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.

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.

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.

MiniModule®
MEMBRANE CONTACTORS

Certified System
ISO 9001
ISO 14001

SERVICE QUESTIONS: Contact your OEM or your Membrana representative.

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A POLYPORE Company

MiniModule®
MEMBRANE CONTACTORS

START-UP & OPERATING GUIDELINES

for MiniModule® Contactors

- **1 x 5.5**
- **1.7 x 5.5**
- **1.7 x 8.75**

MEMBRANA
A POLYPORE Company

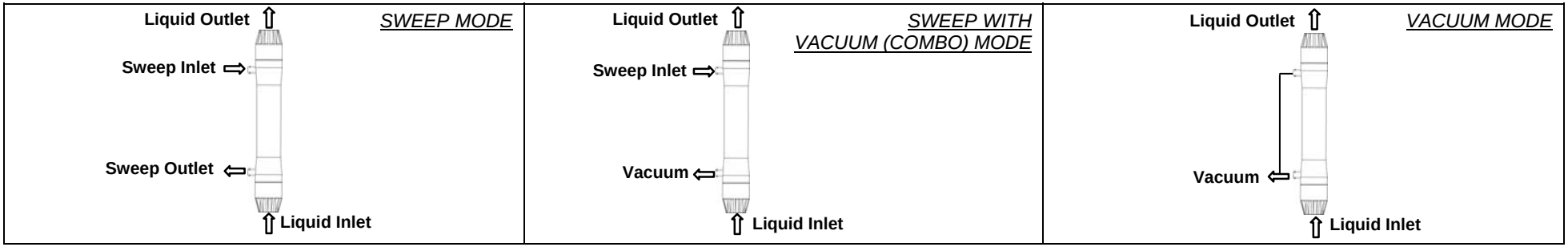
Steps:

1. Identify your mode of operation. Three options are available: sweep, vacuum, or combo, as shown in the three flow diagrams below. Vacuum only is most common for debubbling applications.
2. Mount contactor vertically or horizontally. In a horizontal orientation the gas ports should point down.
3. Refer to start-up procedures below for each mode of operation.

NOTES:

- At a minimum, incoming fluid should be prefiltered at 10 μm.
- Upon initial start-up, flush all pipes to drain prior to introducing water into the contactors.
- Refer to the Cleaning Guides as needed.
- The vacuum pump and/or sweep gas should be on at all time unless the contactors are completely drained.
- Liquid Flows on the Lumenside in MiniModule Contactors.

CONTACTOR OPERATING MODES



A. General start-up instructions for the liquid phase

Note: Both gas/vacuum ports should not be closed off during startup operation.

1. Slowly introduce water to the system, making sure that the water inlet pressure and water flow rate never exceed the respective maximum operating limits:

Note: Liquid flows on the lumenside.

2. Adjust water flow rate and inlet pressure to the desired levels by adjusting the appropriate valves on the system.

	Max. Flow Rate	Max. Pressure
1 x 5.5	500 ml/min	4.1 bar @ 20° C (68 psig @ 68° F)
1.7 x 5.5	2000 ml/min	4.1 bar @ 20° C (68 psig @ 68° F)
1.7 x 8.75	3000 ml/min	4.1 bar @ 20° C (68 psig @ 68° F)

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

Note: Vacuum should always be pulled from the lowest gas port to facilitate draining.

Sweep Gas Mode

Note: Sweep gas should be introduced at the top shell port.

1. Set the pressure entering the contactor at ≤ 10 psig (0.69 bar) 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 sweep gas into each contactor.

Note: If using compressed air, make sure it is oil free and air temp < 30° C (86° F). A 3 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 pressure entering the contactor at ≤ 1 psig (0.07 bar) 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 sweep gas into each contactor. NOTE: If using compressed air, make sure it is oil free and air temp is < 30° C (86° F). A 3 micron filter is recommended with any gas.
4. Apply vacuum as described in the vacuum section below.

	Sweep Guidelines for Sweep Mode	Sweep Guidelines for Combo Mode
1 x 5.5	0.05 – 0.5 scfm (0.085 – 0.85 m^3/hr)	0.01 – 0.1 scfm (0.016 – 0.16 m^3/hr)
1.7 x 5.5	0.1 – 1.0 scfm (0.17 – 1.70 m^3/hr)	0.02 – 0.2 scfm (0.034 – 0.34 m^3/hr)
1.7 x 8.75	0.2 – 1.5 scfm (0.34 – 2.55 m^3/hr)	0.04 – 0.3 scfm (0.068 – 0.51 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. You may pull vacuum from both shellside ports of the MiniModule or block off the top port and pull vacuum from the bottom port only.
3. Adjust gas pressure on the vacuum side to the desired level at the vacuum port on the contactor.