Reverse Osmosis Word
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Installation, Safety and Maintenance Manual for Reverse Osmosis Filtration Systems

This instruction manual should be read and followed before installing and using your Reverse Osmosis System and used as a guide for maintenance to keep your system working well.

Index:

Symbol Key

 Warning

Attention

 Recommendations

 Good Practice

Considerations

Water Pressure

Water Pressure (for operating limits see appendix 1) for Reverse osmosis systems require a mains water pressure of 60 psi minimum to 125 psi maximum;


Our systems come fitted with a water pressure gauge to determine water supply pressure, if you do not have one you may wish to purchase this item from our online store.


If water pressure is too high, it can be reduced by installing a pressure reducing valve in the water supply pipe to the RO system.


Low water pressure will affect the production rate and rejection capability of your reverse osmosis membrane. A booster pump will resolve this issue which can be purchased from our online store.

Components

Systems contain replaceable membrane and filter components with a 6 – 12 month life expectancy (see appendix 2), these are critical for the effective reduction of total dissolved solids and specific contaminants. (see appendix 3)

- Appendix 1 - provides a formula to help determine the factors that could affect the RO production rate and compare your reverse osmosis system operation against manufacturers' data.
- Appendix 2 - provides a list of life expectancy for components.
- Appendix 3 provides list of total dissolved solids and specific contaminants which are removed by our systems.

If you need assistance, please contact sales@reverseosmosisworld.co.uk

Safety Tips


DO NOT use this product to make safe drinking water from non-potable water sources. Do not use the system on microbiologically unsafe water, or water of unknown quality without adequate disinfection before or after the system.


DO NOT install the reverse osmosis system in extreme hot or cold temperature environments. Temperature of the water supply to the reverse osmosis system must be between 40°F (4.5°C) and 100°F (38°C). Do not install on **hot** water lines.


DO NOT use until the new membranes should be flushed for one hour prior to use. Reverse osmosis membranes contain a food grade preservative for storage and shipment. This flush removes the preservative which is not harmful but makes the product water taste objectionable.


For optimal system performance, use the system for at least two minutes continuously each day. Use of the membrane flush valve for 5 minutes prior to and following water production is advisable.

Background Information

Reverse Osmosis was originally designed to desalinization sea water to make is drinkable for sea farers. An R.O. membrane has a pore size much smaller than a bacterial virus, or the cryptosporidium parasite. When functioning properly it will remove all microorganisms from tap water and produce sterile water.

Due to the desalinisation function, it is also ideal for anyone on a low sodium diet.

Reverse osmosis is the reversal of the natural flow of osmosis, in a water purification system, the aim is to separate the pure water by screening out salt and other contaminants. Water is forced to pass through the membrane in the opposite direction by application of pressure-thus the term REVERSE OSMOSIS.

What is Reverse Osmosis

Your Reverse Osmosis World Reverse Osmosis (RO) Filter System is a water treatment and purification unit. It uses water pressure to reverse a natural physical process called *osmosis.* Water, under pressure, is forced through a semi-permeable membrane to filter out minerals and impurities. Clean water leaves the membrane via the blue outlet tubing. Minerals and impurities are sent to the drain with RO wastewater via the green outlet tubing.

The system includes replaceable filters and membrane elements. The Sediment Filter removes sand, silt, dirt, rust particles and other sediments. The carbon filter removes chlorine and other contaminants from the water supply before they enter the RO membrane. Chlorine at levels exceeding 0.1ppm will damage the RO membrane, it is essential that the carbon filter is replaced at the recommended intervals stated in this manual. The deionisation filter cartridge (if fitted) removes any residual contaminants that remain in the product water after passing through the RO membrane.


Replacement filter elements and membranes are available from our online store 24 hours a day. Please telephone or email for advice if unsure of ordering. Complete filter replacement kits are available for your filter system if required.


Use of replacement parts not supplied by Reverse Osmosis World will render system warranties null and void. Replacement parts are available from the online store.

Location of the System

The reverse osmosis system is designed for installation under a sink, usually in a kitchen or bathroom. You may also install the system in a garage or outhouse and use the garden tap adaptor available from our online store.


The RO system can also be located in a nearby water source where a drain point is available; however, the location of installation must not be subjected to temperatures below 4.5°C

Water Supply: To provide supply water to the RO system inlet, a feed supply fitting is required or install pipe fittings as needed.

Drain Point: A suitable drain point is needed for rejected water from the RO system. A floor drain, washing machine connection, standpipe, sump, etc. are all acceptable.


All components and tubing should be located in an area which is not exposed to freezing temperatures. Do not expose unit or tubing to direct sunlight.

Dispensing Faucet: (if present) should be placed near the sink where drinking water is normally obtained.
A 2-inch diameter flat surface is required above and below the installation site. The thickness of mounting surface should not exceed 1-1/4 inches. Avoid any strengthening webbing on the underside of the sink.

