



User Guide

# Samplicity® G2 Filtration System with Millex Samplicity® and Millex® Filters



## Notice

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## Introduction

The Smplicity® G2 Filtration System is a vacuum-based system that simultaneously filters multiple samples directly into standard HPLC vials. It can filter up to eight samples, even those with high viscosity or particulates, in seconds. Samples can be filtered with either disposable Millex Smplicity® filters or conventional 33 mm Millex® filters. Millex Smplicity® filters come in strips of four for fast setup, but can be separated at the perforations to filter fewer samples. The disposable Millex® filters come with separate funnels that are inserted before use. In both cases, the funnel entrance to the filter allows quick and easy loading with a pipettor, providing a convenient, ergonomic alternative to syringe filters. Filtered samples are immediately ready for subsequent analyses.

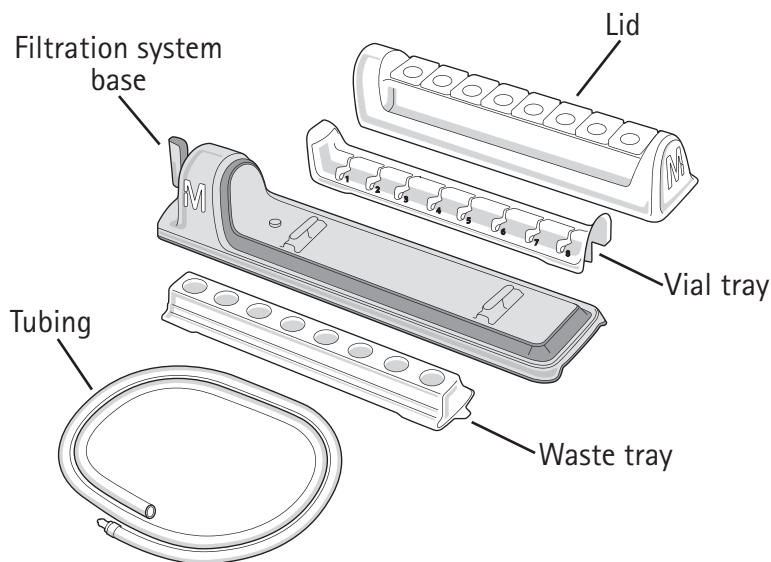
**NOTE:** All instances of Millex® filters cited in this User Guide refer to Millex® filters for the Smplicity® G2 system, which are sold with adapter funnels.

Applications include sample preparation for dissolution testing, high performance liquid chromatography (HPLC), ultra-high performance liquid chromatography (UHPLC or UPLC®), and liquid chromatography-mass spectrometry (LC-MS).

The Smplicity® G2 Filtration System and its associated filters are intended for use in a GLP (Good Laboratory Practice) environment.

## Smplicity® G2 Filtration System Components

The Smplicity® G2 Filtration System includes the following components:



**NOTE:** In order to use the original Smplicity® Filtration System with Millex® filters, you must purchase the new Smplicity® G2 lid.

## Safety Precautions


- Use a vacuum source appropriate for the samples being filtered.
- Protect the vacuum source from contamination with an in-line filter (e.g., Millex®-FA50 filter).

## Chemical Compatibility

### Millex Smplicity® and Millex® Filters Chemical Compatibility


Millex Smplicity® and Millex® filters are compatible with aqueous and mild organic solutions. They can be used to filter the agents listed in the following tables. This information was developed from technical publications, materials suppliers, and laboratory tests, and is believed to be accurate and reliable. However, because of variability in temperature, concentrations, exposure time, and other factors outside of our control that may affect the use of the filter, no warranty is given or is to be implied with respect to such information. Agents not listed below should be tested with the Millex Smplicity® or Millex® filter prior to use.

