Laboratory Filtration Products

Simplifying Progress

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Filtration and ultrafiltration are essential process steps in nearly all environmental, chemistry and bioscientific laboratory applications.

Sartorius supplies a wide range of individual filter papers, microporous membranes, filtration devices, ultrafiltration units and protein purification devices to suit these applications. This catalog provides a condensed overview of the Sartorius Lab Filtration product range. Please contact us directly for specialty catalogs – available for in-depth technical information.


SARTORIUS
VIVAFLOW® 50
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VIVAFLOW® 50

Ultrafiltration

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Introduction

Ultrafiltration is a convective process using anisotropic semi-permeable membranes to separate macromolecular species and solvents – primarily on the basis of size.

By allowing solvents and salts to pass the ultrafiltration membrane, macromolecules which are hindered to pass it, are concentrated. Ultrafiltration can also be applied in solvent exchange applications. Multiple concentration and refilling steps will progressively lead to a buffer exchange, replacing lengthy techniques like dialysis. Although ultrafiltration is not a standard method for separating and fractionating macromolecules, it can be used as such if the macromolecules differ at least 10 times in size. Ultrafiltration is a gentle, non-denaturing method that is more efficient and flexible than other processes.

Ultrafiltration Methods
Sartorius offers you a comprehensive range of ultrafiltration process methods for the concentration of your biological samples.
- Centrifugal Concentration (0.1 to 100 mL starting volume)
- Pressure Ultrafiltration (5 to 100 mL starting volume)
- Crossflow (Tangential Flow) (0.1 to 5 L starting volumes)
- Static Absorption (3 to 20 mL starting volume)

Further information about the operational methods can be found on page 8.

Typical Applications for Ultrafiltration
- Concentration | desalting of proteins, enzymes, DNA, monoclonal antibodies, immunoglobulins, viruses and nanoparticles
- Bence Jones Protein concentration from urine samples prior to capillary electrophoresis
- Forensic DNA sample concentration prior to sequencing reaction
- Peptide fractionation in FASP (filter-aided sample preparation)
- Free drug | hormone assays
- Removal of primers from PCR amplified DNA
- Removal of labeled amino acids and nucleotides
- Deproteinization of samples
- General purpose laboratory concentration and desalting of proteins, enzymes, DNA, biomolecules, viruses, antibodies and immunoglobulins

Membrane Performance Characteristics
Sartorius offers an extended range of membranes to cover the great majority of ultrafiltration requirements.
- Polyethersulfone (PES)
- Cellulose Triacetate (CTA)
- Hydrosart®

Further information about the properties of the different membrane types can be found on page 9.

Process Optimization
When the highest recoveries are crucial, particularly with solute quantities in the microgram range, Sartorius recommends considering the following tips for optimal ultrafiltration results:
- Select the lowest MWCO membrane that suits your application. For the highest recovery, choose a membrane MWCO which is at least half of the molecular weight of the solute to be retained.
- Avoid over-concentration. The smaller the final concentrate volume, the more difficult it is to achieve complete recovery. If feasible, rinse the device with one or more drops of buffer after the first concentration cycle and then recover it again.
- Pretreat the device overnight in distilled water with a passivation solution such as 5 % SDS, Tween 20 or Triton X-100. Rinse thoroughly before use.

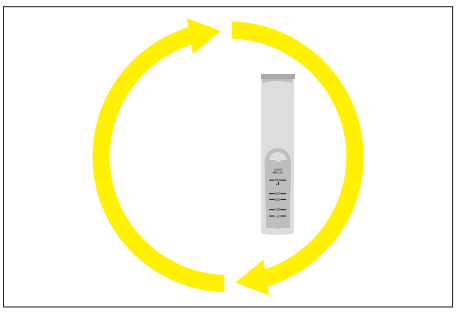
Solute concentration for diagnostics
Ultrafiltration devices can be used in the clinical setting for the concentration and separation of disease markers, such as Bence Jones protein from urine for the diagnosis of acute multiple myeloma, and others from clinical samples, such as blood, serum, urine and cerebrospinal samples. Use of devices for these applications require dedicated *in vitro* Diagnostic (IVD) registered devices. IVD devices are only available in registered countries, according to country specific regulations. Please contact Sartorius for more information on registered countries and availability.


VIVASPIN®TURBO 4
10,000 MWCO
µL

Membrane Selection Guide

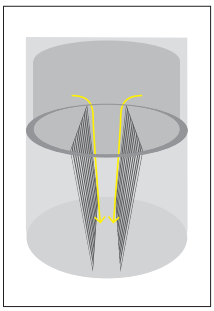
Ultrafiltration Methods

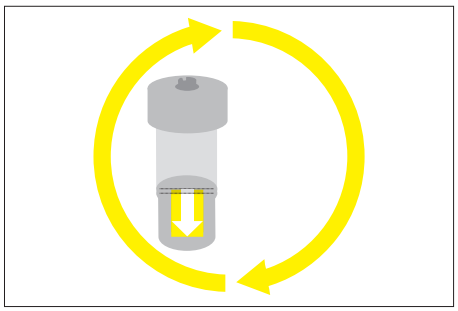
Sartorius offers you a comprehensive range of ultrafiltration process methods for the concentration of your biological samples. The guide below will help you select the most suitable device according to sample volume and available equipment, as well as your desired filtration speed and process control.



Centrifugal Concentration (0.1 to 100 mL Starting Volume)

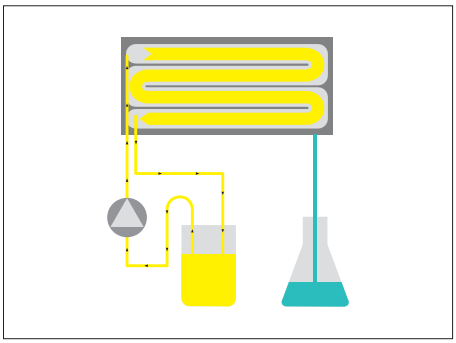
Driven by the centrifugal force, ultrafiltration can be used to purify and concentrate proteins, nucleic acids, viruses, macromolecules and nanoparticles. This gentle process is quick to set up and offers fast filtration speeds for most solutions. Sartorius offers seven Vivaspin® devices and the Vivacell® 100 and Centrisart® I for protein concentration, as well as Vivacon® devices for DNA and peptide concentration | fractionation.





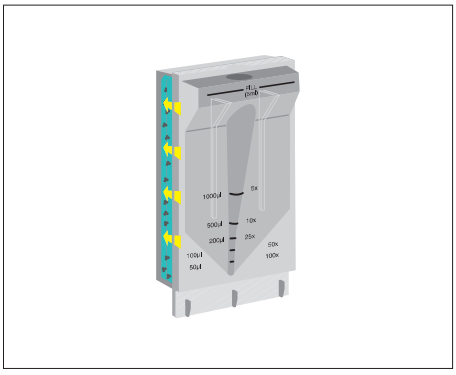
Pressure Ultrafiltration (5 to 100 mL Starting Volume)

Pressurized air or inert gas provide the filtration vector for ultrafiltration. To speed up the filtration process, the pressurized Vivacell® 100 or Vivaspin® 20 can be placed on an orbital laboratory shaker. Agitation helps to prevent membrane blocking and ensures high filtration speed. Vivaspin® 20 and Vivacell® 100 can be run with gas pressure. The Vivaspin® 20 can also be run by pressure-fugation, a unique Sartorius method combining gas and pressure with centrifugation. This is the fastest of all methods, providing process times that are typically 30 to 50 % faster than centrifugation.



Crossflow (Tangential Flow) (0.1 to 5 L Starting Volumes)

The sample is pumped across an ultrafiltration membrane and then returned to the original reservoir, with pressure built up in the device by a flow restrictor. The solution is progressively concentrated as solvent and micromolecules pass through the membrane into a separate filtrate vessel. Reusable Vivaflow® 50R and Vivaflow® 200, as well as disposable Vivaflow® 50, are offered for your dedicated laboratory crossflow filtration.



Static Absorption (3 to 20 mL Starting Volume)

This technique uses an absorbent cellulose pad mounted behind the ultrafiltration membrane to draw solvents and micromolecules through the membrane. The retained macromolecules thus concentrate at the bottom of the sample container. No additional equipment is needed. These devices are ideal for clinical applications like urine concentration prior to further analysis. Both Vivapore® 5 and Vivapore® 20 offer this procedure.

Membrane Performance Characteristics

Sartorius offers an extended range of membranes to cover the great majority of ultrafiltration requirements. To select the most appropriate membranes for your application please refer to the following guide. Please note however that membrane behavior and ultimate performance, largely depends on the specific characteristics of the solution being processed. Where available, alternative membranes should be tested to optimize the process performance.

Polyethersulfone (PES)

Concentration | desalting of column eluates, cell culture supernatants, etc. This is a general purpose membrane that provides excellent performance with most solutions when retentate recovery is of primary importance. PES membranes are usually preferred for their low fouling characteristics, exceptional flux and broad pH compatibility.

Cellulose Triacetate (CTA)

Free | bound drug studies and whenever the filtrate is being analyzed. High hydrophilicity and very low non-specific binding characterize this membrane. Cast without any membrane support that could trap or bind passing micro solutes, these membranes are preferred for sample cleaning and protein removal, and when high recovery from the filtrate solution is of primary importance.

Hydrosart®

Concentration | desalting of column eluates, Hydrosart® membrane evaluation prior to upscaling. Hydrosart® demonstrates the same properties as regenerated cellulose, but with the added benefit of enhanced performance characteristics and extremely low protein binding, making it the membrane of choice for applications such as concentration and desalting of immunoglobulin fractions.

Regenerated Cellulose (RC)

This is a hydrophillic membrane suitable for general samples, wiith ultra-low protein adsorption and high chemical compatability. The membrane is especially well suited to oligonucleotides and peptides. This Sartorius RC membrane has been developed uniquely for the lab ultrafiltration devices and applications, ensuring optimal performance.

Membrane Selection Guide

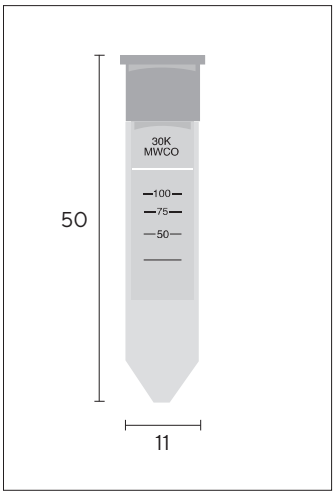
The molecular weight cut-off (MWCO) is the molecular weight of molecules (e.g. globular proteins) which are retained by the membrane to an extent of 90 %. Therefore, to ensure the highest recovery, select a membrane with a MWCO that represents up to half the molecular weight of the solute to be retained.

Sartorius Vivaspin® ultrafiltration units are designed to concentrate protein solutions. Therefore, the membranes in the devices are tested for the retention of proteins and not the passage of proteins into the filtrate vessel. PES and Hydrosart® membranes have support structures, which might lead to some loss of protein after passage through the membrane.

Recommended MWCO (Da):						
Application	**< 5,000**	**10,000**	**30,000**	**50,000**	**100,000**	**> 300,000**
Bacteria					▪	▪
DNA fragments		▪	▪	▪	▪	
Enzymes	▪	▪				
Extracellular Vesicles					▪	▪
Growth factors	▪	▪				
mAB			▪	▪	▪	
Nucleic acids	▪	▪	▪	▪	▪	
Oligonucleotides	▪					
Peptides	▪					
Virus			▪	▪	▪	
Yeast					▪	▪

Vivaspin® 500

Please use a fixed angle rotor for 2 mL reaction vials.



