MODULAIRE 2000

OPERATOR'S MANUAL FOR 50 GPH MODEL

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OPERATOR'S MANUAL FOR MICRO OSMOSIS

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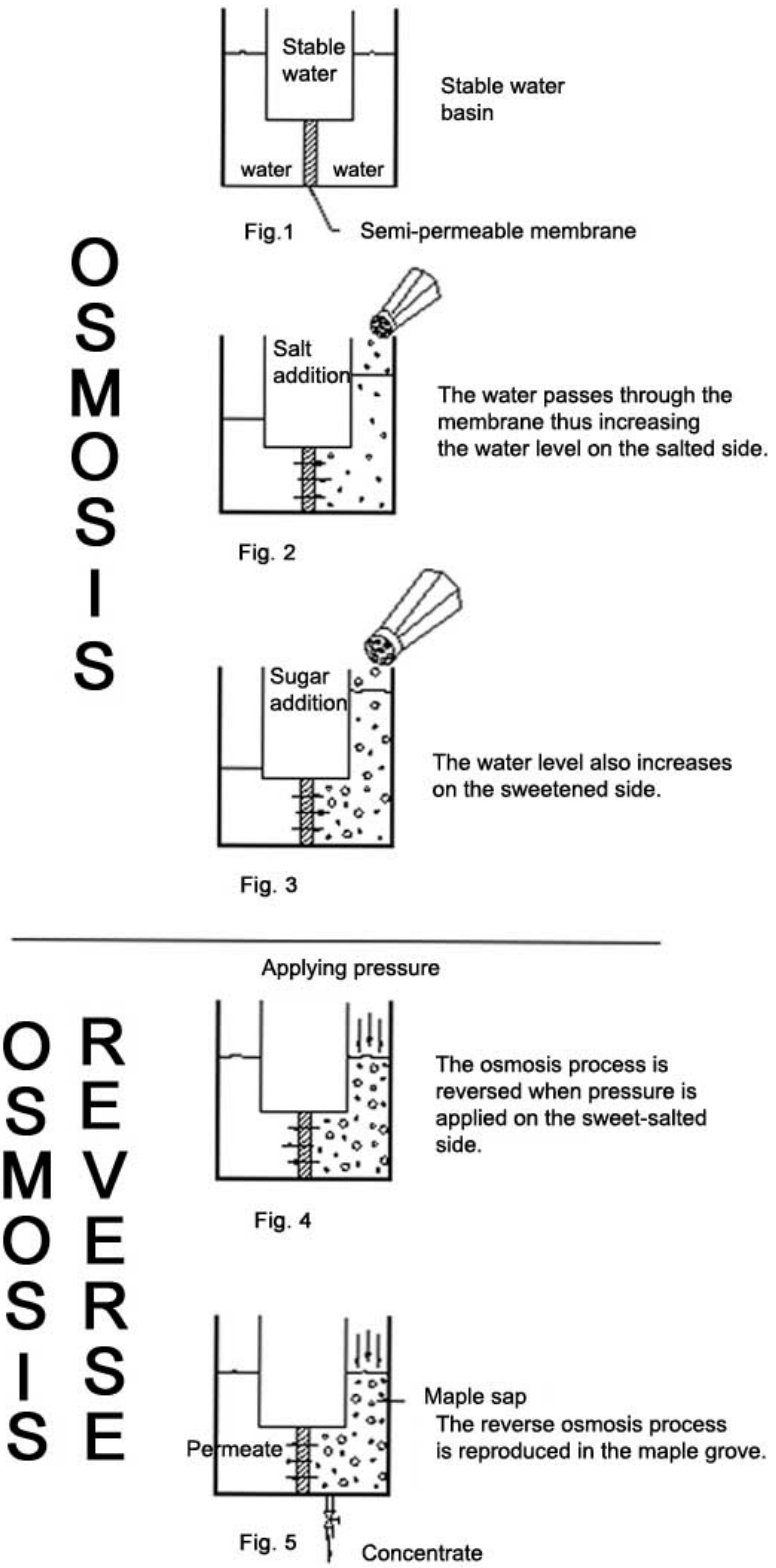


1. MODULAIRE MICRO-OSMOSIS USER'S MANUEL

CONGRATULATIONS! You just acquired an LEADER EVAPORATOR 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 **A. Pellerin & Fils Ltée**, 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 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).

FLOWCHART MICRO-OSMOSIS

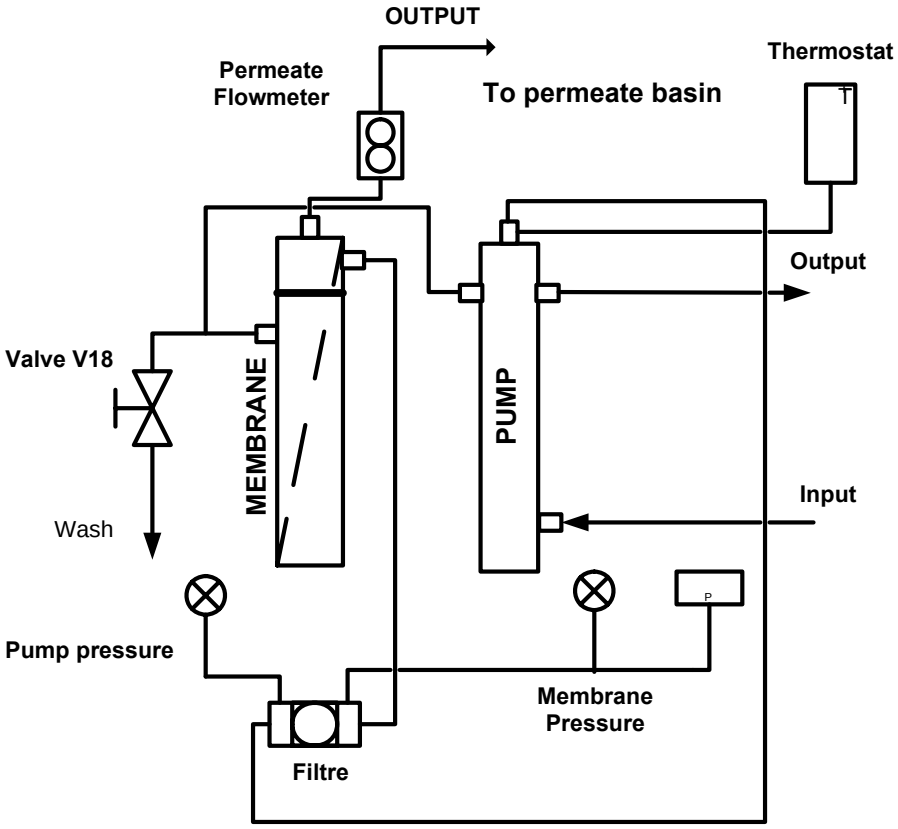


Figure 2. Functioning (micro osmosis 50 GPH)

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. We also recommend that the permeate basin be able to contain at least twice the unit's capacity. **IT IS PREFERABLE TO PLACE THE MAPLE SAP, EVAPORATOR AND PERMEATE BASINS IN SUCH A WAY THAT GRAVITY WILL CAUSE THE LIQUIDS TO RUN.**

Sap and permeate pipes

A return permeate line is already installed, this line must be installed up to the permeate basin. **THE EVAPORATOR MUST BE INSTALLED AT LOWER LEVEL IN SUCH A WAY THAT GRAVITY WILL CAUSE THE LIQUIDS TO RUN.**

Sap, permeate, drain and evaporator basin valves

Please note that the sap and permeate basins are not supplied by the company. You must provided the valves and pipes that will be installed at the output of your permeate and sap basin respectively, the flow of those basins must be controlled by a valve located under each one. Also at the evaporator input and for the drain valve.