Feed Water Connection: The feed water valve should be located as close to the RO Filter assembly as possible. USE A POTABLE COLD-WATER SUPPLY ONLY. Softened water is preferred but not essential as it will extend the life of the RO membrane element.


Keep the lengths of tubing short. Longer lengths of tubing will decrease system performance. A booster pump can be used on the supply line to increase efficiency and water production which can be purchased from our online store or check with us for details.

Drain Connection: Depending on plumbing regulations, the wastewater may need to go to drain through an anti-siphon air gap. Do not connect the system drain line to a dishwasher drain or near a garbage disposal. Back pressure from these units may cause an overflow. Allow adequate tubing lengths for final system placement.

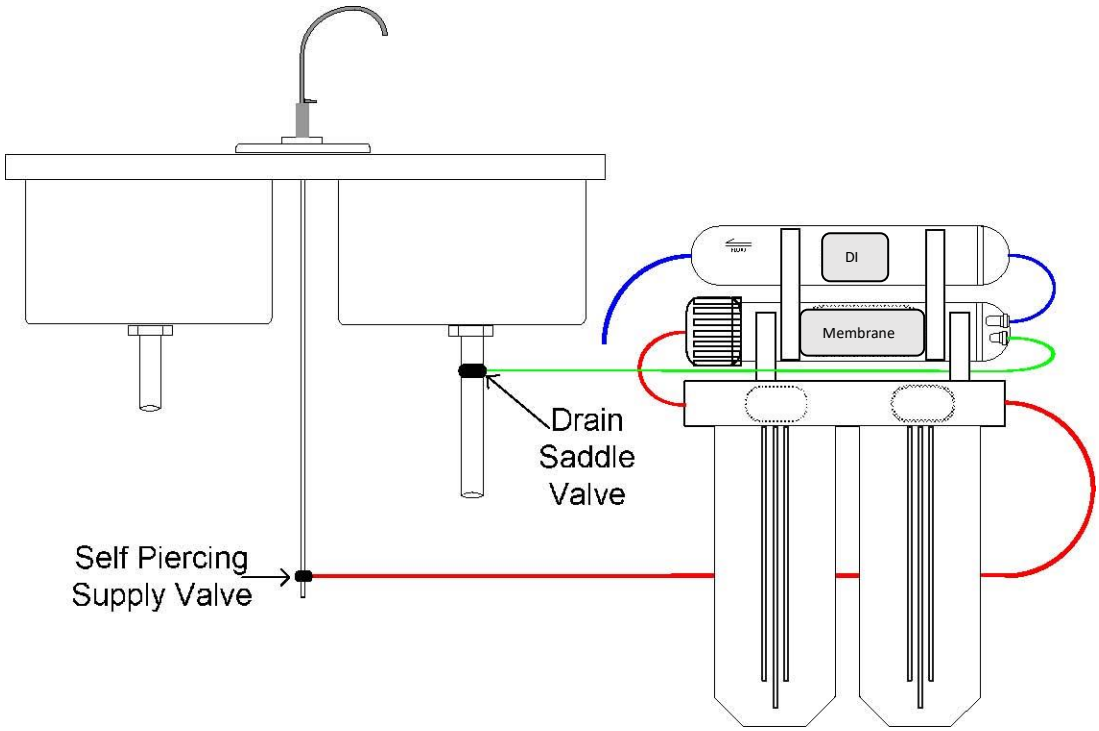
All plumbing should be completed in accordance with local plumbing regulations. Some regulations may require installation by a licensed plumber; check with the local plumbing authority prior to installation.


A garden tap type feed water connection can be supplied to connect to your domestic water supply, please contact us for details. This type of tap connector is ideal for installing your RO System in a garage.


This RO system is designed to work without the aid of a storage tank. Storage tanks are available to purchase from our online store if you would like to store drinking water.


For optimal system performance, use the system for at least two minutes continuously each day. Use of the membrane flush valve for 5 minutes prior to and following water production is advisable

Figure 1 : Typical Under-Sink Installation



Included in your Kit

The reverse osmosis system is purchased as a completed kit. Before starting installation check that the following components have been supplied:

Quantity	Item
1	Reverse Osmosis System
1	Instruction Manual
1	Pressure Gauge Fitting
	Tubing
2	Metres Red ¼" Reverse Osmosis tubing
2	Metres Blue ¼" Reverse Osmosis tubing
2	Metres Green ¼" Reverse Osmosis tubing
	Membrane
1	TFC Reverse Osmosis membrane
	Supply and Waste kit
1	Waste drain kit
1	Supply feed valve
1	Filter Housing Wrench

Tools you will need

- Adjustable wrench, and larger adjustable jaw pliers or pipe wrench.
- Slotted and Phillips head screwdrivers.
- Sharp Knife or Tubing cutters (available from online store)
- Electric drill and bits for cutting the faucet mounting hole and drain entry hole
- Lubricant for seals.

