LAPIERRE

Lapierre R.O.
Junior 100 & 200 GPH

OPERATION MANUAL

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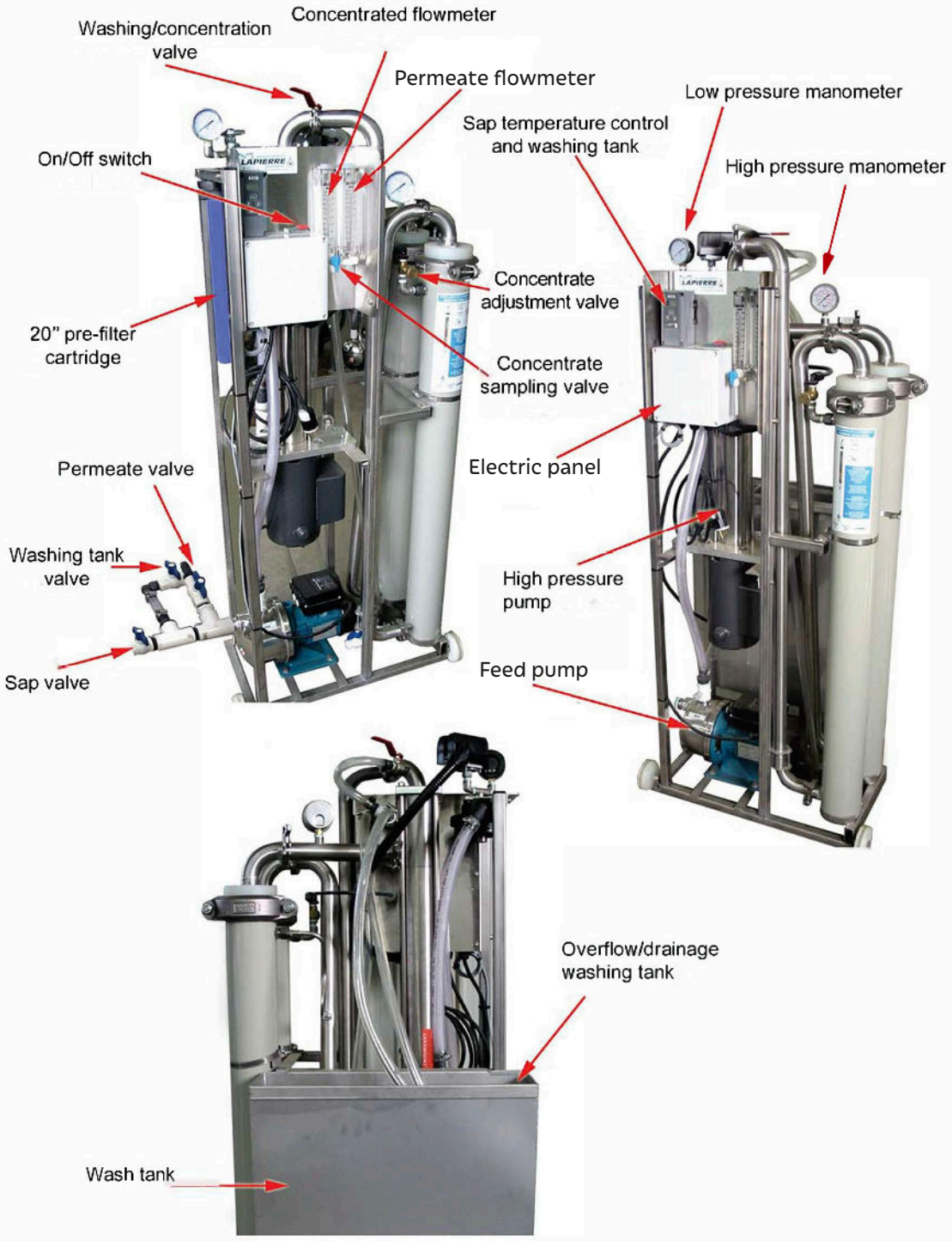
Identification of components



Advantages of using a R.O.

-Energy saving

-Saves time and labor costs

-Allows for larger scale operations

-Maximizes the efficiency of evaporation equipment

-Contributes to the protection of the environment

Reverse Osmosis System

The system significantly reduces the energy and time required for the maple sap evaporation process.

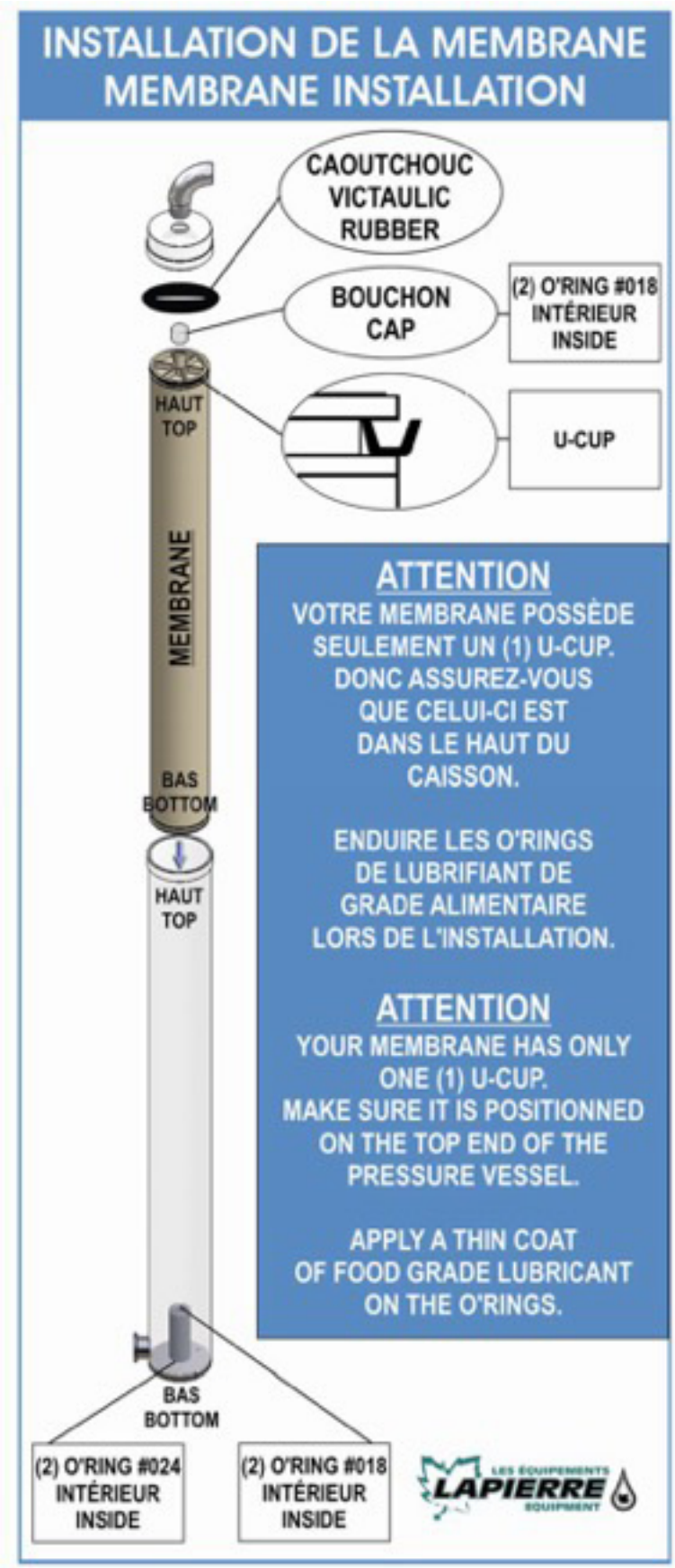
It reduces energy costs and improves the profitability of operations.
In addition, the sap concentration operation reduces greenhouse gas emissions into the atmosphere due to the combustion of wood or petroleum products, while greatly contributing to saving non-renewable energy.

