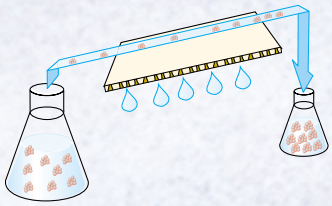
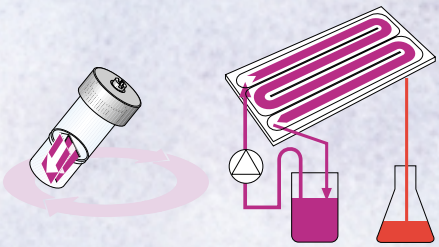
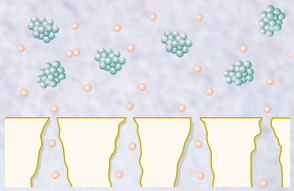
Product Guide and Page Index

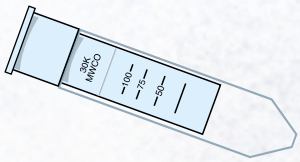






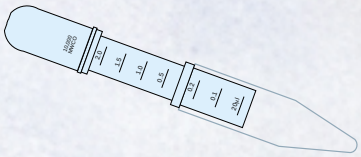
VIVASPIN 500

Process Volume: 500µl to 5µl
Operating Mode: Centrifuge
Pages: 6 - 9



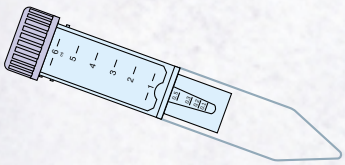
VIVASPIN 2

Process Volume: 2ml to 8µl
Operating Mode: Centrifuge
Pages: 6 - 9



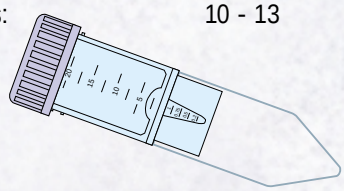
VIVASPIN 6

Process Volume: 6ml to 30µl
Operating Mode: Centrifuge
Pages: 10 - 13



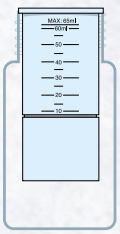
VIVASPIN 20

Process Volume: 20ml to 50µl
Operating Mode: Centrifuge
Gas Pressure
Pages: 10 - 13



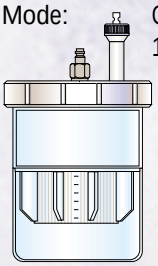
VIVACELL 70

Process Volume: 70ml to 150µl
Operating Mode: Centrifuge
Gas Pressure
Pages: 14 - 15



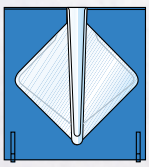
VIVACELL 250

Process Volume: 250ml to 600µl
Operating Mode: Gas Pressure
Pages: 16 - 17



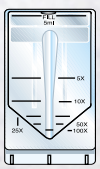
VIVAPORE 2

Process Volume: 2ml to 20µl
Operating Mode: Solvent Absorption
Pages: 18 - 19



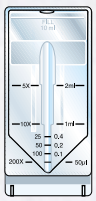
VIVAPORE 5

Process Volume: 5ml to 50µl
Operating Mode: Solvent Absorption
Pages: 18 - 19



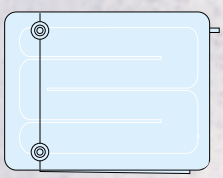
VIVAPORE 10/20

Process Volume: 20ml to 50µl
Operating Mode: Solvent Absorption
Pages: 18 - 19



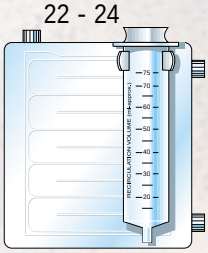
VIVAFLOW 50

Process Volume: <10ml to >5L
Operating Mode: Tangential Flow
Pages: 20 - 24



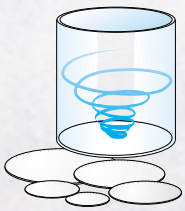
VIVAFLOW 200

Process Volume: <20ml to >5L
Operating Mode: Tangential Flow
Pages: 22 - 24



VIVAFLUX DISCS

Membrane Diameter: 25 to 90mm
Operating Mode: Stirred Cell
Page: 25

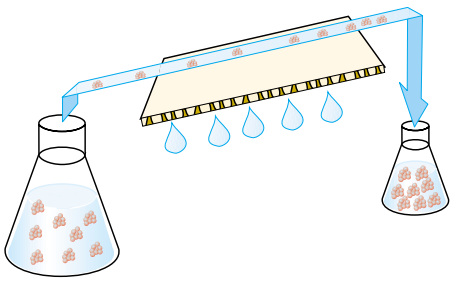


Major Uses for Ultrafiltration

Ultrafiltration is a convective process that uses anisotropic semi-permeable membranes to separate macromolecular species and solvents primarily on the basis of size. It is particularly appropriate for the concentration of macromolecules and can also be used to purify molecular species or for solvent exchange. Ultrafiltration is a gentle, non denaturing method that is more efficient and flexible than alternative processes.

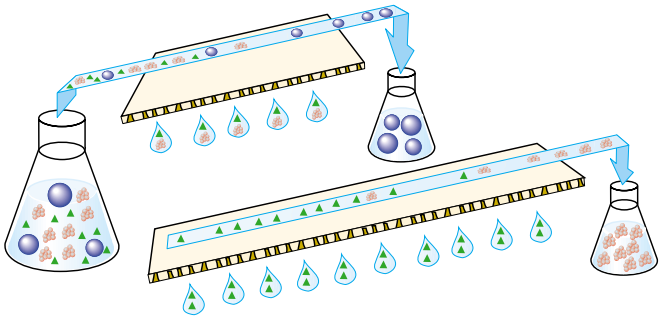
Solute Concentration

Ultrafiltration membranes are used to increase the solute concentration of a desired biological species. The filtrate is cleared of macromolecules which are significantly larger than the retentive membrane pores. Microsolute is removed convectively with the solvent.



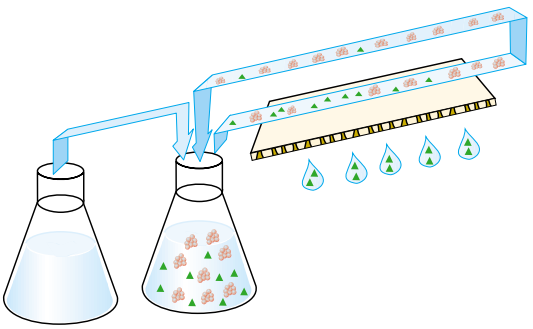
Solute Fractionation or Clarification

Ultrafiltration is a cost effective method for separating samples into size-graded components providing that macromolecular fractions differ in size by a 10X MW difference. During filtration, the permeating solute remains at its initial concentration whilst the retained macromolecules will be enriched.



Solute Desalting or Purification

A solution may be purified from salts, non-aqueous solvents and generally from low molecular weight materials. Multiple solvent exchanges, will progressively purify macromolecules from contaminating solutes. Microsolutes are removed most efficiently by adding solvent to the solution being ultrafiltered at a rate equal to the speed of filtration. This is called Diafiltration.

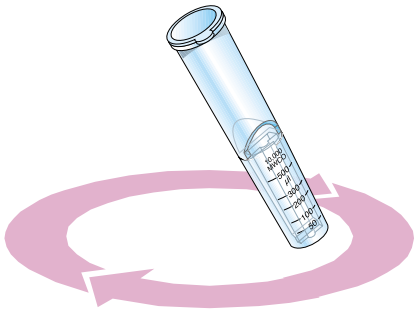


Typical applications for ultrafiltration

- *Concentration/desalting of proteins, enzymes, DNA, monoclonal antibodies, immunoglobulins*
- *Free drug, hormone assays*
- *Removal of primers from PCR amplified DNA*
- *Removal of labelled amino acids and nucleotides*
- *HPLC sample preparation*
- *Deproteinization of samples*
- *Purification of antibiotics, hormones, drugs from biological fluids, fermentation broths*
- *Recovery of biomolecules from cell culture supernatants, lysates*
- *General purpose laboratory concentrations and desalting of proteins, enzymes, cells, DNA, biomolecules, antibodies and immunoglobulins*
- *Mammalian cell harvesting*
- *Cell washing, virus purification, cell debris removal, depyrogenation*

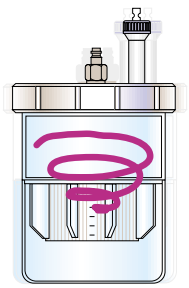
Process Alternatives

Sartorius offers a comprehensive range of process alternatives for the filtration and concentration of biological samples. The following is a guide to selecting the most suitable filtration method, depending on sample volume, equipment available, filtration speed and process control desired.



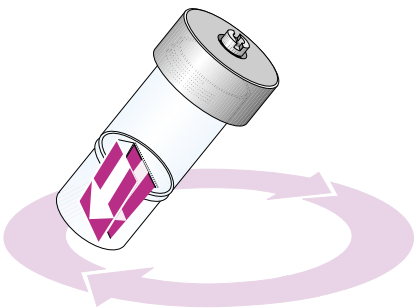
Centrifugal Filtration

(100µl to 70 ml starting volumes)
Centrifugation provides the vector to clear solvent and micro molecules through the ultrafiltration membrane and into a filtrate container positioned below. This is a gentle process that is characterised by quick set up and fast filtration speeds with most solutions.
Vivascience offers six alternative centrifugal devices covering volumes from 100µl up to 70ml.



