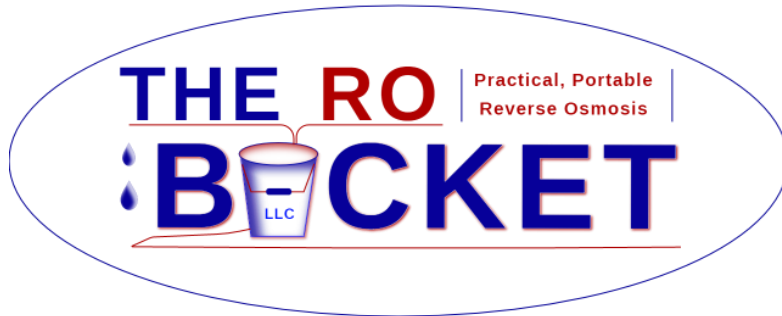


User Instructions



**RB5, RB10, RB15
Maple Sap Buckets**

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**For immediate tech support and information sharing,
join our facebook group:
“The RO Bucket Information Exchange”**

Visit us at www.therobucket.com

E-mail us at sales@therobucket.com

Revision 3

Responsible Use and Liability Disclaimer

The products offered by The RO Bucket LLC are intended for use by individuals who have become knowledgeable regarding the reverse osmosis process as it relates to maple syrup production. **Follow all indications and directions and observe reasonable care when utilizing this product.** Possible hazards associated with the use of the product include, but are not limited to:

- Shock/Electrocution - Always use a ground fault outlet and surge protector. Always wear shoes and keep electrical cord away from wet/moist surfaces. Always run discharge hoses into containers. Never allow them to spill onto nearby surfaces.
- Fire - Do not use the product in potentially explosive, flammable, or corrosive environments. In the event the thermal protection function is enabled, unplug the unit and wait one hour before using again. Do not disassemble or alter the motor or driver. Use only the provided transformer.
- Physical hazards - The product works under high pressure. Always wear safety goggles and point hoses away from your body and face.
- Leaks – Closely monitor the operation of the product. Regularly inspect and repair any components that are leaking.

In no event shall The RO Bucket LLC be liable for any direct, indirect, punitive, incidental, special, or consequential damages to property or life whatsoever arising out of or connected with the use or misuse of our products.

The RO Bucket – User Instructions

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1. Introduction to RO for tree sap

The pre-treatment of tree sap through reverse osmosis has been revolutionary in the syrup industry. The ability to remove large amounts of water prior to boiling greatly reduces the amount of time and energy required to make syrup. The RO Bucket is specifically designed for smaller scale maple producers. As you begin planning your first batch of syrup with your RO Bucket, consider:

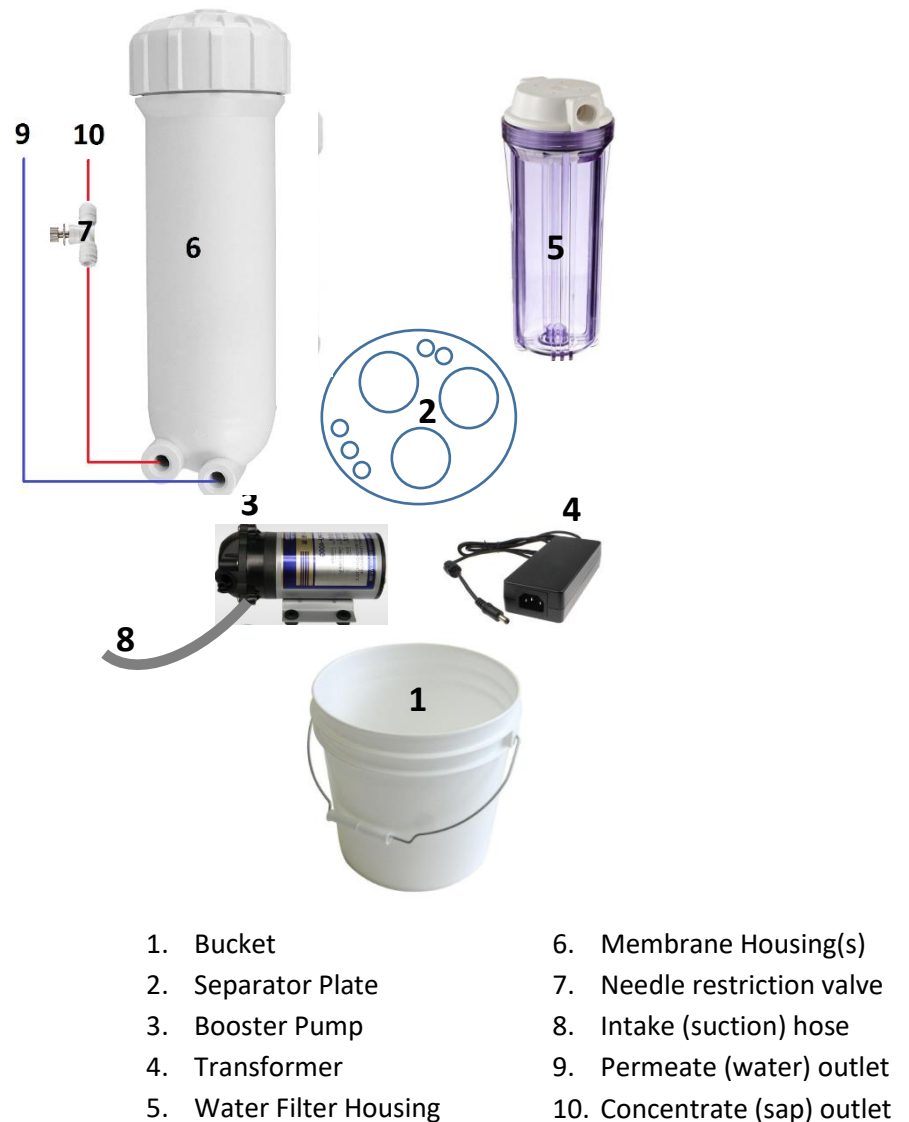
- a. Pre-concentrating sap before you boil – If your boiling rate is greater than your RO Bucket's processing rate, you should concentrate some sap ahead of time so you don't run out during your boil. The amount you need to concentrate will depend on your boiling rate and the capabilities of your RO Bucket. An example scenario is outlined below:

