

Nature's
Spring | *Reverse
Osmosis*



Four-Stage
Reverse Osmosis
Drinking Water System

**Owner's
Manual**



The new, improved Nature's Spring RO is a four-stage water treatment system that utilizes some of the most advanced methods of water treatment technology available today.



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This manual provides information about the application and servicing of your Nature’s Spring RO water treatment system. Descriptions of the components and their functions will help to answer frequently asked questions. By thoroughly reading this manual, you will be better able to operate this unit and perform simple maintenance.

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GENERAL INFORMATION



THE FOUR STAGES:

Stage One

The water first enters a 5-micron pre-filter. The pre-filter is positioned prior to the reverse osmosis membrane to remove any large particles such as rust, sand or other deposits commonly found in water distribution systems. If these particles are not removed, they can clog the passageways in the membrane.

Stage Two

A 12-inch-long, solid-block, solid-carbon filter inside the sedi-

ment pre-filter removes excess chlorine that protects the PA (polyamide) membrane which follows. It also breaks apart the chloramines into chlorine and ammonia that are removed by this filter and by the following stages.

Stage Three

A highly efficient polyamide (PA) reverse osmosis membrane produces 35 gallons of purified, highly oxygenated water per day. This spiral wound membrane functions as a semi-permeable membrane that allows passage of water molecules through the membrane and rejects foreign substances dissolved in the water.

With its reverse osmosis membrane, this device is designed to significantly reduce the amount of total dissolved solids in a water supply. It also helps reduce the levels of organic and biological pollutants.

The operating parameters for this membrane can be found in the Specifications section of this manual.

IMPORTANT NOTE: Reverse Osmosis should NOT be relied upon to provide biologically pure water that is fit for consumption from severely contaminated water sources. If bacterial contamination is present, you should use the Nature's Spring Ozone water purifier.

Stage Four

The 12-inch long, solid-block, 1-micron carbon post-filter acts as a final polishing filter to remove small traces of chlorine, chloramines or organic compounds that may have passed through the reverse osmosis membrane. It also removes any remaining bad taste and odor from the water.* Because it is rated to 1 micron, this filter also acts as a final barrier against bacteria and cysts.



SPECIFICATIONS

Recommended Operating Parameters for the PA membrane:

	<u>MAXIMUM</u>	<u>MINIMUM</u>
pH	11	4
Temperature	113° F	40° F
	45° C	2° C
Pressure	125 psi	30 psi
	860 kPa	210 kPa
Iron	0.1 ppm	0 ppm
Total Dissolved Solids	2000 ppm	0 ppm
Bacterial quality	Nature's Spring systems should only be used on water that is free from bacterial contamination.	
Ratio of Rinse Water to Product Water	5 to 1	at 60 psi
Gallons per day	35 (130 liters)	at 60 psi

- The recommended parameters listed above can either be obtained from your local water department or a water testing service.
- Optimum temperature is 77° F (25° C) and each degree below this value will cause about a 1.5% decrease in the amount of treated water produced.
- Low pressure reduces the quality and volume of water produced. Below 30 psi (210 kPa), the unit becomes very inefficient. Booster pumps should be used with water pressures below 30 psi (210 kPa).
- The membrane must not be allowed to cool to the point of freezing. Freezing of the unit may cause the filter housings to rupture and also cause damage to the membranes. This damage will result in water leakage from the unit and/or the membrane's inability to improve water quality. This type of damage will void the warranty.



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COMPONENT DESCRIPTION

The Nature's Spring RO water treatment system contains four treatment devices to improve the quality of your water. These main components, along with other necessary parts, are briefly described in this section. A replacement parts list and diagrams are also included.

Snap Fitting

This screw-on part replaces the present aerator found on your kitchen tap. A selection of various adapters are provided and allow for a variety of different faucets. This part provides the required fitting to connect the snap coupler on the inlet hose of the Nature's Spring to the tap of your home.

Snap Coupler

The snap coupler allows easy and quick connection of the unit to the water supply. It includes a plastic retaining ring, which is spring-loaded.

Supply Valve

This valve is screwed onto the snap coupler with an o-ring seal. It diverts water into the unit. The high pressure hose is clamped to this valve.