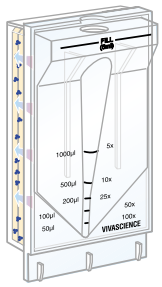
Gas Pressure Filtration

(5 to 250ml starting volume)
Pressurised air or an inert gas is used to provide the filtration vector. Agitation is used to impede macromolecules from polarising on the membrane surface and reducing filtration speed. For fastest filtration, Vivacell products are used with an orbital laboratory shaker but they can also be used without agitation.
Vivaspin 20ml, Vivacell 70ml and the Vivacell 250ml can be run with gas pressure.



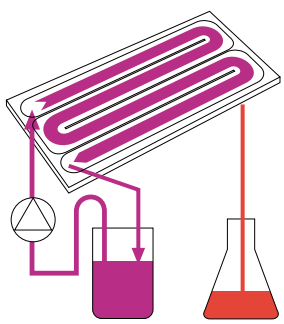
Pressure-fugation

(5 to 50ml starting volumes)
Pressure-fugation is a unique Vivascience method that combines gas pressure with centrifugation. This is the fastest concentration method with process times typically 30 to 50% faster than centrifugation alone.
Vivaspin 20ml and the Vivacell 70ml can be run in this way.



Solvent Absorption

(1 to 20ml starting volume)
This technique uses an absorbent cellulose pad mounted behind the ultrafiltration membrane to draw solvents and micro solutes through the membrane. Retained macromolecules are concentrated into the bottom of the sample container. No additional equipment is required.
Three Vivapore devices are offered for this procedure with maximum initial sample volumes ranging from 2 to 20ml.



Tangential Flow Filtration

(100ml to several litres starting volume)
The solution to be processed is pumped under pressure across an ultrafiltration membrane and then returned to the original reservoir. The solution is progressively concentrated or purified as solvent and micro-molecules pass through the membrane into a seperate filtrate vessel.
Vivaflow 50 and 200 are offered for this procedure.

Membrane Selection Guide

Sartorius offers an extended range of membranes to cover the great majority of ultrafiltration requirements. The following is a guide to selecting the most appropriate membranes according to their typical performance characteristics. Please note however, that membrane behaviour and ultimate performance, largely depends on the specific characteristics of the solution being processed. Sartorius recommends that users experiment with alternative membranes in order to optimise their process performance.

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

Cellulose Triacetate.
High hydrophilicity and very low non specific binding characterise this membrane. Cast without any membrane support that could trap or bind passing micro solutes, these membranes are to be preferred for sample cleaning and protein removal and when high recovery of the filtrate solution is of primary importance.

Regenerated Cellulose.
Membranes are also highly hydrophillic and are often preferred for their higher protein recovery when processing some very dilute solutions. Resistance to autoclaving, ease of cleaning and extended chemical resistance also characterises this type of membrane.

Membrane Performance Comparisons

Membrane	Relative Solute flux* ($ml/min/cm^2$)	Frequently preferred for:
Polyethersulfone pH range 1-14		
5,000 MWCO	0.24	High Retention of peptides, high relative flux
10,000 MWCO	0.41	Versatility, High flux, low absorption
30,000 MWCO	0.41	Versatility, High flux
50,000 MWCO	0.45	Sharp molecular weight limit
100,000 MWCO	0.35	High retention of Immunoglobulins
Cellulose Triacetate pH range 4-8		
5,000 MWCO	0.04	Peptide and Protein Removal
10,000 MWCO	0.11	Micro-partition, Free/Bound drug studies
20,000 MWCO	0.58	Sample cleaning, HPLC sample preparation
Regenerated Cellulose pH range 3-11		
10,000 MWCO	0.18	High recovery of microgram quantities of protein
30,000 MWCO	0.58	Speed and recovery with immunoglobulins
100,000 MWCO	0.40	Protein Fractionation

*0.25mg/ml BSA or IgG depending on MWCO at 4 bar pressure.

Membrane Selection Guide (Recommended MWCO)

Application	5,000	10,000	30,000	50,000	100,000	>500,000
Bacteria					●	●
DNA fragments		●	●	●	●	
Enzymes	●	●				
Growth Factor	●	●				
Immunoglobulins			●	●	●	
Nucleic Acids	●	●	●	●	●	
MAB			●	●		
Oligonucleotides	●					
Peptides	●					
Virus			●	●	●	
Yeast					●	●

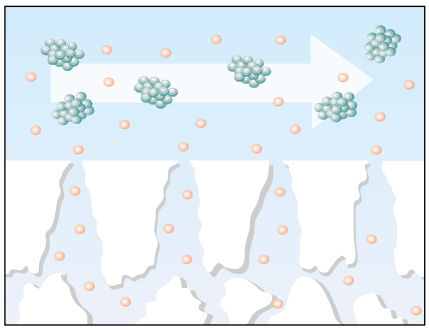
For highest recovery, usually select a membrane MWCO which is at least half of the molecular weight of the solute to be retained

Maximising Solute Recovery

The advanced designs and low adsorption materials that characterise Vivascience products, offer a unique combination of faster processing speeds and higher recovery of the concentrated sample. Providing that the appropriate device size and membrane cut-off is selected, Vivascience products will typically yield recoveries of the concentrated sample in excess of 90% when the starting sample contains over 0.1mg/ml of the solute of interest.
Most of the loss is caused by non specific binding both to the membrane surface and to exposed binding sights on the plastic of the sample container:

Adsorption to the membrane.
Depending on sample characteristics relative to the membrane type used, solute adsorption on the membrane surface is typically 2-10 µg/cm^2. This can increase to 20-100µg/cm^2 when the filtrate is of interest and the solute must pass through the whole internal structure of the membrane. Typically a higher cut-off membrane will bind more than a low molecular weight alternative.

Adsorption to the Sample Container
Although every effort is made to minimise this phenomenon by the selection of low adsorption materials and tool production to optical standards, some solute will bind to the internal surface of the sample container. Whilst the relative adsorption will be proportionately less important than on the membrane, due to the higher total surface area, this can be the major source of yield loss.



Section through ultrafiltration membrane showing internal binding sites

Process Optimisation

When highest recoveries are most important, in particular when working with solute quantities in the microgram range, Sartorius recommends that users consider the following:

- Select the smallest device that suits the sample volume. Eventually, take advantage of the extra speed of Vivascience products by refilling a smaller device repeatedly.
- Select the lowest MWCO membrane that suits the application.
- When available, prefer swing buckets to fixed angle rotors. This reduces the surface area of the concentrator that will be exposed to the solution during centrifugation.
- Reduce pressure or centrifugal force to approximately half of the maximum recommended.
- Avoid over concentration. The smaller the final concentrate volume, the more difficult it is to achieve complete recovery. If feasible, after a first recovery, rinse the device with one or more drops of buffer and then recover again.
- Pre-treat the device overnight with a passivation solution such as 5% SDS, Tween 20, or Triton X in distilled water. Then rinse thoroughly before use.

Solute Recovery Comparisons*

	BSA 0.1 mg/ml		BSA 0.005 mg/ml	
	Total Spin Time Minutes	Solute Recovery %	Total Spin Time Minutes	Solute Recovery %
Untreated Product				
Vivaspin 20 (single spin)	13 min	96.3%	13 min	68.8%
Vivaspin 6 (refilled 3X)	34 min	>99%	34 min	78.8%
After Passivation in SDS 5%				
Vivaspin 20 (single spin)	-	-	12 min	84.4%
Vivaspin 6 (refilled 3X)	-	-	32 min	93.2%

*20ml Start volume, 10,000 MWCO PES membrane, 30X concentration, 3,000 g swing bucket rotor.

Vivaspin Centrifugal Concentrators

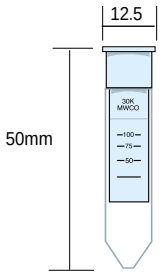
100µl to 2ml samples

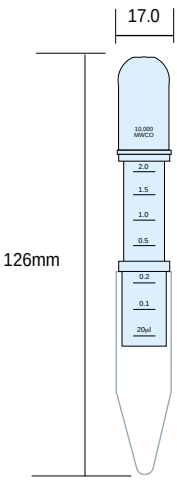
Vivaspin 500µl centrifugal filter units offer a simple, one step procedure for sample preparation. They can effectively be used in either swing out or fixed angle rotors accepting 2.2 ml centrifuge tubes.

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

In addition to the proven Polyethersulfone membrane range, Vivaspin 500 is now also available with Cellulose Triacetate alternatives. CTA is to be preferred when highest recovery of the filtrate is of primary importance.

