MODULAIRE 2000

OPERATOR'S MANUAL FOR MODEL 500-1000 GPH

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OPERATOR'S MANUAL FOR A REVERSE OSMOSIS 2000

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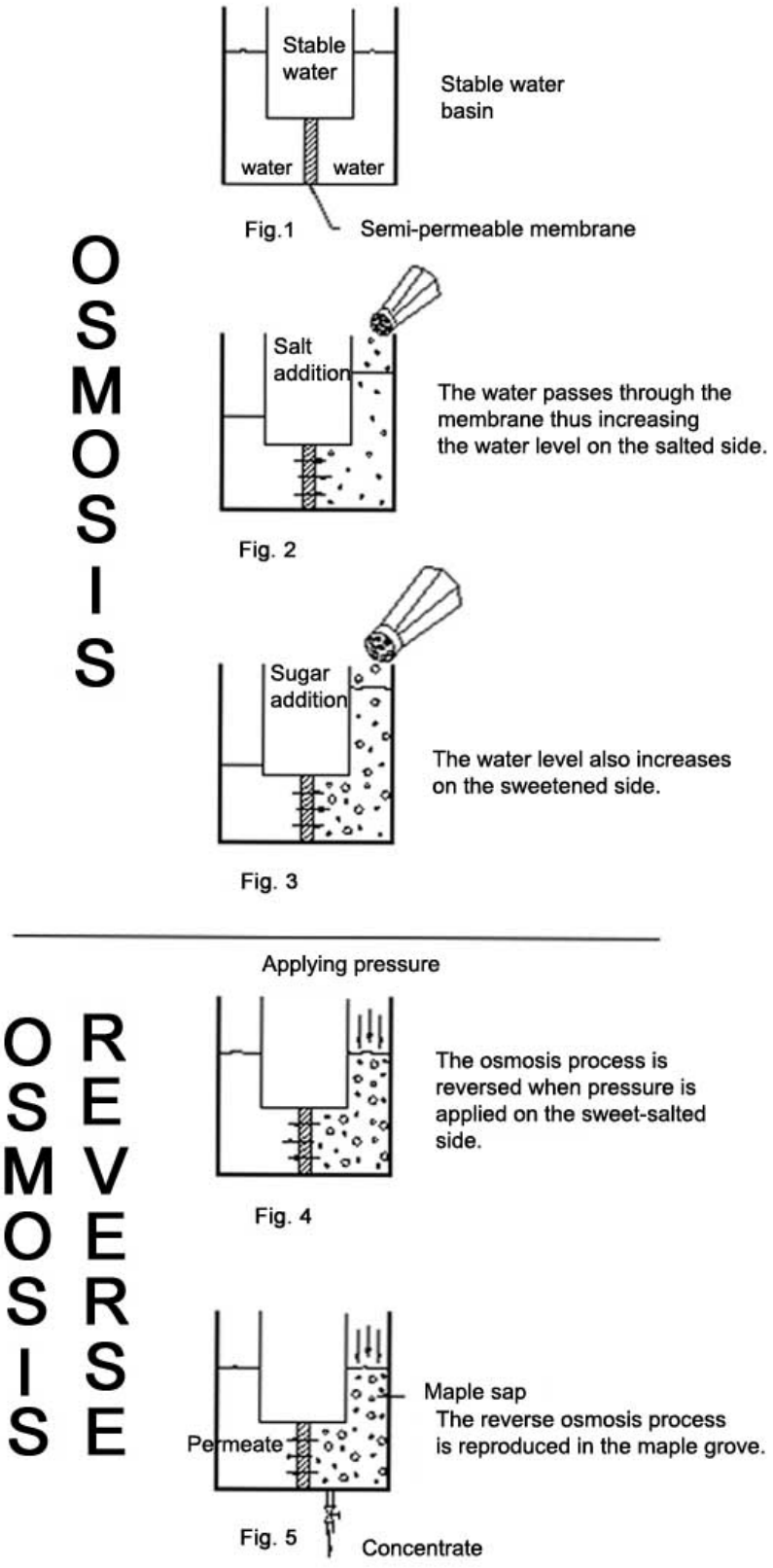


Figure 1. Osmosis and reverse osmosis

1. MODULAIRE 2000 USER'S MANUEL

CONGRATULATIONS! You just acquired an LEADER reverse osmosis. This proves your interest in new technologies and beautiful things.

In fact, you have purchased a technologically advanced unit built by skilled professionals at **LEADER EVAPORATOR LTD.**, who bring many years of research to the use of reverse osmosis in maple syrup production.

1.1 INTRODUCTION

Reverse osmosis is a process by which a solution's natural tendency to scatter its components uniformly is reversed. It occurs in the reverse osmosis because an applied pressure forces the water through a semi-permeable membrane. The water that does not pass through the membrane is left with all the sugar and thus called the concentrate.

1.2 BACKGROUND

The reverse osmosis process has been observed and studied for more than 250 years. Father Nolet, a French scientist, carried out experiments on the osmosis phenomenon around 1748. The scientists have realized long ago that this process could be reversed and that many applications could flow from this research. The principle of reverse osmosis has been applied to the desalination of water since the beginning of 1960.

1.3 OPERATION

How does it work?

This is probably the first question that came to your mind as you opened this manual. The sap provided by maple trees is a solution containing mostly water (96% to 98%), 2% to 3% sugar and small quantities of mineral salts, proteins and other elements such as aroma. Sap is the solution in which you will increase the amount of sugar in relation to the quantity of water. This will be done by extracting the water from the maple tree sap. This separation process will give a more concentrated sap solution (concentrate) and the portion of water which has been subtracted from the sap (permeate).

Figure 2a. Functioning of the 600 gallons. reverse osmosis

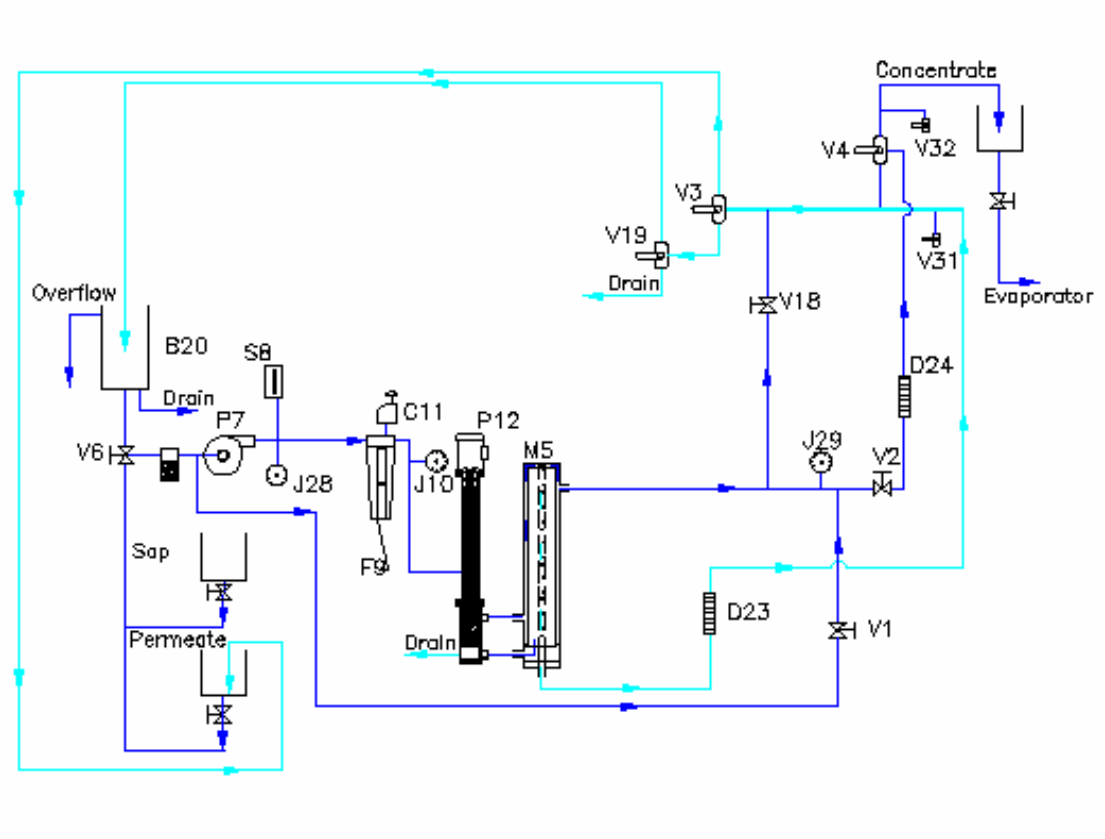
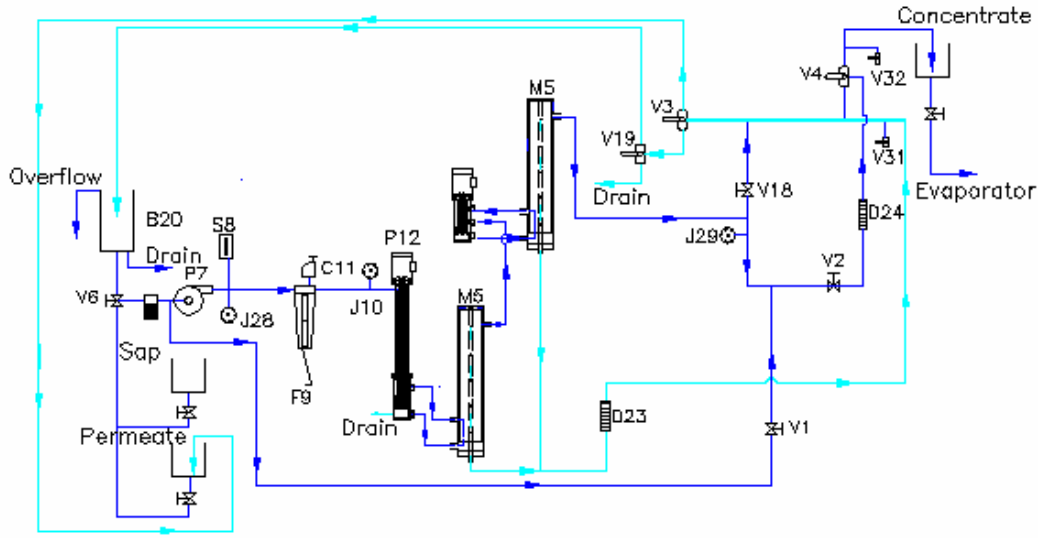


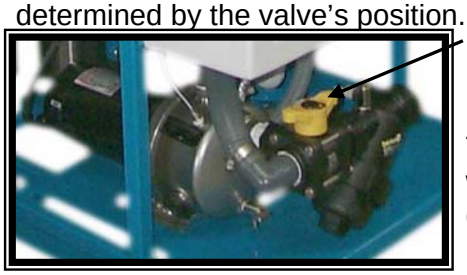
Figure 2b. Functioning with serial expansion kit (see appendix 1)*



*Even if certain components appear in different quantities, the functioning of the 500 gal to 1000 gal reverse osmosis is the same.

V6 : Inlet valve

Three basins (washing, permeate and sap) are connected to this three-way valve, located at the machine inlet. The origin of the liquid entering the reverse osmosis unit is determined by the valve's position.