The reverse osmosis concentration system more than any other equipment quadruples and even more the efficiency of maple syrup production systems.

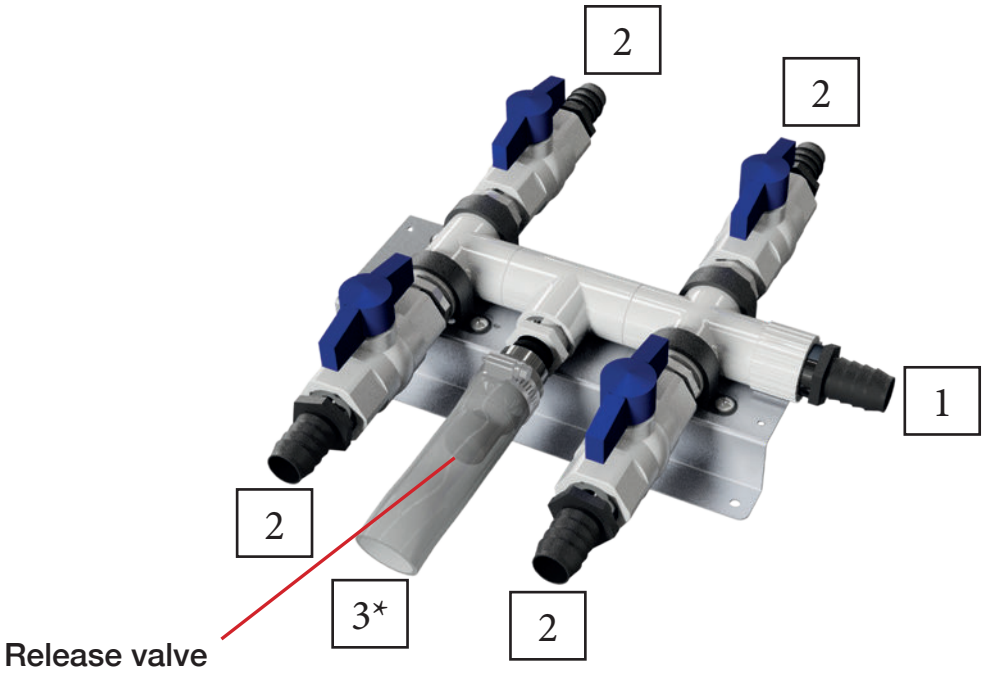
Without the sap concentration system, it would be unthinkable to harvest the large volumes of sap from today's exploitations and transform it into syrup in a reasonable time and at reasonable costs.

Reverse osmosis is the «spearhead» of the maple syrup industry.

Membrane installation



Connection of the valve panels (concentrate and filtrate)



Note: Water inlet #1 can be installed from the left or the right.

Installation for concentrate and/or filtrate :

1 - Entrance.
2 - Outlet (Drain / Maple water tank / Concentrate tank / Wash tank).
3 - To be directed to the drain (release valve).

*** must discharge water only in case of overpressure in the piping system (adjust by adjusting the release valve).**

AVAILABLE DIMENSIONS	
1/2”	CN120-080812XX
3/4”	CN120-121212XX
1”	CN120-161612XX
1 1/4”	CN120-202012XX
1 1/2”	CN120-242412XX

Operation instructions

WARNING!

If you are using a new membrane or if you are at the first use of the season, you must reject the maple sap for 5 minutes before concentrating, to remove chemical residues.

1- Close the valve on the wash tank.
2- Close the filtrate valve.
3- Open the sap valve.

Close the valve: washing/concentration.

Press start button.

When the feed pump pressure gauge reaches 20 PSI, the high pressure pump will start automatically.

Turn the concentrate adjustment valve clockwise to adjust the concentration.

Check the flowmeters: Set both floats to the same level on the flowmeters.

The concentration is then 50/50 (half of the water is removed).

Read at the top of the fleets, take a sample to measure the ºBrix.

If you have removed 50% of the liquid volume of the sap at 2.5 º brix, the volume of the remaining liquid should now be 5 º brix. Now make sure that there is no more sugar in the filtrate.

The filtrate must be completely translucent to be sure that there is no sugar in the filtrate, you can evaporate 1 liter to reduce it to 100 milliliters. Then taste or measure.

Procedure : After concentration

Step 1

De-sugar removal from the membrane (+/- 2 Min) .

1- Close the sap valve.
2- Close the washing tank valve.
3- Open the filtrate valve.

Fully open wash/concentration valve for the rinse/wash cycle.

The pressure on the high pressure gauge will decrease between 30 and 40 PSI.

Valve 1 (concentrate) to: reservoir.
Valve 2 (filtrate) to: reservoir.

Press start.

Take a sample through the concentrate valve. Taste or measure to make sure there is no sugar left.

When there is no sugar left, go to step 2: Pre-rinse.

Step 2

Pre-Rinse (+/- 10 Min).

Valve 1 (concentrate) to: wash/drain.
Valve 2 (filtrate) to: wash/drain.
Valve 3 (concentrate) to: drain.
Valve 4 (filtrate) to: drainage.

After pre-rinsing, fill the filtrate tank.

1-Close the sap valve
2-Open the filtrate valve
3-Open the valve of the washing tank

When the washing tank is full, close the filtrate valve.

Step 3

Washing in closed circuit with or without chemicals (automatic stop at 43ºC) (+/- 45 min to 2 hrs).

Install the filtration cartridge for washing. You must keep a filter cartridge especially for washing with or without chemicals. This cartridge can be reused several times.

Valve 1 (concentrate) to: wash/drain.
Valve 2 (filtrate) to: wash/drain.
Valve 3 (concentrate) to: wash.
Valve 4 (filtrate) to: washing.

Press start.

Step 4

Final Rinse (Until the filtrate tank is empty).

1- Close the sap valve.
2- Close the valve of the washing tank.
3- Open the filtrate valve.

Valve 1 (concentrate) to: wash/drain.
Valve 2 (filtrate) to: wash/drain.
Valve 3 (concentrate) to: drain.
Valve 4 (filtrate) to: drain.

Press start.

Replace the wash cartridge for a pre-filter cartridge with filter cloth.

You are ready to concentrate again.

Increase concentration

It is undeniable that the use of reverse osmosis technology in maple groves has a direct impact on operating costs. The price of fuel and labor is constantly increasing.

These costs are not expected to decrease in the future. For these reasons, many producers have sought to reduce their expenses as much as possible in order to maintain the profitability of their operations.

Thus, the reverse osmosis system is increasingly solicited to increase the sap concentration rate beyond 8 brix. This is quite possible.

However, it is necessary to plan an additional investment through the addition of membranes. The expansion of the filtration surface allows the pump's flow rate to be maintained at a higher concentration.

This investment can be justified by the savings in energy and labor required for sap processing. The following table and graphs show the savings
generated by a higher concentration of sap.

