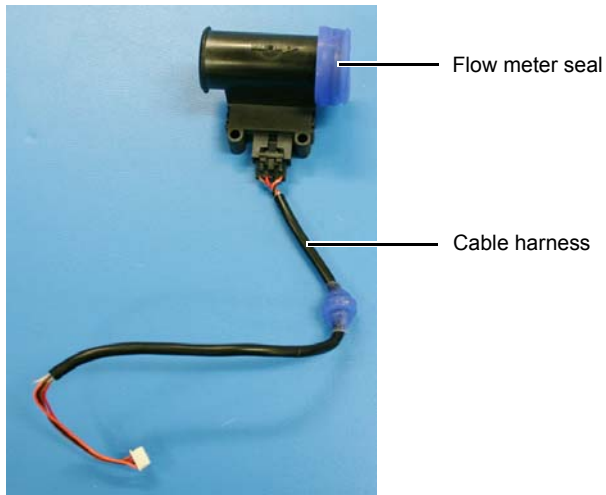
Flow sensor seal

- 3 Gently pull down on the sensor and the flow sensor cable harness in order to disengage the grommet from the chassis. Ensure you do not damage the cable harness or connector.

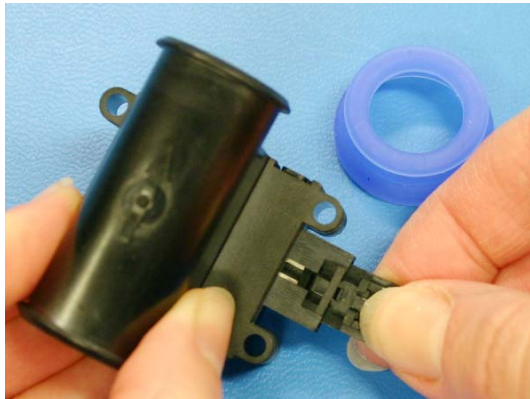


Grommet on cable harness

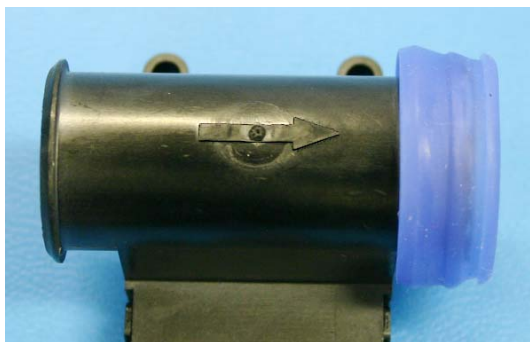
- 4 Remove the flow meter seal and cable harness.



- 5 Clip the cable harness connector to the new flow meter.

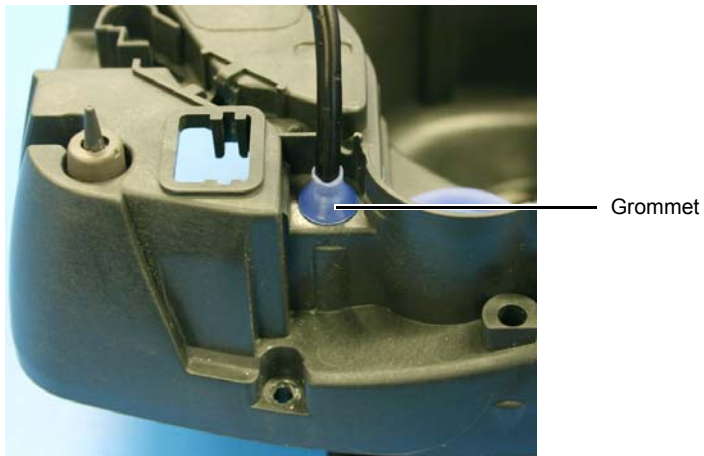


- 6 Fit the seal to the new flow meter, ensuring the arrow on the flow meter is pointing towards the seal.

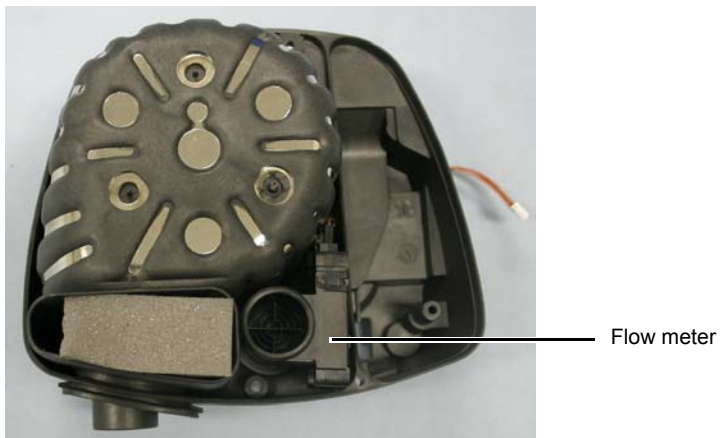


- 7 Feed the cable harness through the underside of the chassis, ensuring you do not damage the cable harness or connector.

