Philips Respironics System One (60 Series) Sleep Therapy Devices

Service & Technical Reference Manual

PHILIPS
RESPIRONICS

LIMITED WARRANTY

Respironics, Inc. warrants that the system shall be free from defects of workmanship and materials and will perform in accordance with the product specifications for a period of two (2) years from the date of sale by Respironics, Inc. to the dealer. If the product fails to perform in accordance with the product specifications, Respironics, Inc. will repair or replace – at its option – the defective material or part. Respironics, Inc. will pay customary freight charges from Respironics, Inc. to the dealer location only. This warranty does not cover damage caused by accident, misuse, abuse, alteration, water ingress, and other defects not related to material or workmanship. The Respironics, Inc. Service department shall examine any devices returned for service, and Respironics, Inc. reserves the right to charge an evaluation fee for any returned device as to which no problem is found after investigation by Respironics, Inc. Service.

This warranty is non-transferable by unauthorized distributors of Respironics, Inc. products and Respironics, Inc. reserves the right to charge dealers for warranty service of failed product not purchased directly from Respironics, Inc. or authorized distributors.

Respironics, Inc. disclaims all liability for economic loss, loss of profits, overhead, or consequential damages which may be claimed to arise from any sale or use of this product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty is given in lieu of all other express warranties. In addition, any implied warranties – including any warranty of merchantability or fitness for the particular purpose – are limited to two years. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

To exercise your rights under this warranty, contact your local authorized Respironics, Inc. dealer or contact Respironics, Inc. at:

1001 Murry Ridge Lane
Murrysville, Pennsylvania
15668-8550

or

Deutschland
Gewerbestrasse 17
82211 Herrsching, Germany
+49 8152 93060

CHAPTER 1: INTRODUCTION

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CHAPTER 1: INTRODUCTION

CAUTION
U.S. federal law restricts this device to sale by or on the order of a physician.

1.0 OVERVIEW

The Philips Respironics (PR) System One 60 Series REMstar continuous positive airway pressure (CPAP) and BiPAP (Bi-level) sleep therapy devices are low-pressure, electrically-driven sleep apnea systems with electronic pressure control for the treatment of Obstructive Sleep Apnea (OSA) in spontaneously breathing patients weighing >66 lbs (>30 kg). The device's pressure controls are adjusted to deliver pressure support to the patient. The devices augment patient breathing by supplying pressurized air through a patient circuit. These devices are intended for use in the home or hospital/institutional environment.PR System One REMstar and BiPAP devices are as follows:

Device	*Model Number Series* (TS suffix at the end of the model number denotes that the device has heated patient tubing. HS denotes tat the system **does not** include heated patient tubing.)*
PR System One REMstar Plus with C-Flex CPAP Device	26X (TS or HS)
PR System One REMstar Pro with C-Flex+ CPAP Device**	46X (TS or HS)
PR System One REMstar Auto with A-Flex CPAP Device	56X (TS or HS)
PR System One BiPAP Pro with Bi-Flex Bi-Level Device	66X (TS or HS)
PR System One BiPAP Auto with Bi-Flex Bi-Level Device	76X (TS or HS)
**Model Numbers vary for Domestic U.S., International, and Private Label devices. For example, the PR System One 60 Series REMstar Plus with C-Flex device's Domestic U.S. model number is 260, whereas the International version of the device is model number 261. Additionally, the model numbers for core package systems are followed by either a "TS" or "HS" suffix. If the "TS" suffix is present in the model number, the system includes a heated humidifier. If the "HS" suffix is present, The system does not include heated tubing functionality.*	

1.1 DEVICE FEATURES

1.1.1 C-FLEX FEATURE

Continuous Positive Airway Pressure (CPAP) sleep therapy devices (listed above) provide patients with the special comfort feature C-Flex. When enabled, C-Flex enhances patient comfort by providing pressure relief

during the expiratory phase of breathing. C-Flex levels of 1, 2, or 3 progressively reflect increased pressure relief.

NOTE

C-Flex must be enabled (set to 1) in Provider Mode.

1.1.2 C-FLEX+ FEATURE

C-Flex+ is a special comfort feature that when enabled, patient comfort is enhanced by a small amount of pressure relief during the latter stages of inspiration and during active exhalation (the beginning part of exhalation). C-Flex+ levels of 1, 2, or 3 progressively reflect increased pressure relief.

NOTE

- *The C-Flex+ feature must be enabled (set to 1) in provider mode.*
- *C-Flex+ transitions from no Flex at 4.0 cm H_2O to full Flex at 6 cm H_2O. A-Flex is top limited at 20.0 cm H_2O pressure.*

1.1.3 A-FLEX FEATURE

A-Flex is a special comfort feature that is only active if Auto-CPAP therapy is enabled. When A-Flex is enabled, patient comfort is enhanced by a small amount of pressure relief during the latter stages of inspiration and during active exhalation (the beginning part of exhalation). A-Flex levels of 1, 2, or 3 progressively reflect increased pressure relief.

NOTE

- *The A-Flex feature must be enabled (set to 1) in provider mode.*
- *A-Flex transitions from no Flex at 4.0 cm H_2O to full Flex at 6 cm H_2O. A-Flex is top limited at 20.0 cm H_2O pressure.*

1.1.4 BI-LEVEL DEVICES

The BiPAP Pro and BiPAP Auto bi-level devices sense the patient's breathing effort by monitoring airflow in the patient circuit and adjust the output pressure to assist in inhalation and exhalation. This assistance is provided by the administration of two levels of positive pressure. During exhalation, pressure is variably positive or near ambient. During inspiration, pressure is variably positive and always equal to or higher than the expiratory level. The BiPAP Pro can operate in either Bi-level mode or Bi-level with Bi-Flex. The BiPAP Auto can also operate in Auto Bi-Level or Auto Bi-Level with Bi-Flex.

Bi-Flex "softens" the airflow in inhalation and exhalation, making the patient's breathing more comfortable. In the Bi-Flex mode, the amount of pressure relief at the end of inhalation and at the beginning of exhalation is established. Patient-adjustable settings of 1, 2, or 3 provide progressively increased pressure relief.

1.1.5 AUTOIQ

If AutoIQ mode is available, the device is capable of providing a two-phase therapy approach that is comprised of an Auto-Trial phase and an Auto-Check phase. In the Auto-Trial phase, the device will deliver Auto-CPAP therapy for a settable number of days of patient use. In the Auto-Check phase, the device will deliver a

modified version of Auto-CPAP therapy which still reacts to patient events but requires a longer duration of time to elapse before adjustments are made and is limited in how much the pressure can be adjusted over time.

1.1.6 HEATED TUBE

PR System One 60 Series devices are equipped with an optional Heated Tube Connection on the Air Outlet Port of the Heated Humidifier. The Air Outlet Port that accommodates the Heated Tube includes a 3-pin connector and a Heated Tubing locking mechanism.

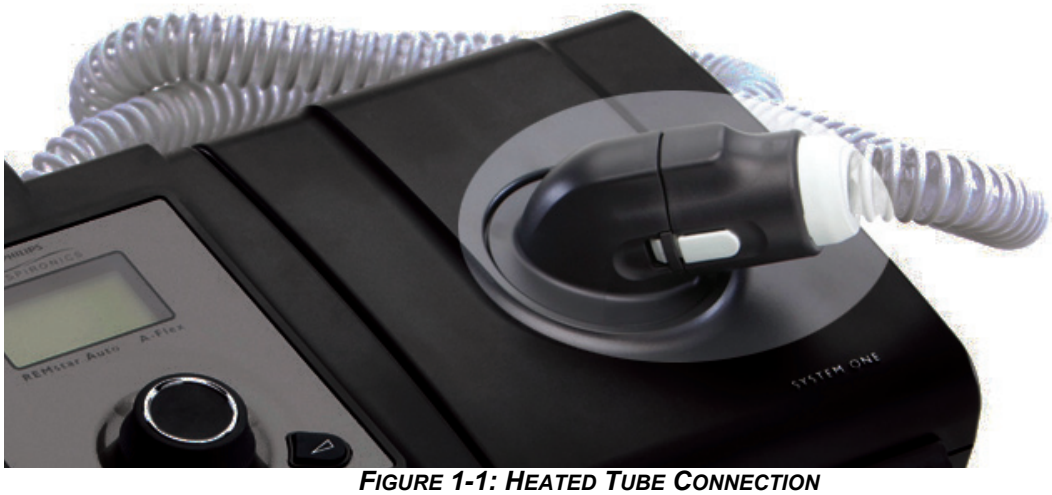
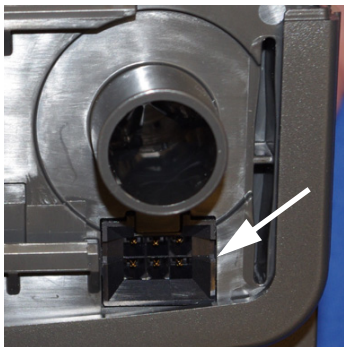


FIGURE 1-1: HEATED TUBE CONNECTION

CAUTION

60 Series Sleep Therapy devices and Humidifiers are not compatible with the legacy System One devices (models 15X, 25X, 45X, 55, 65X, and 75X). Note that the 60 Series Humidifier Cable connector located on the right side of the Sleep Therapy device is a 6-pin connector and can not mate with legacy Humidifiers. The 60 Series devices are also manufactured so as to not allow for the connection of 60 Series devices with legacy devices. Do not try to force the devices together, otherwise damage may occur to the system.



1.2 PRODUCT OPERATING SOFTWARE UPGRADES

Most Philips Respironics products can be upgraded with the latest available software via an Internet connection. To connect a PR System One REMstar or BiPAP sleep therapy device to a PC with an internet connection, refer to the following illustration.

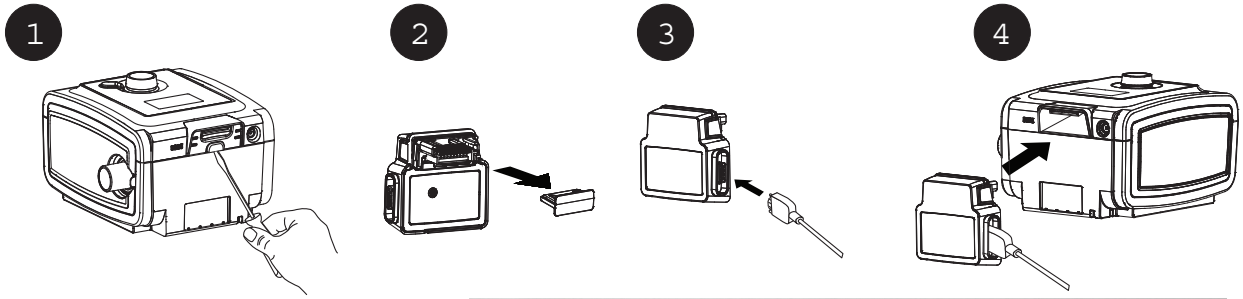


FIGURE 1-2: LINK MODULE

NOTE
The Link Module and DB9F-DB9M cable are available in RP kit #1074113.

You must be a registered user to download service software and product operating software upgrades. If you are not a registered user, go to **http://my.respironics.com** and complete the on-line registration process.

Once you have access to download the software, perform the following:

1. Log into **http://my.respironics.com**.

2. Click on the **Service Software** link.

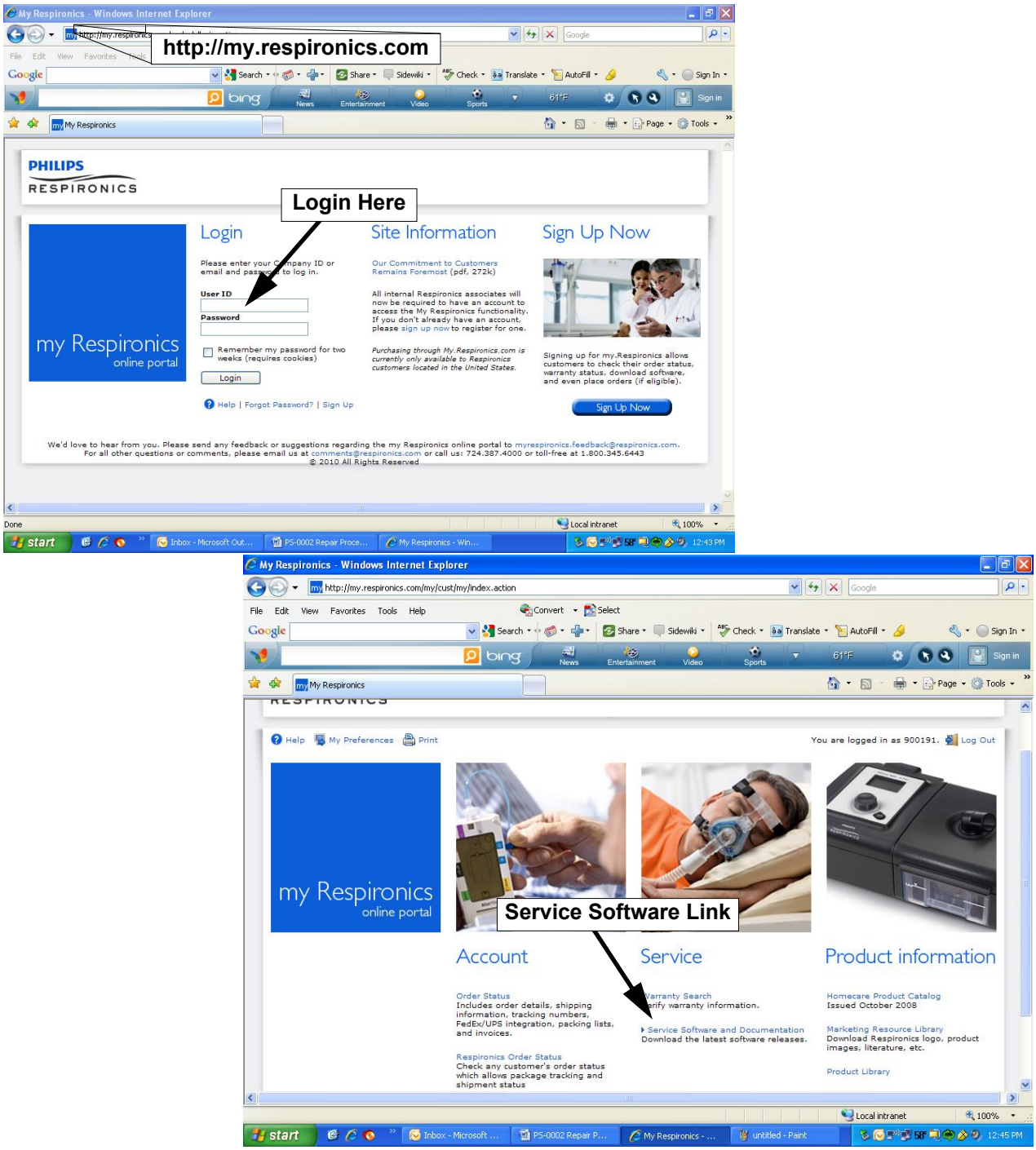


FIGURE 1-3: DOWNLOADING OPERATING SOFTWARE

3. Click on the *Philips Respironics System* One link.

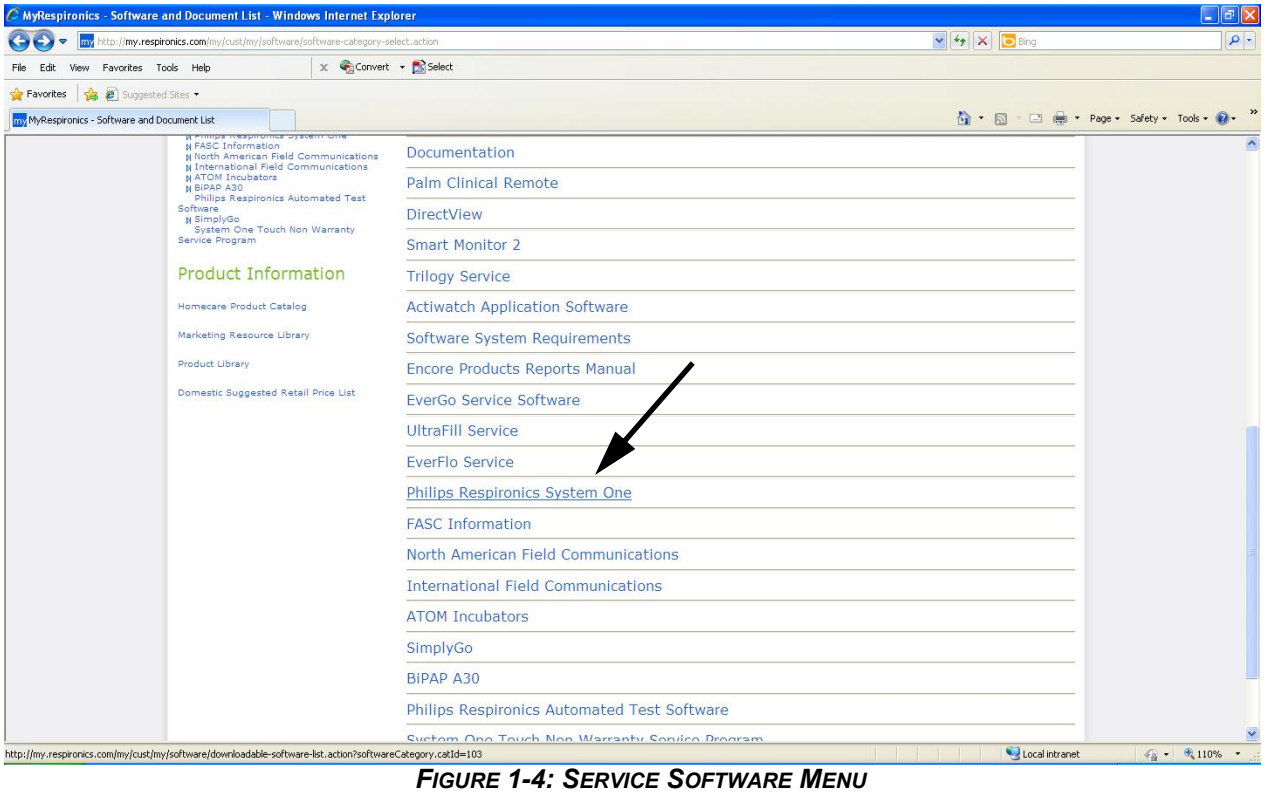


FIGURE 1-4: SERVICE SOFTWARE MENU

4. For product operating software, click on the “Download” button adjacent to the software you wish to download.

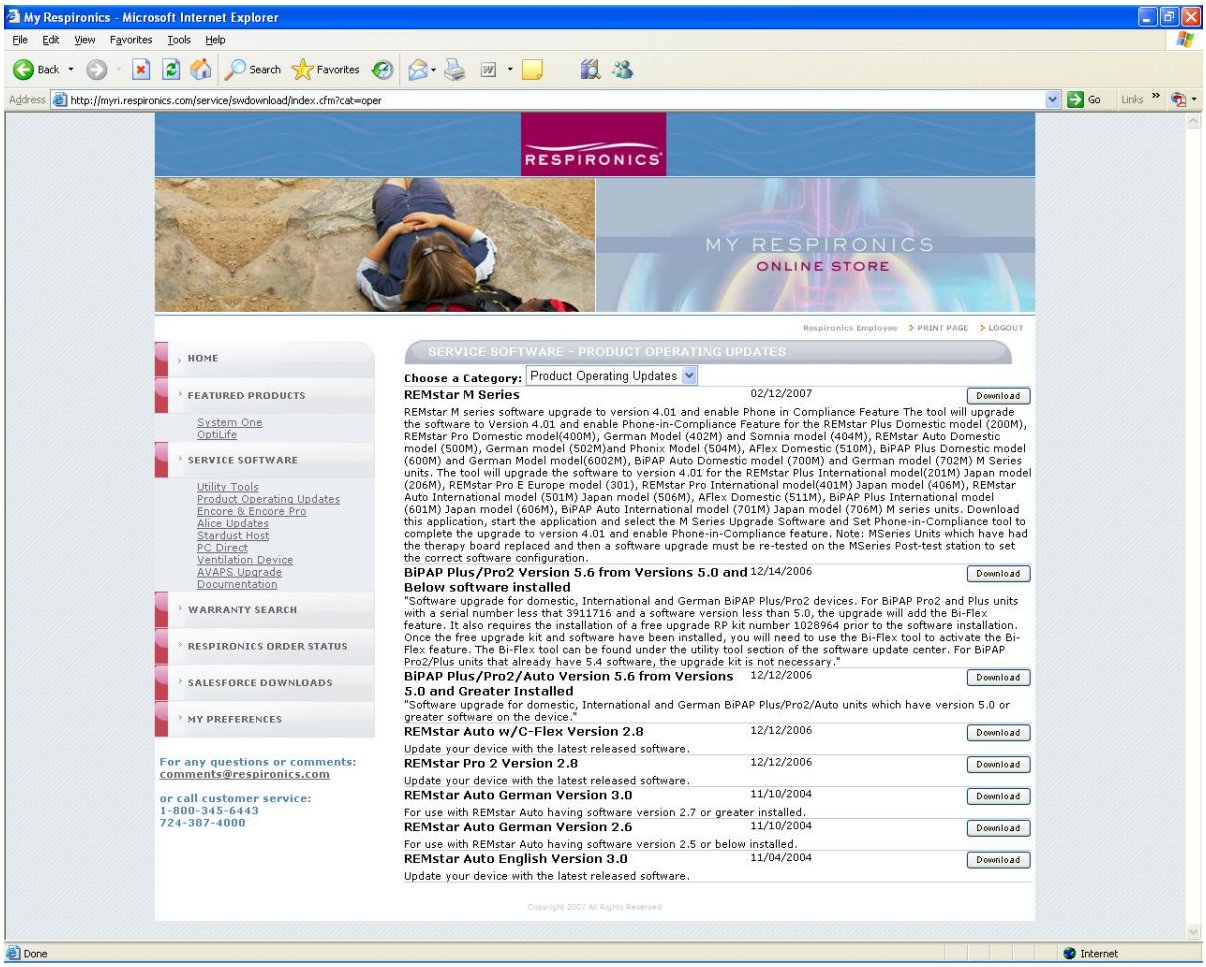


FIGURE 1-5: OPERATING SOFTWARE UPGRADES

5. The installation wizard will guide you through the upgrade process. Follow the on-screen prompts to complete the upgrade process.
6. Save or upload Data to Encore before beginning an Upgrade.
7. Remove the SD Card and Card Cover and connect the Link Module Interface between the Device and PC COM port 1.
8. Connect Power to the Device.
9. Launch the *Flash Upgrade Utility*.

10. Click on the *Upgrade* button. Do not disturb the Upgrade Utility software or the Device while the Upgrade is operating.

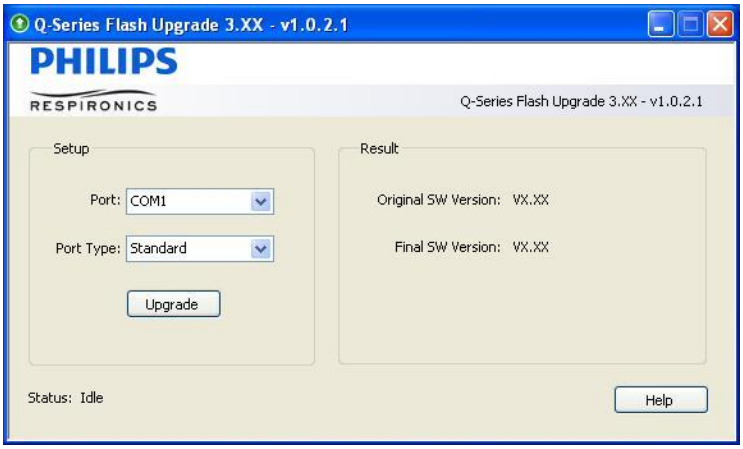


FIGURE 1-6: UPGRADE START SCREEN

11. The following will be displayed at the successful completion of the Upgrade. If the Upgrade fails, check all connections and attempt once again. If the Upgrade fails again, troubleshooting and repair of the device may be required to resolve the issue.

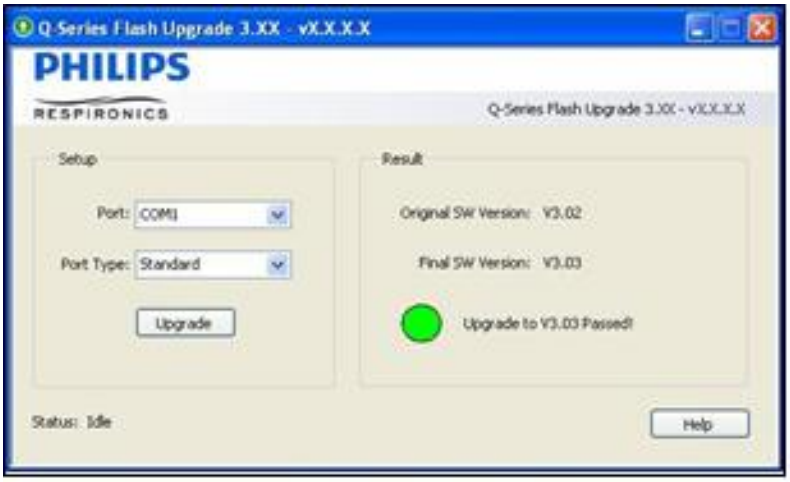


FIGURE 1-7: UPGRADE SUCCESSFUL

NOTE

- *Respironics recommends that you use the Service Center Tools software to Clear the device's error log. Refer to Chapter 5 for additional information.*
- *Remember to periodically log onto* **http://my.respironics.com** and check for software upgrades.

1.3 SERVICE NOTICE

The service technician should have a good working knowledge and understanding of the principles of operation and repair of electro-mechanical sleep therapy devices. By using the most current version of the service manual, and the latest testing software (both found on my.respironics.com), all repairs and testing can be performed. If service training is desired, contact the Philips Respironics service location in your area to schedule training.

1.4 SERVICE TRAINING

Respironics offers service training for the PR System One 60 Series REMstar and BiPAP devices. Training includes complete disassembly of the device, troubleshooting subassemblies and components, and necessary safety testing. For more information, contact us at:

E-mail: respironics.service.operations@philips.com
Phone: (724) 755-822
Fax: (724) 755-8230

1.5 PRODUCT SUPPORT STATEMENT

For product support, please contact Respironics Customer Satisfaction.

U.S.A. and Canada	International
Phone:1-800-345-6443	**Phone: 1-724-387-4000**
Fax: 1-800-886-0245	**Fax: 1-724-387-5236**

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CHAPTER 2: WARNINGS & CAUTIONS

Warnings, cautions, and notes are used throughout this manual to identify possible safety hazards, conditions that may result in equipment or property damage, and important information that must be considered when performing service and testing procedures on the REMstar and Bi-PAP devices. Please read this section carefully before servicing the device.

WARNING

Warnings indicate the possibility of injury to people.

CAUTION

Cautions indicate the possibility of damage to equipment.

NOTE

Notes are used to emphasize a characteristic or important consideration.

Refer to the device's User and Provider Manuals for additional Warnings, Cautions, Notes, and Operating Instructions.

2.0 WARNINGS

WARNINGS

-
- *This manual serves as a reference. The instructions in this manual are not intended to supersede the health care professional's instructions regarding the use of the device.*
- *The operator should read and understand this entire manual before using the device.*
- *This device is not intended for life support.*
- *The device should be used only with masks and connectors recommended by Philips Respironics or with those recommended by the health care professional or respiratory therapist. A mask should not be used unless the device is turned on and operating properly. The exhalation port(s) associated with the mask should never be blocked. Explanation of the Warning: The device is intended to be used with special masks or connectors that have exhalation ports 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 exhalation port. However, when the device is not operating, enough fresh air will not be provided through the mask, and exhaled air may be rebreathed.*
- *If you are using a full face mask (a mask covering both your mouth and your nose), the mask must be equipped with a safety (entrainment) valve.*
- *When using oxygen with this system, the oxygen supply must comply with local regulations for medical oxygen.*
- *Oxygen supports combustion. Oxygen should not be used while smoking or in the presence of an open flame.*
- *When using oxygen with this system, turn the device on before turning on the oxygen. Turn the oxygen off before turning the device off. This will prevent oxygen accumulation in the device. Explanation of the Warning: When the device is not in operation and the oxygen flow is left on, oxygen delivered into the tubing may accumulate within the device's enclosure. Oxygen accumulated in the device enclosure will create a risk of fire.*
- *• When using oxygen with this system, a Philips Respironics Pressure Valve must be placed in-line with the patient circuit between the device and the oxygen source. The pressure valve helps prevent the backflow of oxygen from the patient circuit into the device when the unit is off. Failure to use the pressure valve could result in a fire hazard.*
- *• Do not connect the device to an unregulated or high pressure oxygen source.*
- *• Do not use the device in the presence of a flammable anaesthetic mixture in combination with oxygen or air, or in the presence of nitrous oxide.*
- *• Do not use the device near a source of toxic or harmful vapors.*
- *• Do not use this device if the room temperature is warmer than 35° C (95° F). If the device is used at room temperatures warmer than 35° C (95° F), the temperature of the airflow may exceed 43° C (109° F). This could cause irritation or injury to your airway.*
- *• Do not operate the device in direct sunlight or near a heating appliance because these conditions can increase the temperature of the air coming out of the device.*
- *• Contact your health care professional if symptoms of sleep apnea recur.*

WARNINGS (CONT.)

- *Repairs and adjustments must be performed by Philips Respironics-authorized service personnel only. Unauthorized service could cause injury, invalidate the warranty, or result in costly damage.*
- *Periodically inspect electrical cords and cables for damage or signs of wear. Discontinue use and replace if damaged.*
- *To avoid electrical shock, always unplug the power cord from the wall outlet before cleaning the device. DO NOT immerse the device in any fluids.*
- *If the device is used by multiple persons (such as rental devices), a low-resistance, main flow bacteria filter should be installed in-line between the device and the circuit tubing to prevent contamination.*
- *Be sure to route the power cord to the outlet in a way that will prevent the cord from being tripped over or interfered with by chairs or other furniture.*
- *This device is activated when the power cord is connected.*
- *For safe operation when using a humidifier, the humidifier must always be positioned below the breathing circuit connection at the mask and the air outlet on the device. The humidifier must be level for proper operation.*
- *Note: Please see the "Limited Warranty" section of this manual for information on warranty coverage.*

2.1 CAUTIONS

CAUTIONS

- *Contact your home care provider regarding EMC installation information.*
- *Mobile RF communications equipment can affect medical electrical equipment.*
- *Pins of connectors marked with the ESD warning symbol shall not be touched and connections shall not be made without special precautions. Precautionary procedures include methods to prevent build-up of electrostatic charge (e.g., air conditioning, humidification, conductive floor coverings, non-synthetic clothing), discharging one's body to the frame of the equipment or system or to earth. It is recommended that all individuals that will handle this device understand these precautionary procedures at a minimum as part of their training.*
- *Before operating the device, ensure that the SD card cover is replaced whenever any of the accessories such as the Link Module or Modem are not installed. Refer to the instructions that came with your accessory.*
- *Condensation may damage the device. If this device has been exposed to either very hot or very cold temperatures, allow it to adjust to room temperature (operating temperature) before starting therapy. Do not operate the device outside of the operating temperature range shown in the Specifications.*
- *Do not use extension cords with this device.*
- *Do not place the device directly onto carpet, fabric, or other flammable materials.*
- *Do not place the device in or on any container that can collect or hold water.*
- *A properly installed, undamaged reusable foam inlet filter is required for proper operation.*
- *Tobacco smoke may cause tar build-up within the device, which may result in the device malfunctioning.*
- *Dirty inlet filters may cause high operating temperatures that may affect device performance. Regularly examine the inlet filters as needed for integrity and cleanliness.*
- *Never install a wet filter into the device. You must ensure sufficient drying time for the cleaned filter.*
- *Always ensure that the DC power cord securely fits into your therapy device prior to use. Contact your home care provider or Philips Respironics to determine if you have the appropriate DC cord for your specific therapy device.*
- *When DC power is obtained from a vehicle battery, the device should not be used while the vehicle's engine is running. Damage to the device may occur.*
- *Only use a Philips Respironics DC Power Cord and Battery Adapter Cable. Use of any other system may cause damage to the device.*

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CHAPTER 3: SPECIFICATIONS & CLASSIFICATIONS

This chapter includes specifications and EMC compliance for the PR System One REMstar and BiPAP devices.

NOTE

1 hPa = 1 cm H_2O

3.0 THERAPY DEVICE SPECIFICATIONS

Environmental

Operating Temperature: 5° to 35° C (41° to 95° F)

Storage Temperature: -20° to 60° C (-4° F to 140° F)

Relative Humidity (operating & storage): 15 to 95% (non-condensing)

Atmospheric Pressure: 101 to 77 kPa (0 - 2286 m / 0 - 7500 ft)

Physical

Dimensions: 18 x 14 x 10 cm (7” L x 5.5” W x 4” H)

Weight (Device with power supply): Approximately 1.53 kg (3.37 lbs)

Standards Compliance

This device is designed to conform to the following standards:

IEC 60601-1 General Requirements for Safety of Medical Electrical Equipment

EN ISO 17510-1 Sleep Apnea Breathing Therapy Devices

EN 60601-1-2 Electromagnetic Compatibility

RTCA/DO-160F section 21. Category M: Emission of Radio Frequency Energy (Bi-Level devices only)

IEC 60601-1 Classification

Type of Protection Against Electric Shock: Class II Equipment

Degree of Protection Against Electric Shock: Type BF Applied Part

Degree of Protection against Ingress of Water (device & AC power supply):

- Device: Drip Proof, IP22
- 60W Power Supply: Drip Proof, IP22
- 80W Power Supply: Drip Proof, IP22

Mode of Operation: Continuous

Electrical

AC Power Consumption (with 60W Power Supply: 100 – 240 VAC, 50/60 Hz, 2.1 A

AC Power Consumption (with 80W Power Supply: 100 – 240 VAC, 50/60 Hz, 2.0 A

DC Power Consumption: 12 VDC, 6.67 A

Fuses: There are no user-replaceable fuses.

Declared Dual-Number Noise Emissions Values In accordance with ISO 4871

The measured A-weighted emission sound pressure level is 27 dB(A) with an uncertainty of 2 dB(A). The measured A-weighted sound power level is 35 dB(A) with an uncertainty of two (2) dB(A).