100 to 500 µL Samples
Vivaspin® 500 centrifugal filter units offer a simple, one-step procedure for sample preparation. They can effectively be used in fixed-angle rotors accepting 2.2 mL centrifuge tubes.

The patented vertical membrane design and thin channel filtration chamber (US 5,647,990) minimizes membrane fouling and provides high-speed concentrations – even with particle-loaded solutions.

Specifications

Vivaspin® 500		
Concentrator capacity	Swing bucket rotor Fixed angle rotor	do not use 500 µL
Dimensions	Total length Width Active membrane area Hold-up volume, membrane and support Dead-stop volume	50 mm 11 mm 0.5 cm² <5 µL 5 µL
Materials of construction	Body Filtrate vessel Concentrator cap Membrane	Polycarbonate Polypropylene Polycarbonate Polyethersulfone

Typical Performance Characteristics		
	Time to concentrate up to 30× [min.] at 20 °C and solute recovery [%]	
Rotor	Fixed angle	
Centrifugal force	12,000 g	
Start volume	500 µL	
	Min.	Rec.
Aprotinin 0.25 mg/mL (6,500 MW) 3,000 MWCO PES	 30	 96 %
BSA 1.0 mg/mL (66,000 MW) 5,000 MWCO PES 10,000 MWCO PES 30,000 MWCO PES	 15 5 5	 96 % 96 % 96 %
IgG 0.25 mg/mL (160,000 MW) 30,000 MWCO PES 50,000 MWCO PES 100,000 MWCO PES	 10 10 10	 96 % 96 % 96 %

Ordering Information

Vivaspin® 500 Polyethersulfone	Qty./Pkg.	Prod. No.
3,000 MWCO	25	VS0191
3,000 MWCO	100	VS0192
5,000 MWCO	25	VS0111
5,000 MWCO	100	VS0112
10,000 MWCO	25	VS0101
10,000 MWCO	100	VS0102
30,000 MWCO	25	VS0121
30,000 MWCO	100	VS0122
50,000 MWCO	25	VS0131
50,000 MWCO	100	VS0132
100,000 MWCO	25	VS0141
100,000 MWCO	100	VS0142
300,000 MWCO	25	VS0151
300,000 MWCO	100	VS0152
1,000,000 MWCO	25	VS0161
1,000,000 MWCO	100	VS0162
0.2 µm	25	VS0171
0.2 µm	100	VS0172

Visit us at www.sartorius.com/Vivaspin500 to get additional info.
Find instructions on how to use Vivaspin® 500 for

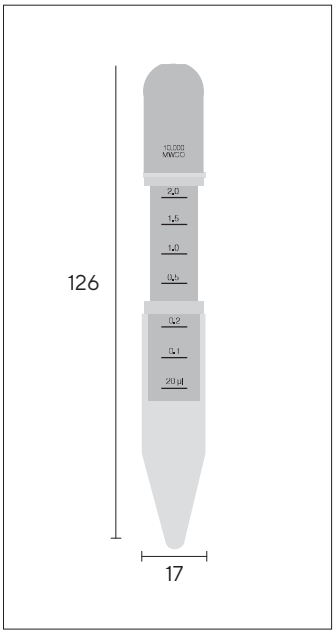
- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Concentration to a predefined volume
- Concentration of diluted samples with increased recovery

Vivaspin® 2

0.4 to 2 mL Samples
The Vivaspin® 2 bridges the gap between the 500 µL and 4 mL centrifugal concentrators. This device combines the speed of the classic Vivaspin® products with low internal surface and membrane area for superior recoveries from very dilute solutions.

Available with a choice of PES, Cellulose Triacetate or Hydrosart® membranes, Vivaspin® 2 offers the highest flexibility for process optimization.

Also unique to Vivaspin® 2 is the choice of directly pipetting the concentrate from the dead-stop pocket built into the bottom of the concentrator, or alternatively reverse spinning into the concentrator cap. Both methods result in near total concentrate recoveries.



Specifications

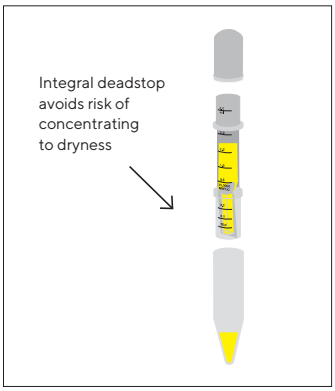
Vivaspin® 2		
Concentrator capacity	Swing bucket rotor Fixed angle rotor	3 mL 2 mL
Dimensions	Total length Width Active membrane area Hold-up volume of membrane Dead-stop volume	126 mm 17 mm 1.2 cm^2 <10 µL 8 µL
Materials of construction	Body Filtrate vessel Concentrator cap Membrane	Polycarbonate Polycarbonate Polycarbonate PES, CTA, HY

Performance Characteristics		
	Time to concentrate up to 30× [min.] at 20 °C and solute recovery [%]	
Rotor	Fixed angle	Swing bucket
Centrifugal force	8,000 g	4,000 g
Start volume	2 mL	
	Min.	Rec.
Aprotinin 0.25 mg/mL (6,500 MW) 3,000 MWCO PES	50	96 %
BSA 1.0 mg/mL (66,000 MW) 5,000 MWCO PES 5,000 MWCO CTA 5,000 MWCO Hydrosart® 10,000 MWCO PES 10,000 MWCO CTA 10,000 MWCO Hydrosart® 20,000 MWCO CTA 30,000 MWCO PES 30,000 MWCO Hydrosart®	 12 50 22 8 10 12 5 8 5	 98 % 98 % 98 % 96 % 98 % 97 % 97 % 95 %

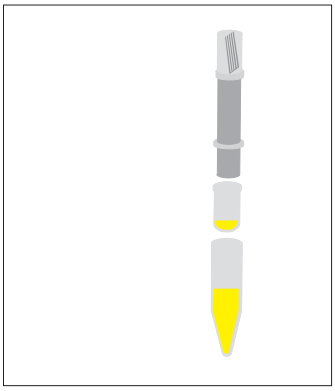
Typical Performance Characteristics		
	Time to concentrate up to 30× [min.] at 20 °C and solute recovery [%]	
Rotor	Fixed angle	
Centrifugal force	5,000 g	
Start volume	2 mL	
	Min.	Rec.
IgG 0.25 mg/mL (160,000 MW)		
20,000 MWCO CTA	6	97 %
30,000 MWCO PES	10	96 %
50,000 MWCO PES	10	96 %
100,000 MWCO PES	8	95 %

Ordering Information

Vivaspin® 2 Polyethersulfone	**Qty./Pkg.**	**Prod. No.**
3,000 MWCO	25	VS0291
3,000 MWCO	100	VS0292
5,000 MWCO	25	VS0211
5,000 MWCO	100	VS0212
10,000 MWCO	25	VS0201
10,000 MWCO	100	VS0202
30,000 MWCO	25	VS0221
30,000 MWCO	100	VS0222
50,000 MWCO	25	VS0231
50,000 MWCO	100	VS0232
100,000 MWCO	25	VS0241
100,000 MWCO	100	VS0242
300,000 MWCO	25	VS0251
300,000 MWCO	100	VS0252
1,000,000 MWCO	25	VS0261
1,000,000 MWCO	100	VS0262
0.2 µm	25	VS0271
0.2 µm	100	VS0272



PES, CTA, or Hydrosart® membranes; Filtrate container fits standard 15 mL tube carriers



Direct pipette recovery or choice of reverse spinning concentrator into sample cap

Vivaspin® 2 Cellulose Triacetate	Qty./Pkg.	Prod. No.
10,000 MWCO	25	VS02V1
10,000 MWCO	100	VS02V2
20,000 MWCO	25	VS02X1
20,000 MWCO	100	VS02X2

Vivaspin® 2 Hydrosart®	Qty./Pkg.	Prod. No.
2,000 MWCO	25	VS02H91
2,000 MWCO	100	VS02H92
5,000 MWCO	25	VS02H11
5,000 MWCO	100	VS02H12
10,000 MWCO	25	VS02H01
10,000 MWCO	100	VS02H02
30,000 MWCO	25	VS02H21
30,000 MWCO	100	VS02H22

Ordering Tips

- Choose a membrane pore size at least 50 % smaller than the size of the molecule to be retained.
- It is usually best to select polyethersulfone membranes to achieve the fastest concentrations.
- Usually choose cellulose triacetate for protein removal or ultrafiltrate recovery.
- Usually choose Hydrosart® membranes for the highest recovery with Ig fractions.

Visit us at www.sartorius.com/Vivaspin2 to get additional info.
Find instructions on how to use Vivaspin® 2 for

- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Concentration of diluted samples with increased recovery
- Sample preparation for radio immunoassay

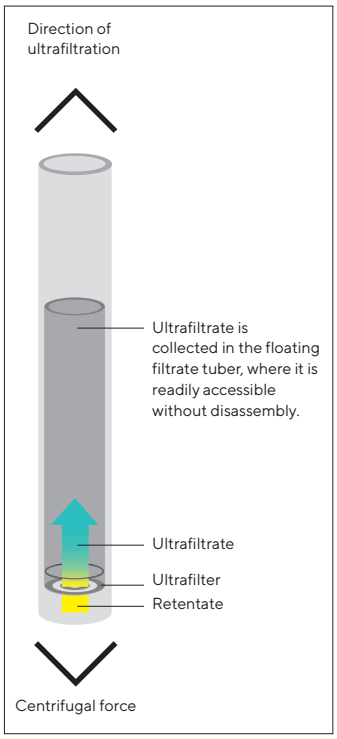
Centrisart® 1

Centrisart® 1* is a ready-to-use unit for small-volume, centrifugal ultrafiltration to separate proteins from low molecular weight substances in biological samples.

Centrisart® 1 features a unique design that enables ultrafiltration in the direction opposite to centrifugal force. This is so effective in preventing premature blockage of the filter that even whole blood samples can be deproteinized.

The ultrafiltrate is collected in the floatering filtrate tube, where it is readily accessible without disassembly.

Centrisart® 1 is ideal for the following applications:
- Drug binding studies
- Determination of metabolites in serum
- Protein removal from blood samples
- Cleaning of liposomes
- Virus removal



Specifications

Centrisart® 1		
Concentrator capacity	Swing bucket rotor Fixed angle rotor	2.5 mL 2.5 mL
Dimensions	Total length Width Active membrane area Hold-up volume of membrane Dead-stop volume	93 mm 14 mm 0.79 cm^2 < 5 µL 100 µL
Materials of construction	Centrifuge tube Floater tube Cap Membrane	Polystyrene Cellulose propionate Polyethylene CTA, PES

Typical Performance Characteristics

	Time to filter 50 % of sample volume	Time to filter 90 % of sample volume	Passage of test molecule
BSA 1.0 mg/mL (66,000 MW)			
5,000 MWCO	300 min	N | A	0 %
10,000 MWCO	35 min	80 min	2 %
20,000 MWCO	9 min	20 min	2 %
IgG 0.25 mg/mL (160,000 MW)			
100,000 MWCO	13 min	35 min	3 %
IBlue Dextran 0.1 mg/mL (2,000,000 MW)			
300,000 MWCO	9 min	25 min	28 %

2.5 mL samples were loaded into each device. The devices were centrifuged at 2,000 g until the required filtrate volumes had been reached.
Devices can be used in conical or flat bottom centrifuge adaptors.

