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INTRODUCTION
A Leader Evaporator Springtech EXTREME Reverse Osmosis system is designed to significantly improve the producer’s productivity by generating high sugar percentage sap. Through use of high pressure, the system removes water from the sap resulting in a more concentrated sugar solution entering the evaporator. This in turn shortens the boil time required resulting in fuel and time savings.

Some of the features of the Springtech MINI EXTREME 2 are:
- Easy accessibility to pumps and membranes
- Stainless steel frame, membrane housings, pumps and pump housings
- Fast wash cycle
- With reasonable sap – the ability to generate high brix concentrate with a single pass
- Flow meters for the permeate of the membrane and one for the system concentrate

THEORY OF OPERATION
In reverse osmosis, through the use of special semi-permeable membranes and high pressure, water is forced, in a pure form, through the membrane while the concentrated solution remains outside the membrane and is concentrated. For the sugar maker this means water (permeate) is removed from the sap and a sap with a higher sugar level (concentrate) is produced for the evaporation process.

Terms
- Semi-permeable Membrane – Unit consisting of multi layers of spacers and membranes
- Pre-Filter Unit – Designed to remove suspended solids from the sap incoming to the reverse osmosis system
- Feed Pump – The initial pump designed to supply the reverse osmosis unit with sap and maintain pressure in the system
- Pressure Pump – The pump designed to provide the pressure needed to force the sap through the reverse osmosis membrane
- Pressure Vessel – The containment unit for the semi-permeable membrane
- Permeate – the water removed from the maple sap during the concentrate cycle
- Concentrate – the maple sap having a higher percentage of sugar because water (permeate) has been removed
- Permeate Holding Tank – A tank designed to hold a minimum twice the hourly output of the system
- Concentrate Cycle – Process during which water is removed from maple sap resulting in Concentrate and Permeate
- De-Sugaring Cycle - Process to reclaim sugars from the membrane during which Permeate is run through the reverse osmosis unit using Concentrate cycle valve settings
- Rinse Cycle – Cleaning process of passing stored Permeate through the Reverse Osmosis system and out to drain
- Chemical Wash Cycle – Process of chemical washing the membranes by recirculating a solution through the reverse osmosis system. Dependent on requirement, chemical maybe be alkali or acid.
- Permeability Test – Test to determine the performance of the membranes against a benchmark
- Sap Concentration Loop – Process of recirculating output from the concentrate cycle to the raw sap tank, increasing the concentration of the sap in the tank
Description of Membrane

The basic units of the reverse osmosis membrane are described in the *cross section drawing.*

- Attached to the permeate tube is a membrane unit consisting of a permeate carrier between two membranes.
- There are a number of these membrane units attached around the outside of the permeate tube.
- Between each of the membrane units is a spacer through which the sap and concentrate can flow.
- The permeate tube is perforated so the permeate can be collected from the membrane unit.
- At each unit as the sap is pressurized, the permeate can flow through the membrane and be carried to the permeate tube. The concentrate cannot penetrate the membrane and is pushed out the membrane assembly.
- The membrane units are wound around the permeate tube and an outside support structure is placed around the wound assembly.

The drawing above represents the flow of liquid through a membrane in the system. The membrane is housed in a pressure vessel (not shown).
EQUIPMENT DESCRIPTION
The LEADER EVAPORATOR Springtech EXTREME Reverse Osmosis System is designed to offer maximum concentration to cost performance. Through optimizing of pumps and membranes the reverse osmosis systems deliver greater flow potential to the user. The LEADER EVAPORATOR Springtech EXTREME Reverse Osmosis system is designed and built using the same principles of superior quality applied to our evaporators.

The LEADER EVAPORATOR Springtech EXTREME Reverse Osmosis System is covered by a manufacturer’s warranty – See ATTACHMENT #3.

NOTES:
1. Pictures, sketches and drawings presented in this document are not to scale.
2. Directions (right and left) will be as facing the front of the system except where facing such parts as valves.
Rear View

Feed Pump
Provides liquid to the system and is the first stage of pressurizing the system

Feed Pump
(M1) – 1 HP

View from Front of System
**Pressure Pump**
Second stage of pressurizing the system required to process the sap through the membranes.

**Prefilter Assembly and Wash Tank**
Prefilter assembly requires one 10” cartridge filter.
Wash tank is used to mix the chemical solution for cleaning the system.

**Control Panel**
The STOP button will reset or will stop the machine when pressed.
The Temperature Meter indicates the temperature of the liquid flowing through the system.
The Feed Pump Start button will start the Feed Pump. This pump is the first to be started. Hold the button down until the air is purged from the flow meters then continue to hold while pressing the pressure pump button start button.
The Pressure Pump Start button will start the Pressure Pump. This pump is started after the system has been purged by holding the feed pump button down.
**Flow Meters**

The Concentrate Meter indicates the liquid flow from the concentrate side of the pressure vessels in gallons per minute.

The Permeate Meter indicates the permeate flow from the membranes in gallons per minute.

---

**Pressure Gauge**

Feed pump pressure is read after the prefilter.

Membrane pressure is read after the last membrane.

**WARNING:** DO NOT ALLOW THE PRESSURE ON THE MEMBRANES TO EXCEED 315 psi.

---

**Sampling Ports**

Concentrate port is used to sample the liquid concentrate to determine the sugar percentage.

The Permeate port is used to sample the permeate from the membranes to determine if they are allowing sugar to pass through.
V2 Valve
V2 controls the flow from the concentrate side of the membranes. It is opened ½ way when starting then adjusted to the desired concentration level.