NOTE

- *These measurements apply to this device with an optional humidifier. Use of this device without a humidifier would result in measurements equal to or less than the stated values.*
- *Values determined according to noise test code given in ISO 17510-1:2007, using the basic standards ISO 3744 and ISO 4871.*

Pressure Accuracy

Pressure Increments: 4.0 to 20.0 cm H_2O, in 0.5 cm H_2O increments (CPAP Devices)

Pressure Increments: 4.0 to 25.0 cm H_2O, in 0.5 cm H_2O increments (Bi-Level Devices)

Pressure Stability:

	Static	Dynamic < 10 cm H_2O	Dynamic ≥ 10.0 cm H_2O
Device	± 0.5 cm H_2O	≤ 0.5 cm H_2O	≤ 1.0 cm H_2O
Device with Humidifier	± 0.5 cm H_2O	≤ 0.5 cm H_2O	≤ 1.0 cm H_2O

Maximum Flow Rate (typical)

60 Series REMstar CPAP Devices						
		Test Pressures (cm H_2O)				
		4.0	8.0	12.0	16.0	20.0
22 mm tubing	Measured pressure at the patient connection port (cm H_2O)	3.6	7.5	11.0	15.0	19.0
	Average flow at the patient connection port (l/min)	84.1	135.2	154.5	146.9	128.7
15 mm tubing (heated or non-heated)	Measured pressure at the patient connection port cm H_2O)	3.8	7.0	11.0	15.0	19.0
	Average flow at the patient connection port (l/min)	85.1	120.7	121.6	1119.3	119.2

60 Series BiPAP Pro with Bi-Flex and BiPAP Auto with Bi-Flex						
		Test Pressures (cm H_2O)				
		4.0	9.0	14.5	20.0	25.0
22 mm tubing	Measured pressure at the patient connection port (cm H_2O)	3.6	8.5	13.5	19.0	24.1
	Average flow at the patient connection port (l/min)	84.1	145.2	153.9	128.7	138.9
15 mm tubing (heated or non-heated)	Measured pressure at the patient connection port (cm H_2O)	3.8	8.0	13.50	19.0	24.0
	Average flow at the patient connection port (l/min)	85.1	122.3	120.6	119.2	138.5

3.1 60 SERIES HEATED HUMIDIFIER SPECIFICATIONS

Environmental

Operating Temperature: 5° to 35° C (41° to 95° F)

Storage Temperature: -20° to 60° C (-4° F to 140° F)

Relative Humidity (operating & storage): 15 to 95% (non-condensing)

Atmospheric Pressure: 77 to 101 kPa (0 - 2286 m / 0 - 7500 ft)

Physical

Dimensions: 18 x 14 x 10 cm (7” L x 5.5” W x 4” H)

Weight: Approximately 0.89 kg (1.95 lbs.)

Water Capacity

325 ml (11 oz.) at recommended water level

Standards Compliance - This device is designed to conform to the following standards:

IEC 60601-1 General Requirements for Safety of Medical Electrical Equipment

EN ISO 8185:2007 General Requirements for Humidification Systems

Electrical (When the System One Heated Humidifier is used with a therapy device)

AC Power Consumption (with 60W Power Supply): 100 – 240 VAC, 50/60 Hz, 2.1 A

AC Power Consumption (with 80W Power Supply): 100 – 240 VAC, 50/60 Hz, 2.0 A

DC Power Consumption: 12 VDC, 6.67 A

Type of Protection Against Electric Shock: Class II Equipment

Degree of Protection Against Electric Shock: Type BF Applied Part

Degree of Protection against Ingress of Water: Drip Proof, IPX1

Mode of Operation: Continuous

Electromagnetic Compatibility: The device meets the requirements of EN 60601-1-2, 2nd edition.

Heater Plate

Max Temperature: 75° C (167° F)

Pressure Drop with Humidifier

Max.: 0.3 cm H_2O at 60 LPM flow

Humidity

Humidity min Output: 10 mg H2O/L - Measured @ max flow, 35° C, 15% RH.

3.2 HEATED TUBING SPECIFICATIONS

Maximum Recommended Pressure

25 cm H_2O

Inner Diameter

15 mm (0.6 in.)

Length

1.83 m (6 ft.)

Heated Tubing Temperature Range

16° to 32º C (60° to 89° F)

Heated Tubing Temperature Cut-out

≤ 41° C (≤ 106° F)

Material

Flexible plastic and electrical components

Electrical (Heated tubing is powered by the attached heated humidifier)

Refer to “Electrical” section of System One Heated Humidifier Specifications

Environmental

Refer to “Environmental” section of System One Heated Humidifier Specifications

3.3 ELECTROMAGNETIC EMISSIONS

This device is intended for use in the electromagnetic environment specified below. Use, service, and testing of the device should be performed in such an environment.

GUIDANCE & MANUFACTURER'S DECLARATION - ELECTROMAGNETIC EMISSIONS		
EMISSIONS TEST	**COMPLIANCE**	**ELECTROMAGNETIC ENVIRONMENT GUIDANCE**
RF emissions CISPR 11	*Group 1*	*The device uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.*
RF emissions CISPR 11	*Class B*	*The device is suitable for use in all establishments, including domestic establishments and those directly connected to the public low voltage power supply network.*
Harmonic emissions IEC 61000-3-2	*Class A*	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	*Complies*	

3.4 ELECTROMAGNETIC IMMUNITY

This device is intended for use in the electromagnetic environment specified below. Use, service, and testing of the device should be performed in such an environment.

GUIDANCE & MANUFACTURER'S DECLARATION - ELECTROMAGNETIC IMMUNITY			
IMMUNITY TEST	**IEC 60601 TEST LEVEL**	**COMPLIANCE**	**EMC ENVIRONMENT GUIDANCE**
Electrostatic Discharge (ESD) *IEC 61000-4-2*	*±6 kV contact* *±8 kV air*	*±6 kV contact* *±8 kV air*	*Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.*
Electrical fast Transient/burst *IEC 61000-4-4*	*±2 kV for power supply lines* *±1 kV for I/O lines*	*±2 kV for supply mains* *±1 kV for I/O lines*	*Mains power quality should be that of a typical home or hospital environment.*
Surge *IEC 61000-4-5*	*±1 kV Differential Mode* *±2 kV Common M ode*	*±1 kV differential mode* *±2 kV common mode*	*Mains power quality should be that of a typical home or hospital environment.*
Voltage dips, short interruptions, and voltage variations on power supply input lines *IEC 61000-4-11*	*<5% U_T (>95% dip in U_T) for 0.5 cycle* *40% U_T (60% dip in U_T) for 5 cycles* *70% U_T (30% dip in U_T) for 25 cycles* *<5% U_T (>95% dip in U_T) for 5 sec*	*<5% U_T (>95% dip in U_T) for 0.5 cycle* *40% U_T (60% dip in U_T) for 5 cycles* *70% U_T (30% dip in U_T) for 25 cycles* *<5% U_T (>95% dip in U_T) for 5 sec*	*Mains power quality should be that of a typical home or hospital environment. If the user of the device requires continued operation during power mains interruptions, it is recommended that the device be powered from an uninterruptible power supply or a battery.*
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	*3 A/m*	*3 A/m*	*Power frequency magnetic fields should be at levels characteristic of a typical location in a typical hospital or home environment.*
NOTE: U_T is the AC mains voltage prior to application of the test level.			

GUIDANCE & MANUFACTURER'S DECLARATION - ELECTROMAGNETIC IMMUNITY			
IMMUNITY TEST	**IEC 60601 TEST LEVEL**	**COMPLIANCE**	**EMC ENVIRONMENT GUIDANCE**
Conducted RF IEC 61000-4-6 *Radiated RF IEC 61000-4-3*	*3Vrms 150 kHz to 80 MHz* *3 V/m 80 MHz to 2.5 GHz*	*3 Vrms* *3 V/m*	*Portable and mobile RF communications equipment should be used no closer to any part of the device, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance:* $d = 1.2\sqrt{P}$ *150 kHz to 80 MHz* $d = 1.2\sqrt{P}$ *80 MHz to 800 MHz* $d = 2.3\sqrt{P}$ *800 MHz to 2.5 GHz* ***P** = maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and **d** = the recommended separation distance in meters (m).* *Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b]* *Interference may occur in the vicinity of equipment marked with the following symbol:* 

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the device is used exceeds the applicable RF compliance level above, the device should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the device.

[b] Over the frequency range 150 kHz to 80 MHz, the field strengths should be less than 3 V/m.

3.5 RECOMMENDED SEPARATION DISTANCES BETWEEN PORTABLE & MOBILE RF COMMUNICATIONS AND THE DEVICE

This device is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. Electromagnetic interference may be prevented by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and this device as recommended in the table below, according to the maximum output power of the communications equipment.

RATED MAXIMUM POWER OUTPUT OF TRANSMITTER (W)	**SEPARATION DISTANCE ACCORDING TO FREQUENCY OF TRANSMITTER (m)**		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	*80 MHz to 800 MHz* $d = 1.2\sqrt{P}$	*800 MHz to 2.5GHz* $d = 2.3\sqrt{P}$
0.01	*0.12*	*0.12*	*0.23*
0.1	*0.38*	*0.38*	*0.73*
1	*1.2*	*1.2*	*2.3*
10	*3.8*	*3.8*	*7.3*
100	*12*	*12*	*23*

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

CHAPTER 4: SETUP

This chapter provides an overview of the system setup including introductory information on the User and Provider modes and menus.

WARNING

- *Inspect the power cord often for any signs of damage. Replace a damaged power cord immediately.*
- *Be sure to route the power cord to the outlet in a way that will prevent the cord from being tripped over or interfered with.*
- *This device is activated when the power cord is connected.*

CAUTION

- *If this device has been exposed to either very hot or very cold temperatures, allow it to adjust to room temperature before using or servicing it.*
- *Do not operate the device outside of the operating temperature range shown in the Specifications.*
- *Do not use extension cords with this device.*

NOTE

Refer to the device's User and Provider Manuals for additional Warnings, Cautions, Notes, and Operating Instructions.

4.0 SUPPLYING POWER TO THE DEVICE

4.0.1 SUPPLYING AC POWER TO THE DEVICE

Complete the following steps to operate the device using AC power.

1. Plug the socket end of the AC power cord (included) into the power supply (also included).

CAUTION

When you are using Heated Tubing with the compatible System One 60 Series Heated Humidifier, you must use the 80W power supply.

2. Plug the pronged end of the AC power cord into an electrical outlet that is not controlled by a wall switch.
3. Plug the power supply cord's connector into the power inlet on the back of the device.

4. Ensure that all connections are secure.

WARNING

Periodically inspect electrical cords and cables for damage or signs of wear. Discontinue use and replace if damaged.
CAUTION: Do not use extension cords with this device.

CAUTION

Do not use extension cords with this device.

NOTE

To remove AC power, disconnect the power supply cord from the electrical outlet.

4.0.2 SUPPLYING DC POWER TO THE DEVICE

A Philips Respironics DC Power Cord can be used to operate this device in a stationary recreational vehicle, boat, or motor home. In addition, a Philips Respironics DC Battery Adapter Cable, when used with a DC Power Cord, allows the device to be operated from a 12 VDC free-standing battery.

CAUTION

- *Always ensure that the DC power cord securely fits into your therapy device prior to use. Contact your home care provider or Philips Respironics to determine if you have the appropriate DC cord for your specific therapy device.*
- *When DC power is obtained from a vehicle battery, the device should not be used while the vehicle's engine is running. Damage to the device may occur.*
- *Only use a Philips Respironics DC Power Cord and Battery Adapter Cable. Use of any other system may cause damage to the device.*

Refer to the instructions supplied with the DC Power Cord and adapter cable for information on how to operate the device using DC power.

4.1 STARTING THE DEVICE

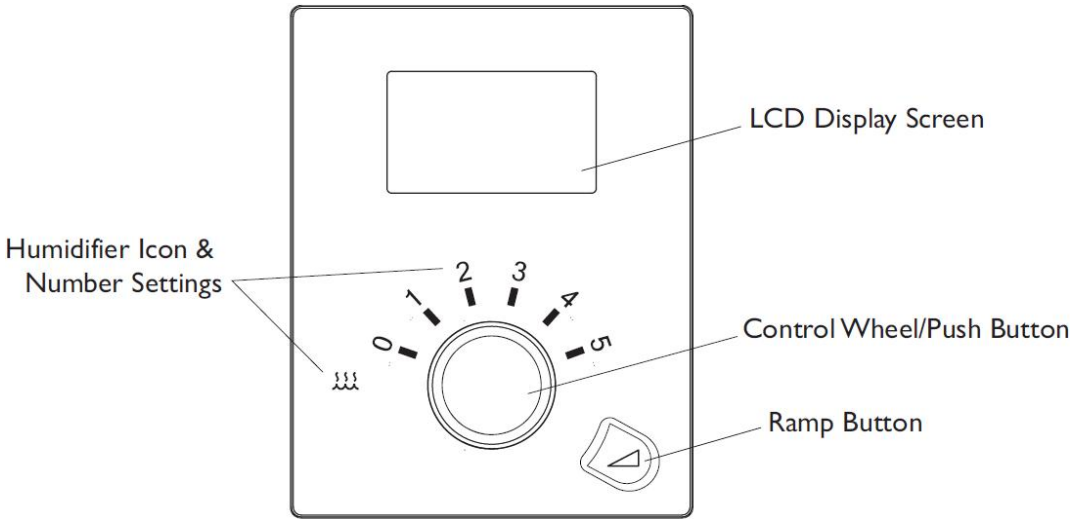


FIGURE 4-1: DEVICE CHARACTERISTICS

Display Screen	*Shows therapy settings, patient data, and other messages. The startup screen is shown temporarily when the unit is first powered.*
Humidifier Icon	*This Icon lights up (different colors) when the optional humidifier and/or heated tube is attached and heat is being applied. White means classic humidification is selected. Blue means System One humidification is selected. Orange means the heated tube is attached. Please refer to the humidifier user manual for more information.*
Humidifier Numbers	*The humidifier number settings are only visible when the humidifier is attached and therapy is active. You can use the control wheel to change the number settings for the humidifier. When the heated tube is being used with the humidifier, these numbers will control the heated tube setting.*
Control Wheel/ Push Button	*Turn the wheel to toggle between options on the screen. Press the wheel to choose an option. Primary function is to turn airflow on/off.*
Ramp Button	*When the airflow is on, this button allows you to activate or restart the ramp function. When the airflow is off, this button allows you to activate the Mask Fit Check. This button lights up when therapy is active or during specific alerts.*

1. Supply power to the device.
2. The Home screen will appear, as follows:

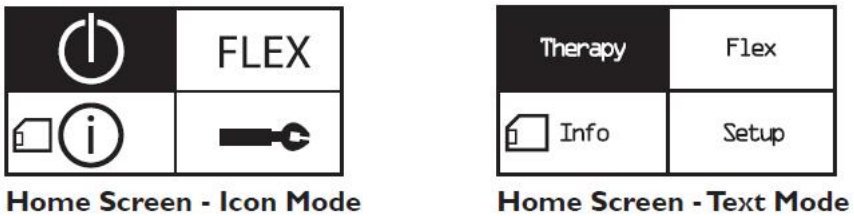


FIGURE 4-2: HOME SCREEN

NOTE

- *In Icon Mode, "FLEX" shown above will either display a blank screen or it will show "FLEX" depending on the provider settings.*
- *In Text Mode, "Flex" shown above will either display a blank screen or it will show the current flex mode or "Rise time" depending on how the provider set up the device.*
- *The SD card icon will display next to "Info" or the icon, if the SD card is inserted.*

3. Turn the wheel to toggle between the options. Highlight "Therapy" or the icon. Press the wheel to turn on the airflow and begin therapy. The Therapy screen will appear, which will show the current pressure setting being delivered (example shown below).

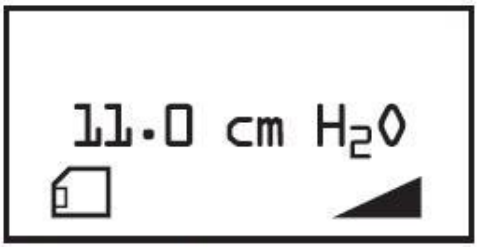


FIGURE 4-3: THERAPY SCREEN

4. Press the wheel again to turn off therapy and return to the Home screen.

4.2 NAVIGATING THE DEVICE SCREENS

In either User Mode or Provider Mode, turn the UI Knob wheel to toggle between options and settings on the screen. Press the UI Knob to choose an option or setting that is highlighted. If you choose "Back" on any screen, it will take you back to the previous screen.

NOTE

- *The screens shown throughout this manual are examples only. Actual screens may vary slightly.*
- *Your device will either display in text mode (English only) or icon mode.*

4.3 USER AND PROVIDER MODES

The PR System One 60 Series REMstar and BiPAP devices are equipped with the following control modes:

- User Mode - The parameters that can be modified by the patient are limited.
- Provider Mode - used by Home Care Professionals to set the device's parameters for the patient's needs.

4.3.1 USER MODE

From the Home screen, highlight the “Setup” option and press the UI Knob. The following Setup screen will appear. The user can change settings in the Setup menu.

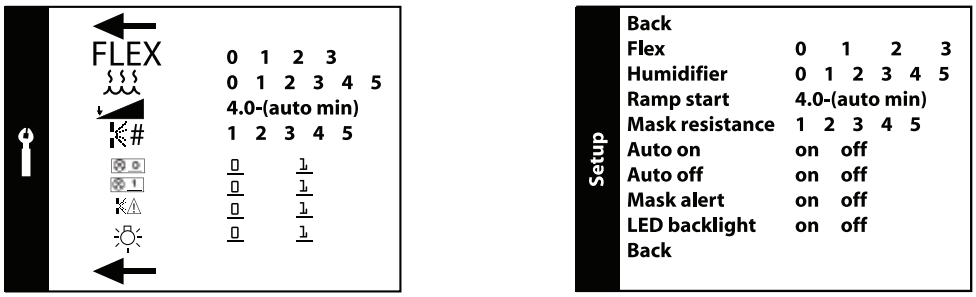


FIGURE 4-4: SETUP SCREEN

NOTE

- *The screen will only show 4 lines at a time. As you rotate the UI Knob to toggle over different options the screen will slide up and down accordingly.*
- *For additional information on User Mode, refer to the appropriate PR System One REMstar and/or BiPAP device User Manual.*

4.3.2 PROVIDER MODE

Accessing provider mode unlocks settings that cannot be modified by the user. To access provider mode:

1. Supply power to the device. First, plug the socket end of the AC power cord into the power supply. Then plug the pronged end of the AC power cord into an electrical outlet that is not controlled by a wall switch. Finally, plug the power supply cord’s connector into the power inlet on the back of the device.
2. Once the device is powered, the Home screen appears, shown below. Turn the control wheel to toggle between the four options and highlight “Setup” or the icon.

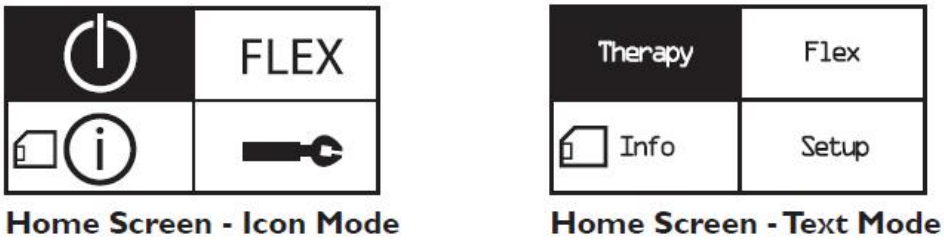
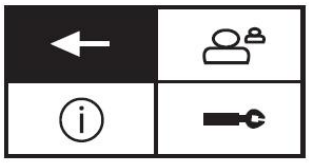


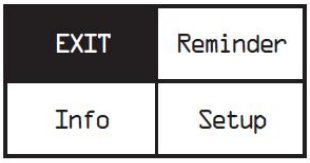
FIGURE 4-5: HOME SCREEN

3. Once “Setup” or the icon is highlighted, press and hold both the control wheel and the Ramp button on the device for at least five (5) seconds.

4. You will hear a quick double beep and the Provider mode screen will appear. You are now in provider mode and can modify the various settings.



Provider Screen - Icon Mode



Provider Screen - Text Mode

FIGURE 4-6: PROVIDER SCREEN

4.3.1 NAVIGATING THE PROVIDER MODE SCREENS

To navigate these display screens, turn the control wheel to toggle between options and settings on the screen. Press the control wheel to choose an option or setting that is highlighted. If you choose “Back” or the icon on any screen, it will take you back to the previous screen.

NOTE

- *Choosing “EXIT” or the icon from the Provider screen will exit provider mode and the device will return to the Home screen in the patient mode.*
- *Provider mode will time out after one (1) minute of inactivity and automatically exit the provider mode and return to the Home screen in the patient mode.*

4.3.2 PROVIDER MODE SCREEN DESCRIPTIONS

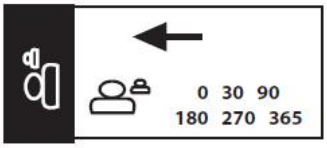
The following sections will describe the options available under the 3 choices from the Provider screen (Reminder, Setup, and Info).

NOTE

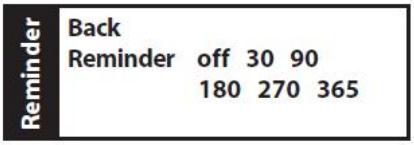
The descriptions provided in the following sub-sections may vary, depending on which device you have. Depending on the device you have, some screens may be present on the device and may not be described below. Refer to the appropriate provider guide for additional information.

Reminder Screen

From the Provider screen, highlight “Reminder” or the icon and press the control wheel. The following Reminder screen will appear.



Reminder Screen - Icon Mode



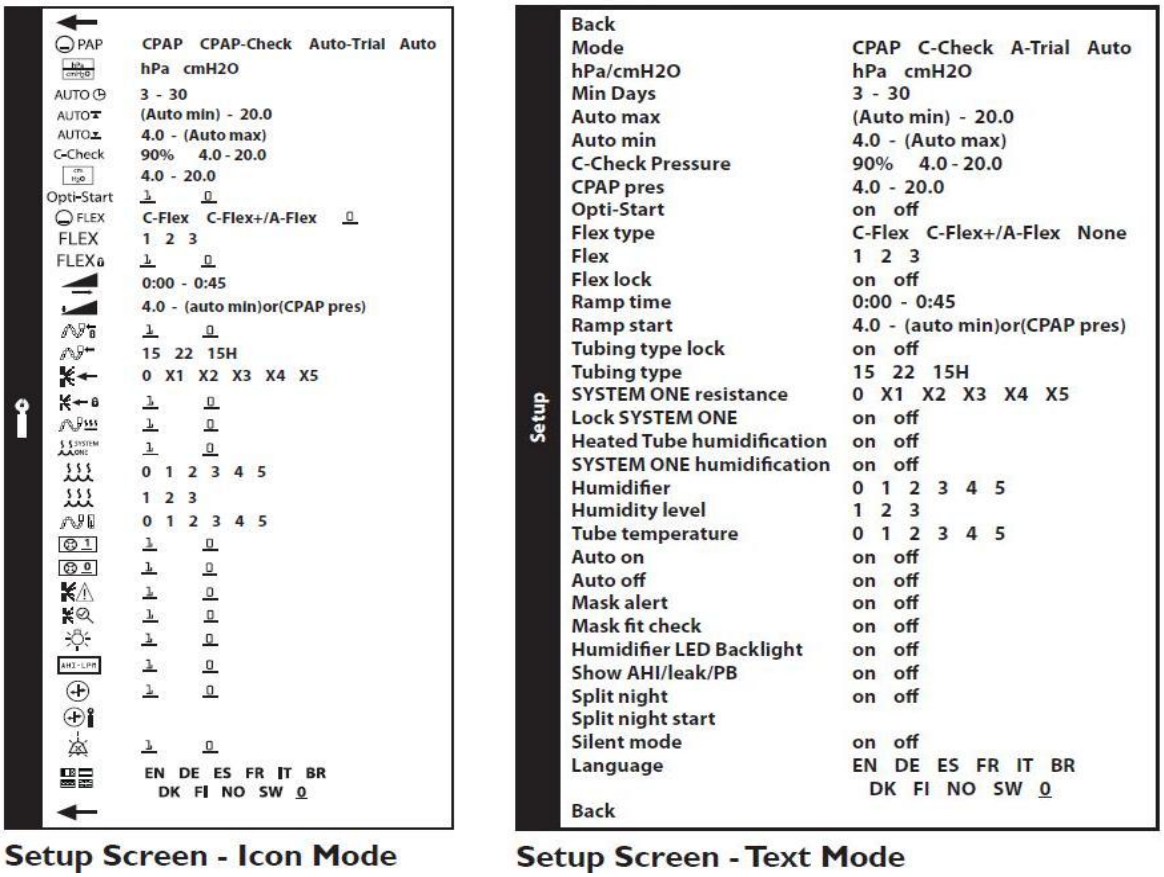
Reminder Screen - Text Mode

FIGURE 4-7: REMINDER SCREEN

You can set a reminder on this screen that will let patients know when it is time to perform a certain task, such as replacing the mask. You can select one of the following settings: 0 (Off - no reminder is set), or you can set the device to display a reminder after 90, 180, 270, or 365 days.

Setup Screen

From the Provider screen, highlight “Setup” or the icon and press the control wheel. The following Setup screen will appear.



Setup Screen - Icon Mode **Setup Screen - Text Mode**

FIGURE 4-8: SETUP SCREEN

NOTE

The screen will only show a few lines at a time. As you rotate the control wheel to toggle over different options the screen will slide up and down accordingly. If the text is too long to completely fit on the screen, it will scroll horizontally across the screen when highlighted.

Mode

This screen displays the therapy mode setting.

NOTE

The menu options will vary depending on which therapy mode is selected.

hPa/cmH2O

If enabled on your device, you will have the option to choose the units of pressure that are displayed. You can choose between “cm H_2O” or “hPa”.

Min Days

This screen allows you to adjust the duration of the Auto-Trial mode (not available on all devices) in number of days. You can set this from three (3) to 30 days. The default is seven (7) days. This screen only displays if Auto-Trial mode is available and enabled.

Auto max

This screen allows you to modify the Auto maximum pressure setting. You can adjust this setting from the Auto minimum pressure setting to 20 cm H_2O. This screen only displays if Auto-CPAP mode is enabled or if Auto-Trial mode is available and enabled.

Auto min

This screen allows you to modify the Auto minimum pressure setting. You can adjust this setting from 4 cm H2O to the Auto maximum pressure setting. This screen only displays if Auto-CPAP mode is enabled or if Auto-Trial mode is available and enabled.

C-Check Pressure

This screen allows you to adjust the CPAP-Check mode starting pressure. If Auto-Trial mode was used, you can choose the 90% pressure setting determined from the Auto-Trial mode, or you can adjust this setting from 4 to 20 cm H2O. If the Auto-Trial mode was not used, this screen allows you to only adjust the pressure setting from 4 to 20 cm H2O. This screen only displays if CPAP-Check mode is available and enabled.

Pressure (pres)

This screen displays the current pressure setting. You can adjust the setting from 4 cm H2O to 20 cm H2O. This screen only displays if CPAP mode is enabled.

Opti-Start

You can enable (1) or disable (0) this setting. This feature determines the optimal start pressure for patient therapy when using the Auto-CPAP therapy mode. The device automatically adjusts the starting pressure after every 30 hours of Auto-CPAP therapy to the optimal set point based on the 90% pressure level. This screen only displays if Auto-CPAP mode is enabled.

Flex type

This screen displays the comfort mode setting.

Flex

You can modify the Flex setting (1, 2 or 3) on this screen if you enabled Flex. The setting of “1” provides a small amount of pressure relief, with higher numbers providing additional relief.

NOTE

The patient also has access to this setting, if Flex lock is off.

Flex lock

This enables you to lock the Flex setting if you do not want the patient to change it. “1” turns the lock “on” and “0” turns the lock “off”.

Ramp time

When you set the Ramp time, the device increases the therapy pressure from the value set on the Ramp start screen to the therapy pressure setting over the length of time specified here. If the therapy pressure is set to 4 cm H_2O (the minimum setting), this screen will not display.

Ramp start

NOTE

If the Ramp time is set to "0", Ramp start will not display

This displays the Ramp starting pressure. You can increase or decrease the Ramp starting pressure in 0.5 cm H_2O increments. This is only available if Ramp time has been set to >0 and therapy pressure >4 cm H_2O. This will not display if your provider enabled Split night on your device.

Tubing type lock

This enables you to lock the Tubing type setting for either the 15 mm or the 22 mm tubing if you do not want the patient to change it. "1" turns the lock "on" and "0" turns the lock "off".

Tubing type

This setting allows you to select the correct size diameter tubing that you are using with the device. You can choose either (22) for the Philips Respironics 22 mm tubing, or (15) for the optional Philips Respironics 15 mm tubing. When using Heated Tubing, the device will automatically change this setting to the appropriate tubing type (15H).

SYSTEM ONE resistance

This setting allows you to adjust the level of air pressure relief based on the specific Philips Respironics mask. Each Philips Respironics mask may have a "System One" resistance control setting. System One resistance compensation can be turned off by choosing the setting "0".

Lock SYSTEM ONE

This enables you to lock the "System One" resistance control setting if you do not want the patient to change it. "1" turns the lock "on" and "0" turns the lock "off".

Heated Tube humidification

This setting will only display if you are using the heated tube. You can enable (1) or disable (0) this feature.

SYSTEM ONE humidification

System One humidity control maintains a consistent mask humidity by monitoring and adjusting for changes in room temperature and room humidity. You can enable (1) or disable (0) this feature. If the System One humidity control has been disabled, the classic style of basic temperature controlled heated humidification will be used. This will only display if the humidifier is attached.

Humidifier

This setting allows you to choose the desired humidity setting: 0, 1, 2, 3, 4 or 5. If the System One humidity control has been disabled, the classic style of basic temperature controlled heated humidification will be used and the display will show: 0, C1, C2, C3, C4 or C5 for these settings. This will only display if the humidifier is attached. Please refer to the humidifier manual if using a humidifier.

Humidity level

This setting will only display if you are using the heated tube. This setting allows you to choose the desired humidity setting for the humidifier: 1, 2 or 3. This setting can only be changed from the Setup screen.

Tube temperature

This setting will only display if you are using the heated tube. This setting allows you to choose the desired temperature for the heated tube: 0, 1, 2, 3, 4 or 5. If you choose zero (0), this will turn off both the humidifier and the heated tube.

Auto on (not available on all devices)

You can enable (1) or disable (0) this feature if you want the device to automatically turn the airflow on whenever the patient applies the interface (mask) to their airway.

Auto off

You can enable (1) or disable (0) this feature if you want the device to automatically turn the airflow off whenever the patient removes the interface (mask) from their airway.

Mask alert

You can enable (1) or disable (0) the mask alert setting. If this feature is enabled, the mask alert will appear on the display screen when a significant mask leak is detected, and an audible alert will sound.

Mask fit check

You can enable (1) or disable (0) the mask fit check setting. This feature allows the patient to check the fit of their mask prior to starting therapy. This is done by measuring the amount of leak in the patient circuit. This screen only displays depending on the which mode is enabled.

NOTE

If Split-night is enabled, Mask Fit Check will be disabled.

Humidifier LED backlight (Ramp backlight)

You can enable (1) or disable (0) the LED backlight for the humidifier number settings and Ramp button on the device.

NOTE

If the Humidifier LED Backlight is enabled or disabled, the humidifier icon will always remain on (if humidifier is attached and heat is being applied), but will dim after 30 seconds of inactivity.

Show AHI/leak/PB

You can select whether or not the Apnea/Hypopnea index, System Leak averages, and Periodic Breathing averages are displayed on the Patient Info screens. “1” turns this option “on” and “0” turns this option “off”.

Split night

You can enable (1) or disable (0) Split Night on this screen, which splits the therapy throughout the night, first in CPAP therapy before switching to Auto-CPAP therapy. This screen only displays depending on the enabled mode.

NOTE

If Split night is enabled, Ramp start will be disabled.

Split night start

You can modify the Split night settings on this screen as follows.

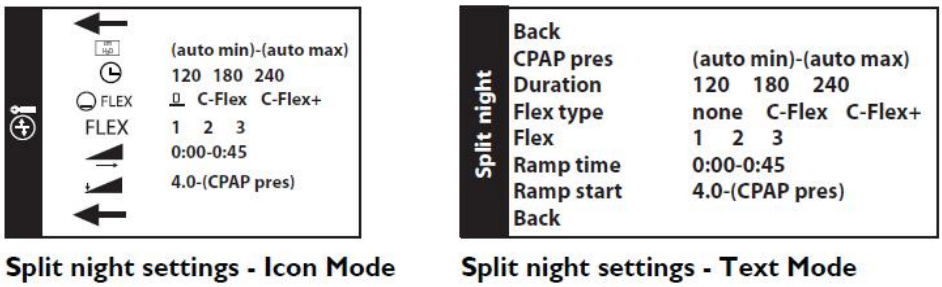


FIGURE 4-9: SPLIT-NIGHT SCREEN

You can adjust the duration, which is the amount of time spent in PAP therapy before switching to Auto-PAP therapy. You can set it to 120, 180, or 240 minutes. You can also adjust the PAP pressure, Flex type, Flex setting, Ramp time, and Ramp starting pressure from this screen. This screen only displays if Split night is enabled and Auto-CPAP mode is enabled.

Silent mode

You can disable (0) this feature if you want the device to emit an audible indicator (beep) during the following device operations: power on, therapy start, therapy stop, mask fit check, and humidifier preheat mode. The device defaults to the Silent mode being enabled (1), meaning the device does not emit a beep during these operations. The patient also has access to this feature.

Language

This feature allows you to choose which language to display on the interface when in “Text mode”. The following languages may be available on your device: English (EN), German (DE), Spanish (ES), French (FR), Italian (IT), Brazilian Portuguese (BR), Danish (DK), Finnish (FI), Norwegian (NO), or Swedish (SW). You can also turn off (0) text mode which means the device will display the “Icon Mode” on the interface.

Info Screen

From the Provider screen, highlight “Info” or the icon and press the control wheel. The following Info screen will appear.

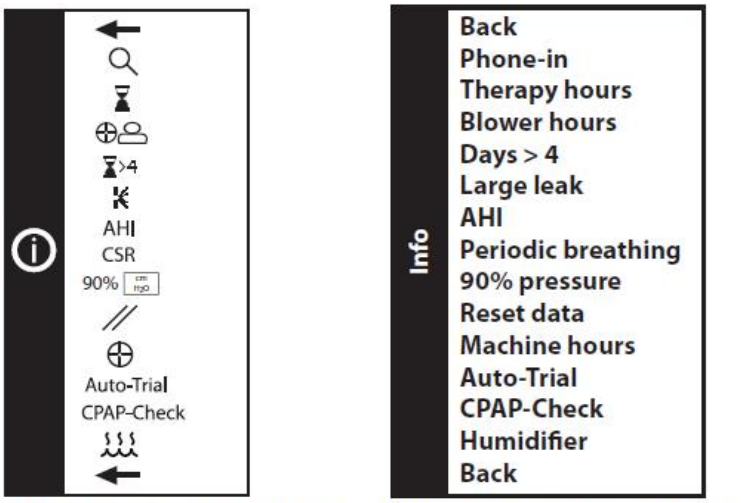


FIGURE 4-10: INFO SCREEN

Phone-in

This screen displays the total therapy hours for the device, the total blower hours, and the total number of days used when the sessions were greater than four (4) hours since the device was last reset. This screen also displays a compliance check number you can use to validate that the data provided to you is the data taken from this screen.

Therapy hours

The device is capable of recognizing the difference between the time the patient is actually receiving therapy and the time when the blower is simply running. This screen displays the amount of time the patient is actually receiving therapy on the device for the most recent one (1) day time frame. It also displays the average amount of time the patient is actually receiving therapy on the device over a seven (7) day and a 30 day time frame (provided the device has at least seven [7] or 30 days of data respectively). If the device has only five (5) days of data to use for the calculation, the five (5) day average value will be seen under the seven (7) day display.

Blower hours

This screen displays the number of hours that the blower has been active over the life of the device.

Days > 4

This screen displays the cumulative number of device therapy sessions that exceeded four (4) hours over a one (1) day, a seven (7) day, and a 30 day time frame.

