User Guide

Millisolve™ Clarification System

Cat. No. XX1614700

Introduction

The Millisolve™ Clarification System is designed for vacuum filtration of liquid chromatography (LC) buffers and solvents. The system uses a disposable 0.2/0.22 or 0.45 micron (µm) filter to remove particles which can shorten column life. Vacuum filtration through this system can also remove a large portion of dissolved gases from buffers, reducing the risk of air bubble interference with LC instrumentation.

NOTE: To avoid solvent and buffer cross-contamination, EMD Millipore Corporation recommends a dedicated filtration system for each solvent and use of a new filter to process each batch of solvent.

The Millisolve™ Clarification System is supplied with two different filter holder configurations. For hazardous fluids, the vacuum cap configuration allows filtration to take place in a closed system. When vacuum is applied, fluid is drawn directly from a bottle, through the filter, and into the conical Millisolve™ flask. For batch filtration, fluid is poured into the open 300 milliliter (mL) funnel and flows through the filter and into the Millisolve™ flask when vacuum is applied.

The following table shows the types of membrane filters appropriate for filtering various solvents and buffers.

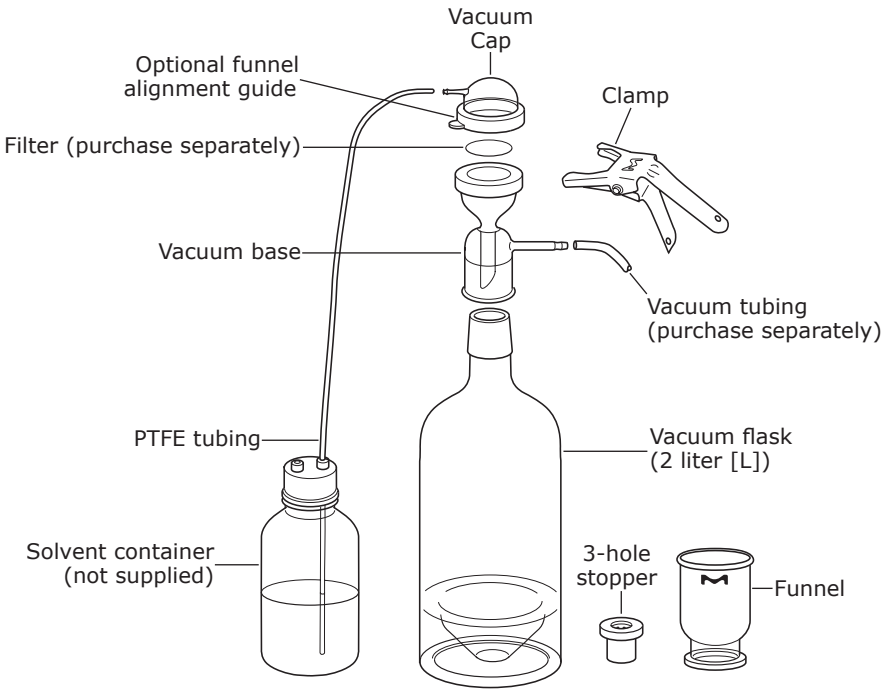
Type of Solvent or Buffer	**Filter to Use**	**Pore Size**	**Cat. No.**
Water, buffers	MF-Millipore™ hydrophilic mixed cellulose esters filter (Triton® surfactant-free)	0.22 µm 0.45 µm	GSTF04700 HATF04700
	Nylon hydrophilic membrane filter	0.2 µm 0.45 µm	GNWP04700 HNWP04700
	Omnipore™ hydrophilic polytetrafluoroethylene (PTFE) filter	0.2 µm 0.45 µm	JGWP04700 JHWP04700
	LCR hydrophilic PTFE filter	0.45 µm	FHLC04700
Water, buffers, alcohol, or mixtures	Durapore® polyvinylidene fluoride (PVDF) hydrophilic filter	0.22 µm 0.45 µm	GVWP04700 HVLP04700
	Nylon hydrophilic membrane filter	0.2 µm 0.45 µm	GNWP04700 HNWP04700
	Omnipore™ hydrophilic PTFE filter	0.2 µm 0.45 µm	JGWP04700 JHWP04700
	LCR hydrophilic PTFE filter	0.45 µm	FHLC04700
All organic solvents (methylene chloride, hexane, tetrahydrofuran)	Fluoropore™ hydrophobic PTFE filter	0.2 µm 0.45 µm	FGLP04700 FHLP04700 or FHUP04700
	Omnipore™ hydrophilic PTFE filter	0.2 µm 0.45 µm	JGWP04700 JHWP04700
	LCR hydrophilic PTFE filter	0.45 µm	FHLC04700

Additional Equipment Required

- 47 millimeter (mm) filter appropriate for your application
- Vacuum source, either central laboratory vacuum or a portable vacuum pump. See **Ordering Information** for available models.

