

Horizontal Installation Adds Additional Degree of Design Flexibility

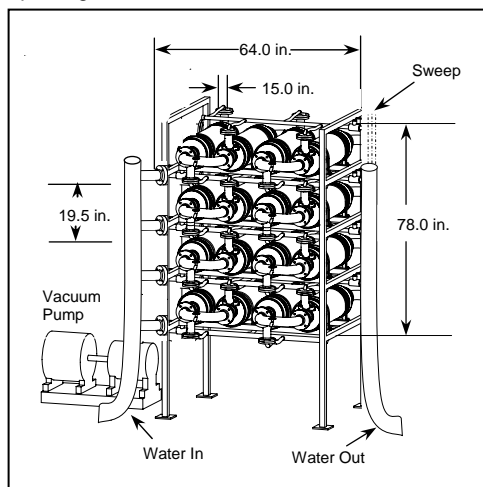
Liqui-Cel® Membrane Contactors offer a number of features and benefits over conventional technology. This is especially true in terms of system design and layout. Liqui-Cel Membrane Contactors are inherently modular in their design. This means that systems can be custom designed to fit into existing footprints.

Many applications have incorporated membrane contactors mounted in a vertical position. Studies have now proven in laboratory and field use that Liqui-Cel Membrane Contactors can also be installed in a horizontal position. This capability provides design engineers with additional options in system layout. Horizontal mounting can significantly simplify piping requirements that can translate into lower system costs. A typical layout of a 4x4 system (four contactors in series is shown in Figure 1).

Design Considerations –One of the advantages of Liqui-Cel Membrane Contactors is the simplicity of system design. Mounting the contactors horizontally also allows for a straightforward system layout. Listed below are a few design tips and guidelines when planning a system with horizontally mounted contactors:

- a) Mounting brackets are not needed. The contactors can be simply strapped to the frame in a manner similar to reverse osmosis housings.
- b) This can significantly reduce

Figure 1. As can be seen in this drawing, horizontal mounting allows the membrane contactors to be arranged in a very compact package.



piping costs. Leaving a space of 19 inches between each contactor housing will allow the cartridges to be replaced with the housing remaining in place.

- c) If the combo mode of operation (*sweep gas in combination with a vacuum source*) is to be used, the lumenside ports should be oriented 180° apart. The contactor housing should then be installed with the sweep gas inlet connection in an upward position and the sweep outlet connection positioned downward. (See Figure 2.) In this configuration, any condensation that forms will be prevented from flowing into the sweep gas piping and will be continuously swept from the lumens and out the contactor assembly. If a

liquid ring vacuum pump is used, this condensation can flow directly into the pump.

d) If the Liqui-Cel Membrane Contactor system is to be operated using only a sweep gas (*sweep gas mode*), the lumenside ports should be oriented 180° apart as described above. Similarly, the sweep gas inlet connection should be pointed upward.

e) A system using only a vacuum source (*vacuum only mode*) should have the lumenside ports oriented in the same position (See Figure 3). The contactor housing should then be installed with these ports pointing downward. These connections should be piped into a common manifold that is attached to the vacuum source. As described above this allows any condensation to be drained from the housing. Again, a liquid-ring vacuum pump can accommodate this consideration.

f) Membrana recommends that lumenside port orientation be specified when placing orders. This allows each contactor assembly to be fully tested in its intended configuration prior to shipment.

Liqui-Cel Membrane Contactors offer the design engineer many advantages as compared to conventional technologies. Installation options are just one of these advantages.

For more information contact your Membrana representative.

Figure 2: Combo Mode Sweep Mode

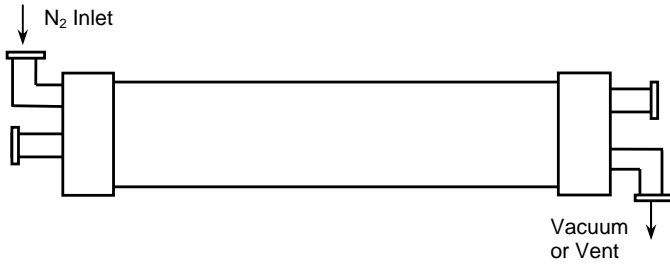
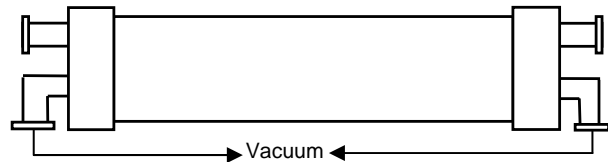


Figure 3: Vacuum Only Mode



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Membrana - Charlotte
A Division of Celgard, LLC
13800 South Lakes Drive
Charlotte, North Carolina 28273
USA
Phone: (704) 587 8888
Fax: (704) 587 8585

Membrana GmbH
Oehder Strasse 28
42289 Wuppertal
Germany
Phone: +49 6126 2260 - 41
Fax: +49 202 6099 -750

Japan Office
Shinjuku Mitsui Building, 27F
1-1, Nishishinjuku 2-chome
Shinjuku-ku, Tokyo 163-0427
Japan
Phone: 81 3 5324 3361
Fax: 81 3 5324 3369

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