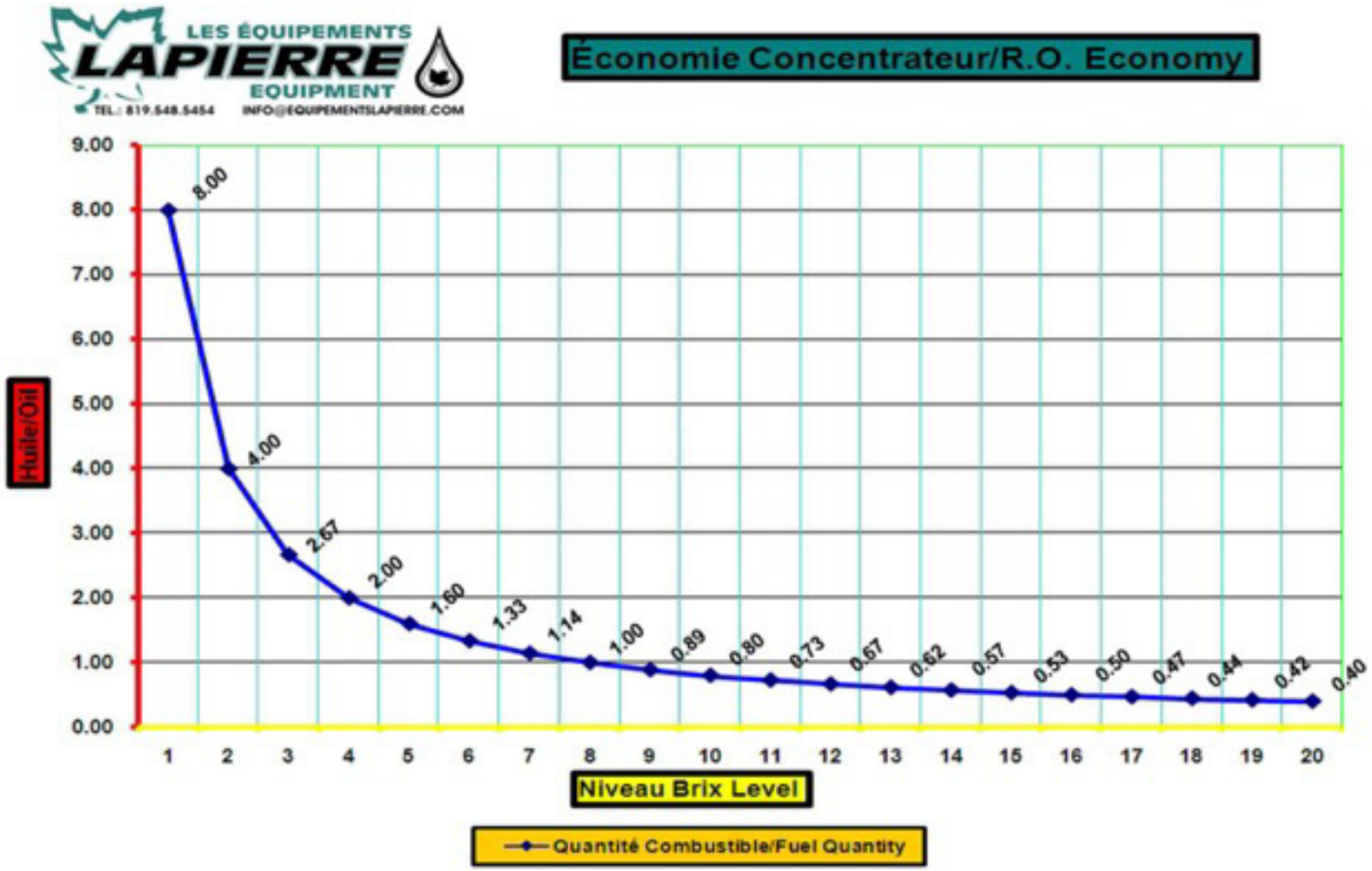
Energy Expense Table

Sap R.O.
Possible savings depending on the level of concentration

Evaporation				250	Gallons/hour
Price of heating oil				1,00 $	litre
Price of heating oil				4,54 $	gallon (Imp)
Quantity of syrup produced/season	Drums	100	32	3,20 $	gallon (Imp)
Worker's hourly rate				21,00 $	/hour

Brix Concentrate	2	4	6	8	10	12	14	16	18	20
Syrup per hour (gallons)	5,8	11,6	17,4	23,3	29,1	34,9	40,7	46,5	52,3	58,1
Oil consumed per gallon	4,00	2,00	1,33	1,00	0,80	0,67	0,57	0,50	0,44	0,40
Oil cost per gallon	18,16 $	9,08 $	6,05 $	4,54 $	3,63 $	3,03 $	2,59 $	2,27 $	2,02 $	1,82 $
Total oil cost	58,112 $	29,056 $	19,371 $	14,528 $	11,622 $	9,685 $	8,302 $	7,264 $	6,457 $	5,811 $
Evaporation hours	550	275	183	138	110	92	79	69	61	55
Labour force	11,558 $	5,779 $	3,853 $	2,890 $	2,312 $	1,926 $	1,651 $	1,445 $	1,284 $	1,156 $
Total per season	69,670 $	34,835 $	23,223 $	17,418 $	13,934 $	11,612 $	9,953 $	8,709 $	7,741 $	6,967 $
		50%	33%	25%	20%	17%	14%	13%	11%	10%

Energy Expense Table



Factors affecting membrane performance

Reverse osmosis technology can be a complicated subject. Especially in the absence of knowledge of the terminology that describes the different aspects of the operation in relation to the different variables.

The following defines some key terms and provides a quick overview of the factors that affect the performance of reverse osmosis membranes, including the effect of pressure, temperature, organic matter concentration, mineral sugars and salts contained in the sap, permeate recovery and PH.

Terminology and definitions

RECOVERY :
Percentage of sap (water) in the membrane system feed that emerges in water or permeate production. Recovery can be increased by adjusting a valve on the concentrate outlet.

REJECTION :
The percentage concentration of solids removed from the system feed water by the membrane.

PASSAGE :
This is the opposite of «rejection». Passage is the percentage of dissolved matter in the feed liquid that passes through the membrane.

PERMEATE (FILTRATE) :
Purified water produced by the membrane system.

TOTAL FLOW :
The rhythm of the feed fluid introduced to the membrane. Normally measured in liters per minute (LPM) or gallons per minute (GPM).

CONCENTRATE FLOW RATE :
The flow rate of the concentrated feed liquid coming out of the membrane. The concentrate contains almost all the dissolved matter (organic and mineral) present in the feed liquid. Normally measured in liters per minute (LPM) or gallons per minute (GPM).

PERMEATE FLOW RATE :
The rate (flow) of permeate produced by a membrane surface. Normally measured in liters per minute (LPM) or gallons per minute (GPM).

DILUTED SOLUTION :
Purified water solution or water produced by the reverse osmosis system.

CONCENTRATED SOLUTION (BRINE) :
Brackish water solution, such as the feed liquid for the reverse osmosis system.