Two-Stage Pre-filter

This self-contained, 5-micron sediment filter surrounds a solid-block activated carbon filter. It is designed to remove large particles such as rust, sand, scale and other undissolved par-

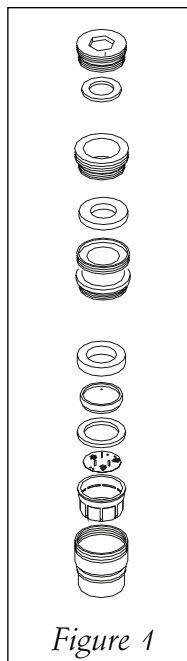
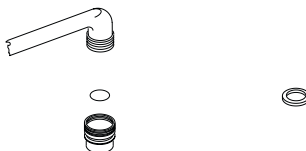


Figure 1





ticles suspended in the water supply, as well as remove excess chlorine that may degrade the RO membrane. Activated carbon is also effective in lowering the amounts of chloramines in the water.

Pressure Vessel

This pressure containment vessel houses the spiral-wound reverse osmosis module. Its construction provides a means to flush the membrane and collect treated water as it is being produced. Water that is forced through the membrane has been reduced in contaminant concentration.

PA (polyamide) Reverse Osmosis Membrane

The rolled module is manufactured from polyamide polymers, which have the ability to restrict passage of almost all substances other than water molecules and oxygen. No membrane is capable of removing 100 percent of any specific contaminant. The spiral-wound configuration consists of the cloth-backed membrane and two spacing materials, one of which is located between the membrane envelope to provide a spiral water-channeling action. The other provides space for water flow between the outer membrane surfaces. The treated water is collected in the product tube through small holes in the sides of the tube.

Restrictor valve (inside pressure vessel just inside the rinse water tube)

This valve restricts the amount of water leaving the pressure vessel, creating the necessary back pressure to force the source water through the reverse osmosis membrane. It is set to allow enough rinse water to flush the membrane surface to prevent fouling. The PA-TFC ratio of rinse water to pure water is about 5 to 1 at 60 psi.

Rinse Water Tube

This tube is connected to the snap coupler that connects to the faucet. It is designed to allow the rinse water to drain into the sink.



Make sure the drain is open when using your RO unit. This rinse water serves a useful purpose. You are not wasting water when water is used to rinse your RO membrane, just as you are not wasting water when you shower or wash clothes. The amount of water used to rinse the membrane during the time it takes to yield one gallon of purified water is less than the water used in one toilet flush.

Carbon Post-Filter

This solid-block activated carbon filter is positioned after the reverse osmosis module to remove any taste, odor and small traces of pollutants from the water that haven't been removed by the reverse osmosis process. The flow through this filter is very slow to allow sufficient time for adsorption.

Product Water Tube with clip

This tube should be placed in a clean glass or polycarbonate container to collect the purified water. The special clip allows you to clip the hose to the side of container and is also used to plug the end of the product water tube to keep it sanitary. Take care to keep this tube away from dirt and contamination. (see figure 6)

INSTRUCTIONS FOR USE

The Nature's Spring RO is a well-designed countertop water treatment system that connects with a one-step, easy-to-use snap fitting.

Initial start-up of your Nature's Spring RO.

Unpack the unit.

If you notice any visible damage to the shipping container, please notify the ship-

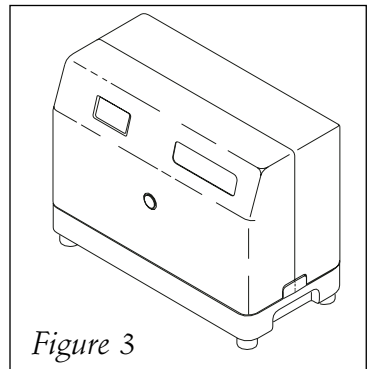


Figure 3



per and the person from whom you purchased your Nature's Spring RO.

IMPORTANT: Always lift your Nature's Spring RO with both hands from the bottom of the base. (see figure 3) Use the hand-holds on the right and left sides on the base. Do not attempt to lift the unit from the upper part of the cover. This may cause the premature unlocking of the cover latches.

