



RECIRCULATOR II

User and Service Manual

Copyright ©2020 by Biosense, Inc.

All Rights Reserved.

04162020

www.recirculator.com

Biosense Inc.

2616 Peartree Lane

San Jose, CA 95121

800-941-2844

sales@recirculator.com

4th Edition, Revised April 2020

Table of Contents

Introduction to the Recirculator II.....	1
Unpacking the Unit.....	1
Testing the Unit.....	1
Using the Recirculator II.....	2
Dual Speed Operation	2
Negative Pressure Adapter (Airflow Diverter).....	2
Maintaining the Recirculator II.....	2
Servicing the Motor.....	3
Changing the Filters	3
HEPA Filter Replacement.....	4
Pre-Filter Replacement	5
Cleaning the Recirculator II	6
Appendix A: Negative Pressure Adapter (Part No. 9405).....	7
Introduction to the NPA 270	7
Installing the Negative Pressure Adapter.....	7
Using the NPA 270	8
Maintaining and Cleaning the NPA 270.....	8
Product Service	9
Limited Warranty	9
Limitation of Liability	9
Prompt Disposition.....	9
Reordering Information	10

Introduction to the Recirculator II

The Recirculator II is a *hospital grade* air purifying device designed to trap and retain airborne particulates. Using the latest True HEPA (High Efficiency Particulate Air) filter technology, this unit is able to remove 99.97% of all particulate nuclei which exceed 0.3 microns in size.

NOTE: See <https://recirculator.com/frequently-asked-questions/> for more information about hospital grade air purifiers, as well as other useful information.

Unpacking the Unit

The Recirculator II is packed fully assembled and tested. When unpacking the unit:

1. Carefully check the exterior of the packing case for any signs of shipping damage. If any damage is discovered, either refuse delivery or contact the carrier.
2. Carefully remove the unit from the shipping case and stand it upright.
3. Again check the unit for any signs of shipping damage.
4. Remove packing reinforcement, unlatch the lid, and remove.

CAUTION: Care should be taken when working inside the unit. The HEPA filters should not be touched, as the filter fabric can easily be nicked or torn, which will impair their efficiency.

5. Check the interior for loose parts or any signs of damage.

Testing the Unit

To test the unit:

1. Re-install the lid and securely fasten both latches, locking with padlocks (not supplied) if desired.
2. Connect the hospital grade plug end of the power cord to a standard wall receptacle (110-120 volt, 60 cycle AC electrical outlet).
3. Turn the unit on by depressing the top (high speed position) of the rocker switch located at the bottom rear corner of the unit.

The blower will start and filtered air will immediately begin to flow from the grilles on each side of the unit.

4. Observe the magnehelic gauge on the front of the unit.

With the power switch in the upper position as above described (high speed), the gauge should indicate approximately 0.60-0.65 inches w.c. and be clearly in or below the green area on the gauge. This gauge displays the differential in pressure between the plenum (inside the unit) and the atmospheric (room) air pressure

Using the Recirculator II

When new, the HEPA filters supplied with this unit (order replacement part No. 9402) will filter about 575 cubic feet of air per minute (cfm). As the filters age and become loaded, the unit's efficiency will decrease. It is then that the pre-filter, HEPA filters, or both should be replaced.

The manufacturer recommends maintaining a minimum of about 400 cfm of airflow. At this level, the unit will still effectively filter the air; however, depending on the size of the room in which it is located, it may not provide adequate or the required number of air changes per hour (ACH). (See "Maintaining the Recirculator II" on page 2 and "HEPA Filter Replacement" on page 1).

Dual Speed Operation

The Recirculator II is equipped with a two-speed blower controlled by a dual position switch (High-Off-Low). At the **High** speed (upper position), the unit will purify about 575 cfm with new, clean filters installed. At the **Low** speed (lower position), the unit will purify about 475 cfm with new, clean filters installed. The Low speed will provide a moderate savings in energy consumption, with a slight reduction in noise level as well. Room size will dictate whether or not Low speed will provide adequate ACH.

Negative Pressure Adapter (Airflow Diverter)

If you purchased a Negative Pressure Adapter (9405 or NPA 270) with your Recirculator II, see Appendix A: Negative Pressure Adapter (Part No. 9405) on page 7 to install it.

Maintaining the Recirculator II

The Recirculator II is a precision unit and is engineered for many years of trouble-free service. Periodic oiling of the motor bearings and changing of filters should be all that is necessary to adequately maintain the unit.

Servicing the Motor

WARNING: Always disconnect the power supply before servicing the blower or working with the unit for any reason. This is especially important with motors equipped with automatic reset thermal protection, because the motor may activate without warning.

According to the manufacturer's specifications, the motor bearings should be re-lubricated every six months with 10 or 20 drops of SAE 10W or 20W non-detergent oil (ML type) or with electric motor oil. (Refer to diagram at the end of this manual for more information.)

