CODELINE MULTI-PORT™ HIGHT FLOW MEMBRANE HOUSINGS

Your Path to Reducing System Cost by Using Multi-port™

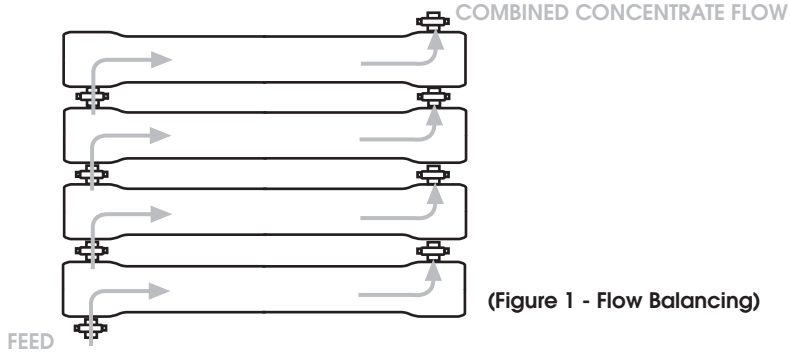
By now most end users, designers and builders of membrane separation systems are familiar with CodeLineTM side-ported FRP housings. With over100,000 units in service, we have leaded the industry in helping reduce the cost of membrane systems around the world.
As CodeLine TM has continued to advance side-porting technology, we have focused on developing products that help further reduce systemcost. With this being the case, CodeLine TM is proud to announce Multi-portTM Membrane Housings with 3" Port.

What can it do for your system?
Multi-porting is a term used to describe membrane housing that feature more than one feed or concentrate port per end. For example, two or three ports in the feed end of a membrane housing. Multi-porting allows vessels to be directly linked together. This powerful feature offers the opportunity to eliminate traditional manifolds resulting in potential system cost savings. While the cost reduction aspect of this technology is enticing, system performance must be carefully evaluated to assure that improper port sizing does not compromise long-term system performance.
While using High Flow-ported housing is not difficult, there are many variables that need to be properly addressed before vessels can be specified. To help ensure the performance of your system, please carefully consider the guidelines and pressure drop data on the following pages when attempting to eliminate external manifolds.

Detailed Guidelines for Using Multi-portTM High Flow

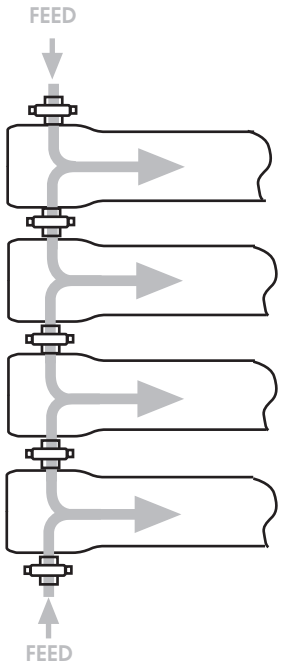
Membrane Housings to Eliminate Manifolds
CAUTION: - The following are Guidelines only. They are intended to aid thePurchaser when using the Multi-portTM feature to eliminate manifolds. It is the system designer's responsibility to evaluate the specific applicationand carefully consider these guidelines when sizing ports.
Improper port sizing could lead to poor system performance and/or damage to membrane elements. Please contact Hytek Technical officeif clarification of these Guidelines is required.

Evaluate the pressure drop across each vessel plenum as this will affect the permeate and concentrate flows in each vessel. Typically, the feed and concentrate manifolds connecting to a number of vessels are designed to minimize variations in flow through the vessels. This is accomplished by assuring that the pressure through out a manifold is nearly equal. The greater the differential across a particular manifold, or set of manifolds, the greater the potential for variations in the average feed pressure as well as the differential pressure across the different vessels in a pass. These factors will affect the flow of the product as well as the flow through the vessels.
The same considerations apply when attempting to eliminate manifolds by linking vessels directly together using Multi-portTM vessels. In this case, the pressure drop across the vessel plenum, as well as the entrance and exit losses through the side ports, must be considered. To simplify this process, we have provided calculated test data, which quantifies the total pressure, drop versus the flow ratefor various size ports.
Flow balance the system by taking the combined concentrate flow from the last vessel in a particular pass. This practice is commonly used when multiple filters are connected in parallel. If the feed comes in the first vessel, the combined concentrate should exit the last vessel.
The feed pressure to the last vessel will always be less than the feed pressure to the first vessel. By flow balancing, the concentrate pressure of the last vessel will also be the lowest of any vessel. This tends to keep the pressure drop across all vessels to be as close as possible. The flow pattern is shown in Figure1.



