

SAFETY INFORMATION

⚠ **WARNING** - To reduce the risks associated with bursting or exposure to chemicals which, if not avoided, could result in serious injury or death:

- Do not exceed maximum operating pressure or temperature limits.
- Implement workplace safety risk controls in accordance with all applicable local and government regulations.
 - Where there are two lumen ports, ensure that one port is open during operation. For contactors that have only one gas/vacuum port, ensure that it is not blocked during operation.

NOTICE - To reduce membrane contactor or system damage:

- In operation, if the membrane contactor is used with air sweep, then the temperature should not exceed 35°C (95°F). For membrane contactors used with vacuum only this statement does not apply.
- Care must be taken not to drop, hit or impact the contactor to minimize the possibility of product damage.
- 3M™ Liqui-Cel™ Membrane Contactors should be stored dry and in a sealed plastic bag or shrink wrap material to help prevent the introduction of contaminants into the contactor.
- Store 3M™ Liqui-Cel™ Membrane Contactors dry at temperatures < 49°C (120°F). Membrane contactors stored at very low temperatures < 5°C (41°F) should be allowed to equilibrate to room temperature before use.
- 3M™ Liqui-Cel™ Membrane Contactors should be stored in their original box, or other opaque box, and should not be installed where they are exposed to direct sunlight.
- Do not allow membrane contactors containing X40, X50 or X1ND hollow fiber membrane to come into contact with surfactants or organic solvents, such as pure alcohols, glycol, acetone, etc., to reduce the risk of membrane wet out.
- Cumulative exposure of the membrane to oxidants, such as ozone, chlorine, hydrogen peroxide, peracetic acid, etc., should be restricted to reduce the risk of membrane oxidation.
- Filtered, de-chlorinated, and deionized water is recommended for mixing cleaning solutions. If a pH shift occurs water containing sparingly soluble compounds of Ca, Mg, Fe, Al, etc. and silica (SiO₂) etc. could precipitate from the solution and block or damage the membrane. Ensure that your water is clean of these compounds.
- At end of life, dispose of the membrane contactor or cartridges in accordance with all applicable local and government regulations.

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ISO 9001



Liqui-Cel™
Membrane Contactors

Start-up Procedures

for 3M™ Liqui-Cel™ SP 1×3, 1×6 and 2×6 Series Membrane Contactors

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

Please read, understand, and follow all operating and safety information contained in this guide and the product data sheet prior to using this membrane contactor. Additional general operating information for membrane contactors can be found in the Operating Guide and should also be reviewed prior to using this membrane contactor. These documents are available at 3M.com/Liqui-Cel. Download and retain the instructions for future reference.

3M™ Liqui-Cel™ SP 1×3, 1×6 and 2×6 Series Membrane Contactors are not for use in food contact applications.



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Steps:

1. Mount the membrane contactor vertically or horizontally. Vertical orientation is recommended where possible.
2. These membrane contactors operate in vacuum only mode. The start-up procedure is the same for all products. The proper liquid and vacuum port connections must be made as illustrated below.

Notes:

- Use of metal connectors is not recommended.
- Prefiltration is recommended. Filtration requirements depend on operating conditions and the nature of the liquid introduced to the contactor. Contact your 3M representative for guidance.
- The liquid pressure should always be higher than the gas pressure inside the contactor.
- Liquid must flow on the shellside (outside) of the fiber.
- The vacuum port should not be closed off during operation. Never connect liquid or gas under pressure to the vacuum port as it may damage the membrane contactor.

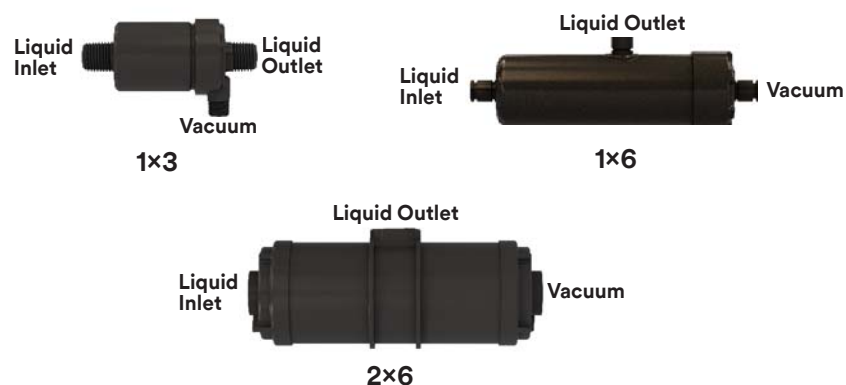
Correct Mounting Position and Port Identification

Vertically Mounted Module



(Other connection options may be available. Refer to product datasheets.)

Horizontally Mounted Module



Start-up Procedures

A. General start-up instructions for the liquid phase

Note: The gas/vacuum port should not be closed off during operation.

1. Connect the liquid inlet/outlet ports and the vacuum port as shown in the illustrations above. For 1×6 and 2×6, either liquid port can be used for the inlet.
2. Slowly introduce liquid into the contactor, making sure that the liquid inlet pressure and liquid flow rate through the contactor never exceed the respective maximum operating limits: The liquid must flow on the shellside of a 3M™ Liqui-Cel™ SP Series Membrane Contactor.
3. Adjust the liquid flow rate and inlet pressure to the desired levels by adjusting the appropriate valves on the system.

B. Vacuum

1. Start vacuum pump following the 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 (absolute pressure depends on gauge vacuum as well as barometric pressure).

Product	Maximum Pressure*	Maximum Flow Rate
1×3	25°C, 3.1 barg (77°F, 45 psig) 40°C, 1.0 barg (104°F, 15 psig)	60 ml/min
1×6	5-25°C, 4.1 barg (41-77°F, 60 psig) 75°C, 1.0 barg (167°F, 15 psig)	300 ml/min
2×6	UP Fiber 25°C, 4.1 barg (77°F, 60 psig) 50°C, 1.0 barg (122°F, 15 psig)	1000 ml/min
	UP II Fiber 25°C, 7.2 barg (77°F, 105 psig) 75°C, 1.0 barg (167°F, 15 psig)	

* using 50 torr (mm Hg) vacuum on vacuum port.

Guideline for Minimum Vacuum Pressure

Maintain a vacuum level such that the absolute pressure on the vacuum side (lumenside) of the membrane is higher than the vapor pressure of the most volatile component in the liquid (water or solvent, etc.) at the operating temperature.

For example, the vapor pressure of a water-based ink operating at a temperature of 25°C would be approximately 20-22 torr (mm Hg) absolute. In this case, the absolute pressure on the vacuum side should be approximately 25-30 torr or higher. Typically, pulling a vacuum deeper than 30 torr is NOT recommended.