8 Gently pull the cable through until the grommet is in position, as shown below:



9 Locate the flow meter in the chassis, as shown below:



10 Ensure the flow meter seal is correctly positioned in the chassis.

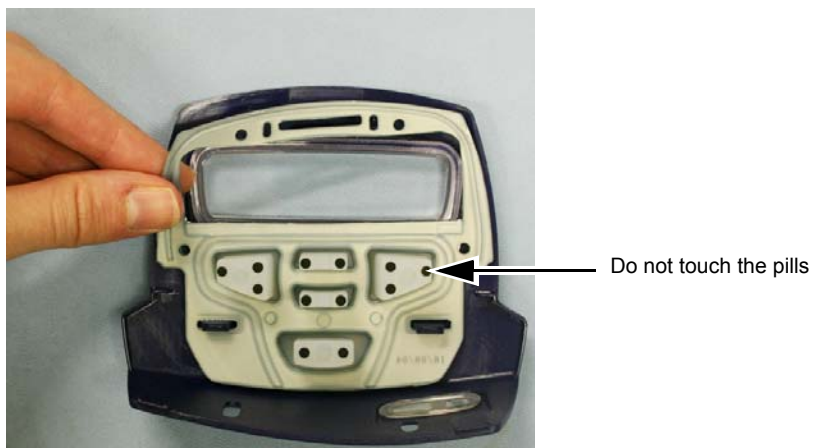


## Replacing the interface panel, keypad and handle

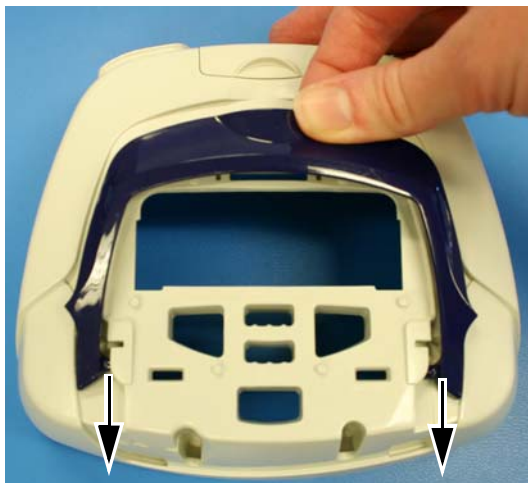
- 1 With the top case removed from the unit, turn the top case upside down, and disengage the three lock tabs connecting the interface panel to the top case:



- 2 Remove the keypad from the interface panel, taking care not to touch the pills on the back of the keypad. At this point both the interface panel and keypad can be replaced.



- 3 With the interface panel removed the handle can be replaced. Lift the handle and slide it forwards to disengage it from the retaining slots.



- 4 Take the new handle and insert it in the top case.
- 5 Take the keypad and insert it in the top case.



- 6 Take the interface panel and place it on the top case. Press down on the interface panel to engage the lock tabs which anchor it to the top case.



- 7 Turn the top case upside down and confirm that all three lock tabs are engaged.

## Closing the flow generator

- 1 Take the top case and fit it to the bottom case.
- 2 Turn the unit upside down and install the four screws.



- 3 Turn the unit right side up, and refit the filter and filter cover, with the blue side of the filter material facing out from the flow generator.

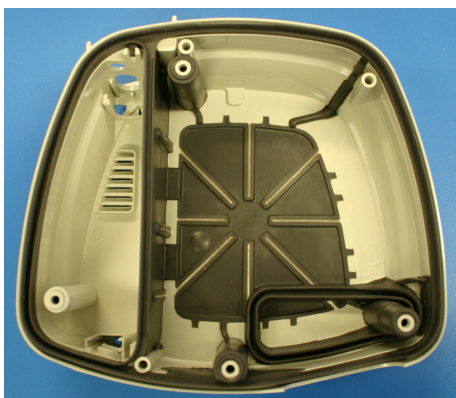


# 6 Replacement parts list

## Outside cases



Top case assembly 19321  
(Including smart card cover)



Bottom case assembly 19476

Base decal kit 19481

**Note:** For instructions on inserting the serial number when replacing the bottom decal refer to Tech note 106318



Power outlet plug R330-764

## Also available

Handle R330-718

Type PT, Self tapping screw, 3 x 25 mm, Torx pan head Z2021

## Interface assembly



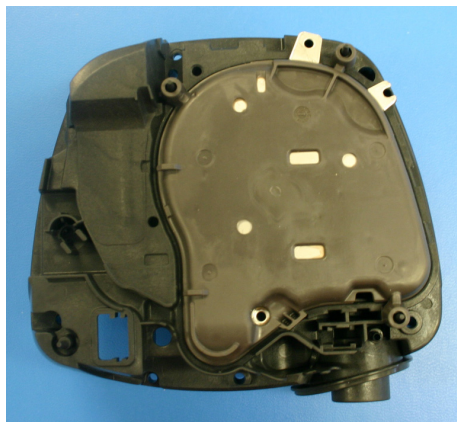
### Interface panel

VPAP Auto 25	R261-7126
VPAP S	R261-7165
VPAP ST	R261-7148
S8 Auto 25 (GER, FRA, EUR 1 & 2, UK)	R261-7160
VPAP IV (GER)	R261-7162
VPAP IV (EUR 1 & 2, UK, FRA, AP)	R261-7149
VPAP IV (ANZ)	R261-7155
VPAP IV ST (GER)	R261-7163
VPAP IV ST (EUR 1 & 2, UK, FRA, AP)	R261-7150
VPAP IV ST (ANZ)	R261-7164



Keypad (ROW)	19329
Keypad (US)	19323

## Internal components



Chassis assembly	19478
(Includes chassis, chassis lid, inlet insert, resonator foam, screws)	
Motor and chassis assembly	19477
Chassis lid	R263-721