  ⚠**WARNING:** Choose a vacuum source appropriate for the fluid being filtered. Many vacuum pumps are **NOT** explosion-proof and should not be used when filtering flammable or explosive liquids.
- Vacuum tubing, 3/16 inch (in.) (4.8 mm) inner diameter (ID) silicone rubber (cat. no. XX7100004)

Millisolve™ Clarification System Components



NOTE: Smooth-tip filter forceps are supplied but not shown.

A vacuum base with a stainless steel screen filter support (instead of a coarse-frit glass support) is also available (cat. no. XX1514732). The stainless steel screen filter support is easier to clean, and improves the filtration rate.

Precautions

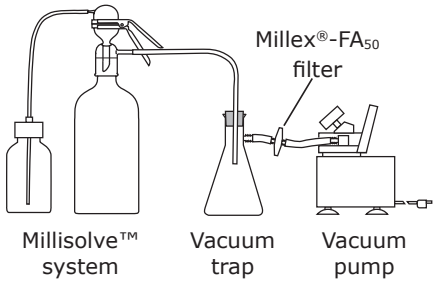
⚠**WARNING: Filtration of flammable liquids can generate enough electrostatic charge to cause a fire or explosion. To mitigate this potential, follow these precautions:**

- **DO NOT use the stainless steel screen filter support with highly flammable solvents.**
- **Work under a hood (or another ventilation system) when filtering flammable liquids to prevent accumulation of ignitable vapor and air mixtures. Ventilation systems, including fume hoods, must be designed in accordance with the National Fire Protection Association (NFPA) code.**
- **Keep the filtration rate low; apply only enough vacuum pressure to maintain steady flow through the filter.**

- Follow safe handling guidelines for laboratory glassware when working with the Millisolve™ Clarification System. Information on safe handling of glassware can be found at www.sigmaaldrich.com/labware/glassware.
- Although this product is rated for 948 mbar (28 in. Hg), it is not necessary to apply maximum vacuum pressure to achieve a reasonable filtration rate. Whenever possible, operate at lower vacuum pressure in order minimize the potential for glassware breakage due to implosion.

Precautions, continued

- Before use, soak new glassware in 1% hydrochloric or nitric acid for several hours, then wash and rinse thoroughly with laboratory grade water. This neutralizes the slight alkalinity of the new glass and ensures that loose particles (glass beads) are removed from the fritted glass filter support. Refer to the **Cleaning** section for details on cleaning after use.
- To protect the vacuum source from fluid contamination, install a vacuum trap flask between the Millisolve™ flask and the vacuum source and place a Millex®-FA_{50} filter (cat. no. SLFA05010) in the vacuum line between the vacuum trap flask and vacuum source.



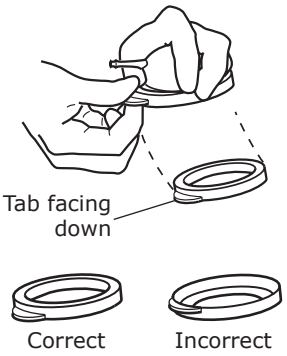
- When using the vacuum cap for continuous filtration, make sure that the filter is dry. If the filter is wet at the beginning of the filtration process (before the solvent/buffer flow enters the vacuum cap), there will be no flow because the vacuum pressure is not high enough to overcome the filter bubble point. If the filtration process is interrupted or air is introduced into the line, use a new, dry filter on a dry support to restart filtration.

Operation

1. Connect one end of the vacuum tubing to the sidearm (outlet) of the vacuum base. Push gently to secure the tubing, wetting the sidearm with water, if necessary.
2. **Optional**: Stretch the funnel alignment guide over the bottom of the vacuum cap or funnel with the **tab facing down and aligned with vacuum cap sidearm**.