You want to boil for 8 hours and you boil at 5 gallons per hour. You have an RO Bucket that will process 7 gallons of sap per hour, making 3.5 gallons of concentrate per hour. Since you will boil 40 gallons of sap for this session, and will only make 28 gallons of concentrate if you run the RO while you are boiling, you will need to have 12 gallons of concentrate on hand as "make up sap" during your boil.

b. Batch size – The darkness and flavor of maple syrup, in part, is a result of the long boiling process required to make it. When utilizing reverse osmosis, it is important to remember that you will not be boiling your syrup as long. These shorter boils tend to produce syrup that is lighter in color. While this is generally a good thing, a boil that is too short may not allow certain compounds to break down properly. If you are experiencing any unfavorable smells or flavors (with or without using RO), consider doubling your batch size. This will ensure adequate boiling time and will help maintain good syrup quality as it allows any negative compounds to break down.

c. Permeate water (pure water) – The importance of properly maintaining your RO should not be overlooked. The RO needs to be flushed with permeate water after every use and a strict flushing schedule should be followed to ensure maximum efficiency and prolonged membrane life. Plan on saving at least 20 gallons of permeate water every time you use the machine. Permeate water has a shelf life of one week. If no permeate water is available for flushing, non-chlorinated water can be used (distilled water, spring water, or well water). **Chlorinated water can only be used if utilizing an activated carbon block pre-filter.**

2. Diagram of The RO Bucket



- | | |
|-------------------------|------------------------------|
| 1. Bucket | 6. Membrane Housing(s) |
| 2. Separator Plate | 7. Needle restriction valve |
| 3. Booster Pump | 8. Intake (suction) hose |
| 4. Transformer | 9. Permeate (water) outlet |
| 5. Water Filter Housing | 10. Concentrate (sap) outlet |

3. Getting Started – Initial Equipment Setup

The RO Bucket generally comes ready-to-use out of the box. Unpacking involves removing the 110v transformer, intake suction hose, membrane preservative, extra pre-filter, any accessories purchased, and packing material.

The 5 micron pre-filter and membranes are already installed in their corresponding housings. The intake hose is coiled up inside the bucket. See our maintenance section if you are unfamiliar with the removal of quick connect fittings. Initial setup and startup is described below (a video tutorial is also available at www.therobucket.com).

1. Before processing sap, rinse the system for 10 minutes with 5 gallons of clean, non chlorinated water. (The 5 micron prefilter should already be installed in the clear water housing):
 - a. Place the 3/8" plastic intake hose into the 3/8" intake bulkhead fitting on the outside of the bucket. Make sure the intake hose is fully inserted into the bulkhead fitting (It should go in a full 3/4"). Place the other end of the intake suction hose (containing the intake strainer) into a filled 5 gallon bucket of clean, non-chlorinated water.

(Note: The intake hose should not exceed 5' of vertical lift if drawing from a container, and should not exceed 15' in length if plumbed to the bottom of a tank).

