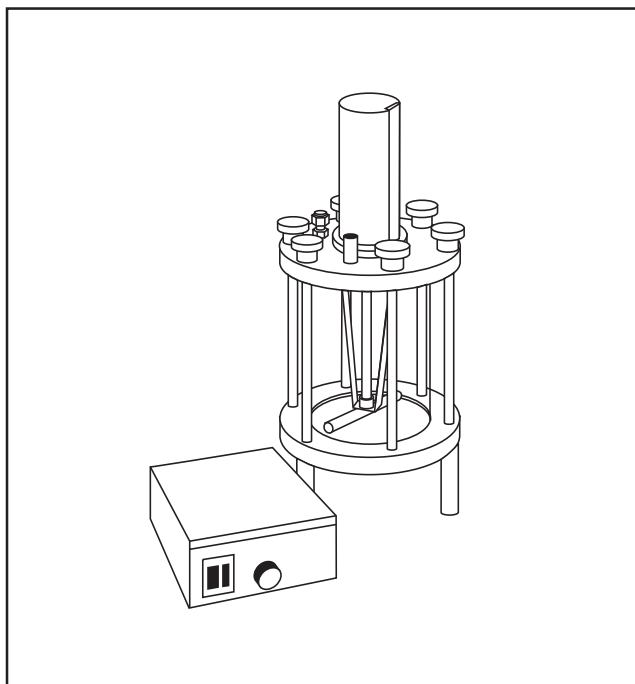


Model 2000

High-performance Ultrafiltration Cell

Models 2000, 2000A, 2000B



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Product Overview

The 2000 series of internally stirred ultrafiltration cells are designed for rapid concentration or purification of macromolecular solutions in volumes up to 2000 mL. All models feature stainless steel construction and include a built-in, replaceable stirring motor controlled by a separate solid state power supply. Speed settings are continuously variable from 0 to 340 RPM ($\pm 9\%$). The motor is magnetically coupled to a stirring bar which maintains fluid movement during operation, thereby reducing the negative effects of concentration polarization (i.e., the buildup of concentrated solutes on the membrane). Typical flux for the 2000 series of stirred cells ranges from 600 to 800 mL/hr.

Model 2000 stirred cells are intended for use only with Millipore 150 mm membrane discs.

Models Available

- **Model 2000** (Catalogue No. 5111): Transparent acrylic sleeve; power supply is switched for operation at 120V, 50–60 Hz.
- **Model 2000A** (Catalogue No. 5112): Transparent acrylic sleeve; power supply is switched for operation at 230V, 50–60 Hz.
- **Model 2000B** (Catalogue No. 5113): Teflon[®]-coated stainless steel sleeve; power supply is switched for operation at 120V, 50–60 Hz.

NOTE: The operating procedure for all models is the same, except where noted. Unless indicated otherwise, all cell internal parts are Teflon-coated stainless steel.