Thermostat

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 procedure of this thermostat is explained in the following way :

No. ITEM	No. SQUAD	Quantity	Description
1	01152443	1	JOHNSON CONTROL VACUUM PUMP THERMOSTAT (DIGITAL)
	174087	4	ROUNDED HEAD ROBERTSON SCREW 6-32 X 1/2"
	108006	4	LOCKNUT 6-32

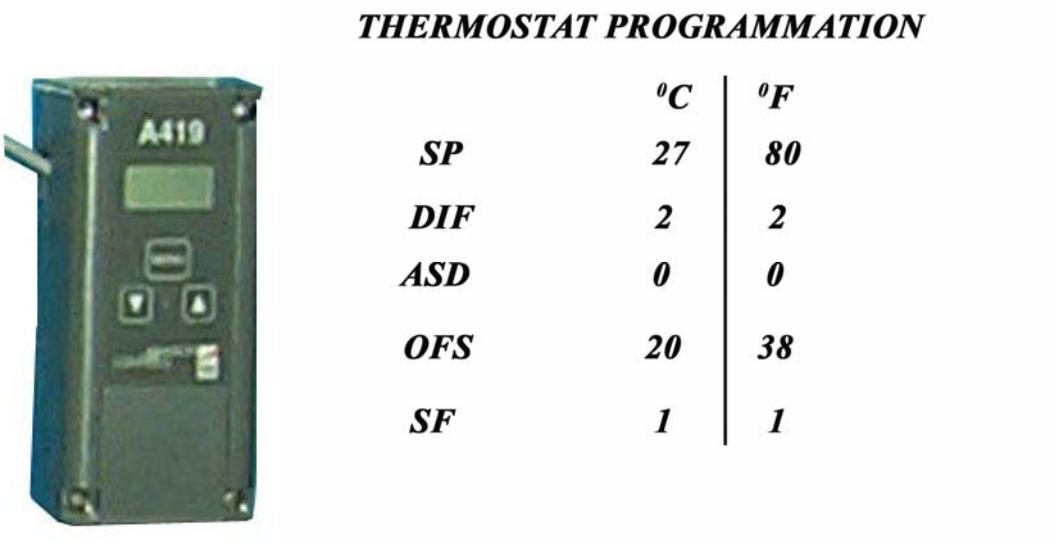
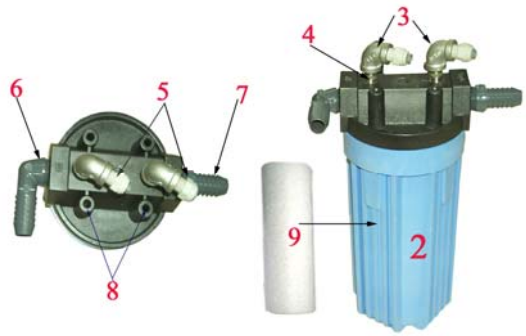


Figure 3. Thermostat

Pre-filter



The sap is filtered by a 10 microns cartridge. This clears it from any substance in suspension. .

Figure 4. Pre filter

No. Item	No. Squad	Quantity	Description
2	04211138	1	SEDIMENT POT FILTER 10"
3	04213457	2	STAINLESS 316 ELBOW, 150 PSI 1/4"
4	04213294	2	NIPPLE STAINLESS 316 SCH40 3/4'' X 1'' (CLOSED)
5	PI450822S	2	FITTING PUSH-IN 1/4" OD TUBE X 1/4'' NPTF
6	04210250	1	PVC ELBOW 90 DEGREE 3/4" MPT X 3/4'' INS
7	04210226	1	PVC ADAPTER 3/4'' MPT * 3/4" INS
8	5000309	4	HEXAGONAL STAINLESS BOLT 1/4-20 * 1''
9	04211010	1	PREFILTER CARTRIDGE 10 MICRONS 9 7/8''

Low Pressure control

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

Figure 5. Low pressure switch

No. ITEM	No. SQUAD	Quantity	Description
10	01150143	1	LOW PRESSURE CONTROL P10-BC7C
11	01260746	1	LOW PRESSURE MOUNTING FOR R/O 1-13/16" .010
12	01280430	1	PVC ADAPTER FOR PRESSURE SWITCH FOR R/O
13	5105093	4	SLOTTED MECHANICAL SCREW SS 6-32 X 1-1/4"

Pressure gauge (pump pressure) 0-300 PSI

This gauge allows you to read the pressure output, its value is indicated on the reading panel.

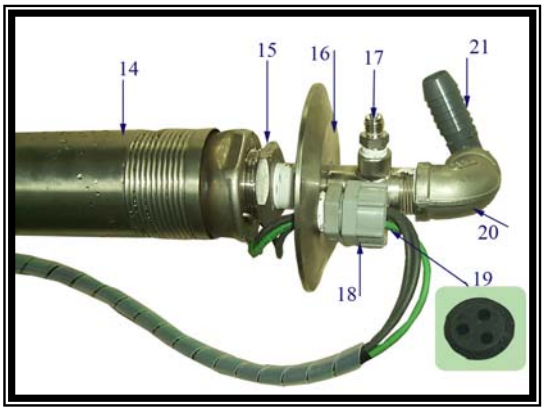
Figure 6. Pressure gauges

No. ITEM	No. SQUAD	Quantity	Description
36	01090021	2	GAUGE 0-300 PSI GLYCERIN BACK CONNECTION

Pressure gauge (membrane pressure) 0-300 PSI

This gauge allows you to read the pressure at the membrane. This gauge is located at the front panel which allows you to read the pressure in PSI or KPa. If this pressure should drop below 12 psi (82,737kPa), the machine will stop by itself.

Pressure pump (4)

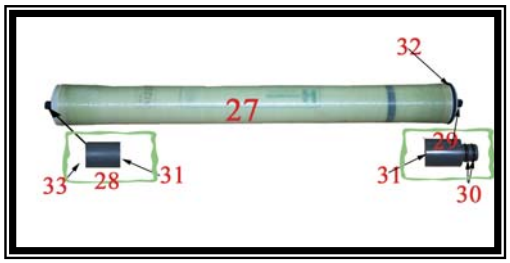


The filtered water is pressurized with the help of the pressure pump. This gives the sap the necessary speed to clean the membrane surface automatically during the sap concentration process. The same thing happens to the washing liquid during the soap and recirculation washes.