B20: Wash basin

This basin, located above the feeding pump, stores the washing liquid. *The soap and recirculation washes are explained in the USER'S GUIDE section.

Figure 3. Feeding pump 1HP (P7)

P7 : Feeding pump

All of the liquid entering your machine – sap, washing liquid or permeate – goes through the feeding pump that gives it the impulse necessary to pursue its way inside the reverse osmosis.

Sap and permeate basins

The sap basin contains the maple tree sap. The permeate basin is filled with the water extracted from the sap during the concentration procedure. We recommend that the sap and permeate basins be connected with a common feeding pipe connected directly to the inlet valve (V6) of your machine. We also recommend that the permeate basin be able to contain at least twice the modulaire's capacity. It is preferable to place the maple sap and permeate basins in such a way that gravity will cause the liquids to run. By doing this you will not have to provide your machine with an additional pump pushing the fluids up to the valve V6. Please note that the sap and permeate basins are not supplied by the company.

Sap and permeate pipes

Return lines have to be installed up to the permeate and concentrate basins. These lines must be emptied. Here is a suggestion that will help you to succeed. Place the V19 valve in rinse position, V3 and V4 valves half-way between two positions at a 45 degree angle. The position of the V6 and V18 valves is not important. This will send all liquid in the pipes to the drain. You must be able to get these lines out of the basins so that the liquid contained in those basins is not drained during the process.

By following the paragraph below, it will possible to wash the sugar residue from the concentration pipe. Here is a way of doing it. First of all, make sure to install the pipe in a drain or a basin that can be emptied. At the end of the RO wash, put V4 valve in concentration position. This will send the hot water from the wash into the concentrate pipe instead of the drain. Repeat this procedure in rinse mode. (To do this operation close the valve V18 partially).

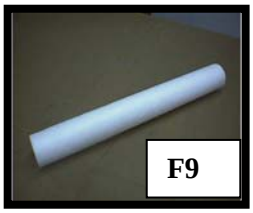
Sap and permeate basin valves

The flow of those basins must be controlled by a valve situated under each one.

Figure 4 . Temperature controller (S8)

S8 : Temperature controller
This controller evaluates the liquid's temperature as it penetrates the reverse osmosis. The value is immediately displayed on a screen located on the reading panel. The temperature must never exceed 49° Celsius (120° Fahrenheit). The programming manual is available inside the reading panel.

J28: Pressure Gauge
This gauge measures the pressure provided at the feeding pump. Its value is indicated on the reading panel.



F9 : Pre-filter
The sap is filtered by a 10 micron cartridge. This clears it from any substance in suspension.

Figure 5. Pre-filter

C11 : Low Pressure control

This control ensures that the filters are not obstructed by dirt or micro-organisms. If such were the case, the machine would stop by itself, thus protecting the pumps and membranes.

Figure 6. Pressure control (C11)

J10 : Pressure gauge
This gauge allows you to read the pressure at the filters' outlet. Should it drop below 12 psi (82,737kPa), the machine will stop by itself.

P12 : Pressure pump
The filtered water is pressurized with the help of the pressure pump. The lower part of the pump creates what is called recirculation. This gives the sap the necessary speed to clean the membrane surface automatically during the sap concentration process. The same thing happens to the washing liquid during the soap and recirculation washes.

M5 : Membrane
The sap is concentrated by the membranes resulting in a sweeter sap (concentrate) and treated water (permeate). It is possible to add a serial expansion kit to increase your reverse osmosis capacity (see appendix 1).

V2 : Concentrate flow regulating valve
As it comes out of the membrane, the concentrate sets out for the reading panel, reaching a flow regulating valve. The flow will be measured by a flowmeter (D24). You can adjust the concentration percentage by regulating the concentrate flow. The sample valve V32 will allow you to determine the concentration that suits you.

Figure 7. Membrane (M5)

D24 : Concentrate flowmeter
This flowmeter calculates the concentrate flow. The value, in gallons per minute (GPM), is indicated on the reading panel

D23 : Permeate flowmeter
As it comes out of the membrane, the permeate is run directly through this flowmeter. The flow value is indicated on the reading panel in GPM. During the concentration process, the liquid is directed to the permeate storage basin. It is essential to know the permeate and concentrate flows to calculate the sap concentration percentage. This calculation is detailed in section 3.1 CALCULATION OF THE SAP CONCENTRATION %.

V1 : Concentrate pressure regulating valve
This valve controls the concentrate pressure. The pressure increases as you tighten the valve and decreases as you loosen it.

J29: Pressure gauge (membrane pressure)
It is this gauge which evaluates the concentrate pressure in the membrane. It is possible for you to know the value of this pressure (in psi.) simply by looking on the reading panel.

V31 Permeate sample valve
This valve is located at the machine outlet, more precisely on the manifold near the V3 and V4 valves. You can know if the reverse osmosis process is performed correctly by analyzing the permeate. For example, if the membrane is damaged and therefore not able to retain all the sugar, your permeate will be sweet.

V32 Concentrate sample valve
Located at the machine outlet, after the V4 valve, this valve allows you to obtain a concentrate sample before it is sent into the concentrate basin. With this sample you will be able to note the difference made by a change of the concentrate flow on the concentration percentage and therefore you will be able to obtain the sweetness you want.

Concentrate basin
After going through the valves, flowmeters and gauges, the concentrate is directed to a storage basin (concentrate basin) to feed the evaporator. The company does not provide you with this basin.

V3 : Permeate direction valve
V4 : Concentrate direction valve
The direction taken by the liquid is determined by the three-way valve position. The black arrows indicate which ways the permeate (V3) and the concentrate (V4) can go.

V18 : Drain valve
This valve is closed during the concentration process. It is open while washing or rinsing.

V19 : Direction valve
This valve directs the water during washing or rinsing only.

MANUAL OPERATING : When selecting this operating mode, you choose the starting time of your machine. The feeding pump sill start first and then, pressure pumps will start sequentially.

AUTOMATIC OPERATING: In the automatic operating mode, the machine can start automatically when the sap basin is full and stop by itself when it is empty. Manual adjustments have to be made first.

TIMER: By setting the timer, you choose your RO's operating duration.

You will find an image accompanied by a short description of the reading panel in section 5.5. The selector (# 11) is used for the manual and automatic operating. The position of the washing timer (#2) is also shown on this page.

1.4 INSTALLATION :

All the **Leader Evaporator** modulaires are delivered with three-way valves at the inlet and outlet of the machine. The permeate and sap basin pipe ought to be connected to a filter (figure 8). The latter must be connected to the V6 valve if this is not already done when you receive your machine. The pipe diameter has to be equal to or greater than that of the filter installed on the machine (see table below). You must plan your connecting pipes to prevent restriction during the rinse and concentration cycles. Watertightness of the feeding pipe must be checked to prevent vibrations which could cause pressure pump and membrane deterioration. The table below shows the coupling dimensions.

Valve allowing the relief of the air in the pipes.

Figure 8. Filter

Capacity, # model	Input	Permeate	Concentrate	Drain	Overflow
80 -160 (GPH)	1''	¾''	¾''	1''	$1^{1/2}$
LYNX 150 – 600 (GPH)	1½''	1''	1''	1''	$1^{1/2}$
Modular 2000 600 – 1000 (GPH)	1½''	1''	1''	1''	$1^{1/2}$
Modular 2000 plus 10 Brix 1600 (GPH)	2''	1¼''	1''	$1^{1/2,}$	2
Modular 2000 2400 - 3200 (GPH)	3''	1½''	1¼''	$1^{1/2,,}$	2

Figure 9. Coupling table

*We suggest that you wash the filter every day you use your RO.

A well lit, well heated, well ventilated, isolated shelter for the machine should be planned in the saphouse. The entrance door dimensions must be calculated according to the machine dimensions (see section 5.1). The shelter should be heated prior to delivery and installation of the machine. The durability of the electrical components will depend on the feeding quality. Therefore, it is very important to have your electrician check your installations to make sure that they comply with the local electricity code standards.

2. YEARLY START UP

All the following procedures can be made with spring water (**without Chlorine!**) or well water, as long as it is clean and does not stain.
Your machine has been filled with a glycol solution to prevent the membranes and other components from freezing. The preparation of your system at the beginning of each season must be carried out in the following way:

- Read the user's manual completely.
- Call an electrician to connect the unit to an electrical source.
- Connect the unit to the maple sap, concentrate and filtrate basins.
- Connect the filtrate pipe beneath the membrane.
- Plug in the machine and rinse the unit following the same process as for membrane rinsing with half the number of water gallons your unit can concentrate in an hour. For example, if your machine has an 8 inches membrane, thus a 600 gallons per hour (GPH) capacity, rinse it with 300 gallons of water.
- Perform a washing without soap, reaching a water temperature of 46^0C (115^0F).
- Do a second rinsing cycle as soon as the washing cycle is finished.
- Do a second washing without soap. It is very important to reach the water temperature mentioned before.
- Do another rinsing cycle as soon as the washing cycle is finished.
- Do a third washing cycle, this time adding the soap. Make sure to reach a temperature of 46^0C (115^0F).
- Do a final rinsing cycle with half the number of water gallons your unit can concentrate in an hour.
- Carry out a **permeability test of membranes**

1. Fill the washing basin just to half of its capacity with filtrate.
2. Concentrate the permeate at 200 PSI pressure. Returning the permeate and concentrate to the washing basin. To do that, you must position the valves in washing soap cycle, close valve V18 and adjust the pressure to 200 pounds.
3. Take down a reading of permeate flow when the temperature reaches 13^0C (55^0F). This reading will indicate you the filtration capacity of your membrane only without imply another factor such as temperature, biofilms or bacteria. A permeability test at 21^0C (70^0F) and 150 PSI, will give you the same lecture.
4. Compare the permeate flow value with the one taken when the unit was manufactured or after you first utilisation during the season. You will evaluate in this way the permeability of your membrane. This data will be your reference for other successive tests.

- You are now ready to concentrate maple sap.

3. USER'S GUIDE

This manual was designed to help you work with your reverse osmosis. All of these instructions are also printed on the front of your machine.

N.B. TO AVOID BREAKING THE UNIT, MAKE SURE THAT THE PUMPS ARE FILLED WITH WATER BEFORE STARTING THE MACHINE.

3.1 GUIDE FOR 1HP PUMP

Concentrate cycle:

1. Turn off feeding permeate reservoir valve
2. Turn on feeding sap reservoir valve
3. Turn off drain valve V18 (horizontal)
4. Position concentrate three way valve V4 (vertical) towards concentrate reservoir
5. Position permeate direction valve V3 (vertical) towards permeate reservoir
6. Position inlet valve V6 in direction of sap reservoir
7. Turn on pressure valve V1 and concentrate flow valve V2
8. Turn the switch on manual or auto (electro)
9. The machine will start sequentially
10. Adjust machine at required concentration with V2 valve by way of concentrate and permeate testing valves.

Sugar extracting: (from membranes)

1. Turn off the sap reservoir feeding valve
2. Turn on the permeate reservoir feeding valve

Rinse cycle:

1. Turn off the sap reservoir feeding valve
2. Turn on the permeate reservoir feeding valve
3. Position V6 inlet valve towards permeate reservoir
4. Position V4 concentrate direction valve (horizontal) towards manifold
5. Position V3 permeate direction valve (horizontal) towards drain
6. Position V19 direction valve (horizontal) towards drain
7. Open drain valve V18 (vertical)
8. Open in one turn pressure valve V1 and then open concentrate flow valve V2 all the way
9. Position switch on manual mode

N.B.: To fill up the wash barrel, position V19 direction valve towards the barrel (vertical) only during the time it takes for the tank to fill up.

