



# OWNER'S MANUAL



## CDL REVERSE OSMOSIS MACHINE

Les Équipements d'Érablière CDL inc.

# INTRODUCTION

Congratulations on your purchase of a new CDL RO. We feel you have purchased the most effective RO on the market today. The CDL RO is designed with you, the customer in mind, allowing simple, problem-free operation with a minimum of maintenance. Operation instructions are clearly printed on the control panel, but we suggest that you read this manual thoroughly before operating your machine as it contains operating instructions in a more detailed form.

As with all equipment, proper care is required to ensure that the system will continue to perform the job for which it was designed. Please make sure that you perform all the maintenance procedures described in this manual. Most important, is the rinsing and cleaning of the membranes to ensure maximum productivity (permeate flow) and extend membrane life. Throughout this manual, permeate may be referred to as filtrate which has the same meaning.

Your warranty will be void if proper maintenance is not performed, if the RO room is not heated properly and if the power supply to the machine is not adequate!

# FINDING INFORMATION

## Make a record for future use

Brand: \_\_\_\_\_

Purchased Date: \_\_\_\_\_

Model Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

## Serial number location

The serial number is located inside the electrical panel door

Serial # location inside this door



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## SAFETY

Use your RO with caution. The electrical RO hook up has to be done by a certified electrician. Never work in the electrical panel, any work in the panel has to be done by a qualified technician. An RO is a heavy piece of equipment. Be very carefull if you have to move it. Make sure there are 2 people when putting in or taking out a membrane of the post. The post is heavy and has to be manipulated with caution.

## SYSTEM DESCRIPTION

Reverse osmosis (RO) is a process where pressure is applied to a solution in contact with semi permeable membrane in order to extract various components. In this case, it is to extract the water (permeate) from the raw sap in order to increase the sugar contraction.

This section describes the operation of the RO system by following the path of the raw sap feed from entry to exit of the system.

Raw sap enters the system through 1 of the 3 inlet valves, the other 2 being permeate and wash tank inlets (see picture 2). A temperature readout mounted on the control panel will enable you to verify the sap temperature at glance. The raw sap then enters the pre-filters. The pre-filters will trap particles that are in suspension that could damage membranes or pumps. A gauge on the control panel indicates the pressure on the outlet side of the pre-filters (supply pressure). A low pressure (less than 25 psi) indicates dirty pre-filters.



The system is protected by 3 sensors that will stop the machine if the pressure at the outlet of the high pressure pump is too high, too low or if sap temperature is too high. The low pressure switch makes sure that the system doesn't run dry. So, if the pressure on the outlet of the pre-filters is too low, the low pressure switch will cut the power and the machine will shut down. This could be caused by:

1. No liquid supply to system (empty tank or closed valve)
2. Plugged pre-filters
3. Air is getting in the system between the feed pump and the sap tank

The high pressure switch will shut the machine down if the system pressure exceeds 500 psi. This could be caused by:

1. a dirty membrane
2. an obstruction in the concentrate circuit

The high temperature switch protects the membranes from temperatures exceeding the manufactures specifications. The raw sap then enters the high-pressure pump, a flow control valve (concentrate valve) regulates the flow of concentrate and influence the system pressure. A pressure control valve is used to balance the system pressure after the concentrate flow adjustment is made. The system pressure gauge is located on top of the sap supply gauge on the control panel. Raw sap then enters the stainless steel post where the membrane is located. A recirculation pump installed at the base of the post. This pump increases sap flow across the membrane at 75 gpm. This flow is necessary to keep the membrane surface free of sugar particles and maximize the filtration surface of the membrane and maintain permeate flow.

The membrane purpose is to separate maple sap in 2 different components:

1. concentrate - high sugar content
2. permeate - no sugar(water)

### Concentrate

The larger molecules such as sugar and other minerals dissolved in the maple sap are kept on the concentrate side of the membrane.

The concentrate controlled by the concentrate valve then exits the membrane and the post then enters the concentrate flow meter on the control panel. The concentrate can then be directed with the concentrate 3-way control valve (bottom left on the control panel) to:

1. The concentrate tank (concentrate cycle)
2. The wash tank (wash and rince cycles)



## Permeate

The permeate (water flows through the membrane) exits the system through a clear hose located on top of the post. Then it goes to the permeate flow meter on the control panel and through the permeate 3-way ball valve (lower right of control panel) to:

1. permeate tank (concentrate cycle)
2. wash tank (wash cycle or rinse cycle)

The permeate accumulated in your tank is used to wash and rinse the system before and after the concentration cycle.

Be sure to carefully follow the washing instructions, operating parameters and the guidelines for the RO room;

## **INSTALLATION**

A proper installation is the most important thing you will have to do if you want your project to be a success. To put it simply, your room needs to be an absolute minimum of 6' x 6' for a 600 gph (ideally 8' x 8') to have enough room to manoeuvre. Obviously, you'll need more square feet for larger machines.

The room needs to be heated at all time. The ideal temperature is between 20° C and 15° C. (60° F to 70° F). It would allow you to work in a comfortable environment. However, it's not necessary, any temperature above 3° C (36° F) will do. Your heat source needs to be located low since heat rises and this will keep the entire room at an even temperature. Never let your RO freeze, major damage to the pumps and membrane could happen. The room also needs to be well ventilated for warm end of season days, so you can keep room cool by opening a door or a window. If the temperature gets too warm, motors with thermal overloads might trip.

A floor drain is highly recommended to evacuate water spills coming from filter change, leak, hose replacement etc. Keep the room dry. If you can't, you will end up with a damped and moldy room wich is not sanitary. It will also create a bad environment for the electrical components and motors of your RO.

A sap filter should be used at the entrance of the sap supply because particles could be found in the water. (Ex : Leaves, wood particles from the tapping, etc)



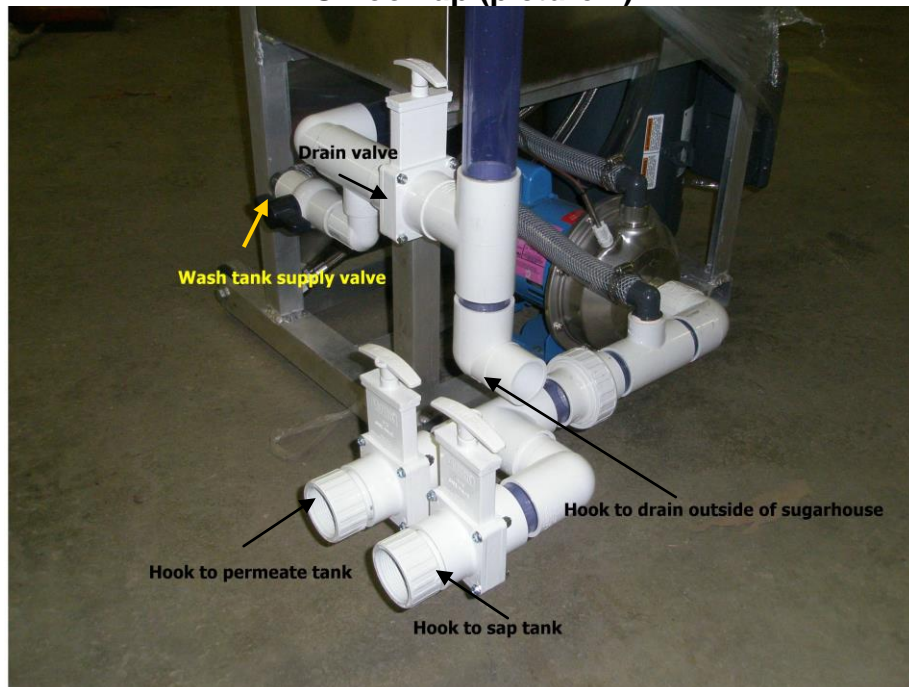
Every RO 1200 gph and smaller will come with the following items in the accessory box:

- Membrane adaptor plate
- Plug for permeate tube on membrane
- Pre-filter housing
- PVC fittings to make up inlet manifold (not included on larger than 1200 gph because the wash tank and feed pump are removed and need to be installed to fit the room).