Specifications	Vivaspin 500	Vivaspin 2
Concentrator capacity:	100 - 600µl	3.0ml swing out 2.0ml fixed angle
Centrifuge rotor required, fixed angle or swing out:	11mm cavity (2.2ml tubes)	17mm cavity (15ml tubes)
Maximum centrifugal force:	15,000 g	8,000 g
Active membrane area:	0.5cm²	1.2cm²
Hold-up volume, membrane and support:	<5µl	<10µl
Dead stop volume:	5µl	8µl
Materials of construction		
Filtrate collection tube:	Polypropylene	Polycarbonate
Concentrator body/sleeve:	Polycarbonate	Polycarbonate



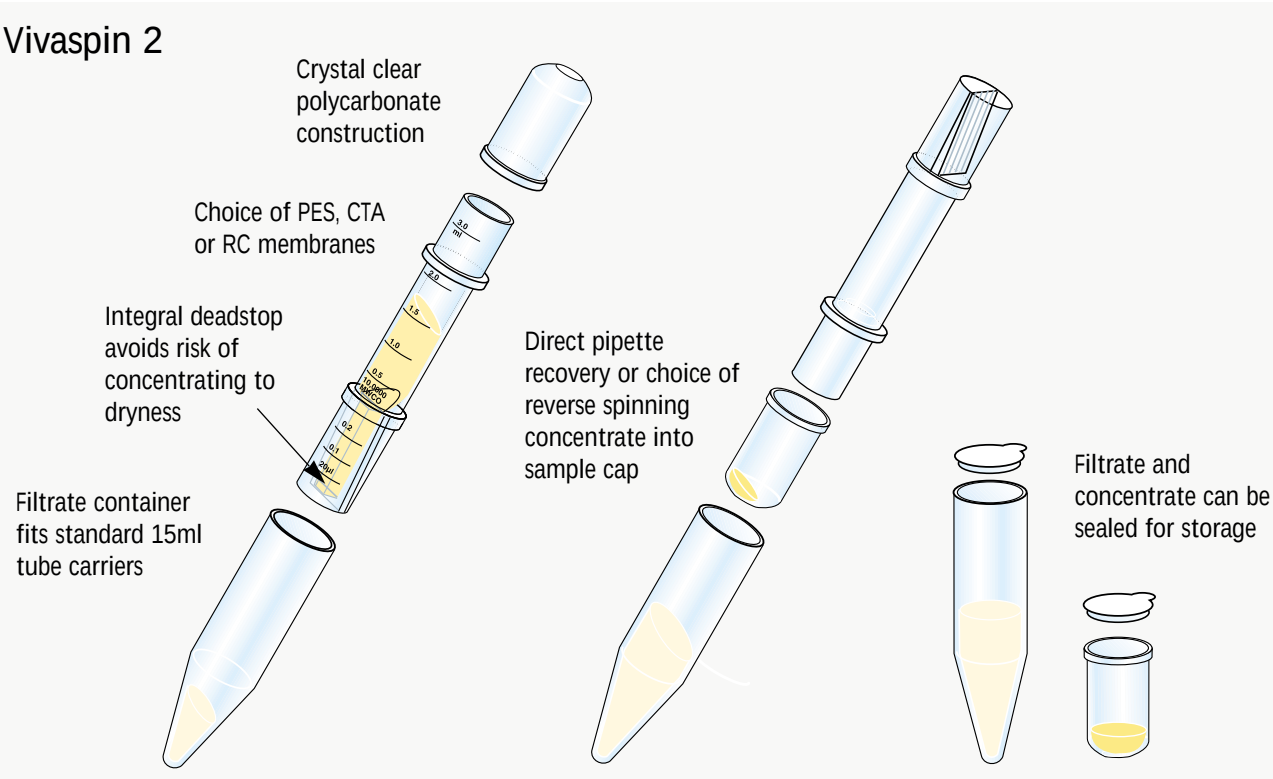


New Vivaspin 2ml

The new Vivaspin 2 bridges the gap between the 500µl and 6ml 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 and Regenerated Cellulose membranes, Vivaspin 2 offers the highest flexibility for process optimisation. The whole device can be autoclaved to 121˚C when used with Regenerated Cellulose membranes.

Also unique to the 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 concentrate recovery cap which can then be sealed for storage . Both methods result in near total concentrate recoveries.



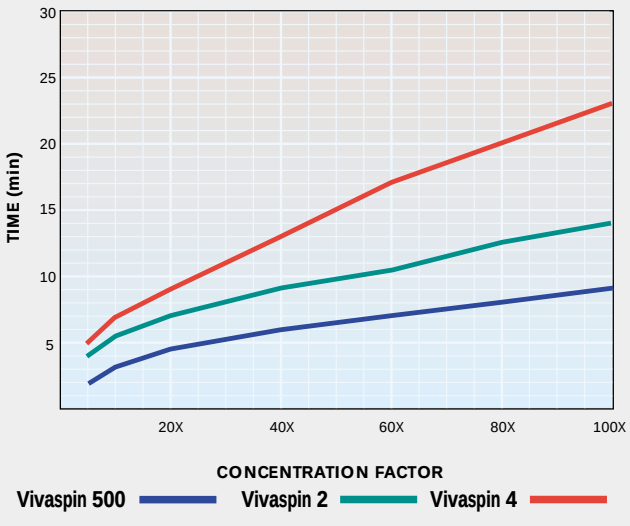
Vivaspin Centrifugal Concentrators

Typical Performance in Fixed Angle Rotors

Typical Performance	Time to Concentrate 30X min. at 20˚C		Concentrate Recovery %	
Product	Vivaspin500	Vivaspin2	Vivaspin500	Vivaspin2
Start Volume	500µl	2ml	500µl	2ml
Centrifugal Force	12,000 g	5,000 g	12,000 g	5,000 g
BSA 1.0mg/ml (66,000 MW)				
5,000 MWCO PES	15	12	96%	98%
5,000 MWCO CTA	30	50	96%	96%
10,000 MWCO PES	5	8	96%	98%
10,000 MWCO RC	-	14	-	98%
10,000 MWCO CTA	15	10	96%	96%
20,000 MWCO CTA	4	5	95%	96%
30,000 MWCO PES	5	8	95%	97%
30,000 MWCO RC	-	5	-	98%
IgG 0.25 mg/ml (160,000 MW)				
20,000 MWCO CTA	5	6	97%	97%
30,000 MWCO PES	10	10	96%	96%
30,000 MWCO RC	-	9	-	97%
50,000 MWCO PES	10	10	96%	96%
100,000 MWCO PES	10	8	96%	95%
100,000 MWCO RC	-	4	-	96%

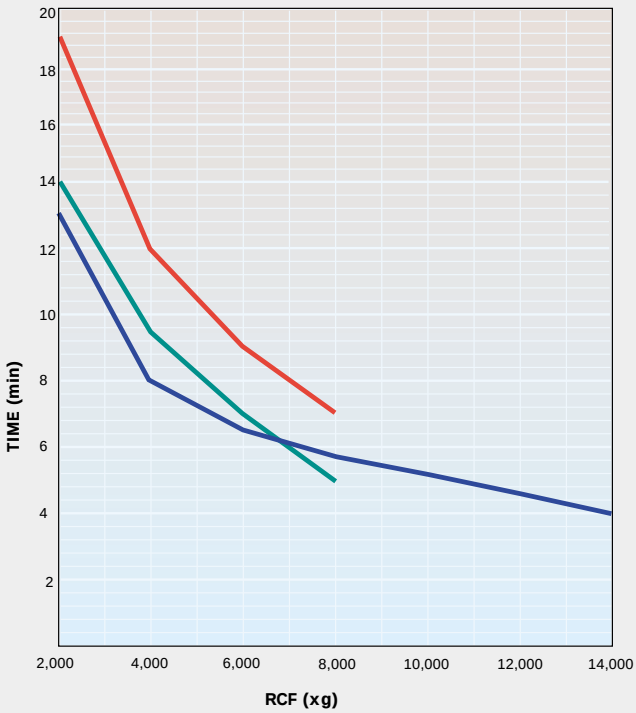
Spin Time vs. Concentration Factor

BSA 1.0 mg/ ml. PES 10,000 MWCO membrane



Time vs. Centrifugal Speed*

BSA 1.0 mg/ ml. PES 10,000 MWCO membrane



* 30x concentration at 20˚C

Ordering Information

Equipment Required	Vivaspin 500	Vivaspin 2
Centrifuge (Swing Bucket or Fixed Angle)		
Rotor size (Based on Falcon type conical bottom tubes)	2.2ml (11mm)	15ml (17mm)
Fixed angle rotor (Minimum Angle)	40˚	25˚
Minimum Effective Speed	3,000 g	2,000 g
Recommended Speed	5,000 g - 15,000 g	3,000 g - 8,000 g
Concentrate recovery - Fixed or variable volume pipette	Thin gel loader type	

Ordering Tips (Refer to pages 4 and 5)

- Choose a membrane pore size at least 50% smaller than the size of the molecule to be retained.
- Usually choose Polyethersulfone membranes for fastest concentrations.
- Usually choose Cellulose Triacetate for Protein Removal/Ultrafiltrate recovery.
- Usually choose Vivaspin 2 and Regenerated Cellulose membranes for highest recovery with very dilute solutions.

Vivaspin 500 (100-500µl samples)
Polyethersulfone Membrane

	Pack Size	Prod. No.
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
Start pack (5 of each MWCO)	25	VS01S1

Vivaspin500 (100-500µl samples)
Cellulose Triacetate Membrane

	Pack Size	Prod. No.
5,000 MWCO	25	VS01U1
5,000 MWCO	100	VS01U2
10,000 MWCO	25	VS01V1
10,000 MWCO	100	VS01V2
20,000 MWCO	25	VS01X1
20,000 MWCO	100	VS01X2

Vivaspin 2 (0.4-2ml samples)
Polyethersulfone Membrane

	Pack Size	Prod. No.
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
Start pack (5 of each MWCO)	25	VS02S1

Vivaspin 2 (0.4-2ml samples)
Regenerated Cellulose Membrane

	Pack Size	Prod. No.
10,000 MWCO	25	VS02K1
10,000 MWCO	100	VS02K2
30,000 MWCO	25	VS02L1
30,000 MWCO	100	VS02L2
100,000 MWCO	25	VS02M1
100,000 MWCO	100	VS02M2

Vivaspin2 (0.4-2ml samples)
Cellulose Triacetate Membrane

	Pack Size	Prod. No.
5,000 MWCO	25	VS02U1
5,000 MWCO	100	VS02U2
10,000 MWCO	25	VS02V1
10,000 MWCO	100	VS02V2
20,000 MWCO	25	VS02X1
20,000 MWCO	100	VS02X2