Large leak During any given night, the device recognizes the percentage of time the patient was experiencing what it deemed to be a large leak. Large leak is defined as the level of leak that is so large, it is no longer possible to determine respiratory events with statistical accuracy. This screen displays the nightly value of percentage of time in large leak for the most recent one (1) day time frame. It also displays the average of these individual nightly values of percentage of time in large leak over a seven (7) day and a 30 day time frame (provided the device has at least seven (7) or 30 days of data respectively). If the device has only five (5) days of data to use for the calculation, the five (5) day average value will be seen under the seven (7) day display.

AHI

The device accumulates individual Apnea/Hypopnea indices (AHI) for each session the patient used the device. This screen displays the nightly AHI value for the most recent 1 day time frame. It also displays the average of these individual nightly AHI values over a seven (7) day and a 30 day time frame (provided the device has at least seven (7) or 30 days of data respectively). If the device has only five (5) days of data to use for the calculation, the five (5) day average value will be seen under the seven (7) day display.

Periodic Breathing

During any given night, the device recognizes the percentage of time the patient was experiencing periodic breathing. This screen displays the nightly value of periodic breathing for the most recent one (1) day time frame. It also displays the average of these individual nightly values of periodic breathing over a seven (7) day and a 30 day time frame (provided the device has at least seven (7) or 30 days of data respectively). If the device has only five (5) days of data to use for the calculation, the five (5) day average value will be seen under the seven (7) day display.

90% Pressure (90% cm H_2O)

During any given night, the device recognizes the 90% Pressure achieved by the Auto Algorithm. 90% Pressure is defined as the pressure at which the device spent 90% of the session time at or below. For example, if the device recognized airflow for 10 hours, and nine (9) hours were spent at or below 11 cm H_2O, and 1 hour was spent above 11 cm H_2O, then the 90% Pressure would be 11 cm H_2O. This screen displays the nightly value of 90% Pressure for the most recent one (1) day time frame. It also displays the average of these individual nightly values of 90% Pressure over a seven (7) day and a 30 day time frame (provided the device has at least seven (7) or 30 days of data respectively). If the device has only five (5) days of data to use for the

calculation, the five (5) day average value will be seen under the seven (7) day display. This screen only displays if the device on the set therapy mode.

Reset data

This screen allows you to erase all seven (7) and 30 day averages, compliance data, therapy hours and patient information on the device. Make sure that “Reset data” is highlighted on the info screen. Press and hold both the control wheel and the Ramp button for at least five (5) seconds. The device will beep once signifying that the data has been reset.

NOTE

Machine hours are not erased. The SD card is not erased.

Machine hours

This screen displays the amount of time that the machine has been active over the life of the device.

NOTE

Therapy hours and blower hours can be reset for new patients. Machine hours are not erased.

Auto-Trial

If Auto-Trial mode is available and enabled, this screen displays Days: xx/xx (where xx/xx is the number of accumulated trial days / number of selected trial days).

CPAP-Check

If CPAP-Check mode is available and enabled, this screen will either display XX.X (where XX.X is the CPAP-Check Pressure) or 90%(XX.X) (where XX.X is the 90% pressure level, if already established by Auto-Trial mode). This screen will also display xx/30 (where xx is the number of Hours Used / 30 Hours).

Humidifier

This screen will display 3 settings: power supply (either the 60W or 80W), tubing type, and either humidifier or tube temperature setting (if using).

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CHAPTER 5: TROUBLESHOOTING AND ERROR CODES

5.0 INTRODUCTION

This section provides instructions for viewing and clearing the PR System One 60 Series REMstar and BiPAP devices' error log as well as a description of the error codes.

5.1 TROUBLESHOOTING

Attempt to verify problem by:

- Visually inspecting the device,
- Operating the device and observing the device's behavior, and
- Using a manometer to verify the pressure.

5.2 READING THE DEVICE'S ERROR LOG

Error codes can be viewed on a PC using *Service Center Tools Suite 3.2* (or greater). Refer to Chapter 1 of this Service Manual for additional information on connecting the device to a PC and downloading software.

To read the device's error log, perform the following:

1. Connect the device to a PC. Refer to Chapter 1 for information on connecting the device to a PC.
2. Apply power to the device.
3. Open *Service Center Tools* from the Windows Start menu.

FIGURE 5-1: START MENU

4. Select *Read Error Log* from the drop-down menu.

FIGURE 5-2: SERVICE CENTER TOOLS

5. The device's stored error codes will be displayed on the PC monitor.

5.3 CLEARING THE DEVICE'S ERROR LOG

To clear the device's error log, perform the following:

1. Connect the device to a PC. Refer to Chapter 1 for information on connecting the device to a PC.
2. Apply power to the device.
3. Open *Service Center Tools* from the Windows Start menu.
4. Select *Clear Error Codes* from the drop-down menu.
5. Verify that a "Error Log Cleared" confirmation window appears.

5.4 ERROR CODES

The four Error Types are described as follows:

ERROR TYPE	DESCRIPTION
STOP	*The error information is recorded in NVRAM and the unit is placed into Safe State. The only functionality available to the user is serial communication, turning off the audible alarm via a key press and removing power.*
REBOOT	*The error information is recorded in NVRAM and the unit is rebooted. This error is promoted to a STOP level error by use of the Verbose Mode configuration flag.*
CONTINUE	*The error information is recorded in NVRAM and the unit continues to operate without noticeable alteration. This error is promoted to a STOP level error by use of the Verbose Mode configuration flag.*

ERROR TYPE	DESCRIPTION
LOG_ONLY	*The error information is recorded in NVRAM and the unit continues to operate without noticeable alteration. This error is not promoted to a STOP level error by use of the Verbose Mode configuration flag.*

The following table lists the error codes for the PR System One REMstar and BiPAP Sleep Therapy devices.

ERROR CODE	DESCRIPTION	TYPE	CORRECTIVE ACTION
General Errors			
E-1	*ERR_SOFTWARE_STOP*	*STOP*	*Replace Therapy PCA*
E-2	*Not Used*		
E-3	*ERR_INT_RAM*	*REBOOT*	*Replace Therapy PCA*
E-4	*ERR_NULL_PTR*	*REBOOT*	*Replace Therapy PCA*
E-5	*ERR_DATA*	*REBOOT*	*Replace Therapy PCA*
E-6	*ERR_STATE_MACHINE*	*REBOOT*	*Replace Therapy PCA*
E-7	*ERR_SOFTWARE*	*REBOOT*	*Replace Therapy PCA*
E-8	*Not Used*		
E-9	*Not Used*		
Watchdog and Timer Errors			
E-10	*ERR_WDOG_TEST_RAM*	*REBOOT*	*Replace Therapy PCA*
E-11	*ERR_WDOG_TEST*	*REBOOT*	*Replace Therapy PCA*
E-12	*ERR_BACKGROUND_WDOG_NO_CARD*	*REBOOT*	*Replace Therapy PCA*
E-13	*ERR_BACKGROUND_WDOG_SD_CARD*	*REBOOT*	*Replace Therapy PCA*
E-14	*ERR_WDOG_LOWRES_TIMER*	*REBOOT*	*Replace Therapy PCA*
E-15	*ERR_CYCLE_HANDLER_OVERRUN*	*REBOOT*	*Replace Therapy PCA*
E-16	*ERR_RASP_RESTORE_TIMEOUT*	*CONTINUE*	*Replace Therapy PCA*
E-17	*ERR_ONEMS_HANDLER_OVERRUN*	*REBOOT*	*Replace Therapy PCA*
E-18	*Not Used*		
E-19	*ERR_WDOG_TIMEOUT*	*REBOOT*	*Clear Error Log and Retest*
Motor/Blower Errors			

ERROR CODE	DESCRIPTION	TYPE	CORRECTIVE ACTION
E-20	*ERR_MOTOR_SPINUP_FLUX_LOW*	*REBOOT*	• *Reseat Blower Connectors* • *Replace Blower Assy* • *Replace Therapy PCA*
E-21	*ERR_MOTOR_VBUS_HIGH*	*STOP*	*Replace Therapy PCA*
E-22	*ERR_MOTOR_FLUX_MAGNITUDE*	*REBOOT*	• *Reseat Blower Connectors* • *Replace Blower Assy* • *Replace Therapy PCA*
E-23	*ERR_MOTOR_OVERSPEED*	*REBOOT*	• *Reseat Blower Connectors* • *Replace Blower Assy* • *Replace Therapy PCA*
E-24	*ERR_MOTOR_SPEED_REVERSE*	*REBOOT*	• *Reseat Blower Connectors* • *Replace Blower Assy* • *Replace Therapy PCA*
E-25	*ERR_MOTOR_THERMISTOR_OPEN*	*CONTINUE*	• *Reseat Blower Connectors* • *Replace Blower Assy* • *Replace Therapy PCA*
E-26	*ERR_MOTOR_THERMISTOR_SHORTED*	*CONTINUE*	• *Reseat Blower Connectors* • *Replace Blower Assy* • *Replace Therapy PCA*
E-27	*ERR_MOTOR_RL_NOCONVERGE*	*STOP*	• *Reseat Blower Connectors* • *Replace Blower Assy* • *Replace Therapy PCA*

ERROR CODE	DESCRIPTION	TYPE	CORRECTIVE ACTION
E-28	*ERR_NEGATIVE_QUADRATURE_VOLTAGE_VECTOR*	*REBOOT*	• *Reseat Blower Connectors* • *Replace Blower Assy* • *Replace Therapy PCA*
E-29	*ERR_VBUS_GAIN_ZERO:*	*REBOOT*	*Replace Therapy PCA*
E-30	*ERR_MOTOR_SPINUP_FLUX_HIGH*	*REBOOT*	• *Reseat Blower Connectors* • *Replace Blower Assy* • *Replace Therapy PCA*
E-31	*Not Used*		*N/A*
E-32	*Not Used*		*N/A*
E-33	*Not Used*		*N/A*
E-34	*Not Used*		*N/A*
E-35	*Not Used*		*N/A*
E-36	*Not Used*		*N/A*
E-37	*Not Used*		*N/A*
E-38	*Not Used*		*N/A*
E-39	*Not Used*		*N/A*
NVRAM Low Level Errors			
E-40	*ERR_NVRAM*	*REBOOT*	*Replace Therapy PCA*
E-41	*ERR_STORAGE_UNIT_RAM*	*REBOOT*	*Replace Therapy PCA*
E-42	*ERR_UNABLE_TO_OBTAIN_BUS*	*REBOOT*	*Replace Therapy PCA*
E-43	*ERR_NVRAM_NO_CALLBACK_OCCURED*	*REBOOT*	*Replace Therapy PCA*
E-44	*ERR_NV_BUFFER_NULL*	*REBOOT*	*Replace Therapy PCA*
E-45	*ERR_NV_CALLBACK_NULL*	*REBOOT*	*Replace Therapy PCA*
E-46	*ERR_NV_ZERO_LENGTH*	*REBOOT*	*Replace Therapy PCA*
E-47	*ERR_NVRAM_INVALID_BYTES_XFRRED*	*REBOOT*	*Replace Therapy PCA*
E-48	*Not Used*		*N/A*
E-49	*Not Used*		*N/A*
NVRAM Unit Related Errors			

ERROR CODE	DESCRIPTION	TYPE	CORRECTIVE ACTION
E-50	ERR_DAILY_VALUES_CORRUPT	LOG_ONLY	Replace Therapy PCA
E-51	ERR_CORRUPT_COMPLIANCE_LOG	CONTINUE	Replace Therapy PCA
E-52	ERR_CORRUPT_COMPLIANCE_CB	CONTINUE	Replace Therapy PCA
E-53	ERR_COMP_LOG_SEM_TIMEOUT	CONTINUE	Replace Therapy PCA
E-54	ERR_COMPLOG_REQS_OVERFLOW	REBOOT	Replace Therapy PCA
E-55	ERR_THERAPY_QUEUE_FULL	CONTINUE	Replace Therapy PCA
E-56	ERR_COMPLOG_PACKET_STATUS	REBOOT	Replace Therapy PCA
E-57	ERR_SESS_OBS_QUEUE_OVF	REBOOT	Replace Therapy PCA
E-58	ERR_SESS_OBS_NO_CALLBACK	REBOOT	Replace Therapy PCA
E-59	Not Used		N/A
General Hardware Errors			
E-60	ERR_UNSUPPORTED_HARDWARE	REBOOT	Replace Therapy PCA
E-61	ERR_PLL_UNLOCKED	REBOOT	Replace Therapy PCA
E-62	ERR_STUCK_RAMP_KEY	CONTINUE	• Verify proper installation/operation of the Ramp Button • Replace Therapy PCA
E-63	ERR_STUCK_KNOB_KEY	CONTINUE	• Verify proper installation/operation of the Top Enclosure. Replace Enclosure if necessary. • Replace Therapy PCA
E-64	ERR_DSP_OVERTIME_PWM	REBOOT	Replace Therapy PCA
E-65	ERR_STUCK_ENCODER_A	CONTINUE	• Clear Error Log and Retest • Replace Therapy PCA
E-66	ERR_STUCK_ENCODER_B	CONTINUE	• Clear Error Log and Retest • Replace Therapy PCA
E-67	Not Used		N/A

ERROR CODE	DESCRIPTION	TYPE	CORRECTIVE ACTION
E-68	*Not Used*		*N/A*
E-69	*Not Used*		*N/A*
	Pressure Sensor Errors		
E-70	*ERR_PRESSURE_SENSOR_ABSENT*	*STOP*	*Replace Therapy PCA*
E-71	*Not Used*		*N/A*
E-72	*ERR_PSENS_UNABLE_TO_OBTAIN_BUS*	*REBOOT*	*Replace Therapy PCA*
E-73	*ERR_SENSOR_PRESS_OFFSET_STOP*	*STOP*	*Replace Therapy PCA*
E-74	*Not Used*		*N/a*
E-75	*Not Used*		*N/A*
E-76	*Not Used*		*N/A*
E-77	*Not Used*		*N/A*
E-78	*Not Used*		*N/A*
E-79	*Not Used*		*N/A*
	Flow Sensor Errors		
E-80	*ERR_UNABLE_TO_INIT_FLOW_SENSOR*	*REBOOT*	*Rep al ce Therapy PCA*
E-81	*ERR__FLOW_SENSOR_TABLE*	*CONTINUE*	*Rep al ce Therapy PCA*
E-82	*ERR_FLOW_SENSOR_OFFSET*	*CONTINUE*	*Replace Therapy PCA*
E-83	*ERR_FSENS_UNABLE_TO_OBTAIN_BUS*	*REBOOT - Upon reboot, a second failure results in a STOP level error.*	*Replace Therapy PCA*
E-84	*ERR_FLOW_SENSOR_ STOP*	*STOP*	*Replace Therapy PCA*
E-85	*ERR_FLOW_SENSOR_OCCLUDED*	*CONTINUE*	*Replace Therapy PCA*
E-86	*ERR_FLOW_SENSOR_ABSENT*	*CONTINUE*	*Replace Therapy PCA*
E-87	*ERR_FLOW_SENSOR_BUS*	*CONTINUE*	*Replace Therapy PCA*
E-88	*Not Used*		*N/A*
E-89	*Not Used*		*N/A*
	OTP and RTC Errors		
E-90	*ERR_OTP_NOT_CONFIGURED*	*STOP*	*Replace Therapy PCA*

ERROR CODE	DESCRIPTION	TYPE	CORRECTIVE ACTION
E-91	ERR_OTP_INCORRECTLY_CONFIGURED	STOP	Replace Therapy PCA
E-92	Not Used		N/A
E-93	ERR_RTC_VALUE	CONTINUE	Clear Error Log, reset RTC, run-in and retest
E-94	ERR_RTC_STOPPED	CONTINUE	Replace Therapy PCA
E-95	Not Used		N/A
E-96	Not Used		N/A
E-97	Not Used		N/A
E-98	Not Used		N/A
E-99	Not Used		N/A
Humidifier Errors			
E-100	ERR_HUMID_NO_HEAT	CONTINUE	• Replace Heater Plate • Orientation/Replace Base Humidifier Cable • Replace Therapy PCA
E-101	ERR_HUMID_TEMP_MAX	STOP	• Replace Heater Plate • Replace Therapy PCA
E-102	ERR_THERMISTOR_HIGH	CONTINUE	• Replace Heater Plate • Replace Therapy PCA
E-103	ERR_THERMISTOR_LOW	CONTINUE	• Replace Heater Plate • Replace Therapy PCA
E-104	Not Used		N/A
E-105	ERR_HUMID_AMBIENT_COMM	CONTINUE	Replace Therapy PCA
E-106	HEATEDTUBE_TUBE_MAX_TEMP	CONTINUE	N/A
E-107	HEATEDTUBE_DISCONNECT	CONTINUE	N/A
E-108	HUMIDIFIER_DISCONNECT	CONTINUE	N/A
E-109	Not Used		N/A
Stack and Exception Handler Errors			

ERROR CODE	DESCRIPTION	TYPE	CORRECTIVE ACTION
E-110	*ERR_STACK*	*REBOOT*	*Replace Therapy PCA*
E-111	*ERR_EXCEPTION_STACK_OVERFLOW*	*REBOOT*	*Replace Therapy PCA*
E-112	*ERR_EXCEPTION_STACK_RESERVE*	*LOG_ONLY*	*Replace Therapy PCA*
E-113	*ERR_EXCEPTION_STACK_UNDERFLOW*	*REBOOT*	*Replace Therapy PCA*
E-114	*ERR_FIQ_STACK_OVERFLOW*	*REBOOT*	*Replace Therapy PCA*
E-115	*ERR_FIQ_STACK_RESERVE*	*LOG_ONLY*	*Replace Therapy PCA*
E-116	*ERR_FIQ_STACK_UNDERFLOW*	*REBOOT*	*Replace Therapy PCA*
E-117	*ERR_IRQ_STACK_OVERFLOW*	*REBOOT*	*Replace Therapy PCA*
E-118	*ERR_IRQ_STACK_RESERVE*	*LOG_ONLY*	*Replace Therapy PCA*
E-119	*ERR_IRQ_STACK_UNDERFLOW*	*REBOOT*	*Replace Therapy PCA*
E-120	*ERR_SVC_STACK_OVERFLOW*	*REBOOT*	*Replace Therapy PCA*
E-121	*ERR_SVC_STACK_RESERVE*	*LOG_ONLY*	*Replace Therapy PCA*
E-122	*ERR_SVC_STACK_UNDERFLOW*	*REBOOT*	*Replace Therapy PCA*
E-123	*ERR_DATA_ABORT_EXCEPTION*	*REBOOT*	*Replace Therapy PCA*
E-124	*ERR_PREFETCH_EXCEPTION*	*REBOOT*	*Replace Therapy PCA*
E-125	*ERR_ILLEGAL_INSTRUCTION_EXCEPTION*	*REBOOT*	*Replace Therapy PCA*
E-126	*ERR_SWI_ABORT_EXCEPTION*	*REBOOT*	*Replace Therapy PCA*

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CHAPTER 6: REPAIR & REPLACE

This Chapter identifies the names, locations, and replacement part (RP) kit numbers of the replaceable components in the PR System One 60 Series REMstar and BiPAP devices. Additionally, repair and replacement procedures are provided in this Chapter. If repair or replacement procedures are performed, the device must be run-in for approximately 20 minutes, and tested to verify its proper operation. Refer to Chapter 8 for Testing Procedures.

WARNING

To prevent electrical shock, disconnect the electrical supply before attempting to make any repairs to the PR System One 60 Series REMstar and BiPAP devices.

CAUTION

Electrical components used in this device are subject to damage from static electricity. Repairs made to this device must be performed only in an antistatic, Electro-Static Discharge (ESD) protected environment.

6.0 RP KITS (REMSTAR DEVICES)

	60 Series REM-star Plus with C-Flex	*60 Series REM-star Pro with C-Flex+*	*60 Series REMstar Auto with A-Flex*
1/4" Test Adapter (for run-in)	*332353*	*332353*	*332353*
Air Inlet Seal	*1080757*	*1080757*	*1080757*
Blower Assembly	*1080758*	*1080758*	*1080758*
Blower Cap	*1080759*	*1080759*	*1080759*
Blower Housing	*1064736*	*1064736*	*1064736*
Blower Outlet Bellows	*1064747*	*1064747*	*1064747*
Bottom Enclosure	*1099560*	*1099560*	*1099560*
Flow Manifold	*1064752*	*1064751*	*1064751*
Humidifier Base Cable	*1099563*	*1099563*	*1099563*
Link Module (with DB9F-DB9M cable)	*1074113*	*1074113*	*1074113*
Main PCA	*1096209*	*1096215*	*1096216*
O_2 Enrichment Attachment (for testing)	*312710*	*312710*	*312710*
Outside Panel	*1099578*	*1099578*	*1099578*
Power Supply (60 Watt)	*1091398*	*1091398*	*1091398*
Power Supply (80 Watt)	*1091399*	*1091399*	*1091399*
Ramp Button	*1064748*	*1064748*	*1064748*
Right Panel Assembly	*1103210*	*1099564*	*1099564*
SD Card Slot Cover	*1099591*	*1099591*	*1099591*
Side (Beauty) Cover	*1099592*	*1099592*	*1099592*
Sound Abatement Foam	*1080760*	*1080760*	*1080760*
Top Cover	*1103402*	*1100750* *1100578 (French)*	*1099579* *1099567 (H&L)* *1099580 (French)*
Torx Screwdriver Kit	*1040889*	*1040889*	*1040889*
UI Knob	*1099581*	*1099581*	*1099581*
Warning Label (Domestic U.S.)	*1099561*	*1099561*	*1099561*
Warning Label (International)	*1099562*	*1099562*	*1099562*

6.1 RP KITS (BIPAP DEVICES)

	60 Series BiPAP Pro	***60 Series BiPAP Auto***
Air Inlet Seal	*1080757*	*1080757*
Blower Assembly	*1080758*	*1080758*
Blower Cap	*1080759*	*1080759*
Blower Housing	*1064736*	*1064736*
Blower Outlet Bellows	*1064747*	*1064747*
Bottom Enclosure	*1099560*	*1099560*
Flow Manifold	*1064751*	*1064751*
Humidifier Base Cable	*1099563*	*1099563*
Link Module (with DB9F-DB9M cable)	*1074113*	*1074113*
Main PCA	*1096217*	*1096218*
Outside Panel	*1099578*	*1099578*
Power Supply (60 Watt)	*1091398*	*1091398*
Power Supply (80 Watt)	*1091399*	*1091399*
Ramp Button	*1064748*	*1064748*
Right Panel Assembly	*1099564*	*1099564*
SD Card Slot Cover	*1099591*	*1099591*
Side (Beauty) Cover	*1099592*	*1099592*
Sound Abatement Foam	*1080760*	*1080760*
Top Cover	*1099566*	*1099565*
Torx Screwdriver Kit	*1040889*	*1040889*
UI Knob	*1064787*	*1064787*
Warning Label (Domestic U.S.)	*1099561*	*1099561*
Warning Label (International)	*1099562*	*1099562*

6.2 REPLACEMENT INSTRUCTIONS

The following sections provide instructions for replacing components in the PRS1 60 Series devices.

6.2.1 REPLACING THE SD CARD SLOT COVER

Included in Kit	*Tools Required*
• *SD Card Slot Cover*	*Small flat blade screwdriver*

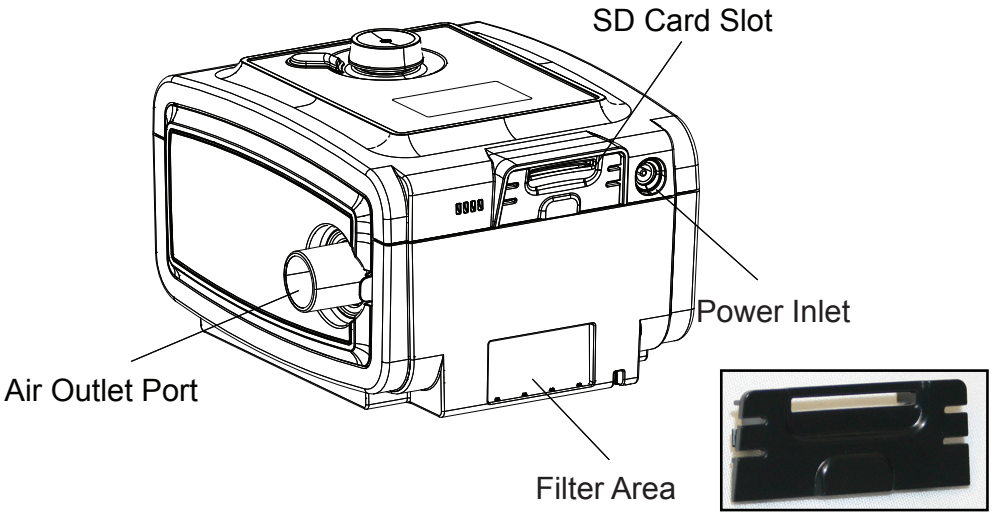


FIGURE 6-1: SD CARD SLOT COVER LOCATION

TO REMOVE THE SD CARD SLOT COVER:

- Refer to Figure 6-2.

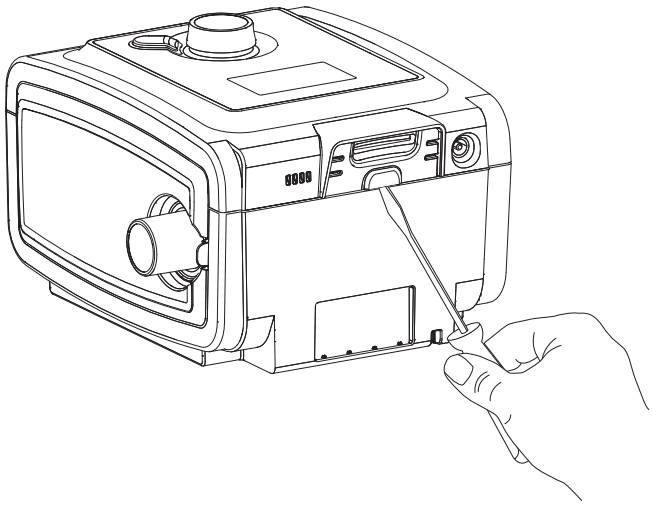


FIGURE 6-2: SD CARD SLOT COVER REMOVAL

TO INSTALL THE SD CARD SLOT COVER:

- Snap the SD Card Slot Cover into place on the back of the device.

6.2.2 REPLACING THE USER INTERFACE (UI) KNOB

Included in Kit	*Tools Required*
• *UI Knob*	*Small flat blade screwdriver*

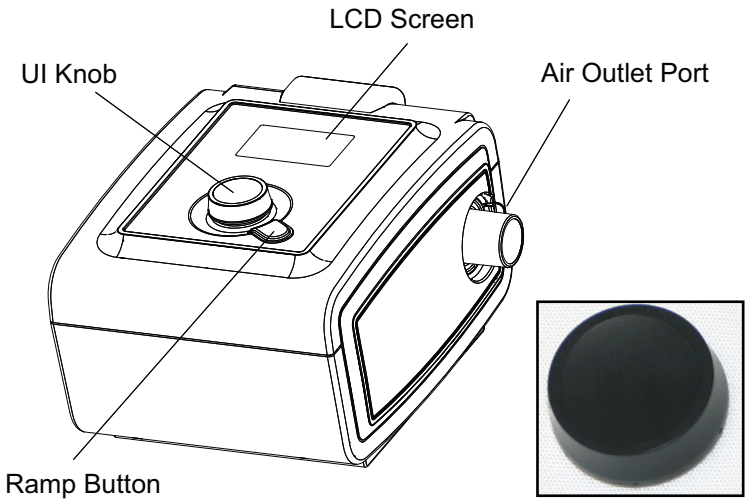


FIGURE 6-3: UI KNOB LOCATION

To remove the UI Knob:

- Pull the UI Knob straight up from the UI stem. A small flat blade screwdriver may be used to carefully pry the UI Knob from the device.

NOTE
A "D" clip is installed in the UI Knob.

To Install the UI Knob:

1. Verify that the "D" clip is installed in UI Knob.
2. Align the flat side of "D" clip with the flat side of the UI stem.
3. Press the UI Knob onto the UI stem.
4. Rotate the UI knob and verify that it is secure and rotates freely.

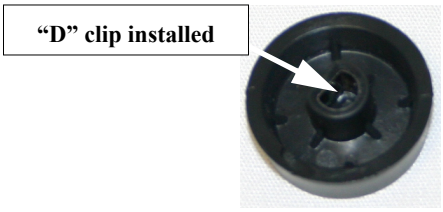


FIGURE 6-4: "D" CLIP IN UI KNOB

6.2.3 REPLACING THE SIDE (BEAUTY) COVER

Included in Kit	*Tools Required*
Side (Beauty) Cover	*None*

NOTE

The Side (Beauty) Cover is used when the System One Heated Humidifier is not present.

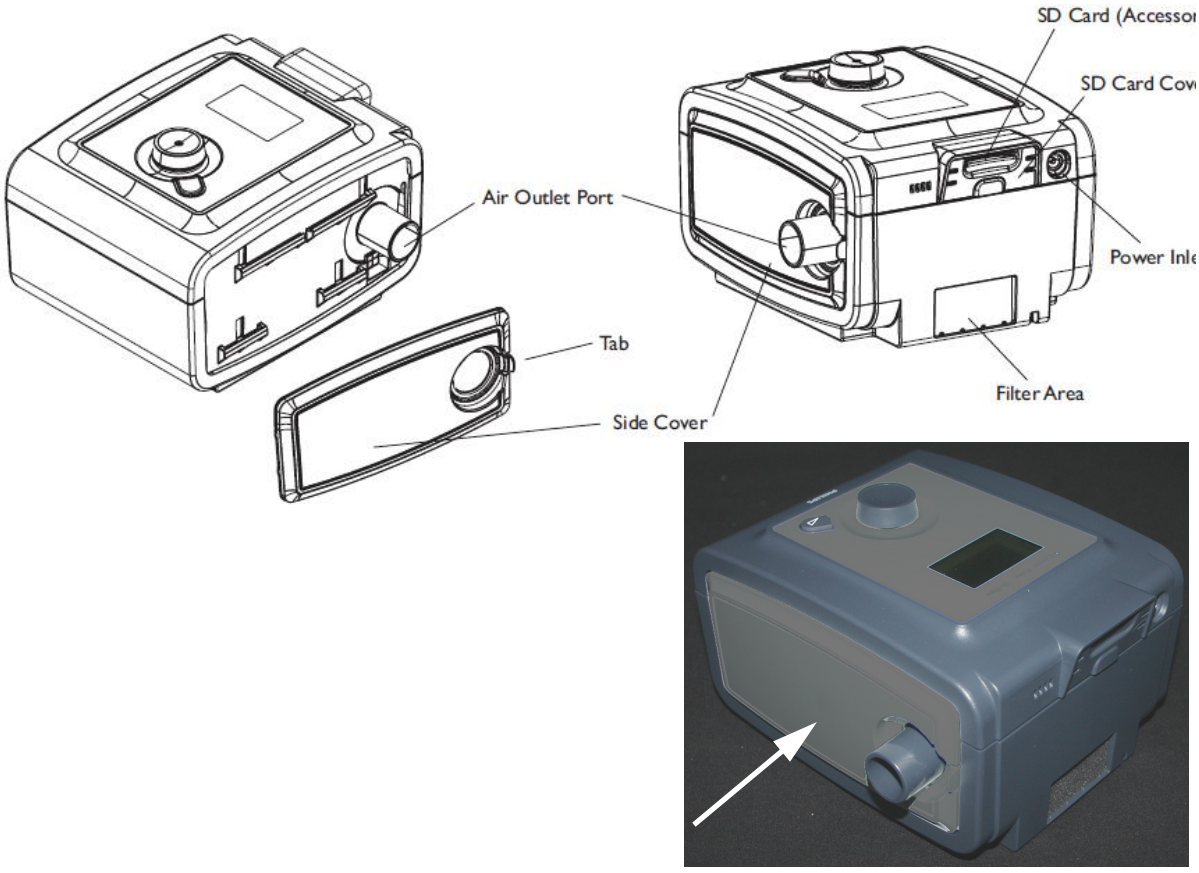


FIGURE 6-5: SIDE (BEAUTY) COVER

TO REMOVE THE SIDE (BEAUTY) COVER

1. Push the locking tab on the end of the Side (Beauty) Cover towards the device's Outlet Port.
2. Lift the Cover away from the device.

TO INSTALL THE SIDE (BEAUTY) COVER

1. Insert the Side (Beauty) Cover, support tabs at the front of the device first, into it's mounting location.
2. Press the Side (Beauty) Cover fully into place. Verify that the locking tab snaps and secures the cover.

6.2.4 REPLACING THE TOP COVER

Included in Kit	*Tools Required*
Top Cover	*T15 Torx screwdriver*

FIGURE 6-6: TOP COVER

TO REMOVE THE TOP COVER

1. Remove the UI Knob. Refer to Replacing the User Interface (UI) Knob.
2. Place the device on a protected work surface and carefully turn it over to expose its bottom.
3. Using a Torx T15 screwdriver, remove the two #6 x 1-3/4” screws that secure the Top Cover to the Bottom Enclosure. Refer to Figure 6-7.
4. While securely holding the device together, carefully return it to its upright position.
5. Lift the Top Cover away from the Bottom Enclosure. The SD Card Slot Cover is loosely installed in the Top Cover.
6. The Ramp Button has a tendency to remain in the Top Cover. If necessary, remove the Ramp Button from the Top Cover and maintain it for installation in the replacement Top Cover.

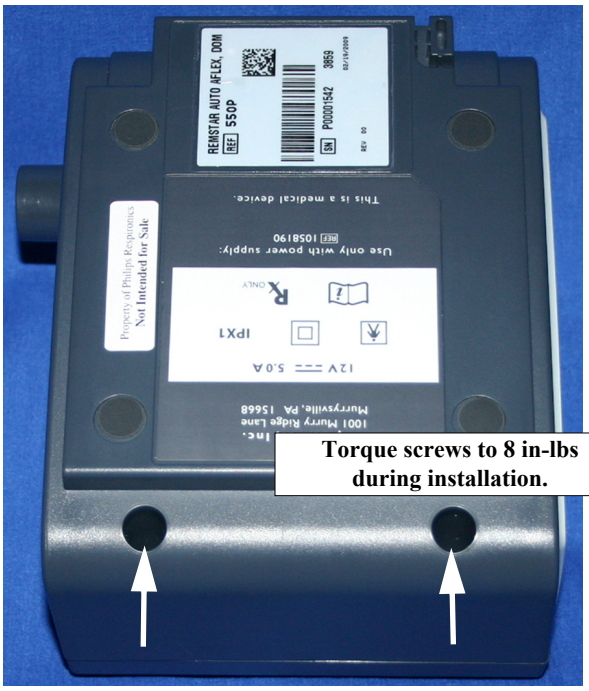


FIGURE 6-7: SCREW LOCATION

NOTE

The SD Card Slot Cover is loosely installed in the Top Cover. Use care when removing the Top Cover so as not to lose the SD Card Slot Cover.

To install the Top Cover:

1. Place the Top Cover onto the Bottom Enclosure.
2. Hold the device together and turn it over to expose its bottom.
3. Secure the Top Cover to the Bottom Enclosure using the two #6 X 1-3/4” screws. Torque screws to eight (8) in-lbs.
4. Assemble the remainder of the device as instructed in previous sections.