Factors affecting membrane performance

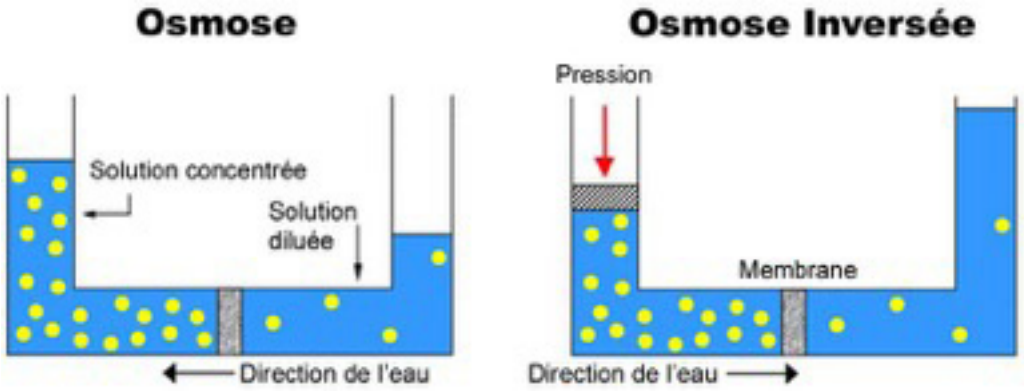
Effect of pressure

Feed pressure affects the permeate flow (flux) as well as the mineral salt rejection from the reverse osmosis membranes. Osmosis is the flow of water through a membrane from the diluted solution to the concentrated solution.

Reverse osmosis technology involves applying sufficient pressure to the feed fluid to reverse the natural effect of osmotic pressure. By applying pressure in excess of the osmotic pressure, the natural effect will be reversed.

A portion of the feed liquid (concentrated solution) is forced through the membrane and emerges as purified water on the diluted solution side. (See Table 1). The higher the concentration, the higher the osmotic pressure.

Table 1: Overview of Osmosis/Reverse Osmosis



Osmosis: The water passes through a semi-permeable membrane to the region of the higher concentration liquid in order to balance the 2 solutions. At the point of equilibrium of the liquids, the difference in height between the concentrated and the diluted side corresponds to the osmotic pressure differential between the 2 liquids.	Reverse osmosis: by applying a pressure exceeding that of the osmotic pressure, the direction of water flow will be reversed, hence the term reverse osmosis.

Effect of temperature

As shown in Table 2, the flow rate of water through the membrane increases in direct relation to the increase in pressure at the membrane inlet. The increase in feed pressure invariably results in an increase in mineral salt rejection.

As shown in Table 2, this effect is less direct than that of permeate flow. Reverse osmosis membranes are an imperfect barrier for mineral salts dissolved in the feed liquid. There is always some passage of minerals through the membrane. By increasing the feed pressure to the membrane, the salt passage will be reduced because water is pushed through the membrane at a faster rate than the salt can be transported.

Table 2

Effect of feed pressure on permeate flow and salt rejection.

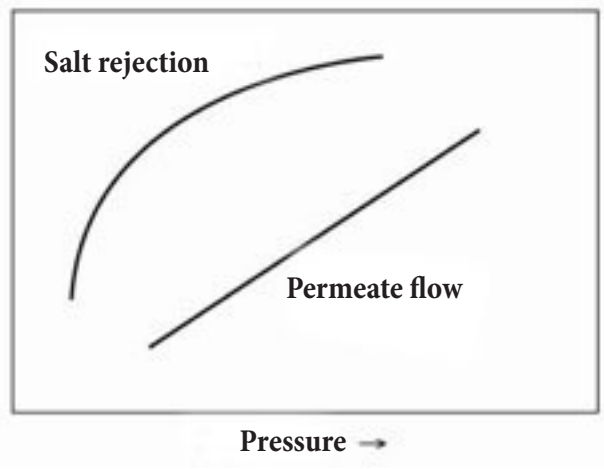
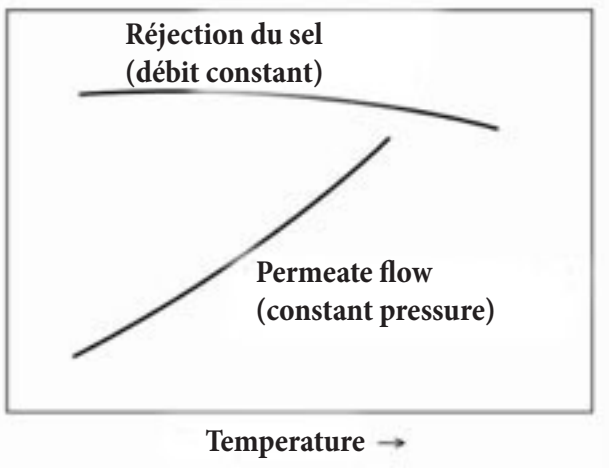


Table 3

Effect of temperature on permeate flow and salt rejection



As Table 3 shows, membrane productivity is very sensitive to the change in feed water temperature. As the temperature rises, the permeate flow increases in an almost linear fashion due mainly to increased diffusion.
water through the membrane.

An increase in temperature also means a decrease in salt rejection or an increase in salt passage. The ability of a membrane to withstand higher temperatures increases the operating latitude and is also important during cleaning operations. A higher temperature allows the use of a more powerful and faster washing process.

Effect of salt concentration

The osmotic pressure is the result of the type and concentration of salts and organic matter contained in the feed liquid. As the concentration of salts increases, so does the osmotic pressure. Therefore the pressure required to reverse the natural direction of osmotic flow will be largely determined by the concentration of salts in the feed fluid.

Table 4 shows that if the feed pressure remains constant, a higher salt concentration results in a decrease in permeate flow. The increase in osmotic pressure counterbalances the effect of the feed pressure. The increase in salt passage through the membrane (decrease in rejection) with the decline in permeate flow is also shown in Table 4.

Effect of recovery

As shown in Table 1, the effect of reverse osmosis occurs when the natural osmotic flow between a dilute and a concentrated solution is reversed by applying pressure to the feed fluid.

If the percentage of recovery is increased (and the feed pressure remains constant), the concentration of salts in the membrane increases and the natural osmotic pressure will increase until it is as high as the pressure applied to the feed. This can negate the effect of the feed pressure causing a drop, even the cessation of permeate flow and salt rejection. (see Table 5)

The maximum percentage recovery in all types of membranes does not normally depend on the osmotic pressure limit but on the concentration of salts present in the feed that precipitate on the membrane surface as deposits of minerals and organic matter in concentration processes. Moderately soluble salts are calcium carbonate (limestone), calcium sulphate (gypsum) and silica. Chemical treatment of feed water may be necessary to control these mineral deposits. (Treatment for drinking water)

Table 4

Effect of increased concentration on permeate flow (flux)