Before Installation

Best performance of the system will be achieved when the incoming water has been treated (softened).

The water coming into the system must be within certain limits for Sediment content, pressure, and temperature. Refer to the specifications in the appendix to determine if your installation is within the limits. Supply pressure is the most important parameter, pressures below 60psi will result in your system not producing water to its' full potential in both volume and TDS levels


If your RO system does not have a pressure gauge, it is worth purchasing one to determine your system operating conditions which are available from our online store.

The filters and membrane elements in the RO system need to be replaced on a regular basis. Follow the instructions for replacement and maintenance guidelines that are in this manual


This RO system is designed to work without the aid of a storage tank. Storage tanks are available to purchase from our online store if you would like to store drinking water

Let's Get started


Reverse osmosis membranes contain a food grade preservative for storage and shipment. **New membranes should be flushed for one hour prior to use**. This flush removes the preservative. The preservative is not harmful but makes the product water taste objectionable.

Quick Reference Guide to Installation

STEP 1: Install cold water supply valve
STEP 2: Install drain adapter
STEP 3: Install faucet (Optional)
STEP 4: Install RO Membrane
STEP 5: Install Auto Shut Off Valve (Optional)
STEP 6: Make tubing connections
STEP 7: Install RO assembly
STEP 8: System Start Up
STEP 9: Pressure Test

Step by Step Instructions

STEP 1: INSTALL COLD WATER SUPPLY VALVE

A self-piercing water supply valve is supplied with your Reverse Osmosis System. If you do not wish to install this on your mains water supply line, alternative installation accessories are available from the online store.

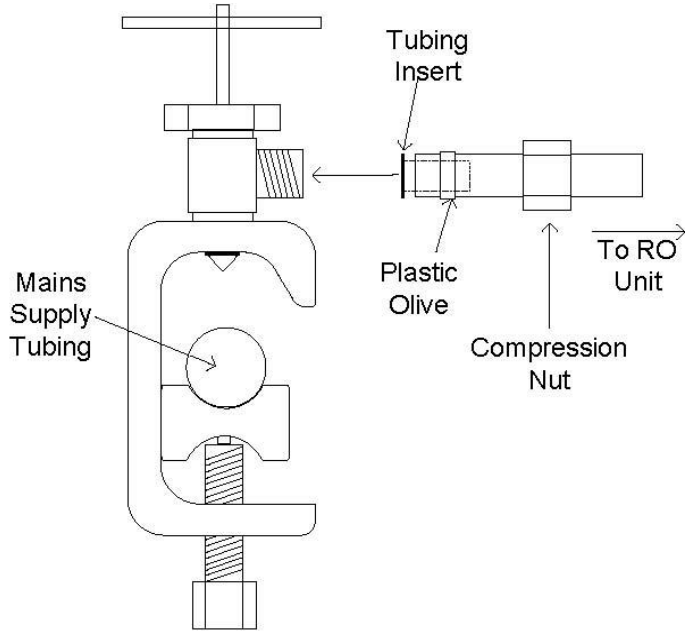
Turn off your house cold water supply valve under the sink or at the main house incoming valve prior to installing the RO system supply valve.

Slide the supply valve over the copper tubing and tighten the bottom bolt assembly firmly to hold the clamp in

position (see illustration below). Pierce the copper tubing by turning the needle valve handle clockwise until it is firmly seated. The valve is closed in this position

Turn on the main supply valve to pressurize the cold-water line. Immediately check for any signs of leakage. Connect the supplied ¼" plastic tubing into the compression nut with the plastic olive and tubing insert in place then tighten the nut firmly. When ready to supply water to the system, turn the needle valve handle counter-clockwise until fully open.

The red tubing supplied should connect to the inlet side of the Reverse Osmosis System. The Inlet side is marked with an "IN" and is identified with a RED connect on the right-hand side of the Reverse Osmosis System.