Chassis resonator foam	R330-765
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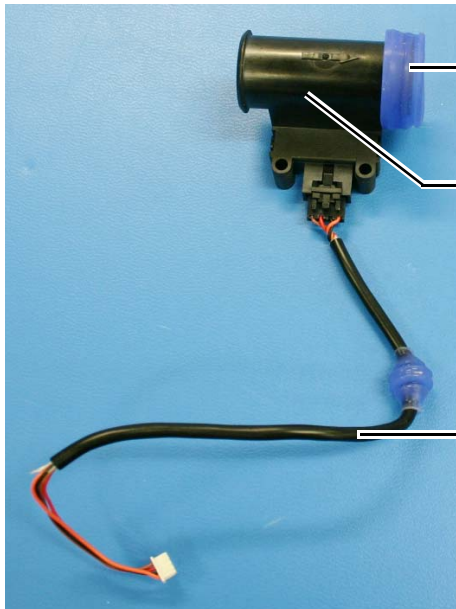
Motor kit 19475



Outlet seal 19330



Acoustic foam R330-766



Flow sensor seal R261-7112

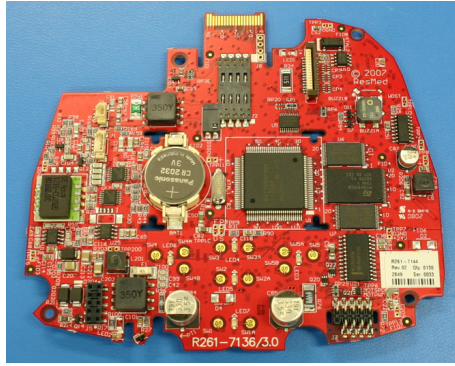
Flow sensor 19300

Flow sensor cable harness R261-7146



Pressure fitting assembly R261-7141

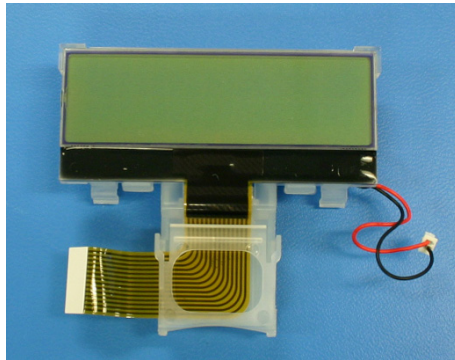
## PCBs



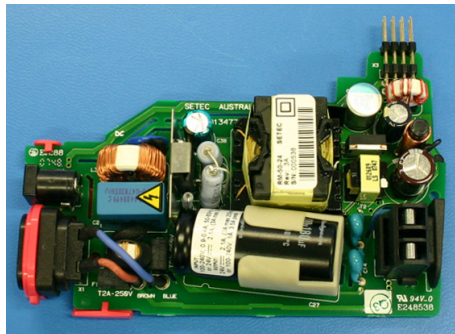
### Main PCBs

VPAP Auto 25	19474
VPAP IV (ROW)	19487
VPAP IV ST (ROW)	19488
VPAP ST (US)	19489
VPAP S (US)	19490
S8 Auto 25 (ROW)	19492

Battery E9025



LCD 19327



Power supply PCB 19479

## Spare parts list

<b>Part number</b>	<b>Part description (in alphabetical order)</b>
R330-766	Acoustic foam
E9025	Battery
19476	Bottom case assembly
19481	Base decal kit
19478	Chassis assembly
19477	Chassis assembly (with motor)
R263-721	Chassis-lid
R330-765	Chassis resonator foam
19300	Flow sensor
R261-7146	Flow sensor cable harness
R261-7112	Flow sensor seal
R330-718	Handle
R261-7160	Interface panel (S8 Auto 25) GER, FRA, EUR 1 & 2, UK
R261-7126	Interface panel (VPAP Auto 25)
R261-7165	Interface panel (VPAP S)
R261-7148	Interface panel (VPAP ST)
R261-7162	Interface panel (VPAP IV) GER
R261-7149	Interface panel (VPAP IV) EUR 1 & 2, UK, FRA, AP
R261-7155	Interface panel (VPAP IV) ANZ
R261-7163	Interface panel (VPAP IV ST) GER
R261-7150	Interface panel (VPAP ST) EUR 1 & 2, UK, FRA, AP
R261-7164	Interface panel (VPAP ST) ANZ
19329	Keypad (ROW)
19323	Keypad (US)
19327	LCD
19492	Main PCB (S8 Auto 25) ROW
19474	Main PCB (VPAP Auto 25)
19487	Main PCB (VPAP IV) ROW
19488	Main PCB (VPAP IV ST) ROW
19489	Main PCB (VPAP ST) US
19490	Main PCB (VPAP S) US
19475	Motor kit
19330	Outlet seal
R330-764	Power outlet plug
19479	Power supply
R261-7141	Pressure fitting assembly
Z2021	Screw, Type PT, self tapping, 3 x 25 mm, Torx pan head
19321	Top case assembly

# 7 Calibration procedures

All calibration procedures should be carried out whenever the Main PCB, flow meter or blower is replaced.

## Equipment required

- ResMed Service Software 1.20, available from the Technical Services website.

*Note:* Ensure you check the Technical Services website to confirm the latest version of service software available for use with this product.

- ResScan USB adaptor and cable (ResMed part #22203)
- Oxygen side port connector
- Straight adaptor
- Calibration cap
- Air tubing connector

*Note:* The above four items are contained in the Service accessories kit (#19919) - this kit includes S9 adapter and USB cable, oxygen sideport connector, straight adaptor, calibration cap and air tubing connector.

