

STERLITECH™ HP4750X STIRRED CELL



INSTRUCTION MANUAL

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DESCRIPTION

1.1 Specifications

Operating Parameters:

Membrane Size:	49 mm diameter (1.93 inches)
Active Membrane Area:	14.6 cm ² (2.26 inches ²)
Processing Volume:	300 mL
Hold-Up Volume:	1 mL
Maximum Pressure:	172 bar (2500 psig)
Maximum Temperature:	205°C (400°F) at 138 bars (2000 psig)
PH Range:	Membrane Dependent

Connections:

Permeate Outlet:	1/8-inch diameter 316L SS
Pressure Inlet:	¼-inch FNPT

Wetted Materials of Construction:

Cell Body:	316L Stainless Steel
O-Rings:	Viton or PTFE (Teflon)
Gaskets:	Viton or PTFE (Teflon)

Dimensions:

Cell Diameter:	7 cm (2.75 inches)
Cell Height:	22.4 cm (10.0 inches)

1.2 General Description

The Sterlitech HP4750X Stirred Cell is designed and manufactured to provide many years of trouble-free operation. The HP4750X Stirred Cell is just one of a number of products that Sterlitech manufactures for membrane research and small-scale production. The instruction manual describes the functions, features, configuration, start-up, and operation of the HP4750X Stirred Cell.

1.3 Function

HP4750X Stirred Cell is a high-pressure chemical resistant stirred cell that performs a wide variety of membrane separations. With a maximum pressure rating of 172 bar (2500 psig) at ambient temperatures, the HP4750X Stirred Cell is ideally suited for reverse osmosis (RO) filtration. The cell also performs nanofiltration (NF), ultrafiltration (UF), and microfiltration (MF) separations. Stainless steel construction and chemical resistant components make the HP4750X Stirred Cell an ideal choice to filter aqueous and non-aqueous solutions.

1.4 Design Parameters

The HP4750X Stirred Cell design parameters were based on ASME Boiler and Pressure Vessel Code Section, VIII, Division I, Rules for Construction for Pressure Vessels.

1.5 Features

In addition to its high-pressure capabilities, the HP4750 Stirred Cell has been specifically designed for ease of use. Some of the unit's features are:

1.5.1 Unique Design

The top of the cell is easily removed to fill the vessel with up to 300 mL of solution. The bottom is removable for easy membrane change-out. The design enables low hold-up volume of 1mL to prevent waste of valuable solutions.

1.5.2 High Pressure Operations

The HP4750X Stirred Cell can complete a variety of separations from microfiltration to reverse osmosis. The standard cell is designed for safe operation to 172 bar (2500 psig).

1.5.3 Inert Gas Pressure Source

Standard sources of compressed air or inert gas allow variable, safe, and consistent supply of pressure to perform separations. Volatile solutions can be processed safely because of HP4750X Stirred Cell does not require a pump to supply operating pressure. Pressure regulators and relief valves are available from Sterlitech.

1.5.4 Mechanical Stirring Mechanism

Sterlitech can provide an optional mechanical stirrer to be used with the HP4750X

1.5.5 Accepts Standard Membrane Disks

HP4750 Stirred Cell accommodates any 47-50 mm diameter membrane disk. For convenience, Sterlitech offers precut and packaged membranes in single type or assortment packs, from a wide selection of RO, NF, UF, and MF membranes.

1.5.6 Autoclavable

All components are fully autoclavable and sterilizable.