picture 1

### RO hook up (picture 2)







picture 3



Permeate out

Concentrate out

Maple sap in

Hose hook up for a 600 GPH RO  
Picture 4







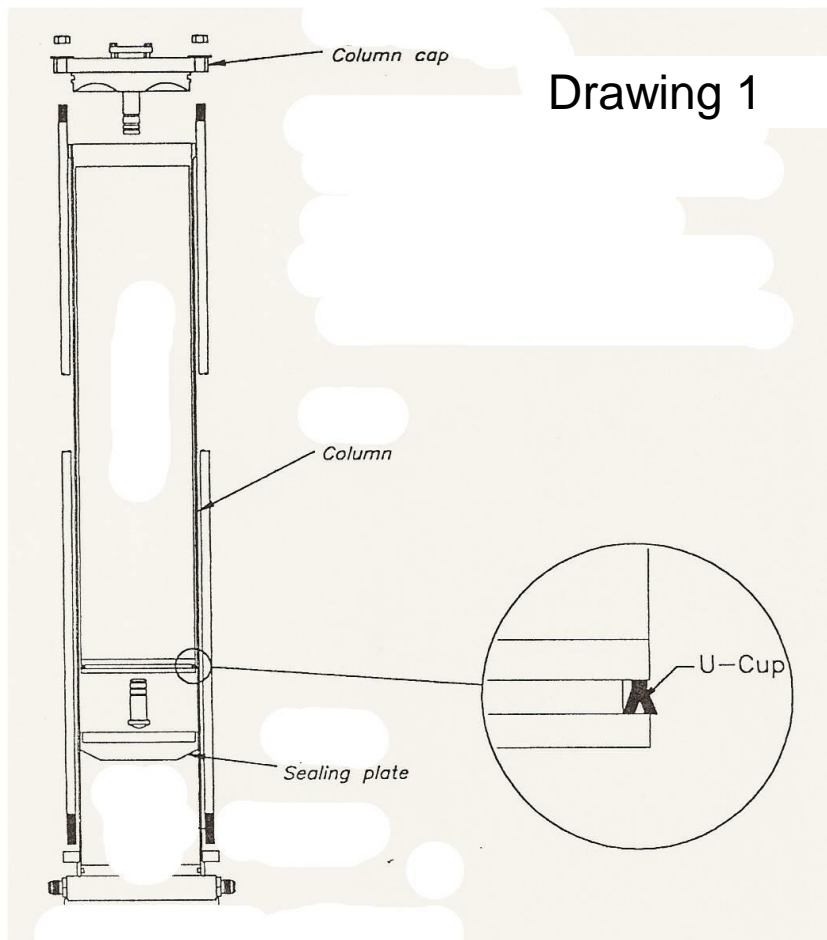
Top of RO post with optional individual flow meter

### **Ambient conditions**

- a) Before beginning the start-up procedure, it is very important to warm up the room temperature for at least 24 hours. The RO must always be protected against freezing conditions.

### **Installing the membrane in the pressure column**

- a) Important: a new membrane has to be soaked in water for at least 24 hours to get maximum performance. Just put the membrane in a pail of water (18" high water level will do)
- b) During the installation, always verify the quality of the O-rings. A damaged or misplaced o-ring could cause a lost of sugar in the permeate.
- c) For each installation, the O-rings (U cup) must be coated with a lubricant recommended by CDL.
- d) The U-cup must be installed as shown on Picture A. You only have a U cup on the bottom end of the post and once installed, the U will be upside down (extremely important, see drawing 1).
- e) Put the plug in the column as shown on Picture B (same end as U cup)
- f) Put the SS plate on top of the membrane (Picture C)
- g) Insert the membrane in the post, SS plate first. To facilitate the insertion of the membrane into the column, we recommend that you lay the column on the side as shown on (Picture D)



### Cover installation

- a) Before installing the cover, the 4 bolts  $\frac{1}{4}$ " (allen head) in the middle of the cover must be loosen (Picture G)
- b) Insert the cover into the 4 rods  $\frac{5}{8}$ ". The permeate exit plug must be inserted in the middle of the membrane (Picture E).
- c) Tap in the cover with a rubber hammer (picture F)
- d) Tighten firmly the 4 nuts  $\frac{5}{8}$ " using the "cross method" Picture G).
- e) Tighten the 4 bolts  $\frac{1}{4}$ " to make sure that the permeate exit plug is down on the membrane. Use the "cross method" when tightening the bolts. **IMPORTANT: don't overtighten, only turn the screw half a turn once it touches the plug (snug only, overtightning will damage the membrane)**



Larger nuts to tighten cover

Four 1/4" bolts allen heads



## Electricity

- The machine must be connected by a licensed electrician. Also, the wires must be sized properly by the electrician.
- Make sure the breaker in the power supply panel is "ON".
- Make sure that the connections are tightened properly to prevent warming up of the connections.

## POWER CONSUMPTION TABLE

Part #	Model description	turbine #1 (HP)	turbine #2 (HP)	turbine #3 (HP)	memb.	Feed pump (HP)	Recirc Motors HP	Total Amps
81125	RO la Fendeuse 125GPH	3	x	x	1 x 4"	1	1/3	30
82250	RO la Fendeuse 250GPH	3	x	x	2 x 4"	1	1/3 (2x)	35
816005	RO la Fendeuse 600GPH	5	x	x	1 x 8"	1	1	41
826005	RO la Fendeuse 600GPH	5	x	x	1 x 8"	1	1	41
8160075	RO la Fendeuse 600GPH	7.5	x	x	1 x 8"	1	1	60
8212005	RO la Fendeuse 900GPH	5	x	x	2 x 8"	2	1 (2x)	50
82120075	RO la Fendeuse 1200GPH	7.5	x	x	2 x 8"	2	1 (2x)	70
83120075	RO la Fendeuse 1200GPH	7.5	x	x	2 x 8"	2	1 (2x)	70
82120025	RO la Fendeuse 1200GPH	5	5	x	2 x 8"	2	1 (2x)	71
83180075	RO la Fendeuse 1600GPH	7.5	x	x	3 x 8"	2	1 (3x)	70
83180025	RO la Fendeuse 1800GPH	5	5	x	3 x 8"	3	1 (3x)	80
831800755	RO la Fendeuse 1800GPH	5	7.5	x	3 x 8"	3	1 (3x)	105
841800275	RO la Fendeuse 1800GPH	7.5	7.5	x	3 x 8"	3	1 (3x)	115
842400755	RO la Fendeuse 2200GPH	7.5	5	x	4 x 8"	3	1 (4x)	115
842400275	RO la Fendeuse 2400GPH	7.5	7.5	x	4 x 8"	3	1 (4x)	124
853000275	RO la Fendeuse 2800GPH	7.5	7.5	x	5 x 8"	5	1 (5x)	133
863600275	RO la Fendeuse 3200GPH	7.5	7.5	x	6 x 8"	5	1 (6x)	142
804800375	RO la Fendeuse 4000GPH	7.5	7.5	7.5	8 x 8"	5	1 (8x)	210
80600375	RO la Fendeuse 4800GPH	7.5	7.5	7.5	10 x 8"	5	1 (10x)	240

Feed pump	230 volts	Turbine	230 volts	GPM at 350 psi	GPM at 500 psi	Recirc. Pump	230 volts
1 HP	6.4 amps	5 HP	26 amps	18	9	1/3 HP	5 amps
1.5 HP	10 amps	7.5 HP	36 amps	27	15	1 HP	9 amps
2HP	10.5amps						
3 HP	15 amps						
5 HP	25 amps						





## Pre-filter

- a) At the beginning of each season, the pre-filter(s) must be changed for a new one(s) and always maintain their good condition during the season.
- b) To increase the life of the pre-filter, we recommend to put a cotton envelope around the pre-filter. The cotton envelope must be held with two elastics, one at the top and one at the bottom. Change the envelope and/or the prefilters whenever the supply pressure cannot go over 20 PSI. Be very careful when changing prefilters. Make sure not to spill sap in the turbine motors. To protect the prefilter housing, we recommend to use wrench especially made for it.

## Drain valve

- a) Make sure that the small drain valve on the plastic T (see picture 2) on the supply line is completely closed.

