

The Membrane Contactor that you have purchased can be damaged through improper handling and storage. The following guidelines are intended to provide a framework for successful storage of these contactors. If you have any questions, please contact your Membrana representative.

Handling. Proper handling of contactors is critical. Care must be taken not to hit or jar (shock) the contactor to minimize the possibility of internal damage. It is recommended that the contactors be stored in a dry, heat-sealed plastic bag or shrink wrap material [0.076 mm (0.003 in.) wall thickness] in their original box to prevent the introduction of contaminants into the contactor.

Important Note: All plastic port extensions should be supported to prevent bending of extensions under excessive piping loads.

Temperature. Store the contactor dry in their original boxes at temperatures not to exceed 49°C (120°F). Contactor stored at very low temperatures < 5°C (41°F) should be allowed to equilibrate to room temperature prior to introducing water.

Humidity. It is recommended that contactors be stored at low to moderate humidity levels (< 60% relative humidity). Humidity will not affect the components of the contactor but exposure at high humidity levels may affect the integrity of the cardboard boxes.

Storage Position. Store the contactors in the horizontal position. Ten inch contactors with SS housings are packaged in wooden crates. Fourteen inch, 10 inch FRP and 6 inch contactors are packaged in cardboard boxes. For safety considerations, they should not be stacked more than 3 boxes high.

Four inch contactors are packed in cardboard boxes and can be stacked up to 7 boxes high.

Shelf Life. Membrane samples from contactors stored for 4 years (room temperature, low to moderate humidity, heat-sealed bag but not stored in a box) have shown no changes in physical properties (hollow fiber tensile strength and elongation).

Exposure to Sunlight. Contactors should not be stored where they are exposed to direct sunlight. Contactors should always be stored in sealed bags, or shrink wrap material, in the original box or other opaque box.



This product is to be used only by persons familiar with its use. It must be maintained within the stated limitations. All sales are subject to Seller's terms and conditions. Purchaser assumes all responsibility for the suitability and fitness for use as well as for the protection of the environment and for health and safety involving this product. Seller reserves the right to modify this document without prior notice. Check with your representative to verify the latest update. To the best of our knowledge the information contained herein is accurate. However, neither Seller nor any of its affiliates assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of the suitability of any material and whether there is any infringement of patents, trademarks, or copyrights is the sole responsibility of the user. Users of any substance should satisfy themselves by independent investigation that the material can be used safely. We may have described certain hazards, but we cannot guarantee that these are the only hazards that exist.

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SERVICE QUESTIONS: Contact your OEM or your Membrana representative.

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START - UP PROCEDURES
for Liqui-Cel® and SuperPhobic®
Extra-Flow Contactors

- 2.5 X 8
- 4 X 13
- 4 X 28
- 6 X 28
- 10 X 28
- 14 x 28

MEMBRANA
MEMBRANA
A POLYPORE Company

For a full version of the Operating Guide, go to www.liqui-cel.com

Our 2.5 x 8, 4 x 13, 4 x 28 and 6 x 28 Contactors are Manufactured with Sound Engineering Practice. Our 10 x 28 and 14 x 28 products have a Category 1 product classification per PED 97/23/EC.

START-UP PROCEDURES

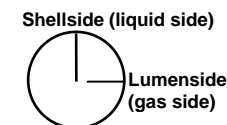
Liqui-Cel® Membrane Contactors

NOTES:

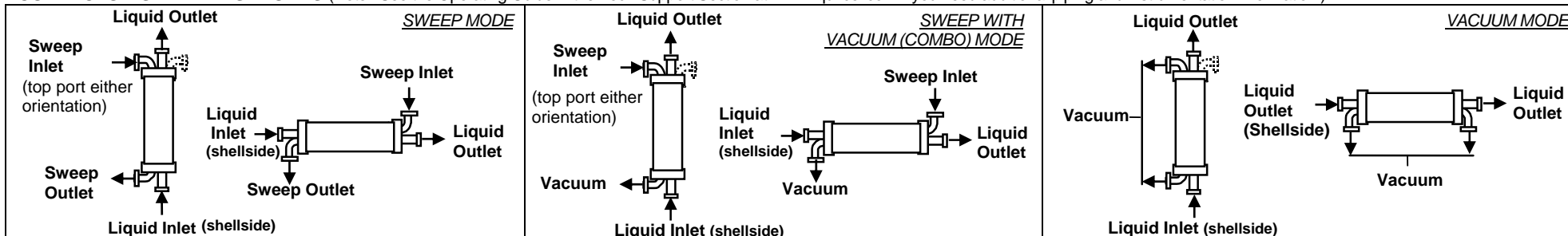
- At a minimum, incoming fluid should be prefiltered at 10 μm .
- Upon initial start-up, flush all pipes to drain prior to introducing liquid into the contactors.
- Carefully read the Liqui-Cel Operating and Cleaning Guides.
- The vacuum pump and/or sweep gas should be on at all times unless the contactors are completely drained of liquid.

2.5x8-inch Connections:

2.5x8-inch Contactors with NPT connections do not have port extensions as shown below. Use this diagram to determine which is the liquid and gas side port. The lines are molded into the end cap.