Flow Control Valves
These valves control the flow of liquid through the system
V3 – Permeate flow
V4 – Concentrate flow
V6 – Feed flow
V18 – Cleaning or Concentrate flow
V19 – Drain or Wash Tank

<table>
<thead>
<tr>
<th>VALVE</th>
<th>TYPE</th>
<th>HANDLE POSITION</th>
<th>LIQUID FROM - TO</th>
<th>HANDLE POSITION</th>
<th>LIQUID FROM-TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>V3</td>
<td>3-Way</td>
<td>HANDLE POINTING UP</td>
<td>Membranes to Permeate out</td>
<td>HANDLE POINTING HORIZONTAL</td>
<td>Membranes to Valve V19</td>
</tr>
<tr>
<td>V4</td>
<td>3-Way</td>
<td>HANDLE POINTING HORIZONTAL</td>
<td>Membranes to Concentrate out</td>
<td>HANDLE POINTING UP</td>
<td>Membranes to Valve V19</td>
</tr>
<tr>
<td>V6</td>
<td>3-Way</td>
<td>HANDLE POINTING TOWARD PUMP</td>
<td>External to Feed Pump</td>
<td>HANDLE POINTING TOWARD WASH TANK PIPE</td>
<td>Wash Tank to Feed Pump</td>
</tr>
<tr>
<td>V18</td>
<td>2-Way</td>
<td>HANDLE POINTING UP</td>
<td>No Flow</td>
<td>HANDLE POINTING HORIZONTAL</td>
<td>Membranes to Valve V19</td>
</tr>
<tr>
<td>V19</td>
<td>3-Way</td>
<td>HANDLE POINTING UP</td>
<td>Membranes to Wash Tank</td>
<td>HANDLE POINTING HORIZONTAL</td>
<td>Membranes to Drain</td>
</tr>
</tbody>
</table>
The Leader Springtech EXTREME Reverse Osmosis system consists of the following parts:

### Included Equipment

<table>
<thead>
<tr>
<th>ITEM</th>
<th>LEADER ORDER #</th>
<th>DESCRIPTION / PHOTO</th>
<th>ITEM</th>
<th>LEADER ORDER #</th>
<th>DESCRIPTION / PHOTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Springtech MINI EXTREME 2</td>
<td>700024</td>
<td><img src="image1.jpg" alt="Strainer Y" /></td>
<td>Strainer Y 1” modified with bleeder valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Springtech MINI EXTREME 2 User Manual</td>
<td></td>
<td><img src="image2.jpg" alt="User Manual" /></td>
<td>Springtech MINI EXTREME 2 Quick Start Guide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1” Quick Coupler C Qty: 2</td>
<td>47148</td>
<td><img src="image3.jpg" alt="Quick Coupler C" /></td>
<td>¾” Quick Coupler C</td>
<td>47142</td>
<td></td>
</tr>
</tbody>
</table>

### Optional Setup Equipment, Parts and Supplies

<table>
<thead>
<tr>
<th>ITEM</th>
<th>LEADER ORDER #</th>
<th>DESCRIPTION / PHOTO</th>
<th>ITEM</th>
<th>LEADER ORDER #</th>
<th>DESCRIPTION / PHOTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Membrane Preservative, 1 lb.</td>
<td>70001</td>
<td><img src="image4.jpg" alt="Preservative" /></td>
<td>RO Soap 5 Lbs.</td>
<td>69992</td>
<td><img src="image5.jpg" alt="RO Soap" /></td>
</tr>
<tr>
<td>Citric Acid, 1 lb.</td>
<td>70008</td>
<td><img src="image6.jpg" alt="Citric Acid" /></td>
<td>Glycol, 1 gal.</td>
<td>70009</td>
<td><img src="image7.jpg" alt="Glycol" /></td>
</tr>
<tr>
<td>10” Cartridge Filter</td>
<td>70013</td>
<td><img src="image8.jpg" alt="Cartridge Filter" /></td>
<td>Food Grade Grease</td>
<td>55095</td>
<td><img src="image9.jpg" alt="Food Grade Grease" /></td>
</tr>
<tr>
<td>12” Sap Hydrometer</td>
<td>61061</td>
<td><img src="image10.jpg" alt="Sap Hydrometer" /></td>
<td>Long 2” Diameter Test Cup</td>
<td>59006</td>
<td><img src="image11.jpg" alt="Test Cup" /></td>
</tr>
<tr>
<td>Digital Refractometer</td>
<td>61058</td>
<td><img src="image12.jpg" alt="Digital Refractometer" /></td>
<td>Sap Refractometer</td>
<td>61073</td>
<td><img src="image13.jpg" alt="Sap Refractometer" /></td>
</tr>
<tr>
<td>pH Meter</td>
<td>61060</td>
<td><img src="image14.jpg" alt="pH Meter" /></td>
<td>pH Meter Replacement Probe</td>
<td>61060P</td>
<td><img src="image15.jpg" alt="pH Meter Probe" /></td>
</tr>
</tbody>
</table>
SETUP

NOTES:
- All materials used should be approved for potable water. No copper should be used.
- When installing plumbing for the system, factor in the system may need to be moved for such items as maintenance. It is recommended the connections be made with fittings such as quick disconnects.
- All feed piping to the Springtech system must be at least as large as the feed on the system itself – 1” is recommended.
- All installations must meet applicable governmental regulations.

Area Required
The space to be used should be capable of preventing the RO system from freezing. Additionally it will need to have adequate ventilation during operations to prevent overheating.

The dimensions of the unit are
- Width – 28”
- Length – 31”
- Height – 68”

A minimum of two feet around the system is recommended. You must also be able to obtain an additional area in order to remove membranes and pump assemblies.

The room should have adequate drainage. The walls, ceiling and floor should be easy to clean.

Power Requirements
The system requires 220V / 1 Phase, 22 amps, 4 wire connection. All electrical work should be done by a licensed electrician and meet all local codes.

<table>
<thead>
<tr>
<th>MOTOR ID</th>
<th>MOTOR FUNCTION</th>
<th>SIZE (HP)</th>
<th>NAMEPLATE AMPERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>Feed Pump</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>M2</td>
<td>Pressure Pump</td>
<td>3</td>
<td>14</td>
</tr>
</tbody>
</table>

NOTE: Any time the control panel is opened, the power should be turned off at the source.

See ATTACHMENT #1 for the electrical schematic.
**General Connection Layout**
The following illustrates a generalized layout for connections with the Springtech EXTREME RO System. The first drawing shows tank connections to the system. The second drawing shows an arrangement of valves to connect the incoming liquid to the system. Dependent on the location, other arrangements are likely. It is beyond the scope of this document to recommend the best layout for all situations. It is recommended you contact your LEADER EVAPORATOR sales person or your local Distributor / Dealer for assistance in deciding the correct tanks and layout for your needs.

**Simple 3 Tank RO Diagram**

![Simple 3 Tank RO Diagram](image)

**Liquid Source Selector**

![Liquid Source Selector](image)

Valves should be in the R/O room for ease of operation. Additional valves and tanks may be required depending upon installation.
Strainer Connections
Plumbing from the supply tanks is recommended to be 1-½” ID. The input to the strainer will need to be reduced to 1”. The strainer is not mounted to the system. It will need to be mounted by the user. The connection can be made as follows:

1. Identify the flow direction through the strainer. There is an arrow on top of the strainer which shows the direction of flow. The input side pushes the liquid through the strainer prior to it going into the system. Additionally, when mounting the strainer, the spigot should be on top as it will need to be opened to bleed air from the system.