1. Place your Nature's Spring RO in a convenient spot on your counter near your sink and faucet.

2. Activate the filter replacement timer by pressing the reset button on the timer light panel on the front of the cover for 3 seconds until the three lights flash and the green light flashes every 10 seconds. (see figure 4, refer to appendix 1)

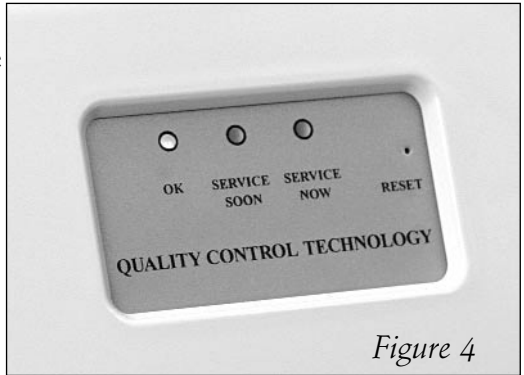


Figure 4

3. Remove the aerator on your faucet using a pair of pliers.

(Note: You may install a quick-disconnect/snap coupler assembly (see figure 2), or you may install the supply valve directly to your faucet. (see figure 5)

In either case, the supply valve allows you to run water into the sink (or into the Nature's Spring RO.) by pulling or pushing the stem on the valve.

If you choose to install the supply valve directly to your faucet (see figure 5), screw the supply valve onto your faucet (with adapters and washers as needed), then tighten snugly. (Wrap a soft cloth around the fitting so that the surface on the fitting is not scarred.)

If you choose to install the snap coupler assembly (see figure 2), you must first screw the snap coupler onto the supply valve with the



appropriate washer. Once this is done, place the supply valve with the plastic ring pointing upwards in the palm of your hand, depress the plastic ring using the thumb and fingers of the same hand.

4. Push the snap coupler onto the snap fitting as far as possible; then release the plastic ring. Always have the supply valve over an open sink before operating your unit.

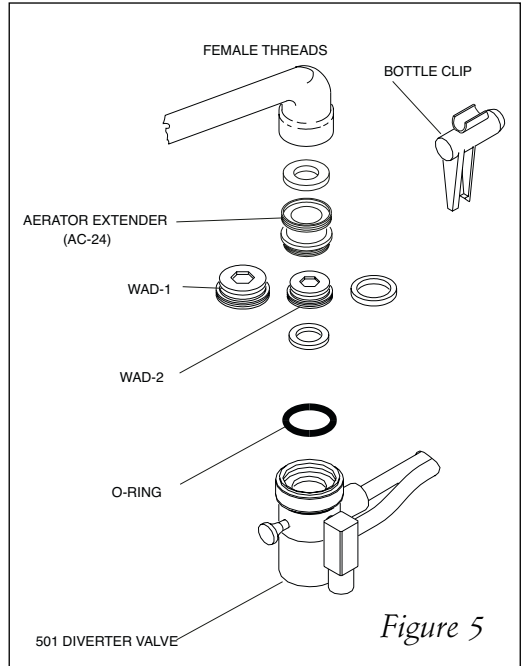


Figure 5

5. Remove the plastic sleeve from the end of the bottle clip. (see figure 6) Failure to do this will result in the sleeve being shot into the container. Place the clip on the edge of a container and place it in the sink.
6. Slowly turn the water on (COLD WATER ONLY) so that water is running into the supply valve. Turn the cold water on completely to obtain maximum flow and pressure. Pull the stem in the supply valve so that the water enters the unit instead of the draining into the sink.
7. Allow the unit to operate for one hour. Discard any water you have collected. This is only required for the initial start-up. For subsequent

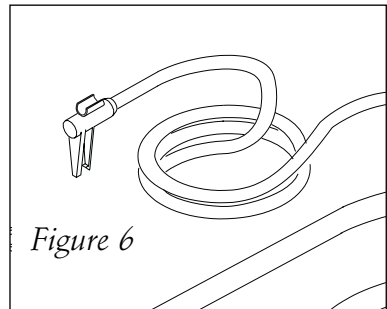


Figure 6



uses, you should let the unit operate for a 2–3 minutes before collecting water.

8. Securely attach the bottle clip to a container. To avoid spilling, place the container in an open sink. When you are finished purifying your water, replace the sleeve on the end of the bottle clip to keep it sanitary.

OPERATING PARAMETERS

To insure proper operation, it is advisable to obtain the following information regarding your water supply. You may perform the simple tests yourself or inquire about this information from your water supplier.