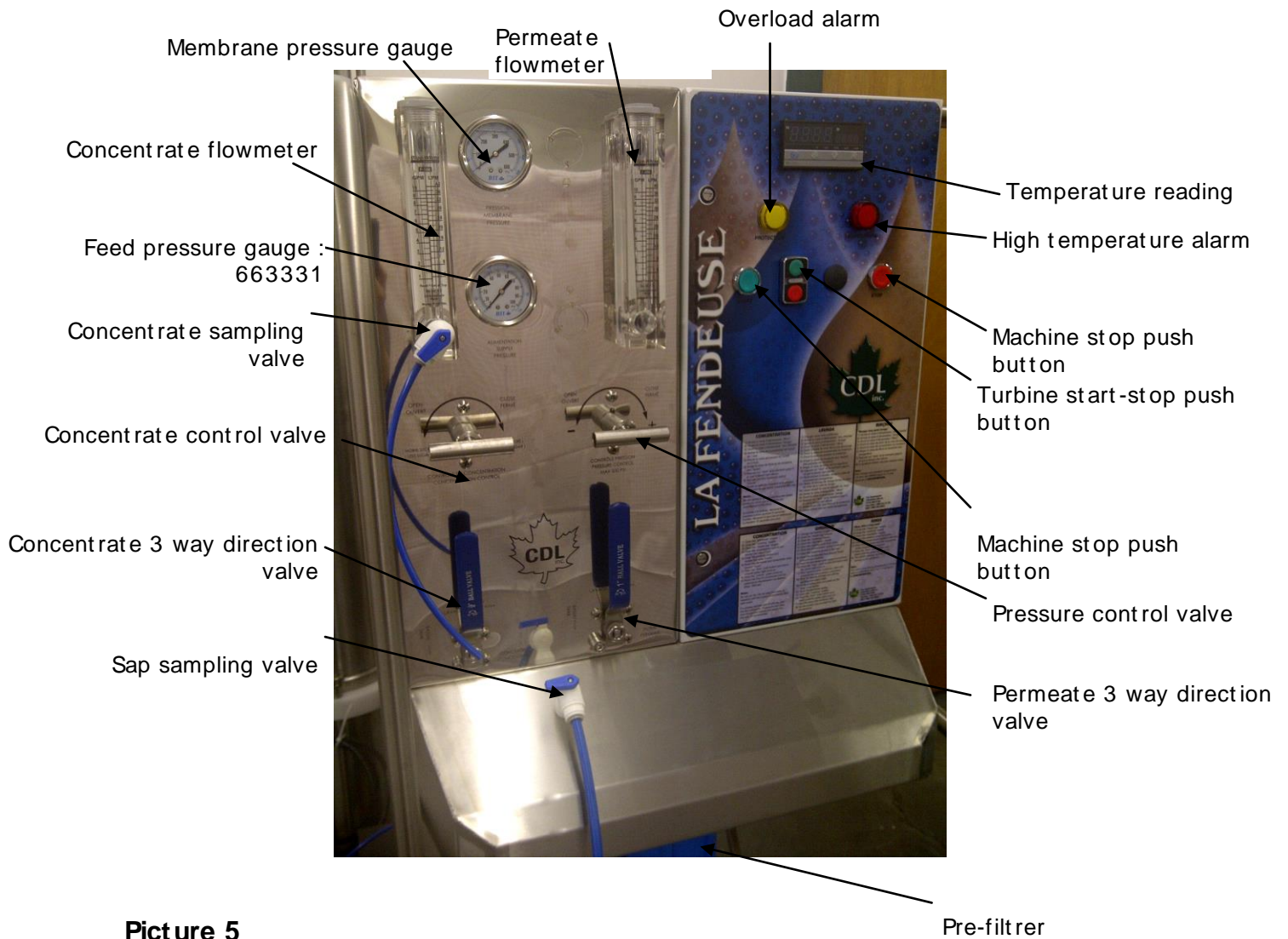
# OPERATION

For the first start of the season, hook up everything except, **don't plug in the power** to your columns (membrane post). Set your valves for a long rinse cycle. Push on the start button until the button's light comes on (it will take at least 20 seconds). **Important : because there is no water in the column(s) at the beginning of the season, it is important to open the air intake valve at the top of the column(s). It's a 1/4" ball valve. Secondly, open the water supply valve for at least 3-5 minutes to let water enter the system, then close again the air intake valve when the column is full of water. Repeat the operation if you have more than one post. This operations is important to protect the recirculation motor at the bottom of the post.**

When the system is full of water, for the first time start of the season, you need to concentrate sap to get about 300 gallons of permeate. Throw away the concentrate you'll get from this operation. As soon as you get enough permeate, proceed with a complete wash cycle to clean properly the whole system and the membranes. Once the wash is finished, you can start concentrating.

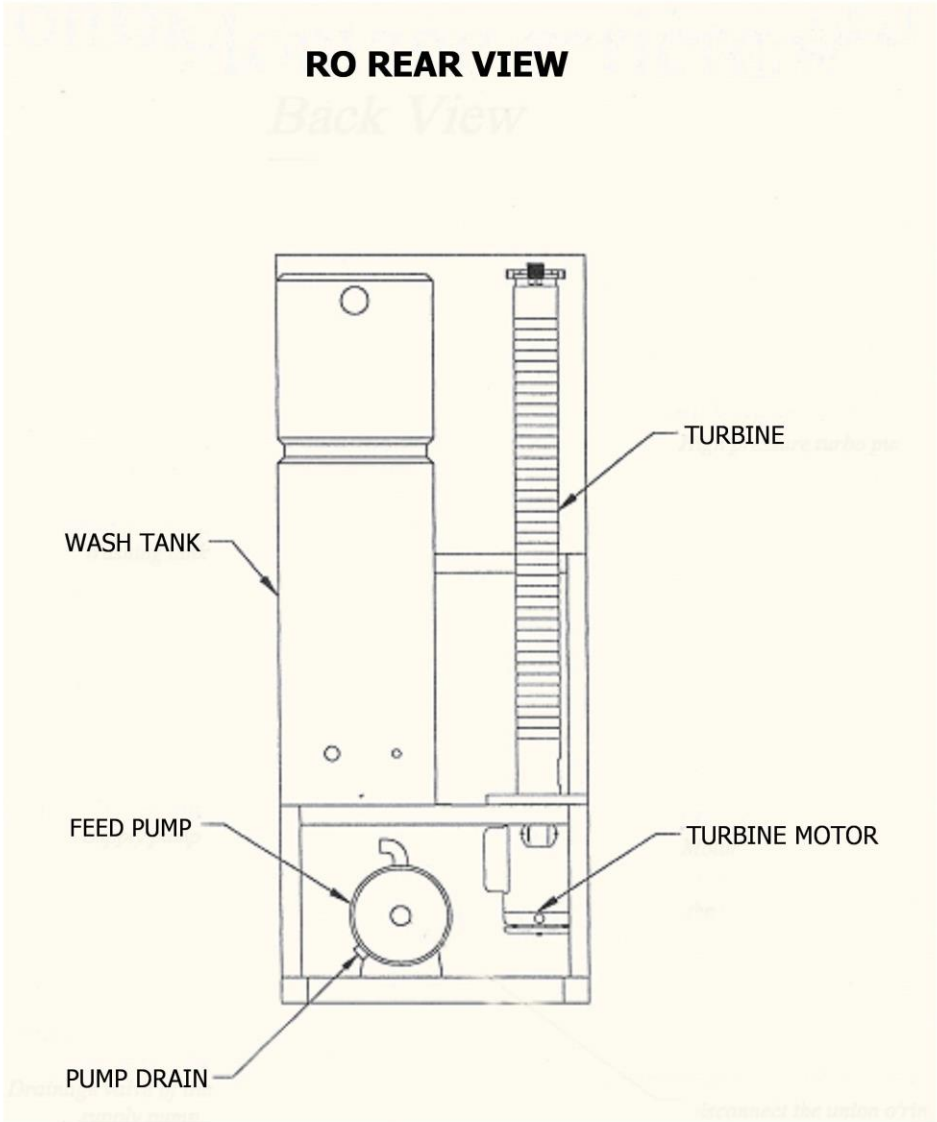
**NEVER CONCENTRATE REGULAR OR TAP WATER TO MAKE PERMEATE TO WASH THE RO WITH. IT WILL DAMAGE THE HIGH PRESSURE PUMP BECAUSE THE MACHINE WILL RUN AT A PRESSURE TOO LOW AND WITH TOO MUCH VOLUME. IT WILL VOID THE WARRANTY.**





**Picture 5**





picture 6



## Concentrate (refer to pictures 2 and 5)

- 1) Close the permeate tank valve
- 2) Close the wash tank supply valve (see picture 2)
- 3) Open the “maple sap” supply (see picture 2)
- 4) Turn off the concentration control valve and reopen the valve 1 turn
- 5) Turn off the pressure control and reopen the valve 2 turns
- 6) Direct the permeate and concentrate valves toward “BASIN”
- 7) Press on the “system start” push-button and hold until the light turns on.
- 7a) Before going to step 8, it is suggested to have a flow in the concentrate flow metre
- 8) Press on the “high pressure” green button(s)
- 9) Adjust the flow of concentrate and the pressure on the membrane(s) as desired (maximum 500 PSI)

Note : At the beginning of the season, if the RO has 2 turbines, start the first turbine for 15 seconds then stop. Start the second turbine and restart the first one 15 seconds later to eliminate air bubbles that could be trapped in the piping and in the turbines.