* Centrisart is a registered trademark in the U.S. and the European Union

Ordering Information

	Qty./Pkg.	Prod. No.
5,000 MWCO CTA	12	13229----------E
10,000 MWCO CTA	12	13239----------E
20,000 MWCO CTA	12	13249----------E
100,000 MWCO PES	12	13269----------E*
300,000 MWCO PES	12	13279----------E

*IVD device article code available only in IVD registered countries, according to country specific regulations

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Digoxin-like immunoreactivity eliminated from serum by centrifugal ultrafiltration before fluorescence polarization immunoassay of digoxin.
Clinical Chemistry 33, 606-608 (1987)

Visit us at wwww.sartorius.com/en/products/lab-filtration-purification/ultrafiltration-devices to get additional info.
Find instructions on how to use Centrisart® I for the high recovery of cationised protein.

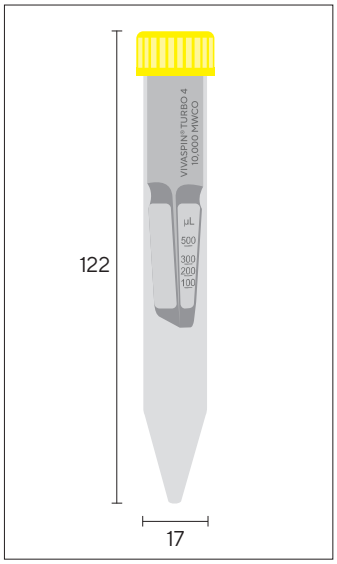
Vivaspin® Turbo 4 PES

2 to 4 mL Samples

Vivaspin® Turbo 4 PES is the newest member of the ultrafiltration family and allows the fastest sample concentration with the highest recoveries. This device can handle up to 4 mL sample volumes in swing bucket and fixed angle rotors that accept 15 mL conical bottom centrifuge tubes.

The Vivaspin® Turbo 4 PES optimized design and sleek internal profile ensure maximum process speeds all the way down to the last few microliters, resulting in more than 100-fold concentration.

The UV joining technology ensures smooth joint transition between the membrane and the plastic housing – allowing removal of the entire concentrated sample from the unique, pipette tip-friendly dead-stop pocket.



Specifications

Vivaspin® Turbo 4 PES		
Concentrator capacity	Swing bucket rotor Fixed angle rotor	4 mL 4 mL
Dimensions	Total length Width Active membrane area Hold-up volume of membrane Dead-stop volume swing bucket rotor Dead-stop volume fixed angle rotor (25°)	122.5 mm 17 mm 3.2 cm^2 <10 µL 40 µL 30 µL
Materials of construction	Body Filtrate vessel Concentrator cap Membrane	Styrene butadiene copolymere Polypropylene Polypropylene Polyethersulfone

Typical Performance Characteristics				
	Time to concentrate up to 30× [min.] at 20 °C and solute recovery [%]			
Rotor	Swing bucket		Fixed angle (25°)	
Centrifuge speed	4,000 g*		7,500 g*	
Start volume	4 mL		4 mL	
	Min.	Rec.	Min.	Rec.
Cytochrome c (12,400 MW)				
3,000 MWCO PES	60	98 %	80	96 %
5,000 MWCO PES	40	95 %	50	94 %
Lysozyme (14,300 MW)				
3,000 MWCO PES	65	95 %	70	93 %
5,000 MWCO PES	50	94 %	60	92 %
α-Chymotrypsin (25,000 MW)				
10,000 MWCO PES	10	95 %	8	95 %
BSA (66,000 MW)				
10,000 MWCO PES	10	98 %	7	97 %
30,000 MWCO PES	8	96 %	6	97 %

* 3,000g for 100K MWCO devices in swing bucket centrifuge, 5,000 g for 100K devices in fixed angle centrifuge.

Performance Characteristics				
	Time to concentrate up to 30× [min.] at 20 °C and solute recovery [%]			
	Min.	Rec.	Min.	Rec.
IgG (160,000 MW)				
30,000 MWCO PES	18	94 %	13	92 %
50,000 MWCO PES	16	93 %	12	90 %
100,000 MWCO PES*	17	94 %	13	92 %

* 3,000 g swing-out | 5,000 g fixed angle

Ordering Information

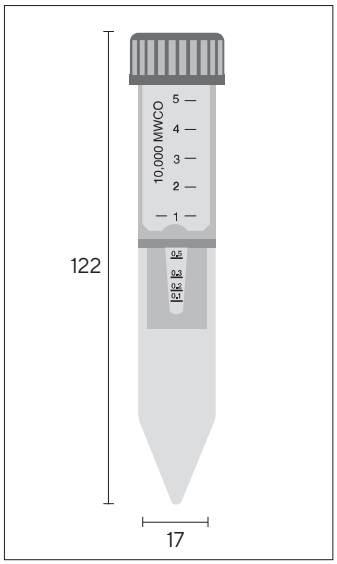
Vivaspin® Turbo 4 Polyethersulfone	Qty./Pkg.	Prod. No.
3,000 MWCO	25	VS04T91
3,000 MWCO	100	VS04T92
5,000 MWCO	25	VS04T11
5,000 MWCO	100	VS04T12
10,000 MWCO	25	VS04T01
10,000 MWCO	100	VS04T02
10,000 MWCO	25	VS04T01IVD**
10,000 MWCO	100	VS04T02IVD**
30,000 MWCO	25	VS04T21
30,000 MWCO	100	VS04T22
50,000 MWCO	25	VS04T31
50,000 MWCO	100	VS04T32
100,000 MWCO	25	VS04T41
100,000 MWCO	100	VS04T42

** IVD device article codes available only in IVD registered countries, according to country specific regulations

Visit us at www.sartorius.com/VivaspinTurbo4 to get additional info.
Find instructions on how to use Vivaspin® Turbo 4 PES for

- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Separation of proteins and metabolites for disease detection

Vivaspin® 6



2 to 6 mL Samples
Vivaspin® 6 concentrators have been developed to offer increased volume flexibility and performance.

Vivaspin® 6 can process an impressive 6 mL in either swing bucket or fixed angle rotors accepting standard 15 mL conical bottom centrifuge tubes.

The Vivaspin® 6 features twin vertical membranes for unparalleled filtration speeds and more than 100-fold concentration. The remaining volume is easy to read off the printed graduations on the side of the concentrator and the modified dead-stop pocket further simplifies direct pipette recovery of the final concentrate.

Specifications

Vivaspin® 6		
Concentrator capacity	Swing bucket rotor Fixed angle rotor	6 mL 6 mL
Dimensions	Total length Width Active membrane area Hold-up volume of membrane Dead-stop volume	122 mm 17 mm 2.5 cm^2 <10 µL 30 µL
Materials of construction	Body Filtrate vessel Concentrator cap Membrane	Polycarbonate Polycarbonate Polypropylene Polyethersulfone

Typical Performance Characteristics

	Time to concentrate up to 30× [min.] at 20 °C and solute recovery [%]			
Rotor	Swing bucket		Fixed angle [25°]	
Centrifuge speed	4,000 g		8,000 g*	
Start volume	6 mL		6 mL	
	Min.	Rec.	Min.	Rec.
Cytochrome c 0.25 mg/mL (12,400 MW) 5,000 MWCO PES	–	–	90	97 %
BSA 1.0 mg/mL (66,000 MW)				
5,000 MWCO PES	20	98 %	12	98 %
10,000 MWCO PES	13	98 %	10	98 %
30,000 MWCO PES	12	98 %	9	97 %
IgG 0.25 mg/mL (160,000 MW)				
30,000 MWCO PES	18	96 %	15	95 %
50,000 MWCO PES	17	96 %	14	95 %
100,000 MWCO PES	15	91 %	12	91 %
Latex beads 0.004 % in DMEM + 10 % FCS (0.055 µm) 300,000 MWCO PES	–	–	25	99 %
Latex beads 0.004 % in DMEM + 10 % FCS (0.24 µm) 1,000,000 MWCO PES	–	–	4	99 %
Yeast 1.0 mg/mL (S. Cerevisiae) 0.2 µm PES	4	97 %	3	97 %

* 6,000 g for 100K MWCO devices

Ordering Information

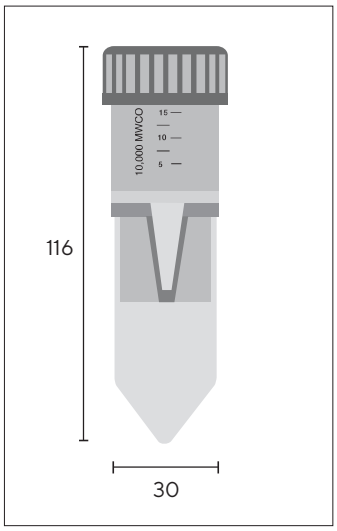
Vivaspin® 6 Polyethersulfone	Qty./Pkg.	Prod. No.
3,000 MWCO	25	VS0691
3,000 MWCO	100	VS0692
5,000 MWCO	25	VS0611
5,000 MWCO	100	VS0612
10,000 MWCO	25	VS0601
10,000 MWCO	100	VS0602
10,000 MWCO	25	VS0601IVD*
10,000 MWCO	100	VS0602IVD*
30,000 MWCO	25	VS0621
30,000 MWCO	100	VS0622
50,000 MWCO	25	VS0631
50,000 MWCO	100	VS0632
100,000 MWCO	25	VS0641
100,000 MWCO	100	VS0642
300,000 MWCO	25	VS0651
300,000 MWCO	100	VS0652
1,000,000 MWCO	25	VS0661
1,000,000 MWCO	100	VS0662
0.2 µm	25	VS0671
0.2 µm	100	VS0672

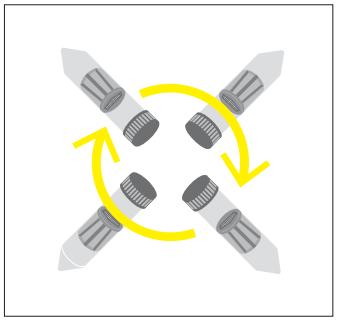
*IVD device article codes available only in IVD registered countries, according to country specific regulations

Visit us at www.sartorius.com/Vivaspin6 to get additional info.
Find instructions on how to use Vivaspin® 6 for

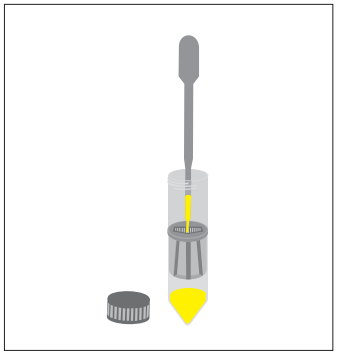
- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Concentration of diluted samples with increased recovery

Vivaspin® 15R





Spin



Recover

2 to 15 mL Samples

Vivaspin® 15R is designed for initial sample volumes of 2 to 15 mL and features a modified regenerated cellulose membrane; Hydrosart®. This membrane is ideal where extremely high recovery with very low adsorption is needed. Examples of these applications include desalting and concentration of Ig fractions.