Pressure

Sufficient water pressure must be available from your water source to overcome the natural osmotic pressure caused by the dissolved minerals in the water. The osmotic pressure is directly proportional to the concentration of these minerals. When the source water pressure equals the osmotic pressure, there is no movement of water through the semi-permeable membrane. As the pressure increases above this point, water molecules will pass through the membrane, leaving the dissolved material on the outer surface of the membrane. As a general rule, the higher the pressure, the better the performance of the unit. A minimum pressure of 40 psi (275 kPa) is recommended. Pressures below this value will result in poor unit performance and may reduce the expected lifetime of the unit. If your water pressure is low, you should add a boost pump to increase the pressure to the Nature's Spring unit.

pH

The maximum pH value for the PA membrane is 11 for PA-TFC membrane. Water sources very seldom if ever have pH values greater than 11.

Chlorine





cleaners or solvents. The box should not be stored in plastic bags because this prevents air circulation and may lead to mold growth on damp surfaces.

Interior Cleaning

If for any reason the inner part of the case becomes wet, the cover should be removed and the components dried.

Carbon/Sediment Pre-Filter

This filter is responsible for removing undissolved sediments from the water before it enters the pressure vessel and module. Its 5-micron pore size removes all particles with a dimension exceeding this value. Its usable lifetime is entirely dependent on the sediment content of the water introduced into the unit. A recommended filter change should occur at one-year intervals or at any time before this if unit performance is affected. Sediment filter clogging will result in low flow through the unit and will also decrease the pressure inside the pressure vessel. Both of these conditions will result in poor performance of the unit and can also cause premature fouling of the membrane surface. The fouling is due to reduced flushing action and turbulent flow across the membrane which will allow contaminants to build up on the membrane surface. The carbon/sediment pre-filter installed in your Nature's Spring RO is also capable of removing excess chlorine to protect the PA RO membrane.

Solid-Block Carbon Post-Filter

This filter is responsible for removing small traces of chlorine, odors and any other organic contaminant not removed by the reverse osmosis process. Its performance is dependent on available surface area on the carbon particles to which contaminants will adsorb. It is recommended that this filter be replaced on a yearly basis.

The solid-block filter used in the Nature's Spring RO is resistant to the common problem of many granulated activated carbon filters—they are breeding grounds for bacteria. It also is rated at 1 micron and acts as a



final barrier to cysts and bacteria.

Filter Replacement Timer

To assist you in remembering to regularly service your Nature's Spring RO, a special battery-operated timer is included on every unit. (*refer to Appendix 1*)

RO Membrane

The membranes used in the reverse osmosis modules will give many years of use and hundreds of gallons of clean, treated water. Problems may arise, however, if any one or a combination of listed parameters for proper membrane performance are not maintained. Membrane failure is evident and will manifest itself with a faster-than-normal flow rate of treated water or with a significant reduction in water quality. The exact total dissolved solids (TDS) removal for your membrane is best determined by use of a conductivity meter. Membranes damaged by inappropriate water conditions cannot be repaired (in most cases) and therefore, replacement is necessary. When needed, you can easily replace your membrane by following these steps.

Removing the Cover

To access the pre- and post-filters as well as the RO membrane, you must first remove the cover of your purifier. To do this, simultaneously press in on both locking buttons located on either ends of the base.

While pressing in on both locking buttons, lift the cover straight up and off, and place it on the counter.

To replace the cover, place the cover over the filter assembly (making sure it is aligned properly with the base) and press down firmly until the locking buttons snap shut on both sides of the base.

Filter Replacement

After 12 months of use (or when the yellow filter replacement timer light is flashing), it is time to replace your pre- and post-filters so you can continue enjoy the highest quality drinking water possible.

1. Remove the outer cover (see instructions for removing cover).
2. Access the filters. The top filter is the carbon sediment pre-filter, the second is the carbon block post-filter, and the bottom housing is the Reverse Osmosis pressure vessel.



Figure 7a

3. With the filters still being held in place by the clips, you are now ready to remove the hoses from the filter housings. Using the black tool strapped to the case of your unit, slide the open end over the collet of the filter housing, press down and pull the plastic elbow out of the filter housing you wish to replace. (see figure 7a)

Repeat on the opposite end. Follow this same process for each filter housing you want to replace.