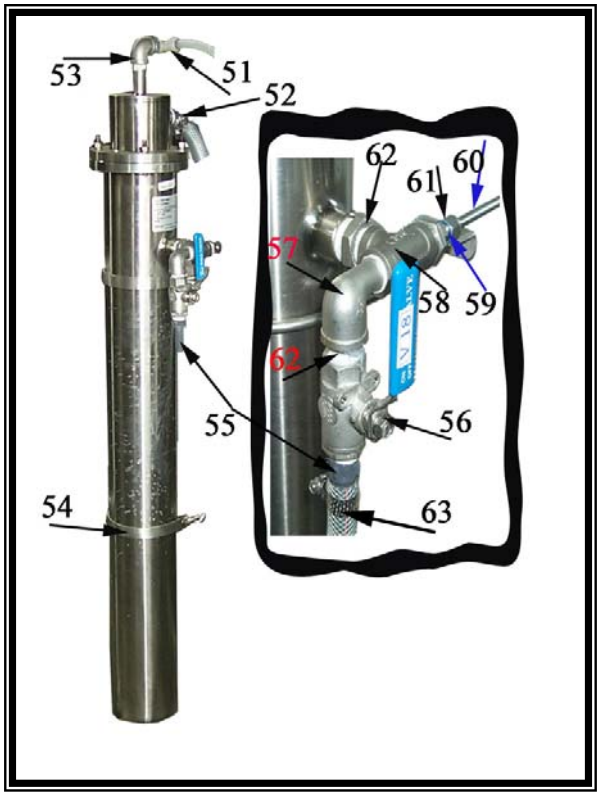
# ITEM	No. SQUAD	Quantity	Description
14	96080242	1	GRUNDFOS PUMP 10SQ10C-330 1C HP/240V 3''DIA. 1-1/4
15	04212065	1	STAINLESS REDUCER 1 1/4'' MPT* 3/4'' FPT
16	01261143	1	ÈNVELOPE COVER FOR PUMP 3 1/2''
17	01171145	1	ADAPTER SS 1/4'' COMPRESSION X 1/4'' MPT
18	01154156	1	ELEC. NYLON CONNECTOR 1/2'' NPT REMKE GREY
19	01151157	2	BUSHING 3 HOLES FOR CONNECTOR 01154156 .156''
20	04213457	2	STAINLESS 316 ELBOW 150 PSI 1/4"
21	04210250	1	PVC ELBOW 90 DEGREE 3/4" MPT X 3/4'' INS
22	01261142	1	PUMP ENVELOPE 3 1/2'' FOR MICRO OSMOSIS MAPLE GROVE
23		1	LIQUID INLET
24		1	LIQUID OUTLET
25	AC13HH-440	1	HEAVY DUTY CLAMP SINGLE PIN 4''
26	4OMPU40	1	STANDARD CLAMB GASKET BUNA-N 4''

Figure 7. Pressure pump

Membrane



The sap is concentrated by the membranes resulting in a sweeter sap (concentrate) and treated water (permeate).



No. ITEM	No. SQUAD	Quantity	Description
27	01260004	1	MEMBRANE 4" X 40" HYDRANAUTICS PVD1
28	01260449	1	ADAPTER 4" HYDRANAUTICS VS AIRABLO (0,800-0, 0.750)
29	01260787	1	PLUG 4" HYDRANAUTICS VS AIRABLO 5
30	01300066	2	O-RING 13/16" ID 1" OD 3/32" MUR
31	01300135	2	O-RING 3/4" ID 1" OD 1/8" MUR
32	01300574	1	O-RING 3 1/4" ID 3 3/4" OD 1/4" WALL BANJO FILTER
33	01300576	1	O-RING 3 1/2" ID 4" OD 1/4" MUR (COUVERCLE 4")
51	PI091624S	1	ELBOW PUSH-IN 1/2'' TUBE X 1/2'' MALE NPT
52	04210352	1	PVC ELBOW 90^0 3/4'' INS * 3/4'' FPT
53	04213459	1	STAINLESS 316 ELBOW 150PSI 1/2''
54	AC13HH-440	2	HEAVY DUTY CLAMP SINGLE PIN 4'' (WITH ITEM 40MPU40)
55	04210225	1	PVC ADAPTER 1/2'' MPT *1/2'' INS
56	01040846	1	BALL VALVE 1/2'' SS 2000 PSI NEW
57	04211603	1	ELBOW STAINLESS 90 DEGREE 1/2'' MPT * 1/2'' FPT
58	04213579	1	T STAINLESS 316 150 PSI 1/2'' FPT
59	04213423	1	STAINLESS 316 REDUCER 150 PSI 1/2'' MPT * 1/4'' FPT
60	01172298	20'	PIPE SS 5/16'' OD #304 .035'' WALL 20'
61	01172296	1	ADAPTER SS 5/16'' COMPRESSION * 1/4'' MPT
62	04211797	2	NIPPLE STAINLESS 1/2'' MPT * CLOSE
63	04211015	1	CLIP 1/2" A 1" HF-8

Figure 8. Membrane

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.

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

CONCENTRATION FUNCTIONING: Place the switch in CONCENTRATION mode and the selector in ON position and push the start button until the membrane pressure surpasses 20 PSI. ***PLEASE NOTE THAT***: the manufacturer does not include the following valves:

- Osmosis inlet valve
- Osmosis outlet valve
- Evaporator valve
- Bypass valve
- Permeate and sap valves
- Drain valve

STOP: The unit will stops when you select the SELECTOR OFF operation mode.

WASHING FUNCTIONING: Place the switch in WASH mode, the selector in ON position and push the start button until the membrane pressure surpasses 20 PSI.

1.4 INSTALLATION

The micro osmosis ‘’**LEADER EVAPORATOR**’’ is delivered without permeate and sap basins. You must connect the pipes and valves that will be connected at the sap and permeate basins. (see the diagrams on user’s guide). The pipe diameter has to be equal to or greater than that of the filter installed on the machine. 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. This is one suggestion for the unit’s installation in concentration mode.