Setup

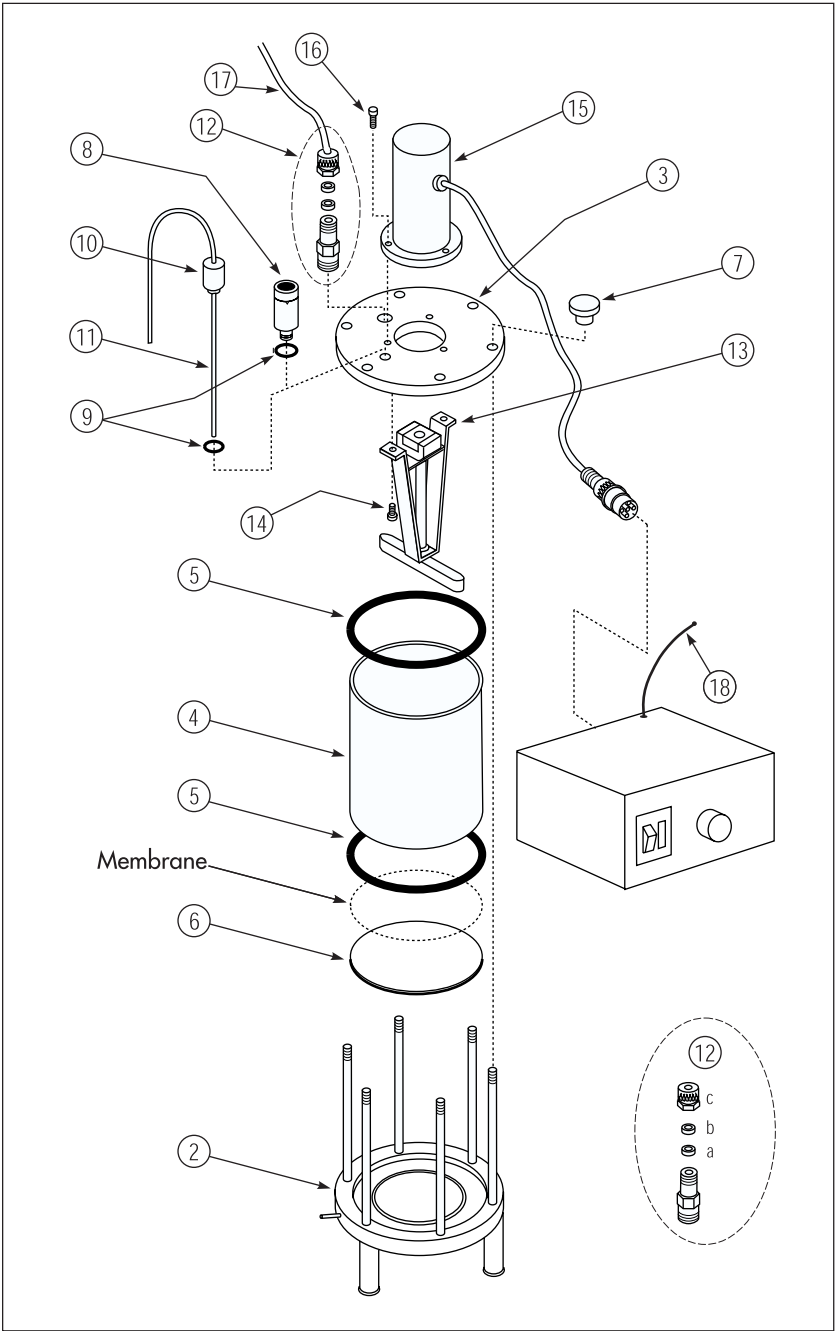
The following pages present an easy, step-by-step guide on how to prepare the Model 2000 stirred cell for operation. Except where noted, the assembly procedure is identical for all cell models. Before adding your sample, be sure to check the “Operating Guidelines” section for additional information on how to achieve optimum results with the Model 2000 ultrafiltration cell.

NOTE: Before proceeding, be sure to prepare the membrane disc according to packaged instructions.

Parts List

Item No.	Catalogue No.	Description	Basic Unit	Spare Parts
1	4432701	Power supply/controller for Models 2000, 2000A, 2000B (Cat. Nos. 5111, 5112, 5113)	1	
2		Bottom cap assembly	1	
3		Top cap assembly	1	
4	2001606 or 2005702	Sleeve/cylinder, acrylic Sleeve/cylinder, Teflon-coated stainless steel	1 or 1	
5	2359S	O-ring Gasket, silicone	2 or 2	2 or 2
6	2000209	Porous support disc	1	2
7	15236	Knob (knurled)	6	
8	1002101	Fill port plug/pressure relief valve	1	
9	2015B	O-ring	2	2
10	20150	Withdrawal fitting/plug		1
11	4500502	Tubing, Teflon	3 ft.	*per ft
12	4200301	Fitting (male connector)	1	
12a	4203403	Ferrule, front		2 ea.
12b	4203404	Ferrule, back		2 ea.
12c		Not available separately		
13	15018 20117 2092401 20197 20213 21474 4001701	Stirring assembly – consists of: Paddle Washer Shaft Shaft frame Magnet lock-nut Magnet Bearing	1	
14	4001302	Round head screw	2	
15	15017AM	Motor housing assembly	1	
16	11137901	Screw	4	
17	XXPE00010	Pressure tubing, ¼", red, replacement only		10 ft.
18	4400511 or 4400512	Cord set, 2000 and 2000B Cord set, 2000A	1 or 1	

* When ordering this tubing as a spare part, use cat. no. 4500502 and specify how many feet of tubing will be needed. Three feet is the minimum length necessary in order for the unit to function properly.



To install membrane disc:

1. Unscrew the six knurled knobs and lift the top cap assembly, sleeve, and the O-ring or gasket from the unit's base.
CAUTION: Avoid scratching the Teflon-coated surfaces.
2. Place selected membrane on porous support disc, **GLOSSY SIDE UP**; then position O-ring or gasket on top of membrane. Be sure to handle the membrane only by its edges.
3. Set sleeve into base, on top of O-ring or gasket. Insert remaining O-ring in recess in top cap, then slide the entire top cap assembly over studs and onto sleeve.
4. Refasten knurled knobs, simultaneously hand tightening each pair of **DIAMETRICALLY OPPOSITE** knobs (use both hands).