- 2 metre air hose (ResMed part # 14961)
- Manometer (0-40 cm H<sub>2</sub>O range)
- Calibrated flow meter with flow regulation valve

*Note:* The flow meter must be capable of measuring air flows ranging from 0 - 180 L/min with an accuracy of 3% or better over this range.

- A computer running Windows XP or Vista (32-bit).

## Cautions





The flow generator clinical settings must be recorded before any calibration procedure is performed. Refer to the instructions provided in **Section 3 General inspection and servicing**. If the clinical settings cannot be recorded, select the appropriate product code for the product. In the XPlorer bar, click on "Read default settings", then click on "Reload to flow generator". Notify the patient, so they can have their settings reloaded.

### 1 Pressure calibration

Warm up the flow generator for at least 15 minutes before commencing the calibration procedures.

- 1 With the unit still switched off, remove the data card module and refit the ResScan USB adaptor, with USB cable attached.
- 2 Turn on the unit and allow it to complete the self test.
- 3 Return to the service software and press the Record button
- 4 The following screen will then appear, indicating the existing service records for the flow generator.



- 5 The most recently created record (the flow generator settings recorded earlier) will be highlighted.
- 6 Click on the Select button  to continue recording the service results to the same record.
- 7 The "Select service agent screen", as shown on page 10, will appear once again.
- 8 Select the name of the service agent and enter the SR number.
- 9 All calibration and tests, including tests completed without service software are then listed in the Xplorer bar.
- 10 Select Pressure calibration in the Xplorer bar, or click on the Perform the pressure calibration icon  .

*Note:* At the top of the screen at the beginning of each procedure is an alert reminding you to reload the clinical settings to the unit after completing the necessary test and calibration procedure. Click the OK button once you have read the alert.




- 11 Set up the test equipment as instructed by the test software.
- 12 Select **Next** and follow the steps as instructed until the calibration is complete.

## 2 Flow calibration

**Caution** The pressure calibration must be performed before the flow calibration.




- 1 Select Flow calibration in the Xplorer bar, or click on the Perform the flow calibration icon .
- 2 Set up the test equipment as instructed by the test software.
- 3 Select **Next** and follow the steps as instructed until the calibration is complete.

## 3 Motor noise calibration

**Caution** The pressure calibration and flow calibration must be performed before the motor noise calibration.



- 1 Select Motor noise calibration in the Xplorer bar, or click on the Perform the motor noise calibration icon .
- 2 Set up the test equipment as instructed by the test software.
- 3 Select **Next** and follow the steps as instructed until the calibration is complete.

Once the calibrations are complete, repeat tests 6-17 from **Section 3 General inspection and servicing**.

If the unit continually fails the calibration, check the following:

- the test set-ups are correct
- the calibration cap is securely attached and there are no leaks in the air delivery system
- the unit has no excess noise or vibration, which may be caused by a problem with the blower.

If the unit continues to fail, send the flow generator with service request form (found on page 57 of this manual) to ResMed for further servicing.

# 8 Troubleshooting guide

## Caution



When the main PCB, flow meter or motor is replaced, the flow generator must be recalibrated and tested. Follow the procedures in **Section 7 Calibration procedures** to calibrate the unit, then repeat tests 6-17 in **Section 3 General inspection and servicing**.

If any other components are replaced, repeat the relevant tests in **Section 3 General inspection and servicing**

**Note:** *The performance tests in the service software are a valuable tool in determining the possible cause of flow generator problems.*

Problem/Cause	Action
<b>No display</b>	
<ul style="list-style-type: none"><li>Flexible cable from LCD not inserted properly into connector</li><li>Faulty LCD</li><li>Flexible cable from LCD damaged</li></ul>	<ul style="list-style-type: none"><li>Check flexible cable is connected properly</li><li>Replace LCD module</li><li>Replace LCD module</li></ul>
<b>Buttons not working or intermittent</b>	
<ul style="list-style-type: none"><li>Flexible cable from LCD not inserted properly into connector</li><li>Pills on the back of the keypad or LCD have been damaged</li><li>Gold contacts on main PCB dirty</li></ul>	<ul style="list-style-type: none"><li>Check flexible cable is connected properly</li><li>Replace keypad or LCD</li><li>Clean contacts. Refer to "4 Internal examination (if necessary)" on page 10.</li></ul>
<b>Poor or insufficient air flow</b>	
<ul style="list-style-type: none"><li>Ramp time is in use</li><li>Air tubing not connected properly</li><li>Air tubing kinked or punctured</li><li>Inlet air filter is clogged up</li><li>Calibration gain set too low</li><li>Faulty motor</li><li>Motor drive controller too low</li></ul>	<ul style="list-style-type: none"><li>Wait for air pressure to build up or change ramp time</li><li>Check and refit tubing as required</li><li>Refit or replace as required</li><li>Check and replace filter as required</li><li>Recalibrate flow generator</li><li>Replace motor</li><li>Replace main PCB</li></ul>
<b>Excessive air flow</b>	
<ul style="list-style-type: none"><li>Calibration gain set too high</li><li>Motor drive controller too high</li></ul>	<ul style="list-style-type: none"><li>Recalibrate the flow generator</li><li>Replace main PCB</li></ul>
<b>Flow generator not operating (no display when power on)</b>	
<ul style="list-style-type: none"><li>Blown fuse in power supply</li><li>Faulty main PCB</li><li>Faulty power supply</li></ul>	<ul style="list-style-type: none"><li>Replace and investigate cause of the blown fuse</li><li>Replace main PCB</li><li>Replace power supply PCB</li></ul>