Advantages

- Ultimate recovery with low adsorption (95–98 %)
- Exceptionally fast concentration time (30 x in 15 min.)
- Convenient application protocol with easy handling
- Easy scale-up to 0.1 to 5 L with Vivaflow® 50R or 200 with Hydrosart® membranes
- Very low hold-up volume (<20 µL)

Specifications

Vivaspin® 15R		
Concentrator capacity	Swing bucket rotor Fixed angle rotor	15 mL 12.5 mL
Dimensions	Total length Width Active membrane area Hold-up volume of membrane Dead-stop volume	116 mm 30 mm 3.9 cm² <20 µL 30 µL
Materials of construction	Body Filtrate vessel Concentrator cap Membrane	Polycarbonate Polypropylene Polypropylene Hydrosart®

Typical Performance Characteristics				
	Time to concentrate up to 30× [min.] at 20 °C and solute recovery [%]			
Rotor	Swing bucket		Fixed angle [25°]	
Centrifuge speed	3,000 g		6,000 g	
Start volume	15 mL		12.5 mL	
	Min.	Rec.	Min.	Rec.
Aprotinin 0.1 mg/mL* (6,500 MW) 5,000 MWCO	47	95 %	45	95 %
Cytochrome c 0.25 mg/mL* (12,400 MW) 5,000 MWCO 10,000 MWCO	 45 25	 96 % 94 %	 45 18	 96 % 94 %
α-Chymotrypsin 0.25 mg/mL* (25,000 MW) 5,000 MWCO 10,000 MWCO	 50 25	 98 % 98 %	 45 18	 98 % 98 %
Ovalbumin 1.0 mg/mL* (45,000 MW) 10,000 MWCO 30,000 MWCO	 20 15	 98 % 94 %	 14 12	 98 % 94 %

Performance Characteristics				
	Time to concentrate up to 30× [min.] at 20 °C and solute recovery [%]			
	Min.	Rec.	Min.	Rec.
BSA 1.0 mg/mL* (66,000 MW) 30,000 MWCO	18	98 %	15	98 %
IgG 0.1 mg/mL* in DMEM (160,000 MW) 30,000 MWCO	30	98 %	25	96 %

* proteins other than IgG made up in 50 mM potassium phosphate, 150 mM sodium chloride, pH 7.4

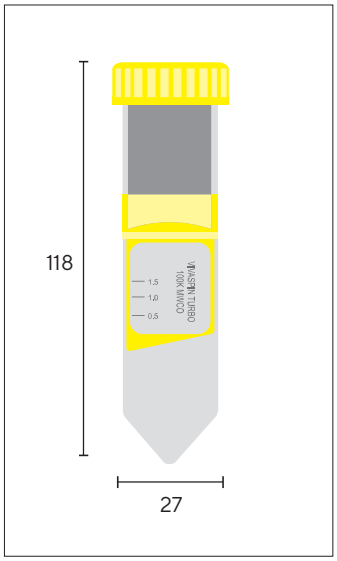
Ordering Information

Vivaspin® 15R Hydrosart®	Qty./Pkg.	Prod. No.
2,000 MWCO	12	VS15RH91
2,000 MWCO	48	VS15RH92
5,000 MWCO	12	VS15RH11
5,000 MWCO	48	VS15RH12
10,000 MWCO	12	VS15RH01
10,000 MWCO	48	VS15RH02
30,000 MWCO	12	VS15RH21
30,000 MWCO	48	VS15RH22

Visit us at www.sartorius.com/Vivaspin15R to get additional info.
Find instructions on how to use Vivaspin® 15R for

- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Concentration of diluted samples with increased recovery

Vivaspin® Turbo 15 PES



4 to 15 mL Samples
Vivaspin® Turbo 15 enables the fastest sample concentration with the highest recoveries. This device can handle a sample volume of up to 110 or 15 mL in fixed angle or swing bucket rotors that accept 50 mL conical bottom centrifuge tubes.

The optimized design and sleek internal profile of Vivaspin® Turbo 15 ensure maximum process speeds all the way down to the last few microliters, which results in more than 100-fold concentration.

The UV joining technology ensures smooth joint transition between the membrane and the plastic housing – allowing removal of the entire sample concentrated in the unique, pipette-friendly dead-stop pocket.

Specifications

Vivaspin® Turbo 15 PES		
Concentrator capacity	Swing bucket rotor Fixed angle rotor (25°)	15 mL 9 mL
Dimensions	Total length (concentrator insert) Total length (in tube with cap) Diameter (concentrator insert) Active membrane area Hold-up volume of membrane Dead-stop volume for swing-bucket rotor Dead-stop volume for fixed-angle rotor	77 mm 118 mm 27 mm 7.2 cm² <10 µL 100 µL 60 µL
Materials of construction	Body Filtrate vessel Concentrator cap Membrane	Styrene butadiene copolymer Polypropylene Polypropylene Polyethersulfone (PES)

Typical Performance Characteristics				
	Time to concentrate up to 20× [min.] at 20 °C and solute recovery [%]			
Rotor	Swing bucket		Fixed angle [25°]	
Centrifuge speed	4,000 g*		4,000 g*	
Start volume	15 mL		9 mL	
	Min.	Rec.	Min.	Rec.
Cytochrome c* (12,400 MW) 5,000 MWCO PES	30	98 %	50	98 %
Lysozyme* (14,300 MW) 5,000 MWCO PES	33	96 %	50	96 %
α-Chymotrypsin** (25,000 MW) 10,000 MWCO PES	10	95 %	10	95 %
BSA** (66,000 MW) 10,000 MWCO PES 30,000 MWCO PES	10 8	99 % 98 %	10 10	99 % 98 %

*2,000 g for 100K MWCO devices

Typical Performance Characteristics				
	Time to concentrate up to 20× [min.] at 20 °C and solute recovery [%]			
	Min.	Rec.	Min.	Rec.
IgG** (160,000 MW) 30,000 MWCO PES	23	95 %	17	95 %

* 0.25 mg/mL ** 1 mg/mL

Ordering Information

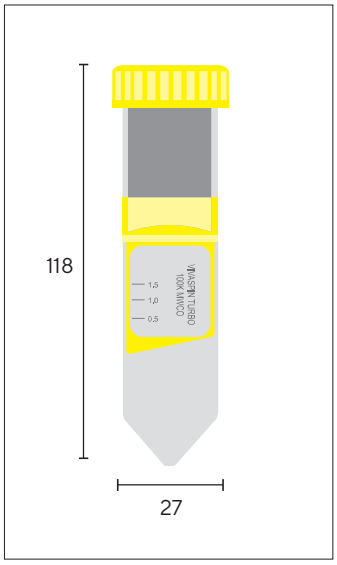
Vivaspin® Turbo 15 Polyethersulfone	Qty./Pkg.	Prod. No.
3,000 MWCO	12	VS15T91
3,000 MWCO	48	VS15T92
5,000 MWCO	12	VS15T11
5,000 MWCO	48	VS15T12
10,000 MWCO	12	VS15T01
10,000 MWCO	48	VS15T02
10,000 MWCO	12	VS15T01IVD***
10,000 MWCO	48	VS15T02IVD***
30,000 MWCO	12	VS15T21
30,000 MWCO	48	VS15T22
50,000 MWCO	12	VS15T31
50,000 MWCO	48	VS15T32
100,000 MWCO	12	VS15T41
100,000 MWCO	48	VS15T42

*** IVD device article codes available only in IVD registered countries, according to country specific regulations

Visit us at www.sartorius.com/VivaspinTurbo15 to get additional info.
Find instructions on how to use Vivaspin® Turbo 15 for

- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Concentration of diluted samples with increased recovery
- Concentration to a predefined volume
- Depyrogenation of the ultrafiltration devices
- Concentration of mammalian cell culture supernatants

Vivaspin® Turbo 15 RC



4 to 15 mL Samples
Vivaspin® Turbo 15 RC allows fastest sample concentration with highest recoveries. This device can handle up to 11 or 15 mL sample volumes in fixed angle or swing bucket rotors accepting 50 mL centrifuge tubes.

The Vivaspin® Turbo 15 RC optimized design and sleek internal profile ensure maximum process speeds right the way down to the last few micro litres leading to more than 100-fold concentration. The hydrophillic regenerated cellulose (RC) is suitable for general samples, with ultra-low protein absorbtion and high chemical compatability. The membrane is especially well suited to oligonucleotides and peptides and has been developed uniquely for lab ultrafiltration applications.

The solvent free heat weld technology allows for a smooth transition between the membrane and plastic housing, providing complete sample recovery from the unique pipette friendly dead stop pocket. Combined with the PES counterpart the Vivaspin® Turbo range offers the best membrane, whatever the sample.

Specifications

Vivaspin® Turbo 15 PES		
Concentrator capacity	Swing bucket rotor	15 mL
	Fixed angle rotor (25 °)	9 mL
Dimensions	Total length (concentrator insert)	77 mm
	Total length (in tube with cap)	118 mm
	Diameter (concentrator insert)	27 mm
	Active membrane area	8.1 cm²
	Hold-up volume of membrane	<10 µL
	Dead-stop volume for swing-bucket rotor	100 µL
	Dead-stop volume for fixed-angle rotor	60 µL
Materials of construction	Body	Styrene butadiene copolymer
	Filtrate vessel	Polypropylene
	Concentrator cap	Polypropylene
	Membrane	Regenerated Cellulose (RC)

Typical Performance Characteristics				
	Time to concentrate up to 20× [min.] at 20 °C and solute recovery [%]			
Rotor	Swing bucket		Fixed angle [25°]	
Centrifuge speed	4,000 g***		6,000 g	
Start volume	15 mL		11 mL	
	Min.	Rec.	Min.	Rec.
Cytochrome c* (12,400 MW) 5 MWCO RC	23	94 %	37	92 %
Lysozyme* (14,300 MW) 5 MWCO RC	23	94 %	37	89 %
α-Chymotrypsin** (25,000 MW) 10 MWCO RC	7	93 %	9	92 %
BSA** (66,000 MW) 10 MWCO RC** 30 MWCO RC*	8 4	94 % 96 %	10 4	98 % 93 %
Gamma Globulin (160,000 MW) 50 MWCO RC** 100 MWCO RC**	17 18	95 % 89 %	11 12	96 % 89 %

* 0.25 mg/mL ** 1 mg/mL *** 3,000 g for 100K MWCO devices

Ordering Information

Vivaspin® Turbo 15 Regenerated Cellulose	Qty./Pkg.	Prod. No.
5,000 MWCO	12	VS15TR11
5,000 MWCO	48	VS15TR12
10,000 MWCO	12	VS15TR01
10,000 MWCO	48	VS15TR02
30,000 MWCO	12	VS15TR21
30,000 MWCO	48	VS15TR22
50,000 MWCO	12	VS15TR31
50,000 MWCO	48	VS15TR32
100,000 MWCO	12	VS15TR41
100,000 MWCO	48	VS15TR42

Visit us at www.sartorius.com/VivaspinTurbo15 to get additional info.
Find instructions on how to use Vivaspin® Turbo 15 for

- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Concentration of diluted samples with increased recovery
- Concentration to a predefined volume
- Depyrogenation of the ultrafiltration devices

Vivaspin® 20

5 to 20 mL Samples

Vivaspin® 20 centrifugal concentrators have been developed to offer increased volume flexibility and performance.