2. Install a valve before the Y strainer so the strainer can be removed and cleaned.

V6 Connection
The V6 valve is to be setup so the connection can be easily disconnected and reconnected as necessary. The following is the recommended connection detail.

1. Teflon tape a 1” F style quick coupler.

2. Thread the F style quick coupler into valve V6. Tighten the coupler. NOTE: Secure valve V6 so as not to break it when tightening the coupler.

3. Obtain a length of 1” braided hose that will connect to the strainer output on the incoming liquid source.

4. Slide a 1” stainless steel band clamp over one end of the hose.

5. Slide the hose onto a 1” C style quick coupler and tighten the clamp over the coupler.

6. Pull the metal latches on the quick coupler out to the sides (perpendicular to the body of the quick coupler) then slide the open end of the coupler over the F style coupler on valve V6.

7. Raise the metal latches on the quick coupler back to the side of the C quick coupler while pressing the couplers together.
Vessel and Pump Drains

The pressure pump and wash tank drains are provided with ½” stainless steel ball valves. Connections can be added to the pressure pump and the wash tank drain connections. It is recommended the drains be setup to allow collection of the liquid. You will need (items sold separately):
- 2 – ½” PVC adapters
- 2 – ½” Stainless Steel band clamps
- 2 pieces of ½” Food Grade Braided hose long enough to connect to the drain adapter and to reach the collection point

- The Membrane Vessel drains are located under the membrane vessels. To drain the vessels remove the heavy duty clamps and the caps. NOTE: Use caution when removing clamps and caps as the membrane may slide down out of the vessel as the cap is removed.

- The feed pump drain is a 7/16” stainless steel plug located on the front of the pump housing on the end connected to valve V6.

- The wash tank drain valve is a ¼” stainless steel ball valve. Connected to the ball valve is a stainless steel tee.

- The wash tank overflow drain is connected to the stainless steel tee below the wash tank drain valve and needs no further connection.
Install drain connections (one to the ball valve on the pressure pump and one on the tee below the wash tank drains) as follows:

1. Teflon tape the ½” PVC adapter.

2. Thread the PVC adapter into the stainless steel ball valve.

3. Cut ½” ID braided hose to length (to reach from the ball valve to the point where you will be collecting the liquid). Place a ½” stainless steel band clamp over one end of the hose. Slide the hose onto the PVC adapter. Position the stainless steel band clamp over the hose on the adapter and tighten the band clamp.

V3, V4 and V19 Connections

V3, V4 and V19 valves are to be setup so the connections can be easily disconnected and reconnected as necessary. The following is the recommended connection detail.

In order to assemble the connections you will need (hose and clamps sold separately);

- 3 – C style Quick Couplers (two 1” and one ¾” - supplied)
- 2 (minimum) – 1” Stainless Steel Band clamps
- 1 (minimum) ¾” Stainless Steel Band clamp
- 1” ID braided food grade hose with length to make the connections for the Permeate and Concentrate tank
- 1” connection to the drain can be made with flexible hose.

V19 Connection To Drain

1. Cut ¾” ID flexible hose to reach from the valve V19 to the drain connection.

2. Place at least one ¾” stainless steel band clamp over one end of the hose. Slide the hose onto the ¾” C style quick coupler.

3. Position the stainless steel band clamp(s) over the hose on the coupler and tighten the band clamp(s).

4. Secure the other end of the hose to the drain connection.

5. Connect the quick couplers by opening the latches on the C style coupler (position the metal latch arms out perpendicular to the body of the coupler) then sliding the C coupler onto the F coupler. Pull the metal latch arms back down to the sides of the C coupler.
V3 – Connection To Permeate Storage

1. Cut 1” ID braided hose to length – from valve V3 to the fill connection for the permeate tank.
2. Place at least one 1” stainless steel band clamp over the hose.
3. Slide the hose onto a 1” C style quick coupler.
4. Position the stainless steel band clamp(s) over the hose on the adapter and tighten the band clamps.
5. Secure the other end of the hose to the tank fill connection.
6. Connect the quick coupler by opening the latch on the C style coupler (position the metal latch arms out perpendicular to the body of the coupler) then sliding the C coupler onto the F coupler. Pull the metal latch arms back up to the sides of the C coupler.

V4 – Connection To Concentrate Storage

1. Cut 1” ID braided hose to length – from valve V4 to the fill connection for the concentrate tank.
2. Place at least one 1” stainless steel band clamp over one end of the hose.
3. Slide the hose onto a 1” C style quick coupler.
4. Position the stainless steel band clamp(s) over the hose on the adapter and tighten the band clamps.
5. Secure the other end of the hoses to the tank fill connection.
6. Connect the quick couplers by opening the latch on the C style coupler (position the metal latch arms out perpendicular to the body of the coupler) then sliding the C coupler onto the F coupler. Pull the metal latch arms back up to the sides of the C coupler.
OPERATION

To start the MINI EXTREME 2 for any cycle, press and hold the Feed Pump Start button until the majority of air is purged from the flow meters then press the pressure pump start button. Release both buttons when both pumps have started. If the system fails to start in this manner, after two attempts, bleed the system.

During any cycle if permeate is not available, use non chlorinated well or spring water.

Initial System Cleaning

To prepare the system after setup;

1. Put approximately 250 US gallons of non-chlorinated well or spring water into a clean permeate storage tank.
2. Set the valves for and run a rinse cycle (see page 27) using a minimum 125 US gallons of water from the permeate tank. While this cycle is running check all fittings, piping, connections and hoses for leaks. Repair as necessary.
3. At the end of the rinse cycle change the position of valve V19 so the liquid flow is directed to the wash tank. When the wash tank is approximately ⅔ full, return V19 to the drain position.
4. Mix alkaline R/O soap with the liquid in the wash tank until a pH of 11 is reached Note – this is for FILMTEC E4 membranes. (If other membranes are being used, consult with a Leader Sales person or a local Distributor / Dealer).
5. Set the valves for and run a alkaline wash cycle (see page 29) allowing the system to run until the automatic temperature shutdown at 118°F.
6. Set the valves for and run a rinse cycle (see page 27) using a minimum 125 US gallons of water from the permeate tank.
7. Run the benchmark permeability test (see page 19).