Problem/Cause	Action
<b>Flow generator operating intermittently</b>	
<ul style="list-style-type: none"> <li>Faulty power supply</li> </ul>	<ul style="list-style-type: none"> <li>Replace power supply PCB</li> </ul>
<b>Audible alarm not operating</b>	
<ul style="list-style-type: none"> <li>Component failure</li> <li>Leak alert not enabled in clinical menu</li> </ul>	<ul style="list-style-type: none"> <li>Replace main PCB</li> <li>Confirm if patient required leak alert enabled.</li> </ul> <p><b>Note:</b> When leak alert is on, SmartStart/Stop is automatically set to off. SmartStart/Stop cannot be used with leak alert because, if a high leak occurs, SmartStop may stop treatment before the leak alert alarm is activated.</p>
<b>Unit cannot maintain correct date and time ("used sessions.total days" ratio display may also be invalid)</b>	
Flat Real time clock battery	<ol style="list-style-type: none"> <li>Download compliance data and record clinical settings.</li> <li>Replace battery</li> <li>Reset the time and date</li> <li>Erase compliance data from the unit</li> </ol>
<b>The following message is displayed on the LCD: "CHECK TUBE!!! KEY IF DONE"</b>	
Air tubing is loose or blocked	Check tubing is connected to flow generator and mask. Confirm nothing is blocking air tubing.
<b>The following message is displayed on the LCD: "SYSTEM ERR 101F Call service!"</b>	
Pressure sensor fault	Replace main PCB
<b>The following message is displayed on the LCD: "SYSTEM ERR 101A Call service!"</b>	
<ul style="list-style-type: none"> <li>Faulty motor</li> <li>Faulty main PCB</li> </ul>	<ul style="list-style-type: none"> <li>Replace motor</li> <li>Replace main PCB</li> </ul>
<b>The following message is displayed on the LCD: "SYSTEM ERR 101B Call service!"</b>	
<ul style="list-style-type: none"> <li>Faulty motor</li> <li>Faulty main PCB</li> </ul>	<ul style="list-style-type: none"> <li>Replace motor</li> <li>Replace main PCB</li> </ul>
<b>The following message is displayed on the LCD: "SYSTEM ERR 1014 Call service!"</b>	
<ul style="list-style-type: none"> <li>Pressure sensor fault</li> <li>Unit is noisy - excessive vibration</li> </ul>	<ul style="list-style-type: none"> <li>Replace main PCB</li> </ul> <ol style="list-style-type: none"> <li>Open unit to locate source of noise/vibration</li> <li>Check air path is clear</li> <li>Replace motor</li> </ol>
<b>The following message is displayed on the LCD: "SYSTEM ERR 1015 Call service!"</b>	
<ul style="list-style-type: none"> <li>Pressure sensor fault</li> <li>Sensor tubing damaged or crushed</li> </ul>	<ul style="list-style-type: none"> <li>Replace main PCB</li> <li>Confirm sensor tubing is installed correctly and not restricted in any way</li> </ul>
<b>The following message is displayed on the LCD: "SYSTEM ERR 1018 Call service!"</b>	
Flow sensor fault	Replace flow sensor
<b>The following message is displayed on the LCD: "SYSTEM ERR 1019 Call service!"</b>	
Flow sensor fault	Replace flow sensor

Problem/Cause	Action
<b>The following message is displayed on the LCD: "SYSTEM ERR 1029 Call service!"</b>	
<ul style="list-style-type: none"> <li>• Faulty motor</li> <li>• Faulty main PCB</li> </ul>	<ul style="list-style-type: none"> <li>• Replace motor</li> <li>• Replace main PCB</li> </ul>
<b>The following message is displayed on the LCD: "SYSTEM ERR 107A Call service!"</b>	
<ul style="list-style-type: none"> <li>• Stalled or sticky motor, motor over temperature</li> </ul>	<ul style="list-style-type: none"> <li>• Replace motor</li> <li>• Replace main PCB</li> </ul>
<b>The following message is displayed on the LCD: "SYSTEM ERR 1068 Call service!"</b>	
<ul style="list-style-type: none"> <li>• Blocked filter</li> <li>• Blocked inlet or outlet</li> <li>• Flow generator has been covered with a blanket</li> <li>• Wear on motor bearings</li> <li>• Faulty power supply</li> <li>• Faulty temperature sensor</li> <li>• Faulty main PCB</li> </ul>	<ul style="list-style-type: none"> <li>1 Replace filter</li> <li>2 Allow flow generator to cool down</li> <li>3 Power-cycle to remove message</li> <li>1 Check for blockages in inlet and outlet</li> <li>2 Allow flow generator to cool down</li> <li>3 Power-cycle to remove message</li> <li>1 Inform user not to cover unit</li> <li>2 Allow flow generator to cool down</li> <li>3 Power-cycle to remove message</li> <li>• Replace motor</li> <li>• Replace power supply PCB</li> <li>• Replace main PCB</li> <li>• Replace main PCB</li> </ul>