Vivaspin® 20 handles up to 140 or 20 mL in fixed angle or swing bucket rotors that accept 50 mL conical bottom centrifuge tubes. Featuring twin vertical membranes for unparalleled filtration speeds, the Vivaspin® 20 can achieve more than 100-fold concentrations. The remaining volume is easy to read off the printedgraduations on the side of the concentrator and the modified dead-stop pocket further simplifies direct pipette recovery of the final concentrate.

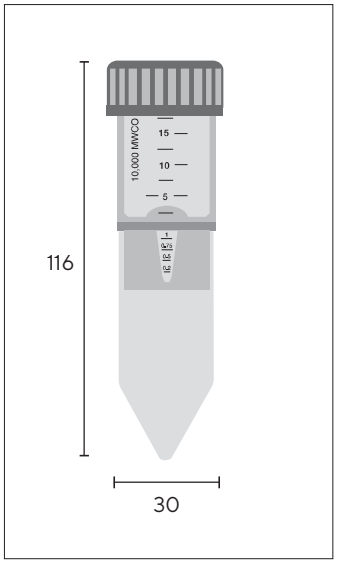
Air pressure controller, VCA002

More Process Flexibility

Vivaspin® 20 is available with unique accessories and operating methods that are designed to provide more process flexibility and further time savings.

Gas Pressure Filtration

When an appropriate centrifuge is unavailable or for single sample processing, Vivaspin® 20 can be filled with up to 15 mL and then pressurized for bench-top concentration. For even faster processing, gas pressure can be combined with centrifugal force. “Pressure-fugation” is particularly suitable for difficult or viscous samples, such as serum, or for use of a low process temperature, which reduces filtration speed, and generally when minimum process time is essential.



Specifications

Vivaspin® 20		
Concentrator capacity	Swing bucket rotor	20 mL
	Fixed angle rotor	14 mL
	With pressure head	15 mL
Dimensions	Total length	116 mm
		125 mm with pressure head
	Width	30 mm
	Active membrane area	6.0 cm²
	Hold-up volume of membrane	<20 µL
	Dead-stop volume	50 µL
Materials of construction	Body	Polycarbonate
	Filtrate vessel	Polycarbonate
	Concentrator cap	Polypropylene
	Pressure head	Acetal | Aluminum
	Membrane	Polyethersulfone

Typical Performance Characteristics				
	Time to concentrate up to 30× [min.] at 20 °C and solute recovery [%]			
Mode	Centrifuge	Centrifuge	Bench top	Press-fuge
Rotor	Swing bucket	Fixed angle [25°]	Pressure	Swing bucket
Centrifugal speed | pressure	4,000 g*	6,000 g	4 bar	3,000 g* + 4 bar
Start volume	20 mL	14 mL	10 mL	10 mL

* 3,000 g for 100K devices in swing bucket centrifuge, 2,000 g for pressure-fuge devices in swing bucket

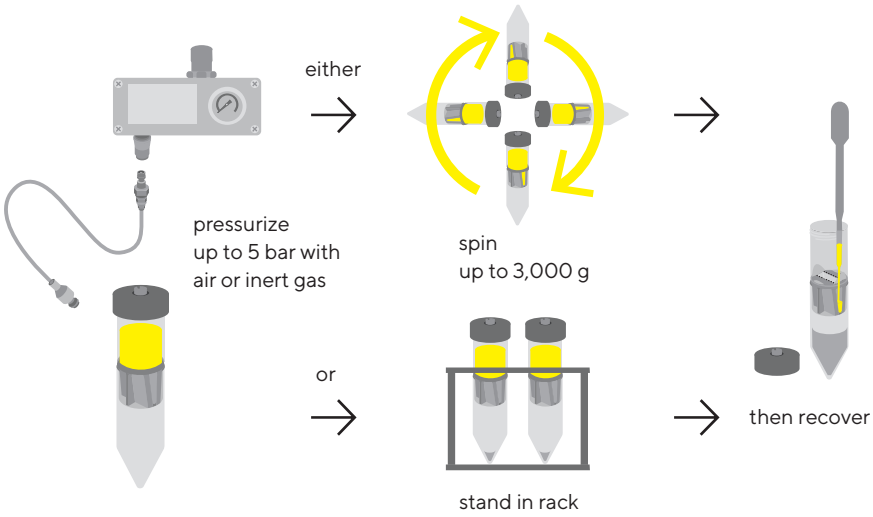
Typical Performance Characteristics								
	Time to concentrate up to 30× [min.] at 20 °C and solute recovery [%]							
	Min.	Rec.	Min.	Rec.	Min.	Rec.	Min.	Rec.
Cytochrome c 0.25 mg/mL (12,400 MW)								
3,000 MWCO PES	110	97 %	180	96 %	60	96 %	–	–
BSA 1.0 mg/mL (66,000 MW)								
5,000 MWCO PES	23	99 %	29	99 %	50	98 %	14	98 %
10,000 MWCO PES	16	98 %	17	98 %	32	97 %	8	97 %
30,000 MWCO PES	13	98 %	15	98 %	32	97 %	8	97 %
IgG 0.25 mg/mL (160,000 MW)								
30,000 MWCO PES	27	97 %	20	95 %	46	94 %	13	97 %
50,000 MWCO PES	27	96 %	22	95 %	46	93 %	13	96 %
100,000 MWCO PES	25	91 %	20	90 %	42	88 %	12	94 %
Latex beads 0.004 % in DMEM + 10 % FCS (0.055 µm)								
300,000 MWCO PES	20	99 %	35	99 %	10	99 %	–	–
Latex beads 0.004 % in DMEM + 10 % FCS (0.24 µm)								
1,000,000 MWCO PES	4	99 %	12	99 %	4	99 %	–	–
Yeast 1.0 mg/mL (S. Cerevisiae)								
0.2 µm PES	15	95 %	5	95 %	20	95 %	2	95 %

Ordering Information

Vivaspin® 20 Polyethersulfone	Qty./Pkg.	Prod. No.
3,000 MWCO	12	VS2091
3,000 MWCO	48	VS2092
5,000 MWCO	12	VS2011
5,000 MWCO	48	VS2012
10,000 MWCO	12	VS2001
10,000 MWCO	48	VS2002
10,000 MWCO	12	VS2001IVD*
10,000 MWCO	48	VS2001IVD*
30,000 MWCO	12	VS2021
30,000 MWCO	48	VS2022
50,000 MWCO	12	VS2031
50,000 MWCO	48	VS2032
100,000 MWCO	12	VS2041
100,000 MWCO	48	VS2042
300,000 MWCO	12	VS2051
300,000 MWCO	48	VS2052
1,000,000 MWCO	12	VS2061
1,000,000 MWCO	48	VS2062
0.2 µm	12	VS2071
0.2 µm	48	VS2072

* IVD device article codes available only in IVD registered countries, according to country specific regulations

Vivaspin® 20 Accessories	Qty./Pkg.	Prod. No.
Air pressure controller (APC)	1	VCA002
Charge valve for pressure head	1	VCA005
Diafiltration cups	12	VSA005
Female coupling	1	VCA010
Male coupling	1	VCA011
Replacement extension line (4 mm pneumatic tubing, 3 m)	1	VCA012
Vivaspin® 20 pressure head	1	VCA200



Using the Vivaspin® 20 pressure head

Visit us at www.sartorius.com/Vivaspin20 to get additional info.
Find instructions on how to use Vivaspin® 20 for

- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Concentration of diluted samples with increased recovery
- The workflow in protein research laboratories

Vivaclear Centrifugal Filters

Vivaclear centrifugal filters are disposable microfiltration devices for the fast and reliable clarification | filtration of biological samples in the range 100 to 500 µL. They can be used in fixed angle rotors accepting 2.2 mL centrifuge tubes.

Product Features

- High-flux polyethersulfone membrane
- 0.8 µm pore size
- Low hold-up volume (< 5 µL)
- Fast and reproducible performance

Applications

- Clarification of samples before loading in Vivapure® protein purification spin columns
- Removal of particles and precipitates
- Filtration of plasma and serum
- Filtration of cells or cell debris

Specifications

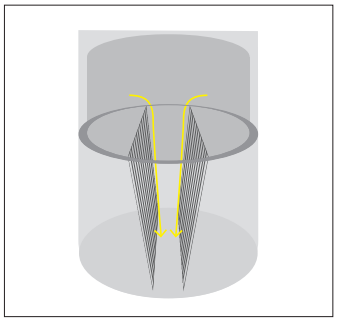
Vivaclear Centrifugal Filters		
Rotor	40 – 45° fixed angle rotor	
Pore size	0.8 µm	
Dimensions	Total length Filtrate collection tube Ø Active membrane area Hold-up volume, membrane plus support Maximum RCF	43 mm 11 mm 0.34 cm² < 5 µL 2,000 g
Materials of construction	Body Membrane Filtrate collection tube	Polypropylene Polyethersulfone Polypropylene

Ordering Information

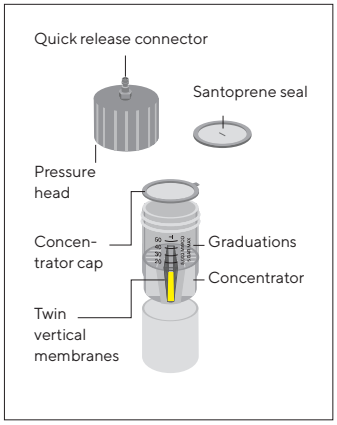
	Qty./Pkg.	Prod. No.
Vivaclear Mini 0.8 µm PES	100	VK01P042

Vivacell 100

Air pressure controller, VCA002



Patented vertical membrane design



Filtrate container fits standard 250 mL rotors

20 to 100 mL Samples
Vivacell 100 is a unique and innovative concentrator for volumes from 20 to 100 mL, and utilizes pressure, centrifuge or pressure-shake to rapidly concentrate even samples with very high particle loads.

Vivacell 100 is designed for centrifugal concentration of samples up to 100 mL, which makes it the largest centrifugal device available. At the same time, its design allows for a maximum centrifugal force of 2,000 g to be used for even faster concentration. The patented vertical membrane design ensures the highest performance and unmatched flexibility.

Vivacell 100 Utilizes:
- Pressure
- Centrifuge
- Pressure-shake

Vivacell 100, when used as a centrifugal device, fits swng bucket rotors that accept 250 mL bottles.

Vivacell 100 units can also be used for single or extremely sensitive samples in the pressurized mode only and left on a bench or placed on an orbitallaboratory shaker for faster concentration. It can also be kept in a pressurized mode in the refrigerator. Pressurized handling is facilitated by the use of quick connectors. In whichever mode Vivacell 100 is used, the vertical membrane design inhibits membrane fouling, while the built in dead-stop impedes concentration to dryness and loss of sample.