## Wash

The membranes of a CDL RO should be washed once a day no matter how long you concentrated. This will preserve sap quality by not letting sap sour if it stays inside the post too long. If you concentrate at high brix in one pass, it's always a good idea to rinse and wash more often to help prolong the life of the membranes.

- 1) Change the pre-filter(s).  
It is also recommended to use a different pre-filter for the wash cycle. It will prevent contaminating the sap with soap that can be caught in the pre-filter..
- 2) Close the "maple sap supply valve.
- 3) Close the wash tank supply valve.
- 4) Open the permeate supply valve.
- 5) Open the wash tank drain valve.
- 6) Fully open the pressure control valve.
- 7) Fully open the concentration control valve.
- 8) Turn the concentrate direction valve to "bassin".
- 9) Turn the permeate direction valve to "wash/drain"
- 10) Push the "system start" button and hold it until the green light turns on.
- 11) Once the concentrate becomes unsugared (after approximately 5 minutes), turn the concentrate direction valve to "wash/drain".
- 12) Rinse with permeate a total of 200 gallons per membrane or with 2/3 of the permeate tank content.
- 13) Close the wash tank drain valve.
- 12) Fill the wash tank and push on the "system stop" button.
- 13) Pour CDL recommended soap in the wash tank (follow the instructions on the soap container for quantity). **Never go over the recommended PH for your type of membrane.**
- 14) Close the permeate supply valve.
- 15) Open the wash tank supply valve.
- 16) Push on the "system start" button and hold it until the green light turns on.
- 17) The machine is washing. When the wash water reaches 115<sup>0</sup>F, the RO will shut off by itself (after about 2 hours). The machine can stay overnight like that.
- 18) Bring PH back between 6.5 and 7.5 in the wash tank before dumping the content of the tank. To do so, on a regular wash, add an acidic solution (like citric acid) in the tank until you reach the right PH. If you do an acid wash, you'll need to add an alkaline product (like baking soda) in the wash tank until you reach the right PH. This step is necessary to meet the environmental regulations of many states.



## Long rinse after a wash

- 1) Close the “maple sap” supply valve.
- 2) Close the wash supply valve.
- 3) Open the permeate supply valve.
- 4) Open the wash tank drain valve.
- 5) Open the concentration control valve at the maximum.
- 6) Open the pressure control valve at the maximum.
- 7) Turn the permeate and concentrate direction valves to “wash/drain”.
- 8) Push on the “system start” button and hold it until the green light turns on.
- 9) The system will stop by itself when running out of permeate. Ideally, rinse with at least 100, ideally 200 gallons of permeate per membrane.

## Short rinse during concentration

Note : A short rinse is necessary when the machine is stopping by itself when running out of maple sap. Never let the membrane rest in the concentrate because the performance will be reduced significantly. A short rinse should last approximately 15 minutes.

- 1) Change the cotton envelope(s) on the pre-filter(s)**
- 2) Close the “maple sap” supply
- 3) Close the “washing” supply.
- 4) Open the “permeate” supply
- 5) Open the washing tank drain valve
- 6) Turn on the concentration control at its maximum
- 7) Direct the concentrate flow toward “basin” (Concentrate recovery)
- 8) Direct the permeate valve toward “wash/drain”
- 9) Push on “system start” and hold it until the light turns on
- 10) Once the concentrate becomes unsugared after approximately 5 minutes, direct the valve toward “wash/drain”

**IMPORTANT :** Always let the membrane rest in the column full of permeate. Traces of sugar in the permeate would cause fermentation after few days. The fermentation would be worst if the room temperature is above 6<sup>0</sup> F (45<sup>0</sup> F).



## Valve position helper

Valve	Concentrate	Wash	Long rinse	Short rinse
Permeate in	Close	Open and close when wash tank is full	Open	Open
Wash tank supply	Close	Close and open when wash tank is full	Close and open when wash tank is full	Close
Sap tank in	Open	Close	Close	Close
Concentration valve	Open 1 turn and adjust later	Fully open	Fully open	Fully open
Pressure control valve	Open 2 turns and adjust later	Fully open	Fully open	Fully open
Permeate control valve	Handle down (to tank)	Handle horizontal	Handle horizontal	Handle horizontal
Concentrate control valve	Handle down (to tank)	Handle down then after 5 minutes turn horizontal	Handle down then after 5 minutes turn horizontal	Handle down then after 5 minutes turn horizontal
Wash bypass valve (optional)	Close	Open	Open	Open
Air intake valve	All close	Close	Close	Close
Drain valve	Close	Open for 15 minutes then close	Open for 15 minutes then close	Open



# END OF SEASON

## Storing of the machine

- 1) Disconnect the union at the entrance of the supply pump (picture 9) and drain the pump by removing the SS plug (Picture 10)
- 2) Open the ¼" valve at the back of the machine for drainage (Figure 11)
- 3) Open completely the concentration and pressure control (Figure 9)
- 4) Put both 3-way valves at 45° angle (Figure 9) to drain the whole system.
- 5) A 2" x 4" piece of wood should be placed under the RO to give an angle (Figure 9). The inclination should be changed few times to make sure that the water has been totally drained the system.
- 6) Take out the drainage valve from the feed pump (Figure 8) and screw the valve back in once empty.
- 7) Do not let any opening for rodents to enter into the system. Close all possible issues and the basin supply lines. A piece of wood should be installed in each basin as an exit for rodents.

Important : Freezing water in the machine could cause damage, ALWAYS keep your RO in a heated room because it's very difficult to make sure the water is all drained out. If the turbine or the membrane post freezes with water in it, it will void the warranty. NEVER put membrane soap (sodium metabisulfite) in the turbine when you store it for the off season, it will break the turbine.

## Storing the membrane

Note : To ease the insertion or removal of the membrane in the column, we recommend to put the column on the side as shown on picture D.

- 1) Never expose the membrane to freezing condition
- 2) Store the membrane in a cool area
- 3) We recommend to submerge the membrane into permeate mixed with sodium metabisulfite in the storing container.
- 4) Never leave the end plug in the membrane, when storing the membrane. The storage solution will eat through the plug.





## Storing the column

- 1) It is important to disconnect the pressure hose on the inlet side of the post

Note : CDL offers annually a membrane washing service to have a good follow-up of the membrane year after year. The performance and the minerals output in the permeate will be verified. A report will be supplied for your files.