# 9 System specifications

## VPAP Auto 25, VPAP ST, VPAP S

Operating pressure range:	3 to 25 cm H <sub>2</sub> O
Maximum single fault pressure:	40 cm H <sub>2</sub> O
Pressure measurement tolerance:	± 0.5 cm H <sub>2</sub> O ± 4% of the measured reading
Flow measurement tolerance:	± 0.1 L/sec or 20% of reading, whichever is greater
VAuto mode:	4 to 25 cm H <sub>2</sub> O (measured at the mask); Min EPAP: 4 cm H <sub>2</sub> O; Max IPAP: 25 cm H <sub>2</sub> O; Pressure support: 0 to 10 cm H <sub>2</sub> O
S, ST and T mode:	IPAP: 4 to 25 H <sub>2</sub> O (measured at the mask); EPAP: 3 to 25 cm H <sub>2</sub> O (measured at the mask)
CPAP mode:	4 to 20 cm H <sub>2</sub> O (measured at the mask)
DECLARED DUAL-NUMBER NOISE EMISSION VALUES	in accordance with ISO 4871:
Sound pressure level:	26 dBA with uncertainty of 2 dBA as measured according to ISO17510-1:2002 28 dBA with uncertainty of 2 dBA as measured according to ISO17510-1:2007
Sound power level	36 dBA with uncertainty of 2 dBA as measured according to ISO17510-1:2007
Dimensions (LxWxH):	4.4" x 6.5" x 5.7" (112 mm x 164 mm x 145mm)
Weight:	2.9 lb. (1.3 kg)
Power supply:	Input range 100-240V, 50-60 Hz, 40VA (typical power consumption), 100VA (maximum power consumption) <
Housing construction:	Flame retardant engineering thermoplastic
Operating temperature:	41° F to 95° F (+5°C to +35°C)
Operating humidity:	10%-95% non-condensing
Storage and transport temperature:	-4°F to +140°F (-20°C to +60°C)
Storage and transport humidity:	10%-95% non-condensing
Operating altitude:	Sea level to 8500' (2600 m)
Electromagnetic compatibility:	Product complies with all applicable electromagnetic compatibility requirements (EMC) according to IEC60601-1-2, for residential, commercial and light industry environments.
Air filter:	Two layered, powder-bonded, polyester non-woven fibre
Air tubing:	Flexible plastic, 1 x 6'6" (2 m)
Air outlet:	The 22 mm conical air outlet complies with EN ISO 5356-1
IEC 60601-1 classification:	Class II (double insulated), Type CF

**Note:** The manufacturer reserves the right to change these specifications without notice.

## Displayed Values

Value	Range	Accuracy	Display Resolution
<b>Pressure sensor at air outlet</b>			
Pressue	-5 to 30 cm H <sub>2</sub> O	±0.5 cm H <sub>2</sub> O (+ 4% of measured value)	0.1 cm H <sub>2</sub> O
<b>Flow derived values**</b>			
Leak	0-120 L/min	†	1 L/min
Tidal volume	50 - 3,000 ml	†	1 mL
Respiratory rate	6-60 BPM	± 0.5 BPM††	1 BPM
Minute ventilation	0.6 - 60 L/min	†	0.1 L/min
TiAvg	0.0 - 4.0 sec	± 10 %	0.1 sec

\*\* Results may be inaccurate in the presence of leaks or supplemental oxygen.

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

†† Results may be inaccurate if the tidal volume is below 50 mL.

## Pressure Accuracy

### Maximum static pressure variation at 10 cm H<sub>2</sub>O according to ISO 17510-1:2007:

Without humidifier 9.85 cm H<sub>2</sub>O to 10.15 cm H<sub>2</sub>O

With H4i 9.36 cm H<sub>2</sub>O to 10.66 cm H<sub>2</sub>O

### Maximum dynamic pressure variation according to ISO 17510-1:2007:

Pressure (cm H <sub>2</sub> O)	10 BPM	15BPM (without H4i/without humidifier)	20 BPM
4	0.21/0.22	0.31/0.31	0.37/0.46
8	0.24/0.25	0.32/0.36	0.47/0.49
12	0.23/0.25	0.33/0.37	0.5/0.53
16	0.26/0.29	0.38/0.41	0.52/0.57
20	0.31/0.34	0.42/0.53	0.52/0.62

## Symbols which appear on the device



Attention, consult accompanying documents;



IPX1 Drip proof;



Type CF equipment;



Dangerous voltage;



Class II equipment;



Start/Stop;



Manufacturer

## VPAP IV, VPAP IV ST

Operating pressure range:	2 to 25 cm H <sub>2</sub> O
Maximum single fault pressure:	30 cm H <sub>2</sub> O
Flow measurement tolerance:	± 0.1 L/sec or 20% of reading, whichever is greater
S, ST and T mode:	IPAP: 4 to 25 H <sub>2</sub> O (measured at the mask); EPAP: 2 to 25 cm H <sub>2</sub> O (measured at the mask)
CPAP mode:	4 to 20 cm H <sub>2</sub> O (measured at the mask)
Flow at set pressures: (measured at end of standard 2 m tubing)	4 cm H <sub>2</sub> O      204 (L/min) 8 cm H <sub>2</sub> O      213 (L/min) 12 cm H <sub>2</sub> O     202 (L/min) 16 cm H <sub>2</sub> O     180 (L/min) 20 cm H <sub>2</sub> O     169 (L/min)