Specifications

Vivacell 100		
Concentrator capacity	Swing bucket rotor With pressure head	90 mL 98 mL
Dimensions	Total length Width Active membrane area Hold-up volume of membrane Dead-stop volume	123 mm centrifugal 197 mm with pressure head 62 mm 23.5 cm² <250 µL 350 µL
Operating requirements	Rotor type Rotor cavity Maximum speed Maximum pressure	Swing-bucket To fit 250 mL (62 mm) centrifuge bottles (maximum cavity depth 105 mm) 2,000 g 5 bar (75 psi)
Materials of construction	Body Filtrate vessel Concentrator cap Pressure head seal Pressure head Membrane	Polycarbonate Polycarbonate Polypropylene TPE-V Acetal Polyethersulfone

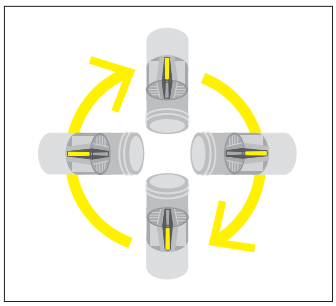
Typical Performance Characteristics				
	Time to concentrate up to 30× [min.] at 20 °C			
90 mL Start volume	Centrifuge (swing bucket, 2,000 g)	Pressure (4 bar)		Solute recovery
		No agitation	Orbital shake	%
BSA 1.0 mg/mL (66,000 MW)				
5,000 MWCO PES	22	75	25	96 %
10,000 MWCO PES	16	60	20	96 %
30,000 MWCO PES	16	60	20	94 %
IgG 0.25 mg/mL (160,000 MW)				
50,000 MWCO PES	20	70	30	94 %
100,000 MWCO PES	20	85	30	90 %
Latex beads 0.004 % in DMEM + 10 % FCS (0.055 µm)				
300,000 MWCO PES	35	–	120	99 %
Latex beads 0.004 % in DMEM + 10 % FCS (0.24 µm)				
1,000,000 MWCO* PES	4	5	4	99 %

* 2,000 g in centrifuge, 2 bar (29 psi) pressure

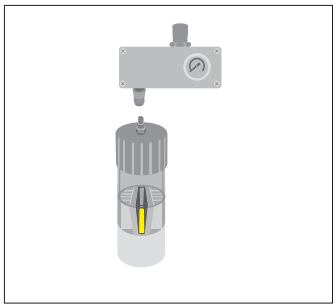
Ordering Information

Vivacell 100 Polyethersulfone with Polypropylene Concentrator Cap	Qty./Pkg.	Prod. No.
5,000 MWCO	2	VC1011
5,000 MWCO	10	VC1012
10,000 MWCO	2	VC1001
10,000 MWCO	10	VC1002
30,000 MWCO	2	VC1021
30,000 MWCO	10	VC1022
50,000 MWCO	2	VC1031
50,000 MWCO	10	VC1032
100,000 MWCO	2	VC1041
100,000 MWCO	10	VC1042
300,000 MWCO	2	VC1051
300,000 MWCO	10	VC1052
1,000,000 MWCO	2	VC1061
1,000,000 MWCO	10	VC1062
0.2 µm	2	VC1071
0.2 µm	10	VC1072

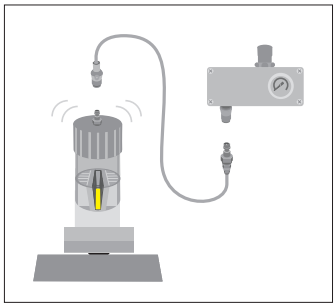
Vivacell 100 Accessories	Qty./Pkg.	Prod. No.
Air pressure controller (APC), complete with pressure gauge, regulator, over-pressure safety valve, female connector, 1 m extension line (4 mm pressure tubing) with male and female connectors and 1 m of 6 mm inlet tubing	1	VCA002
Female coupling	1	VCA010
Male coupling	1	VCA011
4 mm pressure tubing (3 m)	1	VCA012
Replacement extension line (4 mm pneumatic tubing, 3 m)	10	VCA014
Vivacell 100 pressure head with seals (5x)	1	VCA800



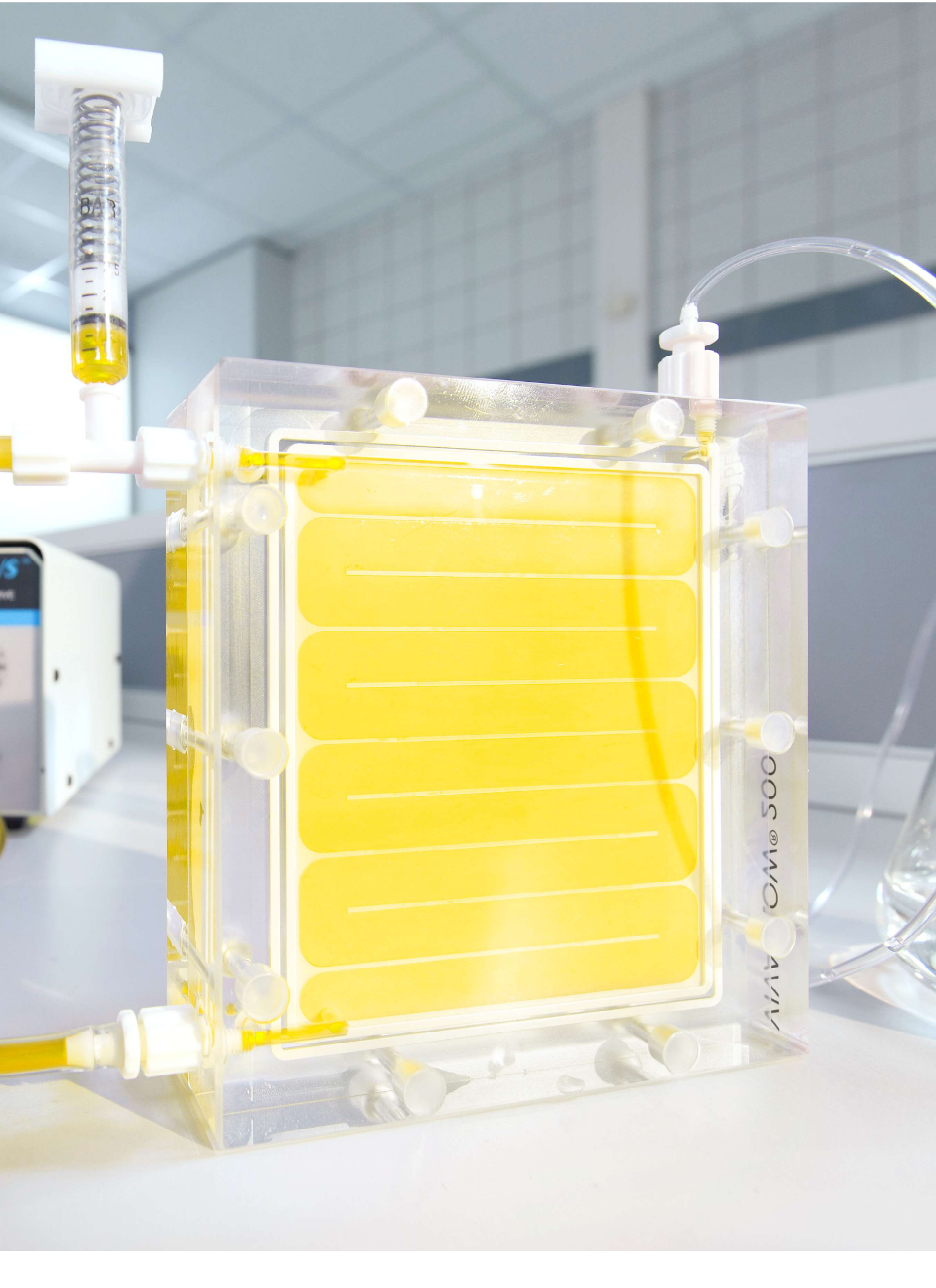
Centrifuge
use with polypropylene concentrator cap in swing out rotor
- Process convenience
- Low shear, non-foaming
- Less visual control



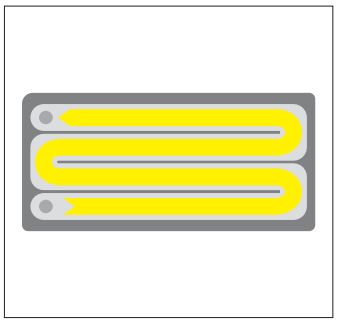
Pressure
use with pressure head VCA800
- Simplicity and the highest process control
- Ideal for refrigerated use
- Slower concentrations



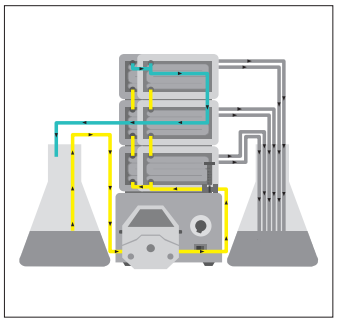
Pressure-Shake
use with pressure head VCA800
- Speed and process control
- Ideal for single samples



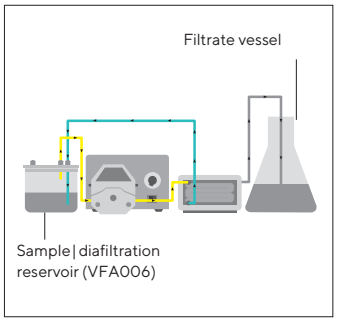
Vivaflow® 50



Flip-flow recirculation path



Multiple cassettes



Single cassette

0.1 to 3 L Samples

The unique, patented Vivaflow®* 50 system provides ease of use, performance, flexibility and economy that are unrivaled by any laboratory or pilot-scale filtration system on the market.

Unique Features

- The thin-channel, flip-flow recirculation path provides high crossflow velocities with minimum pump requirements
- No need for pressure holders
- Crystal clear for simple checking of the concentrate and membrane
- Unique interlocking modules with series connectors for easy scale up
- Disposable

Unique Performance

- A single 50 cm² module will typically reduce 500 mL to less than 15 mL in under 50 minutes
- Less than 10 mL minimum system recirculation for the highest concentration factors
- Less than 500 µL non-recoverable hold-up volume
- Near total recoveries achievable with a single 10 mL rinse

Unique "flip-flow" thin channel flow path results in high turbulence and linear velocity for exceptional flux, even at high concentrations.

Specifications

Vivaflow® 50		
Dimensions	Overall L | W | H	25 | 107 | 84 mm
	Channel W | H	15 | 0.3 mm
	Active membrane area	50 cm²
	Hold-up volume (module)	1.5 mL
	Minimum recirculation volume	<10 mL
	Non-recoverable hold-up	<0.5 mL
Operating conditions	Pump flow	200 to 400 mL/min
	Maximum pressure	3 bar (45 psi)
	Maximum temperature	60 °C
Materials of construction	Main housing	Polycarbonate
	Flow channel	TPX (PMP)
	Membrane support	TPX (PMP)
	Seals and O-rings	Silicone
	Pressure indicator	Polypropylene, SS spring
	Flow restrictor	Polypropylene
	Fittings	Nylon
	Tubing	PVC (medical grade)

* Vivaflow® is a registered trademark in the U.S., Japan and the European Union.

Performance Characteristics				
	Time to concentrate up to 20× [min.] at 3 bar inlet pressure, 20 °C			
	Single device 250 mL start volume	Three devices 1 L start volume	Solute recovery % Direct	After 10 mL rinse
BSA 1.0 mg/mL (66,000 MW)				
5,000 MWCO PES	34	49	96 %	> 99 %
10,000 MWCO PES	22	32	94 %	> 99 %
10,000 MWCO RC	38	55	96 %	> 99 %
30,000 MWCO PES	22	32	92 %	99 %
50,000 MWCO PES	20	29	92 %	98 %
γ Globulins 1.0 mg/mL (160,000 MW)				
100,000 MWCO PES	43	62	92 %	98 %
100,000 MWCO RC	40	58	92 %	98 %
Yeast 1.0 mg/mL (S. Cerevisiae)				
0.2 µm PES	33	47	92 %	98 %

Ordering Information

Vivaflow® 50*	Qty./Pkg.	Prod. No.
3,000 MWCO PES	2	VF05P9
5,000 MWCO PES	2	VF05P1
10,000 MWCO PES	2	VF05P0
30,000 MWCO PES	2	VF05P2
50,000 MWCO PES	2	VF05P3
100,000 MWCO PES	2	VF05P4
1,000,000 MWCO PES	2	VF05P6
0.2 µm PES	2	VF05P7
100,000 MWCO RC	2	VF05C4

* Vivaflow® 50 cassettes are supplied with feed, retentate and filtrate tubing, 0.6 mm flow restrictor and luer fittings.