4. These filters are held together by several clips. If you pull the top filter towards you it will disengage from the top clip and rotate towards you. Remove the appropriate clips and replace the correct filter in its place. (The Sediment filter is on top!) Press the housing pieces back into their original positions by pressing them into their respective clips. (Figure 8)

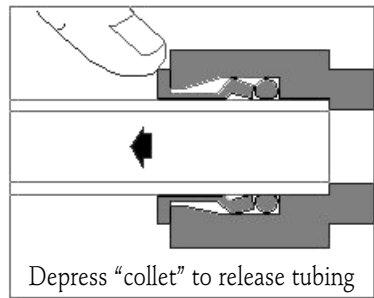
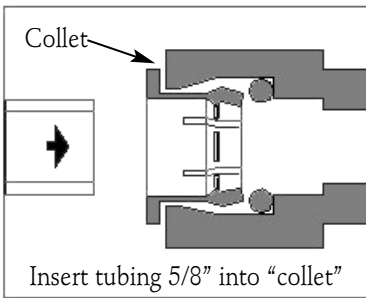
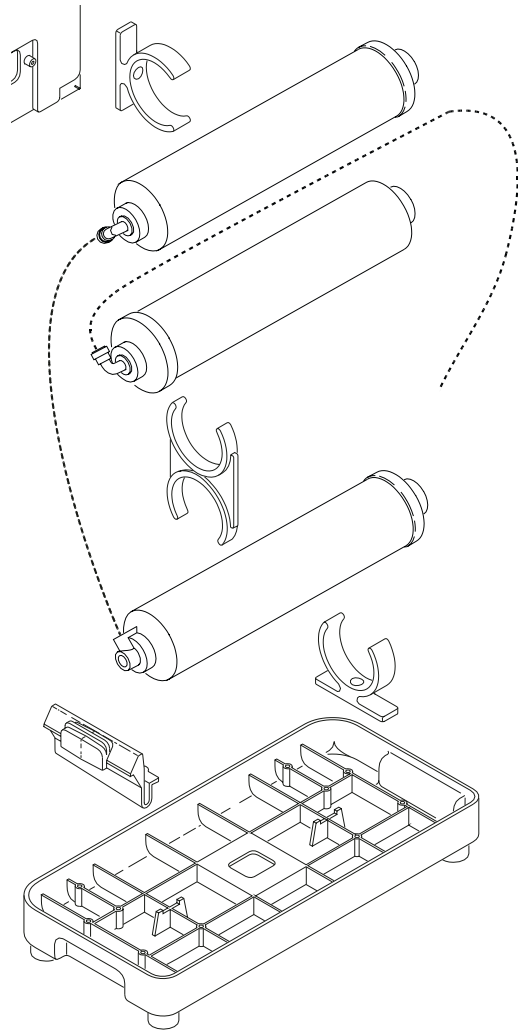


Figure 7b

5. Replace the tubing by taking the plastic elbow and pressing into opening of the housing. Make sure it is firmly in place, tubing must go into the assembly at least 5/8th of an inch. (Figure 7b)
6. When all the filters have been replaced, with the cover still off, hook up the unit to the faucet and turn on the water. Check for any leaks. If you find a fitting is leaking, turn off the water, remove the tubing (elbow) and repeat step 5. Check for leaks.
7. Replace the cover and begin enjoying pure, great-tasting water for another 12 months!



Membrane Replacement

The PA membrane is designed to produce pure water for 2–4 years depending on the quality of the source water and your water pressure. The membrane may need to be replaced if the amount of water it produces increases significantly. You should record in this instruction manual the amount of time it takes to produce one gallon of pure water when you first install your Nature’s Spring. Each year when you replace the pre-



and post-filters, you should measure again and compare it to the original time. You may also have someone with a TDS meter check your input water and compare it to the product water. There should be at least a 70-80% improvement in the reduction of total dissolved solids; if not, make sure you have adequate water pressure, and if you do, you should replace your membrane. Also remember that it is important to replace your carbon pre-filter at least every 12 months to keep chlorine from damaging the PA membrane.

When you are ready to install a new membrane, follow steps 1-7 in the filter replacement directions, but install the RO membrane in the bottom location.

FREQUENTLY ASKED QUESTIONS

Q: HOW LONG WILL MY PRE-FILTER LAST BEFORE IT NEEDS TO BE REPLACED?