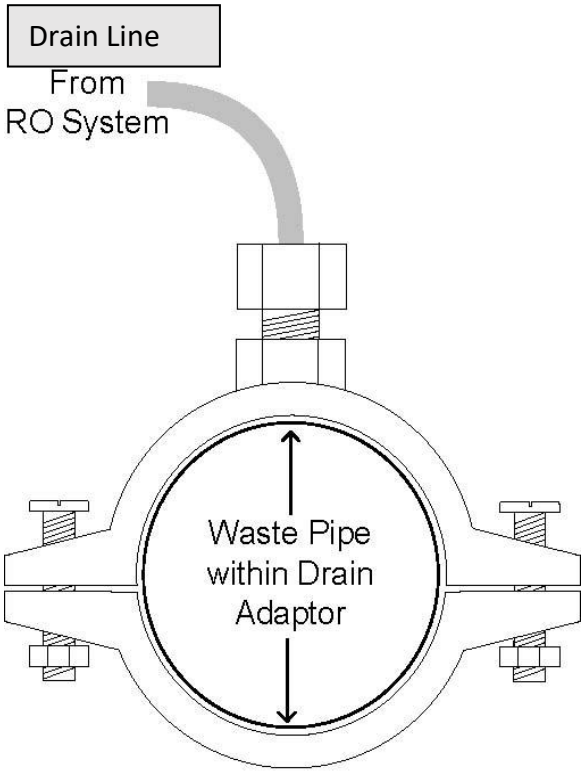


Consult a licensed plumber if you are not familiar with plumbing procedures

STEP 2: INSTALL DRAIN ADAPTER The drain adapter has a rubber inlet that accepts the 1/4-inch green waste tube.

Fix the drain adaptor in position around the waste line from your sink. Drill a ¼" hole through the tubing inlet into the waste line. Attach the waste line from your Reverse Osmosis system to the drain adaptor.

The waste line on your Reverse Osmosis System can be found to the right hand side of the system behind the membrane housing. The waste line has a GREEN collet to identify it.



STEP 3: INSTALL FAUCET (Optional)

The drain adaptor includes a sealing pad which should be fitted in between the waste pipe and the inlet side of the drain adaptor. Failure to correctly fit the sealing pad will result in leakage from the drain outlet.

Select a location for the faucet. Be sure it will fit flat against the sink or counter and that there is space underneath for tubing.

Connect Blue Reverse Osmosis system product tubing to Faucet.

Do not drink product water from the outlet of the deionisation filter cartridge if fitted. A T-Fitting will be required between the RO Membrane outlet and the deionisation filter to supply drinking water to a tank and faucet

STEP 4: INSTALL REVERSE OSMOSIS MEMBRANE

To prevent RO Membrane fouling ensure that the pre-filters are flushed prior to connecting them to the membrane housing. Failure to complete this step may result in premature membrane failure.

Disconnect the red tubing from the RO Membrane housing cap and unscrew until the cap has been removed.

The red tubing joins the membrane housing and pre filter housings.

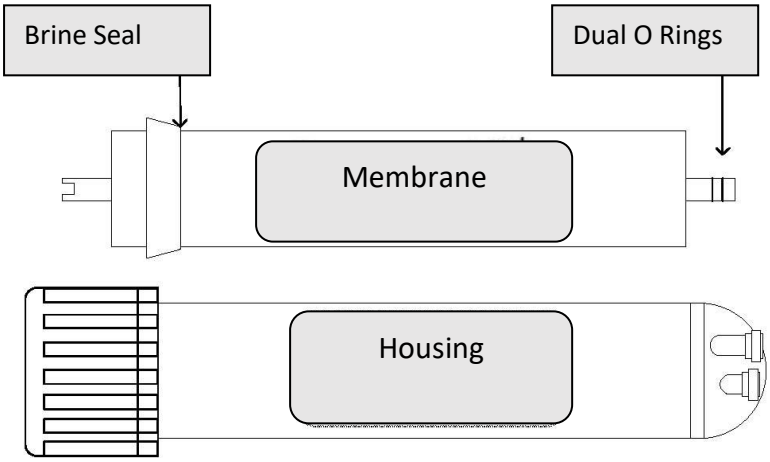
Remove the membrane packaging.

DO NOT remove the white tape or blue outer covering of the membrane itself. Only the clear packaging that the membrane is in should be removed.

Insert the membrane into the membrane housing with the two o-rings first, push the membrane securely into the housing until it has seated correctly. The large black gasket seal will still be visible from the filter housing opening.

Refit the membrane housing cap ensuring the o-ring seal is lubricated. Hand tighten the cap, do not over-tighten or use tools to tighten the membrane housing. Re-insert the red tubing from the pre filter housings to the membrane housing.

The following diagram shows the membrane in the correct orientation for insertion into the membrane housing.



STEP 5: INSTALLING AUTO SHUT OFF VALVE (Optional)

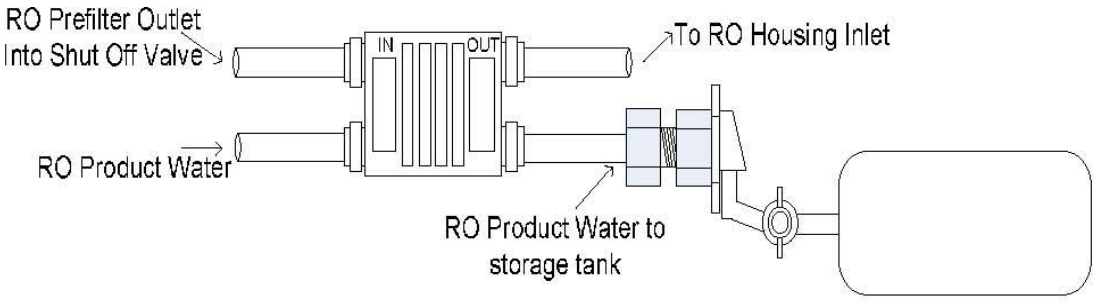
An Auto Shut Off valve kit is available from the online store. Installation of this kit allows unattended operation of the Reverse Osmosis system. The system will automatically cease production of water when the feed container or vessel is full.