To service the motor:

1. Remove the metal grate on the bottom of the Recirculator II and oil the motor bearings. Consult the attached exploded view of the motor that illustrates the points at which to apply the oil.
2. Re-attach the metal grate to the bottom of the Recirculator II securely prior to reconnecting it to the power source.

Changing the Filters

The pre-filter, located at the bottom of the unit, is designed to keep the unit's interior and the HEPA filters free of dust and large particulates. Frequent changing of the pre-filter (see *Pre-Filter Replacement*) will serve to keep the unit running smoothly and will substantially extend the life of the HEPA filters.

NOTE: See <https://recirculator.com/frequently-asked-questions/> for more information about HEPA filters, as well as other useful information.

Typically, the pre-filter should be changed monthly, but in certain situations it should be changed more frequently. A periodic inspection should provide an indication of how often to replace the filter.

NOTE: If properly maintained, the HEPA filters should last 12 months or more in normal use.

The magnehelic gauge, as described previously, is designed to measure and display the pressure differential between the plenum (inside the unit) and the atmospheric (room) air pressure. As the HEPA filters age and become *dirty*, they present a higher resistance to the airflow and thus a higher pressure inside the unit develops, which is represented by higher readings on the gauge.

The standard filters used in the Recirculator II are an extruded aluminum frame, enhanced performance HEPA filter designed to provide approximately 575 cfm when new, at a pressure differential of about 0.60-0.65 inches w.c. When the pressure differential increases to about 0.85-0.90 inches w.c., indicated by the dividing line between red and green on the magnehelic gauge, the airflow has decreased about 25% to approximately 400 cfm. As above referenced, it is at this point the manufacturer recommends HEPA filter replacement, in order to maintain adequate minimum airflow.

NOTE: However, before changing the HEPA filters, check or replace the pre-filter to ensure it is not loaded or is in any way obstructing the airflow, thereby causing a reduction in efficiency. If the magnehelic gauge still indicates a high pressure differential after replacement of the pre-filter, proceed with replacement of the HEPA filters according to the following instructions This will ensure that the unit continues to change and purify the air effectively.

Filters should be handled with caution during inspection and changing, although they need not be classified as medical or hazardous waste. Your facility has developed safety regulations regarding the changing of HEPA filters. Please consult the appropriate staff members for guidelines.

To change a filter:

1. If the unit has recently been in use during a respiratory treatment of a tuberculosis patient, treat it accordingly. It may be necessary to wait a short period of time before handling the filters. Consult your Infection Control or Safety Officer.
2. Wear NIOSH-approved personal respiratory protection rated for 99.97% efficiency at 0.3 microns whenever you open the top of the Recirculator II.
3. Open the Recirculator II only in an area with a negative pressure relationship to adjacent areas, so that contamination of such adjacent areas cannot occur as a result of these procedures.

HEPA Filter Replacement

To replace the HEPA filters:

1. Disconnect the power to the Recirculator II.
2. Open the unit and release the set screws securing the filters in place.
3. Remove the old filter:

- a. Turn a waste bag inside out and lay it on top of the filter to be replaced.
 - b. Grasp the top of the filter with the bottom of the bag.
 - c. Slowly withdraw the filter while rolling the inverted bag down over the filter.
 - d. Seal the bag and dispose of it properly.
4. Install a new HEPA filter (Part No. 9402):
 - a. Insert the new filter and secure it in place with the set screws provided, with its rubber gasket firmly seated against the inside of the grillwork face.
 - b. Adjust the pressure exerted on the filters by the set screws by turning them in a clockwise fashion.

The set screws should be adjusted so they all exert the same pressure on the filter frame and compress the rubber gasket to the extent of 30%-50% of its thickness. This will ensure that there is no leakage around the filter frame.

WARNING: Care should be taken in changing the HEPA filters, because improper handling (damage to the filter fabric) or improper installation could result in infectious particles circumventing filtration and escaping into the atmosphere.

5. Repeat the procedure for the other HEPA filter.

NOTE: Both HEPA filters should be changed concurrently, unless the changing of one is being performed to replace a damaged filter.

6. Secure top to Recirculator II and reconnect to the power source.

Pre-Filter Replacement

To replace a pre-filter:

1. Release the catch at the bottom of the unit that secures the pre-filter in place.
2. Turn a waste bag inside out and grasp the pre-filter with the bottom of the bag.
3. Withdraw (slide out) the filter while rolling the bag down over the filter.

4. Seal the bag and dispose of it properly.
5. Insert (slide in) a new filter noting the direction of airflow (arrow should point up) and secure the catch.

NOTE: The Recirculator II's performance should be checked by your facility's engineering staff at least 12 months, by measuring the unit's airflow with a Velometer or Balometer.

Cleaning the Recirculator II

The Recirculator II has a tough baked enamel finish and can be cleaned with most germicidal cleaners. Avoid abrasive or petroleum cleaners, as these can damage the finish. Over time, and in the normal course of use, some dust may collect inside the unit and possibly on the performance indicator. Carefully vacuum the dust from the unit's interior, being careful not to damage the HEPA filter fabric.