6.2.5 REPLACING THE RAMP BUTTON

Included in Kit	*Tools Required*
Ramp Button	*T15 Torx screwdriver*

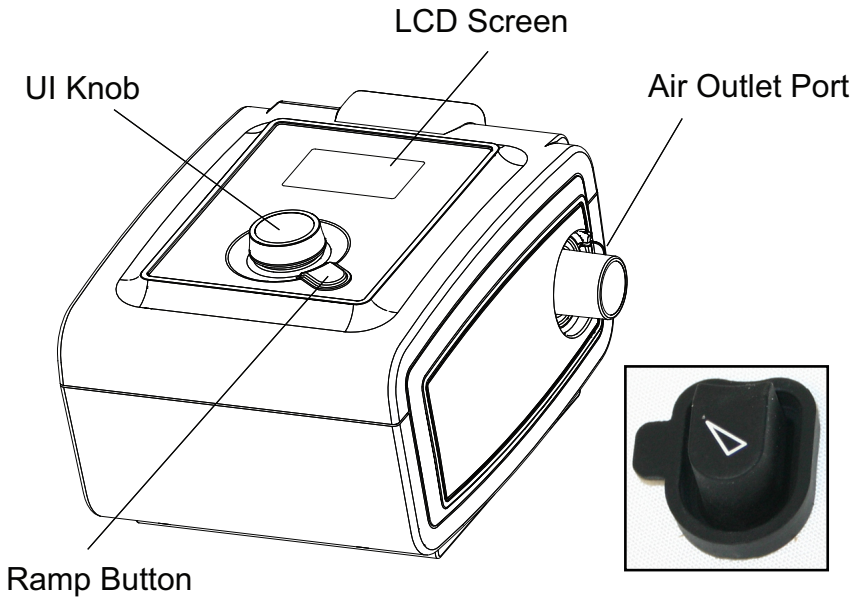


FIGURE 6-8: RAMP BUTTON

To remove the Ramp Button:

1. Remove the UI Knob. Refer to Replacing the User Interface (UI) Knob.
2. Remove the Top Cover. Refer to Replacing the Top Cover.
3. Remove the Ramp Button from the Top Cover.

To install the Ramp Button:

1. Place the Ramp Button in the Top Cover.
2. Assemble the remainder of the device as instructed in previous sections.

6.2.6 REPLACING THE OUTSIDE PANEL

Included in Kit	*Tools Required*
End Panel	*T15 Torx screwdriver*

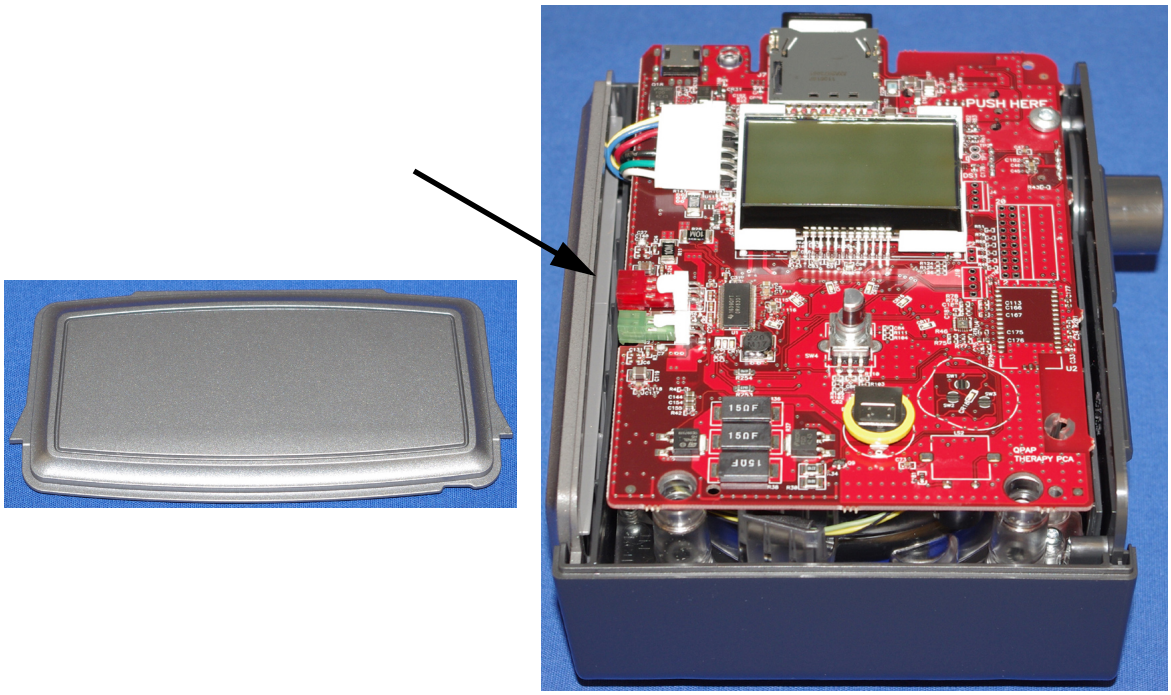


FIGURE 6-9: OUTSIDE PANEL

To remove the Outside Panel:

1. Remove the UI Knob. Refer to 6.2.2.
2. Remove the Top Cover. Refer to Replacing the Top Cover.
3. Slide the Outside Panel out of the Bottom Enclosure.

To Install the Outside Panel:

1. Slide the Outside Panel into the Bottom Enclosure.
2. Assemble the remainder of the device as instructed in previous sections.

6.2.7 REPLACING THE MAIN PCA

Included in Kit	Tools Required
Main PCA	T15 Torx screwdriver

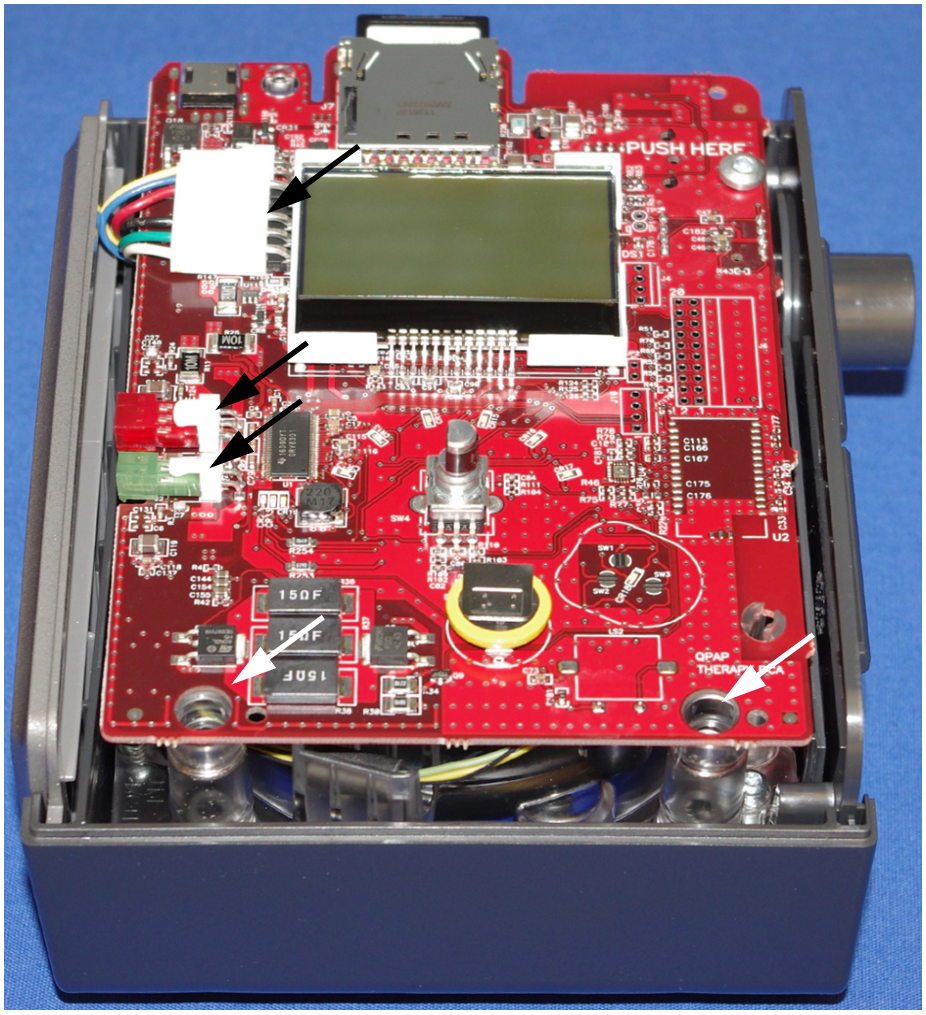


FIGURE 6-10: MAIN PCA

To remove the Main PCA:

1. Remove the UI Knob. Refer to Replacing the User Interface (UI) Knob.
2. Remove the Top Cover. Refer to Replacing the Top Cover.
3. Disconnect the wiring harnesses from the Main PCA. The wiring harnesses are indicated by black arrows in Figure 6-10.
4. Remove the screw that secures the Main PCA to the Right Side Panel.
5. Squeeze the standoffs, indicated by white arrows in Figure 6-10, to release the Main PCA from its mounting location in the Bottom Enclosure.
6. Lift the PCA out of the Bottom Enclosure.

To Install the Main PCA:

1. Place the PCA in the Bottom Enclosure. Be sure that the Flow and Pressure (if applicable) Sensors properly align with the Flow Manifold.

CAUTION

The PCA's Flow and Pressure Sensors must be in proper alignment with the Flow Manifold. Otherwise, the device will not operate properly.

NOTE

Model 26x do not include a Pressure Sensor.

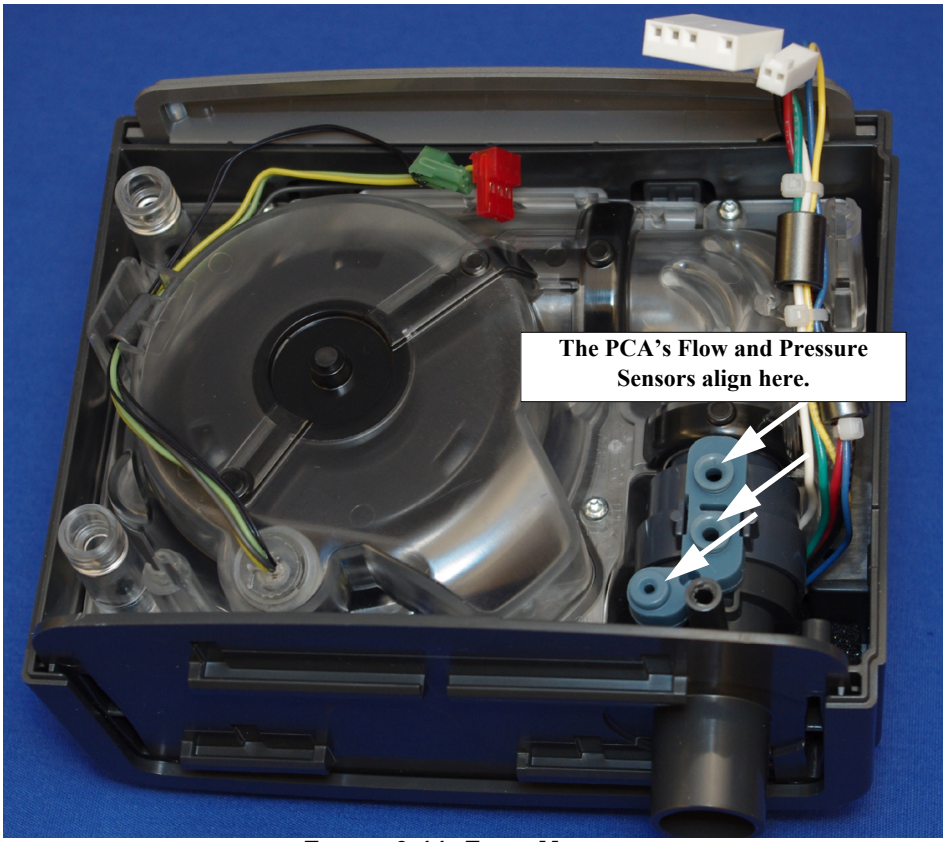


FIGURE 6-11: FLOW MANIFOLD

2. Connect the wiring harnesses to the PCA.

NOTE

Verify that the standoffs secure the PCA.

3. Assemble the remainder of the device as instructed in previous sections.

6.2.8 REPLACING THE BLOWER CAP

Included in Kit	*Tools Required*
• *Blower Cap* • *#4 x 1/2" screw (x7)*	• *T8 Torx screwdriver* • *T15 Torx screwdriver*

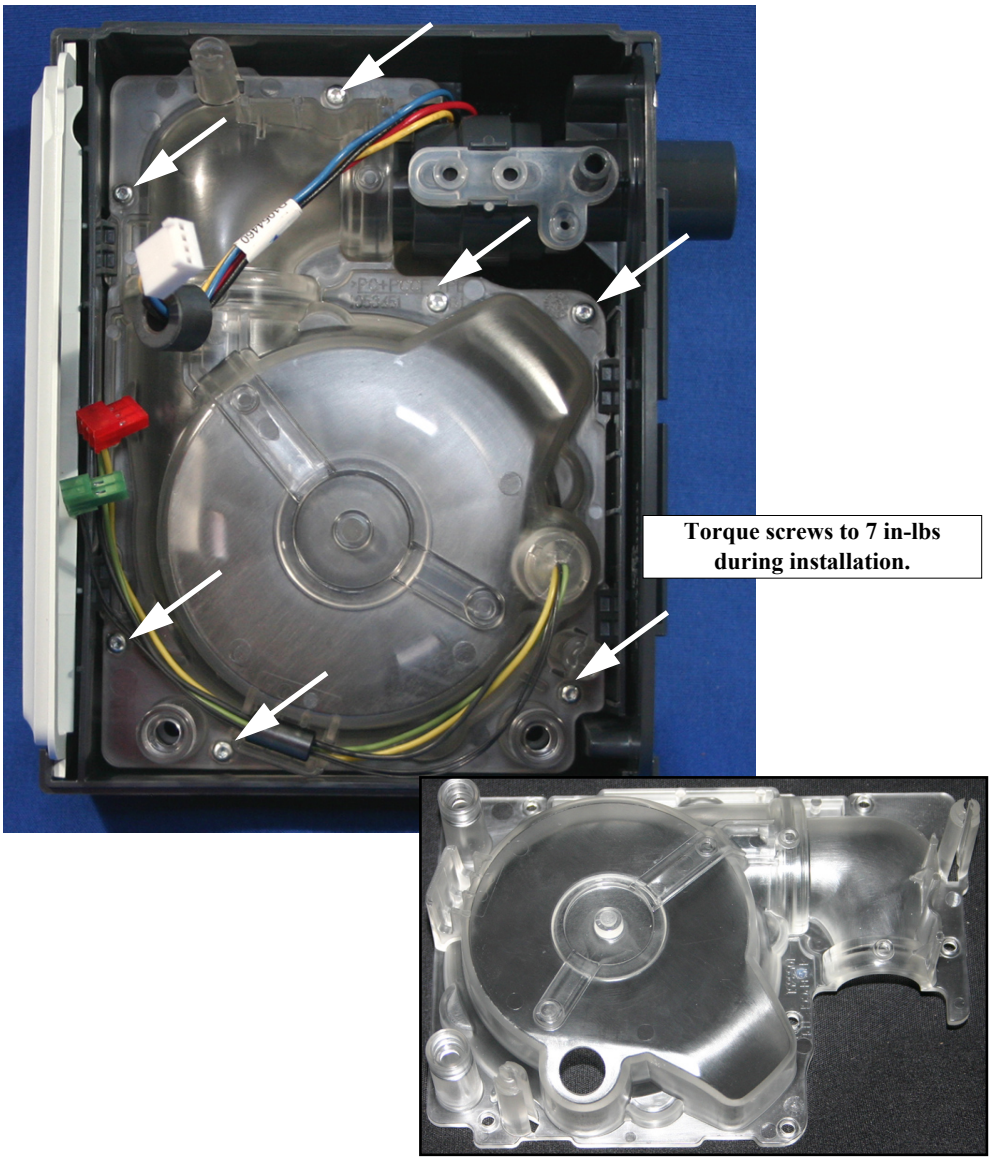


FIGURE 6-12: BLOWER CAP

To remove the Blower Cap:

1. Remove the UI Knob. Refer to section 6.2.2.
2. Remove the Top Cover. Refer to Replacing the Top Cover.
3. Remove the Main PCA. Refer to Replacing the Main PCA.

4. Using a T8 Torx screwdriver, remove the seven #4 x 1/2” screws that secure the Blower Cap to the Bottom Enclosure. The screws are indicated by the white arrows in Figure 6-12.
5. Push the grommet and the Blower wiring harness through its mounting hole in the Blower Cap.
6. Remove the Blower Cap from the Bottom Enclosure.

To install the Blower Cap:

1. Insert the Blower wiring harness and grommet through its mounting hole in the Blower Cap. Verify that the grommet seats properly in the hole.
2. Align the Blower Cap with the Blower Housing in the Bottom Enclosure.
3. Secure the Blower Cap to the Blower Housing using the seven #4 x 1/2” screws.
4. Assemble the remainder of the device as instructed in previous sections.

6.2.9 REPLACING THE BLOWER ASSEMBLY AND/OR THE BLOWER OUTLET BELLOWS

Included in Kit	*Tools Required*
• *Blower Assembly* • *Blower Outlet Bellows*	• *T8 Torx screwdriver* • *T15 Torx screwdriver*

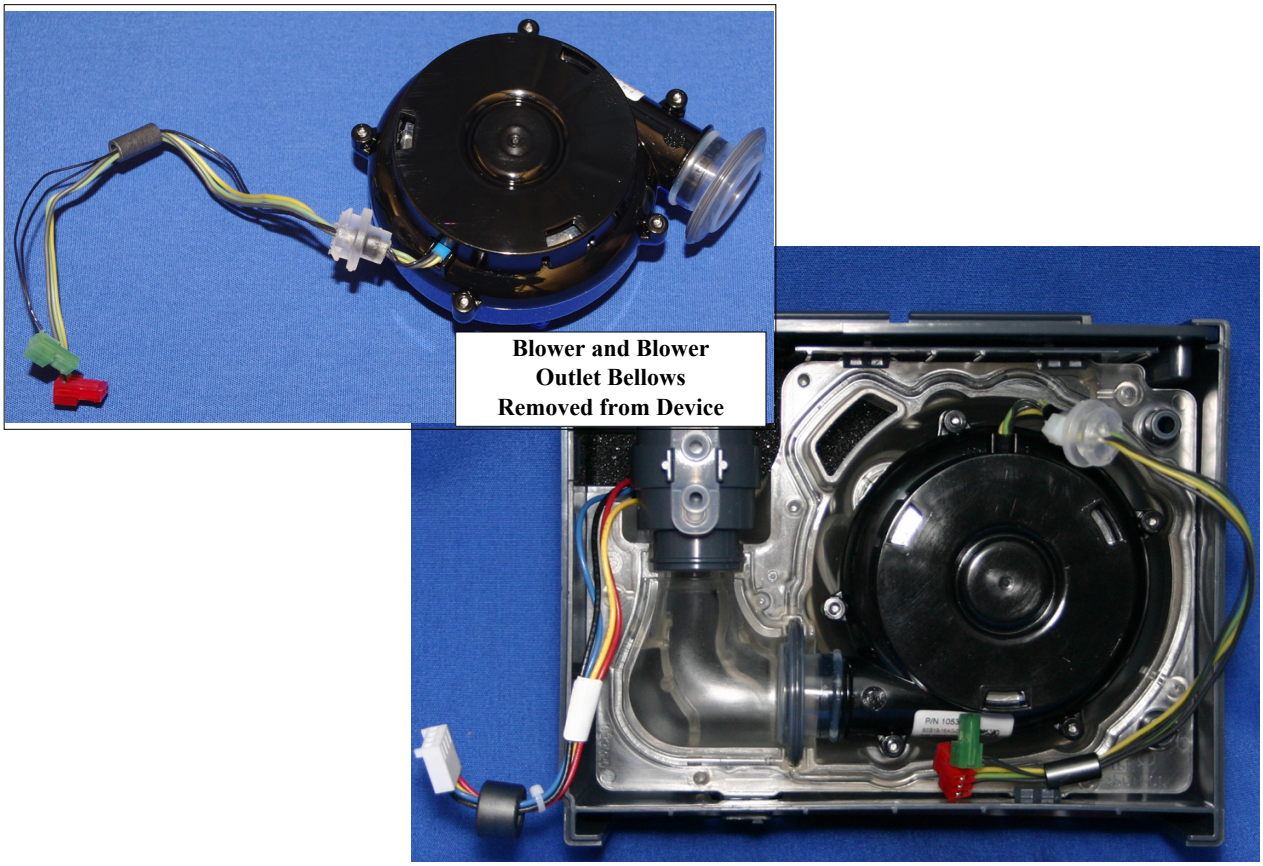


FIGURE 6-13: BLOWER ASSEMBLY AND BLOWER OUTLET BELLOWS

TO REMOVE THE BLOWER ASSEMBLY/OUTLET BELLOWS:

1. Remove the UI Knob. Refer to Replacing the User Interface (UI) Knob.
2. Remove the Top Cover. Refer to Replacing the Top Cover.
3. Remove the Main PCA. Refer to Replacing the Main PCA.
4. Remove the Blower Cap.Refer to Replacing the Blower Cap
5. Lift the Blower Assembly out of the Blower Housing. Remove the Blower Outlet Bellows from the Blower Assembly.

To install the Blower Assembly/Outlet Bellows:

1. Place the Outlet Bellows onto the Blower Assembly.

2. Align the stands located on the bottom of the Blower Assembly with the holes in the Blower Housing.

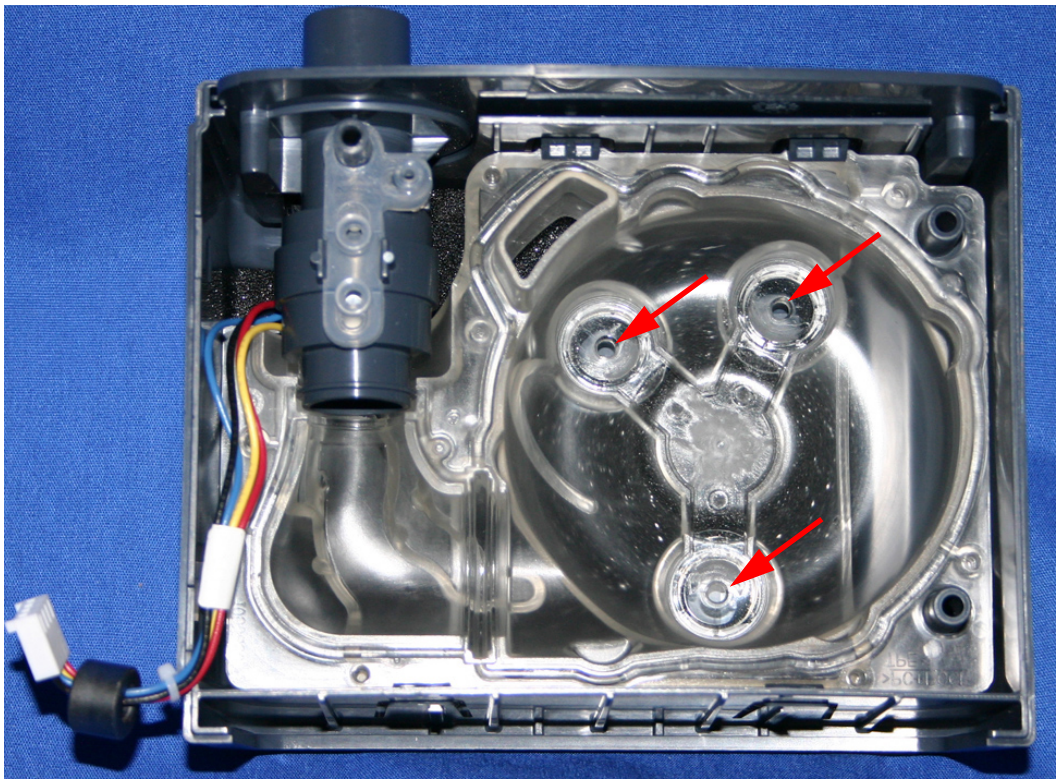


FIGURE 6-14: BLOWER INSTALLATION

3. Gently push the Blower Assembly into the Blower Housing.
4. Properly seat the Blower Outlet Bellows in the Blower Housing.
5. Assemble the remainder of the device as instructed in previous sections.

6.2.10 REPLACING THE FLOW MANIFOLD

Included in Kit	*Tools Required*
• *Flow Manifold*	• *T15 Torx screwdriver*

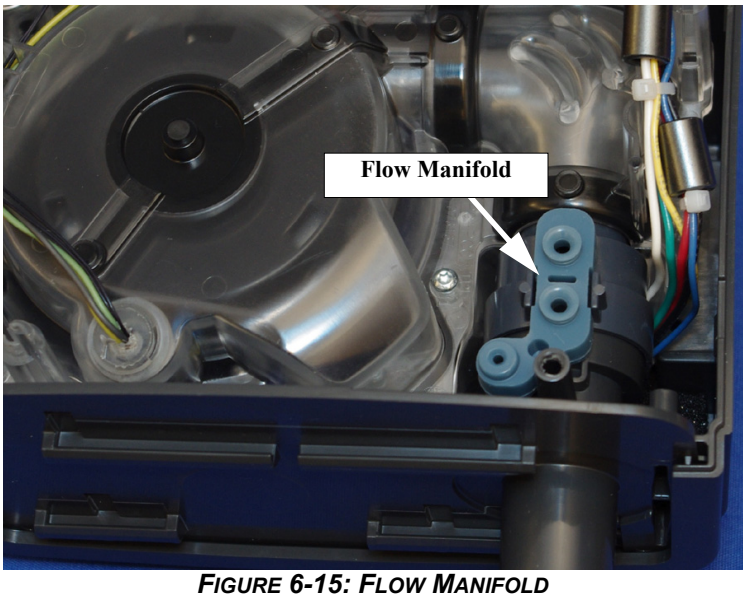


FIGURE 6-15: FLOW MANIFOLD

NOTE

There are two types of Flow Manifolds. One type is for the PR System One 60 Series REMstar Plus with C-Flex, which does not have a Pressure Sensor (). The other type is for devices that have a Pressure Sensor.

To remove the Flow Manifold:

1. Remove the UI Knob. Refer to Replacing the User Interface (UI) Knob.
2. Remove the Top Cover. Refer to Replacing the Top Cover.
3. Remove the Main PCA. Refer to Replacing the Main PCA.
4. Lift the Flow Manifold off of the Right Side Assembly.

To install the Flow Manifold:

1. Place the Flow Manifold onto the Right Side Assembly as shown in Figure 6-15.
2. Assemble the remainder of the device as instructed in previous sections.

6.2.11 REPLACING THE RIGHT PANEL ASSEMBLY

Included in Kit	*Tools Required*
• *Right Side Assembly*	• *T8 Torx screwdriver* • *T15 Torx screwdriver*

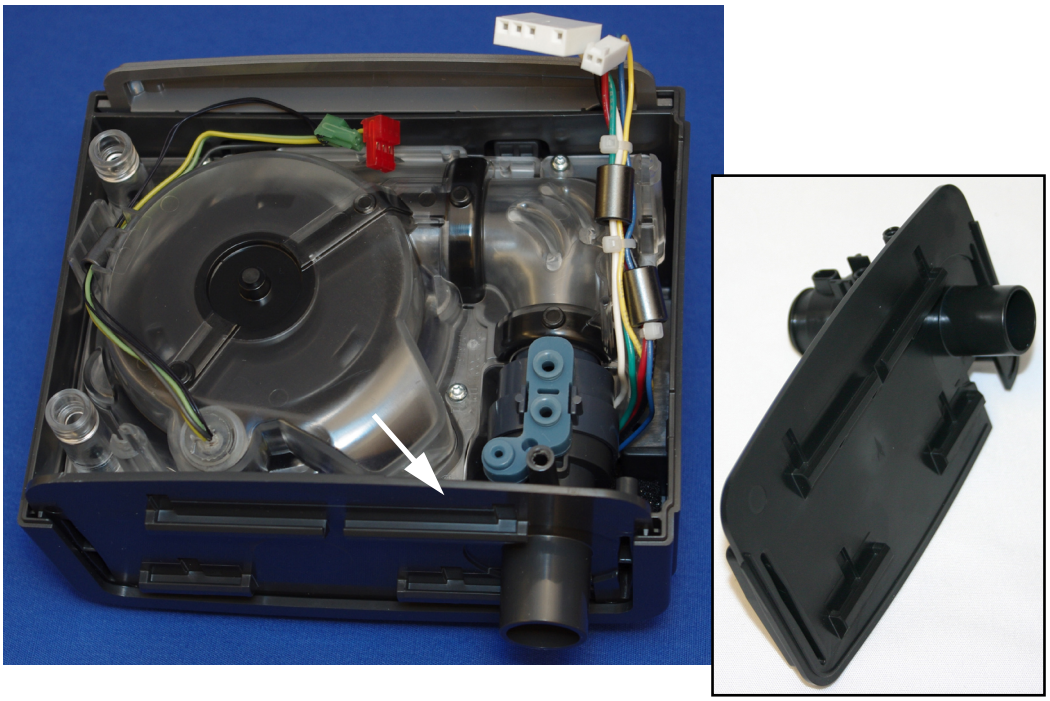


FIGURE 6-16: RIGHT PANEL ASSEMBLY

To remove the Right Panel Assembly:

1. Remove the UI Knob. Refer to Replacing the User Interface (UI) Knob.
2. Remove the Top Cover. Refer to Replacing the Top Cover.
3. Remove the Main PCA. Refer to Replacing the Main PCA.
4. Remove the Blower Cap. Refer to Replacing the Blower Cap.
5. Remove the Flow Manifold. Refer to Replacing the Flow Manifold.
6. Lift the Right Panel Assembly out of the Bottom Enclosure.

To install the Right Panel Assembly:

1. Slide the Right Panel Assembly into the Bottom Enclosure.
2. Place the Flow Manifold onto the Right Panel Assembly as shown in Figure 6-16.
3. Assemble the remainder of the device as instructed in previous sections.

6.2.12 REPLACING THE HUMIDIFIER CABLE

Included in Kit	*Tools Required*
• *Humidifier Cable*	• *T8 Torx screwdriver* • *T15 Torx screwdriver*

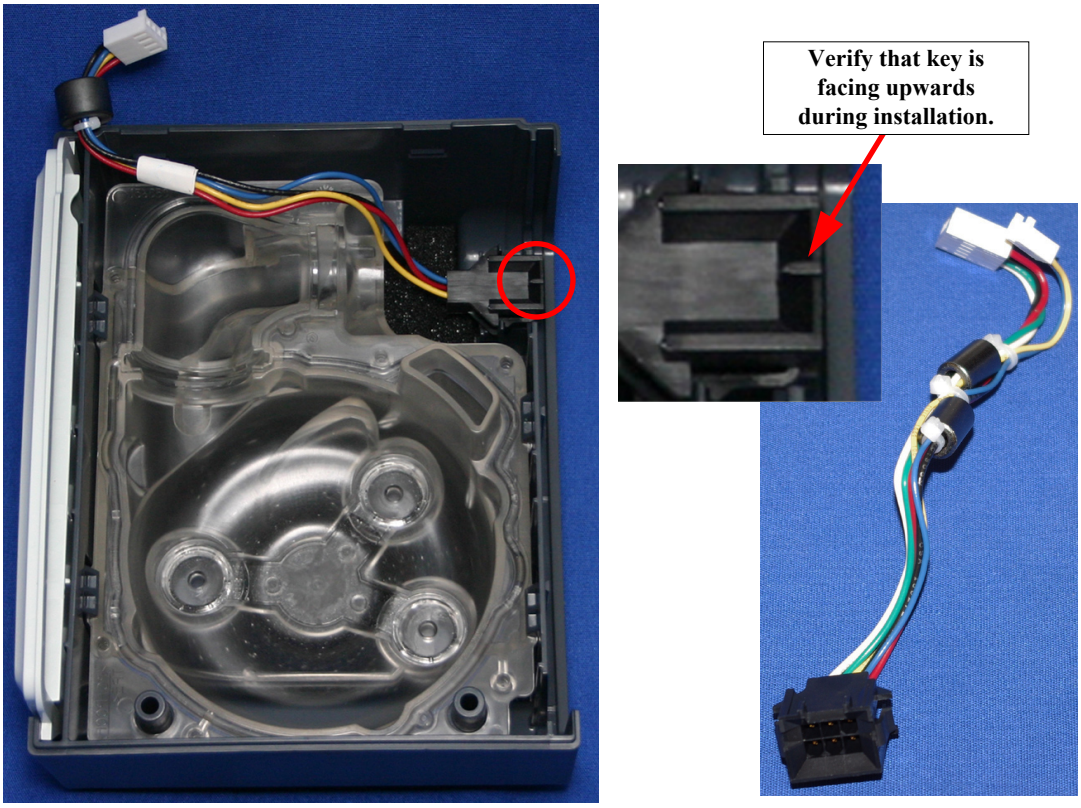


FIGURE 6-17: HUMIDIFIER CABLE

To remove the Humidifier Cable:

1. Remove the UI Knob. Refer to Replacing the User Interface (UI) Knob.
2. Remove the Top Cover. Refer to Replacing the Top Cover.
3. Remove the Main PCA. Refer to Replacing the Main PCA.
4. Remove the Blower Cap. Refer to Replacing the Blower Cap.
5. Remove the Right Panel Assembly. Refer to Replacing the Right Panel Assembly.

To install the Humidifier Cable:

1. Place the Humidifier Cable into the Bottom Enclosure. Be sure the Humidifier Cable is properly seated in its mounting location.
2. Assemble the remainder of the device as instructed in previous sections.