Vivaspin Concentrators

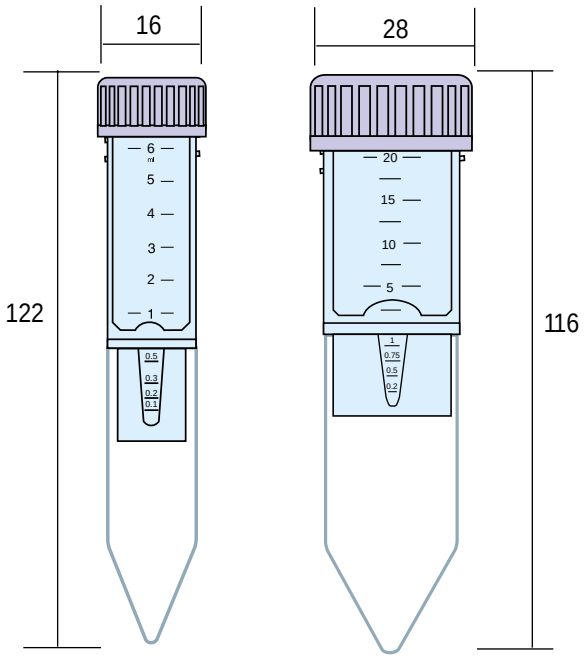
2 - 20 ml samples

The new Vivaspin 6 and 20ml centrifugal concentrators have been developed to offer increased volume flexibility and performance compared to our previous class leading 15ml product. Vivaspin 6 can process a record 6ml in either swing bucket or fixed angle rotors accepting standard 15ml conical bottom test tubes.

Vivaspin 20 handles up to 20ml in swing bucket centrifuges, 14ml in 25˚ fixed angle rotors accepting 50ml centrifuge tubes.

Both products feature twin vertical membranes for unparalleled filtration speeds and 100X plus concentrations.

Remaining volume is easy to read off the printed scale on the side of the concentrator and the modified dead stop pocket further simplifies direct pipette recovery of the final concentrate.



Technical Specifications	Vivaspin 6	Vivaspin 20
Concentrator Capacity		
Swing Bucket Rotor	6ml	20ml
25˚ Fixed Angle Rotor	6ml	14ml
With Pressure Cap	-	15ml
Dimensions		
Total Length	122mm	116mm
Width	16mm	28mm
Active Membrane Area	2.5 cm^2	6.0 cm^2
Carrier Required		
Insert Diameter	17mm	29mm
Conical Bottom Tube	15 ml	50ml
Maximum Centrifugal Force	10,000 g	8,000 g
Maximum Pressure	-	5 bar
Hold up Volume Memb.	<10µl	<20µl
Dead Stop Volume	30µl	50µl
Materials of Construction		
Body and Filtrate Vessel	Polycarbonate	
Concentrator Cap	Polypropylene	
Membranes	Polyethersulfone	

More Process Flexibility

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

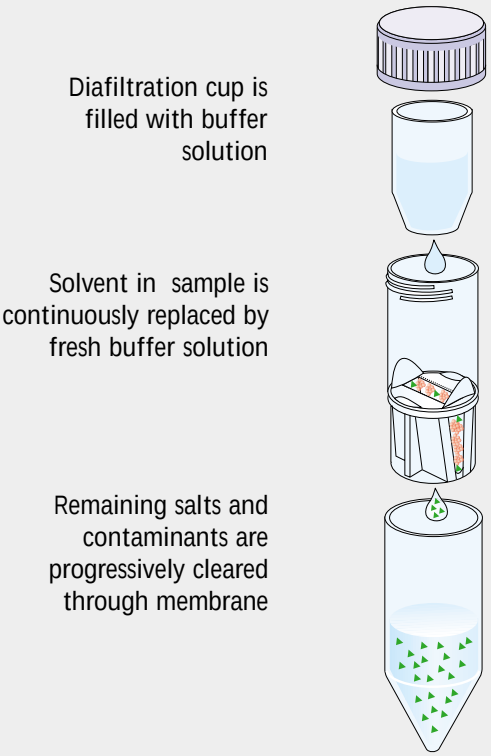
One Step Desalting

In this procedure following concentration, a diafiltration cup is filled with buffer and then spun one time to achieve 98% salt removal. This compares to the need for two spins to achieve the same result with the traditional refill and re-spin procedure. The improved performance is due to the constant washing action of the buffer solution in the accessory cup as it replaces solvent and salts as they pass through the ultrafiltration membrane.

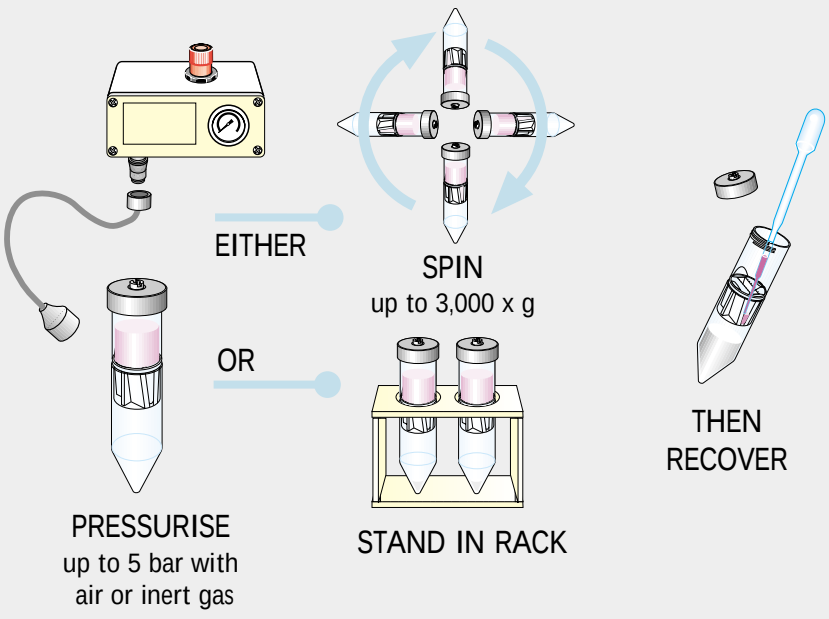
Gas Pressure Filtration

When an appropriate centrifuge is unavailable, or for single sample processing, Vivaspin 20 can be filled with up to 15ml and then pressurised 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 when using a low process temperature which reduces filtration speed, and generally when minimum process time is essential.

Desalting of Concentrated Sample



Using the Vivaspin 20 Pressure Cap



Vivaspin Concentrators

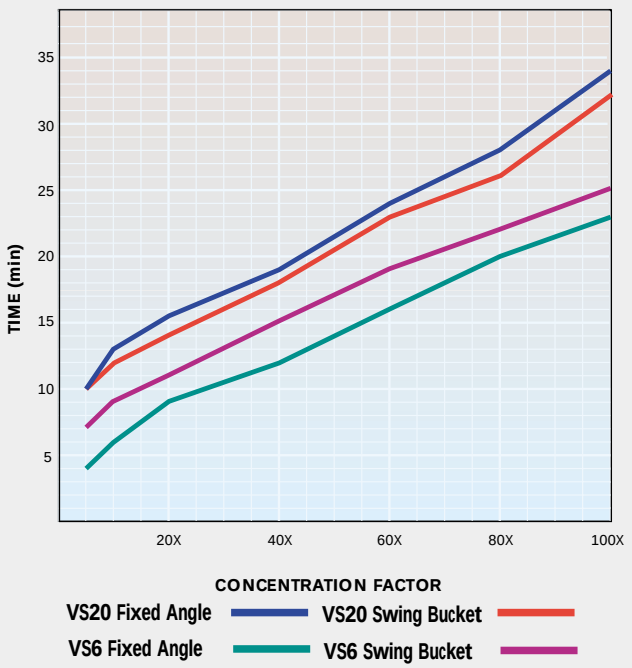
Typical Performance

Time to concentrate 30x in minutes and solute recovery %

	Vivaspin 6				Vivaspin 20							
Mode	Centrifuge		Centrifuge		Centrifuge		Centrifuge		Bench Top		Press-fuge	
Type	Swing Bucket		25° Fixed Angle		Swing Bucket		25° Fixed Angle		Pressure		Swing Bucket	
Pressure/Speed	3,000 g		7,500 g		3,000 g		6,000 g		4 bar		3,000 g + 4 bar	
Start Volume	6ml		6ml		20ml		14ml		10ml		10ml	
BSA 1.0mg/ml (66,000MW)	Min.	Rec.	Min.	Rec.	Min.	Rec.	Min.	Rec.	Min.	Rec.	Min.	Rec.
5,000 MWCO PES	20	98%	12	98%	23	99%	29	99%	50	98%	14	98%
10,000 MWCO PES	13	98%	10	98%	16	98%	17	98%	32	97%	8	97%
30,000 MWCO PES	12	98%	9	97%	13	98%	15	98%	32	97%	8	97%
IgG 0.25mg/ml (160,000MW)												
30,000 MWCO PES	18	96%	15	95%	27	97%	20	95%	46	94%	13	97%
50,000 MWCO PES	17	96%	14	95%	27	96%	22	95%	46	93%	13	96%
100,000 MWCO PES	15	91%	12	91%	25	91%	20	90%	42	88%	12	94%
Yeast 1.0 mg/ml (S. Cerevisiae)												
0.2µm PES	4	97%	3	97%	15	95%	5	95%	20	95%	2	95%