Data Logging

Data on the operation of the system should be recorded and kept. See ATTACHMENT #2 for the data sheet format. The following data is recorded:

- Date – date the information is collected
- Activity – Concentration cycle (enter a C) or Test (enter a T)
- Sap % - the sugar concentration of the raw sap
- Concentrate % - the sugar concentration of the concentrate from the system – test results from the concentrate port
- Permeate Flow – gallons per minute of permeate from membrane 1 – reading from the top of the stainless steel float in the permeate flow meter
- Concentrate Flow – gallons per minute of concentration from the system – reading from the top of the stainless steel float in the concentrate flow meter
- Temperature – reading from temperature gauge on the control panel of the system (°F)
- Feed Pressure – reading from the pressure gauge on the control panel of the system (psi)
- Membrane Pressure – reading from the pressure gauge on the control panel of the system (psi)
- Water Removal % - percent of water removed from incoming sap – calculated as follows
  - PERMEATE FLOW – the flow as indicated on the flow meter
  - TOTAL FLOW - Add Permeate Flow and Concentrate Flow together
  - Divide PERMEATE FLOW by TOTAL FLOW and multiply the result by 100
  - Record this number as the Water Removal %
- GPH Processed – gallons per hour being processed by the system- calculated as follows
  - TOTAL FLOW – Add Permeate Flow and Concentrate Flow together
  - Multiply Total Flow by 60 and record the resulting number as the GPH Processed
Cycles and Timing
The Springtech MINI EXTREME 2 has 4 defined cycles; Concentrate, Desugar, Rinse and Wash. The following table outlines recommended intervals

<table>
<thead>
<tr>
<th>CYCLE</th>
<th>INTERVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentrate</td>
<td>Run 1 to 12 hours dependent on sap quality</td>
</tr>
<tr>
<td>Desugar</td>
<td>Run at the end of every Concentrate cycle or at the end of each day</td>
</tr>
<tr>
<td>Rinse</td>
<td>Run after the Desugar cycle</td>
</tr>
<tr>
<td>Wash</td>
<td>Chemical wash after a rinse. A chemical wash should be run after 12 hours of concentrating or at the end of every day. NOTE: If only a few hundred gallons of sap was run and the machine is to be cleaned, run a hot water wash</td>
</tr>
</tbody>
</table>

The following cycles always need to be run in sequence when used:
- Desugar - Rinse
- Desugar - Rinse – Alkaline Soap Wash – Rinse (also called Alkaline Soap Wash cycle)
- Desugar - Rinse – Alkaline Soap Wash - Rinse - Acid Soak - Rinse – Alkaline Soap Wash – Rinse (also called Chemical Wash cycle)

Permeability Test
The permeability test is used to monitor the performance of the system. It is based on comparing the results of a benchmark test taken when the system is new or at the start of a new season. The permeate flow rate is the basis for the results of the test.

Performing the permeability test for benchmarking:
1. Perform a rinse (see page 27) then fill the wash tank ⅔ full of permeate by moving valve V19 to the vertical up position.
2. Set the valves for the wash cycle position (see page 29).
4. Run the system until the temperature reaches 55°F.
5. Adjust the membrane pressure to 200 psi using valve V2. Valve V18 may need to be opened slightly.
   NOTE: If the starting temperature is higher than 55°F, the same results can be obtained at 70°F and 150psi operating pressure.
6. Record the flow rates from the permeate flow meter and from the concentrate meter.
7. Multiply the permeate flow rate by 60 to give a US gallons per hour rate. This number will be the rate (benchmark rate) for comparison to past and future testing. Record this number in the data log with Activity “T”.

A permeability test should be performed after each wash cycle. The test is performed as described above for steps 2 through 6. Compare the flow rate obtained in the test with previous benchmark rates. If the flow rate is less than the benchmark rate by 15% or more then further cleaning will be necessary. See the flow chart on page 20.

To calculate the difference to the benchmark do the following calculation:
\[ (1-\text{Current Measured GPM/Benchmark GPM}) \times 100 \]

Note concerning the chart – if the sap is of good quality (high clarity with no visible suspended material) and the performance of the system cannot be returned to the benchmark level with alkaline soap chemical wash, it will need an acid soak. Acid soak will help remove mineral deposits. If the sap is of poor quality and bacteria is responsible for poor overall performance the alkaline soap wash should remove the problem.
NOTE: This applies to FILMTEC #4 membranes.
Flow Valve Information
The following is a table illustrating the type of valve being used and where fluid flows when the valves are in certain positions. NOTE: Flow as stated only occurs when all valves are set for the proper cycles.

<table>
<thead>
<tr>
<th>VALVE</th>
<th>TYPE</th>
<th>HANDLE POSITION</th>
<th>LIQUID FROM - TO</th>
<th>HANDLE POSITION</th>
<th>LIQUID FROM-TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>V3</td>
<td>3 - Way</td>
<td>HANDLE POINTING UP</td>
<td>Membranes to Permeate out</td>
<td>HANDLE POINTING HORIZONTAL</td>
<td>Membranes to Valve V19</td>
</tr>
<tr>
<td>V4</td>
<td>3 - Way</td>
<td>HANDLE POINTING HORIZONTAL</td>
<td>Membranes to Concentrate out</td>
<td>HANDLE POINTING UP</td>
<td>Membranes to Valve V19</td>
</tr>
<tr>
<td>V6</td>
<td>3 - Way</td>
<td>HANDLE POINTING TOWARD PUMP</td>
<td>External to Feed Pump</td>
<td>HANDLE POINTING TOWARD WASH TANK PIPE</td>
<td>Wash Tank to Feed Pump</td>
</tr>
<tr>
<td>V18</td>
<td>2 - Way</td>
<td>HANDLE POINTING UP</td>
<td>No Flow</td>
<td>HANDLE HORIZONTAL</td>
<td>Membranes to Valve V19</td>
</tr>
<tr>
<td>V19</td>
<td>3 - Way</td>
<td>HANDLE POINTING UP</td>
<td>Membranes to Wash Tank</td>
<td>HANDLE POINTING HORIZONTAL</td>
<td>Membranes to Drain</td>
</tr>
</tbody>
</table>

The following is a summary table of the system cycles and the related valve settings for the cycle specified. Detail on the cycle settings is in the sections that follow.