6.2.13 REPLACING THE BLOWER HOUSING

Included in Kit	*Tools Required*
Blower Housing	• *T8 Torx screwdriver* • *T15 Torx screwdriver*

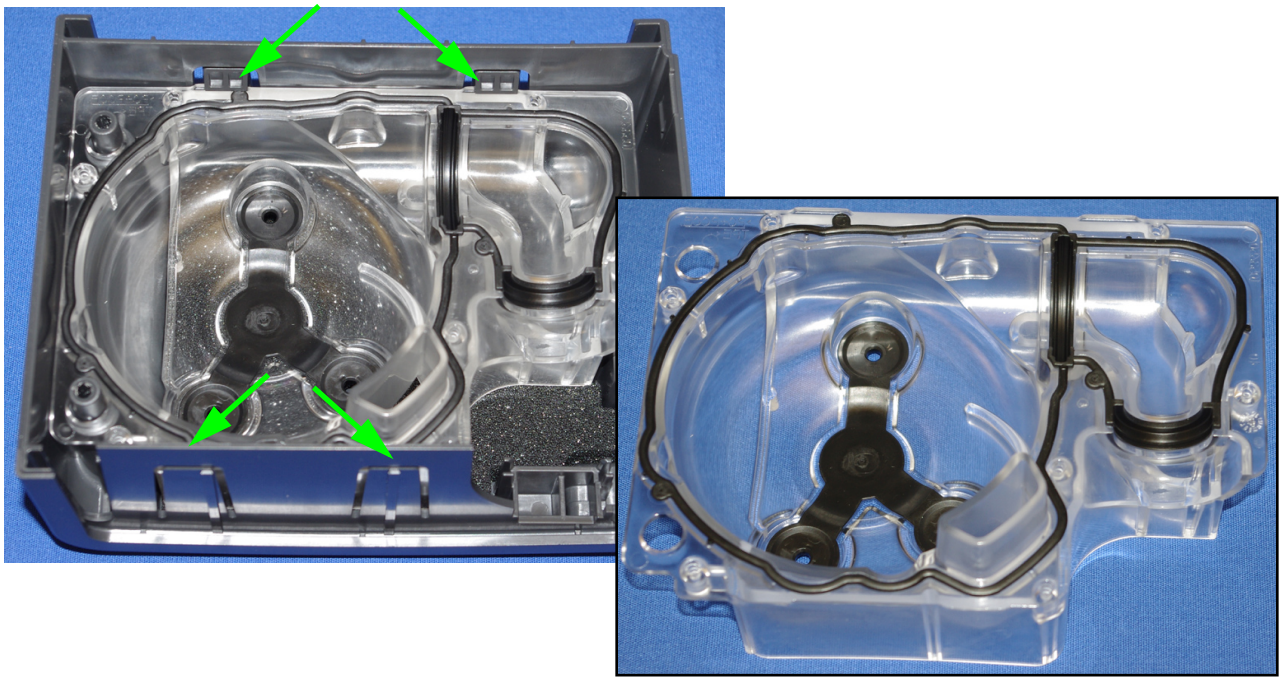


FIGURE 6-18: BLOWER HOUSING

To remove the Blower Housing:

1. Remove the UI Knob. Refer to Replacing the User Interface (UI) Knob.
2. Remove the Top Cover. Refer to Replacing the Top Cover.
3. Remove the Main PCA. Refer to Replacing the Main PCA.
4. Remove the Blower Cap. Refer to Replacing the Blower Cap.
5. Remove the Blower Assembly. Refer to Replacing the Blower Assembly and/or the Blower Outlet Bellows.
6. Remove the Right Panel Assembly. Refer to Replacing the Right Panel Assembly.
7. Remove the Humidifier Cable. Refer to Replacing the Humidifier Cable.
8. Release the four latches that secure the Blower Housing inside the Bottom Enclosure.
9. Lift the Blower Housing out of the Bottom Enclosure.

To install the Blower Housing:

1. Place the Humidifier Cable into the Bottom Enclosure. Be sure the Humidifier Cable is properly seated in its mounting location.
2. Press the Blower Housing into its mounting location in the Bottom Enclosure. Be sure that all four locking tabs secure the Housing.
3. Assemble the remainder of the device as instructed in previous sections.

6.2.14 REPLACING THE SOUND ABATEMENT FOAM

Included in Kit	*Tools Required*
• *Sound Abatement Foam*	• *T8 Torx screwdriver* • *T15 Torx screwdriver*

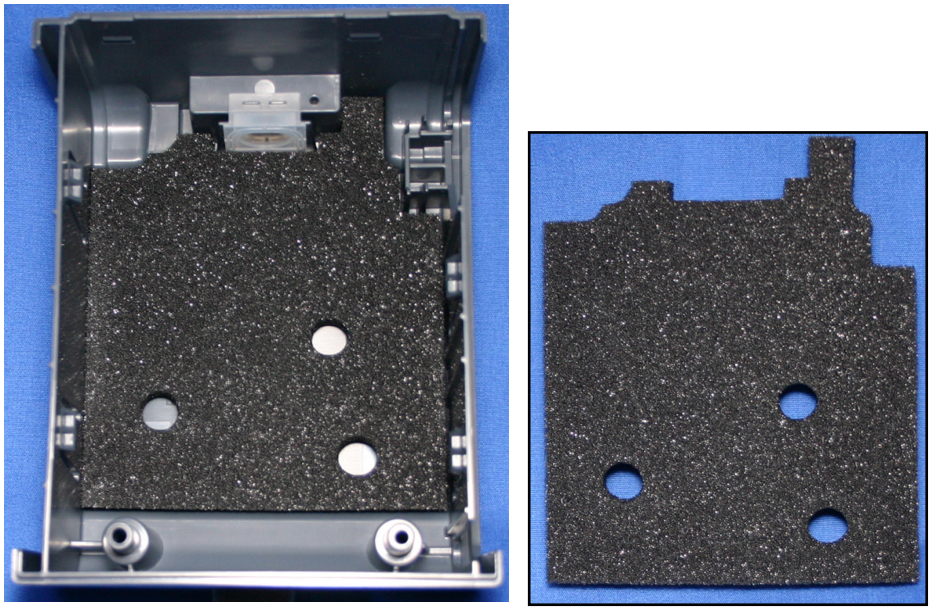


FIGURE 6-19: SOUND ABATEMENT FOAM

TO REMOVE THE SOUND ABATEMENT FOAM:

1. Remove the UI Knob. Refer to Replacing the User Interface (UI) Knob.
2. Remove the Top Cover. Refer to Replacing the Top Cover.
3. Remove the Main PCA. Refer to Replacing the Main PCA.
4. Remove the Blower Cap. Refer to Replacing the Blower Cap.
5. Remove the Blower Assembly. Refer to Replacing the Blower Assembly and/or the Blower Outlet Bellows.
6. Remove the Right Panel Assembly. Refer to Replacing the Right Panel Assembly.
7. Remove the Humidifier Cable. Refer to Replacing the Humidifier Cable.
8. Remove the Blower Housing. Refer to Replacing the Blower Housing.
9. Lift the Foam out of the Bottom Enclosure.

TO INSTALL THE SOUND ABATEMENT FOAM:

1. Place the Foam in the Bottom Enclosure as shown in Figure 6-19.
2. Assemble the remainder of the device as instructed in previous sections.

6.2.15 REPLACING THE AIR INLET SEAL

Included in Kit	Tools Required
Air Inlet Seal	• T8 Torx screwdriver • T15 Torx screwdriver

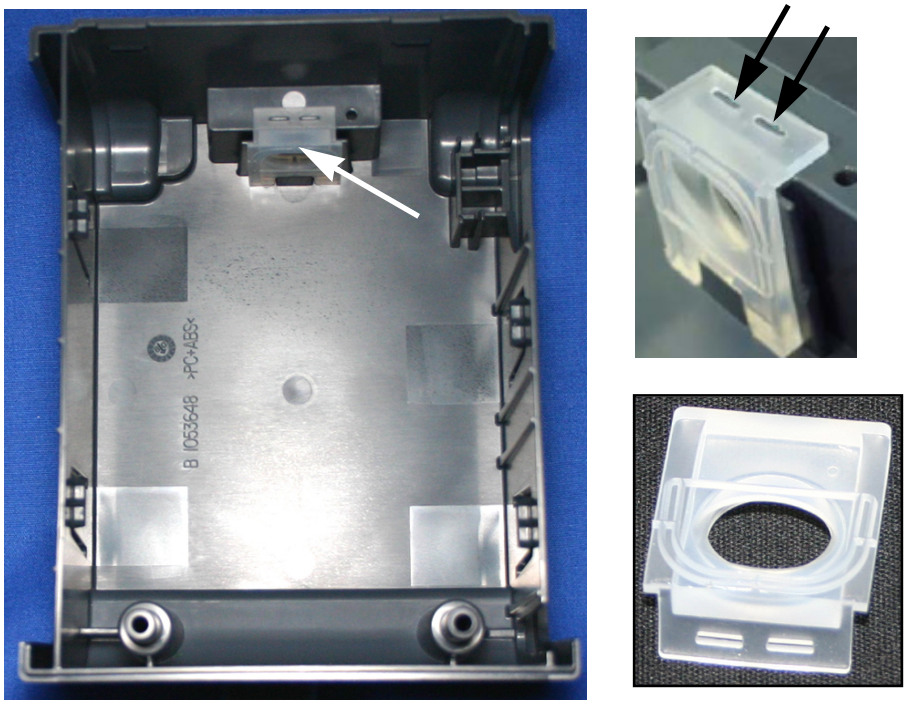


FIGURE 6-20: AIR INLET SEAL

TO REMOVE THE AIR INLET SEAL:

1. Remove the UI Knob. Refer to Replacing the User Interface (UI) Knob.
2. Remove the Top Cover. Refer to Replacing the Top Cover.
3. Remove the Main PCA. Refer to Replacing the Main PCA.
4. Remove the Blower Cap. Refer to Replacing the Blower Cap.
5. Remove the Blower Assembly. Refer to Replacing the Blower Assembly and/or the Blower Outlet Bellows.
6. Remove the Right Panel Assembly. Refer to Replacing the Right Panel Assembly.
7. Remove the Humidifier Cable. Refer to Replacing the Humidifier Cable.
8. Remove the Blower Housing. Refer to Replacing the Blower Housing.

TO INSTALL THE AIR INLET SEAL:

1. Install the Air Inlet Seal in the Bottom Enclosure. Verify that it is flush with the Bottom Enclosure and fully seated on the two prongs as shown in Figure 6-20.
2. Assemble the remainder of the device as instructed in previous sections.

6.2.16 REPLACING THE BOTTOM ENCLOSURE

Included in Kit	*Tools Required*
• *Bottom Enclosure* • *Warning Label*	• *T8 Torx screwdriver* • *T15 Torx screwdriver*

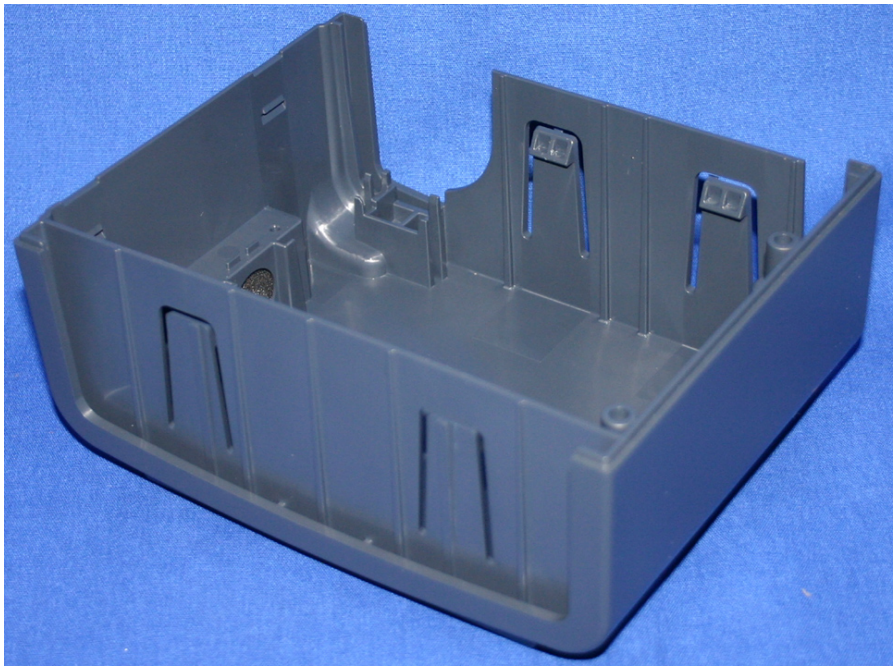


FIGURE 6-21: BOTTOM ENCLOSURE

TO REPLACE THE BOTTOM ENCLOSURE:

NOTE

When you replace the Bottom Enclosure, you must create and apply a serial number/model number label. Refer to the section 6.2.17 for instructions on creating a serial number label.

1. Remove the UI Knob. Refer to Replacing the User Interface (UI) Knob.
2. Remove the Top Cover. Refer to Replacing the Top Cover.
3. Remove the Main PCA. Refer to Replacing the Main PCA.
4. Remove the Blower Cap. Refer to Replacing the Blower Cap.
5. Remove the Blower Assembly. Refer to Replacing the Blower Assembly and/or the Blower Outlet Bellows.
6. Remove the Right Panel Assembly. Refer to Replacing the Right Panel Assembly.
7. Remove the Humidifier Cable. Refer to Replacing the Humidifier Cable.

8. Remove the Blower Housing. Refer to Replacing the Blower Housing.
9. Remove the Sound Abatement Foam. Refer to Replacing the Sound Abatement Foam.
10. Remove the Air Inlet Seal. Refer to Replacing the Air Inlet Seal.
11. Install all the components into the new Bottom Enclosure and assemble the device as instructed in previous sections.

6.2.17 REPLACING THE SERIAL NUMBER/MODEL NUMBER LABEL

There are several instances in which you will have to replace the Serial Number/Model Number Label (e.g., the label is becoming illegible or if the Bottom Enclosure is replaced). To ensure traceability of the Device, it is of utmost importance that when creating the new label for replacement, it includes all of the information from the original label. Refer to Figure 6-22.

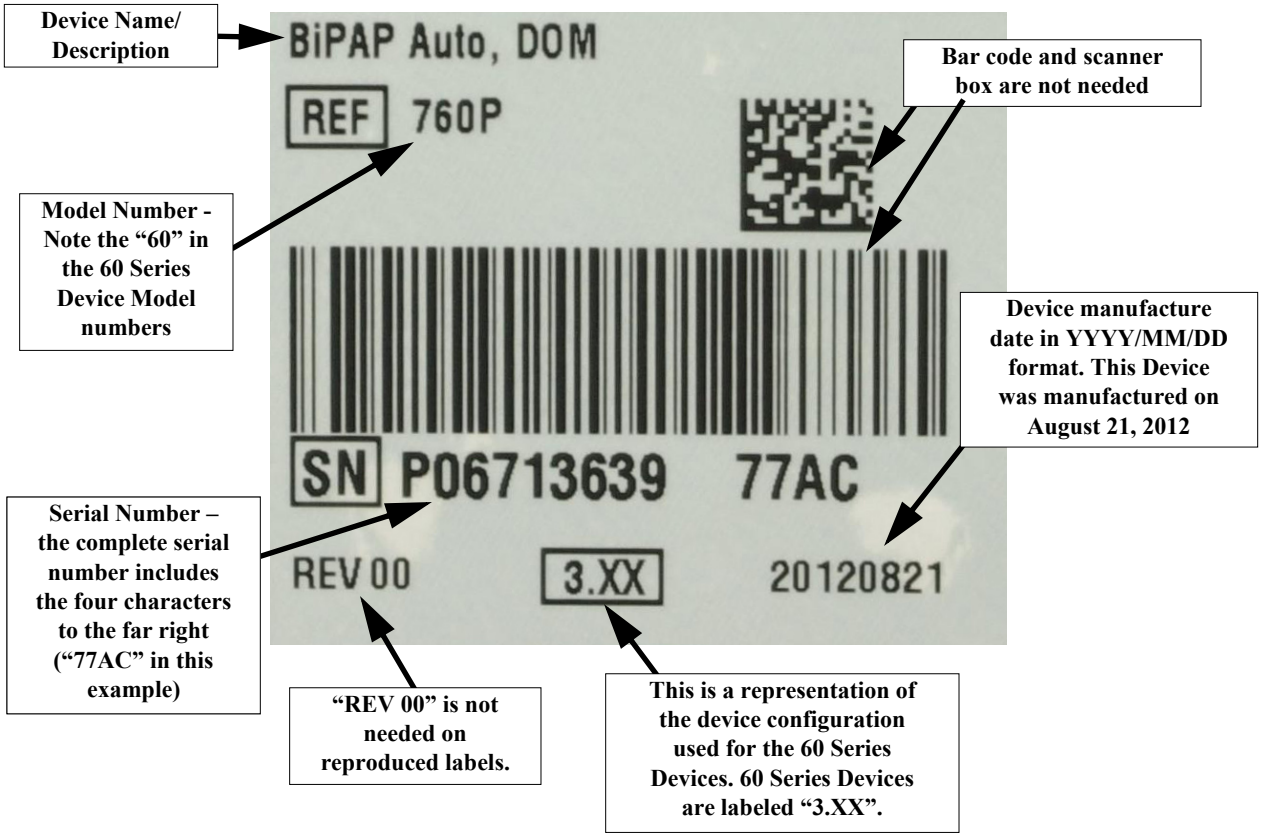


FIGURE 6-22: SERIAL NUMBER/MODEL NUMBER LABEL

The following is required for creating a label:

- Label Printer (Hand written labels are unacceptable)
- Self-Adhesive Label Stock, Minimum Size: 1-1/8 inch x 2-1/4 inch.
- Self- Adhesive Clear Overlay: Minimum Size: 1-1/8 inch x 2-1/4 inch.

Do the following:

1. Before replacing the original or existing label, design the new label in the same layout, format and font size as shown in Figure 6-22. Print the label and verify that the label information is the same as the original or existing label.

2. Remove the existing label and affix the newly created label in the same location and orientation. Trim label if required.
3. Affix the Clear Overlay over the label. Trim to fit if required.

6.2.18 READING/VERIFYING THE DEVICE'S SERIAL NUMBER AND MODEL NUMBER

NOTE

The Read Serial Number & Model Number *tool can be used only on the CPAP and Bi-Level devices, not the System One Heated Humidifier.*

To read or verify the serial number and model number of a Sleep Therapy device, perform the following:

1. Connect the device to a PC. Refer to Chapter 1 for information on connecting the device to a PC.
2. Apply power to the device.
3. Open the *Service Center Tools* software from the Windows Start Menu.
4. Select *Read Serial Number & Model Number* from the drop-down menu.
5. Click on the *Execute Tool* button.
6. The serial number and model number of the device will be displayed.

6.3 ROUTINE MAINTENANCE AND CLEANING

There is no routine service required for this device. Refer to the following subsections for instructions on cleaning the device.

6.3.1 CLEANING THE DEVICE

WARNING

To avoid electrical shock, always unplug the power cord from the wall outlet before cleaning the device. Do not immerse the device in any fluids

1. Unplug the device, and wipe the outside of the device with a cloth slightly dampened with water and a mild detergent. Let the device dry completely before plugging in the power cord.
2. Inspect the device and all circuit parts for damage after cleaning. Replace any damaged parts.

6.3.2 CLEANING OR REPLACING THE FILTERS

Under normal usage, you should clean the gray foam filter at least once every two weeks and replace it with a new one every six months. The white ultra-fine filter is disposable and should be replaced after 30 nights of use or sooner if it appears dirty. DO NOT clean the ultra-fine filter.

WARNING

Dirty inlet filters may cause high operating temperatures that may affect device performance. Regularly examine the inlet filters as needed for integrity and cleanliness.

1. If the device is operating, stop the airflow. Disconnect the device from the power source.

2. Remove the filter(s) from the enclosure by gently squeezing the filter in the center and pulling it away from the device.
3. Examine the filter(s) for cleanliness and integrity.
4. Wash the gray foam filter in warm water with a mild detergent. Rinse thoroughly to remove all detergent residue. Allow the filter to air dry completely before reinstalling it. If the foam filter is torn, replace it. (Only Philips Respironics-supplied filters should be used as replacement filters.)
5. If the white ultra-fine filter is dirty or torn, replace it.
6. Reinstall the filters, inserting the white ultra-fine filter first if applicable.

CAUTION

Never install a wet filter into the device. You must ensure sufficient drying time for the cleaned filter.

6.3.3 CLEANING THE NON-HEATED TUBING

Clean the flexible tubing before first use and daily. Disconnect the flexible tubing from the device. For the 15 or 22 mm flexible tubing, gently wash the tubing in a solution of warm water and a mild detergent. Rinse thoroughly and allow to air dry.

NOTE

Refer to Section 7.3.3 for the instructions on how to clean the heated tube.

CHAPTER 7: HUMIDIFIER REPAIR AND REPLACEMENT

This section illustrates the names and locations of the replaceable components in the PR System One Humidifier.

WARNING

To prevent electrical shock, disconnect the Humidifier from the device before attempting to make any repairs.

CAUTION

Electrical components used in this device are subject to damage from static electricity. Repairs made to this device must be performed only in an antistatic, Electro-Static Discharge (ESD) protected environment.

7.0 PR SYSTEM ONE HUMIDIFIER REPLACEMENT PART (RP) KITS

RP KIT NAME	PART NO.	RP KIT NAME	PART NO.
Dry Box Assembly	*1064803*	*Humidifier Lower Base*	*1099582*
Dry Box Seal (included w/Inlet Seal)	*1064804*	*Humidifier Top Housing*	*1099587*
Flip Lid Assembly (Non-heated Tubing)	*1099588*	*Inlet Seal (included w/Dry Box Seal)*	*1064804*
Flip Lid Assembly (Heated Tubing)	*1099589*	*Outside Panel*	*1099578*
Heater Plate Assembly	*1099585*	*Torx Screwdriver Kit*	*1040889*
Heater Plate Spring	*1064807*	*Water Chamber Assembly*	*1099590*
Humidifier Bottom Housing	*1099586*		

7.1 HEATED HUMIDIFIER PERFORMANCE CONFIRMATION

Humidifier preheat mode can be used to determine if the System One Heated Humidifier is working properly. This can be performed after repairs have been made to the humidifier as part of the performance confirmation, or as a bench checkout procedure. The following steps should be followed if there is a desire to confirm the performance of the System One Heated Humidifier.

WARNING

- *It is important to follow the exact steps below when performing this test in order to ensure no injury. Read all steps first before performing this test.*
- *Do not place your hand directly on the heater plate at any time during this test as it could result in a burn.*

1. Disconnect the patient tubing (if attached) and remove the water tank.

2. While the therapy device is not running, place your hand above the heater plate (without touching it) to assess the temperature of the heater plate when off for later comparison.
3. Turn on humidifier preheat mode as described in the User Manual.
4. Allow the device to run in preheat mode for 30 seconds.
5. Place your hand above the heater plate (without touching it) to confirm an increase in heater plate temperature.
6. Press the control wheel while “Therapy” or the therapy icon is highlighted on the Home screen to enter therapy and end preheat mode.
7. Press the control wheel again to turn off therapy.
8. If using this procedure as part of the Performance Verification of an entire system, enter the results (Pass or Fail) on the Performance Verification Data Sheet on page 8-14.

7.2 REPLACEMENT INSTRUCTIONS

The following subsections provide information for replacing Humidifier components.

7.2.1 REPLACING THE WATER CHAMBER ASSEMBLY

Included in Kit	*Tools Required*
• *Tank Assembly*	*None*

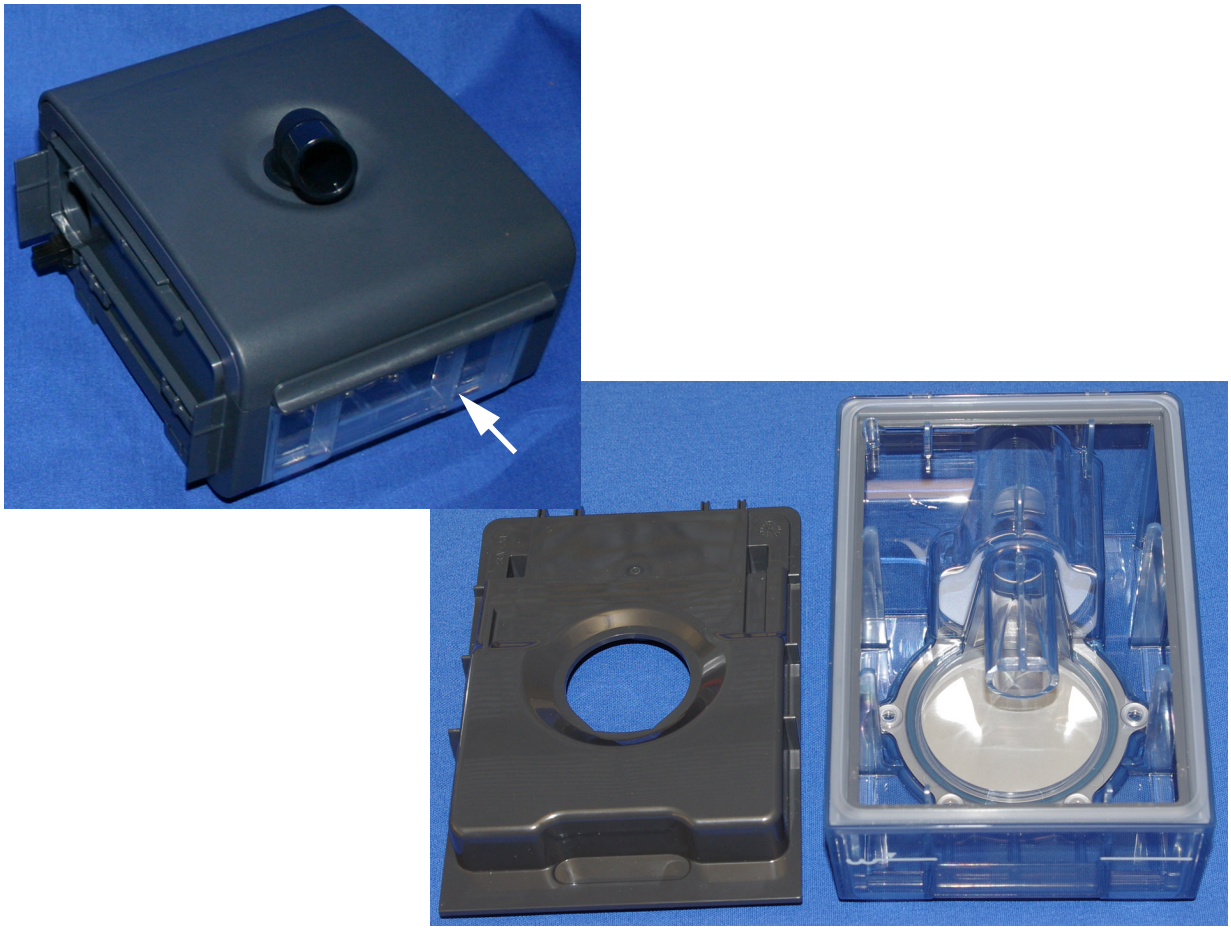


FIGURE 7-1: WATER CHAMBER ASSEMBLY

To remove the Water Chamber Assembly:

1. Gently squeeze the latch on the Flip Lid Assembly to release it and lift the Flip Lid Assembly.
2. Pull the Humidifier Tank Assembly out of the Humidifier.

To Install the Humidifier Tank Assembly:

1. With the Flip Lid Assembly in the up position, push the Tank Assembly into the Humidifier.
2. Be sure the Tank assembly is fully seated with the Dry Box Seal.
3. Close the Flip Lid Assembly.

7.2.2 REPLACING THE DRY BOX SEAL

Included in Kit	*Tools Required*
• *Dry Box Seal* • *Inlet Seal*	*None*

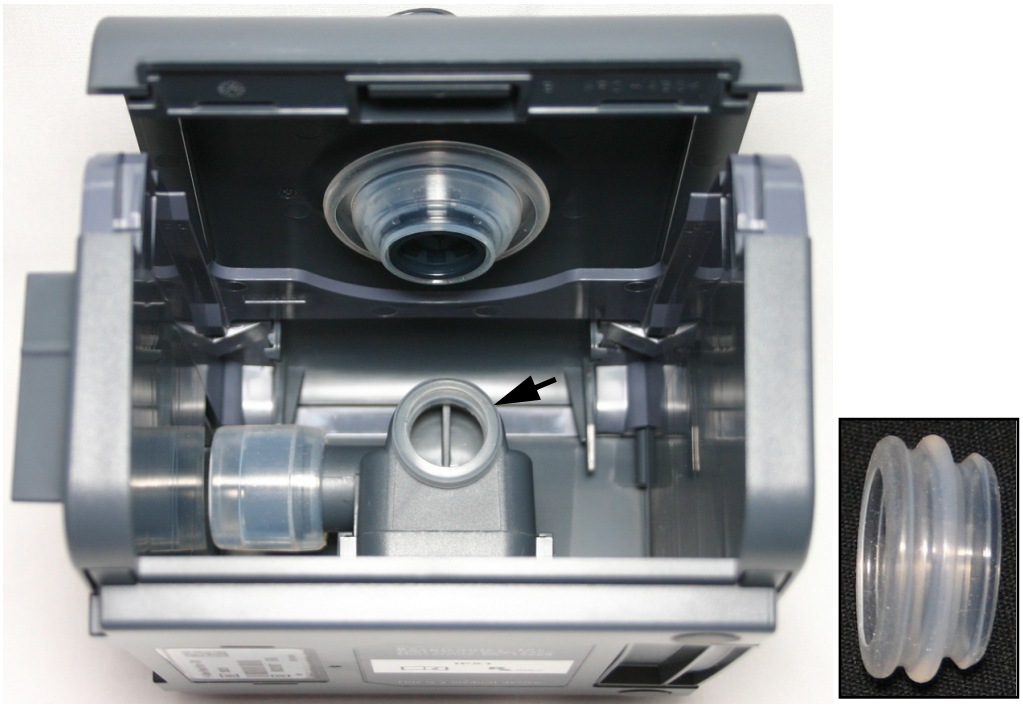


FIGURE 7-2: DRY BOX SEAL

TO REMOVE THE DRY BOX SEAL:

1. Remove the Humidifier Tank Assembly. Refer to Section 7.2.1.
2. Remove the Dry Box Seal.

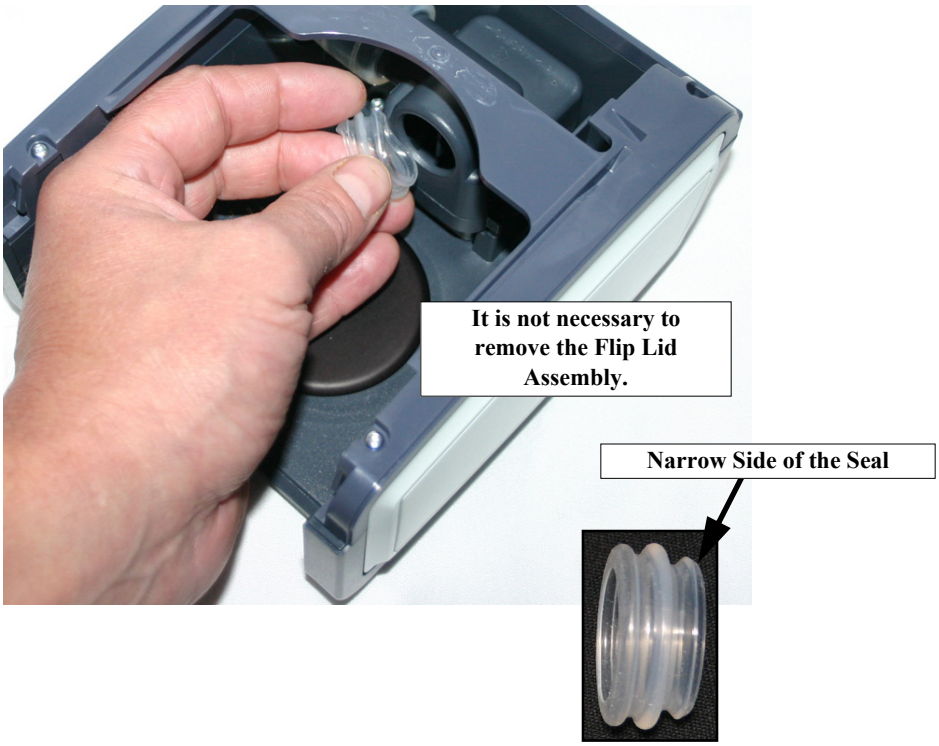


FIGURE 7-3: DRY BOX SEAL REMOVAL

TO INSTALL THE DRY BOX SEAL:

1. Insert the narrow side of the Dry Box Seal into the Dry Box Assembly.
2. Verify that the Dry Box Seal is fully Seated in the Dry Box Assembly.

7.2.3 REPLACING THE DRY BOX ASSEMBLY/HUMIDIFIER INLET SEAL

Included in Kit	Tools Required
• *Dry Box Assembly* • *Inlet Seal* • *Dry Box Seal*	*Flathead Screwdriver*

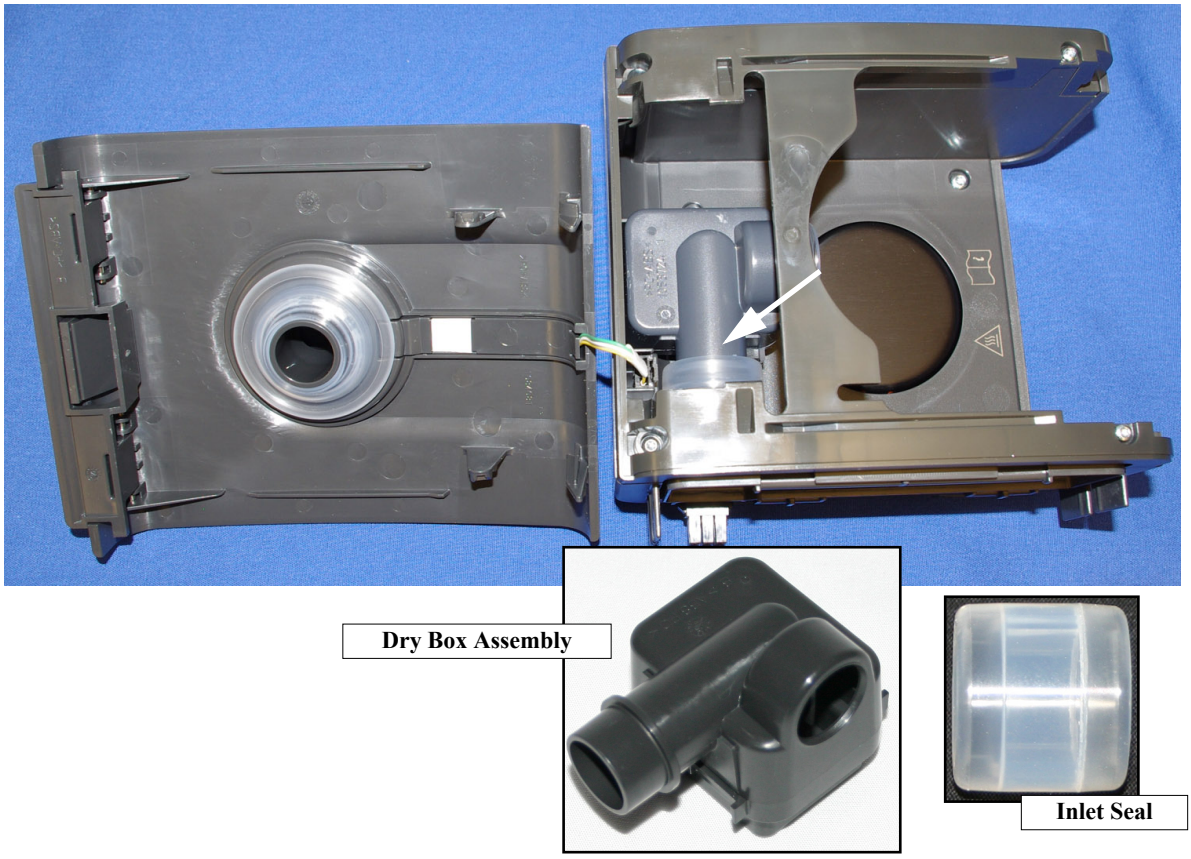


FIGURE 7-4: BLOWER CAP

TO REMOVE THE DRY BOX ASSEMBLY/HUMIDIFIER INLET SEAL:

1. Remove the Humidifier Tank Assembly. Refer to Section 7.2.1.

CAUTION
On Heated Tube Humidifiers, a wiring harness is connected from the Flip Lid Assembly to the Heater Plate in the Lower Housing. Use caution so as not to damage the Wiring Harness or connectors when lifting the Flip Lid Assembly.

2. Insert a flat blade screwdriver into the hole located on the back of the Humidifier and lightly press inward to release the Dry Box Assembly. Refer to Figure 7-5.

Do not press firmly on the screwdriver handle. Very light pressure is needed to release the Dry Box Assembly.

FIGURE 7-5: DRY BOX SEAL REMOVAL

CAUTION

Do not press firmly on the screwdriver as damage to the Humidifier may occur.

