

## STORAGE AND HANDLING

## Membrane Contactors

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 3M 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 [0.08 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). Contactors 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:** Membrane contactors should be stored in a safe location where they are not at risk of falling, being crushed or impacted. Care should be taken to secure the contactors and containers to ensure stability and to avoid any possible injury resulting from falling, leaning or any other accident.

**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 and in the original box or other opaque box.

**Product Use:** Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.



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[www.3M.com/Liqui-Cel](http://www.3M.com/Liqui-Cel)

**SERVICE QUESTIONS:** Contact your OEM or 3M representative.



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# MiniModule™

## MEMBRANE CONTACTORS

## START-UP & OPERATING GUIDELINES for MiniModule™ Contactors

- 1 x 5.5
- 1.7 x 5.5
- 1.7 x 8.75
- 1.7 x 10

**Prior to any start-up procedure, proper installation is required.**

Please read, understand, and follow all safety information contained in the Operating Guide prior to using this membrane contactor. The Operating Guide is available at [3M.com/Liqui-Cel](http://3M.com/Liqui-Cel). Download and retain the instructions for future reference.



**MEMBRANA**  
Now proudly part of 3M

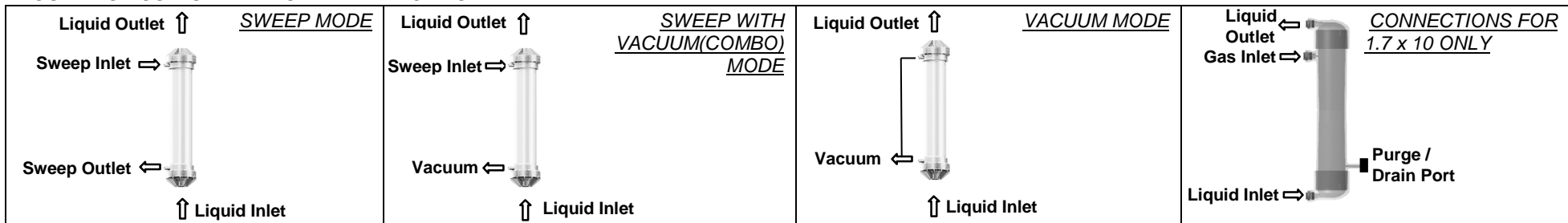
**Steps:**

1. Note that for adding dissolved gases to water, the only mode of operation is sweep.
2. Mount contactor vertically or horizontally. If mounted vertically the drain port should be at the bottom and of the module. If mounted horizontally the drain port should be pointed downwards.
3. Refer to start-up procedures below for connections and mode of operation.

**NOTES:**

- Liquids entering the membrane contactor should be prefiltered at 5 micron absolute at 99.9% removal (beta 1000).
- Gas entering the contactor should be filtered at 0.2 micron absolute at 99.9% removal (beta 1000) for high-purity applications. Filtration at 1 micron absolute at 99.9% removal (beta 1000) may be sufficient for industrial applications.
- Upon initial start-up, flush all pipes to drain prior to introducing liquid into the membrane contactors.
- The vacuum pump and/or sweep gas should be on at all time unless the membrane contactors are completely drained.
- Liquid flows on the lumen side in MiniModule™ Membrane Contactors.
- The liquid pressure should always be higher than the gas phase pressure inside the membrane contactor.

**MOUNTING POSITION AND PORT IDENTIFICATION**



**MEMBRANE CONTACTOR START-UP PROCEDURES AND OPERATING MODES**

**A. General start-up instructions for the liquid phase**

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

Product	Max. Liquid Flow Rate	Max. Liquid Pressure
1 x 5.5	500 ml/min	4.1 barg at 25° C (68 psig at 60° F)
1.7 x 5.5	2500 ml/min	
1.7 x 8.75	3000 ml/min	
1.7 x 10	2000 ml/min	8 barg at 25° C (116 psig at 77° F)

**B. Start-up Instructions for sweep (strip) gas and vacuum phase**

**Sweep (Strip) Gas Mode**

**Note:** Sweep (strip) gas should be introduced at the top shell port.

1. Set the gas delivery pressure entering the contactor at about 0.33 barg (< 5 psig) below the water pressure at the liquid outlet port by adjusting the appropriate valve in the gas delivery system.
2. Introduce sweep gas into the contactor.
3. The required sweep supply rate depends on the target specification of dissolved gas concentration in the water leaving the contactor.

**Sweep (Strip) Gas with Vacuum (Combo) Mode**

1. Set the gas pressure entering the contactor at 0.07 barg (≤ 1 psig) 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 to the contactor.
4. Apply vacuum as described in the vacuum section below.

Product	Sweep Guidelines for Sweep Mode	Sweep Guidelines for Combo Mode
1 x 5.5	0.05 – 0.5 scfm (0.085 – 0.85 m³/hr)	0.01 – 0.1 scfm (0.016 – 0.16 m³/hr)
1.7 x 5.5	0.1 – 1.0 scfm (0.17 – 1.70 m³/hr)	0.02 – 0.2 scfm (0.034 – 0.34 m³/hr)
1.7 x 8.75	0.2 – 1.5 scfm (0.34 – 2.55 m³/hr)	0.04 – 0.3 scfm (0.068 – 0.51 m³/hr)
1.7 x 10		

**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 shell side 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.

Product	Vacuum Guideline for Vacuum Mode
1 x 5.5	30 – 150 mm Hg absolute pressure
1.7 x 5.5	
1.7 x 8.75	
1.7 x 10	