#### Millex Smplicity® Polytetrafluoroethylene (PTFE) Filter Compatibility

|                             |                         |                        |   |
|-----------------------------|-------------------------|------------------------|---|
| Acetic acid, glacial        | Dimethyl sulfoxide      | Isopropyl acetate      | <br>Phenol (10%)<br>Pyridine<br>Silicone oils<br>Sulfuric acid<br>Tetrahydrofuran<br>Toluene<br>Trichloroethane<br>Trichloroethylene<br>Trifluoroacetic acid<br>Xylene |
| Acetone                     | Dioxane                 | Isopropyl alcohol      |   |
| Acetonitrile                | Ethers                  | Kerosene               |   |
| Amyl acetate                | Ethyl acetate           | Methyl alcohol         |   |
| Amyl alcohol                | Ethyl alcohol           | Methylene chloride     |   |
| Benzyl alcohol (10%)        | Ethylene glycol         | Methyl ethyl ketone    |   |
| Boric acid                  | Formaldehyde            | Methyl isobutyl ketone |   |
| Brine (sea water)           | Gasoline                | Nitric acid            |   |
| Butyl alcohol               | Glycerine (Glycerol)    | Nitrobenzene           |   |
| Cellosolve® (ethyl) solvent | Hexane                  | Paraldehyde            |   |
| Chloroform                  | Hydrochloric acid       | Pentane                |   |
| Cyclohexanone               | Hydrofluoric acid       | Perchloroethylene      |   |
| Dimethyl acetamide          | Hydrogen peroxide (30%) | Petroleum based oils   |   |
| Dimethyl formamide          | Isobutyl alcohol        | Petroleum ether        |   |

NOTE: For low extractable HPLC applications, we recommend either discarding the first 1 mL or rinsing the filter with 1 mL of primary solvent before sample filtration.

#### Millex Smplicity® Polyvinylidene Fluoride (PVDF) Filter Compatibility

|                      |                             |                         |   |
|----------------------|-----------------------------|-------------------------|---|
| Acetic acid, glacial | Cellosolve® (ethyl) solvent | Glycerine (glycerol)    | <br>Sulfuric acid (3 N)<br>Toluene<br>Trifluoroacetic acid<br>Xylene |
| Acetonitrile         | Chloroform                  | Hydrochloric acid       |   |
| Ammonium hydroxide   | Cyclohexanone               | Hydrofluoric acid       |   |
| Amyl alcohol         | Ethyl alcohol               | Hydrogen peroxide (10%) |   |
| Benzene              | Ethylene glycol             | Kerosene                |   |
| Boric acid           | Formaldehyde                | Methyl alcohol          |   |
| Brine (sea water)    | Formic acid                 | Petroleum based oils    |   |
| Carbon tetrachloride | Gasoline                    | Phenol (10%)            |   |

## Chemical Compatibility, continued



### Millex® Filter Compatibility

|                             |                                |                         |                      |
|-----------------------------|--------------------------------|-------------------------|----------------------|
| Acetic acid, glacial        | Dimethylacetamide <sup>1</sup> | Hydrogen peroxide (3%)  | Pentane              |
| Acetonitrile                | Dimethylformamide <sup>1</sup> | Isobutyl alcohol        | Perchloroethylene    |
| Amyl acetate                | Dioxane                        | Isopropyl acetate       | Petroleum based oils |
| Amyl alcohol                | Ethers                         | Isopropyl alcohol       | Petroleum ether      |
| Benzene                     | Ethyl acetate                  | Kerosene                | Phenol (10%)         |
| Benzyl alcohol              | Ethyl alcohol                  | Methyl alcohol          | Silicone oils        |
| Boric acid                  | Ethylene glycol                | Methylene chloride      | Sulfuric acid (3 N)  |
| Brine (sea water)           | Formaldehyde                   | Methyl ethyl ketone     | Tetrahydrofuran      |
| Butyl alcohol               | Gasoline                       | Methyl isobutyl ketone  | Toluene              |
| Carbon tetrachloride        | Glycerine (glycerol)           | Mineral spirits         | Trichloroethane      |
| Cellosolve® (ethyl) solvent | Hexane                         | Nitrobenzene            | Trichloroethylene    |
| Chloroform                  | Hydrochloric acid <sup>2</sup> | Ozone (10 ppm in water) | Trifluoroacetic acid |
| Cyclohexane                 | Hydrofluoric acid              | Paraldehyde             | Xylene               |

<sup>1</sup> Not compatible with GV and HV

<sup>2</sup> Hydrochloric acid (6 N) not compatible with GN and HN

**NOTE:** For low extractable HPLC applications, we recommend either discarding the first 1 mL or rinsing the filter with 1 to 2 mL of primary solvent before sample filtration.