A: Because of space requirements in this type of countertop unit, the pre-filter is not capable of handling serious sediment problems found in some water supplies. Under most normal city water conditions, the pre-filter is designed to function properly for 12 months, but sediment concentrations vary so greatly that there is no way of determining the lifetime of a filter without knowing more about the feed water.

Q: HOW DO I KNOW IF I NEED TO REPLACE MY CARBON FILTER?

A: The filter's purpose is to remove chlorine and any other tastes or odors from the water. If there is a taste change in your water, the filter should be replaced. Only elaborate tests can determine if the filter is no longer adsorbing organic contaminants. This filter should be replaced on a yearly basis as indicated by your filter replacement timer lights.



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Q: HOW LONG WILL THE MEMBRANE LAST?

A: The membrane's life depends on the water conditions as listed in the specification section of this manual. If all of these conditions are met, the life of the membrane is 2–4 years. If a membrane fails or its performance becomes reduced before this time, the cause can usually be pinpointed to water conditions outside these specifications.

Q: HOW DO I KNOW IF THERE IS A PROBLEM WITH THE MEMBRANE?

A: The easiest and best method is to measure the conductivity of the input water and the treated water as it is produced. There should be a 70–85 percent improvement in the water quality. If it is below this percentage, the membrane may have been damaged. (Poor reduction of TDS may also be an indication of a plugged pre-filter, so check the filter first). A large increase in treated water flow rate is also an indication of membrane failure. Recording the time required to fill a container of the same volume will provide you with long-term information about your membrane. This information can be charted and will show a variation in ratios and water collection rates.

Q: HOW CAN I MONITOR THE PERFORMANCE OF THE UNIT?

A: With identical feed water pressures, the volume of treated water produced by the unit should remain relatively constant. Simply time how long it takes to fill a gallon or liter container and record this value. This can be done once a month. With these values, it is then possible to determine whether the membrane is still functioning properly. If the amount of time required to fill the container decreases dramatically, it is an indication of a membrane problem. If the time required to fill the same size container increases dramatically and the flow from the rinse water tube also slows, you probably have a plugged pre-filter or lower water pressure.



Q: WILL I LOSE VALUABLE MINERALS WHEN I DRINK REVERSE OSMOSIS WATER?

A: No, the body cannot assimilate the minerals found in drinking water. We obtain the majority of our minerals from the foods we eat. A glass of juice or a piece of fruit or a serving of vegetables contain many more chelated minerals the body can utilize and more than several gallons of water.

Q: HOW SHOULD I STORE THE UNIT WHEN NOT IN USE?

A: The reverse osmosis membrane actually works better and lasts longer the more it is used, so use it often. When not in use, dry off the cover, replace the product water plug and store it in a cool, dry environment. If you need to store the unit for extended periods of time, find the coolest place you can, even in a refrigerator.

Q: SHOULD I STORE MY PURIFIED WATER IN THE REFRIGERATOR?

A: The Nature's Spring RO removes the majority of the disinfectants used to inhibit bacterial growth, so if you store water for extended periods of time, you can place the water in a clean container in the refrigerator to keep airborne bacteria from growing in the water. An interesting note: Reverse osmosis water was placed in a sterile container and was tested over several years and never grew any bacteria.

Q: WILL HOT WATER RUIN MY RO MEMBRANE?

A: Hot water over 110° F will damage the very thin PA membrane and cause poor rejection rates for dissolved solids in the water. Make sure you only use cold water in your Nature's Spring RO.



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NATURE'S SPRING LIMITED WARRANTY

Nature's Sunshine Products, Inc. warrants to the original owner each Nature's Spring RO to be free from defects in materials and workmanship for a period of five (5) years from the date of installation.

Exceptions to Basic Warranty

Disposable filter cartridges are covered for defects in material and workmanship ONLY. Service life of disposable filter cartridges varies with local water conditions and cannot be warranted.

The PA reverse osmosis membrane is covered for manufacturing defects only, and warranty replacement is pro-rated as follows:

First ninety (90) days (from installation) –full replacement at no charge

4th through 12th month—buyers pays a fraction of the selling price of a replacement module corresponding to the fraction of the 12 months that the module is in service (i.e. 4/12 to 12/12 of selling price)

To validate your warranty, return the completed warranty card to Nature's Sunshine Products to the address that appears below within 10 days from the date of installation. Product should be installed within three (3) months from the shipping date stamped on the warranty card.