**IMPORTANT: you can store the membrane inside the RO post in the off season, if you do, keep the post full of soft water and change it once a month. NEVER put membrane preservative in your RO post. The chemical will eat through the o'rings in the machine and cause breakdown the following season.**



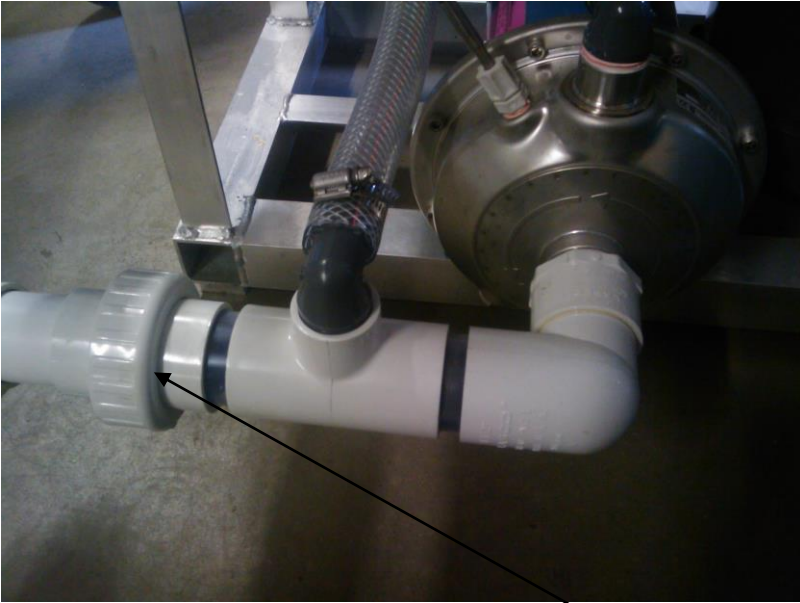
Picture 8

Turbine drain valve



Picture 9

Feed pump drain plug



Picture 10



Quick union at sap entry

Control valves for pressure and

3 way valves

Picture 11



# TROUBLESHOOTING

The following table outlines some of the most frequently encountered minor problems when a reverse osmosis machine and how to solve them. Please refer to this table and check the indicated problem before calling CDL for service. If the problem cannot be solved by referring to the troubleshooting table, please record all the problem characteristics and call CDL for prompt professional service. Listed below are some examples of problem characteristics which may help CDL deliver a faster service.

## Problem characteristics

1. frequency of occurrence
2. when during the process and in which cycle does it happen
3. time of day
4. operating pressure
5. sap temperature
6. pre-filter pressure
7. permeate flow
8. concentrate flow

Most problems are very simple and are solved over the phone however the above info will be needed in order for technician to make an accurate assessment over the phone (you are his eyes and ears be calm and thorough).

## Problems and solutions (Before calling a technician)

PROBLEM	CAUSES	POSSIBLE SOLUTIONS
System does not start.	<ul style="list-style-type: none"> <li>• main power is not turned on.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Check circuit breaker.</li> </ul>
System does not start and red alarm light is on	<ul style="list-style-type: none"> <li>• high temperature alarm is activated (when you try to start right after the wash cycle).</li> <li>• Bad thermocouple or controller</li> </ul>	<ul style="list-style-type: none"> <li>▪ Wait for temperature to drop 2 degrees, the red alarm light will shut off and press start to start the machine.</li> <li>▪ Replace thermocouple or controller</li> </ul>
System does not start and amber alarm light is on	<ul style="list-style-type: none"> <li>• motor protection devices tripped (often due to power fluctuation in the sugarhouse).</li> <li>• Voltage too low, below 220 volt.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Reset motor overload located in control panel and press start again.</li> <li>▪ Call the power company.</li> </ul>
The machine stops by high pressure.	<ul style="list-style-type: none"> <li>• The machine stops because the pressure in the system goes over 500 PSI.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The concentration control valve is plugged or closed too much.</li> <li>▪ The recirculation motor is not connected or broken.</li> <li>▪ The membrane is plugged.</li> </ul>
Low concentrate flow	<ul style="list-style-type: none"> <li>• Plugged membrane.</li> <li>• U-cup in wrong direction.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Do an acid wash or replace membrane.</li> <li>▪ Take membrane out and install U-cup properly.</li> </ul>
Feed pump starts and feed pump pressure is lower than normal and the feed pump won't stay on	<ul style="list-style-type: none"> <li>• Cloaged pre-filter</li> <li>• Supply tank problem</li> </ul>	<ul style="list-style-type: none"> <li>▪ Replace pre-filter</li> <li>▪ Check if tank is empty or outlet blocked</li> </ul>



Feed pump starts but shuts off as soon as start button is released (low feed pressure shut-off)	<ul style="list-style-type: none"> <li>• Pre-filter cartridge is dirty.</li> <li>• Feed inlet valve is not open.</li> <li>• Air is entering the system.</li> <li>• Feed pump doesn't prime itself.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Replace pre-filter cartridge.</li> <li>▪ Make sure raw sap valve is open when you want to concentrate, permeate valve is open for the rinse cycle and wash tank valve is open for wash cycle</li> <li>▪ Check inlet supply plumbing for leaks or obstruction (ice, leaves, mouse...).</li> <li>▪ Open wash tank supply for a few seconds allowing liquid to enter wash tank and prime supply plumbing. Close the valve as soon as sap starts filling the wash tank. All the air will be evacuated from the supply plumbing. Start the pump.</li> </ul>
Feed pump starts and you have normal feed pump pressure (35 to 45 psi for 1 to 3 posts machine or 75 to 85 psi for 4 or more posts) but won't stay on	<ul style="list-style-type: none"> <li>• Low pressure switch problem</li> </ul>	<ul style="list-style-type: none"> <li>▪ Remove the low pressure switch and gently rinse it with hot water, sugar crystals probably is the problem.</li> </ul>
The wash cycle doesn't stop	<ul style="list-style-type: none"> <li>• Water temperature is what stopping the washing cycle. If the temperature of the water and the room is cold, the RO may have a hard time to bring the water temperature high enough.</li> <li>• Bad temperature sensor or RO controller</li> </ul>	<ul style="list-style-type: none"> <li>▪ Lower the water level in the wash tank by 1/3 before starting.</li> <li>▪ Raise the room temperature.</li> <li>▪ Replace the sensor or the controller</li> </ul>
RO membrane is passing sugar	<ul style="list-style-type: none"> <li>• Bad membrane.</li> <li>• Bad o'ring on membrane pin.</li> <li>• Damage SS disk on top of membrane</li> </ul>	<ul style="list-style-type: none"> <li>▪ Replace membrane.</li> <li>▪ Replace o'ring on membrane pin</li> <li>▪ Replace SS disk</li> </ul>
Breaker trips for no apparent reason	<ul style="list-style-type: none"> <li>• Machine works for a while after reset and breaker trips again</li> </ul>	<ul style="list-style-type: none"> <li>▪ Weak breaker, replace it.</li> </ul>
Noisy turbine, turbine breaker tripping	<ul style="list-style-type: none"> <li>• Turbine bearing is dying</li> </ul>	<ul style="list-style-type: none"> <li>▪ Replace turbine motor seal and bearing (call CDL)</li> </ul>
Turbine stops, rest of machine keeps on going, no breaker trips.	<ul style="list-style-type: none"> <li>• High temperature shut-off on turbine</li> </ul>	<ul style="list-style-type: none"> <li>▪ Reset turbine motor (reset is located under the turbine motor electric box)</li> </ul>





# GENERAL INFORMATION

## Membrane information

Membrane 8" NF70-400 nanofiltration  
Membrane 4" NF70-40040 nanofiltration

Product	Water flow rate (GPJ)	Magnesium sulphate rejection %
<b>NF70-40040</b>	1700	95
<b>NF70-400</b>	12,500	95

- 1) Permeate flow and salt rejection based on the following test conditions : 2000 ppm MgSO<sub>4</sub>, 70 PSI (5.5 Mpa), 77 °F (25 °C).
- 2) Flow rates between filter can vary of 20%

## Operating limits

Membrane type :	Thin-film composite
Maximal operating pressure :	250 PSI (1.7 Mpa)
Maximum feed flow rate :	70 gpm (NF70-400) 16 gpm (NF70-40040)
pH range, continuous operation	3-9
pH, range, short term cleaning(30 minutes)	1-11
Maximal operating temperature	95°F (35°C)
Free chlorine tolerance	<0.1 ppm

## How to calculate the membrane performance

### Step 1

After the first 20 hours of concentration with your new RO, you can do an accurate performance calculation of your membrane. The result will be your reference for the 100% flow of your membrane. After doing a complete wash cycle, begin a rinse cycle. Let the rinse cycle run normally until you have used about half the permeate you had after the wash. At this point, start the high pressure pump and adjust the concentrate flow meter reading at 3 gpm and set the system pressure to 250 psi. Write down the permeate flow reading and the temperature reading.