Operating Guidelines

- For best macromolecular partition operate ultrafiltration cell with dilute solutions at low pressure. Predilute process solution and reduce system pressure to 10 psi (0.7 atm) if separation is inadequate. (The improved results usually justify the additional processing time required.)
- Highly viscous solutions filter slowly, as do solutions containing particulate matter such as colloids. In applications where the viscous agent (e.g., sucrose, glycerin) is being removed, the flow rate can often be increased by prediluting the process solution.
- Solutions containing particulate matter, such as cell debris or precipitates, should be prefiltered or centrifuged beforehand.
- Be sure to follow membrane instructions regarding proper cleaning procedures, storage, and chemical compatibility.

Temperature Resistance

DO NOT subject acrylic sleeve to temperatures above 120 °F (49 °C).

NOTE: When operated at elevated temperatures, the cell's porous support material may require frequent replacement.

Chemical Compatibility

Model 2000 system components are **NOT** resistant to the chemicals indicated below. Consult a standard text for specific compatibilities.

Acrylic Sleeve

Avoid contact with alcohols, organic solvents (phenols, esters, ketones, ethers, benzene, toluene, DMF, aniline, acetone, etc.).

Delrin® Plastic Components

DO NOT use with acids, bases, oxidizing agents.

Stainless Steel Components

Avoid contact with strong acids (pH<1), alkalis (pH>10), halogenated or aromatic hydrocarbons.

Operation

1. Unscrew fill port plug/pressure relief valve and slowly add process solution to cell. When finished, make sure small O-ring is correctly positioned in cell; then replace plug and hand tighten.
2. Insert pressure tubing into top cap fitting. Hand tighten hexagonal nut; then use a wrench to tighten an additional 1½ turns. Connect free end of tubing to a pressure source or a pressurized liquid reservoir.
3. Pressurize system as desired (see membrane operating instructions for pressure limitations).

WARNING: A hood is strongly recommended when filtering virulent or corrosive solutions.

4. Plug stirrer motor cable into jack on system power supply; then connect power supply to a properly grounded power outlet (either 110–120V, 50–60 Hz or 230V, 50–60 Hz, depending on cell model).

CAUTION: Before proceeding, be sure to recheck selector switch on rear of unit for proper voltage.

5. Start stirrer by pressing white on/off rocker switch to on; adjust speed as desired via control knob on power supply.

NOTE: DO NOT activate stirrer without liquid in reservoir. Liquid vortex should not extend deeper than 1/3 of the liquid volume.

To shut down:

1. Turn off stirrer.
2. Turn off nitrogen pressure source. Slowly rotate upper portion of pressure-relief valve/fill-port plug to vent system pressure.
3. Unscrew fill-port plug/relief valve.

To remove solution:

1. Make sure small O-ring is in place at base of supplied withdrawal fitting; then insert fitting into port hole and **HAND TIGHTEN**. Withdrawal tubing should reach cell bottom.
2. Apply 5–10 psi (.3–.7 atm) pressure to force solution out through withdrawal tubing. **Viscous solutions may require slightly higher pressures.**

NOTE: Proteins or enzymes will occasionally adhere to the membrane surface. To redissolve these retained materials, vent system pressure, then add a small volume of saline or buffer to cell. Reactivate stirrer and run at slow speed for a few minutes.

Accessory Equipment

- **Model CDS10 Concentration/Dialysis Selector** (Catalogue No. 6003). For instant valving from concentration to rapid dialysis (diafiltration).
- **Model MF2 Manifold** (Catalogue No. 6015). For operation of multiple cells or reservoirs; individually valved.
- **Model TA1 Tubing Adapter Kit** (Catalogue No. 6022). To attach pressure tubing to a variety of nitrogen tank outlets.
- **Model QC1 Quick-Connect/Disconnect Fitting** (Catalogue No. 6023). For instant coupling of ¼ inch (¼-18NPT) pressure tubing to pressure source, and instant release.

Call Millipore for detailed product information or check our website at www.millipore.com.

In Case of Difficulty

This section offers some general troubleshooting steps that may be used to solve typical operating difficulties. If your problem/solution is not listed, contact Millipore technical service at **1-800-MILLIPORE** (1-800-645-5476).

No Filtrate Obtained:

1. Check for system pressurization by slowly turning pressure relief valve knob. If not pressurized, check pressure source and regulator.
2. Be sure membrane's **GLOSSY** side is facing process solution.

Filtrate Rate Abnormally High:

1. Make sure correct membrane type is being used.
2. Check membrane surface for lesions, dirt, roughness, creases or other defects.
3. Be sure lower O-ring or gasket is free of nicks or cuts and is resting on the entire membrane periphery.
4. Check for wear on periphery of porous membrane support.