Soap wash:

1. Position V6 inlet valve towards wash reservoir
2. Open drain valve V18 (vertical)
3. Position V19 direction valve (vertical) towards wash barrel
4. Position V3 permeate direction valve (horizontal) towards wash barrel.
5. Position V4 concentrate direction valve (horizontal) towards manifold
6. Open in one turn pressure valve V1 and then open concentrate flow valve V2 all the way
7. Position switch on manual mode
8. The temperature must reach 43 °C (110 °F) to 46°C (115°F)
9. Proceed with rinse cycle immediately after the wash

Recirculation wash:

1. Turn off the sap reservoir feeding valve
2. Turn on the permeate reservoir feeding valve
3. Position V6 inlet valve towards permeate reservoir
4. Open drain valve V18 (vertical)
5. Position permeate direction valve V3 (vertical) towards permeate reservoir
6. Position concentrate direction valve V4 (horizontal) towards the manifold
7. Position direction valve V19 (vertical) towards wash basin
8. Open in one turn pressure valve V1 and then open concentrate flow valve V2 all the way
9. Position switch on manual mode
10. Proceed with rinse cycle immediately after the wash

3.2 GUIDE FOR 3HP PUMP

Concentrate cycle:

1. Turn off feeding permeate reservoir valve
2. Turn on feeding sap reservoir valve
3. Turn off drain valve V18 (horizontal)
4. Position concentrate three way valve V4 (vertical) towards concentrate reservoir
5. Position permeate direction valve V3 (vertical) towards permeate reservoir
6. Position inlet valve V6 in direction of sap reservoir
7. Turn on pressure valve V1 and concentrate flow valve V2
8. Turn the switch on manual or auto (electro)
9. The machine will start sequentially
10. Adjust machine at required concentration with V2 valve by way of concentrate and permeate testing valves.

Sugar extracting: (from membranes)

1. Turn off the sap reservoir feeding valve
2. Turn on the permeate reservoir feeding valve

Rinse cycle:

1. Turn off the sap reservoir feeding valve
2. Turn on the permeate reservoir feeding valve
3. Position V6 inlet valve towards permeate reservoir
4. Position V4 concentrate direction valve (horizontal) towards manifold
5. Position V3 permeate direction valve (horizontal) towards drain
6. Position V19 direction valve (horizontal) towards drain
7. Open drain valve V18 (vertical)
8. Open in one turn pressure valve V1 and then open concentrate flow valve V2 all the way
9. Position switch on manual mode

N.B.: To fill up the wash barrel, position V19 direction valve towards the barrel (vertical) only during the time it takes for the tank to fill up.

Soap wash:

1. Position V6 inlet valve towards wash reservoir
2. Open drain valve V18 (vertical)
3. Position V19 direction valve (vertical) towards wash barrel
4. Position V3 permeate direction valve (horizontal) towards wash barrel.
5. Position V4 concentrate direction valve (horizontal) towards manifold
6. Open in one turn pressure valve V1 and then open concentrate flow valve V2 all the way
7. Position switch on manual mode
8. The temperature must reach 43 °C (110 °F) to 46°C (115°F)
9. Proceed with rinse cycle immediately after the wash

Recirculation wash:

1. Turn off the sap reservoir feeding valve
2. Turn on the permeate reservoir feeding valve
3. Position V6 inlet valve towards permeate reservoir
4. Open drain valve V18 (vertical)
5. Position permeate direction valve V3 (vertical) towards permeate reservoir
6. Position concentrate direction valve V4 (horizontal) towards the manifold
7. Position direction valve V19 (vertical) towards wash basin
8. Open in one turn pressure valve V1 and then open concentrate flow valve V2 all the way
9. Position switch on manual mode
10. Proceed with rinse cycle immediately after the wash

Figure 10. Pictogram

3.3 CALCULATION OF SAP CONCENTRATION %

The concentration percentage is calculated in terms of the permeate and concentrate flows.

Operation data

Date	Density (Brix)		Flow (GPM)		Temp.	Pressure	Concentrate		Conc.
	Sap	Conc	Permeate	Conc.	F Degrees	psi	Conc %.	Flow GPH	or
1	2	3	4	5	6	7	100x(4/(4+5))	60x(4+5)	Test
Example 1	2.0	8.0	9.0	3.0	55	300	75%	720	C
Example 2	2.0	5.0	9.0	6.0	55	300	60%	900	C
Example 3	2.0	4.0	9.0	9.0	55	300	50%	1080	C
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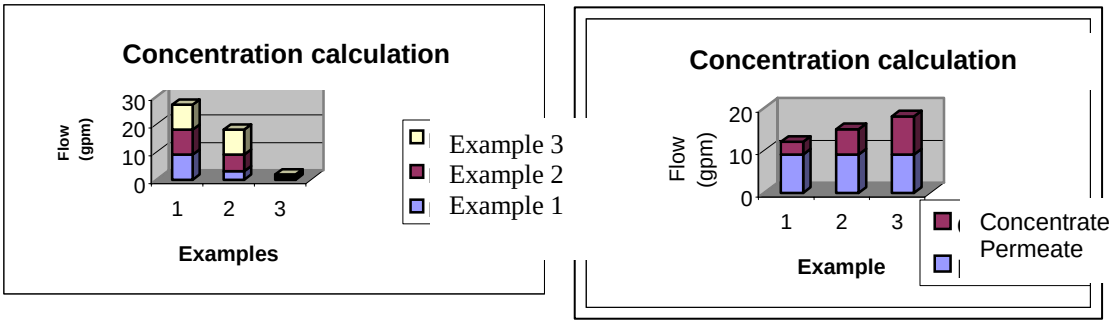


Figure 11. Data results

$$\text{Concentration \%} = 100 \times \left(\frac{\text{(Permeate flow)}}{\text{(Permeate flow + Concentrate flow)}}\right)$$

$$\text{Hour flow} = 60 \times \text{(permeate flow + concentrate flow)}$$

Here are three examples to facilitate your comprehension: your machine treats 9 gpm of permeate and you set the concentrate at 3, 6 or 9 gpm. What will be the concentration percentage and the total flow of the machine? Let us use the data sheet above:

1) filtrate = 9gpm and concentrate= 3 gpm

Concentration % = 100 x ((9)/(3+9))
= 75% @ 720 gallons per hour

2) filtrate = 9 gpm of concentrate =6 gpm

Concentration % = 100 x ((9)/(6+9))
=64% @ 840 gallons per hour

3) filtrate = 9 gpm and concentrate = 9 gpm

Concentration % = 100 x ((9)/(9+9))
= 50% @ 1080 gallons per hour

IT IS VERY IMPORTANT THAT YOU REMEMBER TO TAKE THIS DATA EVERY DAY YOU USE YOUR REVERSE OSMOSIS. THIS WILL ENABLE YOU TO DETECT ANY OPERATIONAL DIFFICULTY.

3.4 PERMEABILITY TEST OF MEMBRANES

The filtration process and the membrane's performance vary depending on the type of membrane, exerted pressure on membrane, sap temperature, percentage of sugar in the concentrate, and presence of other components such as bacteria, biofilm and mineral salts. Therefore, it is important to maintain similar test conditions for all samplings. To do so, we recommend that you use the following method:

1) Prepare a basin full of permeate obtained from sap concentration or from clear, detritus free spring water.

2) Rinse machine for 10 minutes with permeate so that only permeate remains inside.

3) Fill the washing basin just to half of its capacity with filtrate.

4) Concentrate the permeate at 200 PSI pressure. Returning the permeate and concentrate to the washing basin. To do that, you must position the valves in washing soap cycle, close valve V18 and adjust the pressure to 200 pounds.

5) Take down a reading of permeate flow when the temperature reaches 13^0C (55^0F). This reading will indicate you the filtration capacity of your membrane only without imply another factor such as temperature, biofilms, or bacteria. A permeability test at 21^0C (70^0F) and 150 PSI, will give you the same lecture. You can compare the permeate flow value with the one taken when the unit was manufactured.

6) Compare the permeate flow value from your test (no 5) to the same test made at the factory or when you operated your machine for the first time during the season. You will then be able to establish the exact condition of your membrane.

3.5 ANNUAL CLOSING PROCESS

All of the following procedures can be made with spring water (**without Chlorine!**) or well water, as long as it is clean and does not stain. **Use as much permeate water as possible to store your machine.**

1 Rinse your machine with half the number of water gallons it can concentrate per hour.
2 Wash the machine with the amount of soap recommended and let the temperature raise up to 46^0C (115^0F). Soap = 4 ounces per membrane.
3 Rinse your machine with half the number of water gallons it can concentrate per hour.
4 Wash the machine with ACID and let the temperature raise up to 46^0C (115^0F). The unit should soak as long as possible (maximum 1 month).

5, 6, and 7 Do another rinse and wash soap cycle followed by another rinsing as you had done in the three first steps.

Do a permeability membrane test.

- Fill the washing basin just to half of its capacity with filtrate.
- Concentrate the permeate at 200 PSI pressure. Returning the permeate and concentrate to the washing basin. To do that, you must position the valves in washing soap cycle, close valve V18 and adjust the pressure to 200 pounds.
- Take down a reading of permeate flow when the temperature reaches 13^0C (55^0F). This reading will indicate you the filtration capacity of your membrane only without imply another factor such as temperature, biofilms or bacteria. A permeability test at 21^0C (70^0F) and 150 PSI, will give you the same lecture.
- Compare the permeate flow value with the one taken when the unit was manufactured or after you first utilisation during the season. You will evaluate in this way the permeability of your membrane.

8 If your membrane is clean, continue on step # 9. If you are not satisfied with the cleanness of your membrane, you can pursue this process on step # 4 or simply send back the membrane to be CLEANED at the factory.
9 Put 20 litres of permeate in the washing basin and 4 litres of glycol or glycerine. Add a teaspoon of préserve-osmo and let the water flow for 15 minutes. Then, stop your machine and HEAT the room all year between 5^0C and 10^0C.

P.S.: If the room is subject to **FREEZING**, put 20 litres of glycol or glycerine for each 8''x40'' membrane and 30 litres for each 8''x 60'' membrane in the wash basin and let the liquid run inside the machine (see annual storage with antifreeze).

3.6 ANNUAL STORAGE WITH ANTIFREEZE

It is possible to further insure adequate storage of your machine by storing it in a glycol and water solution and following instructions for the soap washing process. Before carrying out the annual storage process, you must be sure that the machine has been thoroughly cleaned.

3.6.1 PRESERVATION SOLUTION

This preservation solution will protect the machine against freezing during the winter months. The below table presents you the way to proceed.

Quantity	Description
20 liters	Glycol or glycerine for one membrane 8'' x 40''
30 liters	Glycol or glycerine for one membrane 8'' x 60''
½ ounce	Of préserve-osmo

Code	Quantity	Description
01260011	20 Liters	Glycol antifreeze alimentaire
01260051	4 Liters	Glycol antifreeze alimentaire
01260823	20 Liters	Glycerine alimentaire
01260824	4 Liters	Glycerine alimentaire

Proceed in the following way:

1. Valves positioned in washing soap cycle, with the exception of valve V19 (rinsing cycle)
2. Drain the washing basin.
3. Add the preservation solution.
4. To reduce the solution in the basin to 4 inches (bottom–up). Switch position in manual operation by 15 seconds period allowing in this way, the starting of the priming pump without the action of the pressure pump.
5. Valves position in washing soap cycle.
6. Do a solution circulation for a period of 10 minutes.