   If the alignment guide covers the sealing surface of the vacuum cap or funnel, it is upside down. Remove and change guide alignment guide orientation so that the sealing surfaces of the cap/funnel and base can be assembled in direct contact with one another.

   NOTE: The alignment guide is helpful in aligning the cap or funnel and base, but it is not required.



3. **For continuous filtration using the vacuum cap**, connect an appropriate length of PTFE tubing to the sidearm (inlet) of the cap.

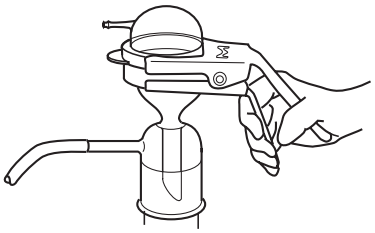
   NOTE: Use the shortest length of tubing possible between the solvent container and the vacuum cap.

   Slowly push the tubing over the sidearm of the cap. If necessary, soften it first by immersing the end (approximately 1 centimeter [cm]) in hot water before pushing it over the sidearm.
4. Place the Millisolve™ vacuum flask on a flat surface close to the vacuum source. Place the base on top of the flask.
5. If using the stainless steel screen filter support, install it in the base, making sure that the supplied PTFE gasket is installed under the support.

Operation, continued

6. With smooth-tip forceps, center a 47 mm filter disc on the support surface.

7. Without disturbing the filter, center the flange of the vacuum cap or funnel on top of the base and lock the cap or funnel and base together with the spring clamp.



8. Connect the free end of the vacuum tubing to the vacuum source.
9. **For continuous filtration (using the vacuum cap)**, pour the buffer/solvent to be filtered into a beaker, Erlenmeyer flask, or other suitable laboratory-grade container. Immerse the end of the PTFE tubing into the solution to be filtered, making sure that the end reaches to the bottom of the container.

   For batch filtration (using the funnel), pour the solution to be filtered into the funnel.

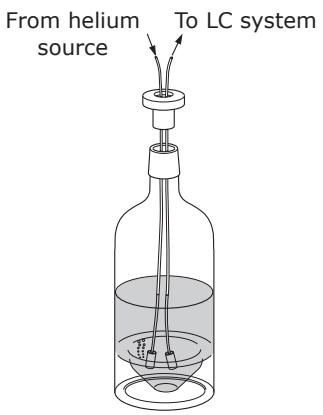
   CAUTION: Make sure that the volume you want to filter does not exceed the 2 L capacity of the Millisolve™ flask. A 5 L flask (XX1614706) is available for larger volumes.
10. Apply vacuum. Do not exceed 948 millibar (mbar) (28 in. Hg).

    For continuous filtration, the liquid will be drawn into the PTFE tubing, through the vacuum cap, through the filter, and into the Millisolve™ flask.
11. After all of the buffer/solvent has filtered, turn off the vacuum and disconnect the vacuum tubing from the vacuum source.
12. Remove the spring clamp, and lift the cap off of the base. Place the cap on a clean surface.
13. With smooth-tip forceps, remove the filter from the base and discard.

Using the Filtered Buffer/Solvent

The Millisolve™ flask can be used as a solvent/buffer reservoir for the High Performance Liquid Chromatography (HPLC) or LC system. The conical bottom of the vacuum flask allows nearly the entire volume of filtered liquid to be utilized.

1. Pass required lengths the LC solvent/buffer tubing through the 3-hole stopper. If desired, attach a solvent filter/sparger to the ends of the tubing.
2. Insert the 3-hole stopper into the flask.
3. Connect the LC solvent/buffer tubing to the LC system and helium source.
4. Pump the buffer through the HPLC or LC system.



Cleaning

Clean the system immediately after use. Depending on the solution filtered, you can flush the system with a filtered, volatile solvent (acetone or acetonitrile) or hot water, or disassemble and clean as follows:

1. Rinse all components with hot tap water. Clean the porous glass frit of the filter support by back-flushing with tap water.

   CAUTION: Do not clean with detergents, as they may introduce contaminants into the system.

   When cleaning the filter holder with the stainless steel screen filter support, the filter support drops out easily when the base is inverted. Take care not to mislay or damage the PTFE gasket that lies under the filter support.

2. After rinsing thoroughly with tap water, rinse the components with laboratory-grade water.

   NOTE: Final rinse water can leave residues that affect critical tests. Use rinse water suitable for your application.