### Samplicity® G2 Filtration System Chemical Compatibility

The Samplicity® G2 Filtration System is compatible with aqueous acid and base solutions, methyl alcohol, ethyl alcohol, isopropyl alcohol, acetonitrile, 40% dimethyl formamide, dimethyl sulfoxide, and 5–10% organic solvents in water.

The waste tray is compatible with weak acids, organic solvents, alcohols, and fuels.

### General Guidelines

- Vacuum should remain off while system is being assembled.
- Vacuum pressure of 610–847 millibar (mbar) [18–25 inches (in.) Hg] at 30 L/min is recommended for optimum performance.
- The waste tray can be used in place of the vial tray when washing or flushing the filters prior to sample filtration.
- When pre-washing or flushing the filters, wait for approximately 10 seconds (until complete release of vacuum) before removing the lid and waste tray.
- Ensure proper alignment of vials to filters when assembling the vial tray.
- Doors above empty positions must be closed during operation.
- Do not turn on vacuum until after samples have been added to filters.
- Make sure that all samples have filtered into vials before turning vacuum off. Some samples may take longer to process.
- System must be turned off (system handle UP) and pressure allowed to release through the bleeder orifice before removing filters and lid or opening doors. Cross-contamination may occur if filters, lid, or doors are moved before vacuum pressure is fully released.

## Materials Required

Vacuum source capable of 610–847 mbar (18–25 in. Hg) at 30 L/min

Pipette and pipette tips

Sample vials (12 × 32 mm)

Millex Smplicity® Filters for the Smplicity® G2 Filtration System

0.20 µm hydrophilic PTFE filter



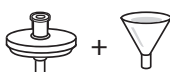
0.45 µm hydrophilic PTFE filter

0.45 µm hydrophilic PVDF filter

OR

Millex® Filters for the Smplicity® G2 Filtration System

0.22 µm hydrophilic PVDF filter



0.45 µm hydrophilic PVDF filter

0.20 µm hydrophilic nylon filter

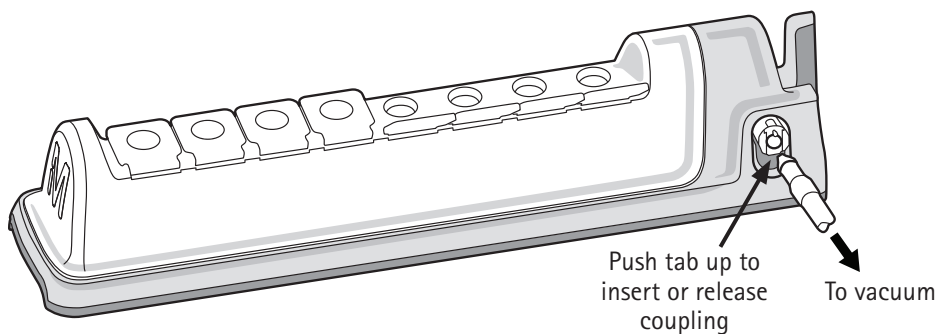
0.45 µm hydrophilic nylon filter

0.22 µm hydrophilic polyethersulfone (PES) filter

0.45 µm hydrophilic PES filter

## How to Use the Smplicity® G2 Filtration System

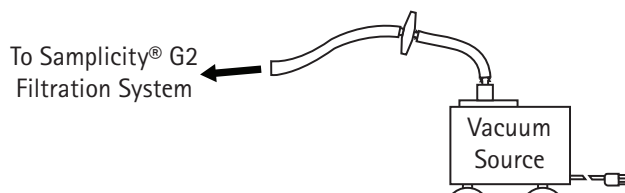
1. Place the Smplicity® G2 Filtration System base on a level bench top.
2. With vacuum source OFF and system handle in the OFF position, attach the vacuum tubing to the back of the system by pushing the coupling insert on the end of the tubing into the quick-disconnect fitting on the system base until it clicks.