2.0 PREPARATIONS AND START-UP

2.1 Shipment Verification

Verify that the shipment is complete, intact and undamaged. A complete system should include:

- A stainless steel Cell Body
- Cell Bottom
- Cell Top
- 10 - 5/16" Cap Screws
- 1 - 5/16" T-Handle Allen Wrench
- Porous Stainless Steel Membrane Disk
- Two O-rings
- Top Gasket

2.2 Membrane Loading

Insert the O-rings in the bottom of the Cell Body. (Photo 1)

Check to be certain that the O-rings fit properly in the grooves. Wet the O-rings with a small amount of water or the fluid to be processed. Place a piece of precut membrane over the center o-ring. (Photo 2)

In general, membranes coated on substrate have a shiny, active side and a dull, substrate side. The membrane should be installed with the active side toward the Cell reservoir. If

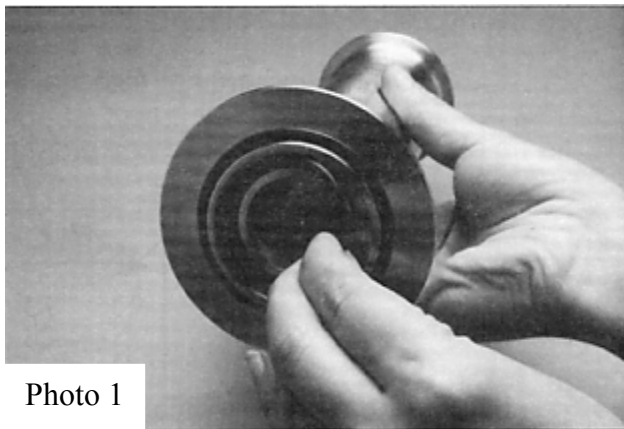


Photo 1

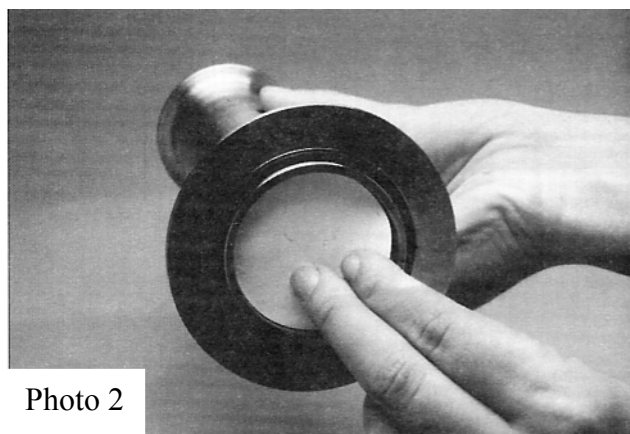


Photo 2

you cut your own membrane, the stainless steel porous disk can be used as a template. Use of a smooth, flat piece of polyethylene as a cutting surface and a single-edged razor blade will allow manual cutting of most membranes.

NOTE: Once most membranes are wetted with water or solvent, they should not be allowed to dry in order to prevent performance loss.

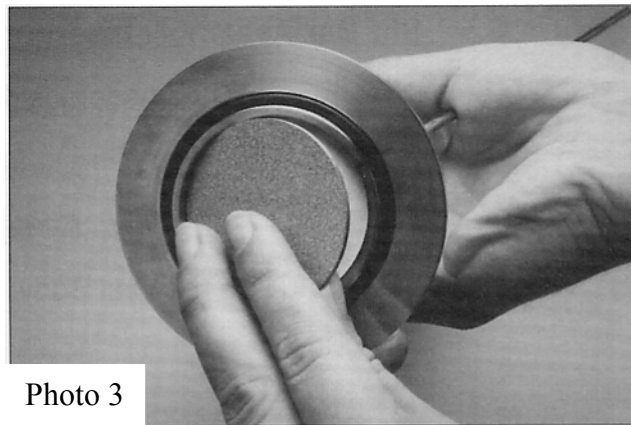


Photo 3

2.3 Porous Support Disk Loading

Place the stainless steel Porous Membrane Support Disk on top of the membrane to hold the membrane in place. (Photo 3)