(Figure 1 - Flow Balancing)

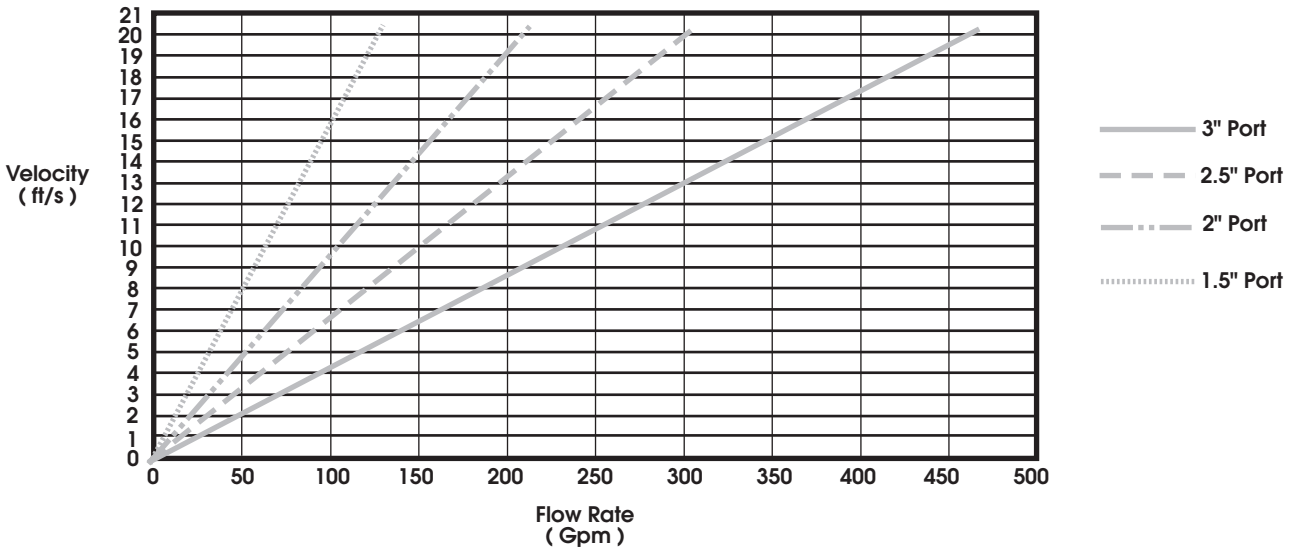
The down side of this arrangement is that it will cause the average feed flow pressure between the first and last vessel to be the at a maximum value, thus affecting permeate flow in the last vessel..
For simplicity of piping, some customers may desire to take combined concentrate flow from the first vessel in a particular pass. This will result in alower differential pressure and thus a lower concentrate flow in the last vessel.
While this practice is less conservative than flow balancing, it has been successfully used in some systems. In any event, the performance of the membranes in each vessel should be checked to confirm that all are within the membrane manufacturer's guidelines.
Consider feeding from both sides or the center of a pass if the differential pressure when feeding from one side would be excessive. By splitting the feed flow the velocity will be reduced by one half and the pressure drop by an even greater amount since the pressure drop is proportional to the square of the flow.
Feeding from both sides may be most economically feasible where the pressure is low enough to use plastic pipe. This option is shown inFigure 2.

