

Vivaspin®

Comprehensive Solutions for Centrifugal and Pressurized Sample Concentration

Benefits

- High speed ultrafiltration
- Maximum target molecule recoveries
- Highest concentration factors
- Broadest choice of MWCO and capacity
- Gentle processing of sensitive samples

Product Information

The original Vivaspin® centrifugal concentrators combine high process speeds with unique choices of membrane materials, MWCOs, sample capacities and process control methods, to suit all target molecule types. Developed by scientists behind the now ubiquitous vertical membrane orientation, these devices are designed for optimal performance, while minimizing membrane polarization and fouling.



Product Information

The Vivaspin® product family is a comprehensive range of centrifugal concentrators, with eight devices suited to most sample types, volumes, and applications. In a single device, it is possible to achieve the highest concentration factors, while eliminating the risk of concentrating samples to dryness. Benefit from high process speeds when concentrating or re-buffering any target molecule, with the convenience of easy-to-use centrifugal devices.

Vivaspin® 500 enables fast concentration of 0.1 – 0.5 mL sample volumes to as little as 5 µL.

Vivaspin® 2 is specially designed with a low internal surface and membrane area, and choice of three membrane types, to ensure superior recoveries. In addition, these devices are reverse spin enabled, for pipette-free concentrate retrieval.

Vivaspin® 6 has a unique capacity, ensuring efficiency when processing 2 – 6 mL samples, without the need to use a larger device. Dual vertical membranes and a low volume dead-stop pocket enable high process speeds and maximum concentration factors.

Vivaspin® 15R features Hydrosart® membranes, which have been optimized for the biopharmaceutical industry, to provide high flux, minimal fouling, and low target molecule adsorption. Convenient scale-up is possible, with Hydrosart® membranes also available in the Vivaflow® range.

Vivaspin® 20 is recommended for initial samples in the 5 – 20 mL range. Complimentary equipment and accessories are also available for continuous diafiltration or ultrafiltration under positive pressure.

Vivaspin® 100 has the highest capacity of any centrifugal ultrafiltration device, for easy and convenient handling of larger sample volumes. Furthermore, pressurization is available as an alternative process method.

Vivaspin® Filtrate performs ultrafiltration in the opposite direction to relative centrifugal force. These devices are highly recommended in applications where the ultrafiltrate is of interest, or when filtering challenging samples.

Vivaspin® Endotest is certified pyrogen free and features a 20 kDa MWCO cellulose triacetate (CTA) membrane, which has been specially selected for the concentration of endotoxin and removal of interfering substances from samples prior to LAL testing

Applications

Vivaspin® concentrators suit most ultrafiltration and diafiltration applications for samples in the 0.1 – 98 mL range, including:

- Concentration, desalting and buffer exchange of proteins, enzymes, nucleic acids, monoclonal antibodies, immunoglobulins, extracellular vesicles, viruses and nanoparticles
- Free drug or hormone assays
- HPLC sample preparation
- Deproteinization of samples
- Recovery of biomolecules from cell culture supernatants or lysates
- Cell washing, virus purification and cell debris removal
- Environmental sample clarification or concentration