Conditions of Warranty

Warranty will be void if product failure or damage is due to any of the following:

1. Misuse, misapplication, (e.g. unacceptable water conditions) neglect (e.g. inadequate filter changes), alteration, hot feed water, freezing or accident.
2. Fouling of membrane by sediment or scaling or mineral salts
3. Improper installation, operation or servicing



4. Product should be installed within three (3) months of the factory shipping date stamped on the warranty card.

5. Failure to operate system within water conditions outlined below:

Regularly chlorinated water supplies require that the carbon sediment pre-filter be replaced at least every 12 months

Water pressure between 40–85 psi

Water temperature between 40° F and 120° F

pH range 3 to 11

Total Dissolved Solids (TDS) Maximum 2000 ppm (parts per million)

Exclusion of certain damages

Nature’s Sunshine Products’ liability is limited to the cost of repair or replacement, at our option, of any defective part and shall in no event include incidental or consequential damages of any kind. This warranty gives you specific legal rights and you may also have other rights that vary from state to state.

Obtaining Warranty Service

To obtain warranty service, the buyer may:

1. Contact the independent NSP distributor who supplied the product to the buyer.

2. Call Nature’s Sunshine Customer Service at 1-800-223-8225 to receive instructions and/or authorization for warranty service.

3. Write to:

Nature’s Sunshine Products, Inc.

Customer Service

PO Box 19005

Provo, UT 84605-9005



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Warranty Stipulations

- Nature's Sunshine Products will furnish any replacement parts for defective ones under the warranty.
- If it is necessary to ship the product to NSP or bring it to the Distributor for service, the buyer must pay for any shipping or traveling costs.
- NSP will pay for any shipping charges in the U.S. for parts or products covered under the warranty.
- NSP will furnish factory labor to make repairs on parts or products returned to the factory that are covered under the warranty.

This warranty is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose to the extent permitted by law. Liability for consequential damage under any and all warranties are excluded to the extent permitted by law.

Not covered by this warranty is damage to any part of the reverse osmosis system by minerals, bacteria and/or installation, service or operation contrary to printed instructions.

In most instances, the requests for warranty service are handled in a prompt, routine manner with no questions regarding their validity. However, there are some warranty requests that are not justified. In these cases the customer may not be aware that the premature failure of their system was a result of abuse, neglect or the make-up of the source water to which the system was connected.

Purchase Date: _____
Purchased From: _____
Serial Number: _____



APENDIX 1

BATTERY POWERED MONITOR

Specifications:

Voltage = 4.5 vdc.

Batteries = (3) AA alkaline.

Power in sleep mode = 3.3 microamps / .003 milliamps.

Power in count mode = 20.0 microamps / .020 milliamps.

(10) second Interval between flash.

Flash duration = 500 milliseconds.

Timer updates operational batches every 24 hours.

Approximate battery life based on alkaline Duracell batteries = 3 months sleep mode + 16 months operation.

To Place In Sleep Mode:

Disconnect power to the microprocessor by removing enclosure and/or batteries.

NOTE: ALL UNITS ARE SHIPPED IN THE SLEEP MODE

To Awaken Monitor:

Press and depress the reset button once and it will activate a series of lights. The green light turns on for _ second then the Yellow light is on for _ second and finally the Red light is on for _ second. After each color light illuminates for _ second the Green light will flash every (10) seconds confirming microprocessor is operational. The green light will flash for eleven (11) months indicating operational life of filters is of optimum performance.

Replacing Filters, Membrane and Batteries:

After replacing components, wake the monitor from the sleep mode by pressing the reset button once. The monitor was placed into sleep mode because removing the enclosure cover disconnected power. A series of lights will activate Green light _ second, Yellow _ second and Red _ second.





Then Reset the monitor for the new filters by pressing the rest button and hold for three (3) seconds until red light illuminates, resetting monitor to zero time.

To Reset Monitor:

Press and hold the reset button for three (3) seconds until red light turns on. Red light will illuminate for (3) seconds confirming timer has been rest and then green light will flash every (10) seconds. Timer has been returned to zero time.

Green Light:

Flashes every (10) seconds for (11) months.

Yellow Light:

Flashes every (10) seconds after (11) months.