The "in & out" markings are on the top of the valve. The top side of the valve is the high pressure side and the bottom side is the low pressure side.

The outlet from the filter housings goes to the "in" on the top of the valve. The "out" goes to the membrane housing inlet using the red tubing supplied.

The membrane housing product water outlet connects to the "in" on the bottom side of the auto shut off valve. The "out" on the bottom goes to the float valve in the container or vessel being filled.

The valve automatically shuts off production when the back pressure reaches approximately 65% of the incoming line pressure.



STEP 6: MAKE TUBING CONNECTIONS

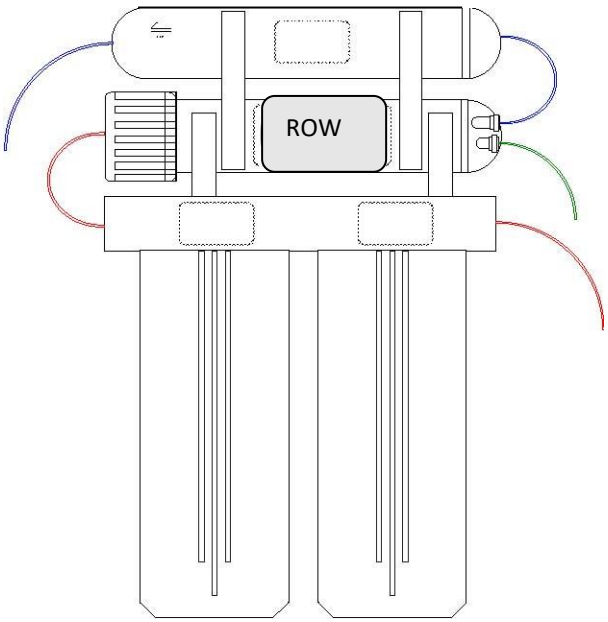
When inserting tubing into quick connect fittings, wet the tubing. Water will help the tubing slide into the rubber inlet.

Feed connection—red tubing from feed valve or garden tap connector to elbow connector on right hand side of filter system (marked “IN”) and with the red collect cover.

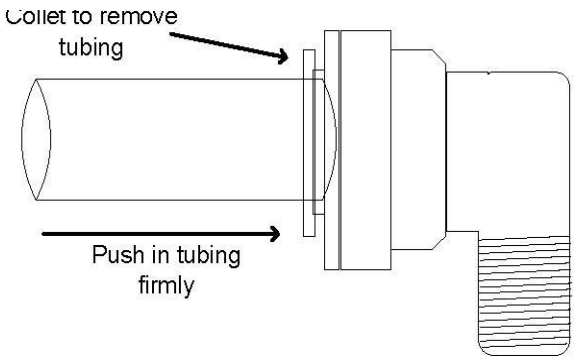
Drain connection—green tubing from the lower outlet on the RO Membrane Housing with the green collet cover.

The tubing is routed to the rear of the membrane housing where the waste connection should be made.

Product Water Connection—blue tubing from upper outlet of RO Membrane Housing with the blue collet cover (or DI filter pod if fitted).



Elements contain a food grade preservative. The use of sterile/latex gloves is recommended.



When removing tubing from quick connect fittings; always hold the collet against the fitting body whilst pulling the tube from the fitting.

If a fitting is leaking, ensure that the tubing end is clean and square. The tubing must be securely pushed home into the fitting body.

STEP 7: INSTALL RO ASSEMBLY

The tubing is attached to the RO System by the quick connect fittings. When choosing a location for the system, allow enough tubing for it to be moved for periodic servicing of the filters and membrane elements.

Be sure to lubricate the O-rings in the filter housings if performing system maintenance.

Do not turn the incoming water valve on until all fittings and connections are confirmed secure. Shipping vibration may have resulted in fittings becoming loose.

STEP 8: SYSTEM STARTUP

1 Inspect all connections.
2 Remove pre filters from packaging.
3 Remove filter housings.
4 Lubricate element O-rings and Filter Housing O-rings with silicone lubricant.
5 Fit sediment and carbon filters into their respective housings.
6 Replace filter housings and tighten using supplied wrench

To prevent RO Membrane fouling ensure that the pre-filters are flushed prior to connecting them to the membrane housing. Failure to complete this step may result in premature membrane failure.