### DECLARED DUALNUMBER NOISE EMISSION VALUES in accordance with ISO 4871:

Sound pressure level:	26 dBA with uncertainty of 2 dBA as measured according to ISO17510-1:2002 28 dBA with uncertainty of 2 dBA as measured according to ISO17510-1:2007
Sound power level	36 dBA with uncertainty of 2 dBA as measured according to ISO17510-1:2007
Dimensions (LxWxH):	112 mm x 164 mm x 145mm
Weight:	1.3 kg
Power supply:	Input range 100-240V, 50-60 Hz, 40VA (typical power consumption), 100VA (maximum power consumption) <
Housing construction:	Flame retardant engineering thermoplastic
Operating temperature:	+5°C to +35°C
Operating humidity:	10%-95% non-condensing
Storage and transport temperature:	-20°C to +60°C
Storage and transport humidity:	10%-95% non-condensing
Operating altitude:	Sea level to 2600 m
Electromagnetic compatibility:	Product complies with all applicable electromagnetic compatibility requirements (EMC) according to IEC60601-1-2, for residential, commercial and light industry environments.
Air filter:	Two layered, powder-bonded, polyester non-woven fibre
Air tubing:	Flexible plastic, 1 x 2 m
Air outlet:	The 22 mm conical air outlet complies with EN ISO 5356-1
IEC 60601-1 classification:	Class II (double insulated), Type CF

**Note:** *The manufacturer reserves the right to change these specifications without notice.*

## Displayed Values

Value	Range	Accuracy	Display Resolution
<b>Pressure sensor at air outlet</b>			
Pressure	-5 to 30 cm H <sub>2</sub> O	±0.5 cm H <sub>2</sub> O (+ 4% of measured value)	0.1 cm H <sub>2</sub> O
<b>Flow derived values**</b>			
Leak	0-120 L/min	†	1 L/min
Tidal volume	50 - 3,000 ml	†	1 mL
Respiratory rate	6-60 BPM	± 0.5 BPM††	1 BPM
Minute ventilation	0.6 - 60 L/min	†	0.1 L/min
TiAvg	0.0 - 4.0 sec	± 10 %	0.1 sec

\*\* Results may be inaccurate in the presence of leaks or supplemental oxygen.

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

†† Results may be inaccurate if the tidal volume is below 50 mL.

## Pressure Accuracy

### Maximum static pressure variation at 10 cm H<sub>2</sub>O according to ISO 17510-1:2007:

Without humidifier 9.85 cm H<sub>2</sub>O to 10.15 cm H<sub>2</sub>O

With H4i 9.36 cm H<sub>2</sub>O to 10.66 cm H<sub>2</sub>O

### Maximum dynamic pressure variation according to ISO 17510-1:2007:

Pressure (cm H <sub>2</sub> O)	10 BPM	15BPM (without H4i/without humidifier)	20 BPM
4	0.21/0.22	0.31/0.31	0.37/0.46
8	0.24/0.25	0.32/0.36	0.47/0.49
12	0.23/0.25	0.33/0.37	0.5/0.53
16	0.26/0.29	0.38/0.41	0.52/0.57
20	0.31/0.34	0.42/0.53	0.52/0.62

## Symbols which appear on the device



Caution;



Follow instructions for use;



IPX1 Drip proof;



Type CF equipment;



Dangerous voltage;



Class II equipment;



Start/Stop and mask fit;



Manufacturer;



Environmental information

WEEE2002/96/EC is a European Directive that requires the proper disposal of electrical and electronic equipment. This device should be disposed of separately, not as unsorted municipal waste. To dispose of your device, you should use appropriate collection, reuse and recycling systems available in your region. The use of these collection, reuse and recycling systems is designed to reduce pressure on natural resources and prevent hazardous substances from damaging the environment.

If you need information on these disposal systems, please contact your local waste administration. The crossed-bin symbol invites you to use these disposal systems. If you required information on collection and disposal of your ResMed device please contact your ResMed office, local distributor or go to [www.resmed.com/environment](http://www.resmed.com/environment).

## S8 Auto 25

Operating pressure range:	4 to 25 cm H <sub>2</sub> O
Maximum single fault pressure:	40 cm H <sub>2</sub> O
Pressure measurement tolerance:	± 0.5 cm H <sub>2</sub> O ± 4% of the measured reading
Flow measurement tolerance:	± 0.1 L/sec or 20% of reading, whichever is greater
V Auto mode:	4 to 25 H <sub>2</sub> O (measured at the mask); Pressure support: 0 - 10 cm H <sub>2</sub> O
CPAP mode:	4 to 20 cm H <sub>2</sub> O (measured at the mask)
DECLARED DUAL-NUMBER NOISE EMISSION VALUES in accordance with ISO 4871:	
Sound pressure level:	26 dBA with uncertainty of 2 dBA as measured according to ISO17510-1:2002 28 dBA with uncertainty of 2 dBA as measured according to ISO17510-1:2007
Sound power level	36 dBA with uncertainty of 2 dBA as measured according to ISO17510-1:2007
Dimensions (LxWxH):	112 mm x 164 mm x 145mm
Weight:	1.3 kg
Power supply:	Input range 100-240V, 50-60 Hz, 40VA (typical power consumption), < 100VA (maximum power consumption)
Housing construction:	Flame retardant engineering thermoplastic
Operating temperature:	+5°C to +35°C
Operating humidity:	10%-95% non-condensing
Storage and transport temperature:	-20°C to +60°C
Storage and transport humidity:	10%-95% non-condensing
Operating altitude:	Sea level to 2600 m
Supplemental oxygen:	Recommended maximum supplemental oxygen flow: 4 L/min
Electromagnetic compatibility:	Product complies with all applicable electromagnetic compatibility requirements (EMC) according to IEC60601-1-2, for residential, commercial and light industry environments.
Air filter:	Two layered, powder-bonded, polyester non-woven fibre
Air tubing:	Flexible plastic, 1 x 2 m
Air outlet:	The 22 mm conical air outlet complies with EN ISO 5356-1
IEC 60601-1 classification:	Class II (double insulated), Type CF