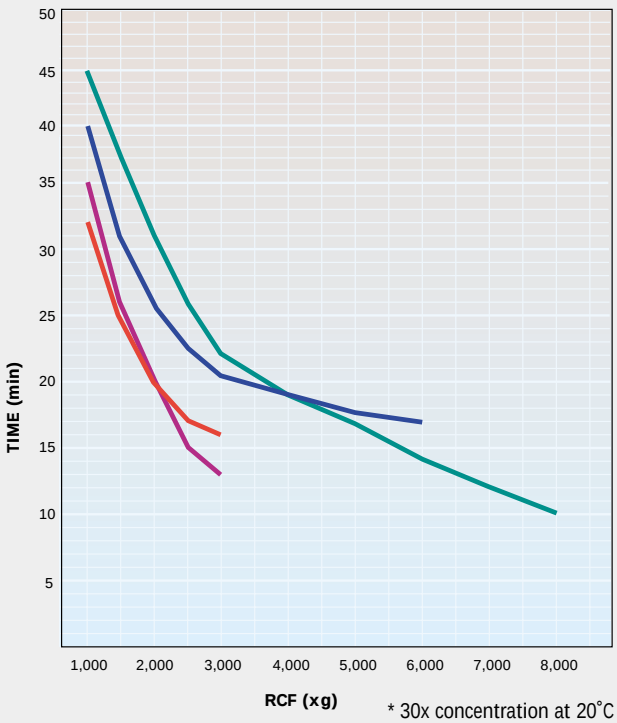
Spin Time vs. Concentration Factor

BSA 1.0 mg/ ml. PES 10,000 MWCO membrane



Time vs. Centrifugal Speed*

BSA 1.0 mg/ ml. PES 10,000 MWCO membrane



* 30x concentration at 20°C

Ordering Information

Equipment Required	Vivaspin 6	Vivaspin 20
Centrifuge (Swing Bucket or Fixed Angle)		
Rotor size (Based on conical bottom centrifuge tubes)	15ml (17mm)	50ml (29mm)
Fixed angle rotor (Minimum Angle)	25°	25°
Minimum Effective Speed	2,000 g.	1,500 g
Preferred Speed	3,000 - 7,500 g	2,000 - 6,000 g
Optional Pressure Accessories for Vivaspin 20		
Pressure Head with Check Valve		Prod. No.VCA200
Charge Valve for Pressure Head (Use with Air Pressure Controller)		Prod No. VCA005
Air Pressure Controller (APC) (Includes gauge, over pressure safety, female and male connections for all Vivascience Pressure products or 4mm pressure tubing)		Prod. NO. VCA002
Concentrate recovery		
Fixed or variable volume pipette	Thin gel loader type preferred	

Vivaspin 6 (2 - 6ml samples)
Polyethersulfone Membrane

	Pack Size	Prod. No.
5,000 MWCO	25	VS0611
5,000 MWCO	100	VS0612
10,000 MWCO	25	VS0601
10,000 MWCO	100	VS0602
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
0.2µm	25	VS0671
0.2µm	100	VS0672
Start Pack. (5 of each 5K, 10K, 30K, 50K, 100K)	25	VS06S1

Vivaspin 20 (5 - 20ml samples)
Polyethersulfone Membrane

	Pack Size	Prod. No.
5,000 MWCO	12	VS2011
5,000 MWCO	48	VS2012
10,000 MWCO	12	VS2001
10,000 MWCO	48	VS2002
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
0.2µm	12	VS2071
0.2µm	48	VS2072
Start Pack. (2 of each 5K, 10K, 30K, 50K, 100K, 0.2µm)	12	VS20S1

Vivaspin20 Accessories

	Pack Size	Prod. No.
Diafiltration Cups	12	VSA005
Vivaspin 20 Pressure Head	1	VCA200
Air Pressure Controller (APC)	1	VCA002
Charge Valve for Pressure Head	1	VCA005
Female Coupling	1	VCA010
Male Tube Coupling	1	VCA011
4mm OD Pressure Tube (3m)	1	VCA012

Vivacell 70

10 to 70ml samples

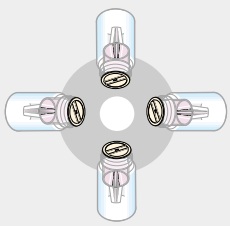
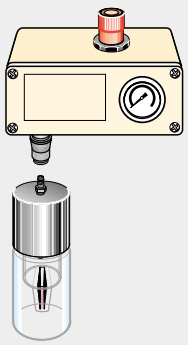
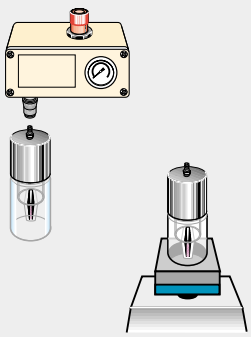
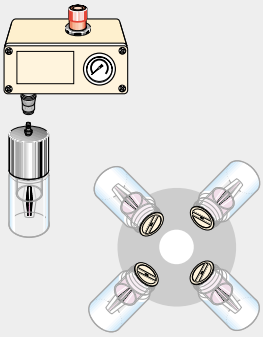
Vivacell 70 combines the ease of use of centrifugal devices with the flexibility and control provided by pressurised ultrafiltration cells. Vivacell 70 is inexpensive, quick and easy to assemble, requires no tubing connections or stirring mechanisms and can be adapted to equipment availability or to specific user preferences.

For convenience, simply spin in a large capacity centrifuge (carriers accepting 250ml bottles). For highest speeds particularly with difficult samples, pressurise the device with air or inert gas before centrifuging.

For more process control or for single samples, combine gas pressure with a gentle orbital shake, or you can even pressurise and then leave standing on a bench top or in a refrigerator for highest simplicity with minimum equipment requirements.

The longitudinal membrane inhibits fouling, whilst the built-in dead stop will hinder further concentration when residual volume drops below 150µl.

The flexibility to adapt to available equipment or user preference

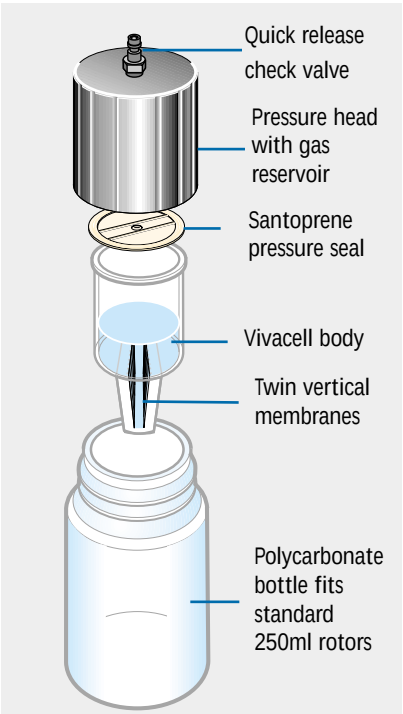
Centrifuge	Pressurise	Pressure-shake	Pressure-fuge
			
• Process convenience • Low shear, no foaming	• Simplicity and highest process control • Ideal for refrigerated use	• Speed and process control • Ideal for single samples	• Fastest processing • Ideal with low MWCO or with difficult solutions
• Less visual control	• Slower concentrations	• If left unattended can concentrate to dryness	• Less visual control

Performance Characteristics

Typical performance 50ml Start Volume	Time to concentrate 30X (minutes at 20˚C)				Solute Recovery
	In Centrifuge 1,000 g		As Pressure Cell 4 bar pressure		
	No Pressure	3 bar Pressure	No Agitation	Orbital Shake	%
BSA 1.0 mg/ml (66,000 MW)					
5,000 MWCO PES	37	18	50	25	96%
10,000 MWCO PES	25	15	45	20	96%
30,000 MWCO PES	22	13	45	20	93%
IgG 0.25 mg/ml (160,000 MW)					
50,000 MWCO PES	25	15	85	20	94%
100,000 MWCO PES	15	11	90	18	90%

Specifications	
Concentrator capacity:	10 - 70ml
Centrifuge rotor required:	62mm cavity
Maximum centrifugal force:	1,000 x g.
Max pressure:	5bar (75psi)
Active membrane area:	20cm^2
Hold-up vol. memb. & support:	<200µl
Dead stop volume:	150µl
Dimensions	
Without pressure head (Ø x L)	62 x 119mm
With centrifugal pressure head (Ø x L)	62 x 125mm
With pressure reservoir (Ø x L)	62 x 184mm
Materials of construction	
Pressure reservoir:	Nylon
Quick release connector:	Acetal
Concentrator cap:	Santoprene
Concentrator body/sleeve:	Polycarbonate
Filtrate bottle:	Polycarbonate

Gentle shaking action reduces membrane fouling for increased process speed



Ordering Information

Vivacell 70 Concentrator Bodies with Polycarbonate filtrate bottles		
	Pack Size	Prod No.
5,000 MWCO PES	2	VS6011
10,000 MWCO PES	2	VS6001
30,000 MWCO PES	2	VS6021
50,000 MWCO PES	2	VS6031
100,000 MWCO PES	2	VS6041
0.2µm PES	2	VS6071

Vivacell 70 Concentrator Body only		
	Pack Size	Prod No.
5,000 MWCO PES	10	VS6012
10,000 MWCO PES	10	VS6002
30,000 MWCO PES	10	VS6022
50,000 MWCO PES	10	VS6032
100,000 MWCO PES	10	VS6042
0.2µm PES	10	VS6072

Vivacell 70 Accessories		
	Pack Size	Prod No.
250ml Centrifuge bottle	4	VSA003
250ml Centrifuge bottles with modified caps for use in fixed angle rotors	2	VCA004
Vivacell 70 Pressure-fuge head (for use in centrifuge)	2	VCA701
Replacement seals for Pressure-fuge head (VCA701)	10	VCA007
Vivacell 70 Pressure head with reservoir and filtrate bottle (bench top use)	1	VCA700
Air Pressure Controller (APC) (Includes gauge, over pressure safety valve, female and male connections for all Vivascience Pressure products or 4mm pressure tubing)	1	VCA002
Charge valve for Pressure-fuge head	1	VCA005