Following the above steps, drain the basin and the permeate output under the membrane housing

4. MANUFACTURER WARRANTY

Reverse osmosis machines are guaranteed by their manufacturer against all workmanship defects for a period of two complete seasons, starting on the installation date of the machine. The manufacturer's responsibility regarding this warranty is limited to the repair or replacement of parts when he should consider it necessary to do so. All replaced parts become the manufacturer's property. **Leader Evaporator Ltd** shall not be held responsible for any damage or injury arising from negligence, abuse, improper handling or installation.

5. EQUIPEMENT DESCRIPTION

Your reverse osmosis unit includes the following components :

5.1 PHYSICAL DIMENSIONS

MODEL	MEMBRANE	CAPACITY	MEMBRANE	FEEDING	PRESSURE	TOTAL	DIMENSIONS	PRE-
		GPH	FT^2 OF SURF.	PUMP	PUMP	AMP	W x DEPTH x H	FILTER
AE124450	2 x 150	300	150	1 CV/230 VOLTS	5CV	26 AMP	29"x34"x69"	1X20"
AE134450	3 x 150	450	225	1 CV/230 VOLTS	5CV	26 AMP	29"x34"x69"	1X20"
AE118450	1 x 600	500	400	1 CV/230 VOLTS	5CV	26 AMP	29"x42"x72"	2X20"
AE118475	1 x 600	600	400	1 CV/230 VOLTS	7.5CV	37 AMP	29"x42"x72"	2X20"
AE318475	1 x 600	600	400	3 CV/230 VOLTS	7.5CV	44 AMP	29"x42"x72"	2X20"
AE328475	2 x 600	1000	800	3 CV/230 VOLTS	7.5CV	44 AMP	29"x42"x72"	2X20"
AE5384D75	3 x 600	1600	1200	5 CV/230 VOLTS	2 X 7.5CV	81 AMP	30"x73"x72"	4X20"
AE5484D75	4 x 600	2000	1600	5 CV/230 VOLTS	2 X 7.5CV	81 AMP	30"x86"x72"	4X20"
AE118675	1 x 800	700	600	1 CV/230 VOLTS	7.5CV	37 AMP	29"x42"x77"	2X20"
AE318675	1 x 800	800	600	3 CV/230 VOLTS	7.5CV	44 AMP	29"x42"x77"	2X20"
AE518675-E2	1 x 800	800	600	5 CV/230 VOLTS	7.5CV	51 À 81	30"x54"x77"	2X20"
AE7518675-E3	1 x 800	800	600	7.5CV/230 VOLTS	2 X 7.5CV	60 À 120	30"x73"x77"	2X20"
AE5286D75	2 x 800	1600	1200	5 CV/230 VOLTS	2 X 7.5CV	81 AMP	30"x54"x77"	4X20"
AE75286D75-E3	2 x 800	1600	1200	7.5CV/230 VOLTS	2 X 7.5CV	90 À 120	30"x73"x77"	4X20"
AE75286D75-E4	2 x 800	1600	1200	7.5CV/230 VOLTS	2 X 7.5CV	90 À 150	30"x86"x77"	4X20"
AE75386T75	3 x 800	2400	1800	7.5CV/230 VOLTS	3 X 7.5CV	120 AMP	30"x73"x77"	6X20"
AE75386T75-E4	3 x 800	2400	1800	7.5CV/230 VOLTS	3 X 7.5CV	120 À 150	30"x86"x77"	6X20"
AE75486Q75	4 x 800	3200	2400	7.5 CV/230 VOLTS	4 X 7.5CV	150 AMP	30"x86"x77"	8X20"

Reverse osmosis with 2nd membrane in series to concentrate at a 10 ^{o} brix level

MODEL	MEMBRANE	CAPACITY	MEMBRANE	FEEDING	PRESSURE	AMP	DIMENSIONS	PRE-
		GPH	FT^2 OF SURFACE	PUMP	PUMP	TOTAL	W x DEPTH x H	FILTER
AE328475B	2 x 600	1000	800	3 CV/230 VOLTS	7.5CV	64	30"x54"x77"	2X20"
AE518418675B	1 x 600	1200	1000	5 CV/230 VOLTS	7.5CV	71	30"x54"x77"	2X20"
	1 x 800							
AE75284286D75B	2 x 600	2000	2000	7.5CV/230 VOLTS	2 X 7.5CV	131	30" x 85 3/16" x 77"	4X20"
	2 x 800							

The average capacity of the reverse osmosis machine is expressed in American gallons for a sap concentration of 2 to 10 degrees brix at a temperature of 55^{0}F.

DIMENSIONS FOR A 600 GAL UNIT

Height : 72"	Width : 29"	Depth : 42"

machine # : AE118450

See table of physical dimensions

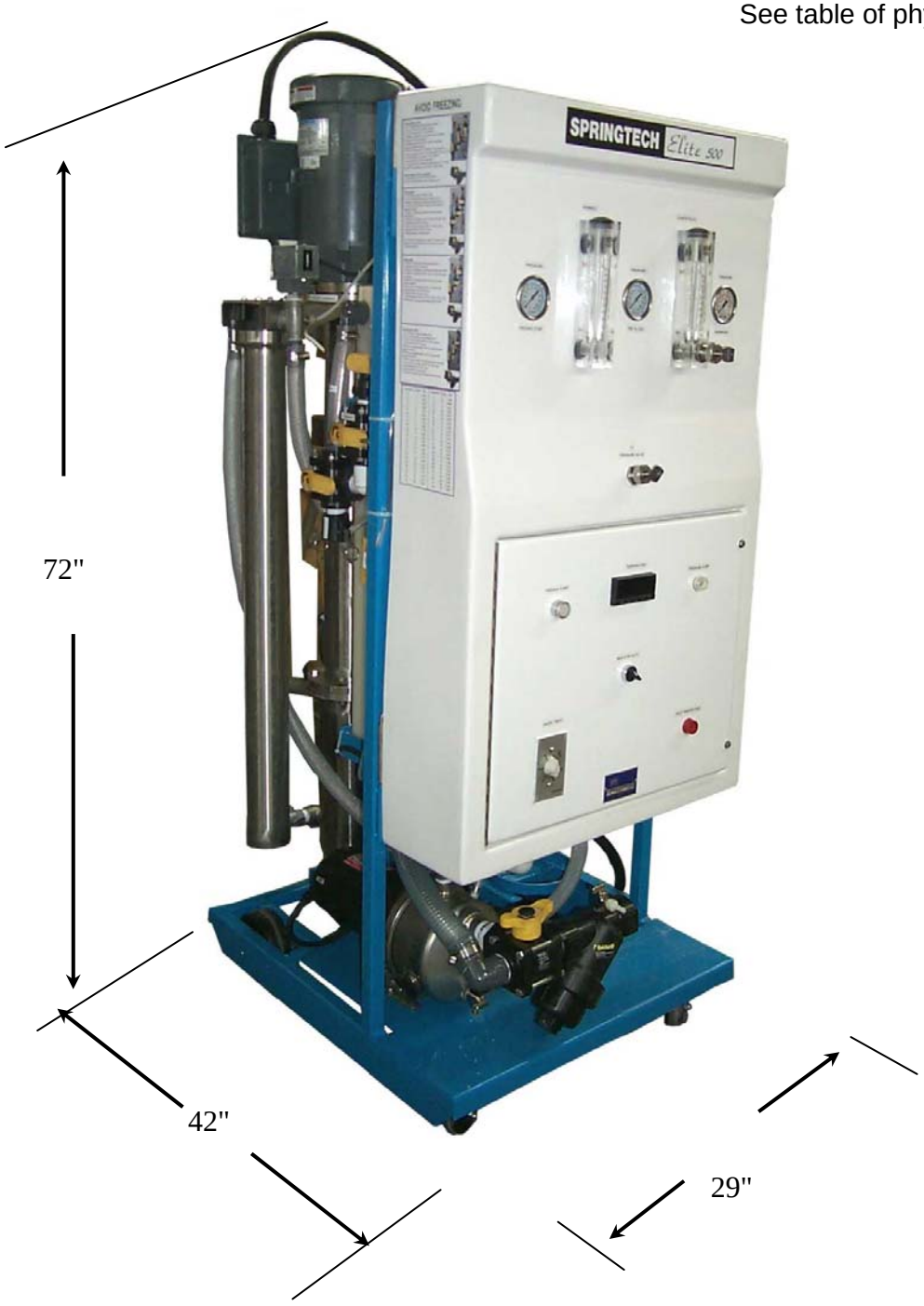
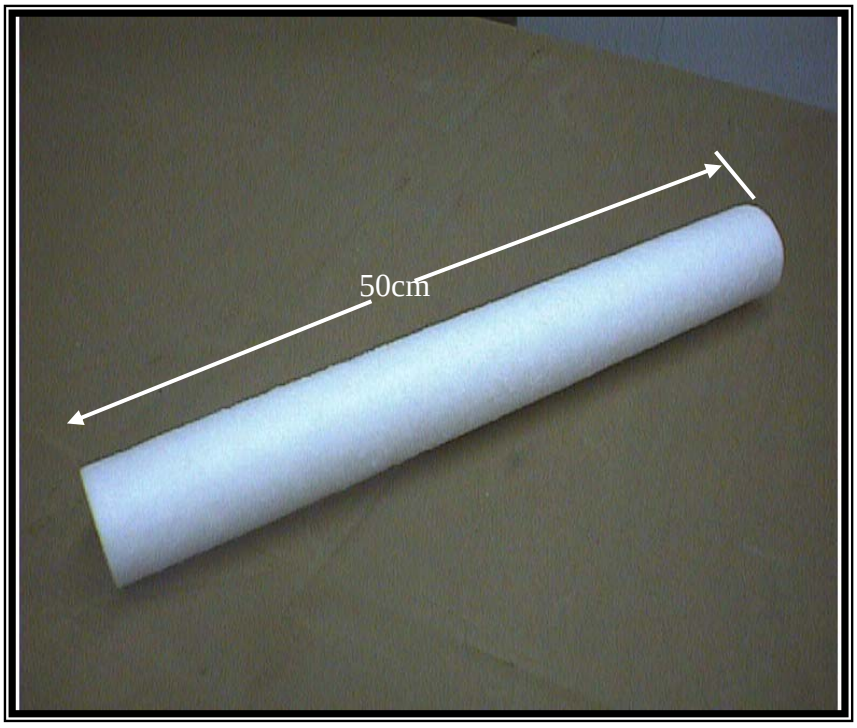


Figure 12. Reverse osmosis unit

5.2 PRE-FILTER

A 10 microns filter is used to clear the liquid to be treated from any substance in suspension.

