

# The BI-SFS Sample Filtration System

## **Purpose**

The BI-SFS is intended to be used to remove contaminating large particles from the fluids used in light scattering experiments. The instrument continuously pumps the fluid through disposable syringe filters in a recycling manner. One or more filters may be used and receptacles are provided to hold both standard 20 mL scintillation vials (BI-RC27) or 12 mm diameter test tubes (BI-RC12)

## **Installation and Operating Tips:**

**Clean Fluids** Abrasives in the pumped fluid may damage cylinder and piston surfaces and should therefore be avoided.

**Fluid Compatibility** Pump only fluids compatible with the materials of construction of your system. The standard components of the filtration system (BI-SFS) are comprised of the following materials: PTFE (Teflon), PVDF (Kynar), and Ceramic (Aluminum Oxide). Please check a chemical compatibility/resistivity chart before using any solvents with this system. Common solvents known to severely react with those materials are:

Acetone	Cyclohexane
Ethyl Acetate	Ethyl Benzoate
Flourine	Ketones
Lacquers	Methyl Acetone
Methyl Dichloride	Methyl Ethyl Ketone
Methyl Isobutyl Ketone	Oleum
Phosphoric Acid	Potassium Carbonate
Potassium Cyanide	Potassium Hydroxide
Sodium Hydroxide	Tricresylphosphate
Uric Acid	Zinc Chloride
Zinc Sulfate	

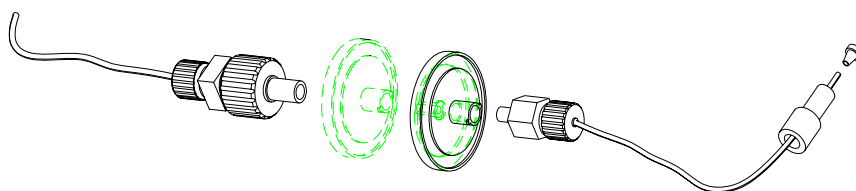
Before using the BI-SFS, always check a chart for compatibility. If you need to filter one or more of the above solvents, contact Brookhaven and we *may* be able to supply a component made of a different material, compatible with the solvent used.

**Wet Operation** The pumped fluid provides surface cooling and lubrication to the piston and cylinder of your BI-SFS pump. Therefore avoid dry operation.

**Pressure** Do not operate the pump against pressures in excess of design specifications (standard configuration limit is 100PSIG [6.90 BAR]). The drive pin on the piston may break under overload. Check your fluid circuit before applying power to the pump.

**Cleaning your BI-SFS** Routine flushing with solvent before shutdown will suffice for most applications. Set the pump for maximum stroke (~ 400 s/min) and operate until solvent appears clear at discharge port.

**CAUTION!** Ceramic piston/cylinder sets are sensitive to neglect and may “freeze” if allowed to dry out without adequate cleansing. Fill a loop of flexible tubing (such as the PTFE tubing supplied with your BI-SFS system) with fluid that will thin or neutralize the last fluid pumped. Then connect one end of the tube to the pump suction port, the other to the discharge port. With this loop positioned above the pump head, the ceramic surfaces and seal areas stay moist and mobile for extended idle periods. If, however, a piston does freeze in the cylinder, DO NOT TRY TO FORCE IT FREE! Be gentle. Try to remove the pump head from the base assembly so the whole pump head can be soaked in a suitable solvent. If the head is not conveniently removable, the tube loop discussed previously may permit solvent to dissolve the frozen residue in reasonable time. If all else fails, pack it all up and return to the factory, with a note telling us what you think might be left inside. Sometimes we may be able to release the frozen components. New pump heads are expensive and realigning pump drive components is tedious work.. If a freeze-up occurs, try to correct it *gently*.



**Tubing installation** The BI-SFS pump ports of the BI-SFS are designed to accept ¼” (6.35mm) outside diameter (O.D.) tubing and/or tubing adapters. BIC includes 1/16” (1.59mm) Teflon tubing and the proper adapters with each system. Pre-cut tubing is provided. If you need to use a different length, cut the tubing leaving a square-cut face (a razor blade is best for this

step). Slide the nut onto the tubing. Slip the ferrule onto the tubing with the cone facing the nut (flat surface toward the fitting); this may be a tight fit since the tubing O.D. varies. No flanging is required. Insert ferrule into the fitting; be sure the tubing is pressed firmly against the fitting; tighten the nut.