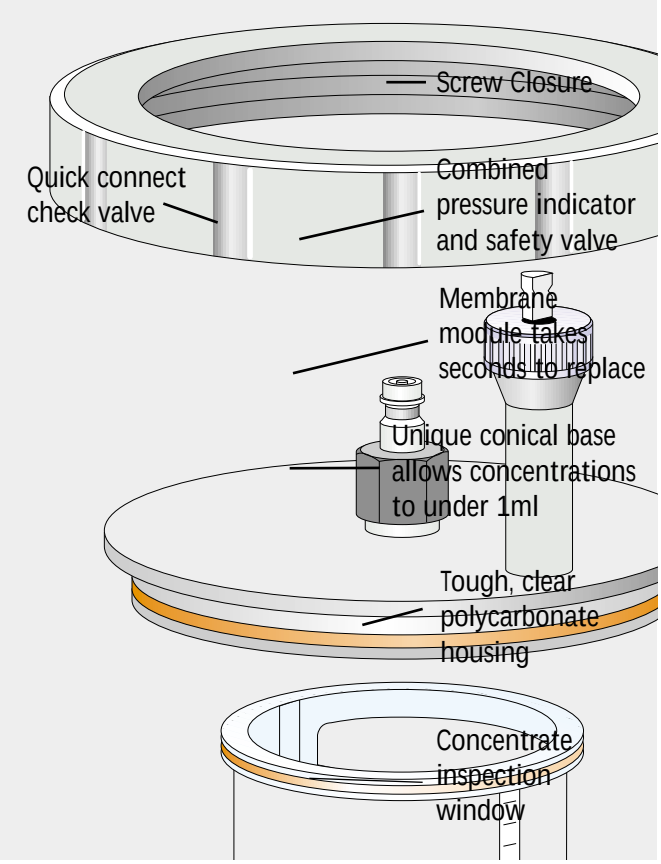
Vivacell 250

50 to 250ml samples

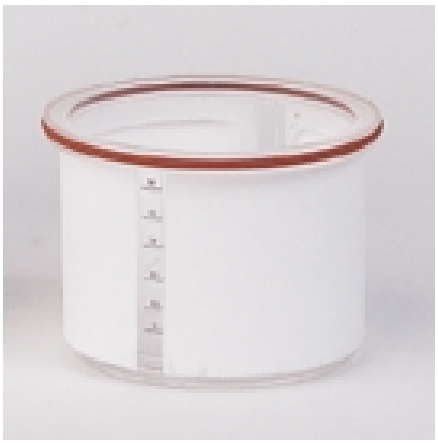
The Vivacell 250 is a totally new concept for the concentration of larger biological samples. This product offers numerous advantages when compared to stirred cells.

- One size handles a volume range from under 50 ml to 250ml.
- Use free standing on a bench top or in a refrigerator for maximum simplicity, or use on laboratory shaker for fastest concentrations.
- The unique conical dead stop built into the bottom of the membrane insert allows concentrations to under 1ml.
- The gentle vortex action controls membrane polarisation whilst greatly reducing the shear effects typical of stirring mechanisms.
- Set up or membrane replacement takes just a few seconds. Quick connect fittings and simple screw closure further enhance ease of use.
- Competitively priced.

Specifications	
Concentrator capacity:	50 - 250ml
Max pressure:	4bar (60psi)
Active membrane area:	40cm²
Hold-up vol. memb. & support:	<200µl
Dead stop volume:	600µl
Materials of construction	
Screw closure:	Acetal
Pressure head:	Acetal
Quick release connector:	Acetal
Concentrator body/sleeve:	Polycarbonate
Filtrate container:	Polycarbonate
Dimensions	
Width Ø	116mm
Height (incl. pressure indicator)	235mm



Air pressure controller can be used with all Vivascience pressure products



Unique membrane module takes seconds to replace. Concentrate can be easily monitored through the graduated inspection window.

Typical Performance

20x concentration 4 bar pressure	100ml Start Volume			250ml Start Volume		
	Time Min.		Solute	Time Min.		Solute
	Orbital Shake	Free Standing	Recovery	Orbital Shake	Free Standing	Recovery
BSA 1.0mg/ml (66,000 MW)						
5,000 MWCO PES	19	70	98%	40	140	99%
10,000 MWCO PES	12	45	97%	28	100	98%
30,000 MWCO PES	12	45	96%	28	100	98%
γ Globulins 0.25 mg/ml (160,000 MW)						
30,000 MWCO PES	25	120	96%	55	240	98%
50,000 MWCO PES	25	120	94%	55	240	98%
100,000 MWCO PES	25	120	96%	58	240	98%

Ordering Information

Equipment Required

2-4 bar air or inert gas pressure source with pressure regulator. Orbital shaker capable of handling one litre bottles at 100-300 rpm recommended for fastest filtration

Item Description	Product No:	Units
Vivacell 250 complete with pressure head, pressure indicator/over-pressure release valve, 2 sample reservoirs and filtrate vessels, quick release connections to APC	VCA250	1
Vivacell 250 Maintenance Kit. (Includes one concentrator and filtrate container, and "O" ring seals for pressure head)	VCA009	1
Air Pressure Controller (APC) (Includes gauge, over pressure safety valve, female and male connections for all Vivascience Pressure products or 4mm pressure tubing)	VCA002	1
Replacement Female coupling	VCA010	1
Replacement Male coupling	VCA011	1
Replacement Pressure Indicator/Over pressure relief valve	VCA008	1
4mm OD Pressure tubing (3m)	VCA012	1
Vivacell 250 Membrane Inserts		
5,000 MWCO PES	VC2511	5
10,000 MWCO PES	VC2501	5
30,000 MWCO PES	VC2521	5
50,000 MWCO PES	VC2531	5
100,000 MWCO PES	VC2541	5
Starter Kit (One of each membrane MWCO)	VC25S1	5

Vivapore Solvent Absorption Concentrators

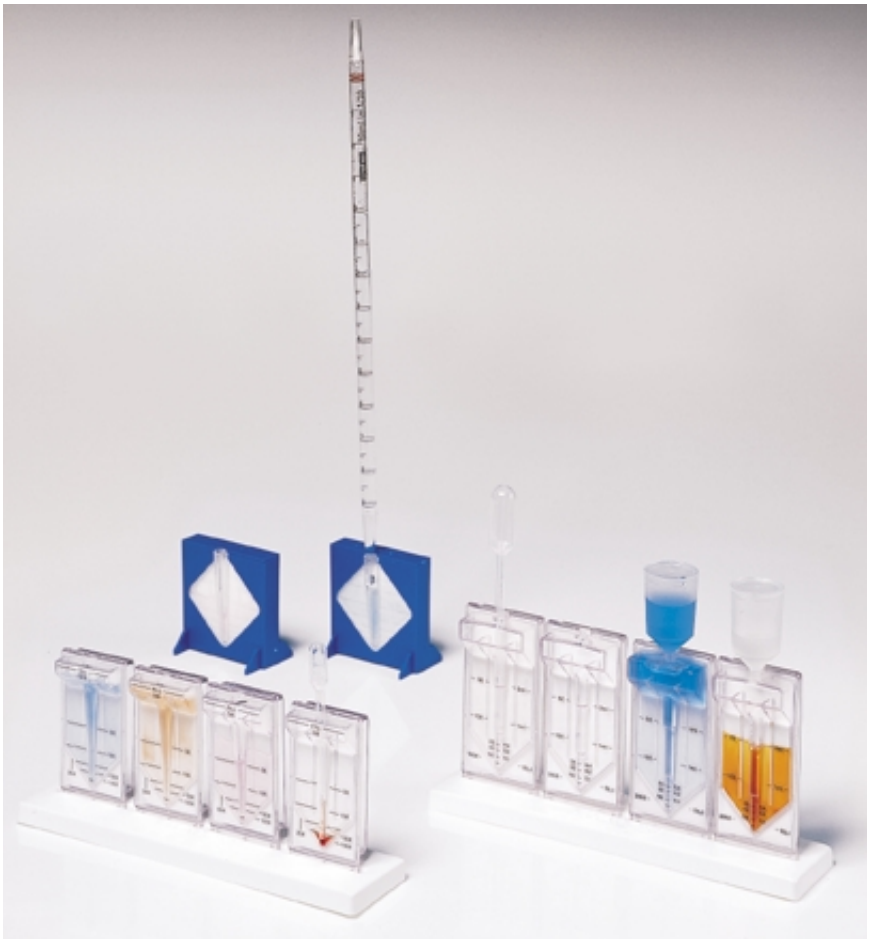
0.5ml to 20ml samples

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.

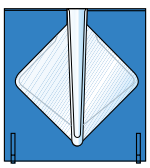
Just fill the unit with the solution to be concentrated, wait for the desired concentration level to be achieved and then pipette the concentrated sample from the bottom of the reservoir.

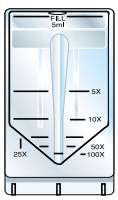
Ideal for general purpose laboratory concentration or purification prior to further analysis, Vivapore is particularly suited for labile solutions that can denature with alternative shear or pressure inducing methods or require processing in a cold room environment.

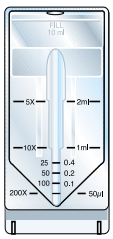
Vivapore concentrators extend the solvent absorption technique to a totally new level of performance, application potential and ease of use.