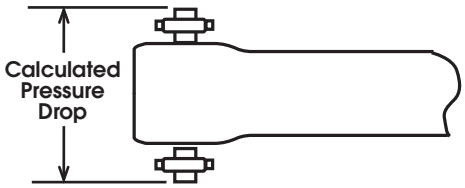


(Figure 2 - Both Sides)

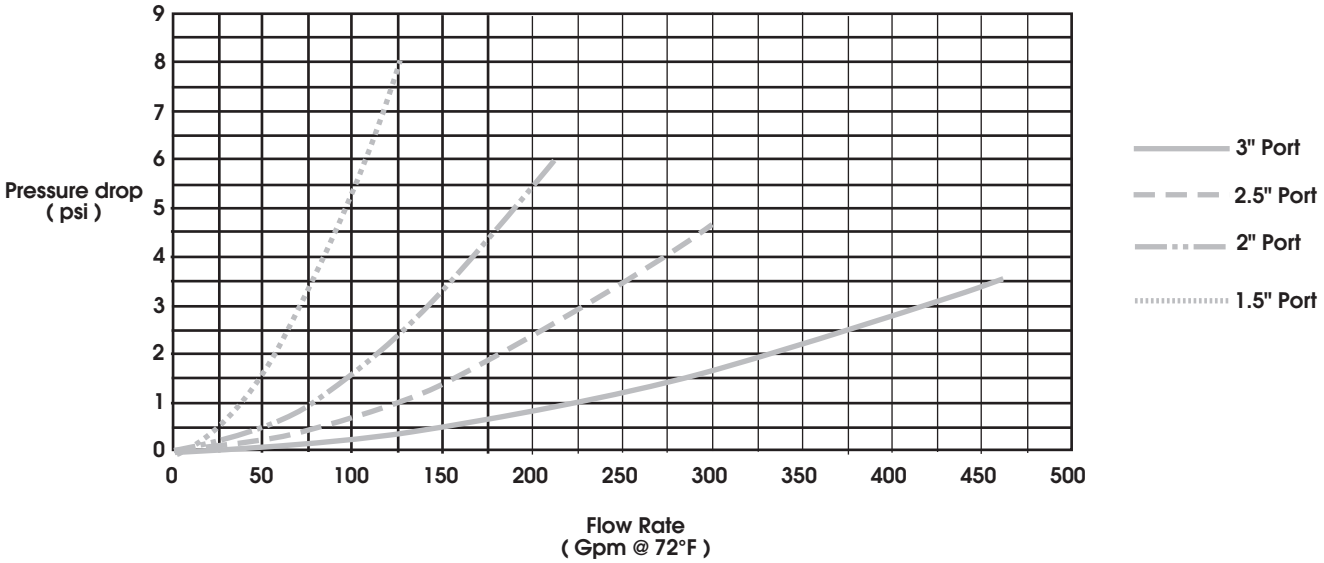
Check with your membrane supplier for evaluation of membrane performance of your proposed system. When properly sized, use of Multi-portTM vessels to eliminate external manifolds will have little if any affect on over all system performance.
However, as pressure drops are increased, systems that are already being operated close to the edge of recommended conditions may experience problems within one or more vessels.
It is therefore recommended that worst case conditions be evaluated carefully in conjunction with your membrane supplier. Consider the effects of higher velocities that may occur during special situations such as flushing or cleaning. It is sometimes advantageous to flush or clean systems at velocities higher than normal.
These situations must be carefully considered when selecting portsizes.
Pressure drops may be considerably increased under such conditions.
Pressure drops across the plenum of a vessel will always be greater than through an equal length of straight pipe of the same size as the port. For this reason you should always select ports at least equal to, and possibly greater than, the size of pipe you would use if manifolds were external.
Do not reduce the size of the feed/concentrate ports in a particular pass, unless you have carefully evaluated the affect on system performance of such reductions. (For brackish water desalination at the recovery above 65% the brine discharge connection size may be reduced as compared to the feed connection size.) Unlike with external manifolds, it is easy to reduce the size of ports of vessels, which are linked together.
The feed port may be one size and the port directly opposite it can be specified a smaller size.
This however could lead to excessive pressure drops. Again, evaluate the affects of such a design carefully. Do not exceed traditional flow velocities.
Even though the pressure drop across each vessel may be acceptable, the velocity of the water through each port must also be evaluated.
It is suggested that the water velocity throughout the entire system be checked for proper velocity, however, the first connection fromthe feed source is typically where problems can occur. While the length of each feed port is very short, velocities in excess of 11 Ft. per second should be avoided to help ensure proper system performance. For your convenience, we have included the published velocities for schedule 40 pipe in this bulletin.
Do not assume, because a set of vessels can be manifolded together, that CodeLine TM recommends or endorses such use in your particular application.
Used properly, multi-porting with 3" ports opens up a whole New World of potential cost savings. With this opportunity comes a responsibility to carefully evaluate projected membrane performance.
CodeLine TM recommends that you work directly with you membrane supplier to obtain approval of your proposed