Example of result :

### 100% performance readings

Date	Time	T. °C Permeate	Permeate flow
March/07/2000	11 :50	8 °C	5,2 GPM

### Temperature compensation factor

Once the readings are taken, the permeate flow obtained must be divided by the temperature after a correction factor is applied because the permeate output varies with the water temperature. The higher the temperature, the higher the output will be and vice versa. By using a correction factor, we are correcting the flow as if the temperature would always be 13°C.

**Table 1 Correction factors**

Temperature °C / °F	Corr factor.	Temperature °C / °F	Corr factor.
0 / 32	0.672	13 / 55	1.000
1 / 34	0.695	14 / 57	1.028
2 / 36	0.719	15 / 59	1.055
3 / 37	0.742	16 / 61	1.084
4 / 39	0.766	17 / 63	1.112
5 / 41	0.790	18 / 64	1.142
6 / 43	0.816	19 / 66	1.170
7 / 45	0.842	20 / 68	1.200
8 / 46	0.866	21 / 70	1.229
9 / 48	0.893	22 / 72	1.259
10 / 50	0.919	23 / 73	1.289
11 / 52	0.946	24 / 75	1.319
12 / 54	0.973	25 / 77	1.350

To obtain the 100% value of the membrane at 13°C or 55 °F

$$5,2 \text{ GPM} \div 0.866 \text{ (Correction factor } 8 \text{ °C)} = 6.00 \text{ GPM}$$

Or, if you want to see if you machine is performing the way it should, take 600 gallons per hour of flow, multiply by the number of columns and by the temperature correction factor. That will give you the flow you should be getting at 8% concentration rate. If you concentrate higher, the flow will come down.



### Flow vs concentration rate

Brix	8	10	12	16
Correction factor	1	0.85	0.71	

So, if a membrane concentrates 55<sup>0</sup> F sap from 2 to 8 brix, it will flow 600 GPH. If you go from 2 to 12 brix, it will flow:

$$600 \times 0.71 = 426 \text{ GPH of sap}$$

If you are seeing a performance drop during your concentration cycle, it is possible that it is affected by a variable such as sap quality. The only way to know for sure is to perform this test and see what your temperature compensated permeate flow.

If we want to check the performance at any given time, the above exercise must be repeated and compared with the 100% result.

For example, if we measure 5.5 GPM with our old membrane (corrected at 13<sup>0</sup>C), the membrane performance is :

$$((6.00 - 5.5) \div 6.00) \times 100 = 8.3\% \text{ of loss}$$

or

$$5.5 \div 6.0 = 91.7\% \text{ efficiency}$$

**Table 3 Example of table to fill.**

Membrane #	Results	T <sup>0</sup> C	Corrected results at 13 <sup>0</sup> C
28736465			
2010	5.2	8	6.00 (100%)
2011	6.0	10	5.50 (91.7%)
2012			
2013			
2014			
2015			
2016			
2017			
2018			
2019			
2020			

CDL offers a factory membrane cleaning service. This is a very effective process and will help you maintain performance with minimum loss of flow over the life of your membrane. Most of the time, this service will improve the performance by at least 10%. The price of the wash will more than pay for itself in fuel savings the following season.



# WARRANTY

Your ro is covered by a two year limited warranty. For two years from your original date of purchase, Les Équipements d'Érablière CDL (CDL), will replace or replace any parts of this RO that prove to be defective in materials or workmanship when such equipment is installed, used and maintained in accordance with the provided instructions.

## Exclusions

This warranty does not cover the following:

1. Products with original serial number that have been removed, altered or cannot be readily determined.
2. Product that has been transferred from its original owner to another party or removed outside the USA or Canada.
3. If the machine is kept in a room that is below freezing temperature.
4. If anything else than maple sap is processed in the machine.
5. If the machine ran dry.
6. If the machine concentrated ordinary water.
7. If normal maintenance is not performed as specified in the CDL owner's manual.
8. Production loss due to any kind of failure of the RO.
9. Revenu losses due to syrup quality.
10. Service calls which do not involve malfunction or defect in materials or workmanship, or used other than in accordance with the provided instructions.
11. Service calls to correct the installation of your RO or to instruct you how to use it.
12. Expenses for making the RO accessible for servicing, such as the removal of wall, shelves etc.
13. Any service beyond the first two years.
14. Damages caused by: services performed by unauthorized service companies; use of parts other than genuine CDL parts or parts obtained from persons other than authorized service companies; or external causes such as abuse, misuse, inadequate power supply, accidents, fires, or acts of God.
15. It doesn't cover the consumable products or accessories.
16. If the product was damaged by abusive use, negligence, accident caused by the customer, modification made by the customer, variation in the electric power.
17. Damage cause by the use of products that are not meant for use with our equipment or a bad use of a product as acids, cleaning products.



**Disclaimer of implied warranties; limitation of remedies**

Customer's sole and exclusive remedy under this limited warranty shall be repair or replacement as provided herein. Claims based on implied warranties, including warranties of merchantability or fitness for a particular purpose, are limited to two years or the shortest period allowed by law, but not less than two years. CDL shall not be liable for consequential or incidental damages such as property damages and incidental expenses or loss or revenues caused by any event covered by this warranty. Some states and provinces do not allow the exclusion or limitation of incidental or consequential damages, or limitations on the duration of implied warranties, so these limitations or exclusions may not apply to you. This written warranty gives you specific legal rights. You may also have other rights that vary from states to states.

**If you need service**

Keep your receipt, delivery slip or some other appropriate payment record to establish the warranty period should service be required. If service is performed, it is in your best interest to obtain and keep all receipts. Service under this warranty must be obtained by contacting CDL at the addresses or phone numbers below. Obligations for service and parts under this warranty will be performed by CDL in Canada. Products features or specifications as described or illustrated are subject to change without notice.

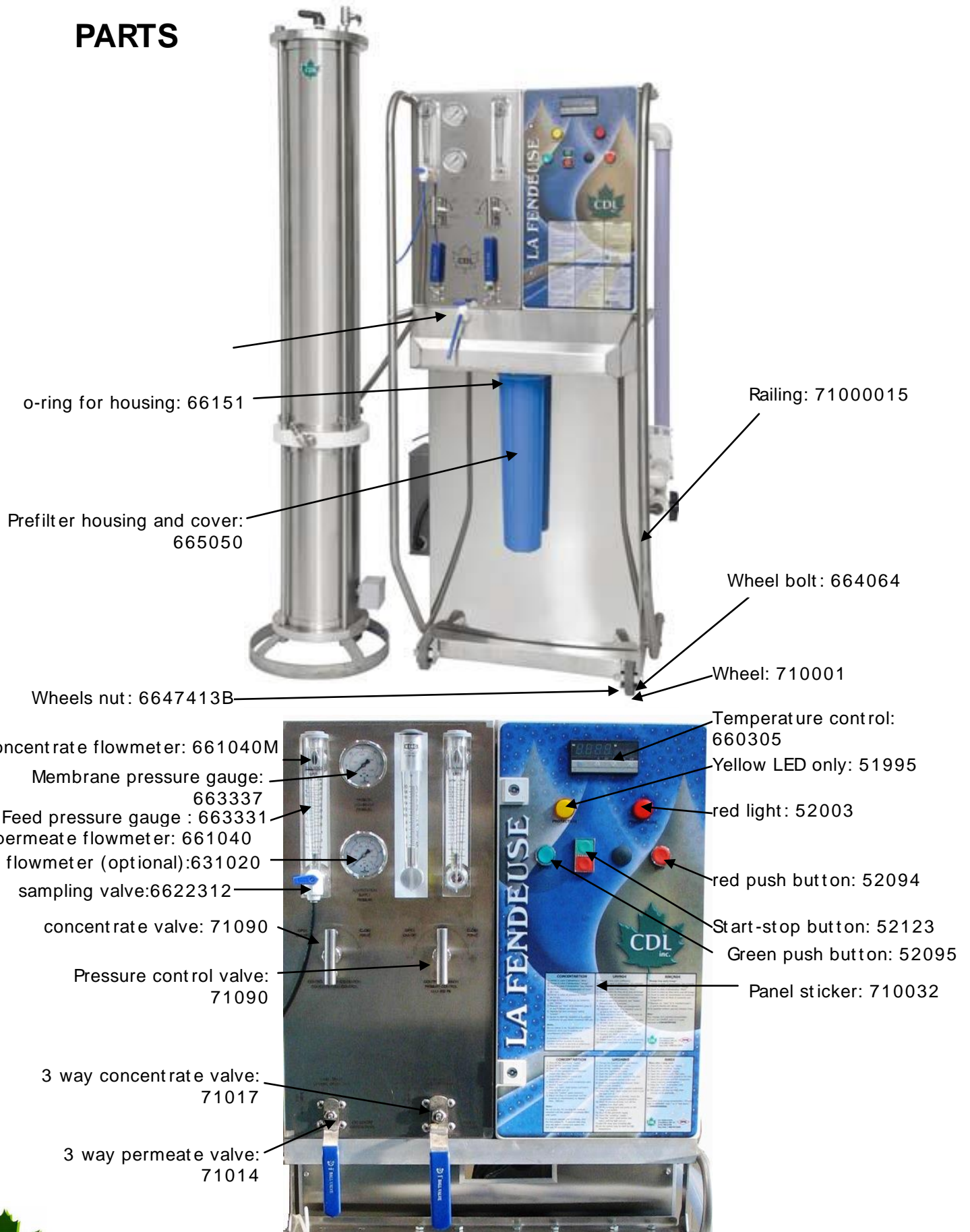
Les Équipements d'Érablière CDL  
257 Route 279  
St-Lazare, Québec, Canada  
G0R 3J0  
(418) 883-5158