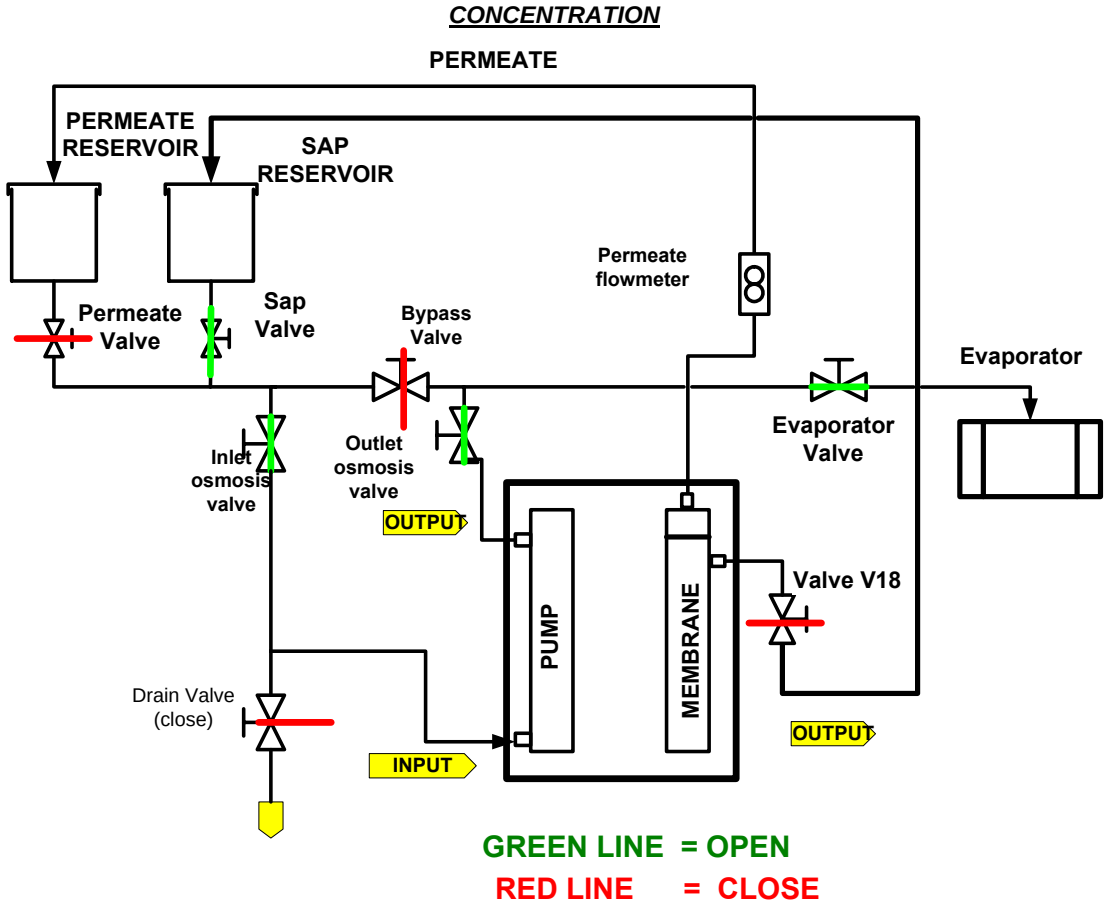


Figure 9. Installation guide

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. We also recommend that the permeate basin be able to contain at least twice the unit’s capacity. **IT IS PREFE RABLE T O PLACE T HE MAPLE SAP AN D PERMEAT E BASINS IN SUCH A WAY THAT GRAVITY WILL CAUSE THE LIQUIDS TO RUN.**

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 permeate basins.
- Connect the permeate 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. Put 10 gallons (approximately) of water in the sap reservoir.
2. Concentrate the permeate at 100 PSI pressure. Returning the permeate and concentrate to the sap basin. To do that, you must position the valves and pipes in washing soap cycle, adjust the pressure to 100 PSI by closing the valve V18.
3. Take down a reading of permeate flow when the temperature reaches 21^0C (70^0F). This reading will indicate you the filtration capacity of your membrane only without imply another factor such as temperature, biofilms or bacteria. You can compare the permeate flow value with the one taken when the unit was manufactured.
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

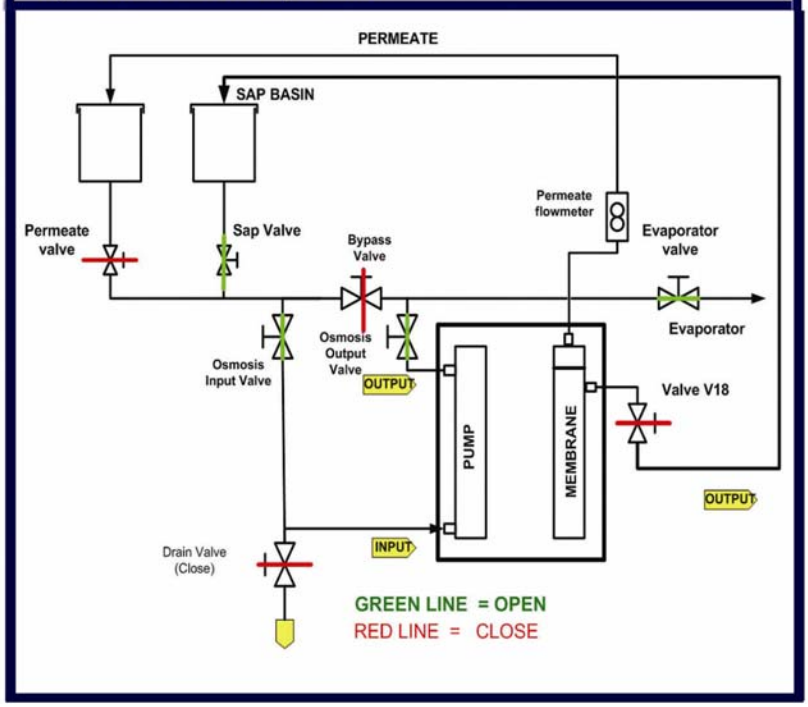
This manual was designed to help you work with your reverse osmosis. All of these instructions are also printed on the front of your machine. (see the following pictograms).

P.S.: TO AVOID BREAKING THE UNIT, MAKE SURE THAT THE PUMPS ARE FILLED WITH WATER BEFORE STARTING THE MACHINE.

Concentration:

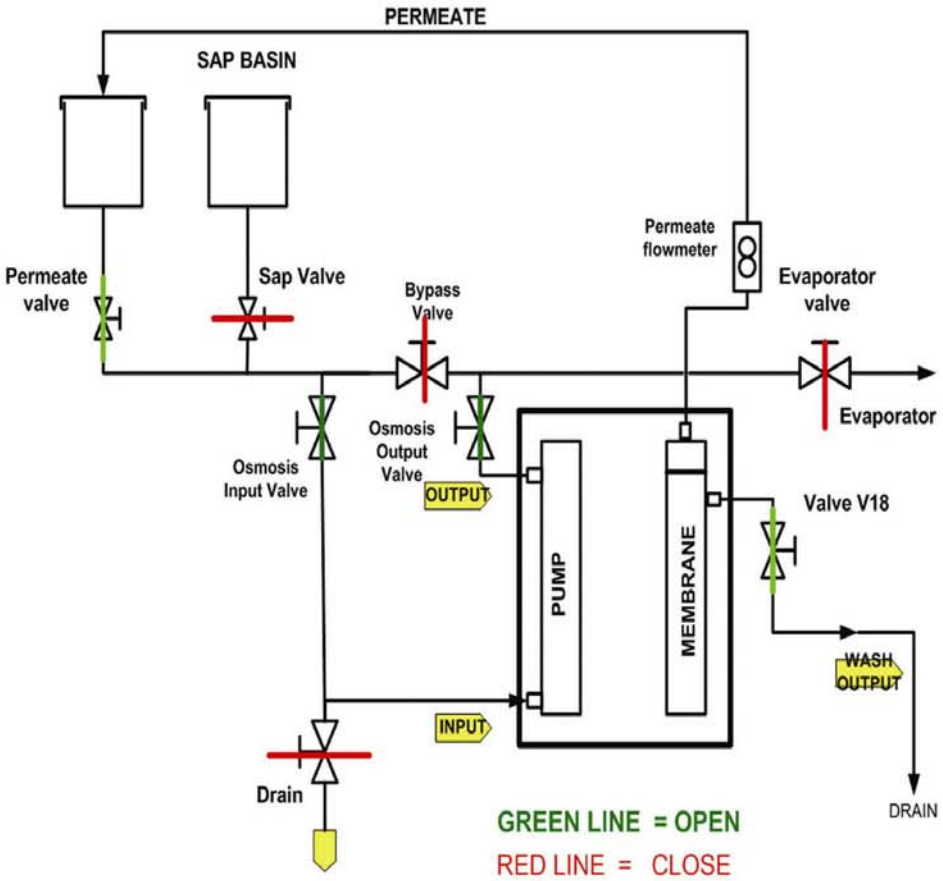
1. Close drain valve.
2. Open the evaporator feeding valve.
3. Place washing pipe in the sap reservoir.
4. Open V18 valve.
5. Close permeate basin feeding valve.
6. Open sap basin feeding valve.
7. Open Osmosis inlet valve.
8. Open Osmosis outlet valve.
9. Close bypass valve.
10. Start the evaporator.
11. Place the switch to ON position.
12. Place the selector switch to concentration position
13. Push the START buttom until the membrane pressure surpasses 20 PSI.
14. Close completely V18 valve.

** The concentration ratio (°brix) will be automatically adjusted with the evaporator. **



Rinse:

1. Close drain valve.
2. Close the evaporator feeding valve.
3. Place washing pipe towards drain.
4. Open V18 valve.
5. Close feeding sap valve.
6. Open feeding permeate valve.
7. Open osmosis inlet valve.
8. Open osmosis outlet valve.
9. Close the bypass valve.
10. Place the selector on WASHING mode.
11. Place the swtich to ON position.
12. Push the START buttom until the membrane pressure surpasses 20 PSI.



Soap wash or permeate wash:

1. Put wash water in the sap reservoir.
2. Close drain valve.
3. Close evaporator feeding valve.
4. Place washing pipe towards sap basin.
5. Place the permeate pipe towards sap basin.
6. Open osmosis inlet valve.
7. Close osmosis outlet valve.
8. Close bypass valve.
9. Open V18 valve completely.
10. Close permeate basin feeding valve.
11. Open sap basin feeding valve.
12. Place the switch on WASH mode.
13. Place the switch to ON position
14. Push the START buttom until the membrane pressure surpasses 20 PSI.
15. The temperature must reach 46°C (115°F).
16. Do a rinse cycle as soon as wash cycle is finished.

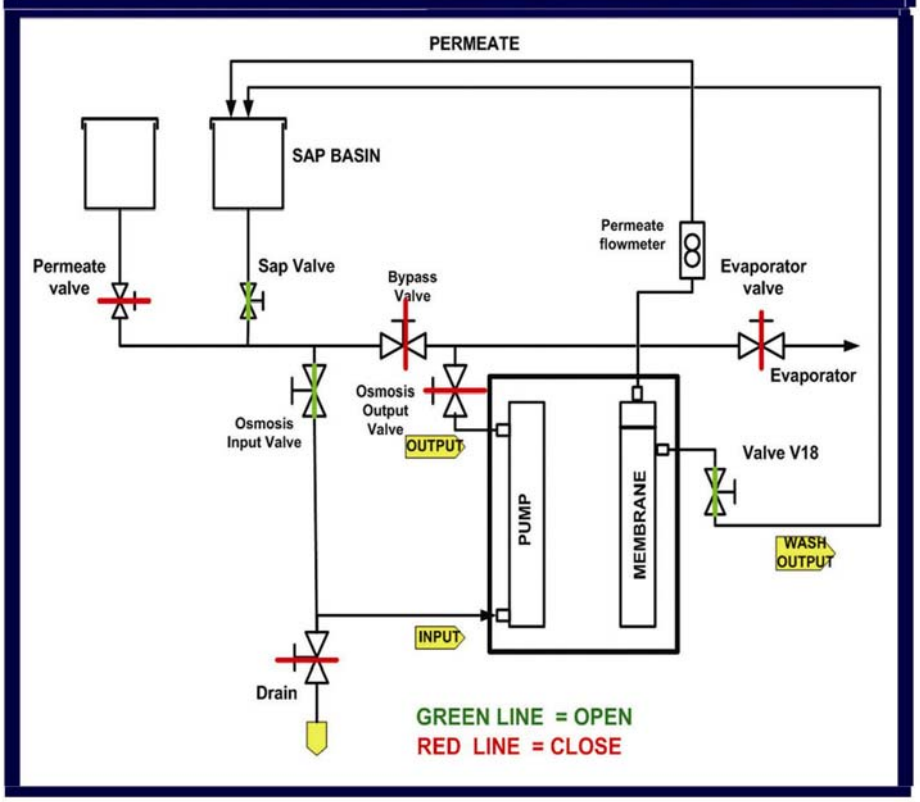


Figure 10. Pictogram

3.3 MEMBRANES PERMEABILITY TEST

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.

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. Put 10 gallons (approximately) of water in the sap reservoir.

4. Concentrate the permeate at 100 PSI pressure. Returning the permeate and concentrate to the sap basin. To do that, you must position the valves and pipes in washing soap cycle, adjust the pressure to 100 PSI by closing the valve V18.

5. Take down a reading of permeate flow when the temperature reaches 21^0C (70^0F). This reading will indicate you the filtration capacity of your membrane only without imply another factor such as temperature, biofilms or bacteria. 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.

3.4 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.

- Put 10 gallons (approximately) of water in the sap reservoir.
- Concentrate the permeate at 100 PSI pressure. Returning the permeate and concentrate to the sap basin. To do that, you must position the valves and pipes in washing soap cycle, adjust the pressure to 100 PSI by closing the valve V18.
- Take down a reading of permeate flow when the temperature reaches 21^0C (70^0F). This reading will indicate you the filtration capacity of your membrane only without imply another factor such as temperature, biofilms or bacteria. You can compare the permeate flow value with the one taken when the unit was manufactured.
- 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.

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 preserve-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 10 litres of glycol or glycerine for each 4'' x 40'' membrane, 20 litres for each 8''x 40'' 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).

4. MANUFACTURER WARRANTY

Reverse osmosis **LEADER EVAPORATOR** 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. **A. Pellerin & Fils Ltée** shall not be held responsible for any damage or injury arising from negligence, abuse, improper handling or installation.