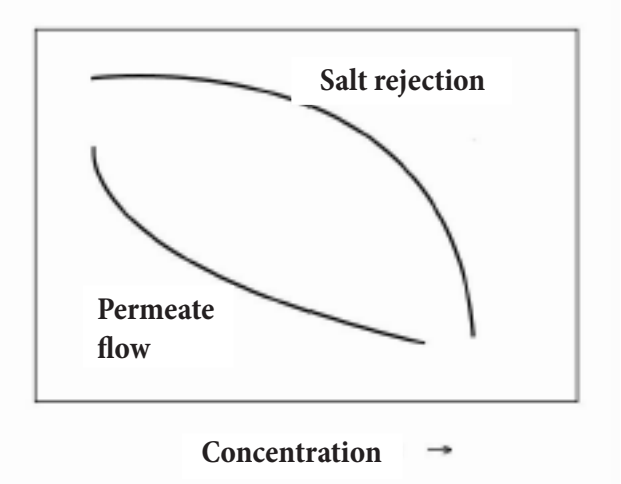


Table 5

Effect of increased recovery on permeate flow (flux) and salt rejection

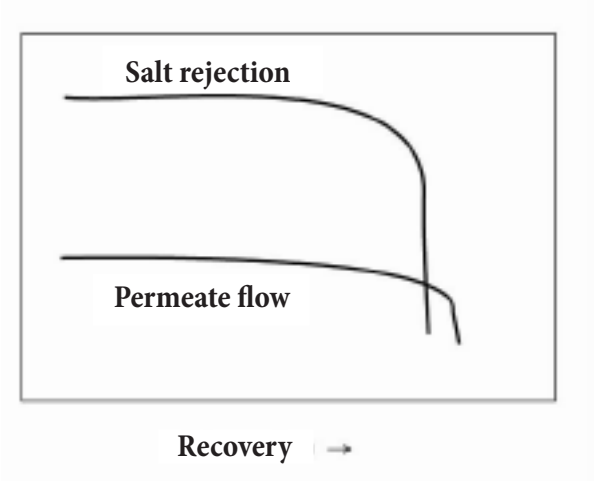
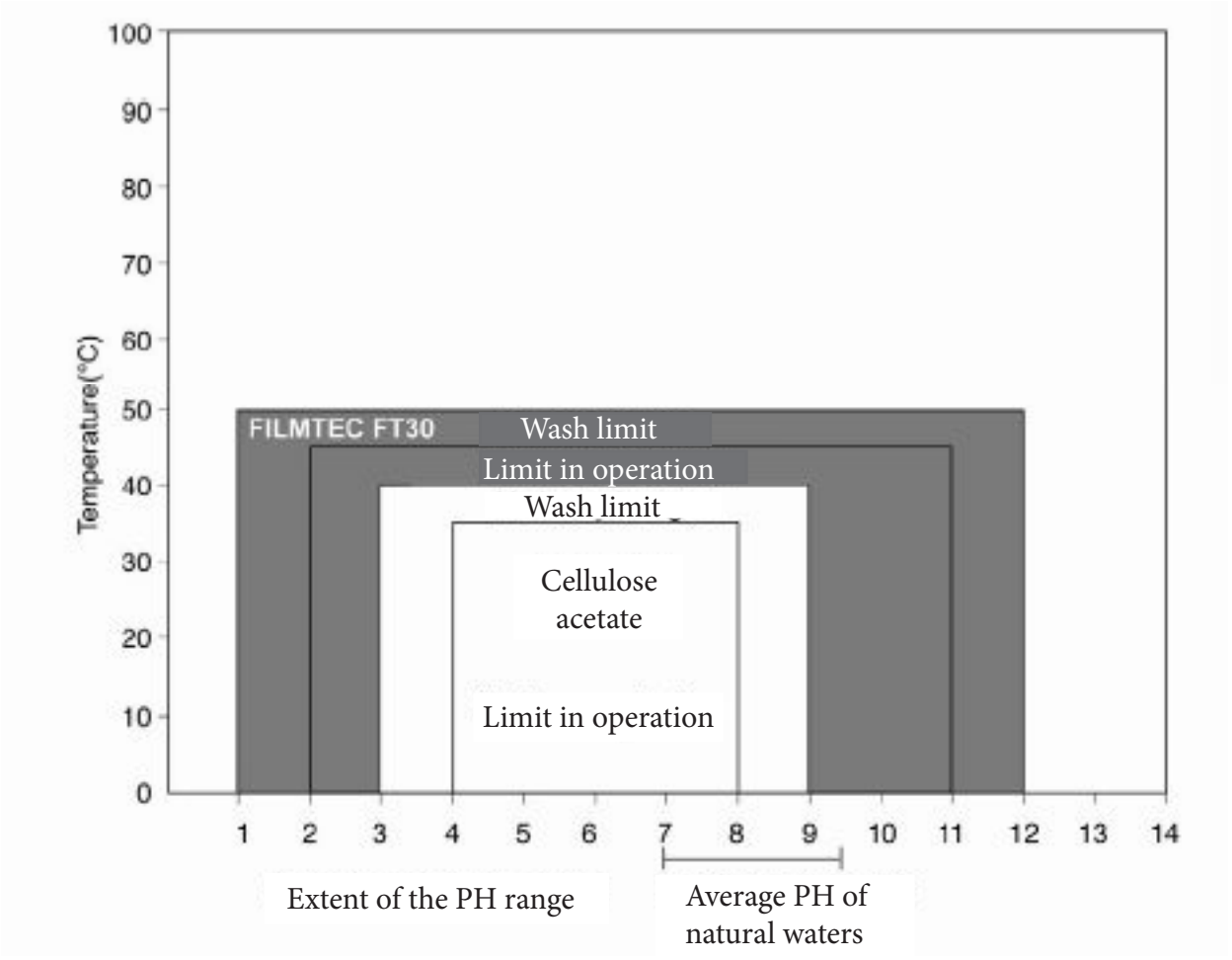


Figure 4.

Comparison of parameters for TFC and AC membranes



Effect of PH

The PH tolerance of different types of reverse osmosis membranes can vary greatly.

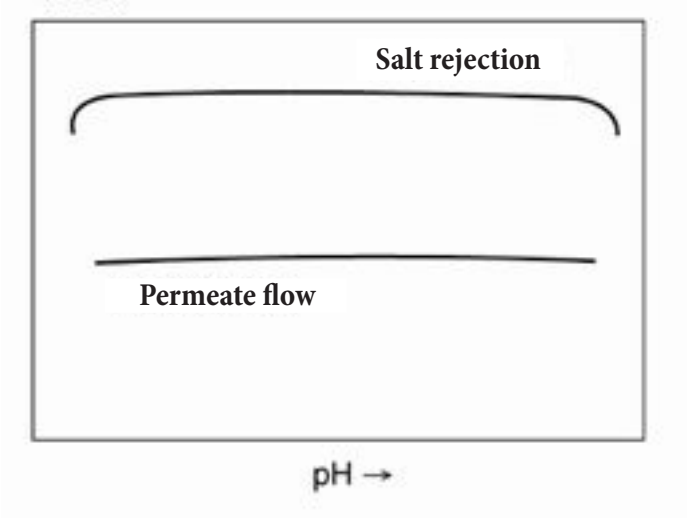
TFC type membranes are typically stable over a wider PH range than cellulose acetate membranes.

The performance of the membrane on salt rejection depends on the PH. The permeate flux may also be affected. Table 7 shows that the permeate flux as well as the salt rejection for TFC membranes is relatively stable over a wide PH range.

As shown in Table 6, the stability of the TFC FT30 membrane over a wide PH range allows the use of more powerful and more efficient washing procedures than for the AC.

TablE 7

Effect of feed water PH on permeate flow (flux) and salt rejection



Washing

The necessity of washing

Any filtration system requires cleaning at more or less regular intervals to maintain a constant flow rate. The membrane is a filter. It can retain particles (molecules) that are invisible to the eye. The accumulation of these mineral and organic particles on the surface of the element's film causes a gradual decrease in the flow of water through the membrane. This results in a decrease in the filtrate flow rate which translates into a decrease in performance.

We can then observe :

-A decrease in permeate flow rate
-A decrease in brix of the concentrate
-An increase in pressure

A drop in permeate flow of 10% to 15% must be rectified as soon as possible by chemical washing. It is important to regularly monitor the performance of the equipment. An excessive drop in performance can result in irreversible damage to the membrane.