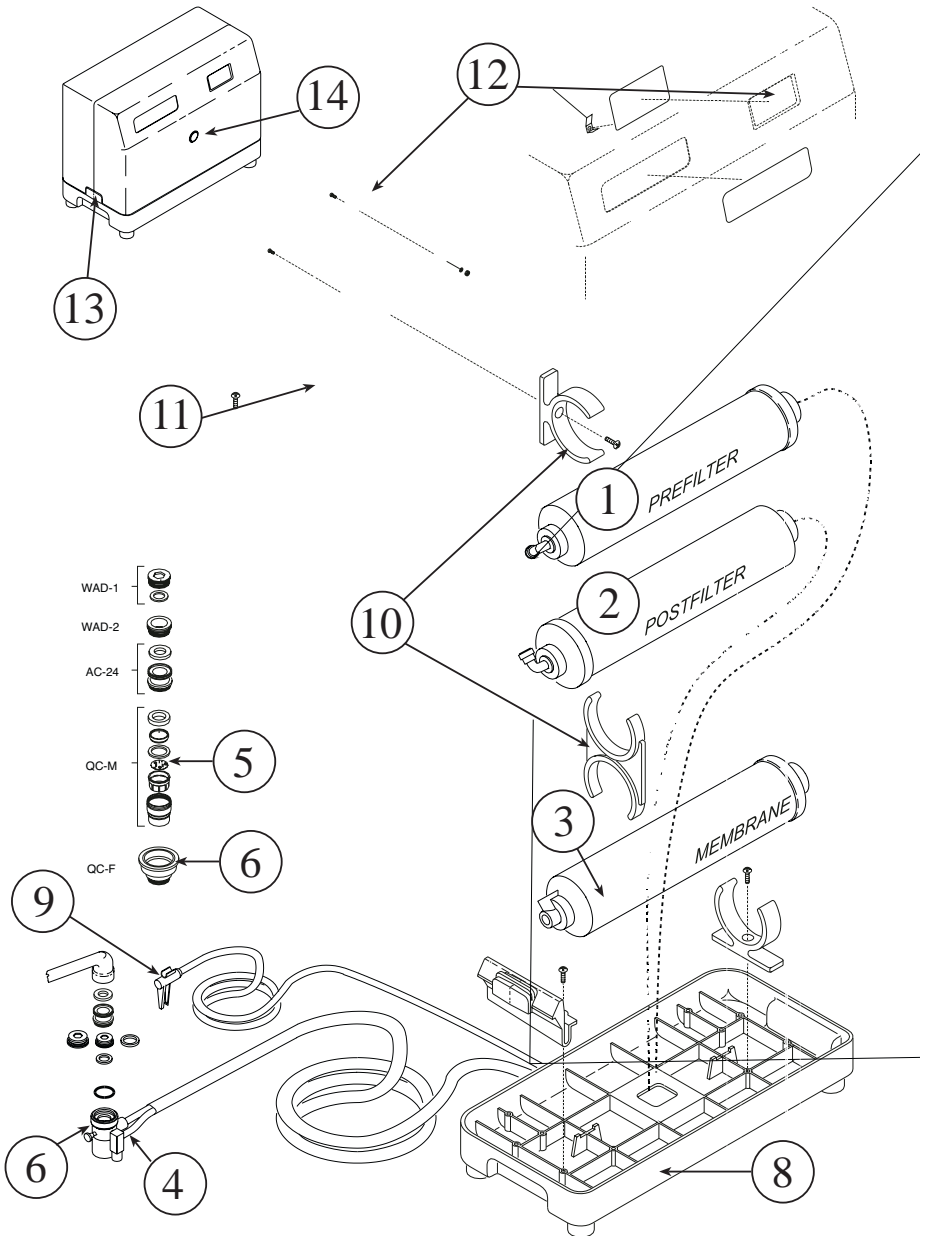
Red Light:

Flashes every (10) seconds after (12) months.



NATURE'S SPRING DIAGRAM

Figure 9





PARTS LIST

(Figure 9)

1. Pre-filter
2. Post-filter
3. RO Module
4. Rinse Water Tube connected to the snap coupler
5. Snap Fitting Assortment
6. Snap Coupler w/Washer
7. Supply Valve w/Source Water Tube
8. Base
9. Treated Water Tube with clip
10. Filter clips
11. Filter tower
12. Filter Replacement
 Timer and battery pack
13. Cover clips
14. Cover



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