3. Remove the Dry Box Assembly with Inlet Seal.
4. Remove the Inlet Seal from the Dry Box Assembly.

TO INSTALL THE DRY BOX ASSEMBLY/HUMIDIFIER INLET SEAL:

1. Install The Inlet Seal onto the Dry Box Assembly if necessary.
2. Slide the Dry Box Assembly with Inlet Seal into its mounting location in the Humidifier Bottom Housing. Verify that the Dry Box Assembly with Inlet Seal are secured and do not fall out of the Housing.

7.2.4 REPLACING THE FLIP LID ASSEMBLY

Included in Kit	Tools Required
• Flip Lid Assembly • Tank Top Seal	None

FIGURE 7-6: FLIP LID ASSEMBLY

TO REMOVE THE FLIP LID ASSEMBLY:

1. Remove the Humidifier Tank Assembly. Refer to Section 7.2.1.
2. Using a screwdriver or similar probing tool, push in on the latches that secure the Flip Lid Assembly to the Humidifier Top Housing. Refer to Figure 7-7.

NOTE

For Heated Humidifiers equipped with Heated Tubing circuitry, you must release the wiring harness connector from the Heater Plate wiring harness connector.

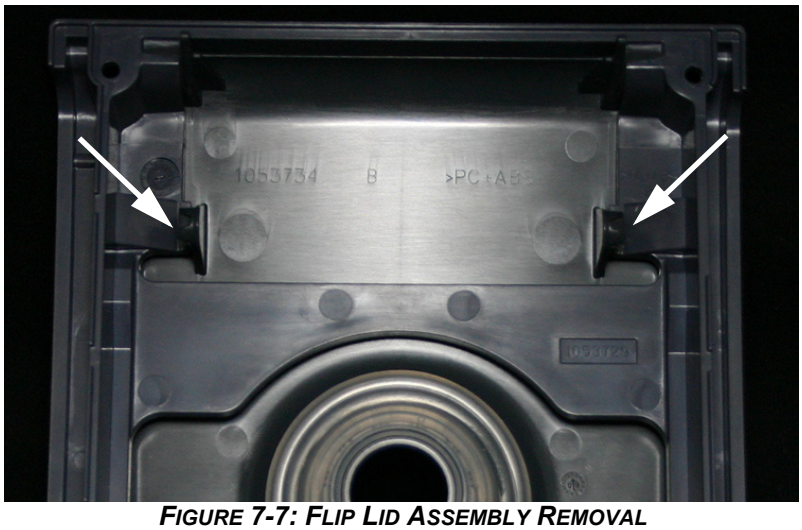


FIGURE 7-7: FLIP LID ASSEMBLY REMOVAL

3. Continue to bend the Flip Lid Assembly completely backwards until it is completely separated from the Bottom Housing. Note that if the Heated Humidifier is equipped with Heated Tubing, you must disconnect the wiring harness. Press in on latch while pulling the wiring harness to disconnect the wiring harness connectors.

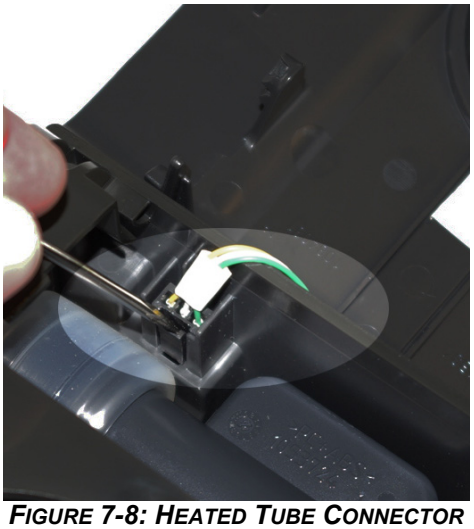


FIGURE 7-8: HEATED TUBE CONNECTOR

7.2.5 REPLACING THE HUMIDIFIER TOP HOUSING

Included in Kit	*Tools Required*
• *Top Housing* • *#4 X 1/2" screw (x4)*	*T8 Torx Screwdriver*

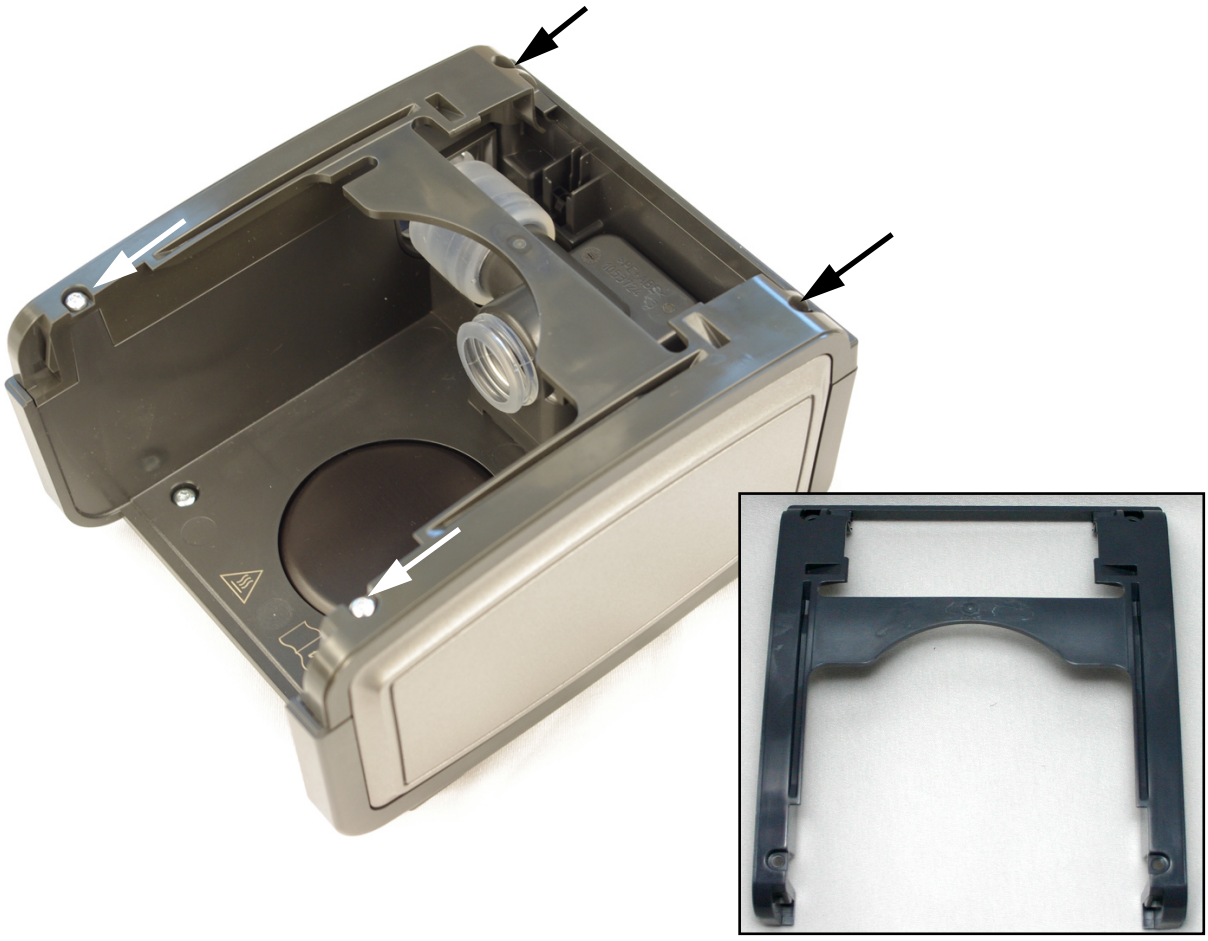


FIGURE 7-9: HUMIDIFIER TOP HOUSING

TO REMOVE THE HUMIDIFIER TOP HOUSING:

1. Remove the Humidifier Tank Assembly. Refer to Section 7.2.1.
2. Using a T8 Torx screwdriver, remove the four #4 x 1/2" screws that secure the Top Housing to the Humidifier Bottom Housing.
3. Lift the Top Housing off of the Bottom Housing.

TO INSTALL THE HUMIDIFIER TOP HOUSING:

1. Place the Top Housing onto the Bottom Housing.
2. Secure the Top Housing to the Bottom Housing using the four #4 x 1/2" screws.

7.2.6 REPLACING THE HUMIDIFIER OUTSIDE PANEL

Included in Kit	*Tools Required*
• *Outside Panel*	*T8 Torx Screwdriver*

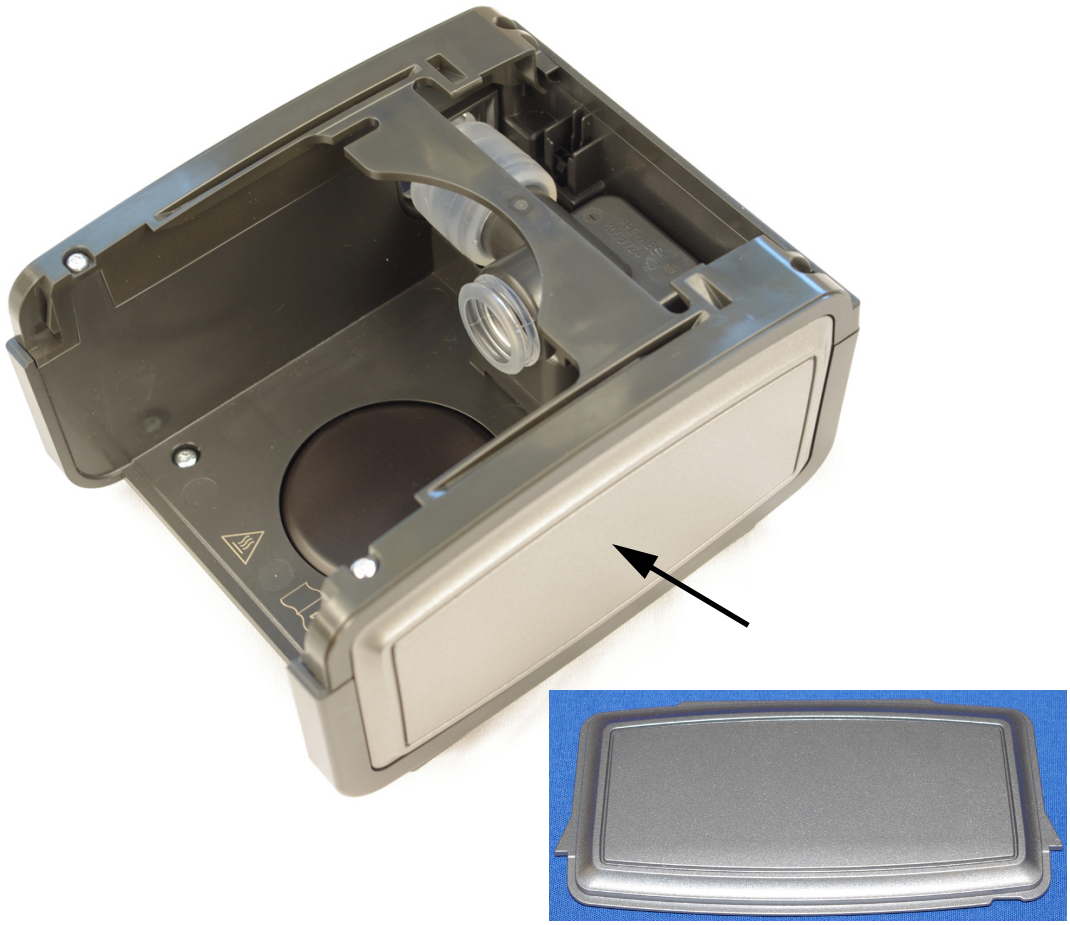


FIGURE 7-10: OUTSIDE PANEL

TO REMOVE THE HUMIDIFIER OUTSIDE PANEL:

1. Remove the Humidifier Tank Assembly. Refer to Section 7.2.1.
2. Remove the Flip Lid Assembly. Refer to Section 7.2.4.
3. Remove the Top Housing. Refer to Section 7.2.5.
4. Slide the Outside Panel out of the Bottom Housing.

TO INSTALL THE OUTSIDE PANEL:

- Slide the Outside Panel into the Bottom Housing.

7.2.7 REPLACING THE HUMIDIFIER BOTTOM HOUSING

Included in Kit	*Tools Required*
• *Bottom Housing (with Left Side Panel)* • *#6 X 1/4" screw (x4)*	• *T8 Torx Screwdriver* • *T15 Torx Screwdriver*

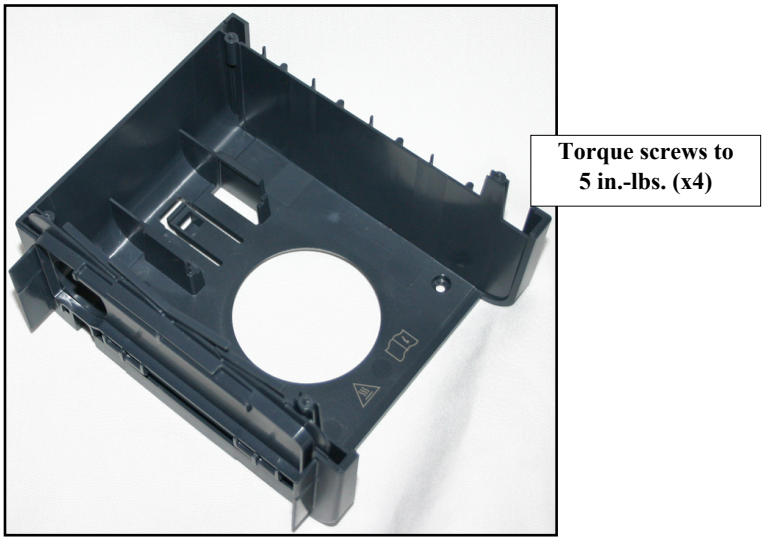


FIGURE 7-11: HUMIDIFIER BOTTOM HOUSING

TO REMOVE THE HUMIDIFIER BOTTOM HOUSING:

1. Remove the Humidifier Tank Assembly. Refer to Section Section 7.2.1.
2. Remove the Flip Lid Assembly. Refer to Section 7.2.4.
3. Remove the Dry Box Assembly with Inlet Seal. Refer to Section 7.2.3.
4. Remove the Top Housing. Refer to Section 7.2.5.
5. Remove the Outside Panel. Refer to Section 7.2.6.
6. Remove the Left Side Panel.
7. Using a T15 Torx screwdriver, remove the four #6 x 1/4" screws that secure the Bottom Housing to the Lower Base Assembly.

TO INSTALL THE HUMIDIFIER BOTTOM HOUSING:

1. Place the Bottom Housing onto the Lower Base Assembly.

CAUTION

Route the Heater Plate wiring harnesses so as not to cause damage during installation of the Humidifier Bottom Housing.

2. Verify that the Heater Plate Wiring Harnesses are properly routed in the Lower Base Assembly and not at risk of being pinched or damaged.
3. Using the four #6 x 1/4" screws, secure the Bottom Housing to the Lower Base Assembly. Torque the screws to 5 in.-lbs.

7.2.8 REPLACING THE HEATER PLATE ASSEMBLY

Included in Kit	*Tools Required*
• *Bottom Housing (with Left Side Panel)* • *#6 X 1/4" screw (x4)*	• *T8 Torx Screwdriver* • *T15 Torx Screwdriver*

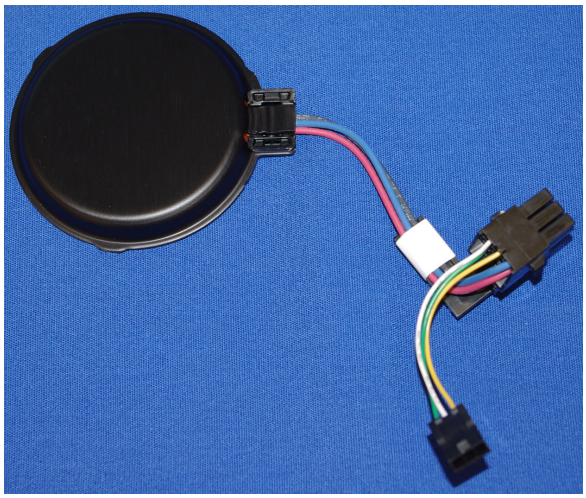


FIGURE 7-12: HEATER PLATE ASSEMBLY

To remove the Heater Plate Assembly:

1. Remove the Humidifier Tank Assembly. Refer to Section 7.2.1.
2. Remove the Flip Lid Assembly. Refer to Section 7.2.4.
3. Remove the Dry Box Assembly with Inlet Seal. Refer to Section 7.2.3.
4. Remove the Top Housing. Refer to Section 7.2.5.
5. Remove the Outside Panel. Refer to Section 7.2.6.
6. Remove the Humidifier Bottom Housing. Refer to Section 7.2.7.
7. Remove the Heater Plate Assembly.

To install the Heater Plate Assembly:

1. Place the Heater Plate Assembly into the Humidifier Lower Base as shown in Figure 7-13. Be sure that the Heater Plate Spring is properly seated under the Heater Plate.

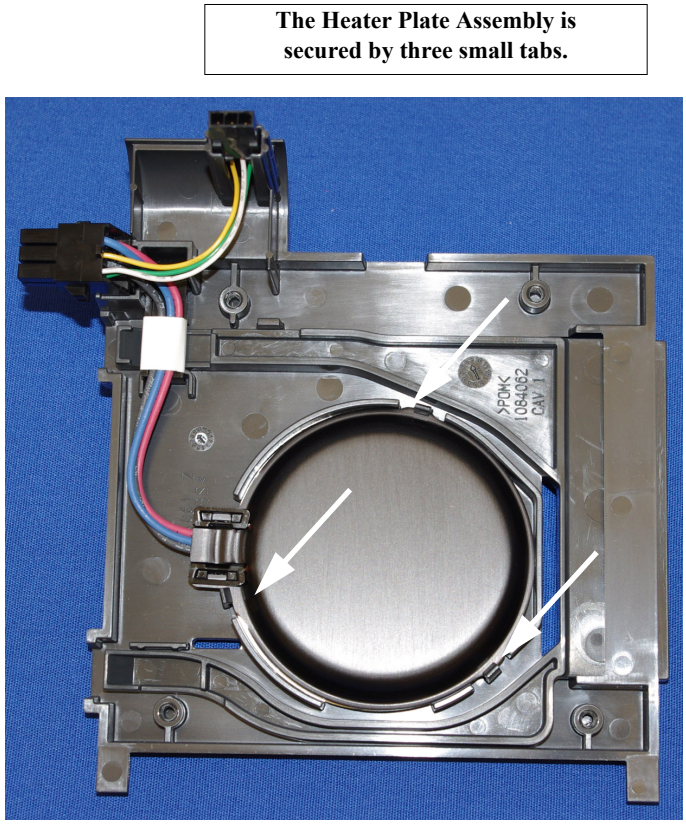


FIGURE 7-13: HEATER PLATE INSTALLATION

2. Route the Heater Plate wiring harnesses as shown in Figure 7-13. Be sure the connectors are properly seated in their mounting locations.
3. Secure the Bottom Housing to the Lower Base using the four #6 x 1/4” screws and assemble the remainder of the device as necessary.

7.2.9 REPLACING THE HUMIDIFIER PLATE SPRING

Included in Kit	*Tools Required*
• *Humidifier Plate Spring*	• *T8 Torx Screwdriver* • *T15 Torx Screwdriver*

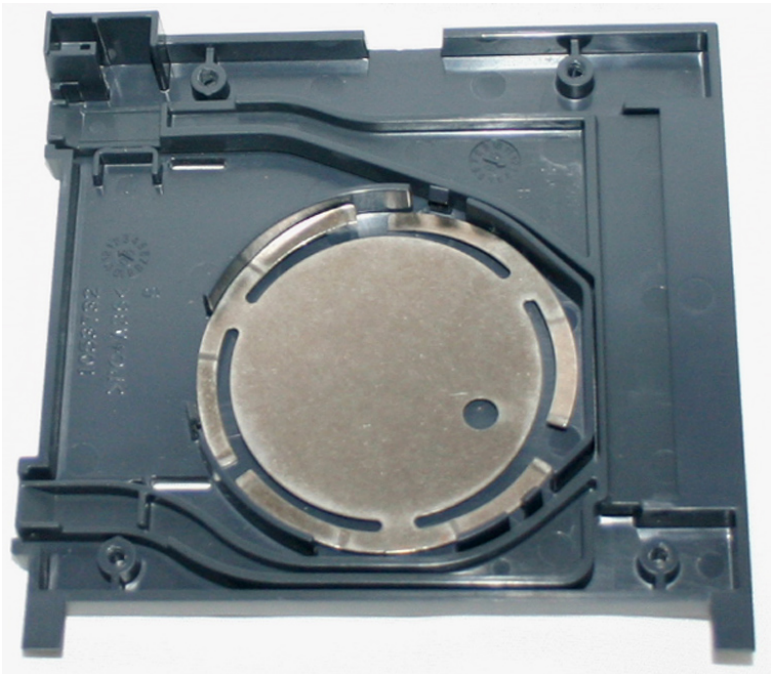


FIGURE 7-14: HEATER PLATE ASSEMBLY

To remove the Heater Spring:

1. Remove the Humidifier Tank Assembly. Refer to Section 7.2.1.
2. Remove the Flip Lid Assembly. Refer to Section 7.2.4.
3. Remove the Dry Box Assembly with Inlet Seal. Refer to Section 7.2.3.
4. Remove the Top Housing. Refer to Section 7.2.5.
5. Remove the Outside Panel. Refer to Section 7.2.6.
6. Remove the Humidifier Bottom Housing. Refer to Section 7.2.7.
7. Remove the Heater Plate Assembly.
8. Lift the Humidifier

To install the Heater Spring:

1. Set the Heater Plate Spring into its mounting location in the Lower Base.
2. Assemble the remainder of the device as necessary.

7.3 CLEANING AND MAINTENANCE

There is no routine service required for this device. Refer to the following subsections for instructions on cleaning the device.

7.3.1 CLEANING THE WATER CHAMBER ASSEMBLY

Hand washing can be performed daily. Dishwashing can be performed once a week. To clean the Water Chamber Assembly, perform the following:

1. Turn the humidifier setting off, turn the therapy device off, and allow the heater plate and water to cool.

WARNING

Allow the humidifier heater plate and water to cool down for approximately 15 minutes before removing the water tank. A burn may result from: touching the heater plate, coming in contact with the heated water, or touching the tank pan.

2. Open the humidifier door with the release lever, and then slide the water tank out of the humidifier base.
3. Press the tab in the hole on top of the tank in toward the front of the tank. Gently remove the tank lid from the tank base. Empty any remaining water from the base of the tank.
4. Wash the parts of the tank in the dishwasher (top shelf only) or in a solution of warm water and a mild liquid dishwashing detergent. Gently wash the middle seal. Rinse the parts with clean water. Wipe the parts completely on the top and bottom. Allow them to air dry.

WARNING

Empty and clean the water tank daily to prevent mold and bacteria growth. Wipe the seal completely.

CAUTION

Use a mild liquid dishwashing detergent only for either hand washing or when using a dishwasher.

5. Inspect the tank and seal for damage.

NOTE

Never use the water tank if the tank lid does not fit comfortably on the tank base.

6. Before using the tank, fill it with distilled water no higher than the maximum fill line located on the front and sides of the tank.

7. Reassemble the tank by placing the hinges on the tank lid over the two tabs on the back of the tank base. Close the lid until the tab on the lid snaps back under the lip in the tank base. Inspect the tank. When it is closed correctly, the lid should be seated completely on the middle seal and it should sit snugly on the tank

base so the tab can easily snap back in place. Inspect the water tank for any leaks or damage. If the water tank shows signs of wear or damage, replace the Water Chamber Assembly.

NOTE

If the lid does not close easily onto the base, separate the two parts, reassemble the tank, and inspect it again.

7.3.2 CLEANING THE HUMIDIFIER BASE

WARNING

- *Allow the humidifier heater plate and water to cool down for approximately 15 minutes before removing the water tank. A burn may result from: touching the heater plate, coming in contact with the heated water, or touching the tank pan.*
- *Before cleaning the humidifier, always remove from the therapy device.*

1. Clean the humidifier base and heater plate by wiping it with a damp cloth. Allow the platform to air dry before reconnecting to the therapy device.
2. Inspect the humidifier base for any damage and replace it if necessary.
3. Clean the humidifier outlet port by using a damp bottle brush or a damp cloth. Insert the brush or cloth approximately 7cm (2.75 inches) into the outlet opening while cleaning.

7.3.3 CLEANING THE HEATED TUBING

Clean the heated tubing before first use and weekly. Heated Tubing is single patient multi-use.

1. Disconnect the heated tubing from the heated humidifier. Refer to the “Disconnecting the Optional Heated Tubing” section earlier in this manual.
2. Gently wash the heated tubing in a solution of warm water and a mild detergent.

WARNING

Avoid submerging the Humidifier Connector End of the heated tubing in water.

NOTE

If the Humidifier Connector End of the tubing does get wet during the cleaning process, be sure to thoroughly rinse all soap residue from the connector and air dry before the next use.

3. Rinse thoroughly and allow to air dry. Make sure the tubing is dry before use.
4. Inspect the heated tubing for damage or wear (cracking, crazing, tears, punctures, etc.). Discard and replace if necessary.

7.3.4 HOSPITAL AND INSTITUTION DISINFECTION: WATER CHAMBER ASSEMBLY

CAUTION

Only the hospital and institution cleaning and disinfection procedures listed in this manual are recommended by Respironics. Use of other cleaning and disinfecting processes, not specified by Respironics, may affect the performance of the product.

1. Disassemble the tank by separating the tank lid and tank base.
2. While soaking the tank pieces in mild liquid dish detergent, use a soft bristle brush to clean each piece. Pay close attention to all corners and crevices.
3. Rinse each piece with water twice. Be sure to agitate it vigorously in water when rinsing and allow to air dry, but not in direct sunlight.
4. The following processes can be used to disinfect the water tank for a maximum of 60 cycles:
   - Thermal Disinfection: Immersion in a (tap) water bath at 75° C ± 2° C for 30 minutes
   - Control III
   - Cidex
   - Cidex OPA
5. Following disinfection, visually inspect each piece. Discard and replace any damaged parts.

CHAPTER 8: TESTING

This section provides procedures for conducting final testing of the Philips Respironics System One 60 Series devices. Final testing of a device is a mandatory requirement after a repair to the device, or if the device enclosure has been opened for any reason. This procedure includes Final Testing of the PR System One Humidifier. If testing only a Humidifier, a known good Philips Respironics System One 60 Series CPAP or b-level device must be available for use in conjunction with testing.

8.0 REQUIRED EQUIPMENT

Hardware:

- Link Module (includes DB9F-DB9M Cable) - RI p/n 1074113)
- Digital Manometer (RI p/n 302227, or equivalent) with Pressure Tubing
- Windows-compatible personal computer (PC) running Windows 97, 98, or XP
- Printer
- Flow meter (range: +180 to -180 lpm, 3% accuracy, 1 lpm resolution)
- Flow control valve (RI p/n 1037985)
- O_2 Enrichment Attachment (312710)
- Negative flow source (any CPAP capable of delivering 20 cm H_2O)
- Three (3) pieces 18” Patient Tubing (RI p/n 1008198)
- System One 60 Series Heated Humidifier
- Heated Patient Tubing (RI p/n 1090800) - if testing heated hose humidifier
- Whisper Swivel II (RI p/n 332113)
- End Cap (not available from Respironics), or similar device
- Pollen (Inlet) Filter (1035443)
- 60W Power Supply for non-heated tubing Humidifier
- 80W Power Supply for heated tubing Humidifier
- SD card (1 each), available in RI p/n 1063859 - 10 pack

Software:

- Latest version of Service Center Tools Suite (3.2 at time of release of this service manual)
- Latest version of PRS1 Service Test Software (1.5 at time of release of this service manual)
- Latest version of Product Operating Firmware Flash Upgrade Utility 3.XX (when applicable)

8.1 NECESSARY SOFTWARE

You must be a registered user to download service software and product operating software upgrades. If you are not a registered user, go to **http://my.respironics.com** and complete the on-line registration process. Refer to Section 1.2 for information on downloading software.

The Software programs that you will be using are written to communicate between the Device and the PC through PC Serial Communication Port 1 (Com1). Therefore you must:

- Verify that the Interface cable used to communicate with the Device has been connected to Com1 on the PC and
- That ***only*** one software program is being used at one time. Failure to close one program before opening and attempting to execute another program will result in a communications error. All PC to Device Communications require the use of Link Module Kit P/N 1074113.

8.1.1 DOWNLOADING THE SERVICE CENTER TOOLS SUITE SOFTWARE

1. Once you have logged onto **http://my.respironics.com**, click on the *Service Software and Documentation link*.

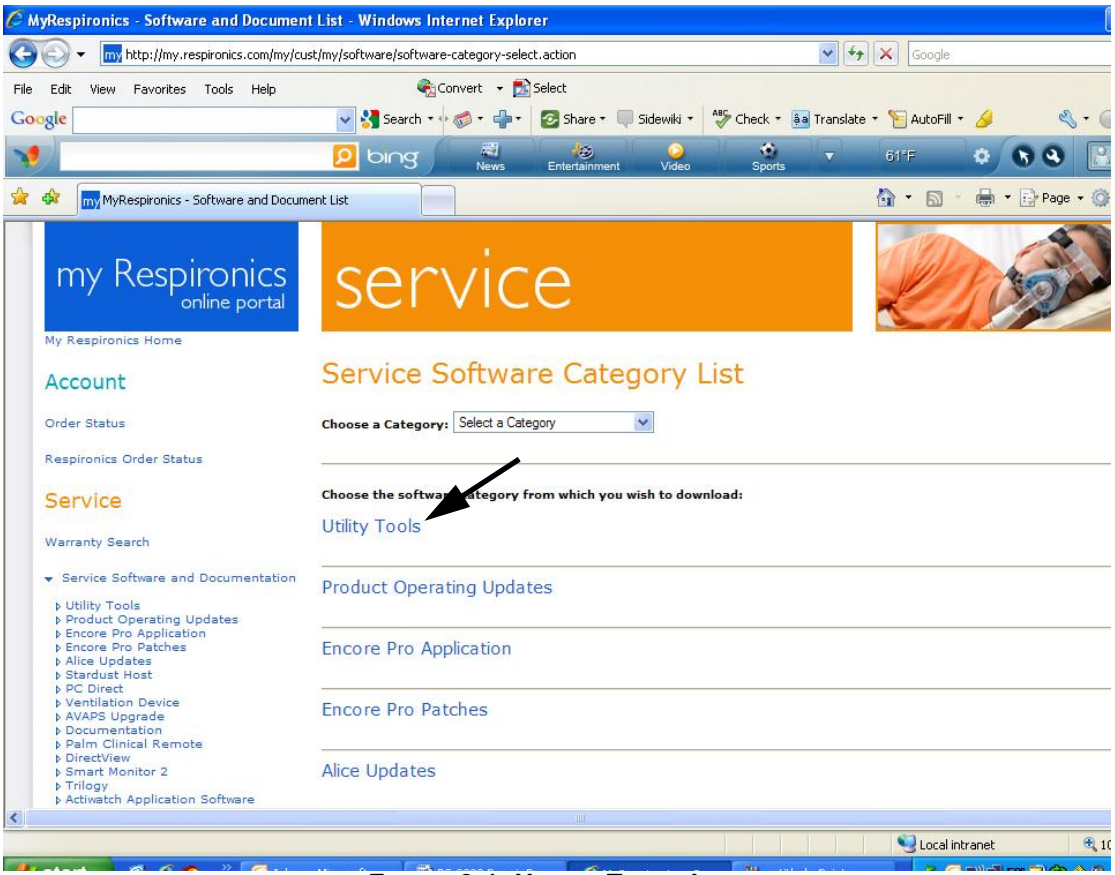


FIGURE 8-1: UTILITY TOOLS LINK

2. Navigate to *Service Center Utility Tools Suite 3.2* and click on the *Download* button adjacent to it.

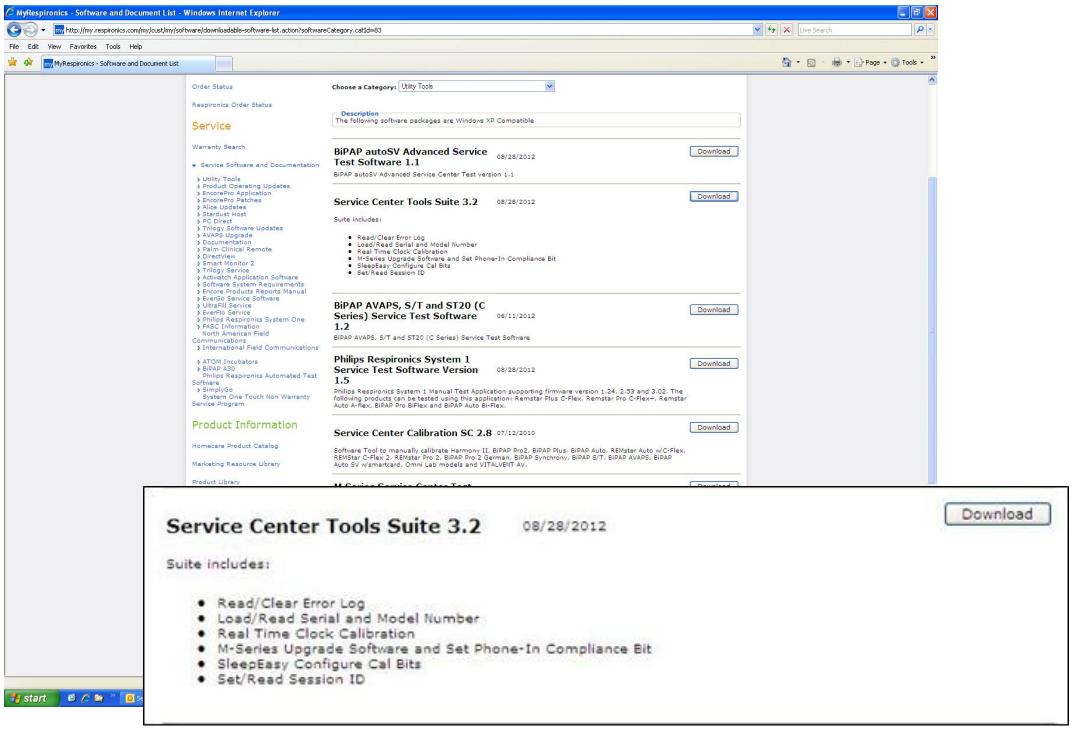


FIGURE 8-2: SERVICE CENTER TOOLS SUITE 3.2

3. If you wish to transfer the software to a different PC, click on the *Save* button and save the file to an accessible drive, otherwise, click on the *Open* button and download the software to your PC. Downloading the software to the default location will place it in the Windows *Start* menu, as shown in Figure 8-3.