- b. Locate the two discharge hoses (concentrate, which contains the needle valve, and permeate hose). **Remove the needle valve from the concentrate hose for the initial rinse with water.** Place both hoses in the same filled 5 gallon bucket of water as the intake suction hose.
- c. With all three hoses in the same 5 gallon bucket, and the needle valve removed, plug in the RO system by connecting the transformer to the electrical port on the electrical bulkhead on the side of the bucket.
- d. After a minute or two, you should get steady flow out of the concentrate hose. Let the system run for 10 minutes. It is normal to have some flow out of the permeate hose as well. (If you do not get any flow out of the concentrate hose, and the pump doesn't seem to be "sucking", check that your intake suction hose is properly inserted into the bulkhead fitting).
- e. After the initial flush, turn the pump off, reconnect the needle valve (taking note of the directional arrow molded into the valve body), and leave the system full of water until you are ready to process sap. Always leave the system full of liquid when storing. Allowing the membranes to dry out could cause them to be damaged.

4. Instructions for sap processing/water removal:

1. Place the intake suction hose into the sap you want to concentrate. Be sure the hose stays submerged at all times. (If it floats or draws any air throughout the concentrating process, you will need to start this procedure over).
2. Place the two outlet lines into the same container as your intake suction hose (temporarily as you prime the system).
5. Plug the 110v transformer into a grounded GFI outlet. Sap will begin to fill the system. Once sap is flowing out of the concentrate hose without any air bubbles (2 – 3 minutes), you can begin water removal.
6. Turn the needle valve clockwise slowly until the stream of sap is significantly smaller than it was before (around half the original flow). In about a minute or two, the pump will begin getting louder and pure water (permeate) will begin to flow out of the blue permeate hose. If you cannot reduce the concentrate flow to achieve 50/50 flow, make sure the backing nut on the needle valve is not hindering operation. Also, make sure the needle valve is correctly installed (The arrow on the side should be pointing towards the discharge side of the hose).
7. Adjust the needle valve so that both streams (concentrate and permeate) are flowing at the same rate. An equal rate of discharge from both hoses will mean you are removing 50% of water from your sap, or doubling the sugar concentration. You can now more your concentrate and water outputs to their respective containers for storage.

Note

At no time should the flow of concentrate be less than the flow of permeate. This could result in rapid deterioration of the reverse osmosis membranes (RB5-RB15 systems). Concentrations up to 8% can be achieved by running multiple passes.

5. System Maintenance

The consumables in the RO Bucket have varying life expectancies. Many factors, including sugar concentration, sap quality, temperature, and time, can all affect the replacement intervals for pre-filters and reverse osmosis membranes. The following general guidelines should give you an idea of how frequently you should be replacing these items:

Pre-filters – Designed to be a single use filter. Usually needs to be discarded due to bacterial growth. If adequately flushed and refrigerated between uses, can last up to a week. If processing large amounts of sap uninterrupted, change every 300 gallons.

To install or change a pre-filter, locate the pre-filter housing and remove the two 3/8" hoses from their quick connect fittings. Pull the entire filter housing out of the RO Bucket. Twist the top lid of the filter housing counter-clockwise to remove it. After replacing the filter, replace the lid and insert it back into the RO Bucket. Re-install the two 3/8" hoses into their quick connect fittings.

Always replace with a quality, 5 micron or less, 10" pre-filter.

Reverse Osmosis Membranes – Provide adequate performance for up to two years, or 2000 gallons of sap per membrane. Never allow water to flow at a faster rate than concentrate. Liberal water flushing between uses will also help maintain membrane performance.

Membranes that begin to show performance decreases can be flushed with our membrane preservative according to the procedure outlined in Section 6 "Instructions for End-of-Season Storage". Flush membranes with water for at least 15 minutes (or until the pH of discharged concentrate approaches 7) before processing any sap.

To remove RO membranes from their housings, you will need to disassemble the system. See our videos section on our website at www.therobucket.com for a detailed explanation of this process.

Quick Connect Fittings:

Quick connect fittings, commonly called "push to connect" fittings, feature a movable collar that allows the inserted hose to be easily removed. To remove a hose from a

quick connect fitting, simply push the collar against the fitting with one hand. Use the other hand to pull the hose out of the fitting. It should pull out easily. Excessive force could ruin the fitting.



Leaking fittings can be repaired by replacing the o-ring, or using Teflon sealing tape. Our housing manufacturers recommend twenty turns of teflon tape to seal plastic fittings when o-rings are not available.