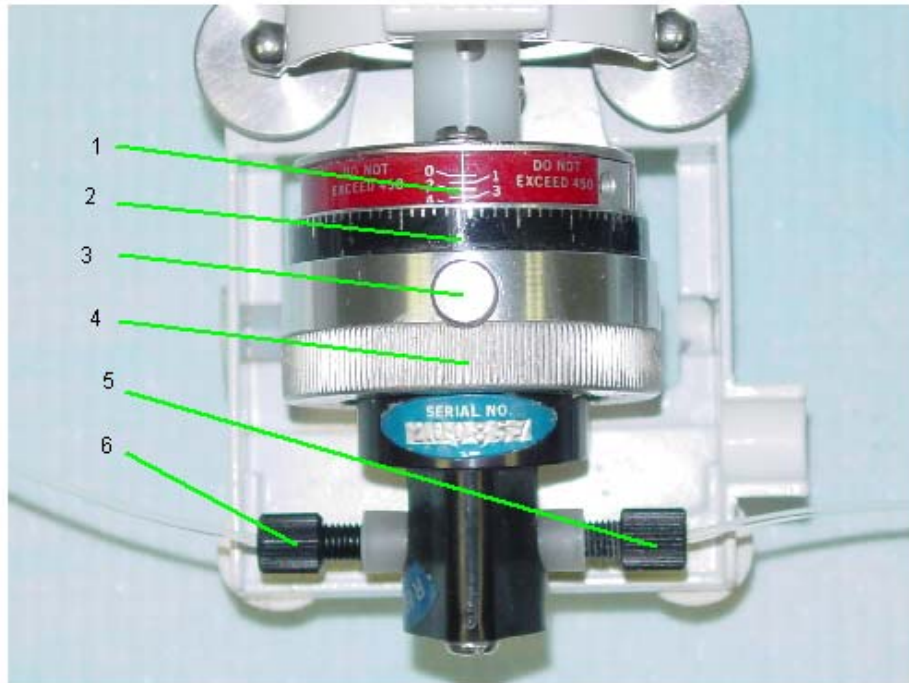
**Operating Speed** The BI-SFS pump is equipped with a variable speed head with settings from 0 – 450 strokes/minute. Best operation is achieved between 200-400 s/min. Your flow rate may vary depending on the viscosity of the pumped liquid and type of filters used. Typically with water, the flow rate is 17ml/min at the 200 s/min setting, and 35ml/min at the 400s/min setting. NEVER EXCEED 450 S/MIN. Please refer to the accompanying diagram of the pump head. The scale (1) indicates the reciprocation rate of the piston in units of 100 strokes/min. Adjust by loosening the screw (3) and rotating the ring (4) and the fine adjustment scale (2). Lock the screw (3) when done.

**Bubble Clearing** After tubing has been securely installed in each of the pump head fittings and the suction line is in the supply fluid, plug electric cord into proper outlet and operate pump until apparent bubbles are cleared from fluid lines. Continue to operate until all bubbles are cleared from the discharge tube.

**Filter Installation** Insert the male connector into the luer syringe style connection of the filter housing. Insert the male end of the filter housing into the female tubing connector. You may stack together as many as 5 filters to speed the cleaning process. (When preparing a sample, keep in mind that each filter has a dead volume of ~150ul.) Adjust the clamp to loosely fit the filters and connectors. Gently tighten the clamp until the connectors and filters are held snugly in place. It is not necessary for this to be overly tight – a good way to check is to run a little DI water through the system to check for leaks. This can also help clean any residue that may be stuck to the filters during manufacturing.

**Sample Cells and Caps** The system is supplied with 6 each of our BI-RC27 scintillation vials and BI-RC12 sample cells. Each comes with a cap that has been predrilled to accept the tubing supplied. In addition, a drill bit is included to modify your existing cell caps.

**Disposable Filters** Each system is supplied with 0.2 um disposable syringe filters for aqueous based samples. The system has been designed to accept as many as five “stacked” filters within the clamp. Most samples require just one or two filters. For faster clean-up of severely dusty samples, adding a third or fourth filter will speed the cleaning process. Also suggested is creating a series of filters in descending order from largest pore size to smallest. This will promote longer life of the smaller pore size filters because the larger dust particles will not be passed through to the smaller pore size filters.



- 1 Scale for piston rate.
- 2 Fine adjustment ring
- 3 Locking screw.
- 4 Piston rate adjustment
5. Fluid exit port
- 6 Fluid entrance to pump.

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**Contacting Us** If you experience any problems, have any questions, or would like to make comments, please contact us at:

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