Vivaflow® 50 Complete Set of Accessories		
Pump (230 V), Easy Load pump head (size 16), tubing, 500 mL sample	diafiltration reservoir, cassette stand, pressure indicator, T-connectors, series interconnectors	1	VFS502
Pump (115 V), Easy Load pump head (size 16), tubing, 500 mL sample	diafiltration reservoir, cassette stand, pressure indicator, T-connectors, series interconnectors	1	VFS504

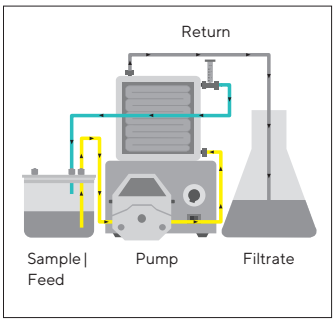
Accessories	Qty./Pkg.	Prod. No.
Masterflex economy drive variable speed peristaltic pump (230 V)	1	VFA004
Masterflex economy drive variable speed peristaltic pump (115 V)	1	VFA009
500 mL sample and	or diafiltration reservoir	1	VFA006
Masterflex Easy-Load pump head (size 16)	1	VFA031
Vivaflow® 50 stand	1	VFA032
Pressure indicator (1 - 3 bar)	1	VFA034

PVC Tubing and Fittings	Qty./Pkg.	
Size 16 PVC pump tubing and Luer fittings (3 m, 3.2 × 1.6 mm)	1	VFA004
Flow restrictor set, 2 each of 0.4, 0.6 and 0.8 mm	6	VFA009
T-connectors for running 2 stacks	2	VFA030
Series interconnectors	6	VFA031
Female luer fittings	10	VFA032
VF50 tubing kit (2 × 1 m size 16 PVC tubing with luer fittings, 2 × 50 cm size 16 PVC tubing with 0.6 mm flow restrictors, 1 x series interconnector)	1	VFA034
Flow restrictor, 0.6 mm	6	VFA035

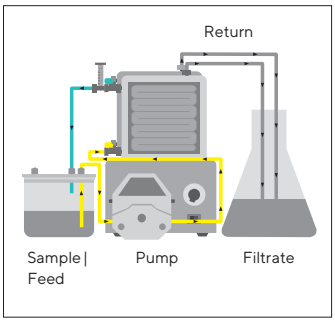
Visit us at www.sartorius.com/Vivaflow50 to get additional info.
Here you can find instructions on how to use Vivaflow® 50 for

- Measurement of soluble trace metals in seawater
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses

Vivaflow® 50R



Vivaflow® 50R – Single cassette



Vivaflow® 50R – Two cassettes

0.1 to 1 L Samples
Concentrate 100 mL to under 20 mL in just a few minutes or concentrate one liter 50-fold in less than 60 minutes. Alternatively, speed up your process by using two Vivaflow® 50R units in parallel and concentrate 1 L in under 30 min.

Vivaflow® 50R is a plug-and-play laboratory crossflow cassette for concentrating up to 1 L aqueous samples. The active membrane area per device is 50 cm².

One unit comes with all the necessary accessories for running the device with a laboratory pump and a size 16 pump head. For speeding up concentration, two cassettes can be run simultaneously.

- Fast and easy protein sample concentration
- Reusable
- Concentrates volumes from 0.1 L to 1 L
- Optimal for concentration of culture supernatants and viruses
- The most compact crossflow cassette with a premium Hydrosart® membrane

Specifications

Vivaflow® 50R		
Dimensions	Overall L | W | H	24 | 100 | 100 mm
	Channel W | H	7.5 | 0.4 mm
	Active membrane area	50 cm²
	Hold-up volume (module)	1.7 mL
	Min. recirculation volume	10 mL
	Non-recoverable hold-up	< 0.5 mL
Operating conditions	Pump flow	200 to 400 mL/min
	Maximum pressure	4 bar (60 psi)
	Maximum temperature	60 °C
Materials of construction	Main housing	Acrylic
	Flow channel	Acrylic
	Membrane support	Polypropylene
	Seals and O-rings	Silicone
	Pressure indicator	Polypropylene, SS spring
	Flow restrictor	Polypropylene
	Fittings	Nylon
	Tubing	PVC (medical grade)

Performance Characteristics				
	Time to concentrate up to 20× [min.] at 3.0 bar inlet | 2.5 bar outlet pressure, 20 °C			
	Start volume 250 mL	Average flux [mL/min]	Direct recovery [%]	Recovery after 25 mL rinse [%]
Lysozyme 0.25 mg/mL (14,000 MW)				
5,000 MWCO Hydrosart®	70	3.4	96 %	98 %
10,000 MWCO Hydrosart®	23	10.3	94 %	96 %
BSA 1.0 mg/mL (66,000 MW)				
10,000 MWCO Hydrosart®	24	9.9	98 %	> 99 %
30,000 MWCO Hydrosart®	15	15.8	97 %	> 99 %
γ Globulins 1.0 mg/mL (150,000 MW)				
100,000 MWCO Hydrosart®	46	5.2	97 %	> 99 %

Performance Characteristics				
	Time to concentrate up to 20× [min.] at 3.0 bar inlet | 2.5 bar outlet pressure, 20 °C			
	Start volume 250 mL	Average flux mL/min	Recovery % Direct	25 mL rinse
Start volume 1 L (one Vivaflow® 50R at 3 bar) 10,000 MWCO Hydrosart® BSA 1.0 mg/mL	95	10.0	98 %	> 99 %
Start volume 1 L (two Vivaflow® 50R in parallel at 3 bar) 10,000 MWCO Hydrosart® BSA 1.0 mg/mL	48	19.8	98 %	> 99 %

Ordering Information

Vivaflow® 50R*	Qty./Pkg.	Prod. No.
5,000 MWCO Hydrosart®	1	VF05H1
10,000 MWCO Hydrosart®	1	VF05H0
30,000 MWCO Hydrosart®	1	VF05H2
100,000 MWCO Hydrosart®	1	VF05H4

* Vivaflow® 50R and filtrate tubing, 0.6 mm flow restrictor, luer fittings and a pressure indicator.

Vivaflow® 50R Complete Set of Accessories		
Pump (230 V), Easy-Load pump head (size 16), tubing, 500 mL sample | diafiltration reservoir	1	VFS202
Pump (115 V), Easy-Load pump head (size 16), tubing, 500 mL sample | diafiltration reservoir	1	VFS204

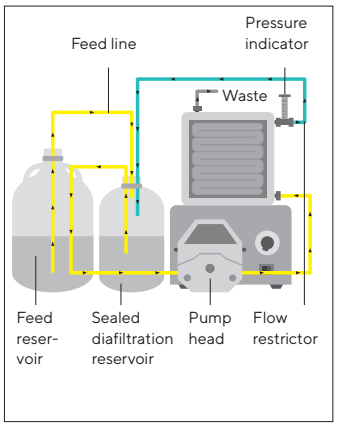
Accessories		
Masterflex economy drive variable speed peristaltic pump (230 V)	1	VFP001
Masterflex economy drive variable speed peristaltic pump (115 V)	1	VFP002
500 mL sample and | or diafiltration reservoir	1	VFA006
Masterflex Easy-Load pump head (size 16)	1	VFA012

Tubing and Fittings		
Size 16 tubing and Luer fittings (3 m, 3.2 × 1.6 mm)	1	VFA004
T-connectors for running 2 cassettes	2	VFA030
Flow restrictor set, 2 each of 0.4, 0.6 and 0.8 mm	6	VFA009
Female luer fittings, size 16	10	VFA032
Flow restrictors, 0.6 mm	6	VFA035

Visit us at www.sartorius.com/Vivaflow50R to get additional info.
Here you can find instructions on how to use Vivaflow® 50R for

- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses

Vivaflow® 200



Vivaflow® 200 setup for diafiltration

0.5 to 5 L Samples
Concentrate 250 mL to under 20 mL in just a few minutes or concentrate one liter 50-fold in less than 30 minutes. Alternatively, use two Vivaflow® 200 units in parallel and concentrate 5 L in under 75 minutes.

Nearly total sample recoveries can be expected with most solutions.

Each cassette is supplied complete with tubing, pressure indicator, flow restrictor and high-pressure pump tubing. All you need is a peristaltic pump capable of handling 6.4 mm OD (size 16) tubing. Should your pump head require larger tubing, just use the interconnecter provided to attach your own peristaltic tubing to this standard product.

To operate two cassettes in parallel, the only additional accessories needed are a Y-connector and size 15 pump head.

Specifications

Vivaflow® 200		
Dimensions	Overall L | W | H	38 | 126 | 138 mm
	Channel W | H	10 | 0.4 mm
	Active membrane area	200 cm²
	Hold-up volume (module)	5.3 mL
	Min. recirculation volume	<20 mL
	Non-recoverable hold-up	<2 mL
Materials of construction	Main housing	Acrylic
	Flow channel	Acrylic
	Membrane support	Polypropylene
	Seals and O-rings	Silicone
	Pressure indicator	Polypropylene, SS spring
	Flow restrictor	Polypropylene
	Fittings	Nylon
	Tubing	PVC (medical grade)
Operating conditions	Pump flow	200 to 400 mL/min
	Maximum pressure	4 bar (60 psi)
	Maximum temperature	60 °C

Performance Characteristics				
	Time to concentrate up to 20× [min.] at 3 bar inlet pressure, 20 °C			
	Start volume 1 L	Average flux [mL/min]	Direct recovery [%]	Recovery after 25 mL rinse [%]
Lysozyme 0.25 mg/mL (14,000 MW)				
2,000 MWCO Hydrosart®	160	6	97 %	> 99 %
3,000 MWCO PES	180	5	97 %	> 99 %
BSA 1.0 mg/mL (66,000 MW)				> 99 %
5,000 MWCO PES	29	33	98 %	> 99 %
5,000 MWCO Hydrosart®	70	14	98 %	> 99 %
10,000 MWCO PES	23	41	96 %	> 99 %
10,000 MWCO Hydrosart®	35	27	98 %	
30,000 MWCO PES	25	38	96 %	99 %
30,000 MWCO Hydrosart®	20	48	96 %	> 99 %
50,000 MWCO PES	22	43	96 %	98 %
γ Globulins 1.0 mg/mL (average 160,000 MW)				
100,000 MWCO PES	54	18	96 %	99 %
Yeast 1.0 mg/mL (S. Cerevisiae)				
0.2 µm PES	11	86	92 %	98 %
Dilute solute concentration, start volume 1 L at 3 bar, 10,000 MWCO PES				
BSA 0.001 mg/mL	18	52	90 %	98 %
BSA 0.01 mg/mL	20	47	92 %	98 %
BSA 0.1 mg/mL	21	45	94 %	99 %
Start volume 5 L (two Vivaflow® 200 in parallel at 3 bar) 10,000 MWCO PES				
BSA 1.0 mg/mL (66,000 MW)	67	70	97 %	> 99 %

Visit us at www.sartorius.com/Vivaflow200 to get additional info.
Find instructions on how to use Vivaflow® 200 for

- The measurement of soluble trace metals in seawater
- The workflow in protein research laboratories
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Concentrating hybridoma supernatants prior to to affinity chromatography

Ordering Information

Vivaflow® 200*	Qty./Pkg.	Prod. No.
3,000 MWCO PES	1	VF20P9
5,000 MWCO PES	1	VF20P1
10,000 MWCO PES	1	VF20P0
30,000 MWCO PES	1	VF20P2
50,000 MWCO PES	1	VF20P3
100,000 MWCO PES	1	VF20P4
0.2 µm PES	1	VF20P7
2,000 MWCO Hydrosart®	1	VF20H9
5,000 MWCO Hydrosart®	1	VF20H1
10,000 MWCO Hydrosart®	1	VF20H0
30,000 MWCO Hydrosart®	1	VF20H2
100,000 MWCO Hydrosart®	1	VF20H4

* Vivaflow® 200 cassettes are supplied with feed, retentate and filtrate tubing, 0.6 mm flow restrictor, luer fittings and a pressure indicator.