It may be necessary to perform more than one wash in order to recover the initial performance, especially on equipment with several components.

You must follow the manufacturer's recommendations for washing.
There are different types of membranes on the market. The concentrations of washing products and the products to be used may vary from one manufacturer to another.

The PH of the washing solution (water and detergent) must be adjusted according to the specifications of the type of membranes used. It is recommended to use a PH meter or PH tape to evaluate the amount of detergent required to prepare the wash solution. The wash is always followed by a rinse with a sufficient amount of permeate. It is preferable to use a permeate at a temperature of 25ºC.

For greater efficiency. The minimum amount of permeate for an 8-inch membrane is 500 gallons. Increase the rinse time by 5 minutes for each additional membrane connected in series. (Approximately 100 gal. per additional membrane).

In order to preserve the life of the membranes :

-Follow the manufacturer's recommendations.
-Monitor the performance of the equipment.
-Perform wash and rinse when necessary.
Do not improvise miracle methods such as the use of chlorine or other non-recommended products.

-Do not leave membranes in concentrated solution when equipment is not in operation. Follow the concentration with a short rinse.

Concentration and performance test

This sheet is intended to control the R.O. data during the concentration operation as well as during the performance tests of your membranes. In order to evaluate the operation of the R.O. it is important to know the parameters written on this sheet.

1. Brix percentage of the raw sap. This is the sap before concentration. Please note that the temperature of the liquid influences the data of the measuring device. Always check the temperature scale of the instrument used.

2. Brix percentage of the concentrate This test is normally performed after 15 to 30 minutes of operation. For the measurement follow the same recommendations as for the raw sap.

3. Filtrate flow rate
Record the flow meter reading in liters or gallons per minute. To know the flow rate/hour, multiply this data by 60 (minutes) e.g.: 3 GPM x 60 minutes = 180 GPH

4. Concentrate flow Follow the same procedures as for filtrate flow.

5. Total flow rate To evaluate the total flow rate, add column 3 (filtrate) and column 4 (concentrate). This will give you the total flow rate per minute. To know the hourly flow rate, multiply by 60 (minutes) e.g.: 2 + 8 X 60 = 600 GPH

Please note that this data is influenced by temperature, concentration percentage, sap condition, membrane condition and operating pressure.

6. Percentage of concentration
The purpose of setting the concentration percentage is to ensure that the recommended operating parameters are not exceeded.

Ex.: For a device equipped with a 600 GPH pump and a 600 GPH membrane, the concentration must not exceed 70%. However by increasing the filtration surface by adding additional membranes. It is possible to surpass this recommendation to obtain a higher concentration of sugar and mineral salts.

A higher concentration increases the osmotic pressure and the precipitation of organic matter. The latter has a downward effect on the total membrane flow rate. To determine the concentration percentage, divide the flow rate of the filtrate by the total of the filtrate and concentrate.
Ex.: Column 3 (filtrate)= 8 Column 4 (concentrate)= 2 So 8 /10 = 80%.

7. Operating temperature
This is the temperature of the sap at the inlet of the unit.
The temperature of the sap has a direct effect on the permeability of the membrane. The colder the sap is, the more difficult it is for the filtrate to flow through the membrane film. To evaluate the treatment capacity of the membrane we must refer to the temperature conversion chart.

8. Operating pressure
This is an important element during the operation or during the performance test (PEP). Pressure has a direct effect on the flow and permeability of the membrane. Increasing the concentration rate requires an increase in pressure to maintain the flow rate. However, it is desirable for the membrane to operate at a lower pressure than the recommended limit.
Always perform the performance test at the same pressure to have a good reference point.

9. Corrected filtrate flow rate
Divide the filtrate flow rate by the temperature correction factor.

Date **Time**	**1**	**2**	3	4	5	6	7	8	9	
	% Brix of raw sap	**% Brix concentred**	**Filtrate flow (GPM)**	**Concentrated flow (GPM)**	**Total flow (3 + 4) x 60**	**% Concentration** **3 / (3+4)**	**temperature Operation**	**Pressure operation**	**Corrected flow rate** **facteur temp**	**Test**
	2%	8 brix	7.5	2.5	600 GPM	75%	13 C	375 PSI		concentration

How to calculate the performance of the membrane

When you purchase your R.O., check on the second day of use the performance of your membrane after washing with hot water and rinsing with cold filtrate. The efficiency obtained will then be your 100% reference.

To check the condition of the membrane, the pressure in the system and the concentrate flow rate must always be set to a reference. We suggest setting the pressure to 250 PSI and the concentrate flow rate to 3 GPM.

Example :

Table 1: Reading to be taken for 100% yield

Date	Time	Temp ° C/F Filtrate	Filtrate Flow
March 10, 2006	11:50	8°C / 46.4 °F	5.2 GPM

Once the above readings have been taken, the filtrate flow rate obtained must be divided by a correction factor since the filtrate flow rate varies with temperature. The higher the temperature, the higher the flow rate and vice versa. We correct the flow rate as if the temperature was always 13° C.

Table 2: Correction factors

Temp ° C	Temp ° F	Correction factors		Temp ° C	Temp ° F	Correction factors
0	32.0	0.672		13	55.4	1.000
1	33.8	0.695		14	57.2	1.028
2	35.6	0.719		15	59.0	1.055
3	37.4	0.742		16	60.8	1.084
4	39.2	0.766		17	62.6	1.112
5	41.0	0.790		18	64.4	1.142
6	42.8	0.816		19	66.2	1.170
7	44.6	0.842		20	68.0	1.200
8	46.4	0.866		21	69.8	1.229
9	48.2	0.893		22	71.6	1.259
10	50.0	0.919		23	73.4	1.289
11	51.8	0.946		24	75.2	1.319
12	53.6	0.973		25	77.0	1.350

Therefore, to obtain the 100% membrane flow rate at 13OC
5.2 GPM / 0.866 (correction factor 8OC) = 6.00 GPM

This result should be retained to compare the performance of the membrane year after year.

Therefore, if one wants to verify the performance of the membrane at a given time, one must repeat the above exercise and compare the result obtained with the original membrane result.

For example, if we obtain 5.5 GPM on the second check (corrected to 13OC), the performance of the membrane would be:

((6.00 - 5.5) / 6.00) x 100 = 8.3% loss
Or
5.5 / 6.0 = 91.7% efficiency

Table 2: Correction factors

# membrane 28736465	Reading	Temp ° C	Temp ° F	Corrected reading to 13•C / 55.4• F
2000	5.2	8	46.4	6.00 (100%)
2001	5.1	10	50.0	5.50 (91.7%)
2002				
2003				
2004				
2005				

Start

- Install the membrane according to the instructions on the recirculation box.

- Before inserting the membrane into the chamber, make sure that the u-cup of the membrane and all adapter o'rings are in perfect condition. Always coat the u-cups and o'rings with a silicone based waterproof grease before installing them.

- Once the installation is completed, connect the hoses (high pressure & permeate return) to the R.O., connect the electrical connection of the recirculation pump to the R.O.

- Make sure that there is no breakage or obstruction in the supply plumbing.

- If the R.O. has been stored in cold storage, heat the apartment for about 2 days before turning it on. This will prevent breakage if a little glass has formed inside the pumps.

- To turn on, open the maple water supply valve before operating the R.O., let the water fill the entire unit by gravity.