- length: 50 cm
- diameter : 6.5 cm



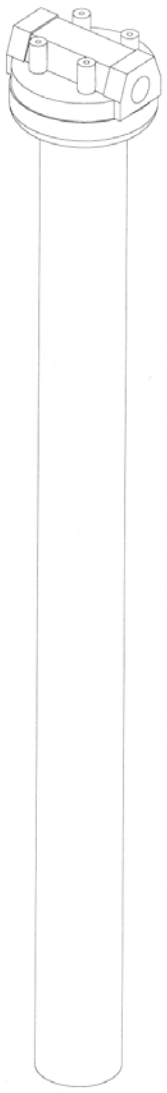


Figure 13. Pre-Filter (10 microns)

5.3 PRESSURE PUMP

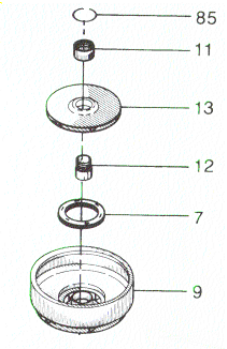
A pressure pump is used to pressurize the liquid in order to obtain the desired filtration. This pump has the following features:

MOTOR	PRESSURE	FLOW		ELECTRICITY	
HP	PSI	GPM	PH	VOLTS	AMPS.
5	**400**	**10**	**1**	**230**	**20**
7.5	**400**	**16**	**1**	**230**	**30**

*208, 230, 440 and 600 volt three-phase engines are available upon request.

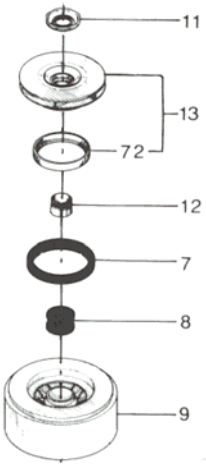
Figure 14. Pressure pump

16GPM

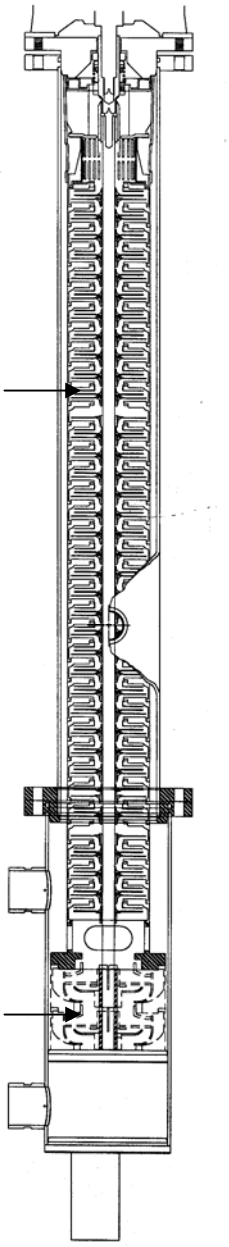


#	Number	Description
7	095006	SEAL RINGS (NBR)
9	950003	INT. CHAMBER
11	095515	SPLIT CONE NUT
12	090012	SPLIT CONE
13	105051	IMPELLER
85	100090	UPTHRUST WASHER

80GPM



#	Number	Description
7	225014	SEAL RING
8	120001	INTERMEDIATE BEARING
9	125005	INTERMEDIATE CHAMBER
11	120003	SPLIT CONE NUT
12	120002	SPLIT CONE
13	125003	IMPELLER AND WEAR RING
72	120005	IMPELLER WEAR RING



5.4 MEMBRANE CASING

Each membrane is enclosed in a casing with the following features:

- material : stainless steel
- dimensions: 125 x 20 cm

01260826 ENVELOPE 5" FOR COMPLETE MEMBRANE 4"

01260119 ENVELOPPE 8 1/2" * 40" STAINLESS STEEL

01260473 ENVELOPPE 8 1/2" * 60" STAINLESS STEEL

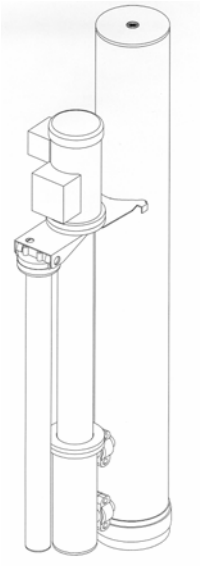
01260019 SERIAL EXPANSION KIT 8” X 40” 600 GPH

01260439 SERIAL EXPANSION KIT 8” X 60” 800 GPH

INCLUDES:

- 1 MEMBRANE 8" x 40" or 8" x 60"
- 1 ENVELOPE 8.5" x 40" or 8.5" x 60" stainless steel
- 1 SUPPORT
- TURBO PUMP 3HP stainless steel
- MAGNETIC STARTER
- OPTIONS

01261011 FLOWMETE KIT 10 GPMR
01261012 FLOWMETER KIT 20 GPM



01260023 EXPANSION MODULE 8" X 40" FOR RO AIRABLO

INCLUDES:

- MEMBRANE 8"x 40"
- ENVELOPE 8.5"x 40"
- STAINLESS STEEL FILTER (ENVELOPE)
- COUPLING KIT

01260732 EXPANSION MODULE 8" X 60" FOR RO AIRABLO

INCLUDES

- MEMBRANE 8"x 60"
- ENVELOPE 8.5"x 60"
- STAINLESS STEEL FILTER. (HOUSING)

These modules are made for EXPANSIONABLE separators. The flowmeters, pressure gauges, etc. are not included.
*SEE APPENDIX ON SERIAL EXPANSION KITS AND EXPANSION MODULES

Figure 15. Membrane housing

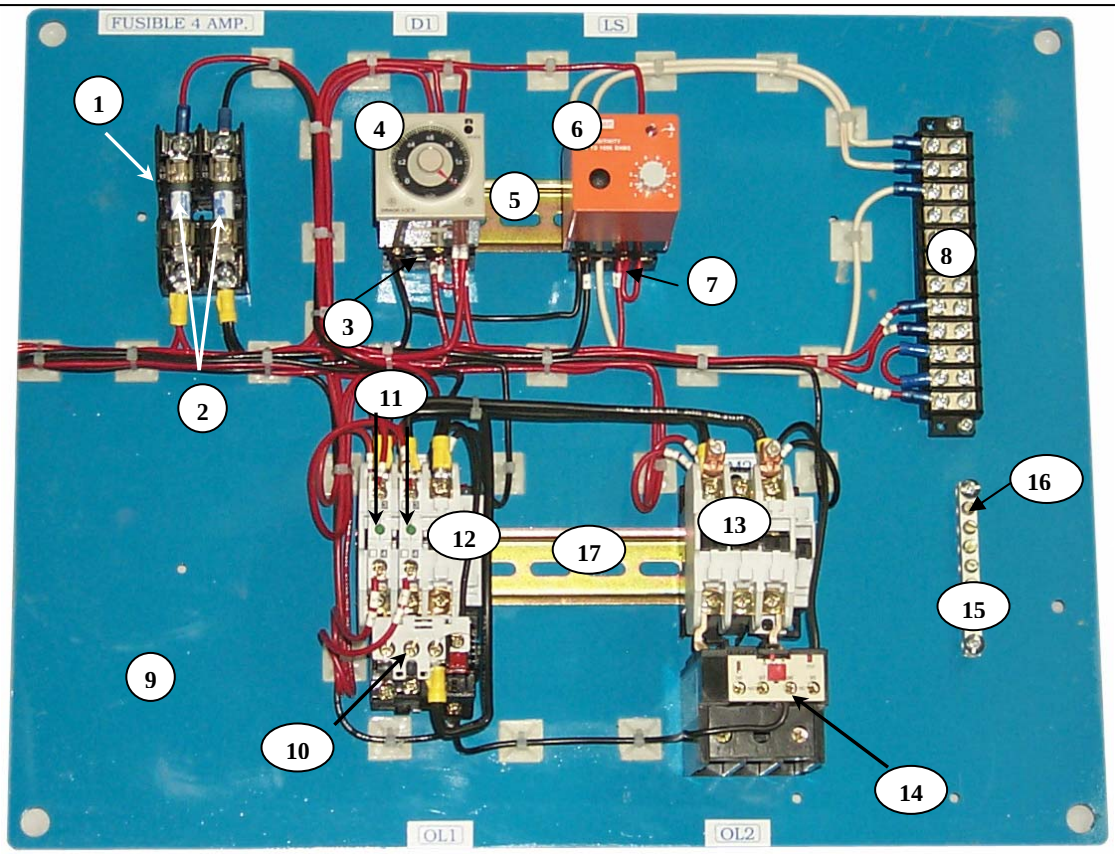
5.5 READING PANEL

The reading panels were designed to meet your needs. They include the following items as standard equipment:

CODE	#	DESCRIPTION
01090018	1	PRESSURE INDICATOR (0-100 PSI)
01090021	1	PRESSURE INDICATOR (0-300 PSI)
01090013	1	PRESSURE INDICATOR (0-1000 PSI)
01150155	2	TIMER 0-60 MINUTES
01260117	3	PERMEATE FLOWMETER
01260098	4	CONCENTRATE FLOWMETER
01260422	5	CONCENTRATE PRESSURE REGULATING VALVE V1
01260422	6	CONCENTRATE FLOW REGULATING VALVE V2
01151198	7	TEMPERATURE DISPLAY
01150709	8	PRESSURE PUMP (clear light)
01153371	9	FEEDING PUMP
01150706	10	HIGH TEMPERATURE (red light)
01153355	11	SELECTOR : MAN/ STOP/ AUTO

Figure 16. Reading pannel

5.6 ELECTRICAL BOARD



#	CODE	QUANTITY	DESCRIPTION
1	1151310	1	FUSE HOLDER 2 POLES 30 AMPS 600 VOLTS
2	1150190	2	FUSE 4.0 AMPS 250 VOLTS
3	1150059	1	RELAY BASE 11 PINS (OMRON) (DANFOSS)
4	1150038	1	MULTI MODE TIMER 120/240 V 1.2 SEC TO 300 HRS
5	1150758	0.2	1 METER DIN RAIL 1 1/4" FOR ELECTRICITY
6	1150144	1	ELECTROD CONTROL SYRELEC PNR 220A
7	1150191	1	RELAY BASE 8 PINS (OMRON)
8	1151590	1	BARRIER TERMINAL 300V 12 TERMINALS 6.0" LONG
9	1152121	1	MODULAIRE 98 BACKPLATE PAINTED FACADE
10	1150624	1	OVERLOAD 6.0 TO 9.2 AMP (TYPE TI 16C,TI 25C)
11	1150258	2	AUXILIARY CONTACT (CB-NO VERT TYPE)
12	1150727	1	MAGNETIC DP 25-3 208-230V/60HZ
13	1150737	1	MAGNETIC DP 40-3 208-230V/60HZ
14	1150106	1	OVERLOAD LOVATO MAN. 28.0-42.0AMP 2 POLES (BF9-25)
15	1150757	0.04	ALUMINIUM GROUND BAR 6'-0
16	1150759	7	ALUMINIUM GROUND BAR SCREW 205 SCREW/BAR
17	1150758	0.13	2 METERS DIN RAIL 1 1/4" FOR ELECTRICITY

Figure 17.Electrical board for 600 gal

5.7 OPERATION DATA

Your machine operation data has to be taken on every day of use. These readings are essential to insure an efficient maintenance of your membranes. They also help you detect operating problems immediately. The readings have to be taken half an hour after the beginning of the concentration cycle. Write down your observations in the following tables:

1) Date: **date of the day you collect the data.**

2) Sap density: **in Brix degrees.**

3) Concentrate density: **in Brix degrees.**

4) Concentrate flow: **measured by the concentrate flowmeter.**

5) Permeate flow: **measured by the permeate flowmeter.**

6) Water temperature: **for the water that is treated inside the reverse osmosis.**

7) Membrane pressure: **measured by the membrane pressure gauge.**

Date	Density (Brix)		Flow (GPM)		Temp.	Pressure	Concentrate		Conc.
	Sap	Conc.	Filtrate	Conc.	F Degrees	psi	Conc. %	Flow GPH	or
1	**2**	**3**	**4**	**5**	**6**	**7**	100x(4/(4+5))	60x(4+5)	Test
6 june 02			7.5		55	200			T
6 june 02	2.0	8.0	7.5	2.5	55	400	75%	600	C
6 june 02									

Figure 18. Operation data

Date	Density (Brix)		Flow (GPM)		Temp.	Pressure	Concentrate		Conc.
	Sap	Conc.	Filtrate	Conc.	F. Degrees	psi	Conc. %	Flow GPH	or
1	2	3	4	5	6	7	100x(4/(4+5))	60x(4+5)	Test

Date	Density (Brix)		Flow (GPM)		Temp.	Pressure	Concentrate		Conc.
	Sap	Conc.	Filtrate	Conc.	F. Degrees	psi	Conc. %	Flow GPH	or
1	2	3	4	5	6	7	100x(4/(4+5))	60x(4+5)	Test

Date	Density (Brix)		Flow (GPM)		Temp.	Pressure	Concentrate		Conc.
	Sap	Conc.	Filtrate	Conc.	F. Degrees	psi	Conc. %	Flow GPH	or
1	2	3	4	5	6	7	100x(4/(4+5))	60x(4+5)	Test

Date	Density (Brix)		Flow (GPM)		Temp.	Pressure	Concentrate		Conc.
	Sap	Conc.	Filtrate	Conc.	F. Degrees	psi	Conc. %	Flow GPH	or
1	2	3	4	5	6	7	100x(4/(4+5))	60x(4+5)	Test

Date	Density (Brix)		Flow (GPM)		Temp.	Pressure	Concentrate		Conc.
	Sap	Conc.	Filtrate	Conc.	F. Degrees	psi	Conc. %	Flow GPH	or
1	2	3	4	5	6	7	100x(4/(4+5))	60x(4+5)	Test

Date	Density (Brix)		Flow (GPM)		Temp.	Pressure	Concentrate		Conc.
	Sap	Conc.	Filtrate	Conc.	F. Degrees	psi	Conc. %	Flow GPH	or
1	2	3	4	5	6	7	100x(4/(4+5))	60x(4+5)	Test

Figure 19. Production sheet for reverse osmosis

REVERSE OSMOSIS :	Membrane models	Serial number :
Serial number_____ Model _____ Pump _____ Motor_____	1._____ 2._____ 3._____ 4._____	1._____ 2._____ 3._____ 4._____

		ACID	**ALKALINE SOAPS**	**OXYDIZERS**
Hydranautic PVD1		**4 oz Acid-Osmo**	**4 oz Sani-Osmo**	
Filmtec NF70-BW30		**4 oz Acid-Osmo**	**4 oz Sani-membrane**	**4 oz Oxy-membrane**
Fluid System TFC		**4 oz Acid-Osmo**	**4 oz Sani-membrane**	**4 oz Oxy-membrane**

CONDUCTIVITY TEST

Membrane #	Conductivity		Temperature	Flow		Pressure
	Concentrate	Permeate	^{0}F	Permeate	Concentrate	psi
1						
2						
3						
4						

TEMPERATURE CONTROLLER

Temperature 48^{0}C (118^{0}F)	

ELECTRICAL TESTS

Dielectric test	_____OK
Total Amperage :	_____Amps.

PROTECTION AGAINST FREEZING

Density :_____	Temperature :_____

Salesman name :_____ _____	Buyer's name :_____ Order # :_____

Technician:_____ _____	Date_____

Fill up in case of malfunction

Our goal is to offer you an impeccable product. This is why every **REVERSE OSMOSIS** machine is thoroughly inspected at the factory. We ask that you help us improve our production methods by sending your comments to our production manager at this fax number: (819) 828-3408.

Do not forget to send us the reverse osmosis production sheet with a description of the problems encountered and their causes. We thank you in advance for your collaboration.

Comments:

Technician : _____ Date : _____

Correction factor for FLUID SYSTEM 8921S membrane										
Temp		**Factor**	**Machine capacity GPH) corrected according to the temperature**							
^{o}F	^{o}C	Corr. T	150	300	450	600	700	800	1000	1600
77	25	1,0000	216	433	649	865	1009	1154	1442	2307
75	24	1,0300	210	420	630	840	980	1120	1400	2240
73	23	1,0610	204	408	612	815	951	1087	1359	2175
72	22	1,0960	197	395	592	789	921	1053	1316	2105
70	21	1,1260	192	384	576	768	896	1025	1281	2049
68	20	1,1610	186	373	559	745	869	994	1242	1987
66	19	1,1960	181	362	543	723	844	965	1206	1929
64	18	1,2340	175	351	526	701	818	935	1169	1870
63	17	1,2720	170	340	510	680	794	907	1134	1814
61	16	1,3120	165	330	495	659	769	879	1099	1759
59	15	1,3540	160	319	479	639	745	852	1065	1704
57	14	1,3970	155	310	464	619	723	826	1032	1652
55	13	1,4420	150	300	450	600	700	800	1000	1600
54	12	1,4890	145	291	436	581	678	775	968	1549
52	11	1,5370	141	281	422	563	657	751	938	1501
50	10	1,5880	136	272	409	545	636	726	908	1453
48	9	1,6410	132	264	395	527	615	703	879	1406
46	8	1,6950	128	255	383	510	596	681	851	1361
45	7	1,7520	123	247	370	494	576	658	823	1317
43	6	1,8120	119	239	358	477	557	637	796	1273
41	5	1,8730	115	231	346	462	539	616	770	1232
39	4	1,9380	112	223	335	446	521	595	744	1191
37	3	2,0050	108	216	324	432	503	575	719	1151
36	2	2,0740	104	209	313	417	487	556	695	1112
34	1	2,1470	101	201	302	403	470	537	672	1075

To calculate the capacity of your unit : We suggest you to proceed in the following way :

The application formula is : $Corrected\ Flow\ (GPH) = \frac{(Flow\ (GPH))_{55^0F} * (Corr.T)_{55^0F}}{(Corr.\ desired\ Temp.^0F)}$

We can take an example to illustrate the formula application with the table showed above. You need to find out the flow of any unit at one temperature of 2^0C (36^0F) for example. You must take the flow value at 13^0C (55^0F) as a base value and multiply by the correction factor value (1.4420) at this temperature. Finally, divide them by the correction factor value at the desired temperature.

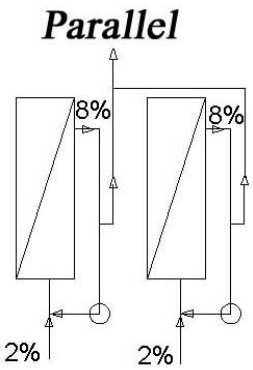
Data : Flow at 13^0C (55^0F) = 600 GPH, Temperature correction factor at 13^0C (55^0F) = 1,4420, and the desired temperature value = 2^0C (36^0F). So the correction factor value at this temperature is 2.0740.

$$Corrected\ Flow\ (GPH) = \frac{(600GPH)_{55^0F} * (1.4420)}{(2.0740)_{36^0F}} = \frac{865.2}{2.0740} = 417\ \textbf{GPH}$$

Figure 20. Correction factor sheet

APPENDIX 1. SERIAL EXPANSION KIT AND EXPANSION MODULE

Figure 21 explains serial and parallel functioning. The concentration percentage of the sap is shown. The circles represent the recirculation pumps, the rectangles represent the membranes and the arrows show the fluid course, including recirculation.



Parallel functioning: During this functioning mode, the membranes concentrate the sap simultaneously. After going through the feeding pump, all the liquid is divided according to the number of V27 valves that are open, thus the number of pressure pumps in function.

Serial functioning: During this functioning mode, the sap is concentrated successively by every membrane. This option allows a higher concentration percentage of the sap.

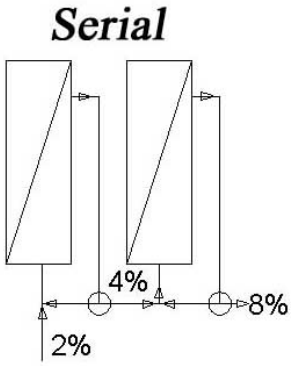
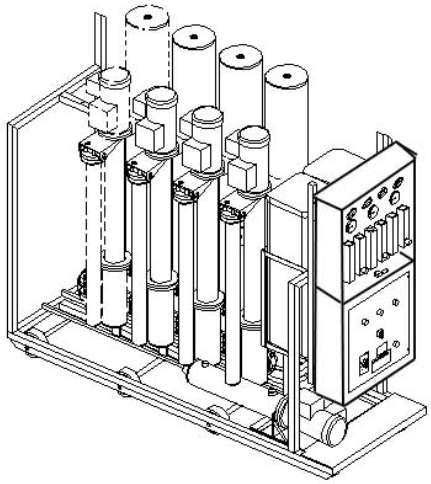


Figure 21a. ***Parallel functioning*** **Figure 21b.** ***Serial functioning***



Expansion module: Certain reverse osmosis can be provided with an expansion module, which means that you can add one or more membranes, accompanied by pressure pumps. Those machines are already provided with a metallic support for this purpose.

Figure 21c. Expansion module

Serial expansion kit: You can allow the production of a sweeter sap by adding a serial expansion kit. This unit works in series with one of the machine's membranes. The sap is thus concentrated two times rather than one. The expansion kit can be placed beside the reverse osmosis since it is provided with a support of its own. It can thus be added to machines that do not have and expansion module support. There are two types of expansion kits: the first is provided with a 8 " x 40 " membrane and the second with an 8 " x 60 " membrane. The latter possesses a higher capacity which means it can concentrate more gallons per hour.

Figure 21. Serial and parallel functioning

Expansion kit components

1. 8 ½ “ x 40 “ envelope with 8 “ x 40 “ 400pi. ca. membrane.

The envelope is the membrane’s case.

2. Recirculator support

It is this support which allows the kit to be placed aside from the reverse osmosis.

3. Turbo pump 3Hp 230V,

Since the liquid entering the kit is already pressurized enough, the pump only allows the recirculation of this liquid.

4. Magnetic starter

This magnetic starter is set to forward the electricity from the electrical panel box to travel to the motor and turbo and execute the primary functions **Stop –Start.**

5. Inlet liquid pipe

This pipe must be connected with the membrane output in the reverse osmosis.

6. Concentrate pipe

The concentrate pipe is set to forward the membrane concentrate to travel to the front panel via valve kit V18.

7. Permeate outlet

To collect the permeate, you will have to install a pipe at the permeate outlet and be connected to the reverse osmosis front panel.