<table>
<thead>
<tr>
<th>CYCLE</th>
<th>Concentration</th>
<th>Desugar</th>
<th>Rinse</th>
<th>Wash</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2</td>
<td>Open minimum ½ way then adjust</td>
<td>Open minimum ½ way then adjust</td>
<td>Open Fully</td>
<td>Open Fully</td>
</tr>
<tr>
<td>V3</td>
<td>Handle Points UP</td>
<td>Handle Points UP</td>
<td>Handle Points HORIZONTAL</td>
<td>Handle Points HORIZONTAL</td>
</tr>
<tr>
<td>V4</td>
<td>Handle Points HORIZONTAL</td>
<td>Handle Points HORIZONTAL</td>
<td>Handle Points UP</td>
<td>Handle Points UP</td>
</tr>
<tr>
<td>V6</td>
<td>Handle Points toward PUMP (Sap)</td>
<td>Handle Points toward PUMP (Permeate)</td>
<td>Handle Points toward PUMP (Permeate)</td>
<td>Handle Points toward Wash TANK PIPE (Wash Tank)</td>
</tr>
<tr>
<td>V18</td>
<td>Handle Points UP (closed)</td>
<td>Handle Points UP (closed)</td>
<td>Handle HORIZONTAL (open)</td>
<td>Handle HORIZONTAL (open)</td>
</tr>
<tr>
<td>V19</td>
<td>Handle Points UP</td>
<td>Handle Points UP</td>
<td>Handle Points LEFT</td>
<td>Handle Points UP</td>
</tr>
<tr>
<td>Drains</td>
<td>Closed</td>
<td>Closed</td>
<td>Closed</td>
<td>Closed</td>
</tr>
</tbody>
</table>

NOTE: During the Rinse, if the machine shuts down due to low pressure and the feed line has been bled or if during the Wash Cycle the machine shuts down due to low pressure, check the prefilter. If the prefilter is dirty, replace and retry the rinse/wash cycle. If the prefilter appear cleans or is new and the problem continues, partially close valve V18 until an operating pressure of 50 – 80 psi is reached and run the remainder of the cycle.

Adjusting V2 for Operations

V2 is adjusted for concentration output by flow or % sugar.

The maximum pressure is 315 psi with a recommended operating pressure of 200 to 310 psi.
**Sample Port Use**
When using the concentrate sample port, run approximately 1 test cup of concentrate through in order to purge the lines. Pour that cup back into the raw sap tank. Draw a second cup and sample.

The permeate sampling port should be purged as done with the concentrate sample port. The permeate through this port should be sampled once per day.

**Concentrate Cycle**
In this cycle the system inputs sap or pre-concentrated sap and cycles it through the membranes resulting in a concentrated liquid (concentrate) and the water being removed (permeate).

There are two output options within the Concentrate Cycle. The first is to direct the concentrate to the concentrate tank. The second is to direct the concentrate to the sap tank – this is called the Sap Concentration Loop. Valves are required between valve V4 and the concentrate tank allowing the option for concentrate to be directed to the sap tank (valves sold separately).

**Standard Concentrate Cycle**
Concentrate Cycle Valve Settings / Positions – also available on the Quick Start Guide

1. Position the valves as follows:

V2 – Open a minimum of ½ way to start then adjust to the desired concentration level or flow.

V6 – The handle should be toward the pump. Input from the liquid source selector should be from the raw sap (or previously concentrated sap).
2. Press and hold the Feed Pump Start button until the majority of air is purged from the flow meters then press the pressure pump start button. Release both buttons when both pumps have started.

3. If the system does not continue, repeat Step 2 up to 2 additional times. The STOP button will need to be pressed after each time.

4. If the system does not start on the third try, bleed the system. To bleed the system, open the valve on the top of the strainer (installed before valve V6) until all the air is released from the system. Close the bleed valve.

5. When the machine has started, adjust V2 to produce the desired concentration.

V3 – The handle should be UP

V4 – The handle should be HORIZONTAL

V18 – The handle is UP

V19 – With V3 and V4 in the concentrate setting, V19 should have no flow. Direct V19 to the wash tank as a precaution.
Desugar Cycle
In this cycle the permeate is run in a concentrate cycle to flush accumulated sugar from the membranes.

Desugar Cycle Valve Settings / Positions – also available on the Quick Start Guide

1. Position the valves as follows:

   V2 – Leave valve where it was set during the concentration cycle.

   V6 – The handle should be towards the pump. Input from the liquid source selector should be from the permeate.
2. Press and hold the Feed Pump Start button until the majority of air is purged from the flow meters then press the pressure pump start button. Release both buttons when both pumps have started.

3. If the system does not continue, repeat Step 2 up to 2 additional times. The STOP button will need to be pressed after each time.

4. If the system does not start on the third try, bleed the system. To bleed the system, open the valve on the top of the strainer (installed before valve V6) until all the air is released from the system. Close the bleed valve.

5. Check the concentrate sugar % level approximately every 5 minutes. The Desugar cycle should be run until the concentrate sugar is down to at least 1% to 2%.
Rinse Cycle
In this cycle permeate is run through the system at high volume and low pressure to rinse sugar, minerals and bacteria from the R/O. A rinse cycle is required before and after every wash cycle. At least 125 US gallons of permeate is required in a rinse following a chemical wash. Desugar and rinsing the system every 4 to 6 hours can help to maintain higher performance rates.

Rinse Cycle Valve Settings / Positions – also available on the Quick Start Guide

1. Position the valves as follows:

   V2 – Open the valve completely

   V6 – The handle should be towards the pump.
       Input from the liquid source selector should be from the permeate.
2. Press and hold the Feed Pump Start button until the majority of air is purged from the flow meters then press the pressure pump start button. Release both buttons when both pumps have started.

3. If the system does not continue, repeat Step 2 up to 2 additional times. The STOP button will need to be pressed after each time.

4. If the system does not start on the third try, bleed the system. To bleed the system, open the valve on the top of the strainer (installed before valve V6) until all the air is released from the system. Close the bleed valve.

5. When the machine has started, run the rinse cycle (see page 27) until a minimum of 125 US gallons of permeate has been processed. If the Rinse is to be followed by a Wash Cycle, at the end of the rinse, fill the wash tank ⅔ full by turning valve V19 handle vertically up.

   NOTE: If the machine shuts down due to low pressure and the feed line has been bled, check the prefilter. If the prefilter is dirty, replace and retry the rinse cycle. If the prefilter appears clean or is new and the problem continues, partially close valve V18 until an operating pressure of 50 – 80psi is reached and run the remainder of the cycle.