Vivapore 10/20 with optional 10 position spring loaded stand







Specifications	Vivapore 2	Vivapore 5	Vivapore 10/20
Membrane Surface Area	15cm^2	20cm^2	28cm^2
Reservoir Material	TPX, (PMP)	SAN	SAN
Volume Range	0.5 - 2.5ml/15ml*	1 - 5ml	2 - 10ml/20ml*
Minimum Concentrate Vol.	20µl	50µl	50µl
Overall Dimensions			
Width (mm)	66	42	46
Height (mm)	68	82	100

* with additional reservoir

Typical Performance

Typical performance	Time to concentrate 10x (minutes)				Concentrate recovery % after 10x concentration			
Product	VP2	VP5	VP10/20	VP10/20*	VP2	VP5	VP10/20	VP10/20*
Start Volume	2ml	5ml	10ml	20ml	2ml	5ml	10ml	20ml
Cytochrome C (12,600 MW)	0.25mg/ml	0.25mg/ml	0.25mg/ml	0.1mg/ml	0.25mg/ml	0.25mg/ml	0.25mg/ml	0.1mg/ml
7,500 MWCO PES	35	35	75	150	90%	90%	90%	92%
30,000 MWCO RC	30	25	50	105	18%	18%	18%	20%
BSA (66,000MW)								
7,500MWCO PES	25	30	55	115	90%	92%	92%	92%
30,000 MWCO RC	20	25	40	80	90%	90%	90%	94%
IgG (160,000MW)								
7,500MWCO PES	35	40	70	160	76%	75%	77%	78%
30,000 MWCO RC	25	35	35	80	80%	82%	85%	90%
	Time to concentrate 50x (minutes)				Concentrate recovery % after 50x concentration			
Cytochrome C (12,600 MW)								
7,500 MWCO PES	65	70	160	-	91%	88%	90%	-
30,000 MWCO RC	55	60	95	-	16%	16%	16%	-
BSA (66,000MW)								
7,500MWCO PES	45	50	105	218	90%	90%	92%	94%
30,000 MWCO RC	40	45	60	120	89%	88%	88%	90%
IgG (160,000MW)								
7,500MWCO PES	50	65	140	290	53%	65%	74%	70%
30,000 MWCO RC	45	60	65	135	60%	70%	82%	88%

* with additional reservoir

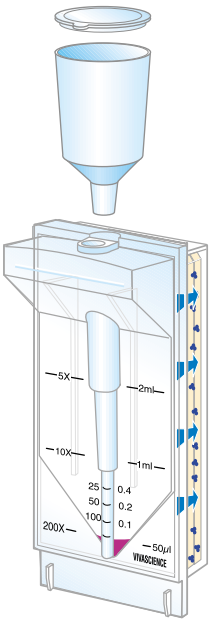
Using the accessory reservoir

Concentration

Accessory reservoir expands capacity up to 20ml

Solvent and low molecular weight species pass through hydrophylic membrane into absorbent at the back of the concentrator. Macromolecules are concentrated in remaining solvent

50µl dead stop impedes concentrating to dryness. Up to 400x concentration can be achieved



Desalting

Up to 10ml of sample is first concentrated to 2ml or less. Accessory reservoir is then fitted to entry port and filled with 10ml of fresh buffer

New buffer enters concentrator one drop at a time replacing existing solvent as it is drawn into absorbent. Volume in concentrator does not change.

Salts and contaminants are progressively cleared through membrane

Ordering Information

	Pack Size	Prod No.
Vivapore 2 (0.5 - 2.5ml samples) Expandable to 15ml with pipette reservoir		
7,500 MWCO PES	30	VP0201
30,000 MWCO RC	30	VP0271
Vivapore 5 (1 - 5ml samples) Includes stand and recovery pipettes		
7,500 MWCO PES	4	VP0503
7,500 MWCO PES	30	VP0501
30,000 MWCO RC	4	VP0573
30,000 MWCO RC	30	VP0571
Requires stand		
7,500 MWCO PES	100	VP0502
30,000 MWCO RC	100	VP0572
Vivapore 10/20 (2 - 20ml samples) Includes stand and recovery pipettes		
7,500 MWCO PES	4	VP2003
7,500 MWCO PES	30	VP2001
30,000 MWCO RC	4	VP2073
30,000 MWCO RC	30	VP2071
Requires stand		
7,500 MWCO PES	100	VP2002
30,000 MWCO RC	100	VP2072
Vivapore Accessories		
Disposable stands for 4 units	6	VPA002
10 position acrylic stand (Vivapore 10/20)	1	VPA010
10 position acrylic stand (Vivapore 5)	1	VPA011
Plastic recovery pipettes (Vivapore 10/20)	100	VPA005
Plastic recovery pipettes (Vivapore 5)	100	VPA007
Pipette reservoir (Vivapore 2)	50	VPA004
10ml expansion reservoir (Vivapore 10/20)	10	VPA006

VivaFlow 50 Flipflow Filtration

100ml to 5 litres and more

The novel Vivaflow system (patents pending) provides a standard of ease of use, performance, flexibility and economy which is unrivalled by any laboratory or pilot scale filtration system on the market.

Unique in its features

- Thin channel flip-flow recirculation path provides high cross flow velocities with minimum pump requirements.
- No need for pressure holders.
- Crystal clear for simple control of remaining hold up and membrane status.
- Unique Interlocking modules with series connectors for easy scale up.
- Priced as a disposable yet easy to clean for re-use.

Unique in its performance

- A single 50cm^2 module will typically reduce 500ml to less than 15ml in under 50 minutes.
- Less than 10ml minimum system recirculation for highest concentrations.
- Less than 500µl non recoverable hold up volume.
- Near total recoveries achievable with a single 10ml rinse.

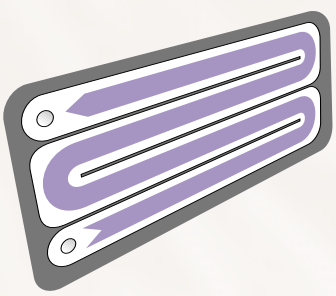
Performance Characteristics

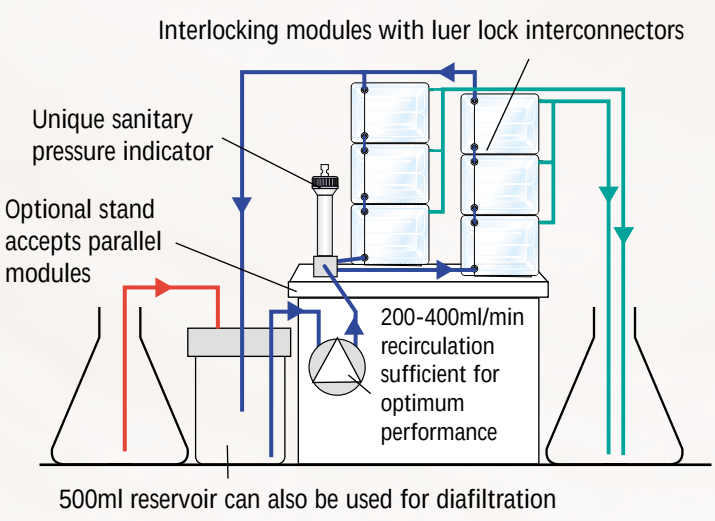
20X Concentration min	Single Device	Three Devices	Solute Recovery %	
3 bar inlet pressure at 20˚C	250ml Start Vol.	1 L Start Vol.	Direct	10ml rinse
	min.	min.		
BSA 1.0mg/ml (66,000 MW)				
5,000 MWCO PES	34	49	96%	>99%
10,000 MWCO PES	22	32	94%	>99%
10,000 MWCO RC	38	55	96%	>99%
30,000 MWCO PES	22	32	92%	99%
30,000 MWCO RC	13	21	96%	99%
50,000 MWCO PES	20	29	92%	98%
γ Globulins 1.0mg/ml				
100,000 MWCO PES	43	62	92%	98%
100,000 MWCO RC	40	58	92%	98%
Yeast 1.0mg/ml (S.Cerevisiae)				
0.2µm PES	33	47	92%	98%

Specifications	
Active Membrane Area:	50cm^2
Hold up Volume (module):	1.5ml
Min Recirculation Volume:	<10ml
Non Recoverable Hold-up	<0.5ml
Materials	
Main Housing:	Polycarbonate
Flow Channel:	TPX (PMP)
Seals and O Rings:	Silicone
Pressure Indicator:	Polypropylene, SS Spring, Acetal Body
Restrictor:	Polypropylene
Fittings:	Nylon
Tubing:	PVC (medical grade)

Dimensions	
Overall L/H/W	107/84/25mm
Channel W/H	15mm/0.3mm
Operating Conditions	
Pump Flow:	200-400ml/min
Maximum Pressure:	4 bar (60psi)
Maximum Temperature:	60˚C

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





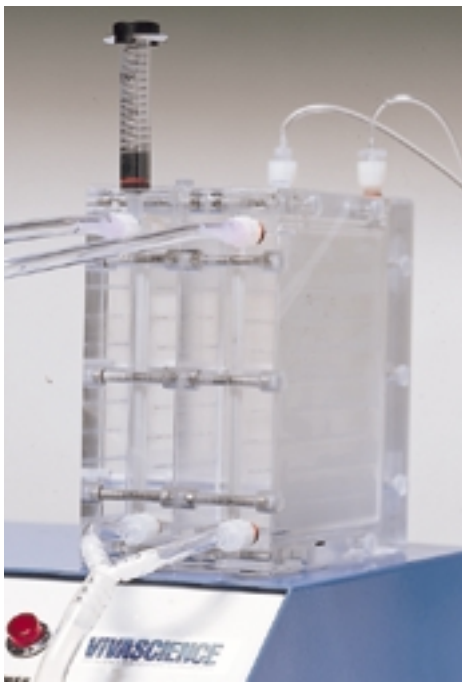
VivaFlow 200 Flipflow Filtration

0.5 to 5 litres and more

Concentrate 250ml to under 20ml in just a few minutes or concentrate one litre 50 times in less than 30 minutes. Alternatively, use two Vivaflow 200 in parallel and concentrate 5 litres in under 75 minutes.