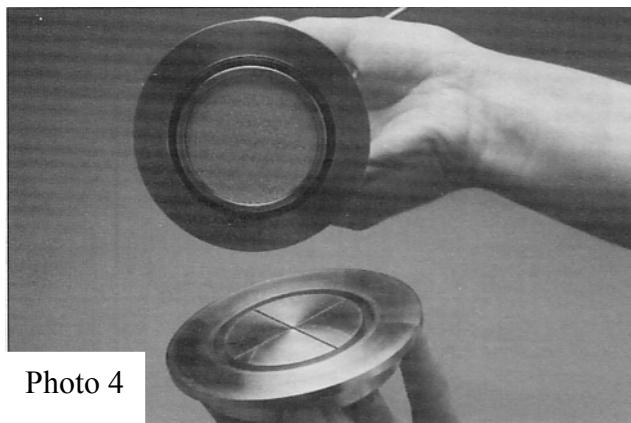


Photo 4

2.4 Cell Bottom Insertion

Fit the Cell Bottom onto the Cell Body, aligning the circular grooves with the circular ridge on the bottom of the Cell Body. (Photo 4) Use the five (5) Cap Screws to attach the Cell Bottom to the Cell Body. Tightening the Cap Screws requires 14-20 foot-pounds of torque for 172 bar (2500 psi) operation.

2.5 Cell Top Insertion

Insert the gasket on the top of the Cell Body, making sure it fits properly in the grooves. (Photo 5) Secure the Cell Top to the Cell Body using the five (5) Cap Screws. Tightening the Cap Screws requires 14-20 foot-pounds of torque for 172 bar (2500 psi) operation.

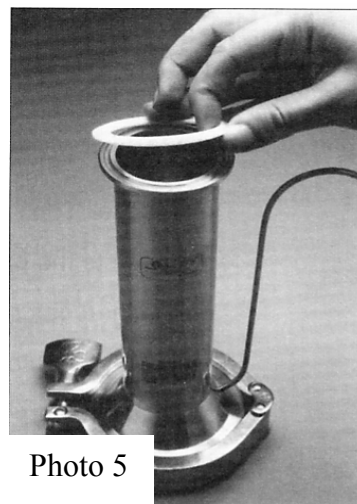


Photo 5

2.6 Gas Pressure Source Hook-Up

The HP4750X Stirred Cell is activated by compressed air or inert gas pressure source. Attach the High Pressure Hose to the fitting on the Cell Top. Connect the other end of the hose to the pressure regulator assembly on the inert gas supply or the compressed air supply. Photo 6 illustrates installation of the gas pressure source. The compressed air or inert gas source selected will determine regulator style and pressure requirements.



Photo 6

3.0 OPERATION

3.1 Pressure Source and Stir Plate Activation

Place a Permeate Collection Vessel (user-supplied) under the Permeate Tube. Gradually pressurize the HP4750X Stirred Cell, checking for leaks. Foreign material on the surface of the seals and insufficient tightening are most common causes for leakage.

3.2 Optional Mechanical Stirrer

See Photo 7 for stir bar and propeller set – up. See Photo 8 for stirrer stand and cell operation. An additional manual is available for information on the mechanical stirrer



Photo 7

3.3 Separation Completion

Upon completion of filtration, turn off the pressure source and depressurize the unit. Slowly open the pressure discharge port allowing the system to depressurize.

CAUTION: *Do not depressurize the HP4750X Stirred Cell by loosening the bolts.*

3.4 Cleaning

The HP4750X Stirred Cell can be cleaned with a variety of cleaners, including detergents, solvents, caustic, acid, enzyme cleaners, etc. Choice of the appropriate cleaning regime should also consider the compatibility of the gasket and O-ring material.

4.0 ACCESSORY AND SPARE PART ORDERING INFORMATION

See the Sterlitech Corporation website (www.sterlitech.com) or call 1-877-544-4420 for information on accessories or spare parts.

5.0 MEMBRANE INFORMATION

See Sterlitech website www.sterlitech.com or call 877-544-4420 or 253-437-0844.