V3 – The handle should be HORIZONTAL
V4 – The handle should be UP
V18 – The handle should be HORIZONTAL
V19 – The handle should be HORIZONTAL
Wash Cycle
There are three different wash cycles. A hot water wash which can be run when good clear sap was processed and the flows are still good. An alkaline soap wash is done to remove bacteria from the system. An acid soak and wash is done to remove mineral deposits from the system. Generally the acid soak is used where the system does not recover flow rates after the alkaline soap wash.

Hot Water Wash
1. Perform a rinse cycle (see page 27) using a minimum of 125 US gallons of permeate stored for system rinsing.
2. Toward the end of the rinse cycle, turn valve V19 toward the wash tank feed position. This will direct the flow of permeate to the wash tank. When the wash tank is ⅔ full, return V19 to the drain position.
3. Set the valves as listed below. Start and run the system until it shuts down automatically. The system will shut down when the temperature reaches 118°F.
   NOTE: If the machine shuts down due to low pressure, check the prefilter. If the prefilter is dirty, replace and retry the wash cycle. If the prefilter appears clean or is new and the problem continues, partially close valve V18 until an operating pressure of 50 – 80 psi is reached and run the remainder of the cycle.
4. Perform a Rinse cycle (see page 27) using a minimum of 125 US gallons of stored permeate water.

Alkaline Soap Wash
1. Perform a rinse cycle (see page 27) using a minimum of 125 US gallons of permeate stored for system rinsing.
2. Toward the end of the rinse cycle, turn valve V19 toward the wash tank feed position. This will direct the flow of permeate to the wash tank. When the wash tank is ⅔ full, return V19 to the drain position.
3. At the completion of the rinse cycle, add R/O soap (LEADER Order # 69992) to the wash tank and mix. Add R/O soap until a pH of 11 is reached. NOTE: This applies to FILMTEC E4 membranes. For other membranes consult with a Leader sales person or a local distributor / dealer.
4. Set the valves as listed below. Start and run the system until it shuts down automatically. The system will shut down when the temperature reaches 118°F.
   NOTE: If the machine shuts down due to low pressure, check the prefilter. If the prefilter is dirty, replace and retry the wash cycle. If the prefilter appears clean or is new and the problem continues, partially close valve V18 until an operating pressure of 50 – 80 psi is reached and run the remainder of the cycle.
5. Perform a Rinse cycle (see page 27) using a minimum of 125 US gallons of stored permeate water.
6. Drain the wash tank. The drain valve is located under the wash tank. Turn the flow indicator to the left.

Intensive Alkaline Soap Wash
1. Follow the directions for the Alkaline Soap Wash.
2. Check the pH of the wash solution every 15 minutes. Maintain the pH by adding soap as needed.

Acid Soak
1. Perform an alkaline Soap wash as listed above.
2. At the end of the rinse cycle (following the wash) turn valve V19 toward the wash tank feed position. Run until the wash tank is approximately ⅔ full, return V19 to the drain position.
3. Add ⅓ cup of citric acid to the wash tank and mix.
4. Run a wash cycle. The system will shut down when the temperature reaches 118°F.
5. Shut off the system and allow the acid solution to soak for 8 to 24 hours.
6. Drain the wash tank.
7. Perform a rinse cycle (see page 27) using a minimum of 125 US gallons of stored permeate water.
8. Perform an alkaline soap wash as detailed above.
9. Drain the wash tank.
10. Perform a rinse cycle (see page 27) using a minimum of 125 US gallons of stored permeate water.
Wash Cycle Valve Settings / Positions – also available on the Quick Start Guide

1. Position the valves as follows:

   V2 – Open the valve completely

   V6 – The handle should be towards the wash tank pipe.

   V3 – The handle should be HORIZONTAL

   V4 – The flow indicator should be UP

   V18 – The handle should be HORIZONTAL

   V19 – The handle should be UP

2. Add the soap required for the type of wash to be performed. NOTE: Ensure the wash tank is filled first.
3. Press and hold the Feed Pump Start button until the majority of air is purged from the flow meters then press the pressure pump start button. Release both buttons when both pumps have started.

4. If the system does not continue, repeat Step 2 up to 2 additional times. The STOP button will need to be pressed after each time.

5. If the system does not start on the third try, bleed the system. To bleed the system, open the valve on the top of the strainer (installed before valve V6) until all the air is released from the system. Close the bleed valve.

6. For an alkaline soap wash (see page 29) - run the Wash cycle until the system shuts down automatically. The system shutdown is based on the temperature of the liquid. When the liquid reaches 118°F the system will shut down.

   NOTE: If the machine shuts down due to low pressure, check the prefilter. If the prefilter is dirty, replace and retry the wash cycle. If the prefilter appears clean or is new and the problem continues, partially close valve V18 until an operating pressure of 50 – 80 psi is reached and run the remainder of the cycle.

7. Press the STOP button to reset.

8. Open the wash tank drain valve to drain the wash tank. When the wash tank is empty, return the drain valve to the recirculation position.

9. Run a rinse cycle (see page 27) using a minimum of 125 US gallons of permeate from the permeate storage tank.

10. Do a permeability test (see page 19). If the test is good, continue the rinse cycle with any additional permeate.
MAINTENANCE

Pre Filters
When the feed pump pressure drops 20 psi or more, the prefilter may need to be changed. The procedure to change the prefilter is as follows:

1. Loosen and remove the heavy duty clamp which fastens the two parts of the filter housing together.

2. Remove the prefilter bottom by pulling down. It may need to be turned as it is being pulled.

3. Remove the filter from the housing.
4. Wipe the O-rings on the top of the assembly then apply a light coating of food grade grease such as LEADER order #64436.

5. Rinse out the housing. Insert a new filter into the housing aligning one of the open ends over the alignment projection.

6. Bring the prefilter bottom, with the filter installed, up to the underside of the top of the filter housing on the system. Carefully align the open top of the filter with the alignment projection in the top of the filter housing then slide the prefilter bottom up to the prefilter top.

7. Secure the two parts of the prefilter assembly with the heavy duty clamp. Ensure the clamp grooves are over the edges and surround where the two parts of the prefilter meet.
Membrane Removal and Installation
The LEADER Springtech Mini Extreme 2 has two membrane; membrane #1 (front membrane) and membrane #2 (rear membrane). Both membranes should be removed during the process.