***Visit our website at www.therobucket.com to view our extensive video library covering a multitude of maintenance topics.**

6. Instructions for cleaning unit after sap processing/water removal:

1. If unit will be used within 24 hours:

After processing all of your sap, the unit needs to be flushed with permeate water (RO water). The following procedure should be followed with the needle valve fully open (or removed) after EVERY use:

- a. Remove the 3/8" intake hose from sap and allow unit to run dry (it will begin gurgling and pushing air).
- b. Insert 3/8" intake hose into 5 gallons of saved permeate water (DO NOT USE MUNICIPAL TAP WATER OR WATER CONTAINING CHLORINE AS IT WILL RUIN THE MEMBRANES) and recirculate (all three hoses in same container) for 10 minutes. Unplug the unit and keep it full of water.
- c. Remove the 5 micron pre-filter, empty contents of filter housing, and leave the prefilter housing open and dry. (Note: the old pre-filter can be saved in the refrigerator for future use).

2. If unit will not be used within 24 hours, but will be used within 48 hours:

After processing all of your sap, the unit needs to be flushed with permeate water (RO water). The following procedure should be followed with the needle valve fully open (or removed):

- a. Remove the 3/8" intake hose from sap and allow unit to run dry (it will begin gurgling and pushing air).
- b. Remove the 5 micron pre-filter, empty contents of filter housing, and install a new pre-filter and reinstall the filter housing. (Note: the old pre-filter can be saved in the refrigerator for future use. The new pre-filter can be reused for subsequent flushes).
- c. Place the 3/8" intake hose into permeate water that has been saved from sap processing (DO NOT USE MUNICIPAL TAP WATER OR WATER CONTAINING CHLORINE AS IT WILL RUIN THE MEMBRANES)

and run the entire 5 gallons of water through the system (run the discharge hoses onto the ground or in a waste container.)

- d. Place the 3/8" intake hose, and the two discharge hoses, into another 5 gallons of fresh permeate water and run the unit for 10 minutes. The water should keep recirculating into the same 5 gallon bucket. After 10 minutes, unplug unit before it runs dry.
- e. Remove the pre-filter from the filter housing, empty the housing of water, and leave it open until the next use. This filter can be saved for future flushes, or for sap processing.

3. If unit will not be used for an extended period of time, but is not being stored for end-of-season.

The unit will need to be flushed according to section 5, step 2 above. In addition, every week it isn't used, you must run 5 gallons of water through it until it is flushed for end-of-season storage (See Section 6 below), or run preservative mixture through the system (see below).

If at any time you notice odors developing, performance decreasing, or for extended period storage, it would be advisable to do a flush with membrane preservative mixture. Do so by mixing our membrane preservative according to the instructions on the bottle and recirculating it through the system for 10 minutes. After 10 minutes, unplug the unit and leave it full of the preservative. Rinse the system thoroughly before continuing to process sap. This may require 20 to 30 gallons of water (or until the discharged concentrate approaches a pH of 7).

7. Instructions for End-of-Season Storage

For end-of-season storage, flush according to “Instructions for Cleaning” section 5, step 2.

After you have completed the flush:

- a. prepare 1 gallon of warm water (~80F), and dissolve our membrane preservative in it (as per the instructions on the bottle).
- b. Re-circulate the gallon of solution through the system for 15 minutes. After 15 minutes, turn the unit off and let it sit for a couple of hours to a day.
- c. Place the intake suction hose into clean water and rinse the system (run the pump) for one minute (approximately 1 gallon of water will go through the system). The goal is to slightly dilute the preservative mixture and flush out the pump head.
- e. At this point, the system should be turned off, and completely full of diluted preservative.

There are several versions of storage instructions that serve the same purpose as above. Any of our currently published procedures are acceptable. The overall goal in maintaining your system is to rinse, flush, and preserve.

It is recommended to remove the pre-filter from the filter housing. If storing a bucket system, leave the lid off the bucket to make sure the exterior contents are completely dry (leaving the membranes full of liquid). Do not let the pump sit in a humid environment during storage. The membranes should be submerged in liquid at all times.

8. Limited Warranty Information

The majority of components comprising our products are intended to be easily replaceable and relatively inexpensive. It is expected that the user becomes familiar with how the product functions and has the ability to repair broken fittings, hoses, and leaks if necessary. Furthermore, the user must perform routine maintenance (filter and membrane changes, routine membrane flushing, etc.).

Membrane fouling, bacterial growth, and unpleasant odors can all develop due to improper maintenance and handling. While membrane degradation is not covered by a warranty, our customer service team will gladly help you determine the cause of such issues and help you improve product performance moving forward.

The booster pump and transformer have a **one-year limited warranty** from the date of purchase. The limited warranty covers manufacturer defects. It does not cover damage caused by freezing, submersion in water, or rough handling. It is the purchaser’s responsibility to ship the defective pump and/or transformer back to The RO Bucket LLC along with proof of purchase to be eligible for replacement.