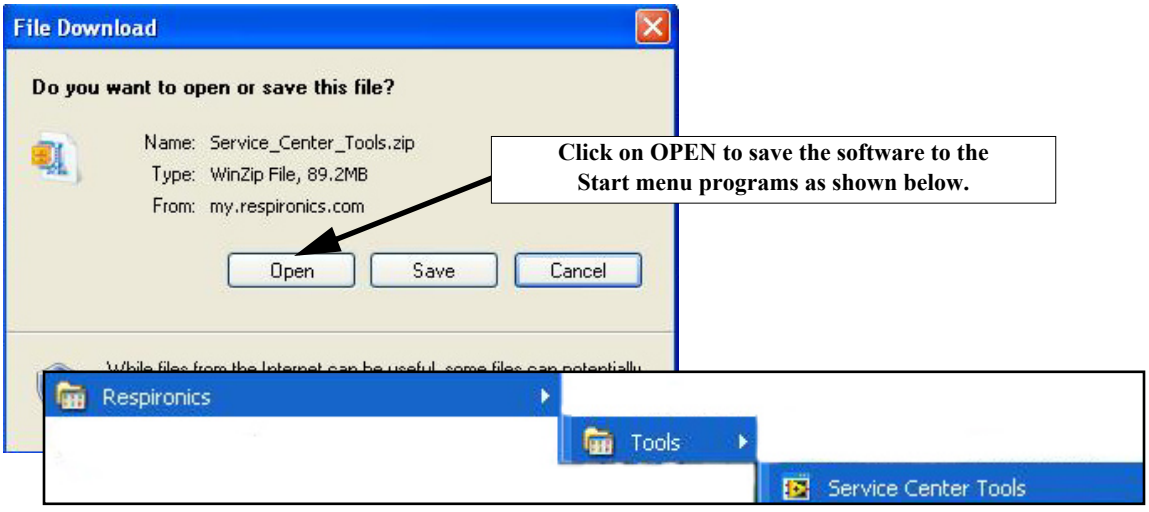


FIGURE 8-3: SAVING SOFTWARE

4. To use the *Service Center Tools Suite*, remove the SD Card Cover and connect the Link Module Interface between the Device and PC COM port 1.

5. Connect Power to the Device. Remember to use the correct Power Supply for heated or non-heated tubing Humidifiers.
6. Click on the Windows *Start* menu button and launch the Service Center Tools.
7. Select the Tool Drop Down arrow and the following will be available for selection.

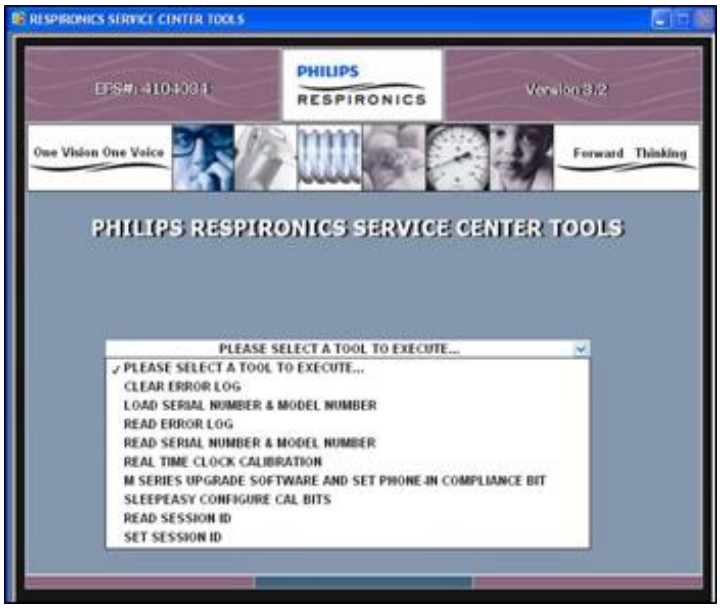


FIGURE 8-4: SERVICE CENTER TOOLS DROP-DOWN MENU

8.1.2 DOWNLOADING THE DEVICE TESTING SOFTWARE

1. This software is also located in the *Utility Tools* category. Select *Utility Tools* and locate *Philips Respironics System 1 Service Test Software*:

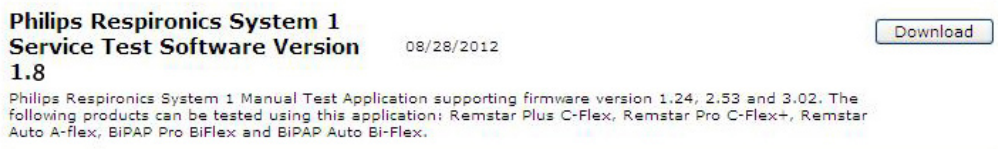


FIGURE 8-5: SERVICE TEST SOFTWARE

2. Click on the *Download* button and install the software, accepting all license agreements, and default installation locations. If you wish to transfer the software to a different PC, click on the *Save* button and save the file to an accessible drive, otherwise, click on the *Open* button and download the software to your PC.
3. By clicking on the *Open* button, the software will be installed to the PCs' *Start* menu and is named *P-Series Service Center Test*:

FIGURE 8-6: SERVICE TEST SOFTWARE IN THE START MENU

8.2 PREREQUISITES FOR FINAL TESTING (CLEAR ERROR LOG/VERIFY REAL-TIME CLOCK)

1. One of the first verifications that this test software performs validates that the Device under test is operating with the most current firmware version. If it is not, the test will immediately halt and fail the Device. Therefore, before testing, verify that the Device is operating with the most current version and if required, upgrade the Device using the Flash Upgrade Utility.
2. The Device Error Log must be cleared. Refer to Section 5.3 of this service manual for information on clearing the device's error log.
3. The Device Real Time Clock must be accurate. Verify and/or calibrate the Device Real-time Clock. To Verify/Calibrate the device's Real-time Clock, click on the *Start* menu button and launch the *Service Center Tools* application.
4. Select *Real Time Clock Calibration* from the drop-down menu.
5. Click on the *Set RT Clock* button to set the Real-time clock (this should be performed any time a PCA has been replaced. You can also verify the Real-time clock by clicking on the *Verify RT Clock* button.

FIGURE 8-7: SET/VERIFY REAL-TIME CLOCK

CAUTION

Prior to Setting or Verifying the device's Real-time Clock, confirm that he PC's date and time are accurate. Refer to the PC's operating instructions for setting the PC's date and time as necessary.

8.3 FINAL TESTING PROCEDURE

1. RUn in the device at maximum output pressure for 20 minutes.
2. Launch the *P Series Service Center Test* software from the Windows *Start* menu.
3. Enter the device's serial number, model number, and your name when prompted.
4. The test software requires operator interaction throughout the testing program. Be sure to observe and input accurate information in a timely manner.
5. When setting up the Device as per the *Action Required* prompt shown in Figure 8-8, be sure to:
   a. Remove the SD Card Cover and verify that the SD Card is inserted properly,

b. Use the correct Power Supply required for the Humidifier you will being used for testing (60W for non-heated tubing humidifiers or 80W for heated tubing humidifiers), and

c. Connect the Link Module between the Device and PC Communication Port 1(Com 1 only).

FIGURE 8-8: ACTION REQUIRED WINDOW

6. Click on the *Done* button when ready and proceed with following all prompts and inputting appropriate responses.
7. At the completion of the humidifier testing section, the following *Action Required* prompt will appear for setting up equipment for the pressure verification.

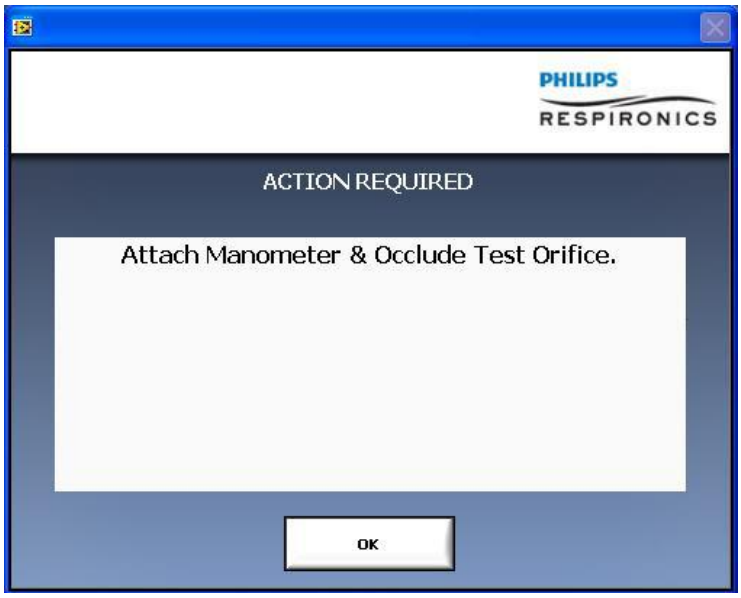


FIGURE 8-9: ACTION REQUIRED WINDOW

8. Connect the equipment as follows (refer to Figure 8-10):
   a. Remove the six (6) foot Heated Tubing from the Humidifier Outlet Port, if applicable.

b. Connect the O_2 enrichment attachment to the Humidifier Outlet Port and occlude the end of the attachment.

c. Zero the Manometer, if applicable, and connect the pressure tubing between the Manometer and the enrichment attachment pick-off port.

FIGURE 8-10: PRESSURE TEST SETUP

9. Click on the *Done* button when ready.
10. When prompted, enter the pressure reading from the manometer display for all requested pressures.
11. When the following *Action Required* window appears, you will have to set up additional equipment. Proceed to step 12.

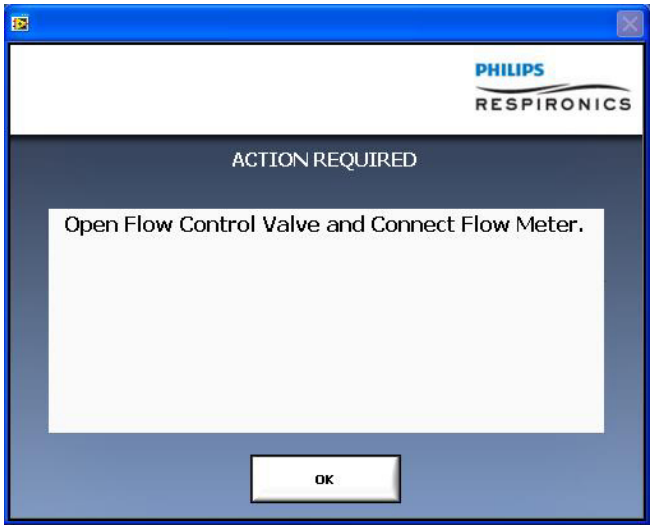


FIGURE 8-11:

12. Connect the equipment as follows (refer to Figure 8-12).
    a. Remove the O2 enrichment attachment with manometer from the Humidifier Outlet Port.

b. Connect one section of 18 inch Patient Tubing to the Humidifier Outlet Port and connect the other end of the tubing to the Flow Control Valve.

c. Connect one section of 18 inch tubing between the other end of the Flow Control Valve and the Flow Meter.

FIGURE 8-12: FLOW MEASUREMENT SETUP

13. Verify that the Flow Control Valve is completely open and select the Done button when ready.
14. Monitor the Flow Meter display and select the appropriate interactive button on the test software display to increase or decrease the blower speed to adjust the flow to the requested setting.

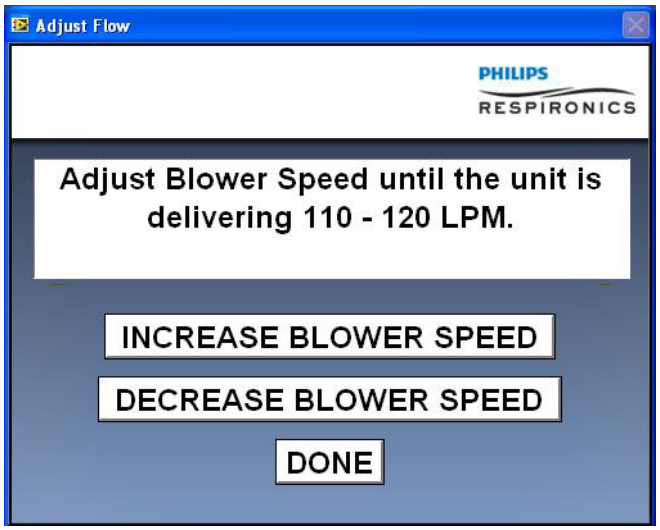


FIGURE 8-13: ADJUST BLOWER SPEED

15. For the remaining flow verifications, adjust the Flow Control Valve to the requested setting and enter the appropriate flow measurement when prompted.

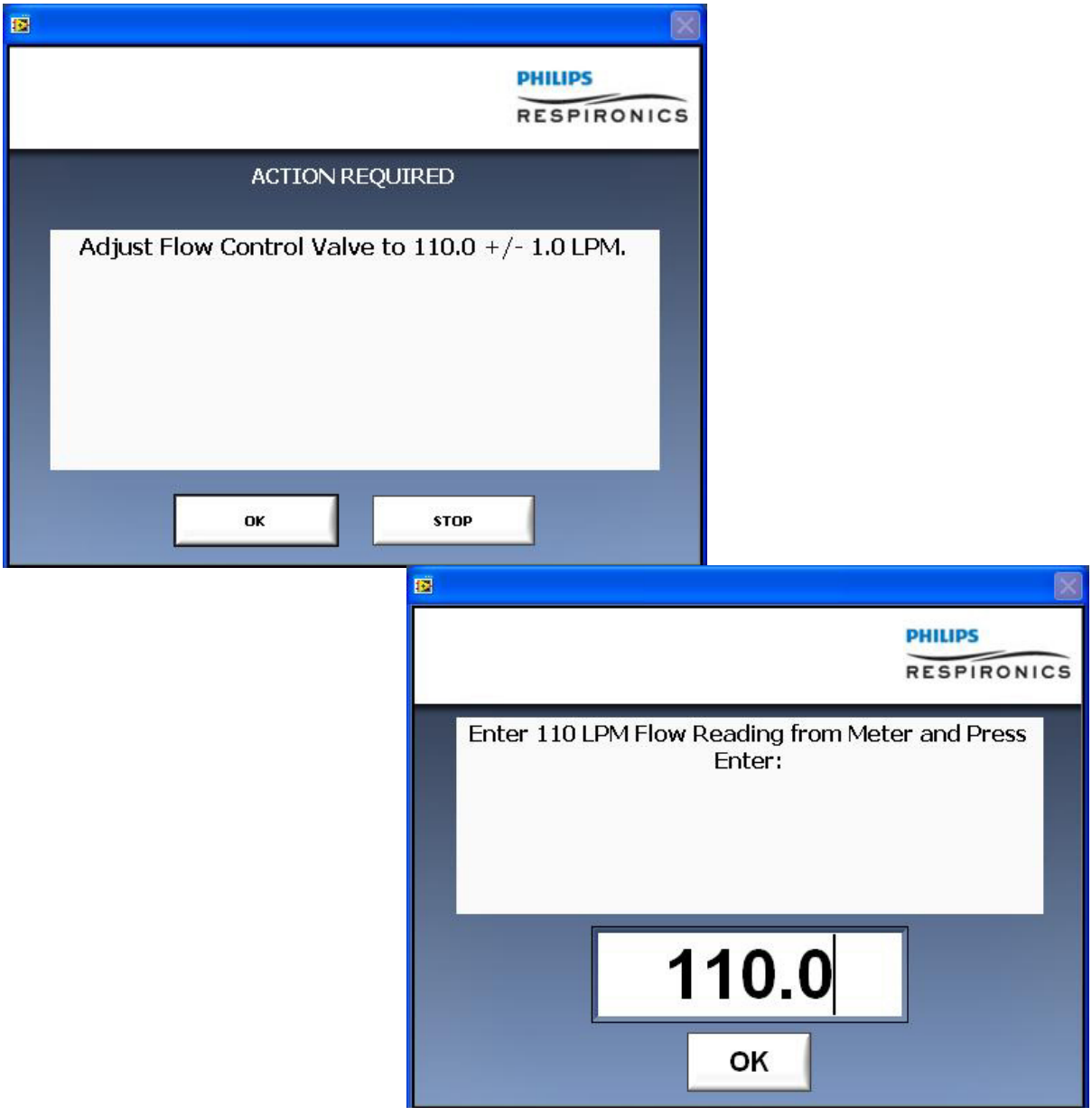


FIGURE 8-14: FLOW VALVE ADJUSTMENT/READING

16. When the following *Action Required* window appears, you will have to set up additional equipment. Proceed to step 17.

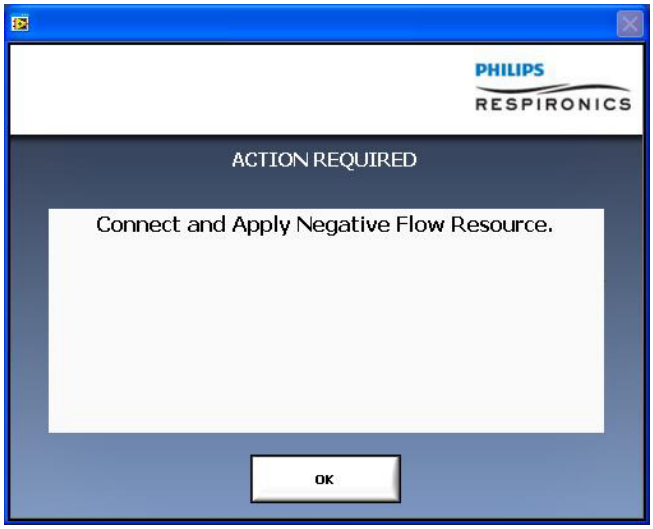


FIGURE 8-15

17. Setup for the negative flow portion of testing as follows (refer to Figure 8-16):
    a. Connect the Power Supply to the Device which you will be using as the negative flow source and adjust the Device to the maximum pressure setting.
    b. Connect the last section of 18 inch tubing between the outlet port of this Device and the open end of the flow meter.
    c. Start the blower of this Device.

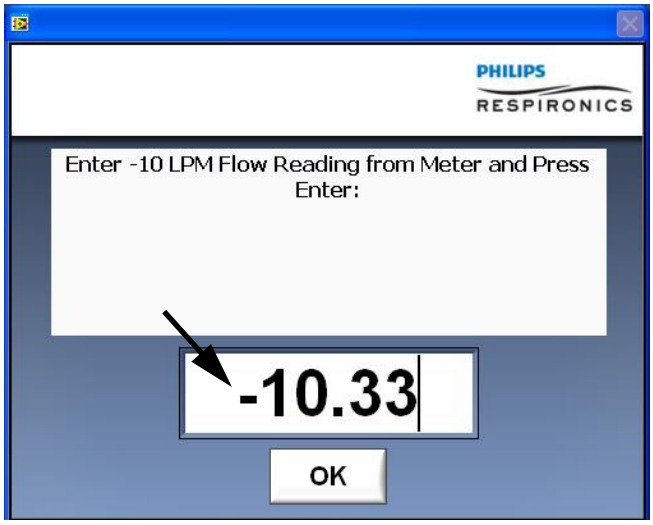
FIGURE 8-16: NEGATIVE FLOW SETUP

18. Click on the *OK* button when ready.

19. For the remaining negative flow verifications, adjust the Flow Control Valve to the requested setting and enter the appropriate flow measurement when prompted.

NOTE

- *This particular flow meter will not display a minus sign as an indication of negative flow. Negative flow is described as the flow from the negative flow source, flowing back into the Device under test to simulate a patient breathing or exhaling into the Device.*
- *When entering the negative flow information, you must enter a minus sign for the negative value, as follows:*



20. Complete testing by following all remaining *Action Required* prompts and entering all information appropriately.
21. When complete, a test report will be printed. Sign and save the test sheet as required by your facility's procedures.
22. If the Device fails testing, troubleshoot for repair and re-test.
23. If the Device passes testing, close the Test Software and Clear the Devices Error Log. This step removes any errors that may have been created during testing.

8.4 PERFORMANCE VERIFICATION

If part of your patient setup procedure is to verify actual pressure with a manometer, please use the following instructions to ensure that the device is functioning properly. This performance verification can be used as a quick check of the system, and can be performed at any time to confirm proper operation of the device.To verify the pressure, complete the following steps:

1. Install a clean foam filter into the back of the device.
2. With the device unplugged, connect the system as shown in Figure 8-17.

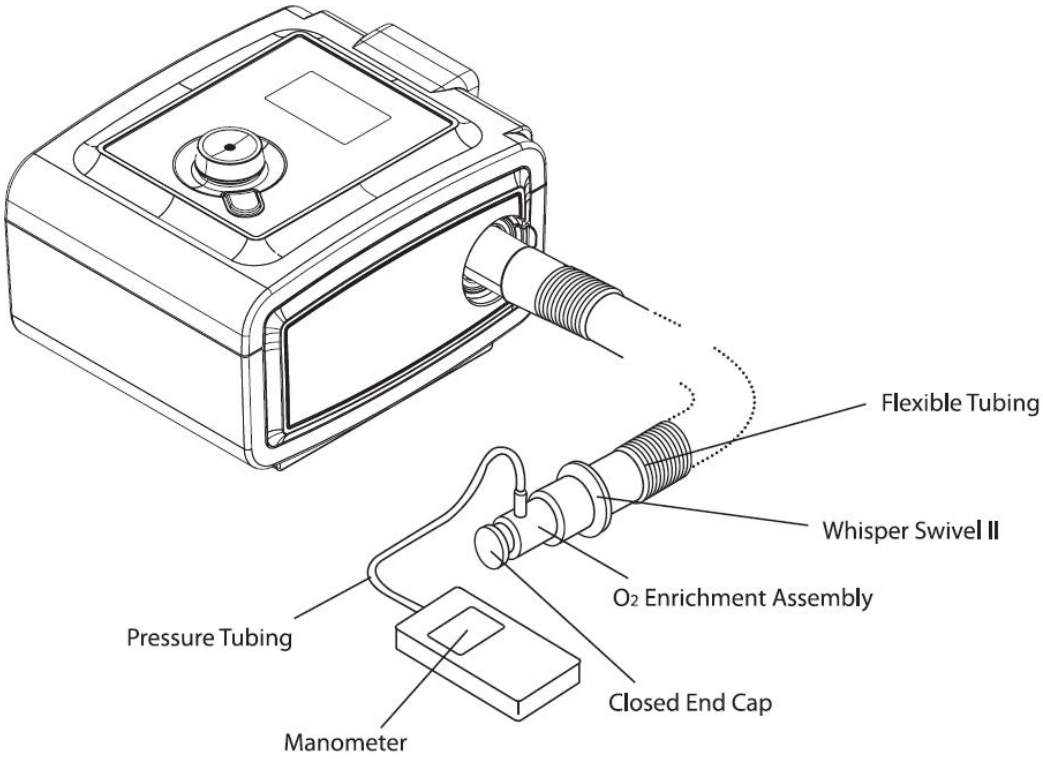


FIGURE 8-17: PERFORMANCE VERIFICATION SETUP

NOTE

If the device was returned with a Humidifier, connect it to the Therapy Device and complete this procedure.

3. Turn the manometer on. If it does not display a reading of zero, adjust the manometer to calibrate it. If the manometer has variable settings for devices, set it to cm H_2O.
4. Supply power to the device then place the device in provider mode.
5. Set the device to the 4.0 cm H_2O in CPAP mode. For Bi-level devices, set both IPAP and EPAP to 4.0 cm H_2O and turn on the Blower.
6. Verify that the pressure displayed on the manometer is within the tolerance provided in the Performance Verification Data Sheet located on page 8-14.
7. Set the device to the maximum therapy delivery setting, 20.0 cm H_2O for CPAP devices. For Bi-level devices, set both IPAP and EPAP to 25.0 cm H_2O and turn on the Blower.
8. Verify that the pressure displayed on the manometer is within the tolerance provided in the Performance Verification Data Sheet located on page 8-14.

9. If the measured pressure value is not within the tolerances specified in the Performance Verification Data Sheet located on page 8-14, prepare the device for troubleshooting and/or repair.

NOTE

Output pressures may vary at local altitude and barometric pressure. Because of these factors, devices may slightly vary in output pressure over the range of the altitude settings.

PERFORMANCE VERIFICATION DATA SHEET

Notification # (if applicable):	
Model #/Serial #:	/
Model Name:	
Line Voltage:	
Blower Hours	

BiPAP (Bi-Level)			
	*IPAP Setting**	*EPAP Setting**	*Manometer Reading (Tolerance)**
	4	*4*	*(3.50-4.50)*
	25	*25*	*(24.00-26.00)*
**Pressure Setting units and Manometer Reading Units are cm H_2O.*			

CPAP		
	*Pressure Settings**	*Manometer Reading (Tolerance)**
	4	*(2.00-6.00 for REMstar Plus w/C-Flex)* *(3.50-4.50 for all other devices)*
	20	*(18.00-22.00 for REMstar Plus w/C-Flex)* *(19.00-21.00 for all other devices)*
**Pressure Setting units and Manometer Reading Units are cm H_2O.*		

	Humidifier Test
Heater Plate warms and cools appropriately (	*PASS / FAIL (circle one)*

NOTE

If the device does not pass all tests, perform repairs as necessary and retest the device.

	Result
Pressure Verification	*PASS / FAIL (circle one)*

Tested By (Print / Sign): _____ / _____ *Date:* ____ / ____ / ____

CHAPTER 9: SCHEMATICS

9.0 PROPRIETARY STATEMENT

Schematics are supplied in direct support of the sale and purchase of this product.

The Schematics are proprietary and confidential. Do not copy the schematics or disclose them to third parties beyond the purpose for which they are intended.

The schematics are intended to satisfy administrative requirements only. They are not intended to be used for component level testing and repair. Any changes of components could effect the reliability of the device, prohibit lot tracking of electronic components, and void warranties. Repairs and testing are supported only at the complete board level.

The schematics are of the revision level in effect at the time this manual was last revised. New revisions may or may not be distributed in the future.

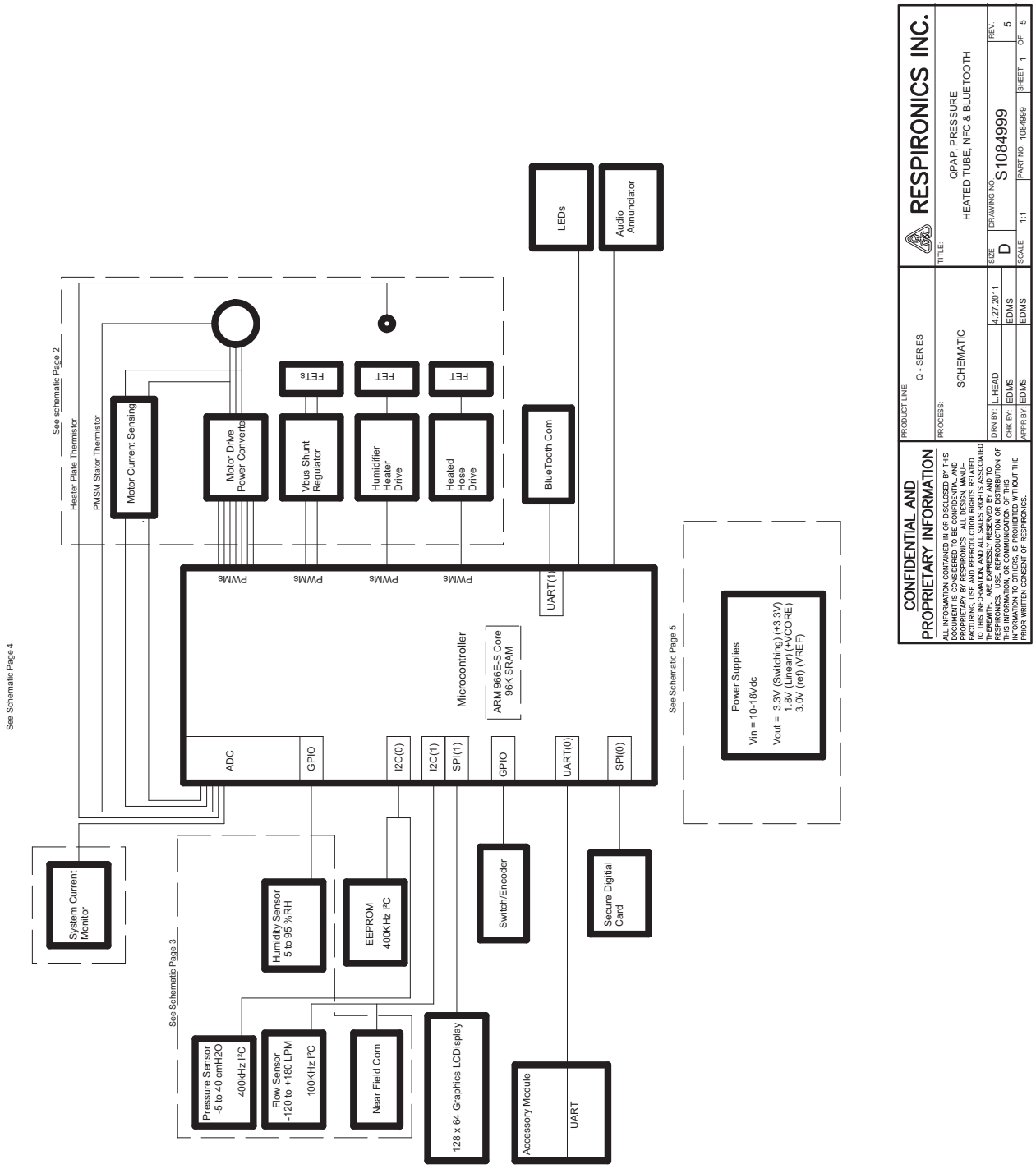
NOTE

The schematics on pages 9-2 through 9-6 are for the following device model numbers:

- *46X*
- *56X*
- *66X*
- *76X*

The schematics on pages 9-7 through 9-11 are for the following device model numbers:

- *26X*

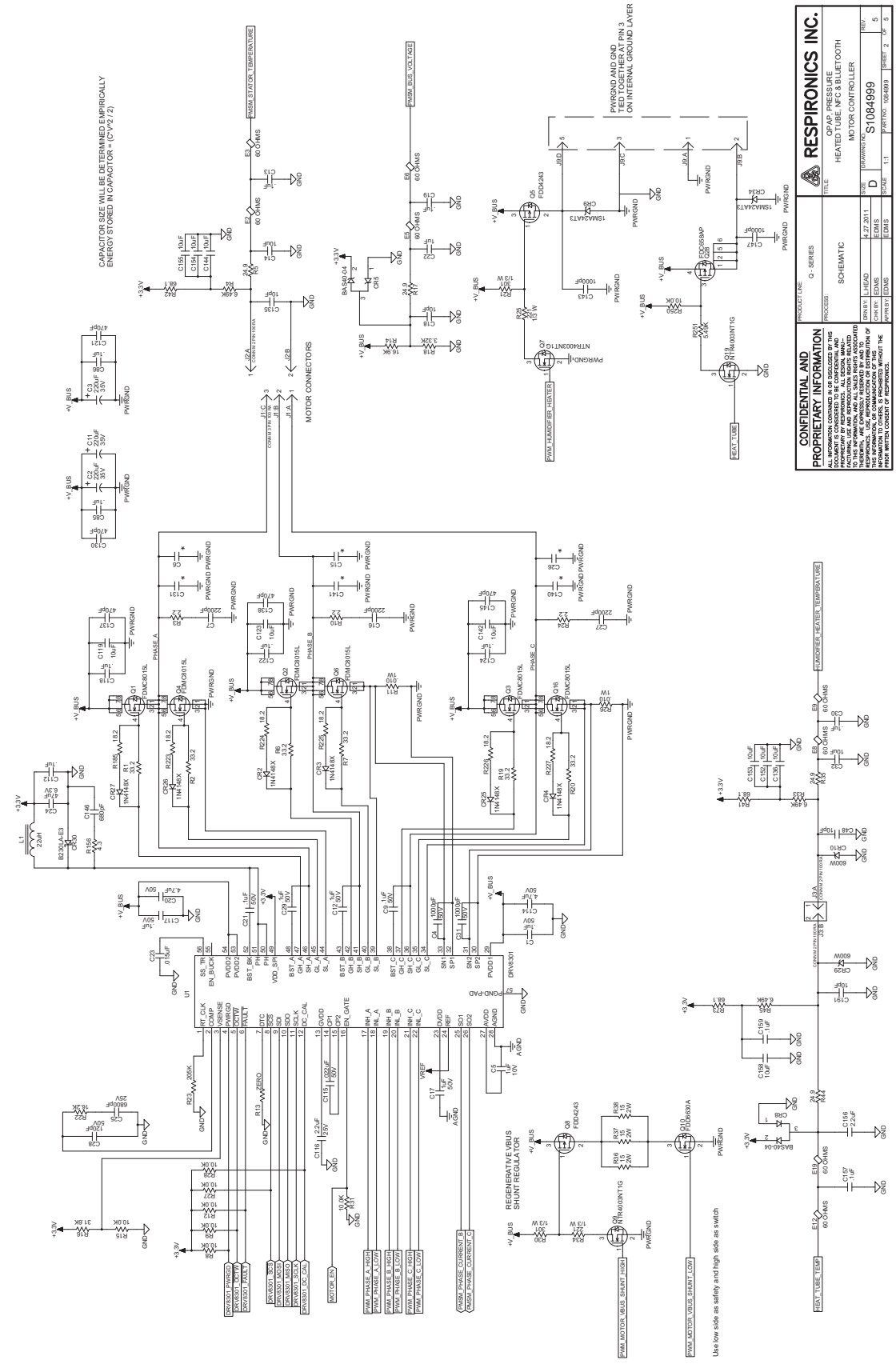


PRODUCT LINE: Q - SERIES
PROCESS: SCHEMATIC

RESPIRONICS INC.