Removal

1. Remove the heavy duty clamps securing the permeate connections and vessel covers.

2. Leave the cover assemblies off the vessels and remove the seal from the top of each vessel.

3. Grasp and lift the membrane from the rear vessel (#2).
4. Grasp and slowly lift the membrane out of the front vessel (#1). The liquid in the vessel will drain through the vessel connecting pipe to the rear vessel (#2).

5. To drain the vessels, remove the heavy duty clamp, cap and TEFLO N gasket from each of the vessels.

Installation

1. Lubricate the membrane adapter O-rings mounted to the vessel bottom caps.

2. Place the TEFLO N gasket and cap on the bottom of each membrane vessel and secure with a heavy duty clamp.

3. Inspect and replace the membrane (brine) seal, if necessary on each membrane. Lubricate the seals with food grade grease.
4. Insert a membrane into the rear vessel (#2). The end with the seal will go into the vessel last and the seal will be at the top of the vessel when in place. Use caution when installing the membrane – ensure the seal remains in the grooves of the membrane as it enters the vessel.

5. Insert a membrane into the front vessel (#1). The end with the seal will go into the vessel first and will be at the bottom of the vessel when in place. Use caution when installing the membrane – ensure the seal remains in the grooves of the membrane as it is installed in the vessel.

6. Inspect and replace the vessel seal if necessary. Place the vessel seal on the top of the vessel aligned with the grooves.

7. Lubricate the O-rings of the membrane adapters on the vessel caps of the permeate connection assembly.

8. Place the permeate connection assembly over the membrane vessels. Ensure the membrane adapters and seals are properly aligned.

9. Secure the permeate connection assembly to the membrane vessels with the heavy duty clamps.
Daily
Each day, it is recommended the following be done:

1. Remove, clean and reinstall the strainer in the Y-strainer.
2. Sample the permeate liquid from the sampling port;
   a. Purge the permeate sample line by running the system and drawing a volume of permeate from the port approximately equal to a test cup.
   b. Draw a sample for testing. Test the permeate sugar level using either a refractometer or a hydrometer.
   c. If the results indicate there is any sugar present there is a possible problem with the membrane O-rings or alignment coupling. Check the troubleshooting chart.
3. Check all hoses, piping, fittings and connections for leaks. Repair as necessary.
4. Run a cycle of Desugar (see page 25) – Rinse (see page 27) – Alkaline Soap Wash (see page 29) – Rinse (see page 27)
5. Do a Permeability test (see page 19)
6. Inspect and clean storage tanks
   a. Permeate
   b. Concentrate
   c. Sap

Periodic
1. When the feed pump pressure drops 20 psi or more, the prefilter may need to be changed (see page 32).
2. If a permeability test (see page 19) indicates the system performance is less than 85% of the benchmarked performance;
   a. Run a cycle of Rinse (see page 27) – Intensive Alkaline Soap Wash (see page 29) (checking pH 2 to 3 times and adding additional soap as necessary) – Rinse (see page 27) and repeat the permeability test (see page 19).
   b. If necessary or at the end of the season, run a cycle of Rinse (see page 27) – Acid Wash (see page 29) – Rinse (see page 27) – Alkaline Soap Wash (see page 29) – Rinse (see page 27) and repeat the permeability test (see page 19).
3. Pump motors will need to be lubricated. The following table describes the lubrication requirements. NOTE: The output of the grease gun will need to be measured prior to lubricating the bearings in order to ensure the proper amount of lubrication is used.
   a. All bearings require EXXON POLYREX EM lubricant.

<table>
<thead>
<tr>
<th>MOTOR ID</th>
<th>MOTOR FUNCTION</th>
<th>HP</th>
<th>Bearing Location</th>
<th>Lubrication Interval (hrs)</th>
<th>Lubrication Amount (ounces)</th>
<th>Lubrication Location</th>
<th>Lubrication Interval (hrs)</th>
<th>Lubrication Amount (ounces)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M2</td>
<td>Pressure Pump</td>
<td>3</td>
<td>Pump End</td>
<td>5500</td>
<td>5.0</td>
<td>Non Pump End</td>
<td>5500</td>
<td>3.9</td>
</tr>
</tbody>
</table>

End Of Season Shutdown and Storage
If permeate is not available to perform the rinse and wash cycles stated in the following procedure, obtain the necessary volume of water using non chlorinated well or spring water.

1. Do a rinse cycle (see page 27) – intensive alkaline soap wash (see page 29) – rinse cycle (see page 27).
2. Do an acid soak cycle (see page 29) allow the machine to soak for 1 to 7 days starting the system once per day and allowing it to run to the auto stop temperature of 118°F.
3. Do a rinse cycle (see page 27) – intensive alkaline soap wash (see page 29) – rinse cycle (see page 27)
4. Perform a permeability test (see page 19). If the test result shows a difference of greater than 15% to the benchmark, repeat the process starting with Step 2.
5. Drain the wash tank then close the drain.
6. In the wash tank mix:
   a. 3 US gallons of permeate
   b. 1 US gallons of glycol
   c. 1 Tablespoons of membrane preservative
7. Set the system valves for a wash cycle (see page 29) and run the system for 15 minutes. Drain the wash tank.
8. Empty then reinstall the prefilter housing.
9. Drain the pumps then close the drains.
10. Maintain a temperature minimum of 40°F to 50°F in the area where the system is stored. Do not allow the system to freeze.
11. Drain and clean all storage tanks. Cover them in order to keep dirt and pests out. NOTE: If permeate is not available for cleaning, use non-chlorinated well or spring water.

**Beginning of Season Startup**

As permeate will not be available to perform the rinse and wash cycles stated in the following procedure, obtain the necessary volume of water using non chlorinated well or spring water.