CONTACTOR OPERATING MODES (Note: See the Operating Guide in the Tech Support Section at www.liqui-cel.com if you need additional piping and instrumentation information.)



START-UP PROCEDURES

Before you begin start-up: Identify the mode of operation, mount contactor in desired orientation, then refer to instructions below for the start-up procedure.

A. General start-up instructions for the liquid phase

Note: Both gas/vacuum ports should not be closed during operation. These ports provide a safety vent in the contactors so that pressure does not build up.

1. Slowly introduce water to the system, making sure that the water inlet pressure and water flow rate through the contactor never exceed the maximum operating limits listed below. If using a SuperPhobic device, the liquid must flow on the shellside. (Labeled with Liquid Inlet above). [Maximum Flow: 2.5x8 - 3gpm (0.68 m^3/hr), 4x13 - 15 gpm (3.4 m^3/hr), 4x28 - 30 gpm (6.8 m^3/hr), 6x28 - 50 gpm (11.4 m^3/hr), 10 x 28 - 210 gpm (47.7 m^3/hr) with X50 fiber, 250 gpm (56.8 m^3/hr) with X40 fiber, 14 x 28 - 400 gpm (90.8 m^3/hr .)]
2. Adjust water flow rate and inlet pressure to desired levels by adjusting the appropriate system valves.

Maximum transmembrane pressure for membrane in Liqui-Cel Contactors is 120psi (8.3 bar, 8.4 Kg/cm^2). For SuperPhobic Contactors, use 75psi (5.2 bar, 5.3 Kg/cm^2) at 25 C (77 F).

Housing pressure ratings for liquid-side when using nondangerous liquids and gasses*:

2.5x8PP, 4x13, 4x28 FRP/PVDF and 6x28	120 psi (8.3 bar, 8.4 Kg/cm^2)
4x28 SS, 10x28 SS, 10x28 FRP Liquid Contact	150 psi (10.3 bar, 10.5 Kg/cm^2)
4x28 PP	105 psi (7.2 bar, 7.4 Kg/cm^2)
14 x 28 PVC vessels, Nylon end caps Liquid Contact	120 psi (8.3 bar, 8.4 Kg/cm^2)

*See Operating Guide for other pressure restrictions in the European Communities (EU). Also note that the gas side/vacuum pressure limits may be less than this.

B. Start-Up Instructions for strip gas and vacuum phase

Note: Vacuum when used in combo, should always be pulled from the lowest gas port to facilitate draining and ensure performance.

Sweep Gas Mode

1. Set the pressure entering the contactor at ≤ 10 psig (0.7 bar, 0.7 kg/cm^2) by adjusting the appropriate valve in the gas delivery system.

2. Set the recommended total sweep flow rate by adjusting the appropriate valves. See the sweep guidelines for typical sweep gas flow rate ranges in the table to the right.
3. Introduce fresh sweep gas into each contactor.

NOTES: - If using compressed air, make sure it is oil free and air temp $< 20^\circ\text{C}$.

- A 0.2 micron filter is recommended with any gas.
- The liquid pressure should always be higher than the gas phase pressure inside the contactor.

Sweep Gas with Vacuum (Combo) Mode

1. Set the gas pressure entering the contactor at ≤ 1 psig (0.07 bar, 0.07 kg/cm^2) by adjusting the appropriate valve on the gas delivery system.
2. Set the recommended total sweep flow rate by adjusting the appropriate valve. See sweep guidelines for typical sweep gas flow rate ranges in the table below.
3. Introduce fresh sweep gas into each contactor. **NOTE:** If using compressed air, make sure it is oil free and air temp $< 20^\circ\text{C}$. A 0.2 micron filter is recommended with any gas.
4. Apply vacuum as described in the vacuum section below. **NOTE:** If the lumens are filled with water vapor, the contactor performance can be restored by applying 40-60 psi of sweep gas on the lumen side for ~5 min.

	Sweep Guidelines for Sweep Mode	Sweep Guidelines for Combo Mode
2.5 x 8 inch	0.1 - 1.1 scfm (0.16 - 1.8 m^3/hr)	0.02 - 0.1 scfm (0.03 - 0.16 m^3/hr)
4 x 13 inch	0.5 - 3 scfm (0.8 - 5.1 m^3/hr)	0.025 - 0.25 scfm (0.04 - 0.4 m^3/hr)
4 x 28 inch	1 - 6 scfm (1.6 - 10 m^3/hr)	0.05 - 0.5 scfm (0.08 - 0.8 m^3/hr)
6 x 28 inch	1 - 20 scfm (1.6 - 33.9 m^3/hr)	0.025 - 0.5 scfm (0.04 - 0.8 m^3/hr)
10 x 28 inch	4 - 25 scfm (6 - 42.5 m^3/hr)	0.15 - 3.5 scfm (0.25 - 5.9 m^3/hr)
14 x 28 inch	6-40 scfm (10 - 64 m^3/hr)	0.2 - 10 scfm (0.32 - 16 m^3/hr)

Vacuum Only Mode

1. Start vacuum pump following vacuum pump manufacturer's instructions.
2. Apply vacuum to the contactor by opening appropriate valve.
3. Adjust absolute gas pressure on the vacuum side to the desired level at the vacuum port on the contactor.