5. EQUIPEMENT DESCRIPTION

5.1 PHYSICAL DIMENSIONS FOR (50 GAL) UNIT

Height: 52"	Width: 18"	Depth: 25"

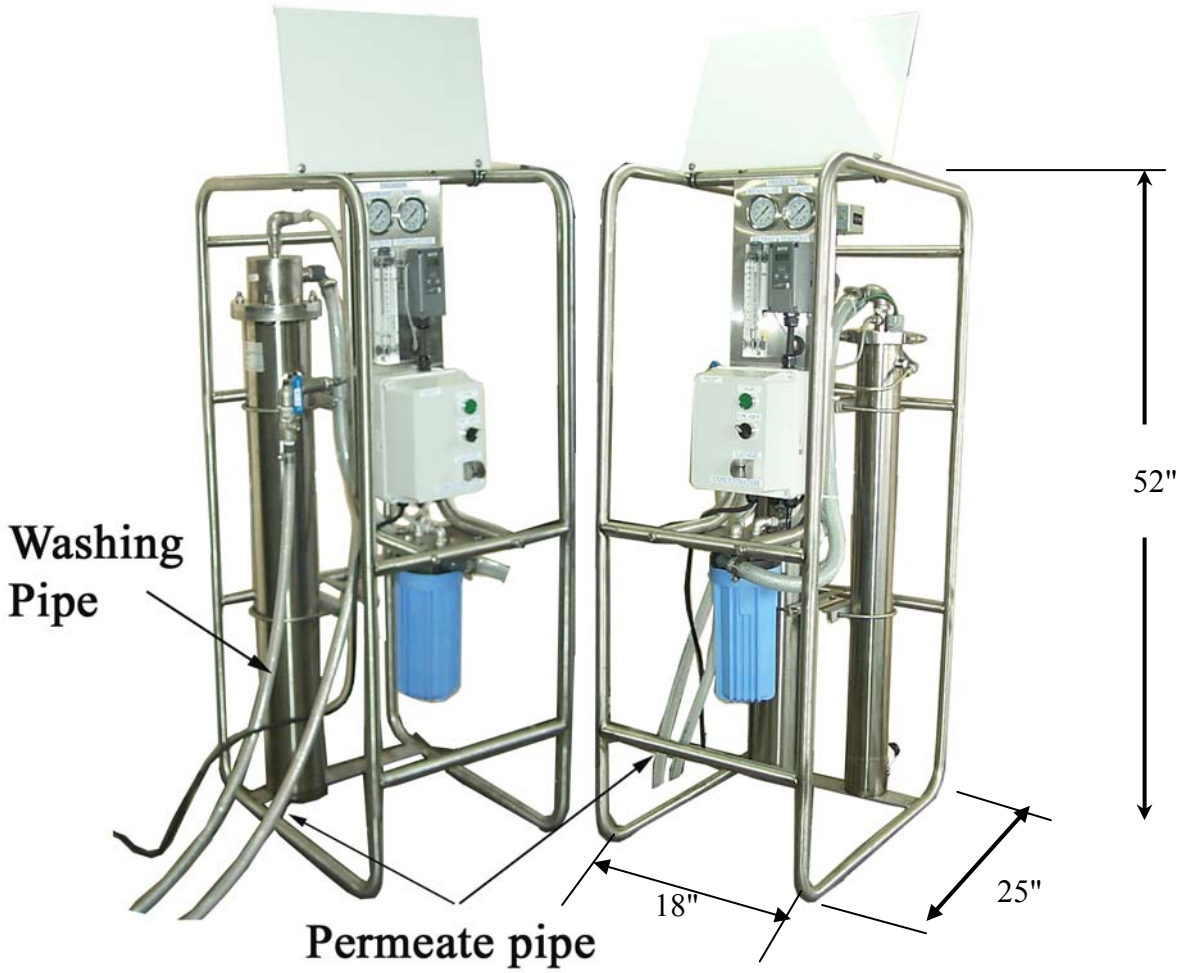
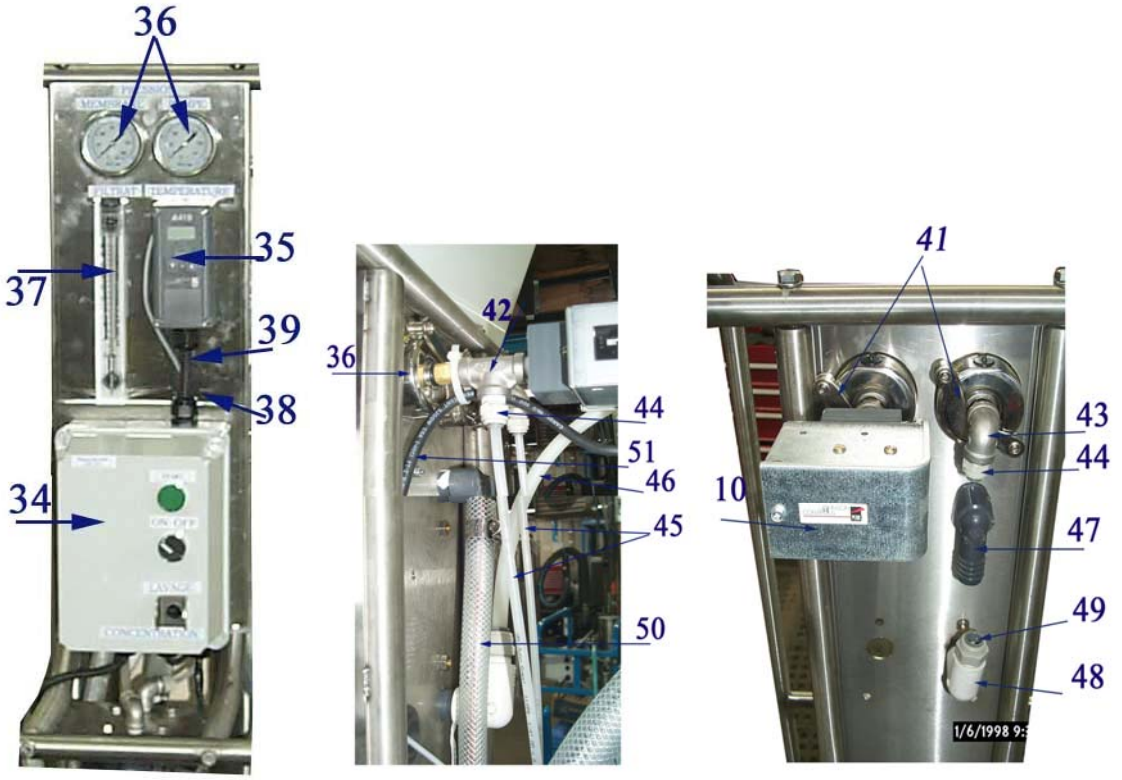