- It is very important to rinse abundantly before starting the concentration, you must first follow the rinsing instructions and turn the equipment on.

Conditioning of the membrane

Before concentration, it is important to condition the membrane.

Procedure :

-Rinse with water for 10 to 15 minutes.

As it is important not to use water containing minerals, we recommend testing the PH.

The PH should range from 6 to 7.5.

You should rinse with water for 30 to 45 minutes using a full wash tank. The water should be at approximately 85° C (185° F).

Then drain the water and repeat the procedure with cold water.

Now proceed to concentration :

-At the end of the day, you must do a chemical wash.

Once finished, add permeate to finish rinsing thoroughly.

Troubleshooting

P : The R.O. starts but stops as soon as my finger leaves the power switch.
1. First check if the unit reaches a pressure of at least 20 PSI.
2. 2. Check that the maple water supply valve is properly open.
3. Check if the prefilters are clogged, replace them.
4. Check if the plumbing is not obstructed by debris or even damaged letting air in. An improperly glued or poorly sealed joint can cause this problem.
5. Check the feed pump.

P : The R.O. starts but stops as soon as I engage the pressure pump. (High pressure switch)
1. First check if the unit reaches a pressure of at least 20 PSI.
2. Replace the prefilters.
3. Check for any obstructions in the plumbing or the feed pump.
4. Check the feed pump.

P : The R.O. performance declines rapidly after power-up.
1. Make sure the recirculation pump motor is running. Place your hand under the motor and you will feel the air move as the motor rotates. If the motor inadvertently stops working, the diaphragm will clog quickly.

2. At the beginning and end of the season, it is important to closely monitor the condition of the membranes. During these periods, it is necessary to bring the washings closer together in order to maintain the performance of the membranes.

Some years at the beginning of the season, the sap can contain dormant oils produced by the maple, such sap can quickly clog the membrane(s) if we are not vigilant.

P : The recirculation pump is not working. Normally, shutting off the recirculation pump will cause the R.O. to shut down completely. The «OUT OF SERVICE» indicator light will therefore be on. But sometimes, depending on the source of the problem, the R.O. will not shut down.

1. Control Panel.

A) Check whether the breaker is switched on. (The R.O. continues to operate, except on newer models).
B) Check if the overload relay is switched on (the R.O. stops and the «OFF» light is on).
C) Check the electrical connection to the socket or motor. (The R.O. continues to operate).

2. Recirculation motor.

A) Check if the electric motor can be turned by hand. If not, it may be defective and will need to be repaired or replaced.

B) If the motor runs, check the electrical connection to the motor. If there are no problems with the electrical connection and power supply to the motor, the motor should be repaired by a qualified technician.

P : I hear a rumbling in an electric motor.

In general, this problem is not very serious. It is probably a ball bearing problem.

However, this situation must be addressed before damage is extensive. A qualified technician can repair the motor and check the pump to make sure everything is in good working order. Avoid operating your R.O. in a wet location.

Moisture is the enemy of electrical motors and components. A dry, well-drained area will prevent unnecessary problems.
During the sugar season, you can contact our technical services for any questions or problems related to your equipment.

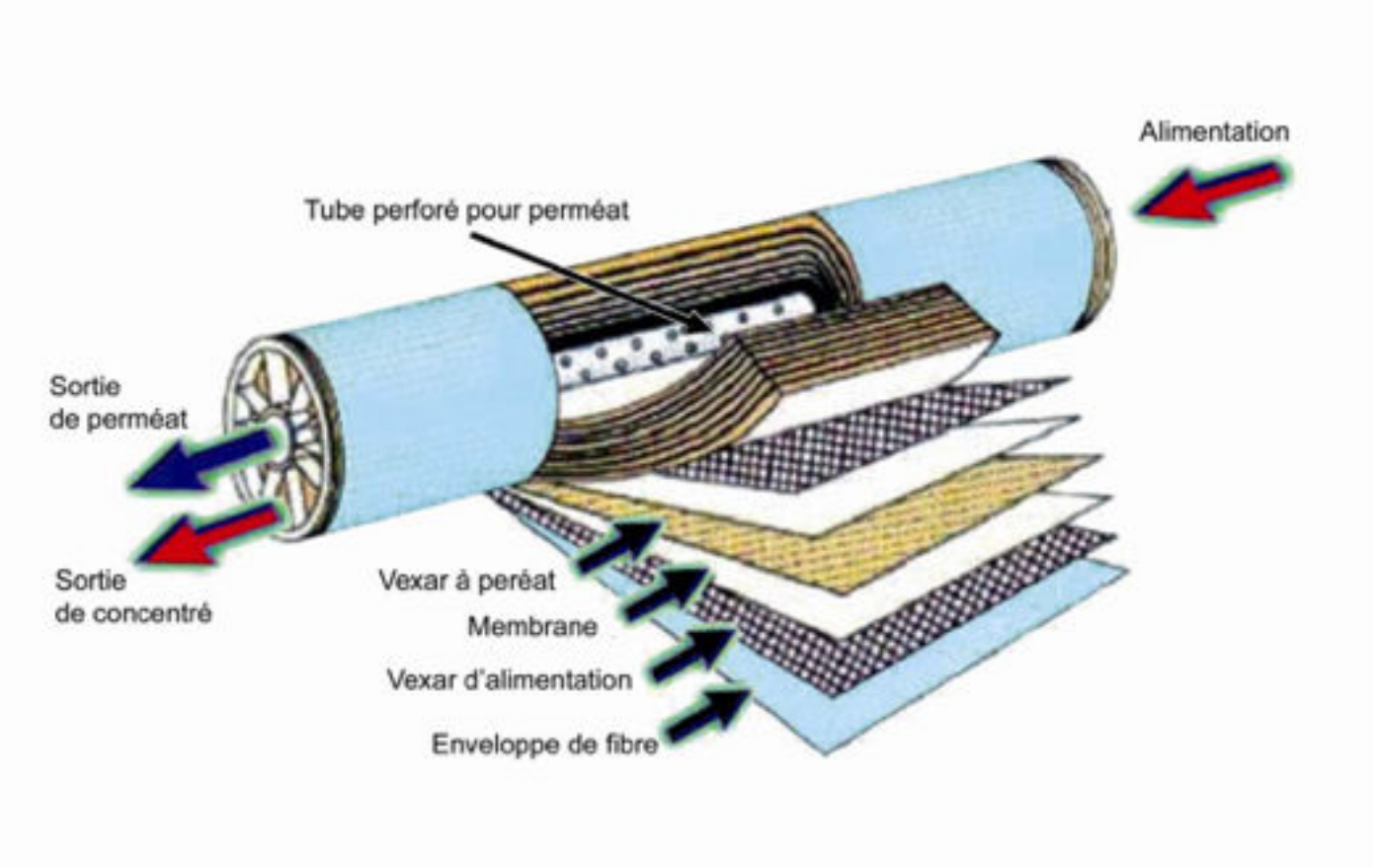
Storage procedure

At the end of the season, it's time to store your R.O. until next season.

To start you must make sure you have enough permeate (filtrate) to allow for a good wash.