Appendix A: Negative Pressure Adapter (Part No. 9405)

Introduction to the NPA 270

In areas where infectious diseases are present, such as tuberculosis patient rooms, isolation rooms, treatment rooms, etc., it is not only desirable, but mandatory that a *Negative Pressure* be maintained with respect to adjacent areas. Airflow should be **into**, rather than **out of** such areas. It is sometimes impractical or impossible to create such a Negative Pressure environment by simple adjustments to the central HVAC systems.

The NPA 270 is an adapter, which is designed to be fitted onto the grillwork face of the Recirculator series manufactured by Biosense, Inc. It consists of a rectangular chassis with an 8" diameter outlet sleeve to which exhaust ducting can be connected.

When fitted to the Recirculator, the NPA 270 will cause approximately 250-270 cubic feet per minute (cfm) of filtered air to be collected and concentrated into the 8" diameter outlet.

Installing the Negative Pressure Adapter

Unpack the NPA 270 and inspect for damage. The two insertion pins contain manufactured bends, *but should extend parallel with the face of the unit.*

The following are general guidelines based on the *Code of Federal Regulations*:

Because of the potential risk of infection to staff who perform this operation, it should be performed by only those who are adequately trained. Observe specifically the safety procedures established by your facility, including, but not necessarily limited to the following:

1. Shut off and unplug the Recirculator.
2. Remove the lid, observing the following precautions:

If the Recirculator unit has recently been in use during a respiratory treatment of a tuberculosis patient, treat it with care. Open the unit only in an area with a negative pressure relationship to adjacent areas, so that contamination of such adjacent areas cannot occur as a result of this procedure. Consult your Infection Control or Safety Officer. It may be necessary to wait a short while before opening the unit.

3. Wear NIOSH-approved personal respiratory protection rated for 99.96% efficiency at 0.3 microns whenever you open the top of the Recirculator.
4. Hold the NPA 270 by its top end (end opposite insertion pins) and center it directly in front of the Recirculator's face. **Insert the two pins into the two outermost holes of the next to the next to the bottom row of holes in the grillwork.** Once correctly fitted and positioned on the grillwork, the adapter will be centered by coincident. If the adapter is either off-center, too high or too low, reposition as necessary by inserting the pins into different holes until it is properly aligned. Once positioned correctly, hold the adapter tightly against the Recirculator's face and replace the lid covering the adapter as well, which serves to hold it in place. Secure lid fasteners.
5. Plug in and turn on the unit.

Using the NPA 270

Hospital Engineering staff, HVAC personnel or independent HVAC contractors may now attach appropriate ductwork to the NPA 270 outlet in order to exhaust airflow from the area.

It should be noted that once fitted with the NPA 270 connected to ductwork exhausting air out of the area, the Recirculator II will still return approximately 260 cfm into the room in which it is located. Although this will still provide about 9-10 air changes per hour (ACH) in a moderately sized room, it may be necessary to install a second Recirculator unit for local air treatment to maintain any required higher ACH rates.

NOTE: Length of ductwork, reduction in diameter or bending of ductwork all serve to reduce efficiency of this assembly. Use the shortest, straightest run possible to maximize its efficiency.

Maintaining and Cleaning the NPA 270

The NPA 270 is an all-metal, powder-coated apparatus, which is extremely durable. It may be cleaned with any commercial cleaning solution, and should give a lifetime of service with proper care.

Product Service

Limited Warranty

Dayton Shaded Pole blowers, General Electric or Sylvania germicidal UV fluorescent lamps and fixtures and all other electrical and mechanical components or assemblies within this unit are warranted by Biosense, Inc. to the original user against defects in materials or workmanship under normal use for a period of one year from date of purchase. Any part or assembly which is determined by Biosense to be defective in materials or workmanship and returned to an authorized service location, as Biosense designates, shipping costs prepaid will be, as the exclusive remedy, repaired or replaced at Biosense's option.

Limitation of Liability

To the extent allowable under applicable law, Biosense's liability for consequential and incidental damages is expressly disclaimed. Biosense's liability in all events is limited to and shall not exceed the purchase price paid.

Prompt Disposition

Biosense will make a good faith effort for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product believed to be defective within limited warranty, first write or call the dealer from who the product was purchased. The dealer will give additional directions. If unable to resolve satisfactorily, write to Biosense using the address below, giving the dealer's name, address, date of purchase, dealer's invoice number, and a description of the defect. Title and risk of loss pass to the buyer on deliver to common carrier. If product was damaged in transit to you, file a claim with the carrier.

Manufactured by Biosense, Inc., 2616 Peartree Lane, San Jose, CA 95121, USA,
Tel: (800) 941-2844, Fax: (408) 270-4457, E-mail: sales@recirculator.com,
WWW.RECIRCULATOR.COM.

Reordering Information

<u>Product</u>	<u>Part Number</u>
Recirculator II	9431
Negative Pressure Adapter	9405
HEPA Filter	9402
Pre- Filter	9403

Recirculator manual.doc

5/16/20