7 Disconnect the membrane housing inlet tubing and remove housing cap.
8 Securely insert O-ring end of membrane elements into membrane housing.
9 Replace membrane housing cap and reconnect inlet tubing to membrane housing (red).

STEP 9: PRESSURE TEST SYSTEM

To check for leaks, the system must be filled with water and brought up to operating pressure. It is advisable to ensure the filter housings are tight prior to introducing water. The supplied housing wrench can be used to ensure a good seal is achieved.

1 Open cold water feed valve slowly. Run at 1/2 open for a minute, then open fully.
2 Open filter outlet valve or system faucet (optional) until water flows.
3 Check for leaks.
4 Purge the system. Run water through the RO system for one hour. This purges air and clears residual membrane preservative
5 RO system is now ready for us.

MAINTENANCE OF THE RO SYSTEM

 Use of replacement parts not supplied by us will render system warranties null and void. Replacement parts are available from the online store

 The components of the RO system are designed to function with minimal maintenance. However, the membrane elements and filters will need to be replaced on a regular basis. Run the system for at least two minutes each day for optimal performance.

 Periodic use of the membrane flush valve will increase the service life of the membrane by flushing water across the membrane removing particulates and scale build up.

REPLACEMENT OF PREFILTER AND POSTFILTER

The carbon and sediment pre-filters remove sediment and certain chemicals, such as chlorine, from the water.

 Depending on water use and the amount of impurities, these filters should be replaced every six months or 2500 gallons.

 Water production volumes may be estimated from time in use or by purchasing the Flow Meter available from our online store

REPLACEMENT OF RO MEMBRANE ELEMENTS

The functional life of the RO membrane elements will vary based on feed water quality. Product water should be tested periodically to verify the membrane elements are performing properly.

 For most residential applications, RO membrane elements should be replaced every two to four years or when product water rate drops off indicating scaling (particularly in hard water areas).

REPLACEMENT OF THE PREFILTER, CARBON FILTER, AND RO MEMBRANE ELEMENTS

1. Turn off the water supply to the RO System.
2. Reduce system water pressure by opening the faucet or outlet valve.
3. Disconnect the feed and drain tubing connectors.
4. Move system into a contained area, such as a sink or drain.
5. Remove the filter housings as necessary using the supplied filter housing wrench.

If changing only the pre-filter and post-filter, the other housings do not need to be removed. If changing the membrane elements, the pre-filter, post-filter and flow restrictor should also be changed.

6 Remove exhausted filters and dispose of them in a responsible manner.

7 Replacing Reverse Osmosis Membrane Elements:

- Remove filter housings. Remove and discard used elements.
- Remove new RO membrane from packaging.
- Lubricate membrane O-rings and membrane housing O-rings with silicone lubricant.
- Securely insert O-ring end of membrane into membrane housing.
- Replace membrane housing cap.
- Connect membrane housing to pre filter housings.


When replacing membrane elements ensure membrane flushing for one hour; this removes a food grade preservative from the membrane elements. It is not harmful but may affect the taste of the water.

8 Replacing pre filters.

- Remove new pre filter from packaging. Ensure gaskets are secure.
- Insert pre filter into correct housing on filter bracket.
- Lubricate housing O-ring with silicone lubricant.
- With the pre filter element in place, screw the housing back onto the system.
- Do not over tighten, use the supplied wrench.

9 Replacing carbon filters

- Remove new carbon filter from packaging. Ensure gaskets are secure.
- Insert carbon filter into correct housing on filter bracket.
- Lubricate housing O-ring with silicone lubricant.
- With the carbon filter element in place, screw the housing back onto the system.
- Do not over tighten, use the supplied wrench.

10 Re-connect tubing and fitting to the filter housing.
11 Re-position the filter assembly and turn the water supply on. Check the system for leaks.
12 Open the faucet or outlet valve and run water for two minutes.
13 Close the faucet or outlet valve and allow the system to stand idle for 20 to 30 minutes.
14 Check for system leaks.

The Reverse Osmosis system is now ready for use.