1. Even if you are sending the membrane(s) for factory washing; it is important to wash and rinse the membrane thoroughly.
2. Disconnect the recirculation vessel from the R.O.
3. 3. Loosen the nuts on the cover and remove the membrane(s).
4. Place the membrane in the storage box with about 1 liter of filtrate to keep it in a humid environment. Store in a cool, frost-free place.
5. 5. Drain the unit and all pumps completely.
6. It is strongly recommended to store the R.O. in a dry and heated area. This precaution will prevent problems caused by moisture infiltration and unpleasant surprises due to incomplete drainage.

Diagram of the membrane



MEMBRANE :
Semi-permeable film that allows the flow of water molecules while retaining organic molecules and dissolved minerals.

FEEDING VEXAR :
Net that acts as a supply and recirculation channel for the membrane.

VEXAR TO PERMEATE :
Thin net that conveys the permeate to the central tube of the membrane element.

Information sources :
-Filmtech (Dow chemicals)
-Complete filtration resource (CFR)

Specifications (standard models)

Model	Structure	Membrane	Inlet hose size	Prefilter	Volts	Amperes	High pressure pump	Recirculation pump	Feed pump
100 g/h Junior	Structure Junior	1x (4''x40'')	1''	1 x 5microns	220 v. (1 phase)	11.5	1.5 HP	-	1/2 HP
200 g/h Junior	Structure Junior	2x (4''x40'')	1''	1 x 5microns	220 v. (1 phase)	11.5	1.5 HP	-	1/2 HP
125 g/h -Turbo -NG	2000	1x (4''x40'')	1 1/4''	1 x 5microns	220 v. (1 phase)	20.5	3 HP	1/2 HP / pressure vessel (1)	1/2 HP
250 g/h -Turbo -NG	2000	2x (4''x40'')	1 1/4''	1 x 5microns	220 v. (1 phase)	25	3 HP	1/2 HP / pressure vessel (2)	1/2 HP
600 g/h -Turbo -NG	-2000 -3000	1x (8''x40'')	1 1/4''	1 x 5microns	220 v. (1 phase)	40 @ 220 v. (1 phase)	5 HP	3/4 HP / pressure vessel (1)	1 HP
1200 g/h -Turbo -NG	-2000 -3000	2x (8''x40'')	1 1/4''	2 x 5microns	220 v. (1 phase)	65 @ 220 v. (1 phase)	2 x5 HP	3/4 HP / pressure vessel (2)	1 HP
1800 g/h -Turbo -NG	-3000	3x (8''x40'')	1 1/4''	3 x 5microns	220 v. (1 phase)	90 @ 220 v. (1 phase)	3 x5 HP	3/4 HP / pressure vessel (3)	2 HP
2400 g/h -Turbo -NG .	-3000	4x (8''x40'')	1 1/4''	4 x 5microns	220 v. (1 phase)	110 @ 220 v. (1 phase)	4 x5 HP	3/4 HP / pressure vessel (4)	2 HP or 3HP

WARRANTY CERTIFICATE
EQUIPMENT MANUFACTURED BY LAPIERRE EQUIPMENT INC.

Standard products covered by this certificate:
Evaporators, reverse osmosis separators, tanks, filters, presses, stainless steel fittings, extractors, syrup tanks, jacketed tanks, and all other products manufactured in Lapierre Equipment Inc. facilities.

LAPIERRE EQUIPMENT GUARANTEES THAT every new product manufactured by Lapierre Equipment is free of defects in material and workmanship in normal conditions of installation, use, and maintenance for a period of two years. If a product is proven to be defective before the expiry of the warranty period, Lapierre Equipment will repair or replace the necessary parts with new parts or their equivalent, without cost to the customer (parts and labour included). The defective parts that are replaced become the property of Lapierre Equipment. The cosmetic aspect of parts or equipment is only warrantied for 7 days from the date of delivery.

This warranty does not cover the following circumstances:
- If the serial number on the product has been altered, modified, or removed.
- If the product has been damaged by any usage deemed improper or negligent, by an accident caused by the customer, or by an unauthorized modification conducted by the customer.
- If the damages are caused by a variation, a surge, or poor quality of power supply or faulty connection of electricity.
- If the customer neglected to follow the operational instructions, maintenance or storage directions, or installation recommendations provided by Lapierre Equipment.
- If the damages are caused by repairs made by unauthorized technicians, by the use of parts other than the original Lapierre parts, or by the use of parts that were not obtained through an authorized Lapierre technician or distributor.
- If the damages are caused by the use of parts or products that are not recommended resulting in a break or deterioration of the equipment (e.g. improper use of products such as acids or cleaning products).
- If the damages are caused by installing our equipment in a place that is not suitable for its normal use.
- If the damages are caused by events that are out of the control of Lapierre Equipment such as excessive voltage, mechanical shock, water damage, or a catastrophe such as fire, flood, storms, earthquake, or any other natural or human catastrophe.
- The costs incurred to make the device accessible for repair and transportation costs.
- The costs for service calls that do not concern a malfunction, a manufacturing or material defect, or for products that are not used in compliance with the instructions provided.
- Losses of income caused by the quality of the syrup or loss of production related to all problems covered by this warranty.
- The costs for service calls associated with starting up at the beginning of the season or closing up post-season if not stipulated in the purchase agreement.
- The costs for service calls after two years from the date of purchase.

Specific exclusions for evaporators if the defects are caused by:
- The use of painted wood, treated wood, or any wood containing chemical products, glue, or any other added agent in the evaporators or all use of any fuel other than natural wood (for wood-fired evaporators).
- The use of any fuel other than Number 2 fuel oil (for oil-fired evaporators).

Specific exclusions for reverse osmosis separators if the defects are caused by:
- If the reverse osmosis is maintained at a temperature lower than the freezing point.
- If water left in the pumps or canister freezes and breaks anything.
- If anything other than maple sap is treated in the machine, including ordinary water.
- If the machine is started or operated dry (without liquid inside).
- If normal maintenance is not conducted as specified in the operation manual from Lapierre Equipment.

Warranty for replacement parts and accessories

New parts or accessories sold to a customer that are not covered by the terms of the DISTRIBUTOR WARRANTY are guaranteed for a period of one (1) year from the date of purchase. This warranty for parts and accessories does not apply to parts that are modified, used, or installed on equipment for which the parts were not designed. Electrical parts available off-the-shelf are not covered by the warranty. The warranty on replacement parts and accessories does not include the transportation costs for the exchange or repair of the parts. The warranty only covers the exchange or repair of the parts. The labour to reinstall the part on the equipment is not included.

Limitation of liability

Lapierre Equipment Inc. cannot be held responsible for incidental or consequential damages, nor material or constructive damages. Lapierre Equipment Inc. bears no responsibility for any direct or resulting loss of time, production or benefits, inconveniences, costs to acquire material or replace parts or storage due to a warranty claim.

How to qualify for this warranty

Contact your Lapierre representative or our offices directly where appropriate to declare the defect and plan for the necessary intervention. For all claims, the client must necessarily have a copy of the receipt as proof of payment. If not, we will not accept the claim. After inspection, equipment that has been confirmed defective will be repaired or replaced if possible by a new part or will be refurbished if necessary. The equipment will be returned in good order and in a state comparable to the state it was in when it was received as determined by Lapierre Equipment or by one of its distributors. After the repair, the warranty end date will still be the same as the initial warrant end date.

This warranty is only provided to the initial purchaser of the equipment and is not transferable. The features and specifications described or illustrated can be modified without notice. Lapierre Equipment reserves the right to terminate this warranty without notice if it has proof of the improper use of the equipment.

Date of revision: October 5th, 2020

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