Vivaspin® 500, 2, 6, 15R, 20, 100, Filtrate and Endotest

Technical Specifications

	Vivaspin® 500	Vivaspin® 2	Vivaspin® 6
Dimensions			
Sample capacity	0.1 – 0.5 mL	0.4 – 3 mL	2 – 6 mL
Dimensions (L D)	50 11 mm	126 17 mm	122 17 mm
Active membrane area	0.5 cm ²	1.2 cm ²	2.5 cm ²
Dead-stop volume	5 µL	8 µL	30 µL
Hold-up volume	< 5 µL	< 10 µL	< 10 µL
Materials of Construction			
Body	Polycarbonate (PC)	Polycarbonate (PC)	Polycarbonate (PC)
Filtrate vessel	Polypropylene (PP)	Polycarbonate (PC)	Polycarbonate (PC)
Concentrator cap	Polycarbonate (PC)	Polycarbonate (PC)	Polypropylene (PP)
Membrane	Polyethersulfone (PES)	Polyethersulfone (PES) Hydrosart® (HY) Cellulose Triacetate (CTA)	Polyethersulfone (PES)
	Vivaspin® 15R	Vivaspin® 20	Vivaspin® 100
Dimensions			
Sample capacity	2 – 15 mL	5 – 20 mL	20 – 98 mL
Dimensions (L D)	116 30 mm	116 30 mm 125 30 mm w/ pressure head	123 62 mm 197 62 mm w/ pressure head
Active membrane area	3.9 cm ²	6.0 cm ²	23.5 cm ²
Dead-stop volume	30 µL	50 µL	350 µL
Hold-up volume	< 20 µL	< 20 µL	< 250 µL
Materials of Construction			
Body	Polycarbonate (PC)	Polycarbonate (PC)	Polycarbonate (PC)
Filtrate vessel	Polycarbonate (PC)	Polycarbonate (PC)	Polycarbonate (PC)
Concentrator cap	Polypropylene (PP)	Polypropylene (PP)	Polypropylene (PP)
Membrane	Hydrosart® (HY)	Polyethersulfone (PES)	Polyethersulfone (PES)
	Vivaspin® Filtrate	Vivaspin® Endotest	
Dimensions			
Sample capacity	0.5 – 2.5 mL	2 – 15 mL	
Dimensions (L D)	93 14 mm	116 30 mm	
Active membrane area	0.79 cm ²	3.9 cm ²	
Dead-stop volume	100 µL	30 µL	
Hold-up volume	< 5 µL	< 20 µL	
Materials of Construction			
Body	Polystyrene (PS)	Polycarbonate (PC)	
Filtrate vessel	Styrene Acrylonitrile (SAN)	Polycarbonate (PC)	
Concentrator cap	Polyethylene (PE)	Polypropylene (PP)	
Membrane	Cellulose Triacetate (CTA) Polyethersulfone (PES)	Cellulose Triacetate (CTA)	

Alternative Process Methods

Continuous Diafiltration

In this procedure, a specially designed diafiltration cup inserted into the concentrator body of Vivaspin® 20 is filled with buffer and centrifuged once to achieve 98% salt removal. This compares to the need for two centrifugation steps to achieve the same result with the discontinuous (re-fill and re-spin) diafiltration method.

The improved performance is due to the constant washing action of the exchange buffer from the diafiltration cup, as it replaces the original solvent and salts when they pass through the ultrafiltration membrane.

Pressurized Ultrafiltration

When an appropriate centrifuge is unavailable, or for single sample processing, Vivaspin® 20 and 100 centrifugal concentrators may be pressurized with compressed gas for bench-top concentration. This process method is also ideal for sensitive samples, due to consistent transmembrane pressures.

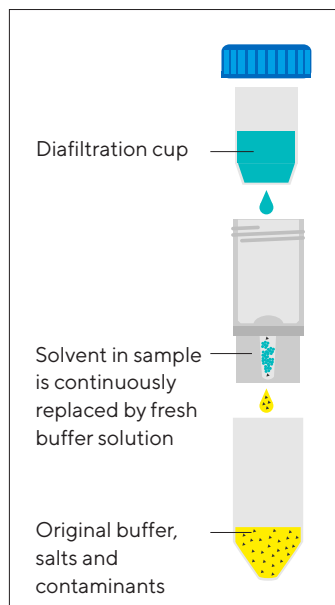
For even faster processing of samples in Vivaspin® 20, gas pressure can be combined with centrifugal force. This pressure-fugation method is particularly suitable for difficult to filter or viscous samples, such as serum, or when using low process temperatures, which reduce filtration speed, and generally when minimum process time is essential. In a similar way, Vivaspin® 100 may be pressurized and placed on an orbital shaker for faster processing.

