



Start-up Procedures

for 3M™ Liqui-Cel™ MM 0.5×1 Series Membrane Contactors

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

Please read and follow all safety information, warnings and instructions in this manual. Failure to follow all product warnings and instructions could cause serious injury and property damage. Retain these instructions for future reference.

Intended Use and Product Selection:

3M™ Liqui-Cel™ Membrane Contactors are intended to remove dissolved gasses and bubbles from compatible liquids or to add gasses to a liquid stream. Liqui-Cel products are for use in industrial separation applications of industrial fluids only, in accordance with the applicable product instructions and specifications. 3M Liqui-Cel MM 0.5×1 Series Membrane Contactors are not constructed of US FDA Title 21 CFR § 174-186 compliant materials. Not for use in food contact applications.

Since there are many factors that can affect a product's use, the customer and user remains responsible for determining whether the 3M product is suitable and appropriate for the user's specific application, including user conducting an appropriate risk assessment and evaluating the 3M product in user's application.

Restrictions on Use:

3M advises against the use of these 3M products in any application other than the stated intended use(s), since other applications have not been evaluated by 3M and may result in an unsafe or unintended condition. Do not use in any manner whereby the 3M product, or any extractable or leachable from the 3M product, may become part of or remains in a medical device, drug, cosmetic, supplement, infant formula; or in applications involving life-sustaining medical applications or prolonged contact with internal bodily fluids or tissues.

Steps:

1. Mount contactor as shown below.
2. Refer to start-up procedures below for each mode of operation.

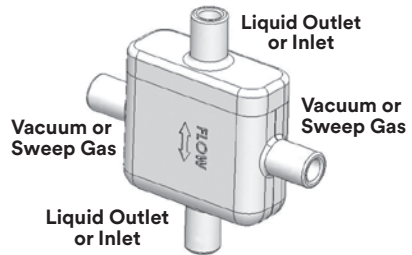
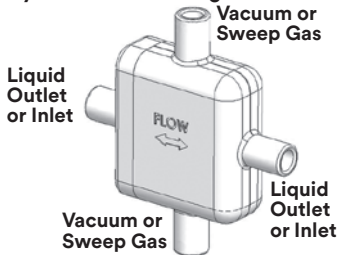
Notes:

- The liquid pressure should always be higher than the gas pressure inside the contactor.
- Liquids entering the membrane contactor should be prefiltered at 5 micron absolute at 99.9% removal (beta 1000).

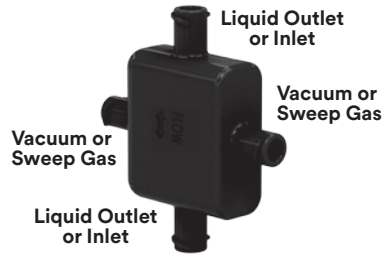
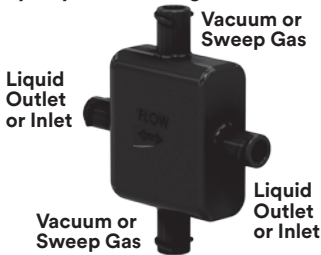
Correct Mounting Position and Port Identification

MM-0.5x1 Series

Polycarbonate Housing



Polyethylene Housing



Start-up Procedures

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

Note: Liquid flows on the shellside. The liquid pressure should always be higher than the gas phase pressure inside the contactor.

1. Connect the liquid in/out ports and the vacuum/sweep ports as shown in the diagrams above.
2. Slowly introduce liquid to the contactor, making sure that the liquid inlet pressure and liquid flow rate through the contactor never exceed the respective maximum operating limits.

B. General start-up instructions for the sweep (strip) gas and vacuum phase.

Sweep (Strip) Gas Mode

1. Set the gas pressure in the contactor to the lowest possible level by adjusting the appropriate valve in the gas delivery system.
2. Set the recommended sweep flow rate by adjusting the appropriate valves. The typical sweep gas flow rate range is 50-500 std. cc/min.
3. Introduce sweep gas into the contactor.

Note: If using compressed air, make sure it is oil free and air temp is < 35°C. A 0.2 micron filter is recommended with any gas.

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- 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 shell side and sweep or vacuum are applied to the lumen side for these 3M Liqui-Cel MM-Series Membrane Contactors.