**Notes:** *The manufacturer reserves the right to change these specifications without notice.*

*Pressure may be displayed in cm H<sub>2</sub>O or hPa.*

## Displayed Values

Value	Range	Accuracy	Display Resolution
<b>Pressure sensor at air outlet</b>			
Pressure	-5 to 30 cm H <sub>2</sub> O	±0.5 cm H <sub>2</sub> O (+ 4% of measured value)	0.1 cm H <sub>2</sub> O
<b>Flow derived values**</b>			
Leak	0-120 L/min	†	1 L/min
Tidal volume	50 - 3,000 ml	†	1 mL
Respiratory rate	6-60 BPM	± 0.5 BPM††	1 BPM
Minute ventilation	0.6 - 60 L/min	†	0.1 L/min
TiAvg	0.0 - 4.0 sec	± 10 %	0.1 sec

\*\* Results may be inaccurate in the presence of leaks or supplemental oxygen.

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

†† Results may be inaccurate if the tidal volume is below 50 mL.

## Pressure Accuracy

### Maximum static pressure variation at 10 cm H<sub>2</sub>O according to ISO 17510-1:2007:

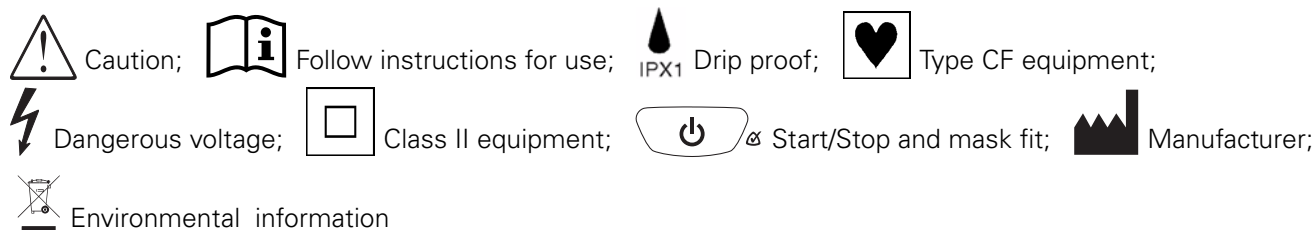
Without humidifier 9.85 cm H<sub>2</sub>O to 10.15 cm H<sub>2</sub>O

With H4i 9.36 cm H<sub>2</sub>O to 10.66 cm H<sub>2</sub>O

### Maximum dynamic pressure variation according to ISO 17510-1:2007:

Pressure (cm H <sub>2</sub> O)	10 BPM	15BPM (without H4i/without humidifier)	20 BPM
4	0.21/0.22	0.31/0.31	0.37/0.46
8	0.24/0.25	0.32/0.36	0.47/0.49
12	0.23/0.25	0.33/0.37	0.5/0.53
16	0.26/0.29	0.38/0.41	0.52/0.57
20	0.31/0.34	0.42/0.53	0.52/0.62

## Symbols which appear on the device



WEEE2002/96/EC is a European Directive that requires the proper disposal of electrical and electronic equipment. This device should be disposed of separately, not as unsorted municipal waste. To dispose of your device, you should use appropriate collection, reuse and recycling systems available in your region. The use of these collection, reuse and recycling systems is designed to reduce pressure on natural resources and prevent hazardous substances from damaging the environment.

If you need information on these disposal systems, please contact your local waste administration. The crossed-bin symbol invites you to use these disposal systems. If you required information on collection and disposal of your ResMed device please contact your ResMed office, local distributor or go to [www.resmed.com/environment](http://www.resmed.com/environment).

## 10 Recommended maintenance schedule

The VPAP devices are intended to provide safe and reliable operation when operated in accordance with the instructions provided by ResMed. ResMed recommends that these devices be inspected and serviced by an authorised ResMed Service Centre if there is any sign of wear or concern with device function. Otherwise, service and inspections of the devices generally should not be required during the five year design life of the product.

Procedures for filter replacement and regular cleaning are provided in the User Manual. All of these procedures can be carried out by the owner.

Some countries require all medical equipment to have a periodic service to confirm that the equipment is in good working order. **Section 3 General inspection and servicing** may be used in this situation.

# Appendix A: Service request form

## ResMed Service Request Form

### Distributor details

Reported by	Contact details (Email or phone)
Company name	Equipment owner
Additional owner information	

### Problem details

#### Product details

Product code	Mask type
Product name	Pressure settings
Serial/Lot number	Hourmeter reading

Under warranty? Yes  No

Humidifier? Yes  No

SmartStart? Yes  No

#### Problem description

#### Effect on user

Date problem occurred

Date of purchase

Or

If the purchase date is unknown, please indicate below the time the product was used before the problem occurred

< 3 months  3 - 6 months  6 - 12 months  1 - 2 years  2 - 5 years  > 5 years

When did the fault occur?

Not being used

During use

Start up

Unknown

Other

Out of box failure

Is this device being returned to ResMed?

Yes

No

### Service details

ResMed reference number	Distributor reference number (if applicable)	Today's date
Signature		

AUF 19019-01/5

# Appendix B: Operational diagram