Reverse Ultrafiltration

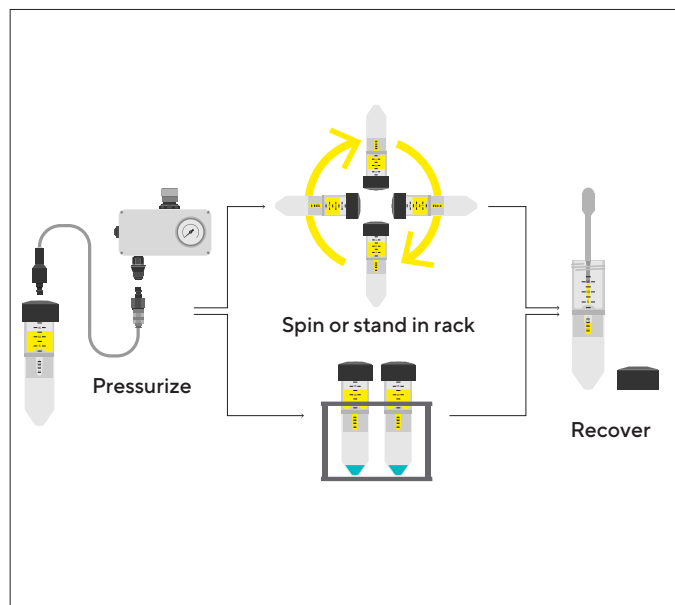
Vivaspin® Filtrate is designed to perform ultrafiltration in the opposite direction to centrifugal force. This design is so effective in preventing premature filter blocking, that it is ideal for processing viscous and highly particle loaded samples.

In addition, these devices are especially recommended in applications where the ultrafiltrate is of primary interest, since this sample is collected above the membrane, where it can be retrieved without any disassembly of the device.

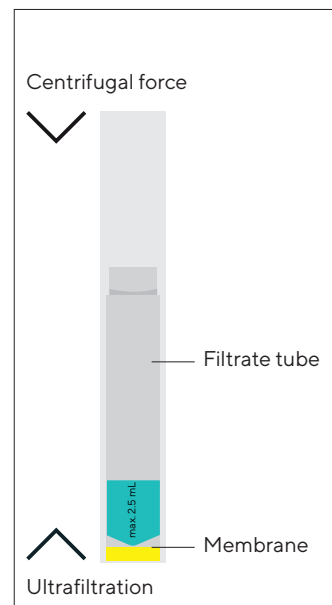
Furthermore, cast without any membrane support, the cellulose triacetate (CTA) membranes in Vivaspin® Filtrate help to ensure maximum passage of low molecular weight analytes.



Vivaspin® 20 continuous diafiltration



Vivaspin® 20 pressurized operation



Vivaspin® Filtrate reverse ultrafiltration

Performance

Performance Characteristics for Vivaspin® 500

Time to concentrate up to 30x at 20°C and solute recovery		
Rotor	Fixed angle	
Centrifugal force	12,000 <i>g</i>	
Start volume	0.5 mL	
	Time	Recovery
Aprotonin 0.25 mg/mL (6.5 kDa) 3 kDa MWCO PES	30 min	96%
BSA 1.0 mg/mL (66 kDa) 5 kDa MWCO PES	15 min	96%
10 kDa MWCO PES	5 min	96%
30 kDa MWCO PES	5 min	95%
IgG 0.25 mg/mL (160 kDa) 30 kDa MWCO PES	10 min	96%
50 kDa MWCO PES	10 min	96%
100 kDa MWCO PES	10 min	96%