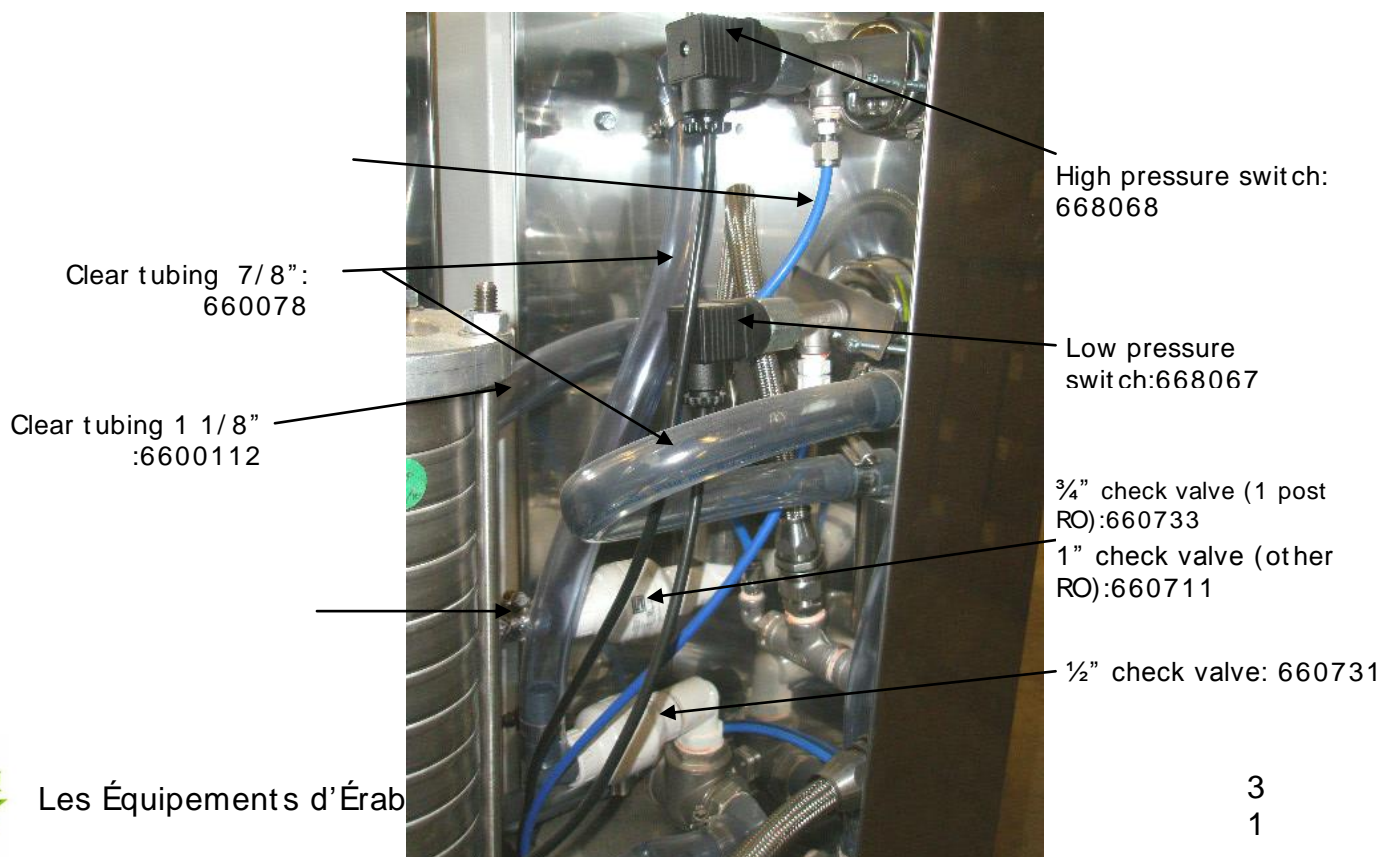
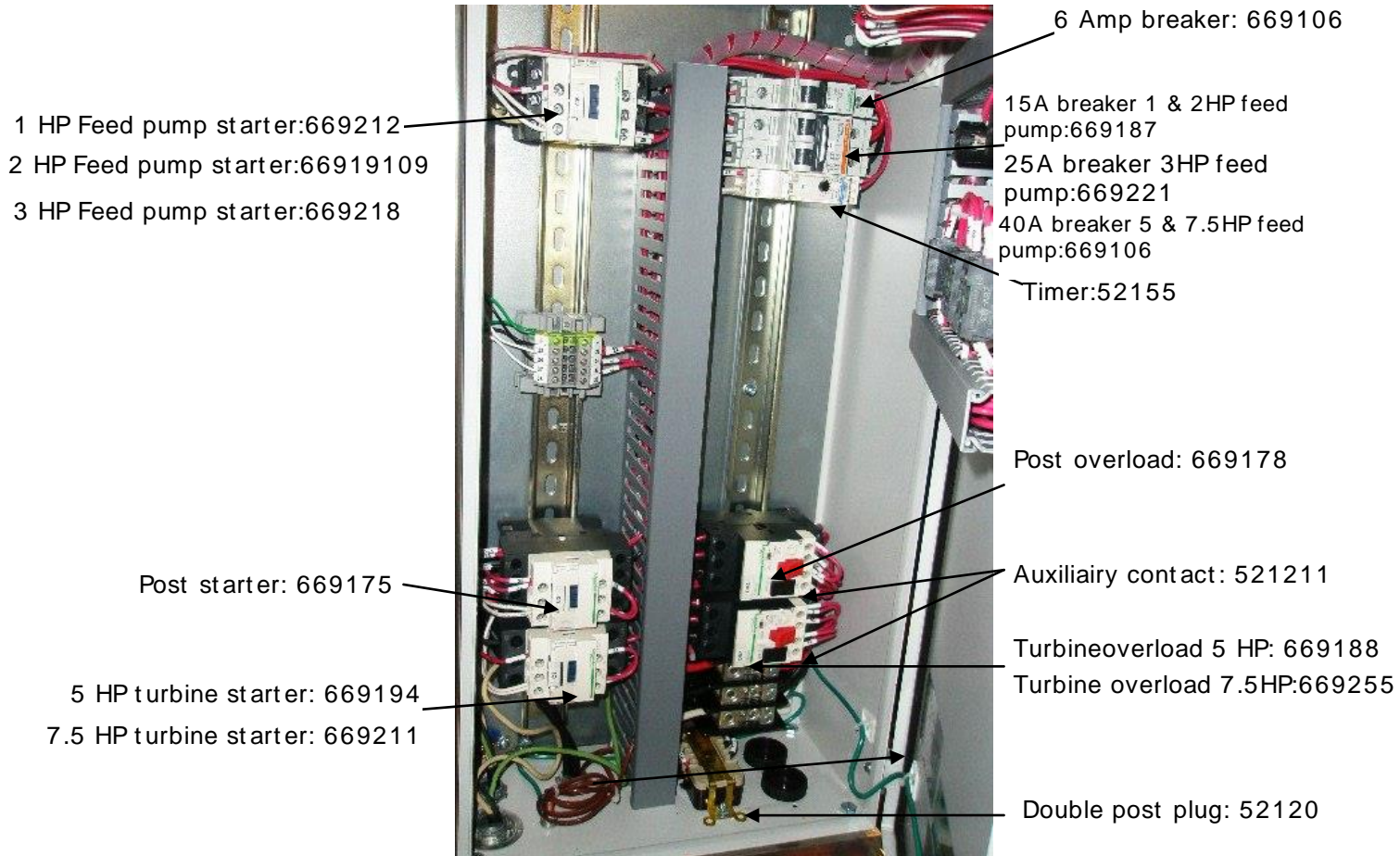
CDL USA  
3 Lemnah Drive  
St. Albans, VT, 05478  
(802) 527-0000