Sweep (Strip) Gas with Vacuum (Combo) Mode

1. Set the gas delivery pressure to the contactor at ≤ 1 psig (0.07 barg).
2. Connect sweep gas to contactor via one of the ports marked Vacuum or Sweep Gas.
3. Start sweep flow and adjust flow rate by adjusting the appropriate valve. The typical sweep flow rate range in combo mode is 10-100 Std cc/min.
4. Connect vacuum to the contactor via the second port marked Vacuum or Sweep Gas.
5. Start vacuum pump.
6. Adjust absolute gas pressure on vacuum side to desired level.

Vacuum Only Mode

1. Start vacuum pump following vacuum pump manufacturer's instructions.
2. Apply vacuum to the membrane contactor by opening the appropriate valve. Vacuum can be applied to both gas ports together, or to one port while keeping the other port capped off.
3. Adjust absolute gas pressure on the vacuum side to the desired level at the vacuum port on the contactor.

Product	Maximum Pressure*	Maximum Flow Rate
0.5 × 1	3.1 barg, 25°C (45 psig, 77°F)	30 ml/min

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

SAFETY INFORMATION

Explanation of Signal Word Consequences

⚠ WARNING	Indicates a hazardous situation which, if not avoided, could result in serious injury or death.
NOTICE	Indicates a situation which, if not avoided, could result in product or system damage.

Read entire product manual. Failure to follow all product instructions and warnings could cause personal injury and/or property damage.

⚠ WARNING – To reduce the risks associated with liquid bursting or gas explosion and/or exposure to chemicals and membrane contactor damage:

- Do not exceed maximum operating pressure or temperature limits. Cleaning should be conducted at the minimal temperature and pressure required to clean the contactor, never exceeding the maximum operating pressure and temperature limits of the contactor.
- Implement workplace safety risk controls according to local applicable laws and regulations.
- Always use appropriate personal protective equipment (PPE) when installing, servicing, operating, cleaning or disposing of the membrane contactor.
- To prevent buildup of pressure inside the membrane contactor, do not block or valve off all gas/vacuum ports during operation or downtime.

To reduce the risks associated with fire and explosion:

- Do not introduce explosive, flammable, toxic or oxidizing liquids or gases in dangerous concentrations into the membrane contactor or the system.

NOTICE – To reduce membrane contactor or system damage:

- Care must be taken not to drop, hit or impact the membrane contactor.
- 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.
- To avoid contamination of the process fluid, gloves are recommended when handling the membrane contactors.
- 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 membrane contactor.
- 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.
- Store 3M Liqui-Cel Membrane Contactors dry at temperatures < 50°C (122°F), but preferably at lower temperature such as <35°C (95°F), to not risk reduced lifetime. Membrane contactors should always be stored above freezing temperatures, and if stored at low temperature, they should be allowed to equilibrate to room temperature before use.
- Do not allow membrane contactors containing microporous hollow fiber membranes to come into contact with surfactants, oil, or organic solvents, such as pure alcohols, glycol, acetone, etc., to reduce the risk of membrane wet out. SP-series membrane contactors containing polyolefin membrane are not subject to this restriction.
- 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, and silica (SiO₂) etc. could precipitate from the solution and block or damage the membrane. Ensure that your water is free of these compounds.
- 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.

ATTENTION:

Disposal

At end of life, dispose of the membrane contactor or cartridges in accordance with all applicable local and government regulations.

Hazards from Chemicals

The chemicals that User selects to use in connection with the membrane can present their own hazards. User should follow all safety information and related requirements provided by the chemical supplier and applicable regulations, as well as conduct User's own workplace safety, hazard and application assessment. This document cannot and does not address all safety and/or safe handling requirements that different chemicals could present. User is responsible for ensuring that chemicals are only used by persons familiar with their use and hazards (for example, personnel who have received hazardous material training), and who have the appropriate protective equipment as specified in their organization's safety program and the chemical's safety datasheet (SDS). User 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 such chemicals.

Product Selection and 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. As a result, customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's application, including conducting a workplace hazard assessment and reviewing all applicable regulations and standards (e.g., OSHA, ANSI, etc.). Failure to properly evaluate, select, and use a 3M product and appropriate safety products, or to meet all applicable safety regulations, may result in injury, sickness, death, and/or harm to property.

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