Performance Characteristics for Vivaspin® 2

Time to concentrate up to 30x at 20°C and solute recovery		
Rotor	Fixed angle	
Centrifugal force	5,000 <i>g</i>	
Start volume	2 mL	
	Time	Recovery
Insulin chain A 0.1 mg/mL (2.5 kDa) 2 kDa MWCO HY	35 min	95%
Aprotonin 0.25 mg/mL (6.5 kDa) 3 kDa MWCO PES	50 min	96%
BSA 1.0 mg/mL (66 kDa) 5 kDa MWCO PES	12 min	98%
5 kDa MWCO HY	22 min	98%
10 kDa MWCO PES	8 min	98%
10 kDa MWCO HY	12 min	98%
10 kDa MWCO CTA	10 min	96%
20 kDa MWCO CTA	5 min	96%
30 kDa MWCO PES	8 min	97%
30 kDa MWCO HY	5 min	97%
IgG 0.25 mg/mL (160 kDa) 20 kDa MWCO CTA	6 min	97%
30 kDa MWCO PES	10 min	96%
50 kDa MWCO PES	10 min	96%
100 kDa MWCO PES	8 min	95%

Performance Characteristics for Vivaspin® 6

Time to concentrate up to 30x at 20°C and solute recovery				
Rotor	Swing bucket		Fixed angle (25°)	
Centrifugal force	3,000 g		7,500 g ¹	
Start volume	6 mL		6 mL	
	Time	Recovery	Time	Recovery
Cytochrome c 0.25 mg/mL (12.4 kDa) 3 kDa MWCO PES	-	-	90 min	97%
BSA 1.0 mg/mL (66 kDa) 5 kDa MWCO PES	20 min	98%	12 min	98%
10 kDa MWCO PES	13 min	98%	10 min	98%
30 kDa MWCO PES	12 min	98%	9 min	97%
IgG 0.25 mg/mL (160 kDa) 30 kDa MWCO PES	18 min	96%	15 min	95%
50 kDa MWCO PES	17 min	96%	14 min	95%
100 kDa MWCO PES	15 min	91%	12 min	91%
Latex beads 0.004% (55 nm) 300 kDa MWCO PES	-	-	25 min	99%
Latex beads 0.004% (240 nm) 1,000 kDa MWCO PES	-	-	4 min	99%
Yeast 1.0 mg/mL (<i>S. cerevisiae</i>) 0.2 µm PES	4 min	97%	3 min	97%

¹6,000 g relative centrifugal force for devices with 100, 300 and 1,000 kDa MWCO or 0.2 µm pore size membranes.

Performance Characteristics for Vivaspin® 15R

Time to concentrate up to 30x at 20°C and solute recovery				
Rotor	Swing bucket		Fixed angle (25°)	
Centrifugal force	3,000 g		6,000 g	
Start volume	15 mL		12.5 mL	
	Time	Recovery	Time	Recovery
Insulin chain A 0.1 mg/mL (2.5 kDa) 2 kDa MWCO HY	70 min	96%	60 min	96%
Aprotonin 0.1 mg/mL (6.5 kDa) 5 kDa MWCO HY	47 min	95%	45 min	95%
Cytochrome c 0.25 mg/mL (12.4 kDa) 5 kDa MWCO HY	45 min	96%	45 min	96%
10 kDa MWCO HY	25 min	94%	18 min	94%
Alpha chymotrypsin 0.25 mg/mL (25 kDa) 5 kDa MWCO HY	50 min	98%	45 min	98%
10 kDa MWCO HY	25 min	98%	18 min	98%
Ovalbumin 1.0 mg/mL (45 kDa) 10 kDa MWCO HY	20 min	98%	14 min	98%
30 kDa MWCO HY	15 min	94%	12 min	94%
BSA 1.0 mg/mL (66 kDa) 30 kDa MWCO HY	18 min	98%	15 min	98%
IgG 0.1 mg/mL (160 kDa) 30 kDa MWCO HY	30 min	98%	25 min	96%

Performance Characteristics for Vivaspin® 20 (Centrifugation)