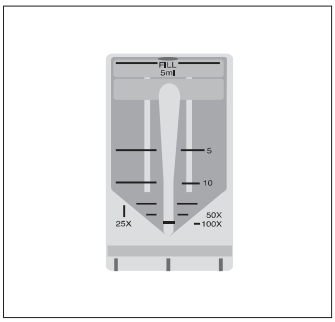
Vivaflow® 200 Complete Set of Accessories**		
Pump (230 V), Easy-Load pump head (size 16), tubing, 500 mL sample	diafiltration reservoir	1	VFS202
Pump (115 V), Easy-Load pump head (size 16), tubing, 500 mL sample	diafiltration reservoir	1	VFS204

* * VFS202 and VFS204 are suitable only for operation of a single Vivaflow® 200 cassette. To operate 2 cassettes in parallel, an Easy-Load size 15 pump head is required.

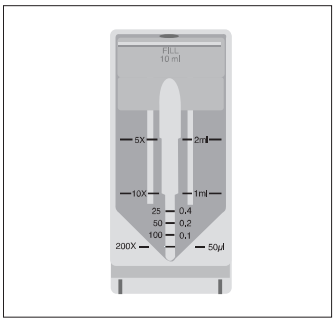
Accessories	Qty./Pkg.	Prod. No.
Masterflex economy drive variable speed peristaltic pump (240 V)	1	VFP001
Masterflex economy drive variable speed peristaltic pump (115 V)	1	VFP002
500 mL sample and	or diafiltration reservoir	1	VFA006
Masterflex Easy-Load pump head (size 16)	1	VFA012
Masterflex Easy-Load pump head (size 15)	1	VFA013

Tubing and Fittings	Qty./Pkg.	Prod. No.
Size 15 tubing and Luer fittings (3 m, 4.8 mm × 2.6 mm)	1	VFA003
Size 16 tubing and Luer fittings (3 m, 3.2 mm × 1.6 mm)	1	VFA004
Y-connector (size 15 to 2 × size 16 for running 2 cassettes in parallel)	1	VFA005
Flow restrictor set, 2 each of 0.4, 0.6 and 0.8 mm	6	VFA009
Female luer fittings, size 16	10	VFA032
Flow restrictors, 0.6 mm	6	VFA035
Female luer fittings, size 15	10	VFA036

Vivapore® Solvent Absorption Concentrators



Vivapore® 5



Vivapore® 10 | 20

3 to 20 mL Samples
With no need for additional equipment, pressure or vacuum, solvent absorption is the most economic and user-friendly concentration technique available to the clinician and research scientist.

Just fill the unit with the solution to be concentrated, wait for the desired concentration level to be achieved and then pipette the concentrated sample from the bottom of the device.

Vivapore® is ideal for general-purpose laboratory concentration and purification prior to further analysis. It is particularly suited for labile solutions that can denature with alternative shear- or pressure-inducing methods or that require processing in a cold room environment.

Vivapore® concentrators extend the solvent absorption technique to a totally new level of performance, application potential and ease of use.

Vivapore® solvent absorption concentrators are IVD registered devices. Article codes are only available in IVD registered countries, according to country specific regulations. Please contact Sartorius for more information on registered countries and availability.

Specifications

	Vivapore® 5	**Vivapore® 10 | 20**
Membrane material	PES	PES
Membrane MWCO	7,500	7,500
Membrane surface area	20 cm^2	28 cm^2
Reservoir material	SAN	SAN
Volume range	1 to 5 mL	2 to 10 mL | 20 mL*
Minimum concentrate volume	50 µL	50 µL
Vivapore® overall dimensions Width (mm) Height (mm)	 42 82	 46 100

* to concentrate 20 mL please use the 10 mL expansion reservoir (VPA006)

Visit us at www.sartorius.com/en/products/lab-filtration-purification/diagnostic-sample-prep to get additional info.
Here you can find instructions on how to use Vivapore® Solvent Absorption Concentrators and Vivaspin® products for the concentration of urine samples.

Typical Performance Characteristics						
	Time to concentrate up to 10× [min.]			Concentrate recovery [%]		
Product	VP5	VP10 | 20	VP10 | 20*	VP5	VP10 | 20	VP10 | 20*
Start volume	5 mL	10 mL	20 mL	5 mL	10 mL	20 mL
Cytochrome c (12,600 MW)	0.25 mg/mL	0.25 mg/mL	0.1 mg/mL	0.25 mg/mL	0.25 mg/mL	0.1 mg/mL
7,500 MWCO PES	35	75	150	90 %	90 %	92 %
BSA (66,000 MW) 7,500 MWCO PES	30	55	115	92 %	92 %	92 %
IgG (160,000 MW) 7,500 MWCO PES	40	70	160	75 %	77 %	78 %

* with additional reservoir

Performance Characteristics						
	Time to concentrate up to 50× [min.]			Concentrate recovery [%]		
Product	VP5	VP10 | 20	VP10 | 20*	VP5	VP10 | 20	VP10 | 20*
Start volume	5 mL	10 mL	20 mL	5 mL	10 mL	20 mL
Cytochrome c (12,600 MW) 7,500 MWCO PES	65	70	160	91 %	88 %	90 %
BSA (66,000 MW) 7,500 MWCO PES	45	50	105	90 %	90 %	92 %
IgG (160,000 MW) 7,500 MWCO PES	50	65	140	53 %	65 %	74 %

* with additional reservoir

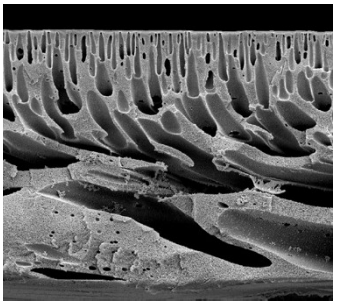
Ordering Information

Vivapore® 5*	Qty./Pkg.	Prod. No.
7,500 MWCO PES	4	VP0503**
7,500 MWCO PES	30	VP0501**
Requires Stand		
7,500 MWCO PES	100	VP0502**
Vivapore® 10 | 20*		
7,500 MWCO PES	4	VP2003**
7,500 MWCO PES	30	VP2001**
Requires Stand		
7,500 MWCO PES	100	VP2002**
Requires Stand		
Disposable stands for 4 units	6	VPA002**
Plastic recovery pipettes (Vivapore® 10 | 20)	100	VPA005**
10 mL expansion reservoir (Vivapore® 10 | 20)	10	VPA006**
Plastic recovery pipettes (Vivapore® 5)	100	VPA007**

* includes stand and recovery pipettes
** For *In Vitro* Diagnostic (IVD) applications only, available in registered countries only.

Ultrafiltration Membrane Filters

PES 146, CTA 145 and Hydrosart® 144



Polyethersulfone (PES)

This is a general purpose membrane that provides excellent performance with most solutions when retentate recovery is of primary importance. PES membranes exhibit no hydrophobic or hydrophilic interactions and are usually preferred for their low fouling characteristics, exceptional flux and broad pH compatibility.

Cellulose Triacetate (CTA)

High hydrophilicity and exceptionally low non-specific binding characterize this membrane. Cast without any membrane support that could trap or bind passing microsolutes, these membranes are ideal for sample cleaning and protein removal, and when high recovery from the filtrate solution is of primary importance.

Hydrosart®

These membranes are also highly hydrophilic and are often preferred for their high protein recovery when processing very dilute solutions. Resistance to autoclaving, ease of cleaning and extended chemical resistance also characterize this type of membrane.

Specifications

Specifications for Polyethersulfone, Type 146		
Thickness	120 µm	
pH range	1–14	
Water flux	MWCO 10,000	0.2 mL/min/cm²
Protein retention	Cytochrome C	95 %

Specifications for Cellulose Triacetate, Type 145		
Thickness	120 µm	
pH range	4–8	
Water flux	MWCO 10,000	0.11 mL/min/cm^2
Protein retention	Cytochrome C	90 %

Specifications for Cellulose Triacetate, Type 145		
Thickness	180 µm	
pH range	1–13	
Water flux	MWCO 10,000	0.08 mL/min/cm^2
Protein retention	Cytochrome C	99 %

Ordering Information

Polyethersulfone Membrane Filters, Type 146			
Ø in mm	MWCO	Qty./Pkg.	Prod. No.
47	1,000	10	14609--47------D
63	1,000	10	14609--63------D
76	1,000	10	14609--76------D
25	5,000	10	14629--25------D
47	5,000	10	14629--47------D
63	5,000	10	14629--63------D
76	5,000	10	14629--76------D
25	10,000	10	14639--25------D
63	10,000	10	14639--63------D
76	10,000	10	14639--76------D
150	10,000	10	14639-150------D
25	30,000	10	14659--25------D
63	30,000	10	14659--63------D
76	30,000	10	14659--76------D
25	50,000	10	14650--25------D
47	50,000	10	14650--47------D
76	50,000	10	14650--76------D
25	300,000	10	14679--25------D
47	300,000	10	14679--47------D
76	300,000	10	14679--76------D

Cellulose Triacetate Membrane Filters, Type 145			
Ø in mm	MWCO	Qty./Pkg.	Prod. No.
25	5,000	10	14529--25------D
47	5,000	10	14529--47------D
25	10,000	10	14539--25------D
47	10,000	10	14539--47------D
50	10,000	10	14539--50------D
25	20,000	10	14549--25------D
43	20,000	10	14549--43------D
47	20,000	10	14549--47------D
47	20,000	100	14549--47------N
63	20,000	10	14549--63------D

Hydrosart® Membrane Filters, Type 144			
Ø in mm	MWCO	Qty./Pkg.	Prod. No.
25	5,000	10	14429--25------D
44	5,000	10	14429--44------D
63	5,000	10	14429--63------D
76	5,000	10	14429--76------D
25	10,000	10	14439--25------D
47	10,000	10	14439--47------D
63	10,000	10	14439--63------D
76	10,000	10	14439--76------D
25	30,000	10	14459--25------D
47	30,000	10	14459--47------D
63	30,000	10	14459--63------D
76	30,000	10	14459--76------D