NOTE: To disconnect the tubing, push the tab below the tubing connector up with the index finger and pull tubing out.

## How to Use the Smplicity® G2 Filtration System, continued

3. Connect the other end of the tubing to a vacuum source. Use a Millex®-FA<sub>50</sub> filter to protect the vacuum source from contamination.



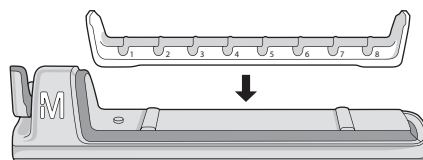
**NOTE:** Any vacuum source which can deliver 474 mbar (14 in. Hg) at 20 L/min is sufficient.

A vacuum flask trap may be used; however, if the vacuum source is a pump rather than a central vacuum system, it may take longer to achieve the required vacuum pressure.

When setting up the system, avoid crimping the tubing, as this can reduce vacuum pressure.

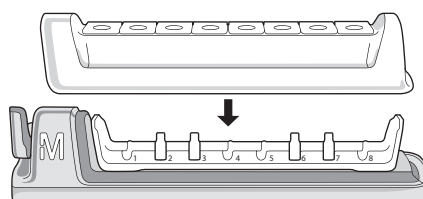
**CAUTION:** Do not allow the in-line Millex®-FA<sub>50</sub> filter to get wet; this will block flow of vacuum.

4. Place vial tray on system base with tray numbers facing forward.

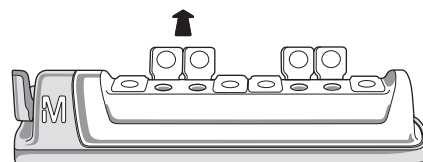


5. Place one to eight uncapped HPLC vials (12 × 32 mm) in the vial tray and place lid over vials.

**NOTE:** To wash filters prior to sample filtration, install the waste tray in place of vials. Follow steps 6–10, using the appropriate solvent/sample to wash the filters. Then, replace the waste tray with vial tray and vials, and process samples beginning with step 8.



6. Open doors directly above the positions where vials have been installed. Close doors above empty positions.



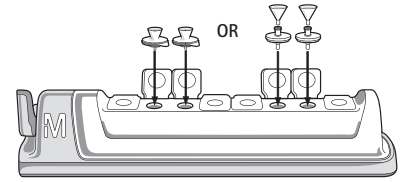


## How to Use the Smplicity® G2 Filtration System, continued

7. For Millex Smplicity® filters, place one to eight filters over the openings, with the M logos facing forward. Filters can be separated from the strip by twisting them at the perforations. Ensure that filters are properly aligned with vials.

OR

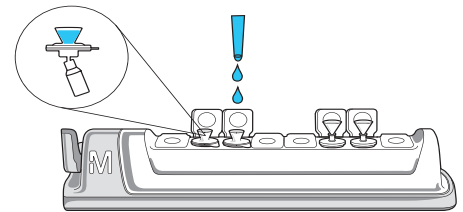
For Millex® filters, place one to eight filters over the openings, pressing down firmly to ensure proper sealing. Attach the provided funnels to the filters. Ensure that filters are properly aligned with vials.



8. For Millex Smplicity® filters, add 0.3–1.7 mL of sample to filters. To avoid air-locking the filter, pipette the sample directly into the center of the funnel, not down the side.