TITLE: QPAP, PRESSURE HEATED TUBE, NFC & BLUETOOTH

DRN BY:	L.HEAD	4.27.2011	SIZE: D	DRAWING NO. S1084999	REV. 5
CHK BY:	EDMS	EDMS	SCALE 1:1	PART NO. 1084999	SHEET 1 OF 5
APPR BY:	EDMS	EDMS			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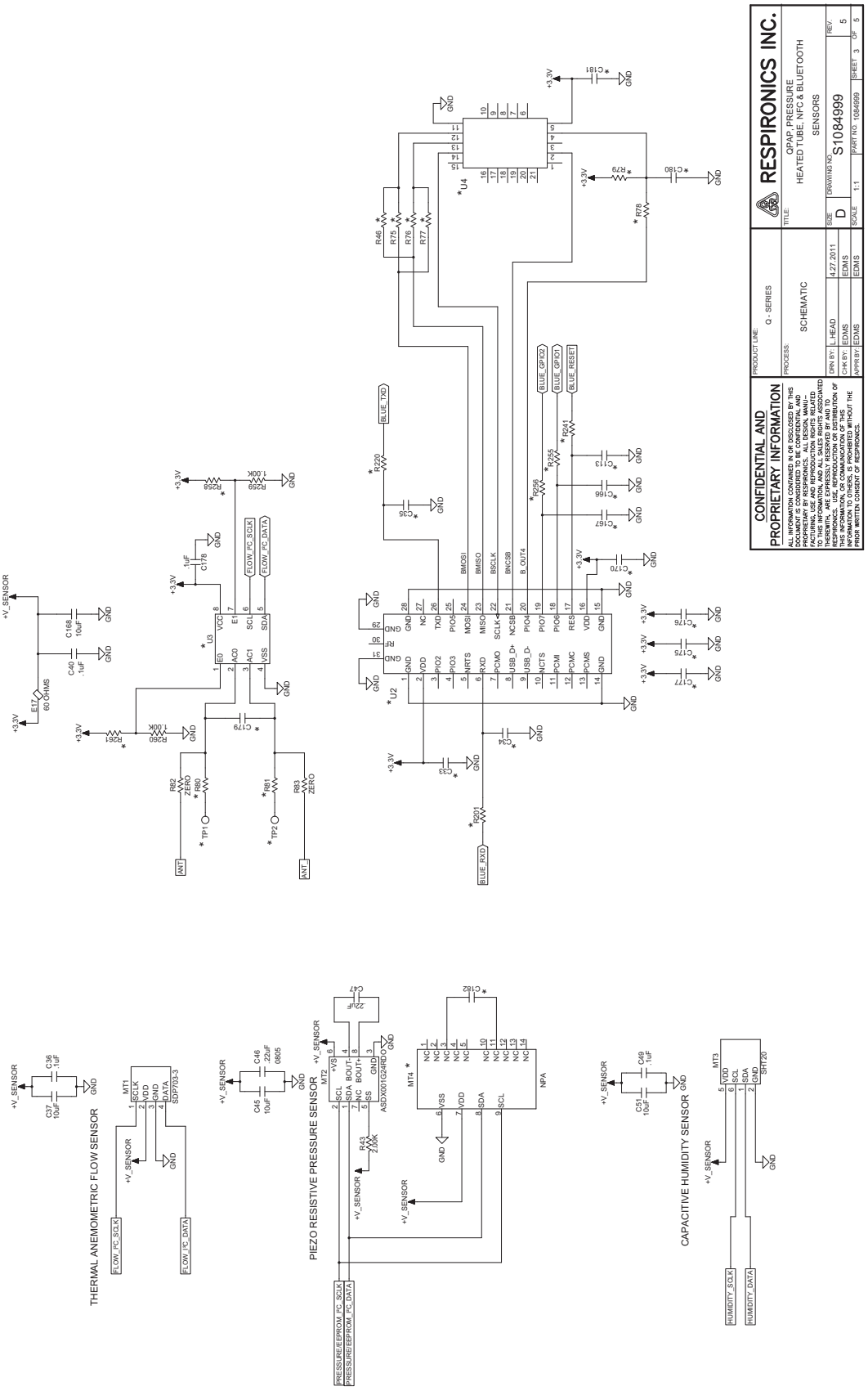
RESPIRONICS INC.
TITLE: QPAP, PRESSURE HEATED TUBE, NFC & BLUETOOTH MOTOR CONTROLLER
SCHEMATIC
S1084999
MOTOR CONNECTORS
REGENERATIVE VBUS SHUNT REGULATOR
HEATED TUBE
HUMIDIFIER HEATER
PWRGND AND GND TIED TOGETHER AT PIN 3 ON INTERNAL GROUND LAYER
CAPACITOR SIZE WILL BE DETERMINED EMPIRICALLY ENERGY STORED IN CAPACITOR = (CV^2 / 2)
Use low side as safety and high side as switch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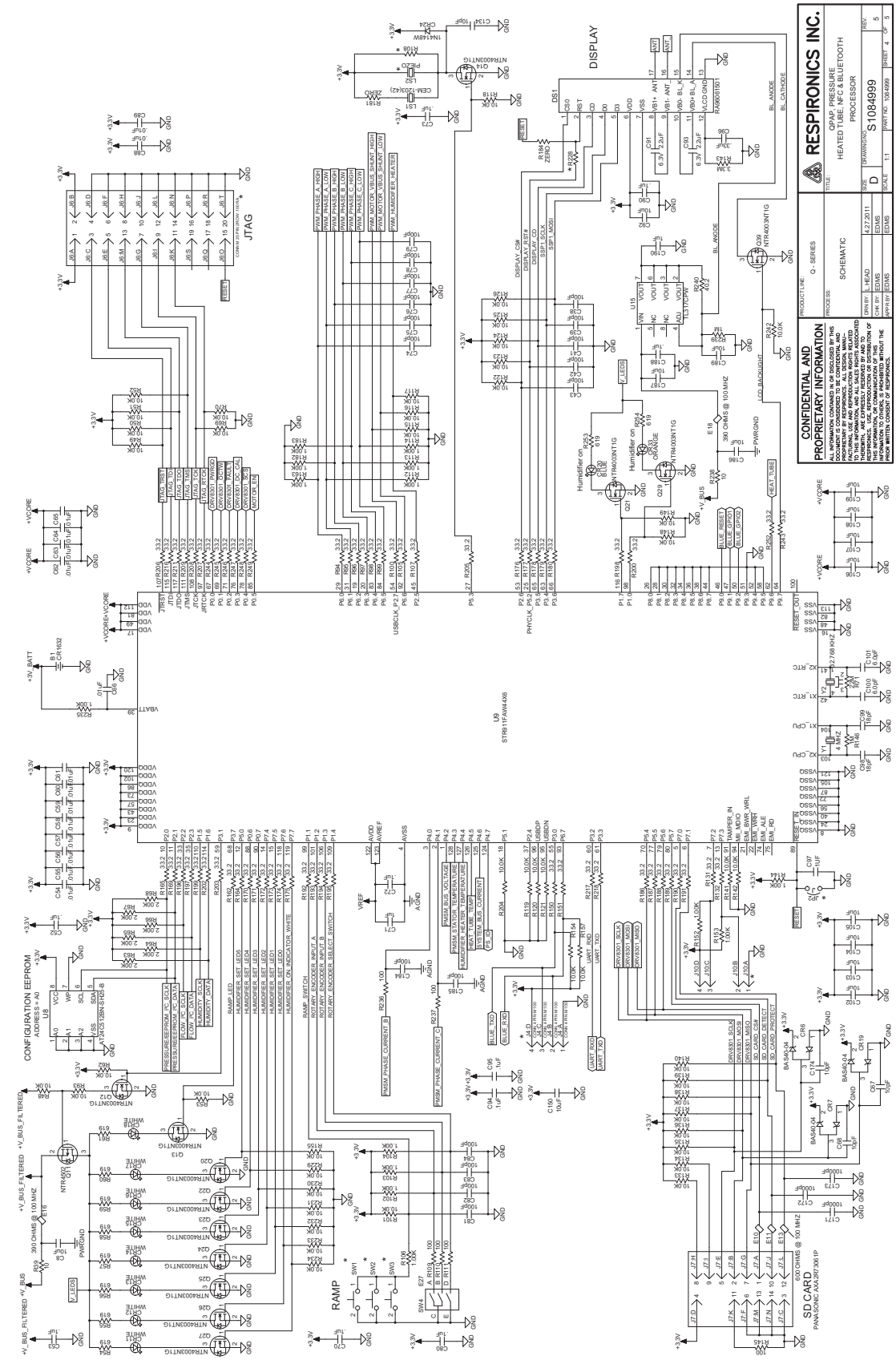
SCHEMATIC
QPAP, PRESSURE HEATED TUBE, NFC & BLUETOOTH SENSORS
S1084999
THERMAL ANEMOMETRIC FLOW SENSOR
PIEZO RESISTIVE PRESSURE SENSOR
CAPACITIVE HUMIDITY SENSOR


RESPIRONICS INC.
QPAP, PRESSURE
HEATED TUBE, NFC & BLUETOOTH
PROCESSOR
SCHEMATIC
S1084999
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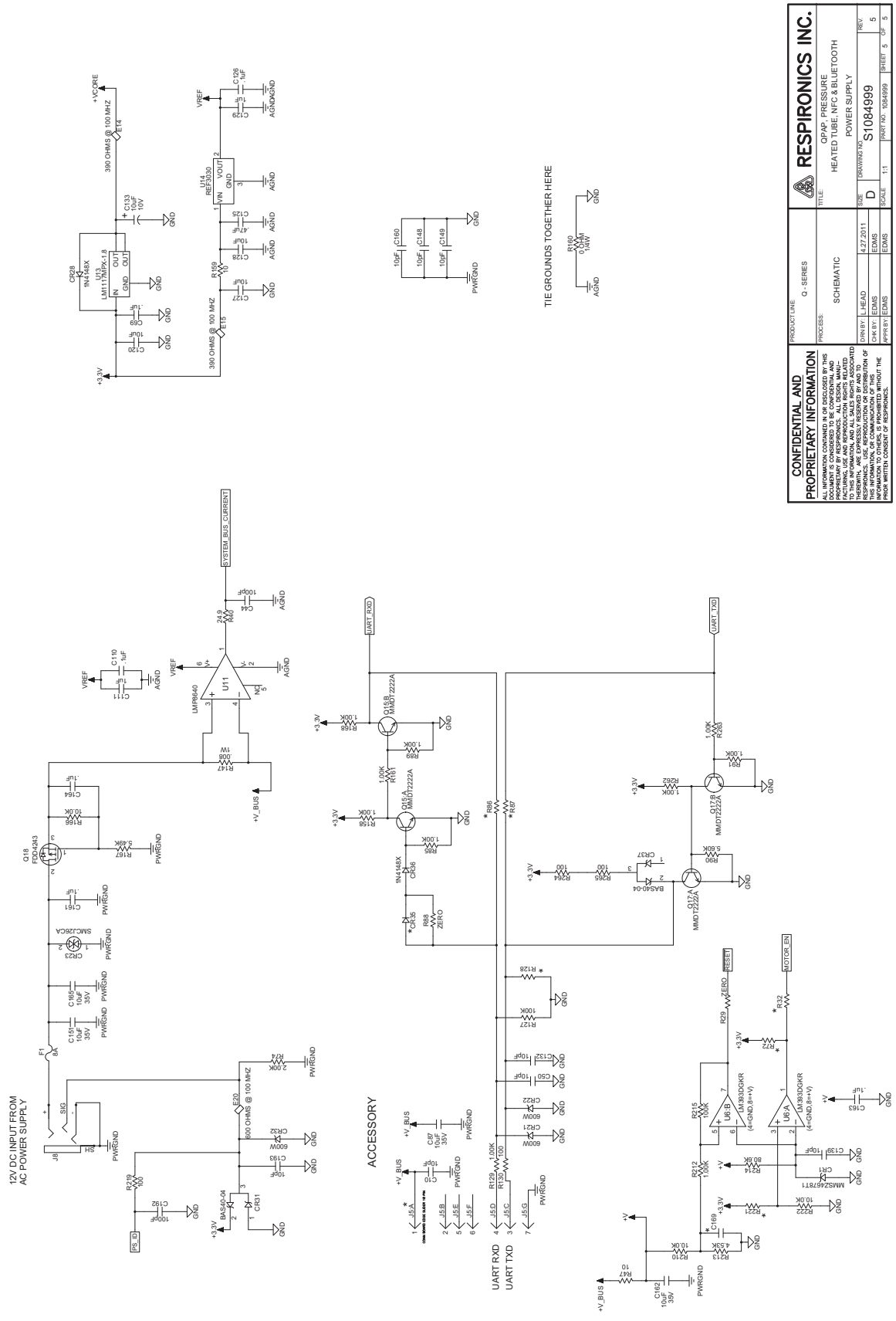
DISPLAY
JTAG
RAMP
SD CARD
CONFIGURATION EEPROM
U9
STR911FAW44X6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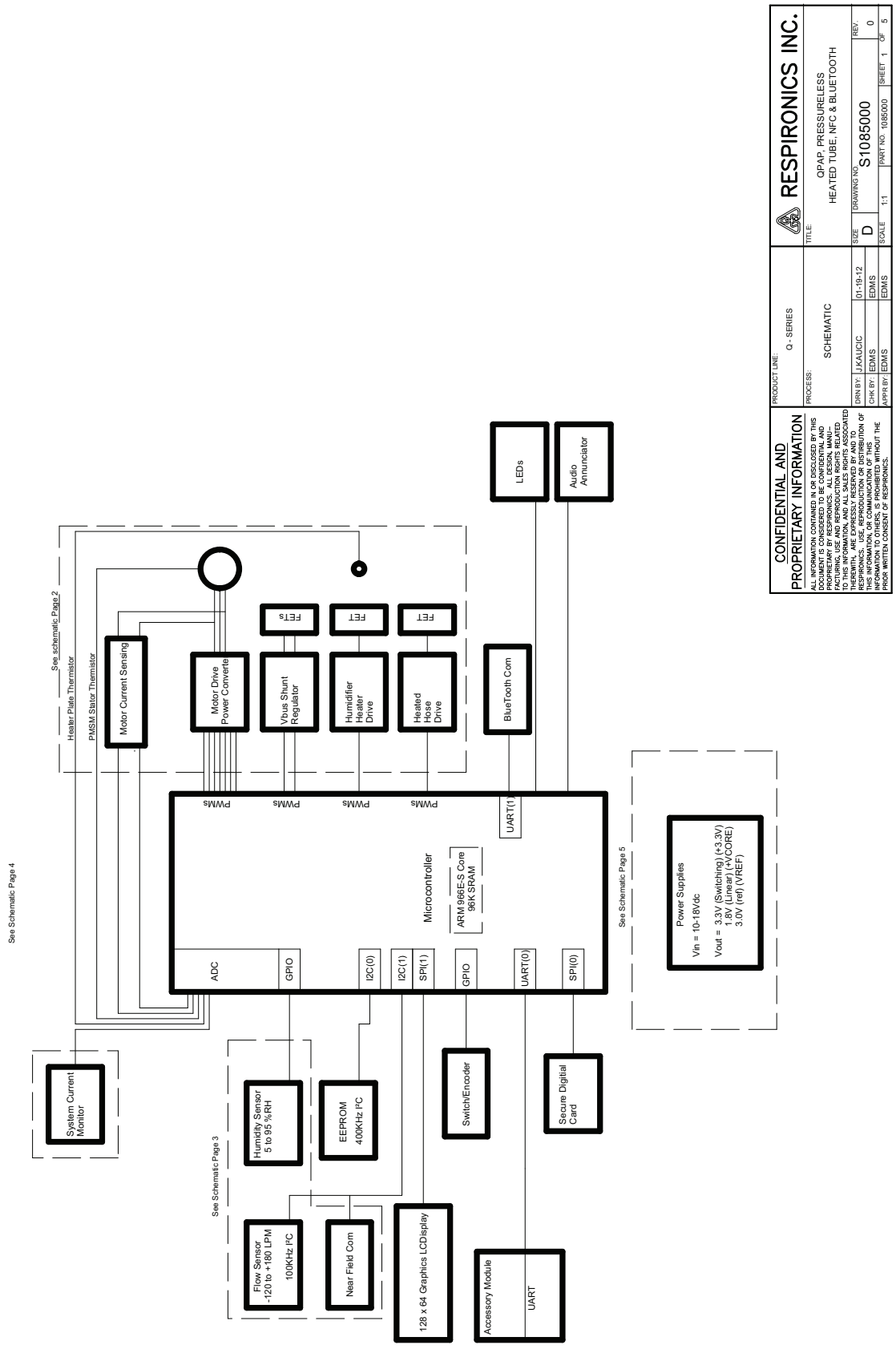
PRODUCT LINE: G - SERIES
PROCESS: SCHEMATIC
DRN BY: L.HEAD 4.27.2011
CHK BY: EDMS EDMS
APPR BY: EDMS EDMS
RESPIRONICS INC.
TITLE: CPAP, PRESSURE HEATED TUBE, NFC & BLUETOOTH POWER SUPPLY
SIZE: D
DRAWING NO: S1084999
REV: 5
SCALE: 1:1
PART NO: 1084999
SHEET 5 OF 5
12V DC INPUT FROM AC POWER SUPPLY
ACCESSORY
UART RXD
UART TXD
TIE GROUNDS TOGETHER HERE
SYSTEM_BUS_CURRENT
UART_RXD
UART_TXD
MOTOR_ISN
RESET
ZERO
+V_BUS
+3.3V
+VCORE
VREF
AGND
PWRGND
GND


See schematic Page 2
Heater Plate Thermistor
PMSM Stator Thermistor
Motor Current Sensing
Motor Drive Power Converte
Vbus Shunt Regulator
Humidifier Heater Drive
Heated Hose Drive
FETs
FET
FET
FET
BlueTooth Com
LEDs
Audio Annunciator
PWMs
PWMs
PWMs
PWMs
UART(1)
Microcontroller
ARM 966E-S Core
96K SRAM
ADC
GPIO
I2C(0)
I2C(1)
SPI(1)
GPIO
UART(0)
SPI(0)
See Schematic Page 4
See Schematic Page 5
Power Supplies
Vin = 10-18Vdc
Vout = 3.3V (Switching) (+3.3V)
1.8V (Linear) (+VCORE)
3.0V (ref) (VREF)
System Current Monitor
See Schematic Page 3
Humidity Sensor 5 to 95 %RH
EEPROM 400KHz I²C
SwitchEncoder
Secure Digital Card
Flow Sensor -120 to +180 LPM 100KHz I²C
Near Field Com
128 x 64 Graphics LCDisplay
Accessory Module
UART
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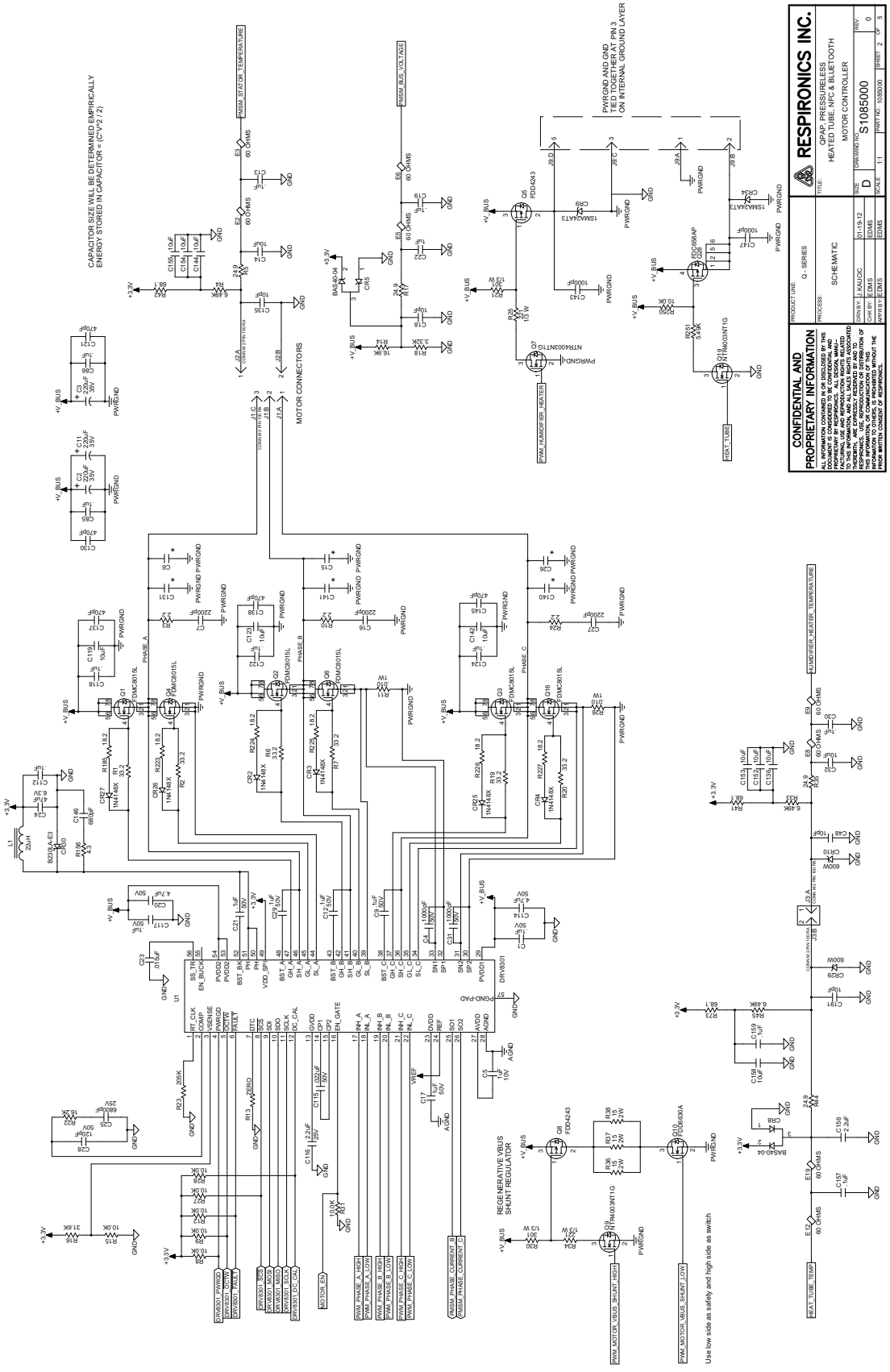
DRN BY: JKAUCIC 01-19-12
CHK BY: EDMS EDMS
APPR BY: EDMS EDMS
RESPIRONICS INC.
TITLE: QPAP, PRESSURELESS HEATED TUBE, NFC & BLUETOOTH
SIZE: D
DRAWING NO: S1085000
REV: 0
SCALE: 1:1
PART NO. 1085000
SHEET 1 OF 5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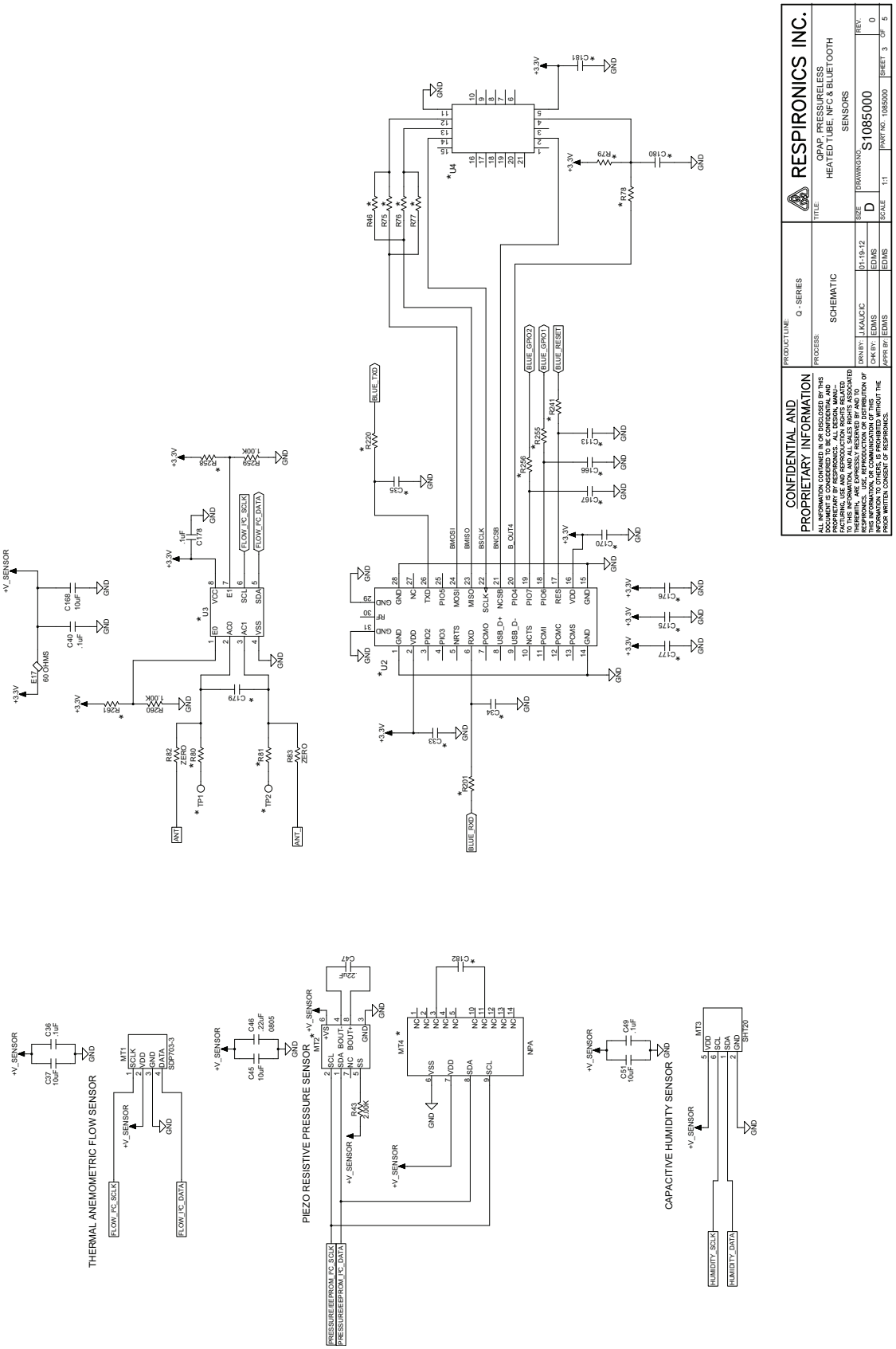
REGENERATIVE VBUS SHUNT REGULATOR
CAPACITOR SIZE WILL BE DETERMINED EMPIRICALLY ENERGY STORED IN CAPACITOR = (C*V^2 / 2)
PWRGND AND GND TIED TOGETHER AT PIN 3 ON INTERNAL GROUND LAYER
HUMIDIFIER_HEATER_TEMPERATURE
HEAT_TUBE_TEMP
PWM_HUMIDIFIER_HEATER
HEAT_TUBE
PWM_MOTOR_VBUS_SHUNT_HIGH
PWM_MOTOR_VBUS_SHUNT_LOW
Use low side as safety and high side as switch
MOTOR_ENABLE
PWM_PHASE_A_HIGH
PWM_PHASE_A_LOW
PWM_PHASE_B_HIGH
PWM_PHASE_B_LOW
PWM_PHASE_C_HIGH
PWM_PHASE_C_LOW
PWM_PHASE_CURRENT_B
PWM_PHASE_CURRENT_C
DRV8301_PWRGD
DRV8301_OCTW
DRV8301_FAULT
DRV8301_MOSI
DRV8301_MISO
DRV8301_SCLK
DRV8301_DC_CAL
PWM_STATOR_TEMPERATURE
PWM_BUS_VOLTAGE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PROCESS: SCHEMATIC
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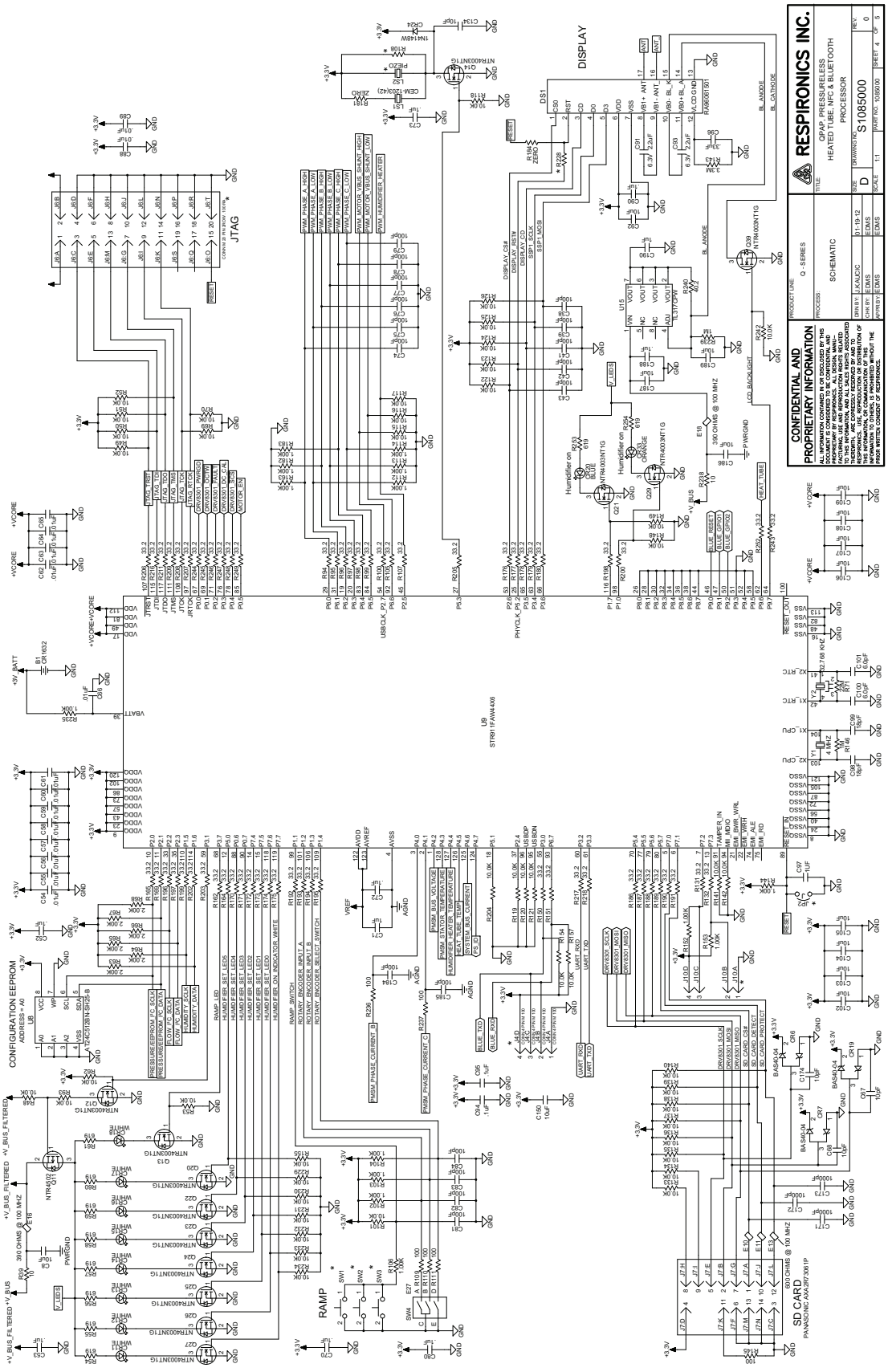
SIZE: D
DRAWING NO: S1085000
REV: 0
SCALE: 1:1
PART NO: 1085000
SHEET 3 OF 5
DRN BY: J.KAUCIC 01-19-12
CHK BY: EDMS EDMS
APPR BY: EDMS EDMS
THERMAL ANEMOMETRIC FLOW SENSOR
PIEZO RESISTIVE PRESSURE SENSOR
CAPACITIVE HUMIDITY SENSOR
+V_SENSOR
+3.3V
GND
FLOW_I²C_SCLK
FLOW_I²C_DATA
PRESSUREEEPROM_I²C_SCLK
PRESSUREEEPROM_I²C_DATA
HUMIDITY_SCLK
HUMIDITY_DATA
BLUE_TXD
BLUE_RXD
BLUE_GPIO2
BLUE_GPIO1
BLUE_RESET
ANT
U2
U3
U4
MT1
MT2
MT3
MT4
TP1
TP2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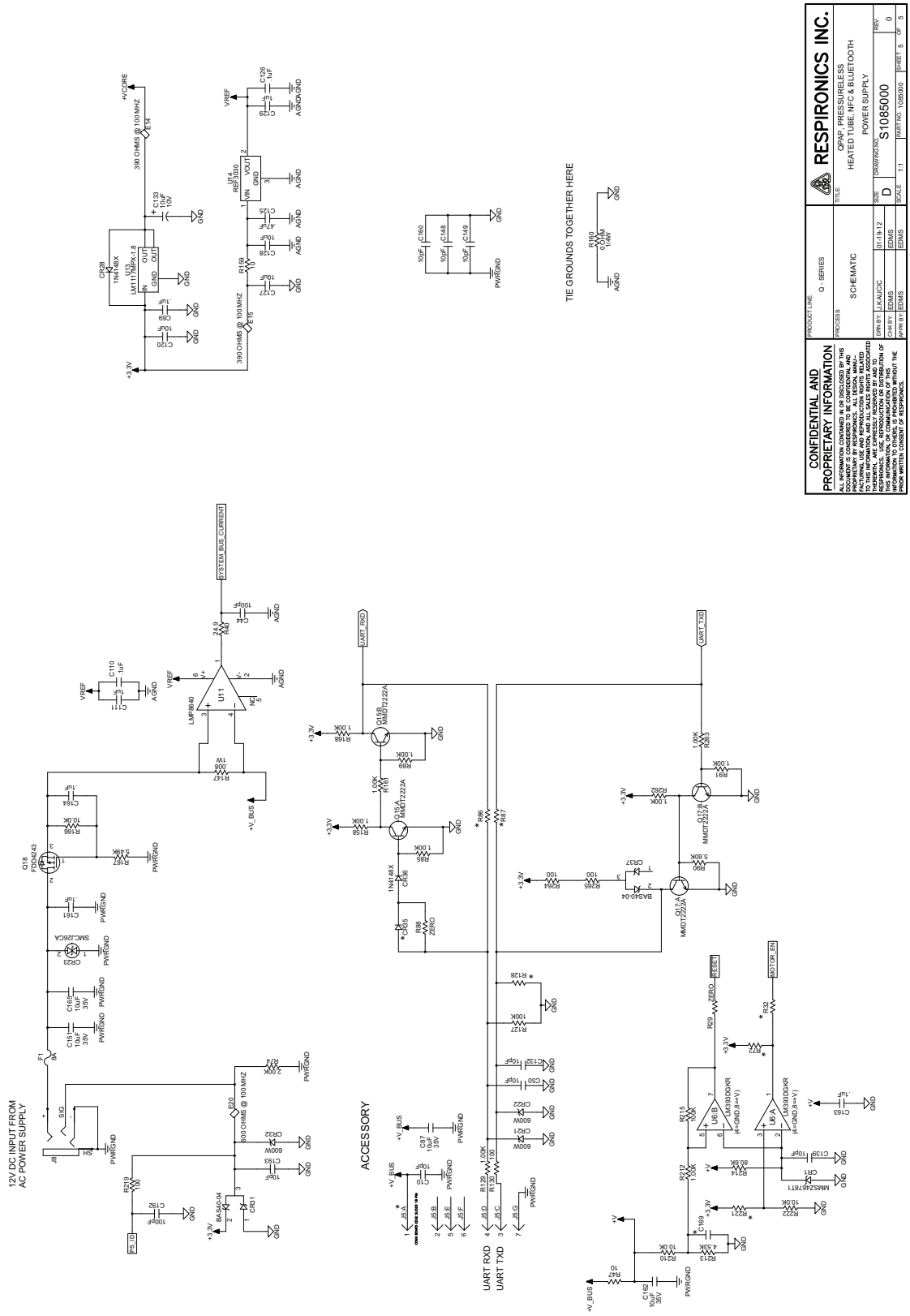
JTAG
SD CARD
RAMP
CONFIGURATION EEPROM
PRESSURE EEPROM
HUMIDIFIER
HEATED TUBE
BLUETOOTH
STR91FAW44X6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RESPIRONICS INC.
PRODUCT LINE: Q - SERIES
PROCESS: SCHEMATIC
TITLE: QPAP, PRESSURELESS HEATED TUBE, NFC & BLUETOOTH POWER SUPPLY
DRAWING NO. S1085000
SIZE: D
REV: 0
SCALE: 1:1
PART NO. 1085000
SHEET 5 OF 5
12V DC INPUT FROM AC POWER SUPPLY
ACCESSORY
UART RXD
UART TXD
TIE GROUNDS TOGETHER HERE
SYSTEM_BUS_CURRENT
MOTOR_EN
RESET
+V_BUS
+3.3V
VREF
PWRGND
AGND
GND

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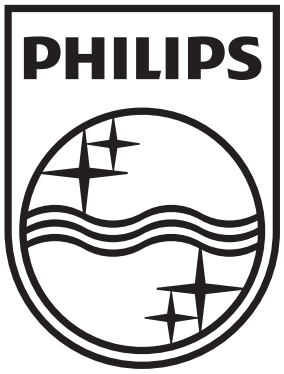

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Murrysville, PA 15668 USA

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