Item	Description	CODE
1	Envelope 8.5’’x40’’ in stainless steel	01260119
1	Membrane 8’’x40’’ (PVD1 for example)	01260005
2	Recirculator support	R300004
3	Turbo pump for the support	01260578
4	Magnetic starter	01150068
5	Code stainless 90 degrees	04210400
6	Hose alimentaire	01130205
7	Hose PVC reinforced	04210585

Figure 22a : **Expansion Kit WITH flowmeter**

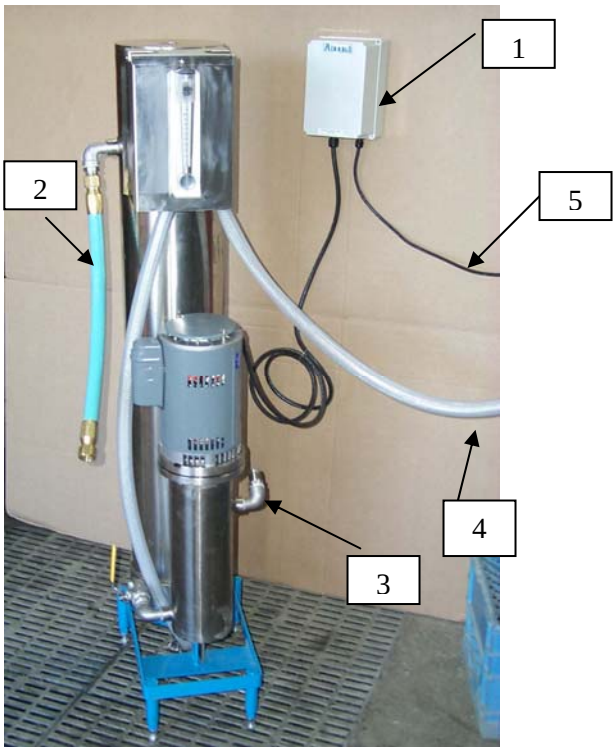


Fig. 1A

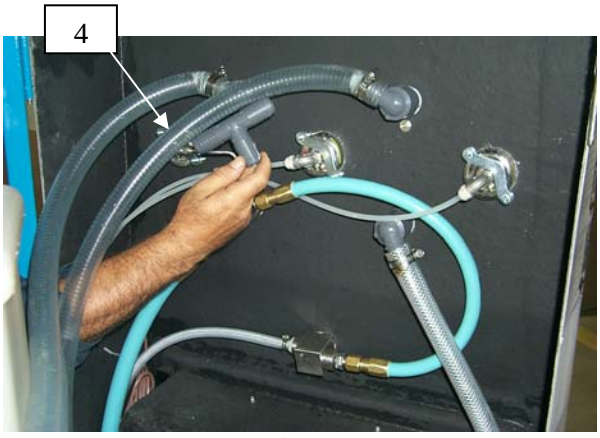


Fig. 1B

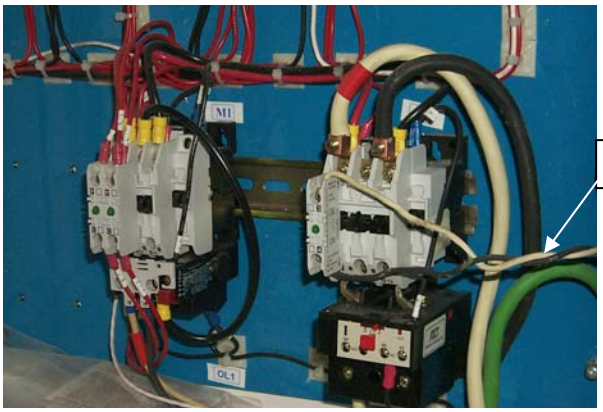


Fig. 1C

#1 : This box must be connected to some electrical source. Therefore, its very important to verify your installation with your electrical technician and verify the conformity with the electrical code local norms. Your box must be connected with the motor pressure pump contactor in your reverse osmosis by an auxiliary contact (see fig. 1C). This last item is normally open (NO), shipped to you with the kit box. This last item is also supply with a contactor and time relay controller. Also, when the motor for the pressure pump starts, the auxiliary contact will be closed, connecting in this way your modular with the KIT.

#2 : Concentrate pipe to be connected with valve V18.

#3 : Input maple sap to be connected with the membrane output in the reverse osmosis.

#4 : Permeate pipe to be connected with the permeate flowmeter output (see fig. 1B).

#5 : Wire for the auxiliary contact. The auxiliary must be installed in the contactor for the pressure pump.(seer fig. 1C).

8" x 40" 600GPH :	**01260019**
Flowmeter Kit 10GPM :	**01261011**
8" x 60" 800GPH :	**01260439**
Flowmeter Kit 20GPM :	**01261012**

Figure 22b. Expansion Kit WITHOUT flowmeter

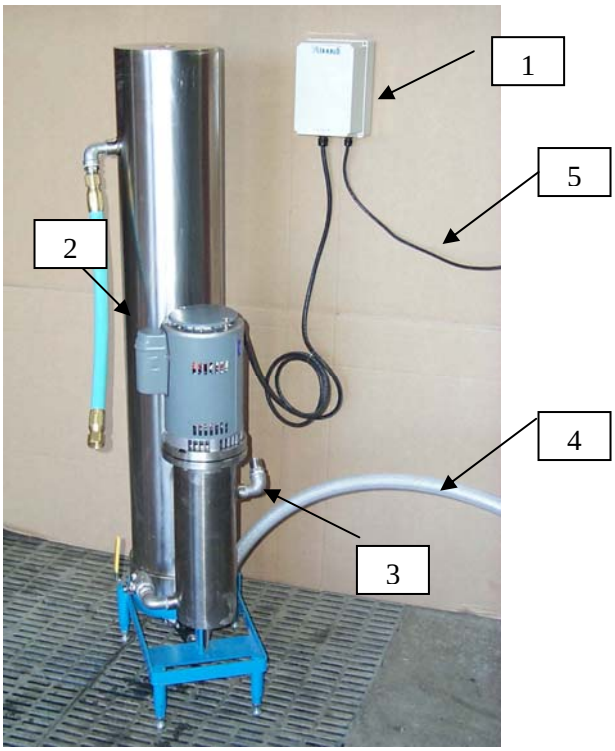


Fig. 2A

Fig. 2B

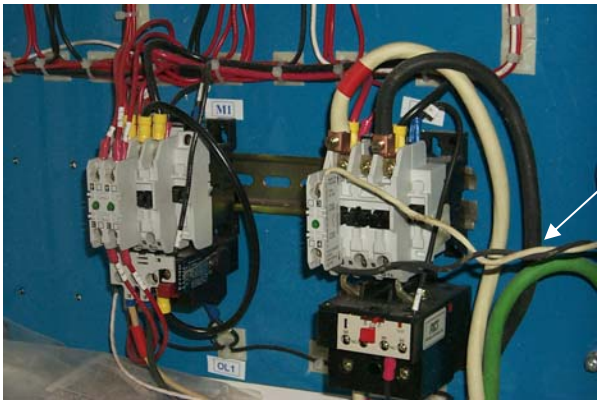


Fig. 2C.

#1 : This box must be connected to some electrical source. Therefore, its very important to verify your installation with your electrical technician and verify the conformity with the electrical code local norms. Your box must be connected with the motor pressure pump contactor in your reverse osmosis by an auxiliary contact (see fig. 2C). This last item is normally open (NO), shipped to you with the kit box. This last item is also supply with a contactor and time relay controller. Also, when the motor for the pressure pump starts, the auxiliary contact will be closed, connecting in this way your modular with the KIT..

#2 : Concentrate pipe to be connected with valve V18.

#3 : Input maple sap to be connected with the membrane output in the reverse osmosis.

#4 : Permeate pipe link with the flowmeter permeate input (see fig. 2B), between the flowmeter and membrane. If needed, change the flowmeter for a 20GPM capacity.

#5 : Wire for the auxiliary contact. The auxiliary must be installed in the contactor for the pressure pump.(seer fig. 2C).

8" x 40" 600GPH : 01260019
8" x 60" 800GPH : 01260439

APPENDIX 2. PIPE INSTALLATION SUGGESTIONS

This appendix contains ideas to help you use your RO easily and efficiently.

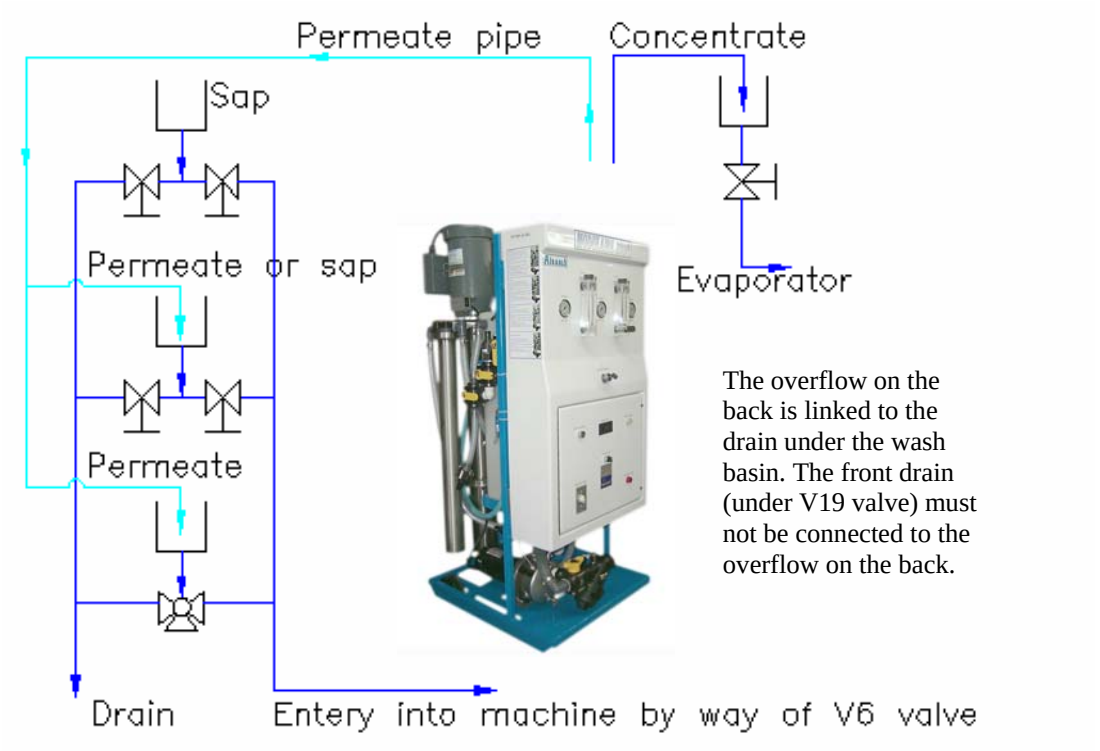
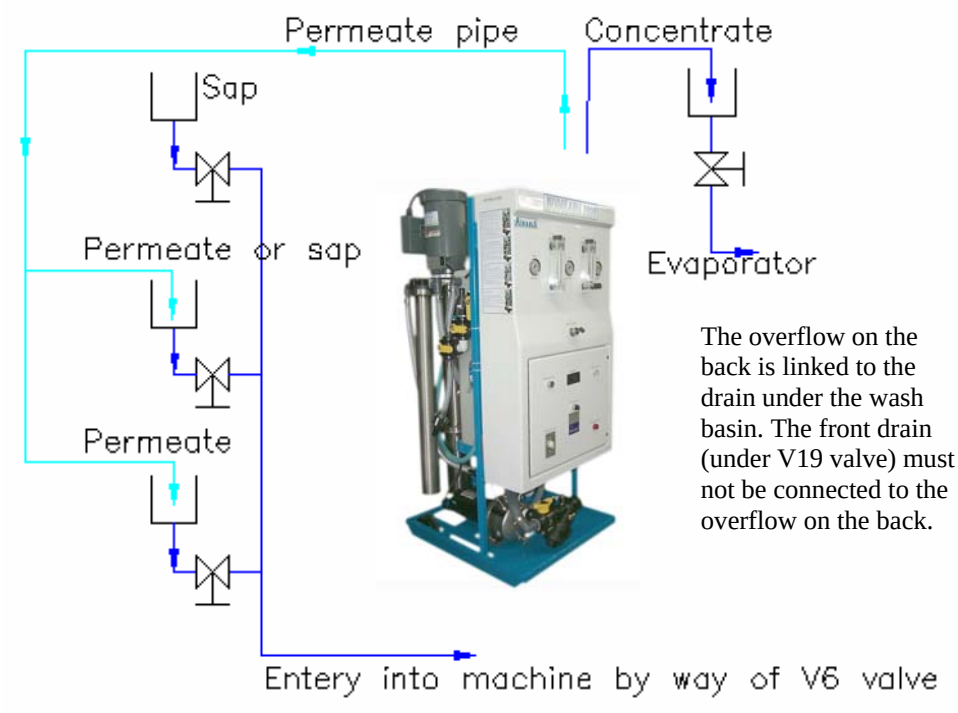