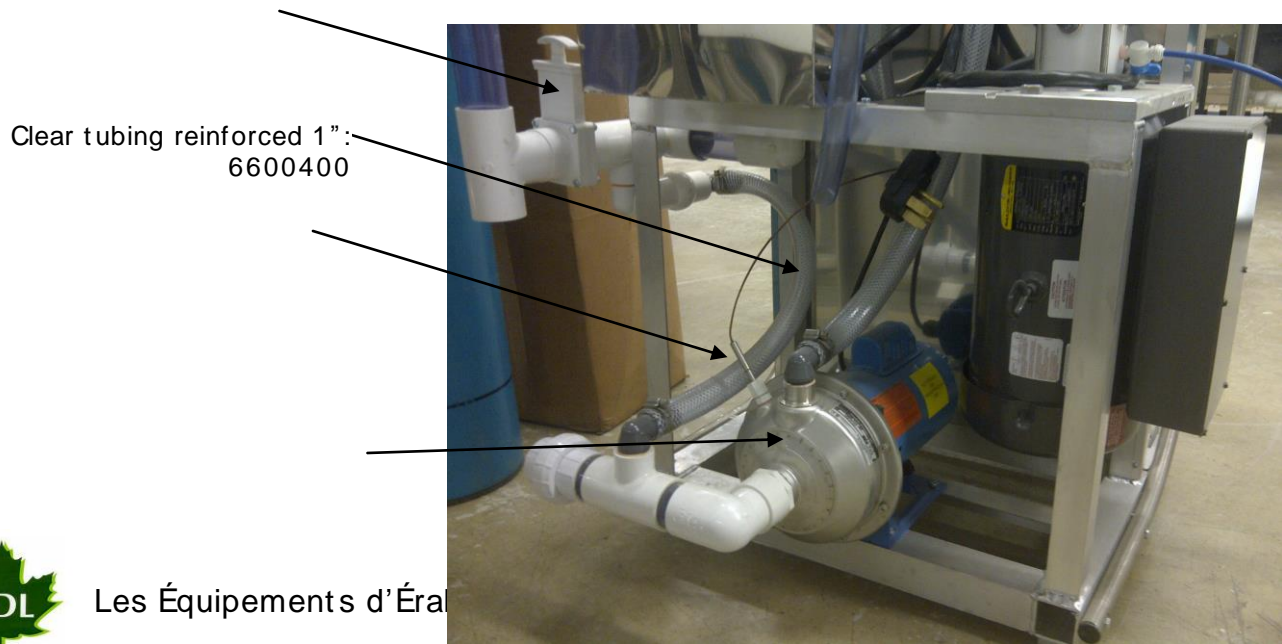
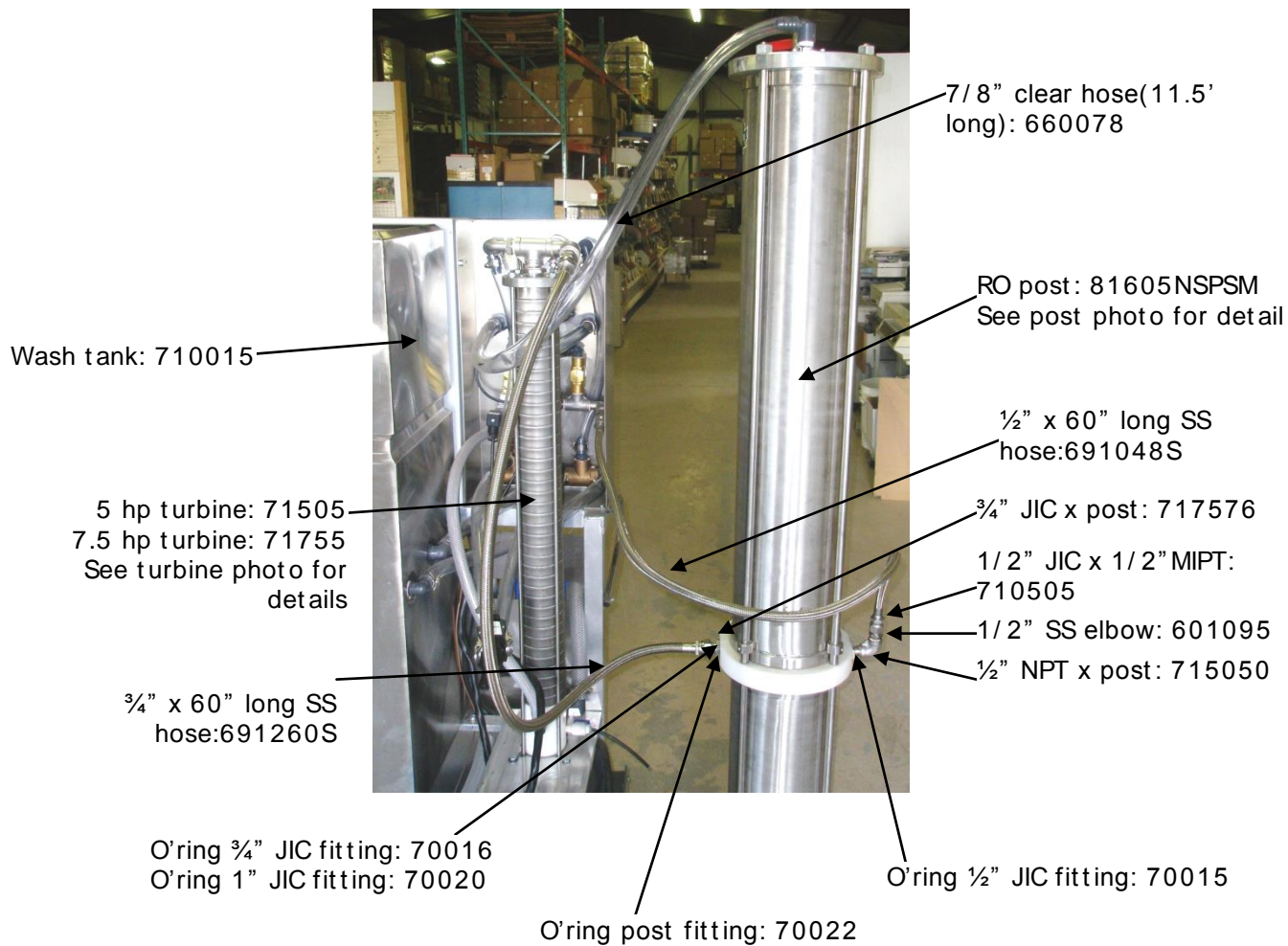


# PARTS











nuts 5/8":667127

valve ss 1/4": 6617053

ajustment ring: 716003

Top SS plate:

Plastic plate: 716608

O'rings: 70118

Permeate plug:  
716604

O'rings: 70134

PVC box:  
52149P

SS sleeve: 7160184A

Washer: 716044

starter: 66593

spacer: 716019

Nut:

Plastic disk:

O'ring:

top SS sleeve:OS800MMN

bottom SS sleeve:  
OS800MPN

Deflector SS:  
770027

SS rods 5/8":  
716258N

Base plate: 716599

recirculation motor:  
6400083

Base plate: 716005

SS base: 710010



Les Équipements d'Érablière CDL inc.