Time to concentrate up to 30x at 20°C and solute recovery				
Rotor	Swing bucket		Fixed angle (25°)	
Centrifugal force	3,000 <i>g</i>		6,000 <i>g</i>	
Start volume	20 mL		14 mL	
	Time	Recovery	Time	Recovery
Cytochrome c 0.25 mg/mL (12.4 kDa) 3 kDa MWCO PES	110 min	97%	180 min	96%
BSA 1.0 mg/mL (66 kDa) 5 kDa MWCO PES	23 min	99%	29 min	99%
10 kDa MWCO PES	16 min	98%	17 min	98%
30 kDa MWCO PES	13 min	98%	15 min	98%
IgG 0.25 mg/mL (160 kDa) 30 kDa MWCO PES	27 min	97%	20 min	95%
50 kDa MWCO PES	27 min	96%	22 min	95%
100 kDa MWCO PES	25 min	91%	20 min	90%
Latex beads 0.004% (55 nm) 300 kDa MWCO PES	20 min	99%	35 min	99%
Latex beads 0.004% (240 nm) 1,000 kDa MWCO PES	4 min	99%	12 min	99%
Yeast 1.0 mg/mL (<i>S. cerevisiae</i>) 0.2 µm PES	15 min	95%	5 min	95%

Performance Characteristics for Vivaspin® 20 (Pressurization)

Time to concentrate up to 30x at 20°C and solute recovery				
Mode	Pressure		Pressure-fuge	
Pressure	4 bar ²		4 bar ²	
Rotor	-		Swing bucket	
Centrifugal force	-		3,000 <i>g</i> ³	
Start volume	10 mL		10 mL	
	Time	Recovery	Time	Recovery
Cytochrome c 0.25 mg/mL (12.4 kDa) 3 kDa MWCO PES	60 min	96%	-	-
BSA 1.0 mg/mL (66 kDa) 5 kDa MWCO PES	50 min	98%	14 min	98%
10 kDa MWCO PES	32 min	97%	8 min	97%
30 kDa MWCO PES	32 min	97%	8 min	97%
IgG 0.25 mg/mL (160 kDa) 30 kDa MWCO PES	46 min	94%	13 min	97%
50 kDa MWCO PES	46 min	93%	13 min	96%
100 kDa MWCO PES	42 min	88%	12 min	94%
Latex beads 0.004% (55 nm) 300 kDa MWCO PES	10 min	99%	-	-
Latex beads 0.004% (240 nm) 1,000 kDa MWCO PES	4 min	99%	-	-
Yeast 1.0 mg/mL (<i>S. cerevisiae</i>) 0.2 µm PES	20 min	95%	2 min	95%

² 2 bar operating pressure for devices with 100, 300 and 1,000 kDa MWCO or 0.2 µm pore size membranes.

³ 2,000 *g* relative centrifugal force for devices with 100, 300 and 1,000 kDa MWCO or 0.2 µm pore size membranes.

Performance Characteristics for Vivaspin® 100

Time to concentrate up to 30x at 20°C and solute recovery

Mode	Centrifuge	Pressure	Pressure-shake			
Pressure	-	4 bar ⁴	4 bar ⁴			
Rotor	Swing Bucket	-	-			
Centrifugal force	2,000 g	-	-			
Start volume	90 mL	90 mL	90 mL			
	Time	Recovery	Time	Recovery	Time	Recovery
BSA 1.0 mg/mL (66 kDa)						
5 kDa MWCO PES	22 min	96%	75 min	96%	25 min	96%
10 kDa MWCO PES	16 min	96%	60 min	96%	20 min	96%
30 kDa MWCO PES	16 min	94%	60 min	94%	20 min	94%
IgG 0.25 mg/mL (160 kDa)						
50 kDa MWCO PES	20 min	94%	70 min	94%	30 min	94%
100 kDa MWCO PES	20 min	90%	85 min	90%	30 min	90%
Latex beads 0.004% (55 nm)						
300 kDa MWCO PES	35 min	99%	-	-	120 min	99%
Latex beads 0.004% (240 nm)						
1,000 kDa MWCO PES	4 min	99%	5 min	99%	4 min	99%

⁴ 2 bar operating pressure for devices with 100, 300 and 1,000 kDa MWCO membranes.