Flow Rate V/s Velocity Schedule 40 pipe





Flow rate V/s Pressure Drop



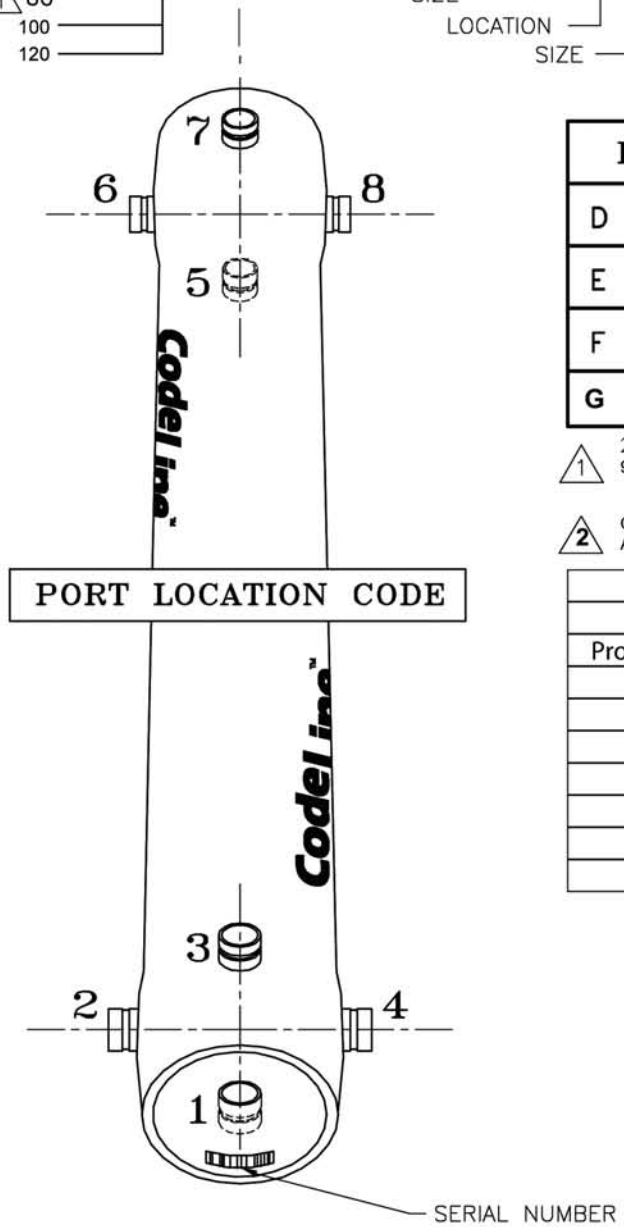
OCTA Series ☐

MODEL

- 15
- 30
- 45
- ⚠1 60
- 100
- 120

☐☐☐☐☐☐ LOCATION / SIZE / LOCATION / SIZE / LOCATION / SIZE

☐☐☐☐☐☐ LOCATION / SIZE / LOCATION / SIZE / LOCATION / SIZE



PORT SIZE CODE	
D	1 1/2" GROOVED END
E	2" GROOVED END
F	2 1/2" GROOVED END ⚠1
G	3" GROOVED END ⚠2

Material	
316L	
CN3MN	

⚠1 2-1/2" & 3.0" PORTS ARE NOT ALLOWED 90 DEGREES FROM ANY PORT

⚠2 CONSULT YOUR SALES MANAGER ABOUT SPECIFICATIONS ON 3" PORTS.

Date	
Customer	
Project Name / Number	
P.O. Number	
Ship to Address	
ASME	
Membrane	
Heads	
Sanitary ports	
Others	

For Internal Use Only	
S.O. Number	
Ship Date	

CodeLine™
Pentair Water

Approved by CUSTOMER: _____

PLEASE FAX THIS SHEET WITH YOUR ORDER TO: CODELINE CUSTOMER SERVICE DEPT.

www.codeline.com

ORDER SPECIFICATION SHEET CODELINE OCTA SERIES

SIZE AND LOCATION OF PORTS