Figure 11. Reverse osmosis unit

5.5 FRONT PANEL

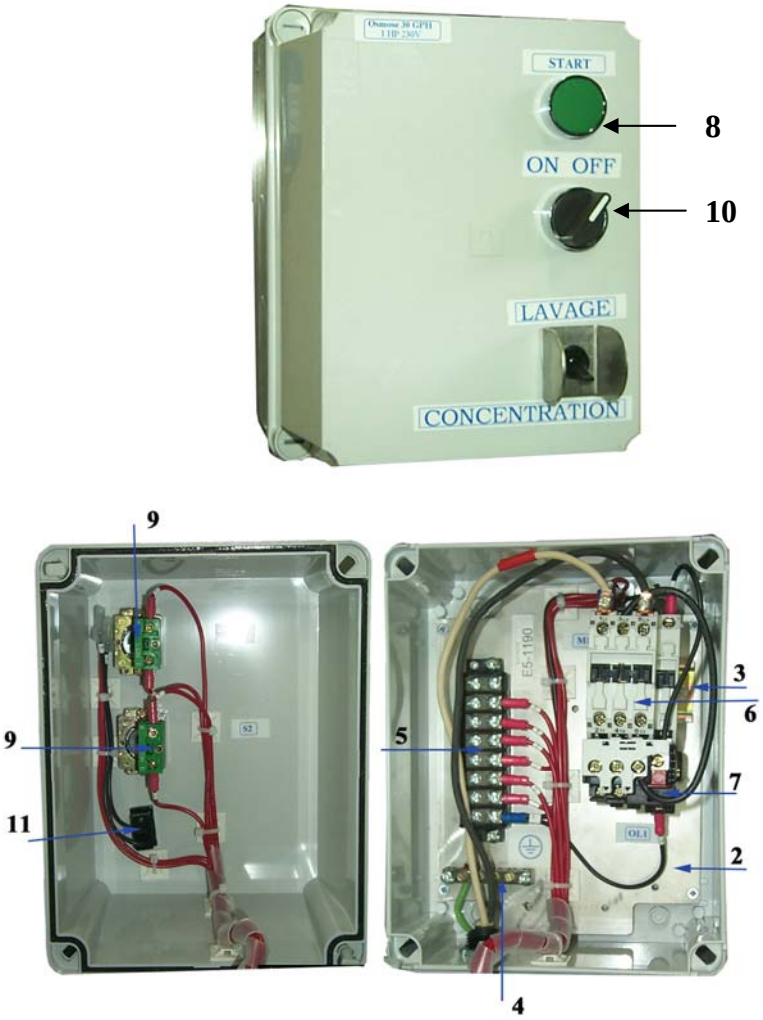
The reading panels were designed to meet your needs. They include the following items as standard equipment



No. ITEM	No. SQUAD	Quantity	Description
34	01154173	1	CONTROL BOX FOR MICRO OSMOSIS 1 HP 240V
35	01152443	1	JOHNSON CONTROL VACUUM PUMP THERMOSTAT DIGITAL
36	01090021	2	GAUGE 0-300 PSI GLYCERIN BACK CONNECTION
37	01260893	1	NO VALVE FLOWMETER 2 GPM 5'' PVC ADAPTER
38	RB233	1	RONDELLE ISOLANTE CAOUT. 7/16'' ID 15/16'' OD 7/16''
39	01152476	1,5	ELECTRICAL WIRE 18/6 SOW (PRICE BY FOOT)
10	01150143	1	LOW PRESSURE SWITCH P10-BC7C
41	01090025	2	GAUGE BACK HOLDER 2 1/2''
42	04213577	1	T STAINLESS 316 150PSI 1/4'' FPT
43	04213457	1	STAINLESS 316 ELBOW 150 PSI ¼''
44	PI010822S	2	FITTING PUSH-IN 1/4'' HOSE X 1/4'' MALE NPTF
45	PE08BI0500F-W	2	TUBE PUSH – IN 1/4'' OD WHITE FDA 120 PSI AT 150 F
46	01301392	1	POLYETHYLENE PNUMATIC TUBE 1/2 OD NATURAL 100'
47	04210350	1	PVC ELBOW 90^0 1/2'' INS * 1/2'' FPT
48	408005	1	PVC ELBOW 90^0 1/2'' FPT
49	PI011604S	1	ADAPTER PUSH-IN 1/2'' TUBE X 1/2'' MALE NPT
50	04210581	15	TUBE PVC 1/2"I.D. 200PSI(70F)-100PSI(122F) 300'

Figure 12. Front panel

5.6 ELECTRICAL BOX



No. ITEM	No. SQUAD	Quantity	Description
1	01150964	1	PVC BOX LUME 9 X 7 X 6.5 (220 X 170 X 150)
2	01151650	1	BACKPLATE FOR VACCUM AND WASHER
3	01150758	1	ELECTRICITY 2 METERS DIN RAIL 1 1/4"
4	01150757	1	ALUMINUM GROUND BAR 6' - 0
5	01151588	1	SCREW STRIP 300V 8 TERMINALS 4.25" LONG
6	01150727	1	MAGNETIC DP25-3 208-230 V/ 60 HZ.
7	01150625	1	OVERLOAD 8 AMP. TO 12 AMP. (TYPE TI 16C, TI 25C)
8	01153334	1	FLUSH PUSH BUTTON SPRING RETURN DANFOSS GREEN
9	01153379	1	CONTACT BLOCK 2 POSITION CONTACT NO+NO
10	01153351	1	SELECT SWITCH 2 POS. STAYPUT STANDARD HANDLE
11	01153684	1	TOGGLE SWITCHES 5 AMP 250VAC BLACK PLASTIC 2 WIR
12	01153200	2	LOG SLU 25S
13	01152325	1	MALE CARD 3 LEGS 15A, 250V LEV 615 PA EAG ,4866
14	01150985	15	15 FEETS WIRE 14/3 SJOOW (PRICE/FOOT)

Figure 13. Electrical control box for 50 GPH

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

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

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

	Density (Brix)	Flow (GPM)	Temperature	Pressure	
	Sap	Permeate	Degrees F.	PSI	Or
1 2		**3**	**4**	**5**	Test
6 june 02		7.5	55	200	T
6 june 02	2.0	7.5	55	400	C
6 june 02					

Figure 14. Operation data

	Density (Brix)	Flow (GPM)	Temperature	Pressure	
	Sap	Permeate	Degrees F.	PSI	
1	2	3	4	5	

Figure 15.Production sheet for reverse osmosis

CONCENTRATOR :	MEMBRANE MODELS	SERIAL No. :
Serial No._____	1._____	1._____
Model _____	2._____	2._____
Pump _____	3._____	3._____
Motor_____	4._____	4._____

Pumps	**HP MODÈL**		Serial Pump #	Motor serial #
PRIMING				
PRESSURE # 1				
PRESSURE #2				
PRESSURE #3				
PRESSURE #4				

		ACID AL	**KALIN SOAPS OXYD**	**ANTS**
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 No.	Conductivity		Temperature	FLOW		PRESSURE
	Concentrate	Permeate	^{o}F	Permeate	Concentrate	PSI
1						
2						
3						
4						

TEMPERATURE CONTROL

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

ELECTRICAL TESTS

Test dielectric	_____OK
Total Amperage :	_____Amps.