Figure 23. Installation diagram (1)

Figure 24. Installation diagram (2)

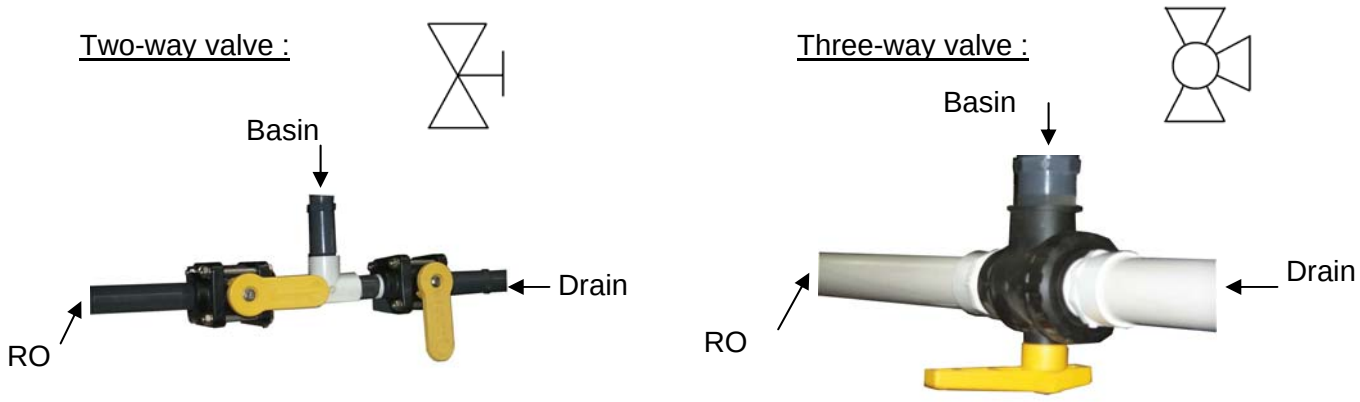


Diagrams:
The figures 23 and 24 show possible installations for your reverse osmosis unit. The installation on figure 23 allows you to wash and drain the basins while you are in concentration mode. This will not be possible if you install your unit as shown on figure 24. The squares represent a top view of your basins. The permeate that comes out of your machine must go back into the permeate basin and the concentrate basin feeds the evaporator. On figure 23, each basin is connected to two pipes, one linked to the drain and the other to the V6 valve. On figure 24, a single pipe connects the basins to the V6 valve.

Basins:
You can add as many permeate and sap basins as you want. That allows you to fill up a sap basin, as soon as it becomes empty, with permeate obtained from the concentration process. Make sure that the basins are situated higher than the RO so that gravity will cause the liquids to run from the basins to the V6 valve. Do not install level indicators on the pipes at the outlet of your basins. This allows the air to enter the pipe system causing the machine to stop.

Valves :
On figure 23, it is suggested that you install two valves or one three-way valve under your permeate and sap basins (see figure 25). Make sure that your valves can be completely closed. These valves will allow you to wash and drain a basin while you concentrate. That way you will save a considerable amount of time.

Figure 25. Valves



WASHING AND TAKING CARE OF YOUR MEMBRANES

1. WHEN TO WASH THE MEMBRANES?

The filtration process and thus the membrane's performance vary depending on the type of membrane, exerted pressure on membrane, sap temperature, percentage of sugar in the concentrate, and presence of other components such as bacteria, biofilm and mineral salts. Therefore, it is important to maintain similar test conditions in each sampling. To do so, we recommend that you use the following method:

2. TESTING METHODS :

- Fill the washing basin just to half of its capacity with filtrate.
- Concentrate the permeate at 200 PSI pressure. Returning the permeate and concentrate to the washing basin. To do that, you must position the valves in washing soap cycle, close valve V18 and adjust the pressure to 200 pounds.
- Take down a reading of permeate flow when the temperature reaches 13^0C (55^0F). This reading will indicate you the filtration capacity of your membrane only without imply another factor such as temperature, biofilms or bacteria. A permeability test at 21^0C (70^0F) and 150 PSI, will give you the same lecture.
- Compare the permeate flow value with the one taken when the unit was manufactured or after you first utilisation during the season. You will evaluate in this way the permeability of your membrane.

3. WASHING FREQUENCY :

It is often difficult for the user to determine when and how to wash the membranes because the operating conditions vary according to many environmental factors. We have thus established a simple and efficient method to keep your membrane clean without putting it through a lot of washes. Otherwise it would wear out prematurely.

4 SOAP WASH :

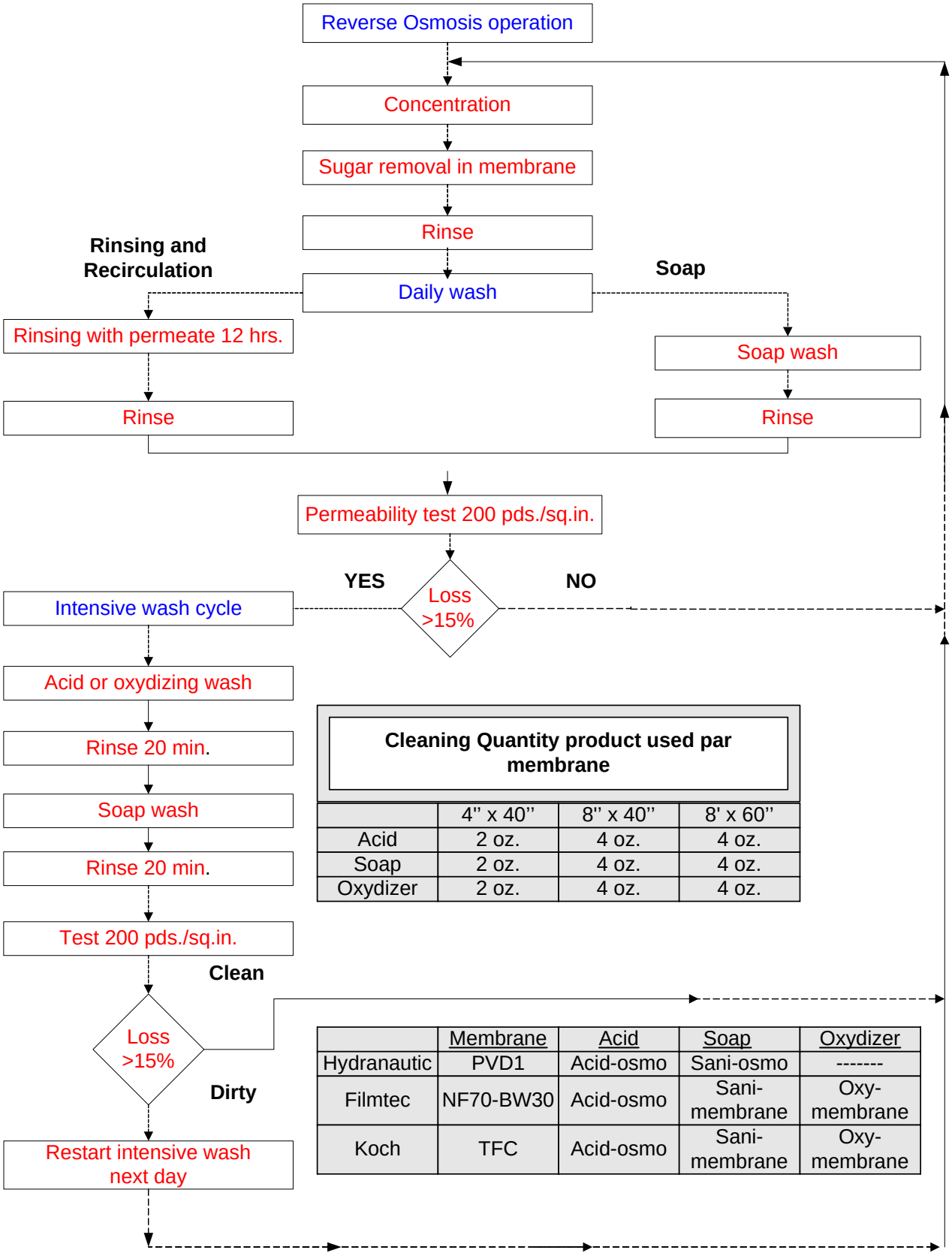
The soap wash is the key process to keeping your membrane clean soap has been specially conceived to clean your membrane while providing the best capacity (in gallons per hour)/longevity ratio. This type of wash is efficient when the temperature reaches 43^0C (110 degrees F) but does not exceed 46^0C (115^0F) because this could change its properties. The recommended washing time is 30 to 45 minutes. It is more important that you be sure to have the right temperature conditions and the right amount of soap: **increasing the soap wash time or using another soap than sani - osmo soap could destroy your membrane.**

5. RECIRCULATION WASH

During this type of washing, in **recirculation mode**, the water contained in the permeate basin runs through the whole machine at the lowest possible pressure for 8 to 12 hours.

6. ACID WASH :

The acid wash is a very important process to keep your membrane clean. It helps getting rid of the biofilm and bacteria that develop when there are hotter periods in the season. To be efficient, the Osmo acid soaking has to last at least 8 hours. It can go on without damaging the membrane for up to four weeks. The acid wash is carried out following the **soap wash mode.**



Cleaning Quantity product used par membrane

	4" x 40"	8" x 40"	8' x 60"
Acid	2 oz.	4 oz.	4 oz.
Soap	2 oz.	4 oz.	4 oz.
Oxydizer	2 oz.	4 oz.	4 oz.

	Membrane	Acid	Soap	Oxydizer
Hydranautic	PVD1	Acid-osmo	Sani-osmo	-------
Filmtec	NF70-BW30	Acid-osmo	Sani-membrane	Oxy-membrane
Koch	TFC	Acid-osmo	Sani-membrane	Oxy-membrane