1. Connect the reverse osmosis system to the concentrate, permeate and feed lines.
2. Change the prefilter.
3. Ensure your source valves (water or permeate) are open to feed the system.
4. Position the valves for the rinse cycle (see page 27).
5. Press the START button to start the feed pump.
6. Run the feed pump until most of the bubbles are gone from the flow meters located on the front of the system. This will take 3 to 4 minutes. Not all the bubbles can be removed.
7. Press the STOP button to stop the feed pump.
8. Check all fittings, hoses, connections and parts of the system for leaks. Repair as necessary.
9. Run a rinse cycle (see page 27) until a minimum of 125 US gallons of water have been processed. Near the end of the rinse cycle turn valve V19 down and fill the wash tank ⅔ full. Return valve V19 to its original position.
10. Run a hot water wash cycle (see page 29).
11. Repeat the rinse cycle (see page 27) again filling the wash tank as specified then add R/O soap (LEADER Order # 69992) to the wash tank and mix. Add R/O soap until a pH of 11 is reached.
12. Run alkaline wash cycle (see page 29).
13. Perform a rinse cycle (see page 27) using a minimum of 125 US gallons of water.
14. Drain the wash tank then close the wash tank drain valve.
15. Perform a permeability test (see page 19).
   a. Compare the results to the results of the test when the system was new. If the results are not acceptable contact LEADER EVAPORATOR or your local Distributor / Dealer for assistance.
   b. Record the results, if acceptable, and use these results as the reference for test for the season.
## TROUBLESHOOTING CHART
The following conditions may occur during operations.

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>CAUSE</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed pump does not start when START button is pressed</td>
<td>No power</td>
<td>Verify power is “ON” at the source.</td>
</tr>
<tr>
<td>Feed pump starts but system does not continue running</td>
<td>Low pressure</td>
<td>Inspect incoming plumbing for leaks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check and clean Y-strainer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pre Filters need changing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>System needs to be bled</td>
</tr>
<tr>
<td>No liquid coming from storage</td>
<td></td>
<td>Check the positions of all valves</td>
</tr>
<tr>
<td>Low rate found during permeability test</td>
<td>Suspected bacteria buildup</td>
<td>Rewash system with R/O alkali soap</td>
</tr>
<tr>
<td></td>
<td>Suspected Mineral Buildup</td>
<td>Acid wash system</td>
</tr>
<tr>
<td>Sugar in the permeate</td>
<td>Leak at alignment coupling</td>
<td>Replace O-ring on alignment coupling or the membrane plug</td>
</tr>
<tr>
<td></td>
<td>or membrane plug</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Membrane deterioration</td>
<td>Replace membrane</td>
</tr>
</tbody>
</table>
ATTACHMENT #1 – ELECTRICAL SCHEMATIC

Service 230 Vac, 1 Phase, 25 Amps, 3 Wire & Ground

Danger
High Voltage

MAIN DISCONNECT MUST BE ADDED AT INSTALLATION

Pressure Pump
3HP, 230 Vac, 1 Phase, 14 Amps (Nameplate)

Feed Pump
1HP, 230 Vac, 1 Phase, 4.9 Amps (Nameplate)

Temperature Controller

Temp 1

W1
16 AWG Black
Type J Thermocouple
Red
White

W2
12 AWG White

W3
10 AWG

W6
9
10

W7
9
10

Pressure Pump
START (Green)

Pressure Alarm

Stop (Red)

W8
11

W11
13

W12
14

W13
14

Feeding Pump
START (Green)

Stop (Red)

W14
14

Temp Controller Programming

Input = BC
Unit = F
Or = HEAT
P = 0.1
I = 0
D = 0

Sv = 120
Others = Default

Note:
- All control wires are 16 AWG Red unless otherwise noted.
- All terminal blocks are labeled to their corresponding wire numbers.

Leader Evaporator Co., Inc

Drawing No. Mini Extreme 2 inch

Rev. A
ATTACHMENT #2 – OPERATIONS DATA LOGSHEET

Water Removal % = ((permeate flow) / (permeate flow + concentrate flow)) * 100

GPH Processed = (permeate flow + concentrate flow) * 60

<table>
<thead>
<tr>
<th>SPRINGTECH MINI EXTREME 2 OPERATIONS DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE</td>
</tr>
<tr>
<td>ACTIVITY (C or T)</td>
</tr>
<tr>
<td>SUGAR CONCENTRATION</td>
</tr>
<tr>
<td>SAP</td>
</tr>
<tr>
<td>CONCENTRATE</td>
</tr>
<tr>
<td>FLOW (gpm)</td>
</tr>
<tr>
<td>PERMEATE</td>
</tr>
<tr>
<td>CONCENTRATE</td>
</tr>
<tr>
<td>TEMPERATURE</td>
</tr>
<tr>
<td>PRESSURE (psi)</td>
</tr>
<tr>
<td>FEED PUMP</td>
</tr>
<tr>
<td>MEMBRANE</td>
</tr>
<tr>
<td>WATER REMOVAL %</td>
</tr>
<tr>
<td>GPH PROCESSED</td>
</tr>
</tbody>
</table>

| DATE                                      |
| ACTIVITY (C or T)                         |
| SUGAR CONCENTRATION                       |
| SAP                                       |
| CONCENTRATE                               |
| FLOW (gpm)                                |
| PERMEATE                                  |
| CONCENTRATE                               |
| TEMPERATURE                               |
| PRESSURE (psi)                            |
| FEED PUMP                                 |
| MEMBRANE                                  |
| WATER REMOVAL %                           |
| GPH PROCESSED                             |

<p>| DATE                                      |
| ACTIVITY (C or T)                         |
| SUGAR CONCENTRATION                       |
| SAP                                       |
| CONCENTRATE                               |
| FLOW (gpm)                                |
| PERMEATE                                  |
| CONCENTRATE                               |
| TEMPERATURE                               |
| PRESSURE (psi)                            |
| FEED PUMP                                 |
| MEMBRANE                                  |
| WATER REMOVAL %                           |
| GPH PROCESSED                             |</p>
<table>
<thead>
<tr>
<th>DATE</th>
<th>ACTIVITY (C or T)</th>
</tr>
</thead>
</table>

**SUGAR CONCENTRATION**

- SAP
- CONCENTRATE

**FLOW (gpm)**

- PERMEATE
- CONCENTRATE

**TEMPERATURE**

**PRESSURE (psi)**

- FEED PUMP
- MEMBRANE

**WATER REMOVAL %**

**GPH PROCESSED**

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- CONCENTRATE

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Leader Evaporator Manufacturer’s Warranty
For Springtech Extreme Reverse Osmosis Machines

Leader Evaporator Co., Inc. warranties our Springtech Extreme line of Reverse Osmosis Machines against any manufacturer defects for a period of two years from the date of purchase. This warranty is at the discretion of the manufacturer, Leader Evaporator Co., Inc., to be replaced or repaired, as necessary. All replaced parts become the manufacturer’s property. Leader Evaporator Co., Inc. shall not be held responsible for any damage or injury arising from negligence, abuse, improper handling or installation.