The filter housings are sealed using an O-Ring. Tighten by hand. If any leaks are detected when water pressure is applied, the housings can be tightened further with the supplied filter housing wrench

TROUBLESHOOTING GUIDE

PROBLEM	CAUSE	SOLUTION
Little or no RO water production or quantity.	Feed valve is off or plugged.	Open valve or remove debris from valve orifice.
	Blocked pre filters	Replace sediment and carbon prefilters.
	Scaled or fouled RO membrane	Replace membrane.
	Storage tank air pre charge pressure is too high.	Drain tank and adjust air precharge to supplier's specification (e.g., 5-7 psi).
	Undetected RO product water leak.	Find and repair leak.
	The production capacity sizing exceeds capabilities at local pressure and temperature conditions are exceeded.	Install an RO booster pump with tank switch controls.
	System functioning correctly, a regular drip rate is normal.	Time how long it takes to produce one litre of product water and then calculate the resultant gallons per day. Remember that all RO membranes are specified in US Gallons per day which is lower than UK Gallons per day.
Little or no RO water flow from faucet (if supplied)	Storage tank air loss or ruptured diaphragm/bladder.	Restore the correct empty tank air charge (e.g., 5-7 psi). If water remains in the tank after air is pumped into the air valve, the diaphragm or bladder is likely ruptured and the entire tank (or replaceable bladder, if applicable) needs to be replaced.
	Plugged carbon post filter due to carbon fines collecting on the outlet media retainer. First verify acceptable flow before the post filter or with the post filter removed.	Replace carbon post filter.
	Storage tank valve partially closed.	Open tank valve fully.
	Crimped tubing line to RO faucet.	Replace section of crimped tubing.
Bad tasting water from RO faucet First, attempt to identify the taste -e.g., metallic,	Metallic -copper tubing used from product hook up.	Tap water taste -The RO membrane is extremely scaled, deteriorated, or ruptured.
	Bitter/astringent -excess CO2 in RO water lowers pH.	This may be a seasonal problem resulting from changes in local water chemistry.
	Plastic/rubber -new plastic tubing after post filter;	First check the post filter sealing gaskets to make sure bypass is

sour /astringent, plastic, rubber, rotten egg, musty, salty, same as tap water.	Diaphragm/bladder in tank; exhausted post filter.	not occurring. If okay, replace post filter.
	Rotten egg -H2S in household water supply not removed by RO; system contaminated due to long period of no use or improper sanitizing.	H2S in the water supply must be removed prior to the RO system using conventional technologies such as aeration or oxidation / filtration. If non pathogenic contamination of the RO system is suspected, replace all filters, " flush" the RO system to clean and sanitize purification assembly and tank. Verify acceptable RO performance when finished.
	Musty -Water stale with high bacteria counts due to long periods of no use.	Replace filters and sanitize purification assembly and tank. Verify acceptable RO performance when finished.
	Salty -A malfunctioning water softener, which is not properly rinsing after regeneration, allowing high TDS brine into the RO feedwater.	Repair water softener.
	Tap water taste -The RO membrane is extremely scaled, deteriorated, or ruptured.	Determine the cause of membrane failure, correct the problem, and replace the membrane.
RO water TDS too high	Scaled, deteriorated, or ruptured RO membrane. A scaled membrane can result from blocked reject flow control. Deterioration can result from chlorine attack on a TFC membrane. A ruptured membrane can result from failed product check valve.	Replace the membrane (and associated cause of scaling, deterioration, or rupturing). Perform required sanitizing.
	Feed pressure too low for the membrane. Recommend minimum pressure of 40 psi for TFC membranes.	Check if a pressure regulator is on the main house water line which can be reset to a higher pressure. If not, install an RO booster pump with tank switch controls.
	The carbon post-filter (if fitted) is not sufficiently flushed on new installation or service. Carbon fines in product water affect TDS reading.	Drain about one litre of water from the RO faucet every few hours throughout a day.
	New replacement membrane has been fitted.	The membrane will require four to six hours of continuous use before stabilising fully.
	Deionisation stage if fitted has become exhausted.	Bypass deionisation stage at start-up to divert TDS spike from resin.

One or more pre- filter housings is/are emptying or not filling fully.	Air lock within system.	Unscrew pre-filter housing when system is running to bleed air off. Care required to not overflow the housings.

APPENDIX 1

Operating Limits

Membrane Type : Polyamide Thin-Film Composite
Maximum Operating Temperature : 113°F (45°C)
Maximum Operating Pressure : 125 psig (8.3 bar)
Maximum Feed Flow Rate : 2.0 gpm (7.6 lpm)
pH Range, Continuous Operation : 2 – 11
Maximum Feed Silt Density Index : (SDI) 5
Free Chlorine Tolerance <0.1 ppm

Keep elements moist at all times after initial wetting.

Depending on water use and the amount of impurities, these filters should be replaced every six months or 2500 gallons.

RO membrane elements should be replaced every two to four years or when product water rate drops off indicating scaling (particularly in hard water areas).

If operating limits and guidelines given in this document are not strictly followed, the limited warranty will be null and void.

To prevent biological growth during prolonged system shutdowns, it is recommended that membrane elements be immersed in a preservative solution.

The membrane shows some resistance to short-term attack by chlorine (hypochlorite). Continuous exposure, however, may damage the membrane and should be avoided.

The customer is fully responsible for the effects of incompatible chemicals and lubricants on elements. Their use will void the element limited warranty.