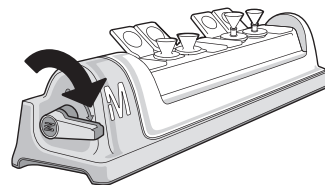
OR

For Millex® filters, add 0.4–1.7 mL of sample to funnels, filling funnels for all samples that need to be filtered at the same time.



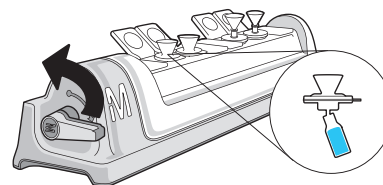
9. Turn vacuum on at the source, then rotate system handle forward. Vacuum will pull samples through the filters and into the vials.

**NOTE:** Light downward pressure on the lid may be required to initiate vacuum.



10. When all filters are empty, rotate the system handle up and wait for the vacuum pressure to release through the bleeder orifice (approximately 10 seconds). Remove filters and discard, then remove lid to access sample vials.

**NOTE:** To avoid sample spray/cross-contamination, do not remove filters or lid, or open doors before vacuum has released.



## Troubleshooting

| Symptom                                 | Cause  | Corrective Action  |
|---|--|--|
| Sample does not filter                  | Inadequate vacuum  | Make sure tubing connection between system and vacuum source is secure and leak-free.  |
|   |  | If using a flask trap, make sure it is empty and that the in-line Millex®-FA <sub>50</sub> filter has not gotten wet.                                |
|   |  | Make sure that the lid is properly aligned with the base. To ensure sealing, gently push down on the lid after the applying vacuum.                  |
|   |  | Make sure Millex Smplicity® filters are seated correctly with the M logo facing forward.   |
|   |  | Make sure Millex® filters are properly inserted into filter sealing grommets. Push filters gently into grommets to ensure that they lie flat.        |
|   |  | Make sure vial tray and lid are seated correctly.  |
|   |  | Make sure doors on any empty ports are closed.   |
|   |  | Make sure vacuum source is on and system handle is in the "ON" position.   |
|   | Make sure system gaskets and door gaskets are clean and undamaged. |  |
|   | Air-locked filter  | Pipette sample directly into center of filter, not down the side. To dislodge trapped air bubbles, resuspend sample by gently pipetting up and down. |
| Slow filtration                         | Insufficient vacuum  | Increase vacuum pressure.  |
|   | Sample viscosity or particulate load too high                      | Dilute or prefilter sample.  |
|   | Reuse of filter  | Filters are single use. Do not reuse.  |
| Sample spray/sample cross contamination | Incorrect release of vacuum  | Rotate system handle up and wait for vacuum to release before removing filters or lid, or opening doors.   |
|   | Reuse of filter  | Filters are single use. Do not reuse.  |
| Vacuum does not release                 | Bleeder orifice is clogged   | Contact Technical Service.   |

## Storage

Store the Smplicity® G2 Filtration System, Millex Smplicity® filters, and Millex® filters at room temperature in a dry environment. The system lid should be stored on the base in order to maintain the correct shape.

## Cleaning and Maintenance

The Smplicity® G2 Filtration System must be kept clean in order to function properly. To prevent buildup of contaminants, clean up spills and sample residue promptly. If liquid spills in the system, remove the vial tray, clean the system, then apply vacuum pressure for 30 seconds. Clean components as follows:

- Lid, doors, and vial tray: Hand wash with mild soap solution, followed by rinse in deionized water; or wipe down with deionized water, 10% bleach, 70% ethyl alcohol, or 100% methyl alcohol. Do not use abrasive cleaning agents. Wipe components dry with a soft, lint-free cloth.
- Base: Wipe down with mild soap solution, then wipe with deionized water; or wipe down with deionized water, 10% bleach, 70% ethyl alcohol, or 100% methyl alcohol. Wipe dry with a soft, lint-free cloth.