Near total sample recoveries can be expected with most solutions.
Desalting or buffer exchange is just as quick when using the optional recirculation assembly available from Sartorius.

The economical standard package comes complete with tubing, pressure control gauge, flow restrictor and high pressure pump tubing. All you need is a peristaltic pump capable of handling 6.4mm OD (size 16) tubing. Should your pump head require larger tubing, link your own peristaltic tube up to the standard product, using the interconnector provided.
Vivaflow 200 is easy to clean and can be used repeatedly.



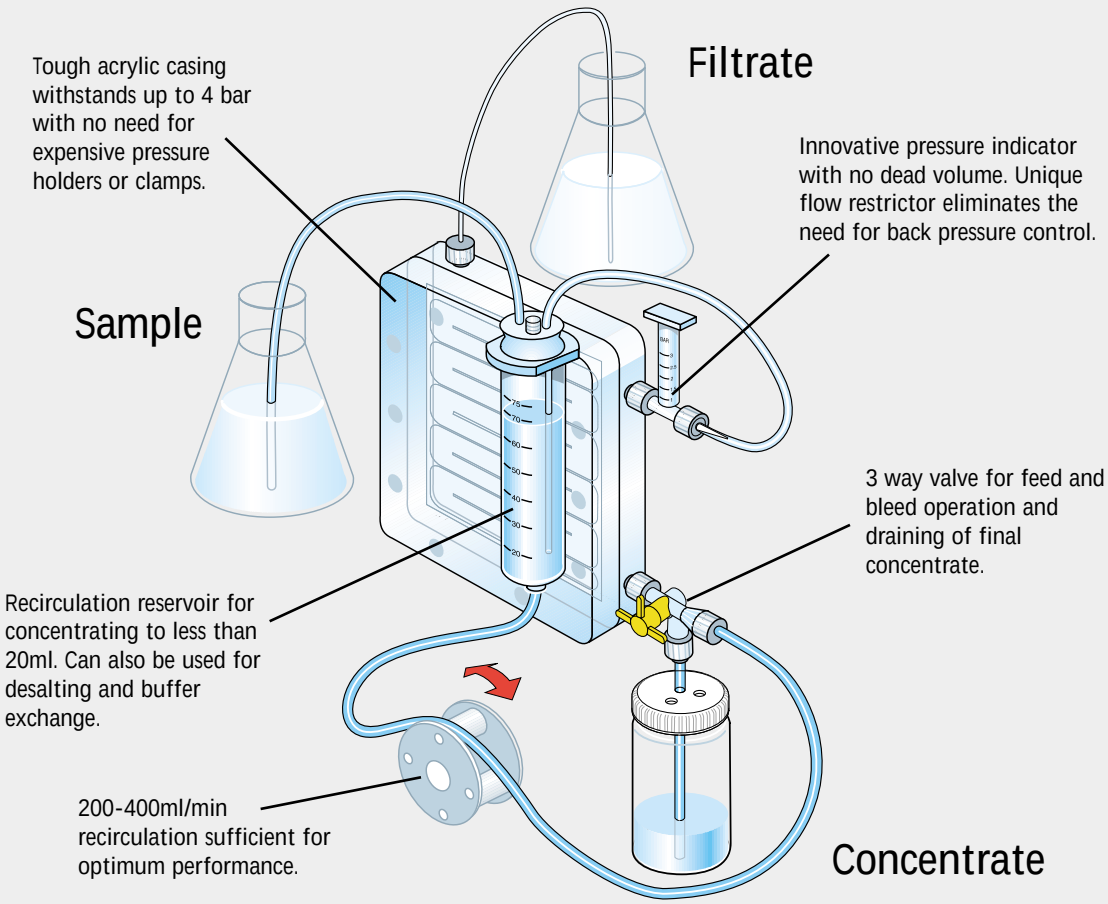
Two modules in parallel will concentrate 5 litres in under 75 minutes

Specifications	
Active Membrane Area:	200cm^2
Hold up Volume (module):	5.3ml
Min Recirculation Volume:	<20ml
Non Recoverable Hold-up:	<2ml
Materials	
Main Housing:	Acrylic
Membrane Support:	Polypropylene
Seals and O Rings:	Silicone
Pressure Gauge:	Polypropylene, SS Spring
Restrictor Assembly:	Polypropylene
Fittings:	PP, Nylon and Polysulfone
Tubing:	PVC (medical grade)
Dimensions	
Overall L/H/W	126/138/38mm
Channel W/H	10mm/0.4mm
Operating Conditions	
Pump Flow:	200-400ml/min
Maximum Pressure:	4 bar (60psi)
Maximum Temperature:	45˚C

Performance Characteristics

Start Volume 1 litre at 3 bar inlet pressure at 20˚C	20X Concentration Average Flux		Recovery %	
	Minutes	ml/min	Direct	25ml rinse
BSA 1.0mg/ml (66,000 MW)				
5,000 MWCO PES	29	33	98%	>99%
10,000 MWCO PES	23	41	96%	>99%
10,000 MWCO RC	42	23	97%	>99%
30,000 MWCO PES	25	38	96%	99%
30,000 MWCO RC	22	43	96%	99%
50,000 MWCO PES	22	43	96%	98%
γ Globulins 1.0mg/ml (Average160,000MW)				
100,000 MWCO PES	54	18	96%	99%
100,000 MWCO RC	45	21	96%	99%
Yeast 1.0mg/ml (S.Cerevisiae)				
0.2µm PES	11	86	92%	98%
Dilute Solute Concentration Start Volume 1 litre at 3 bar, 10,000 MWCO PES				
BSA 0.001mg/ml	18	52	90%	98%
BSA 0.01mg/ml	20	47	92%	98%
BSA 0.1mg/ml	21	45	94%	99%
Start Volume 5 litres (Two VF200 in parallel at 3 bar) 10,000 MWCO PES				
BSA 1.0mg/ml (66,000 MW)	67	70	97%	>99%

Vivaflow 200 operating with diafiltration reservoir



VivaFlow Flipflow Filtration

Ordering Information

Equipment Required	VivaFlow 50	VivaFlow 200	VivaFlow 200
(Single stack or parallel)	(Single unit)		(2 units in parallel)
Peristaltic pump			
Flow range	200 - 400 ml/min	200 - 400 ml/min	500 - 900 ml/min
Pressure range	1.5 - 3 bar	1.5 - 3 bar	1.5 - 3 bar
Pump head to accept (Bore x Wall of Tubing)	3.2 x 1.6 mm.	3.2 x 1.6 mm.	4.8 x 2.6 mm.
Masterflex Size	(LS16)	(LS 16)	LS15 (plus Y adapter)
Optional Equipment			
Sample/ Diafiltration reservoir	See Vivaflow Accessories		
Vivaflow 50 Stand for use with 2 parrallel stacks	Product No: VFA016	-	-
Pressure Indicator	Product No: VFA020	-	-

VivaFlow 50
Includes Luer fittings, filtrate tube and flow restrictor

	Pack Size	Prod. No.
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
0.2µm (PES)	2	VF05P7
10,000 MWCO (RC)	2	VF05C0
30,000 MWCO (RC)	2	VF05C2
100,000 MWCO (RC)	2	VF05C4

Vivaflow 50 and Accessories	
Masterflex Economy Drive Variable Speed Peristaltic Pump (CE 230V - US 115V)	VFP001
Masterflex Standard Pump Head - Size16	VFA010
Masterflex Easy Load Pump Head - Size16	VFA012
500 Sample and/or Diafiltration Reservoir	VFA006
Vivaflow 50 Stand (one stack position)	VFA016
Second stack position on Vivaflow Stand	VFA021
Pressure Indicator (0.5 - 3 bar)	VFA020
Tubing and Fittings	
Tygon Size 16 pump tubing (3 metres ,3.2X1.6 mm)	VFA004
Female Luer fittings (set of 10)	VFA032
Series Interconnectors (6 pieces)	VFA031
2 T Connectors for running 2 stacks	VFA030
Flow restrictors (set of 2X 0.4, 0.6, 0.8 mm)	VFA009

VivaFlow 200
Includes presure indicator, flow restrictor and size 16 tygon peristaltic tubing and fittings

	Pack Size	Prod. No.
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
0.2µm (PES)	1	VF20P7
10,000 MWCO (RC)	1	VF20C0
30,000 MWCO (RC)	1	VF20C2
100,000 MWCO (RC)	1	VF20C4

Vivaflow 200 and Accessories	
Masterflex Economy Drive Variable Speed Peristaltic Pump (CE 230V - US 115V)	VFP001
Masterflex Standard Pump Head - Size16	VFA010
Masterflex Standard Pump Head - Size15	VFA011
Masterflex Easy Load Pump Head - Size16	VFA012
Masterflex Easy Load Pump Head - Size15	VFA013
Vivaflow Recirculation Assembly	VFA001
500ml Sample and/or Diafiltration Reservoir	VFA006
Tubing and Fittings	
Tygon Size 16 pump tubing and Luer fittings (3 metres)	VFA004
Tygon Size 15 pump tubing and Luer fittings (3 metres)	VFA003
Y Connector (size 15 to 2X size 16)	VFA005
Flow restrictors (set of 2X 0.4, 0.6, 0.8 mm)	VFA009