Cell Leaks:

1. Disassemble cell and inspect large O-rings or gaskets for damage; replace, if necessary. Check for improperly fitting O-ring or gasket in base assembly.
2. Clean O-rings or gaskets, base assembly, and sleeve bottom thoroughly; then reassemble cell.
3. Make sure knurled knobs are firmly and equally tightened.

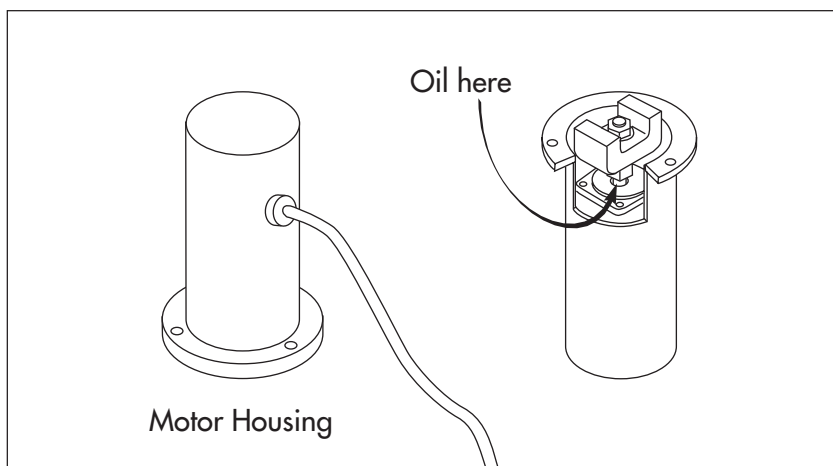
Stirrer Does Not Operate:

1. Check for positive electrical connection between stirrer motor and power supply.
2. Check fuse at back of power supply box. If blown, replace with a ¼ amp, 250V, 5 × 20 mm Slo-Blo® fuse.

NOTE: A spare fuse is provided in the spare fuse compartment, located at the rear of power supply.

Maintenance

- Replace porous membrane support disc if discolored or deformed.
- Replace O-rings or gaskets if damaged, worn, or cut.
- Replace transparent sleeve if it becomes cracked or crazed (Catalogue No. 2001606).
- If Teflon coating becomes scratched, thus exposing metal in a wetted area, contact Millipore Technical Service for instructions.
- After every 100 hours of operation, remove stirrer motor housing and lubricate the shaft bearing with a light oil. To remove housing, unscrew the three socket head cap screws. Invert housing and lubricate shaft where it enters the motor bearing, under magnet. Run motor at low speed for a few seconds to allow oil to work into bearing.



Sterilization

To sterilize Model 2000 stirred cells, use standard sterilizing gas or a 5% formalin solution. Stainless steel portions (including the sleeve on Model 2000B) may be autoclaved or boiled; however be sure to remove the motor housing assembly beforehand. The supplied polyethylene tubing cannot be autoclaved.

Storage

When not using cell, leave the knurled knobs loose on the threaded studs. **Storing solutions within the cell is not recommended.**

Materials of Construction

Top cap, base assembly, stirring shaft, frame: Teflon-coated (TFE) stainless steel

Fittings: stainless steel

Sleeve, Models 2000/2000A: acrylic

Sleeve, Model 2000B: Teflon-coated (TFE) stainless steel

Stirrer shaft and paddle, fill port plug, withdrawal fitting: Delrin plastic, acetal copolymer

Knurled knobs: polypropylene

Membrane support disc: porous polypropylene

O-rings: silicone rubber (red), Buna[®]-N copolymer (black)

Gaskets: silicone

Specifications

Maximum internal volume: 2000 mL

Stirred minimum volume: 50 mL

Membrane diameter: 150 mm (6 in.)

Effective membrane area: 144 cm² (22.3 in²)

Maximum operating pressure: 100 psi (7 atm)

Relief-valve setting: 125 psi (8.5 atm)

Power Supply Input:

Models 2000, 2000B: 120V, 50–60 Hz

Model 2000A: 230V, 50–60 Hz

Dimensions (height × diameter):

Cell: 17 × 8 in. (45 × 19 cm)

Power Supply: 5.5 × 5.5 × 2.87 in. (140 × 140 × 73 mm)

Technical Service

For more information, contact the Millipore office nearest you. In the U.S., call **1-800-MILLIPORE** (1-800-645-5476). Outside the U.S., see your Millipore catalogue for the phone number of the office nearest you or go to our web site at www.millipore.com/offices for up-to-date worldwide contact information. You can also visit the tech service page on our web site at www.millipore.com/techservice.

Standard Warranty

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