**NOTE:** Smplicity® G2 Filtration System components should not be cleaned in a dishwasher or autoclaved.

## Specifications

### Smplicity® G2 Filtration System

#### Performance

Vacuum pressure recommended 610–847 mbar (18–25 in. Hg) at 30 L/min

#### Dimensions

Length 44.5 cm (17.5 in.)  
Width 10.2 cm (4.0 in.)  
Height 9.1 cm (3.6 in.)  
Weight (approximate) 1.3 kg (2.9 lb)  
Tubing 6.4 mm ID × 0.9 m (1/4 in. ID × 36 in.)  
Waste tray well capacity 5 mL

#### Materials of Construction

Base Polypropylene, silicone, stainless steel  
Waste tray Recycled polyester (PET)  
Vial tray Polypropylene, thermoplastic elastomer (TPE)  
Lid/doors/seals Engineering copolymer, TPE  
Filter sealing grommet Thermoplastic vulcanizate (TPV)  
Internal components Polypropylene, Tygon® tubing, polyvinyl chloride (PVC), acetal, Buna-N  
Vacuum tubing and connector Tubing: silicone  
Connector: acetal, Buna-N, stainless steel

## Specifications, continued

### Millex Smplicity® Filter

#### Dimensions (strip of 4 filters)

|               |                   |
|---------------|-------------------|
| Length        | 14.5 cm (5.7 in.) |
| Width         | 4.3 cm (1.7 in.)  |
| Height        | 3.0 cm (1.2 in.)  |
| Weight        | 22.7 g (0.8 oz)   |
| Sample volume | 0.3–1.7 mL        |

#### Materials of Construction

|          |  |
|----------|--|
| Housing  | High density polyethylene (HDPE), TPE,<br>high impact polystyrene/polyester (HIPS/PET) |
| Membrane | 0.20 µm hydrophilic PTFE<br>0.45 µm hydrophilic PTFE<br>0.45 µm hydrophilic PVDF       |

#### HPLC Certification (PTFE filters only)

Millex Smplicity® PTFE filters are tested for UV-absorbing extractables. One-milliliter samples of acetonitrile (0.20 and 0.45 µm filters) and water (0.45 µm filter) are collected after discarding the first 1 mL of solvent. HPLC analysis shows no peaks greater in intensity than 0.004 AUFS (after column frontal volume) at either 214 or 254 nm.

### Millex® Filters for the Smplicity® G2 Filtration System

#### Dimensions

|                         | Millex® filter                              | Funnel   |
|-------------------------|---|--|
| Length                  | 26 mm (1.02 in.)                            | 23.4 mm (0.92 in.)                             |
| Diameter                | 33 mm (1.30 in.)                            | 22.4 mm (0.88 in.) opening<br>Luer-slip outlet |
| Filtration surface area | 4.5 cm <sup>2</sup> (0.7 in. <sup>2</sup> ) | N/A  |
| Weight                  | 3.7 g (0.13 oz)                             | 0.5 g (0.02 oz)                                |
| Sample volume           | 0.4–1.7 mL                                  | N/A  |

#### Materials of Construction

|                |   |
|----------------|---|
| Membrane       |   |
| GV, HV         | Hydrophilic Durapore® PVDF              |
| GP, HP         | Hydrophilic Millipore Express® PLUS PES |
| GN, HN         | Nylon                                   |
| Filter housing | Polypropylene                           |
| Funnel         | Polypropylene                           |

#### HPLC Certification (Nylon filters only)

Millex®-GN and HN filters are tested for UV-absorbing extractables. HPLC analysis of 1 mL samples of both acetonitrile and water collected after discarding the first 1 mL of solvent showed no peaks greater in intensity than 0.004 AUFS (after column frontal volume) at either 214 or 254 nm. Representative samples of all lots manufactured are tested.

## Conformance to Pressure Equipment Directive

The Smplicity® G2 Filtration System does not fall within the scope of Pressure Equipment Directive 2014/68/EU (PED), therefore, conformance to this directive is not applicable.