APPENDIX 2

Membrane Rejection Data

This reverse osmosis membrane gives excellent performance for a wide variety of applications including low-pressure tap water purification, single-pass seawater desalination, chemical processing, and waste treatment. Our membranes exhibit high rejection at low pressures with very stable long-term operation.

Component	Symbol	% Rejection
Sodium	Na^{+}	98
Calcium	Ca^{+2}	99.5
Magnesium	Mg^{+2}	99.5
Potassium	K^{+}	97
Iron	Fe^{+2}	95-98
Manganese	Mn^{+2}	95-98
Aluminium	Al^{+3}	98-99
*Ammonium	NH_4^{+}	86-92
Copper	Cu^{+2}	98-99
Nickel	Ni^{+2}	98-99
Zinc	Zn^{+2}	98-99
Strontium	Sr^{+2}	96-98
Cadmium	Cd^{+2}	96-98
Silver	Ag^{+}	93-96
Mercury	Hg^{+2}	96-98
Barium	Ba^{+2}	96-98
Chromium	Cr^{+3}	96-98
Lead	Pb^{+2}	96-98
Chloride	Cl^{-1}	98.8
Bicarbonate	HCO_3^{-}	60-75
Fluoride	F	87-93
*Silicate	SiO_2^{-2}	85-90
Phosphate	PO_4^{-3}	98-99
*Chromate	CrO_4^{-2}	86-92
*Cyanide	CN	86-92
Sulfite	SO_3^{-2}	96-98
Thiosulfate	$S_2O_3^{-2}$	98-99
Ferrocyanide	$Fe(CN)_6^{-3}$	98-99
Bromide	Br^{+}	87-93
*Borate	$B_4O_2^{-2}$	30-50
Sulfate	SO_4^{-2}	99.5
Arsenic	As	94-96
Selenium	Se^{-2}	94-96
Bacteria and virus		99.9
Pyrogen		99.9

Appendix 3

FACTORS AFFECTING RO PRODUCTION RATE FROM YOUR REVERSE OSMOSIS SYSTEM

Membranes produce the rated gallons per day (GPD) at 60 psi (4.1 bars) operating pressure, 77°F (25°C) operating temperature and 500 p pm total dissolved solids. Membrane output gallons per day (GPD) depends on operating pressure, water temperature and the ppm TDS in the feed water.

Expected GPD = Rated GPD × PCF × TCF × OCF - where PCF is the pressure correction factor, TCF is the temperature correction factor and OCF is the osmotic correction factor.

1. Calculation of PCF:

The output GPD from the membrane is directly proportional to the applied pressure. Note: The membrane is rated to produce the rated GPD at 60 psi. For any pressure other than 60 psi the output GPD is multiplied by the PCF (Pressure correction factor).

PCF = Pressure available (in psi) ÷ 60

2. Calculation of TCF:

The output GPD also decreases with decrease in temperature. This is because the water viscosity increases with decrease in water temperature. The GPD increases by approximately 3% for every °C rise in temperature. (Ref er to the following table for TCF values).

Table 1: Temperature Correction Factors (TCF)

℉ (℃)	TCF	℉ (℃)	TCF	℉ (℃)	TCF
41.0 (5)	0.521	59.0(15)	0.730	77.0 (25)	1.000
42.8 (6)	0.540	60.8 (16)	0.754	78.8 (26)	1.031
44.6 (7)	0.560	62.6 (17)	0.779	80.6 (27)	1.063
46.4 (8)	0.578	64.4 (18)	0.804	82.4 (28)	1.094
48.2 (9)	0.598	66.2 (19)	0.830	84.2 (29)	1.127
50.0 (10)	0.620	68.0 (20)	0.857	86.0 (30)	1.161
51.8 (11)	0.640	69.8 (21)	0.884	87.8 (31)	1.196
53.6 (12)	0.661	71.6 (22)	0.912	89.6 (32)	1.232
55.4 (13)	0.684	73.4 (23)	0.941	91.4 (33)	1.267
57.2 (14)	0.707	75.2 (24)	0.970	93.2 (34)	1.304

3. Calculation of OCF

The output GPD of the system decreases with an increase in ppm TDS of tap water. This is because the osmotic pressure increases with increase in ppm TDS, and the increased osmotic pressure reduces the net driving force for pure water passage through the membrane. The osmotic pressure is approximately 1 psi for every 100 ppm TDS. Note: Generally speaking, the effect of osmotic pressure can be neglected for most tap water supplies and the OCF can be assumed to be 1.

Example: What is the expected GPD from a 50 GPD system at 40 psi pressure and 60°F water temperature?

PCF =40 ÷60 =0.666 TCF = 0.754 (from Table 1) OCF =1

Expected GPD = 50 x 0.666 x 0.754 x 1 = 25.10 GPD

End of Guide