Performance Characteristics for Vivaspin® Filtrate

	Time to filter 50% of sample volume	Time to filter 90% of sample volume	Passage of sample species
Centrifugal force	2,000 <i>g</i>	2,000 <i>g</i>	2,000 <i>g</i>
Start volume	2.5 mL	2.5 mL	2.5 mL
BSA 1.0 mg/mL (66 kDa)			
5 kDa MWCO CTA	300 min	-	0%
10 kDa MWCO CTA	35 min	80 min	2%
20 kDa MWCO CTA	9 min	20 min	2%
Blue dextran 0.1 mg/mL (2,000 kDa)			
300 kDa MWCO PES	9 min	25 min	28%

Ordering Information

Vivaspin®	500 ¹	2 ¹	6 ¹	15R ²	20 ²	100 ³	Filtrate ⁴	Endotest ⁴
PES MWCO								
3 kDa	VS0191	VS0291	VS0691		VS2091			
	VS0192	VS0292	VS0692		VS2092			
5 kDa	VS0111	VS0211	VS0611		VS2011	VC1011		
	VS0112	VS0212	VS0612		VS2012	VC1012		
10 kDa	VS0101	VS0201	VS0601		VS2001	VC1001		
	VS0102	VS0202	VS0602		VS2002	VC1002		
30 kDa	VS0121	VS0221	VS0621		VS2021	VC1021		
	VS0122	VS0222	VS0622		VS2022	VC1022		
50 kDa	VS0131	VS0231	VS0631		VS2031	VC1031		
	VS0132	VS0232	VS0632		VS2032	VC1032		
100 kDa	VS0141	VS0241	VS0641		VS2041	VC1041		
	VS0142	VS0242	VS0642		VS2042	VC1042		
300 kDa	VS0151	VS0251	VS0651		VS2051	VC1051	13279-E	
	VS0152	VS0252	VS0652		VS2052	VC1052		
1,000 kDa	VS0161	VS0261	VS0661		VS2061	VC1061		
	VS0162	VS0262	VS0662		VS2062	VC1062		
0.2 µm	VS0171	VS0271	VS0671		VS2071	VC1071		
	VS0172	VS0272	VS0672		VS2072	VC1072		
HY MWCO								
2 kDa		VS02H91		VS15RH91				
		VS02H92		VS15RH92				
5 kDa		VS02H11		VS15RH11				
		VS02H12		VS15RH12				
10 kDa		VS02H01		VS15RH01				
		VS02H02		VS15RH02				
30 kDa		VS02H21		VS15RH21				
		VS02H22		VS15RH22				
CTA MWCO								
5 kDa							13229-E	
10 kDa		VS02V1					13239-E	
		VS02V2						
20 kDa		VS02X1					13249-E	VS15RXETO
		VS02X2						

Pack sizes of: ¹ 25 | 100 pieces; ² 12 | 48 pieces; ³ 2 | 10 pieces; or ⁴ 12 pieces

Vivaspin® Equipment and Accessories


Continuous Diafiltration	Quantity	Order No.
Vivaspin® 20 diafiltration cups	12	VSA005
Pressurized Ultrafiltration		
Air pressure controller (APC) fitted with pressure gauge, regulator, over-pressure safety valve and female coupling. APC is supplied with extension line (4 mm pneumatic tubing, 1 m) with male and female couplings, and inlet tubing (6 mm pneumatic tubing, 1 m)	1	VCA002
Replacement female coupling	1	VCA010
Replacement male coupling	1	VCA011
Replacement extension line (4 mm pneumatic tubing, 3 m)	1	VCA012
Charge valve for pressure head VCA200	1	VCA005
Vivaspin® 20 pressure head	1	VCA200
Vivaspin® 100 pressure head	1	VCA800

Germany

Sartorius Lab Instruments GmbH & Co. KG
Otto-Brenner-Strasse 20
37079 Goettingen
Phone +49 551 308 0

USA

Sartorius Corporation
565 Johnson Avenue
Bohemia, NY 11716
Phone +1 631 254 4249
Toll-free +1 800 635 2906

 For further contacts, visit
www.sartorius.com