## Ordering Information

This section lists catalogue numbers for the Smplicity® G2 Filtration System and related products. See the Technical Assistance section for contact information. You can also purchase these products online at [www.millipore.com/products](http://www.millipore.com/products).

| Product Description  |       | Cat. No.  | Qty/Pk          |
|--|-------|-----------|-----------------|
| <b>Smplicity® G2 Filtration System</b>                                     |       |           |                 |
| (includes base, vial tray, lid, waste tray, tubing, and quick-start guide) | Blue  | SAMP2SYSB | 1               |
|  | Green | SAMP2SYSG | 1               |
| Smplicity® Filtration System Vial Trays (one blue, one green)              |       | SAMVIALTR | 2               |
| Smplicity® Filtration System Waste Trays                                   |       | SAMWASTTR | 5               |
| Smplicity® Filtration System Tube Set Assembly                             |       | SAMTUBING | 1               |
| Smplicity® G2 Filtration System Lid  |       | SAMP2LID  | 1               |
| <b>Millex Smplicity® Filters</b>   |       |           |                 |
| 0.20 µm hydrophilic PTFE filter  |       | SAMPLG001 | 96              |
|  |       | SAMPLG004 | 384 (4 × 96/pk) |
| 0.45 µm hydrophilic PTFE filter  |       | SAMPLCR01 | 96              |
|  |       | SAMPLCR04 | 384 (4 × 96/pk) |
| 0.45 µm hydrophilic PVDF filter  |       | SAMPHV001 | 96              |
|  |       | SAMPHV004 | 384 (4 × 96/pk) |

## Ordering Information, continued

### Millex® Filters for Smplicity® G2 Filtration System (includes Millex® filter plus funnel)

|                                  |            |                   |
|----------------------------------|------------|-------------------|
| 0.22 µm hydrophilic PVDF filter  | SAMP2GVNB  | 250               |
|                                  | SAMP2GVNK  | 1000 (4 × 250/pk) |
| 0.45 µm hydrophilic PVDF filter  | SAMP2HVN B | 250               |
|                                  | SAMP2HVNK  | 1000 (4 × 250/pk) |
| 0.20 µm hydrophilic nylon filter | SAMP2GNNB  | 250               |
|                                  | SAMP2GNNK  | 1000 (4 × 250/pk) |
| 0.45 µm hydrophilic nylon filter | SAMP2HNNB  | 250               |
|                                  | SAMP2HNNK  | 1000 (4 × 250/pk) |
| 0.22 µm hydrophilic PES filter   | SAMP2GPNB  | 250               |
|                                  | SAMP2GPNK  | 1000 (4 × 250/pk) |
| 0.45 µm hydrophilic PES filter   | SAMP2HPNB  | 250               |
|                                  | SAMP2HPNK  | 1000 (4 × 250/pk) |

### Smplicity® G2 Filtration System and Filter Starter Bundles

For available system and filter combinations go to [www.millipore.com](http://www.millipore.com) and enter *smplicity starter bundle* in the search box.

### Accessories

|  |           |    |
|--|-----------|----|
| Millex®-FA <sub>50</sub> filter, 1.0 µm, hydrophobic PTFE, 50 mm | SLFA05010 | 10 |
| Chemical Duty Pump, 115 V (60 Hz)                                | WP6111560 | 1  |
| Chemical Duty Pump, 100 V (50/60 Hz)                             | WP6110060 | 1  |
| Chemical Duty Pump, 220 V (50 Hz)                                | WP6122050 | 1  |
| High Output Pump, 115 V (60 Hz)                                  | WP6211560 | 1  |
| High Output Pump, 100 V (50/60 Hz)                               | WP6210060 | 1  |
| High Output Pump, 220 V (50 Hz)                                  | WP6222050 | 1  |
| Vacuum Tubing, 6.4 mm ID × 3 m (1/4 in. ID × 10 ft)              | MSVMHTS09 | 1  |

## Technical Assistance

For more information, contact the office nearest you. In the U.S., call 1-800-221-1975. Outside the U.S., go to our web site at [www.millipore.com/offices](http://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](http://www.millipore.com/techservice).

## Standard Warranty

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