6.0 RETURN MATERIAL ORDER (RMO) PROCEDURE

If materials are to be returned to Sterlitech for repair, evaluation, or warranty consideration, an RMO number and form must be obtained from Sterlitech prior to the return. Contact Sterlitech's Customer Service Department for these forms.



Photo 8

The form must be completed and returned with the material. Be sure to include a complete, detailed written reason for the return. Also, include serial numbers, installation and removal dates, and any other pertinent information that is available. HP4750X Stirred Cells have a serial number imprinted on the Cell Body.

Indicate the proposed disposition of the material, and reference the RMO number on all packages or cartons. All material must be shipped to Sterlitech with freight prepared by the customer.

7.0 WARRANTY

The following is made in lieu of all other warranties expressed or implied. Sterlitech, Corp guarantees equipment to be free from defects in material and workmanship when operated in accordance with written instructions for a period of one year from receipt. Parts not manufactured by Sterlitech are covered by their manufacturer's warranties, which are normally for one year.

Manufacturer's and Seller's only obligation shall be to issue credit against the purchase or replacement of equipment proved to be defective in material or workmanship. Neither manufacturer nor seller shall be liable for any injury, loss or damage, direct or indirect, special or consequential, arising out of the use of, misuse, or the inability to use such product.

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MEDIA COMPATIBILITY CHART

The following O-ring and gasket compatibility chart is provided as an aid in selecting a specific synthetic rubber compound for a particular application situation. Operating conditions and environment must also be considered in determining the media suitability.

For recommendations regarding fluids not listed, consult Sterlitech. The recommendations represent compatibility of materials only and do not necessarily constitute a recommendation for use in a specific application.

TABLE 1

<u>CODE</u>	<u>COMPOUND</u>	<u>TEMP RANGE</u>
BN	Buna-N	-40 to 120°C (-40 to 250°F)
EP	Ethylene-Propylene	-50 to 150°C (-65 to 300°F)
V	Viton	-30 to 205°C (-20 to 400°F)

<u>MEDIA</u> (Liquid or Gas)	<u>CODE</u>	<u>MEDIA</u> (Liquid or Gas)	<u>CODE</u>
Acetic Acid, Glacial	EP	Fatty Acids	V
Acetone	EP	Fatty Oil	BN
Aluminum Salts	BN	Glycols	EP
Ammonium Hydroxide	EP	Grease and Oils	BN
Ammonium Salts	BN	N-Hexane	BN
Amyl Alcohol	EP	Hydrazine	EP
Aniline Dyes	EP	Hydrochloric Acid	EP
Aromatic Fuel – 50%	V	Hydrofluoric Acid	EP
Benzene	V	Hydrogen Peroxide	V
Bleach Liquor	EP	Kerosene	BN
Butanol (Buty Alcohol)	BN	Linseed Oil	BN
Butyl Cellosolve	EP	Methyl Ethyl Ketone	EP
Carbon Disulfide	V	Mineral Oils	BN
Carbon Tetrachloride	V	Naphthas	V
Cellosolve	EP	Octyl Alcohol	EP
Chlorinated Solvents	V	Peanut OilB	N
Crude Oil	V	Phenol	V
Cutting Oil	V	Pyridine Oil	EP
Decane	BN	Sewage	BN
Denatured Alcohol	BN	Sodium Acetate	EP
Detergent, Water Solution	BN	Sodium Chloride	BN
Diesel Oil	BN	Stoddard Solvent	BN
Diethylene Glycol	EP	Sulfuric Acid	V
Dry Cleaning Fluids	V	Tannic Acid	BN
Organic Ester	EP	Tertiary Butyl Alcohol	V
Ethyl Alcohol	BN	Titanium Tetrachloride	V
Ethylene Glycol	EP	Transmission Fluid	BN
Ethyl Hexanol	BN	Trioctyle Phosphate	EP
		Varnish	V
		Water (Demineralized)	BN