PROTECTION AGAINTS FREEZE

Density :_____	Temperature :_____
Salesman Name :_____	Buyer's Name :_____ Order # :_____
Technicien:_____	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											
Temperature Factor			**Machine capacity GPH) corrected according to the temperature**								
^{o}F	^{o}C	Corr. T	50	150	300	450	600	700	800	1000	1600
77	25	1,0000	72	216	433	649	865	1009	1154	1442	2307
75	24	1,0300	70	210	420	630	840	980	1120	1400	2240
73	23	1,0610	68	204	408	612	815	951	1087	1359	2175
72	22	1,0960	66	197	395	592	789	921	1053	1316	2105
70	21	1,1260	64	192	384	576	768	896	1025	1281	2049
68	20	1,1610	62	186	373	559	745	869	994	1242	1987
66	19	1,1960	60	181	362	543	723	844	965	1206	1929
64	18	1,2340	58	175	351	526	701	818	935	1169	1870
63	17	1,2720	57	170	340	510	680	794	907	1134	1814
61	16	1,3120	55	165	330	495	659	769	879	1099	1759
59	15	1,3540	53	160	319	479	639	745	852	1065	1704
57	14	1,3970	52	155	310	464	619	723	826	1032	1652
55	13	1,4420	50	150	300	450	600	700	800	1000	1600
54	12	1,4890	48	145	291	436	581	678	775	968	1549
52	11	1,5370	47	141	281	422	563	657	751	938	1501
50	10	1,5880	45	136	272	409	545	636	726	908	1453
48	9	1,6410	44	132	264	395	527	615	703	879	1406
46	8	1,6950	43	128	255	383	510	596	681	851	1361
45	7	1,7520	41	123	247	370	494	576	658	823	1317
43	6	1,8120	40	119	239	358	477	557	637	796	1273
41	5	1,8730	38	115	231	346	462	539	616	770	1232
39	4	1,9380	37	112	223	335	446	521	595	744	1191
37	3	2,0050	36	108	216	324	432	503	575	719	1151
36	2	2,0740	35	104	209	313	417	487	556	695	1112
34	1	2,1470	34	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) = 50 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.

$$Corrected\,Flow\,(GPH) = \frac{(50GPH)_{55^0F} * (1.4420)}{(2.0740)_{36^0F}} = \frac{72.1}{2.0740} = 35\ \textbf{GPH}$$

Figure 16. Correction factor sheet

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 :

- Put 10 gallons (approximately) of water in the sap reservoir.
- Concentrate the permeate at 100 PSI pressure. Returning the permeate and concentrate to the sap basin. To do that, you must position the valves and pipes in washing soap cycle, adjust the pressure to 100 PSI by closing the valve V18.
- Take down a reading of permeate flow when the temperature reaches 21^0C (70^0F). This reading will indicate you the filtration capacity of your membrane only without imply another factor such as temperature, biofilms or bacteria. You can compare the permeate flow value with the one taken when the unit was manufactured.
- 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

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 :

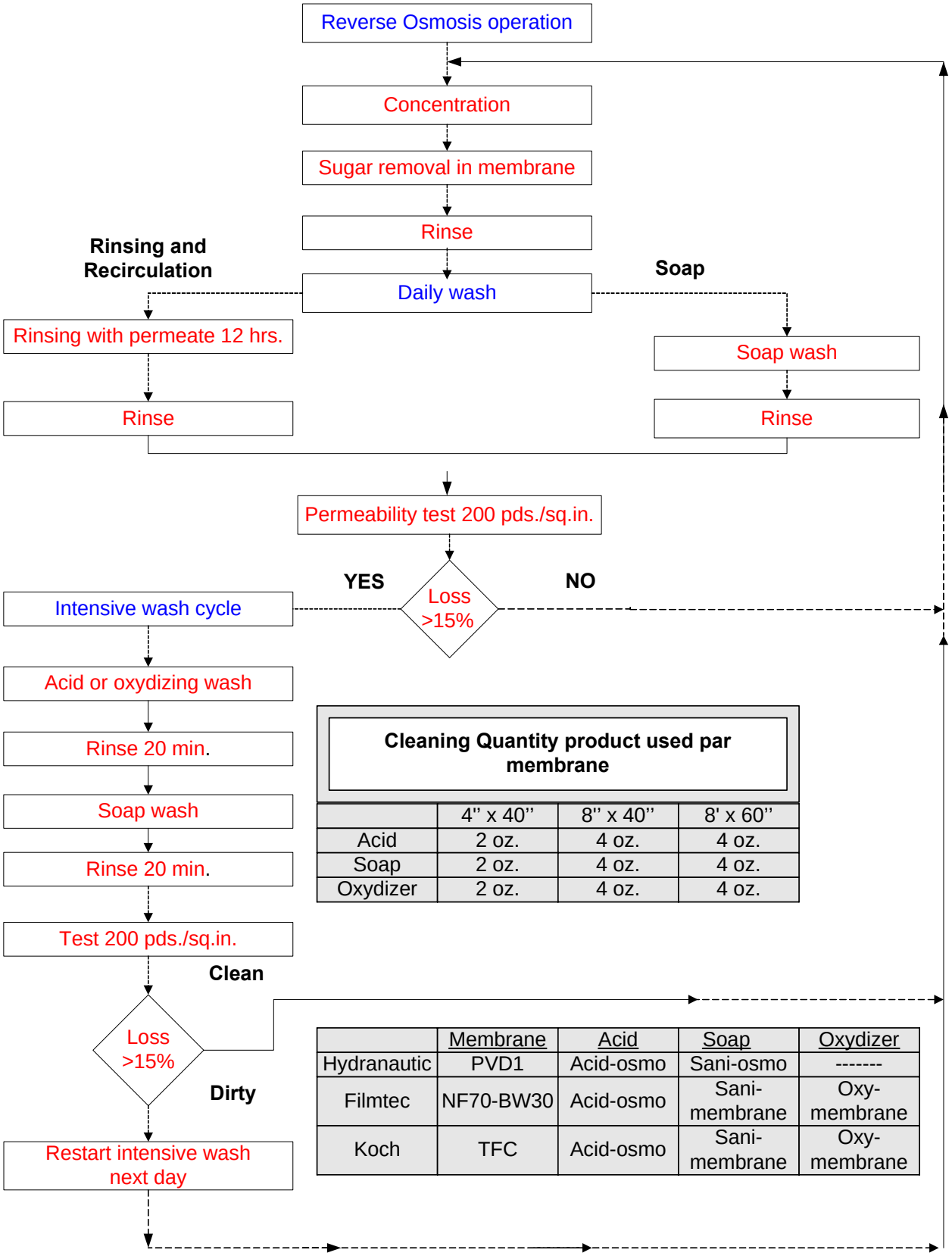
The LEADER soap wash is the key process to keeping your membrane clean. LEADER soap has been specially conceived to clean your membrane while providing the best capacity (in gallons per hour)/longevity ratio. This type of wash is efficient when the temperature reaches 43^0C (110 degrees F) but does not 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 LEADER 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