3. Allow components to air dry while disassembled.

   CAUTION: Do not wipe dry with paper or cloth, as this leaves fibers and lint on the surfaces and also generates electrostatic forces that can attract more dirt. To facilitate drying, flush with a volatile solvent such as acetone or acetonitrile.

Specifications

Materials	
Millisolve™ flask, vacuum cap, filter holder base, funnel	Borosilicate glass
Clamp	Anodized aluminum
Funnel alignment guide	Silicone
3-hole stopper	Polypropylene
Filter diameter	47 mm
Effective filter area	Approximately 9.6 square centimeters (cm^2) (1.5 in^2)
Funnel capacity	300 mL
Vacuum flask capacity	2 L
Maximum pressure	948 mbar (28 in. Hg)
Approximate dimensions	
Height with vacuum cap	45.7 cm (18.0 in.)
Height with funnel	53.3 cm (21.0 in.)
Vacuum flask diameter	12.5 cm (4.9 in.)

Ordering Information

This section lists catalogue numbers for the Millisolve™ Clarification System, replacement parts, and accessories. See the **Technical Assistance** section for contact information. You can purchase these products online at www.millipore.com/products.

Product Description	
Millisolve™ Clarification System	XX1614700
Replacement Parts	
Vacuum cap	XX1614701
Vacuum base	XX1514702
Funnel, 300 mL	XX1014704
Clamp	XX1014703
Vacuum flask with conical bottom, 2 L, ground glass attachment	XX1614705
Funnel alignment guide	ALIGNED05
Filter forceps, stainless, smooth-tip	XX6200006P
PTFE tubing for solvent and buffer, 70 cm (27.6 in.)	XT1200000
Accessories for Millisolve™ Clarification System	
Base	
Vacuum base with stainless steel screen filter support and gasket, ground glass attachment	XX1514732
Funnel	
Funnel, 500 mL	XX5014704
Flasks with ground glass attachment	
Vacuum filtering flask, 4 L	XX1014745
Vacuum filtering flask, 1 L	XX1514705
Vacuum filtering flask with conical bottom, 5 L	XX1614706
Flask with stopper attachment for use as vacuum trap	
Vacuum filtering flask, 1 L	XX1014705
Vacuum filtering flask, 1 L, threaded sidearm	XX1514706
Pumps	
Chemical Duty Pump, 115 V, 60 Hz	WP6111560
Chemical Duty Pump, 100 V, 50/60 Hz	WP6110060
Chemical Duty Pump, 220 V, 50 Hz	WP6122050
Filters	
MF-Millipore™ 0.22 µm hydrophilic MCE filter, Triton® surfactant-free, 47 mm, 100/pk	GSTF04700
Durapore® 0.22 µm hydrophilic PVDF filter, 47 mm, 100/pk	GVWP04700
Nylon 0.2 µm hydrophilic membrane filter, 47 mm, 100/pk	GNWP04700
Fluoropore™ 0.2 µm hydrophobic PTFE filter, 47 mm, 100/pk	FGLP04700
Omnipore™ 0.2 µm hydrophilic PTFE filter, 47 mm, 100/pk	JGWP04700
MF-Millipore™ 0.45 µm hydrophilic MCE filter, Triton® surfactant-free, 47 mm, 100/pk	HATF04700
Durapore® 0.45 µm hydrophilic PVDF filter, 47 mm, 100/pk	HVLP04700
Nylon 0.45 µm hydrophilic membrane filter, 47 mm, 100/pk	HNWP04700
Fluoropore™ 0.45 µm hydrophobic PTFE filter, 47 mm, 100/pk	FHLP04700
Fluoropore™ 0.45 µm hydrophobic PTFE filter, unbacked, 47 mm, 100/pk	FHUP04700
Omnipore™ 0.45 µm hydrophilic PTFE filter, 47 mm, 100/pk	JHWP04700
LCR 0.45 µm hydrophilic low extractables PTFE filter, 47 mm, 100/pk	FHLC04700
Miscellaneous	
Millex®-FA_{50} filter, 1.0 µm hydrophobic PTFE, 50 mm, 10/pk	SLFA05010
Tubing, 3/16 in. (4.8 mm) ID x 4.6 ft (140 cm), silicone with Luer adapter	XX7100004

Notice

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Technical Assistance

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Standard Warranty

The applicable warranty for the products listed in this publication may be found at www.millipore.com/terms ("Conditions of Sale").

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