

Vivaspin 500, 2, 6 and 20

Instructions for Use

Intended Use

This product is intended for research use only, and shall not be used in any clinical or *in vitro* procedures for diagnostic purposes.

Vivaspin 500 contains

25 disposable Vivaspin™ 500 ultrafiltration devices with either 3000, 5000, 10 000, 30 000, 50 000 or 100 000 molecular weight cut off (MWCO) polyethersulphone (PES).

Vivaspin 2 contains

25 disposable Vivaspin 2 ultrafiltration devices with either 3000, 5000, 10 000, 30 000, 50 000 or 100 000 MWCO PES.

Vivaspin 6 contains

25 disposable Vivaspin 6 ultrafiltration devices with either 3000, 5000, 10 000, 30 000, 50 000 or 100 000 MWCO PES.

Vivaspin 20 contains

12 disposable Vivaspin 20 ultrafiltration devices with either 3000, 5000, 10 000, 30 000, 50 000 or 100 000 MWCO PES.

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1 Introduction

Vivaspin Concentrators are disposable ultrafiltration devices for the concentration of biological samples. Main features of the concentrators are ease of use, speed and exceptional concentrate recoveries. There are four available sizes of Vivaspin, 500, 2, 6 and 20, each suitable for certain sample volumes, see the figure below. For each Vivaspin size several different MWCO membranes are available.

The patented vertical membrane design and thin channel filtration chamber minimizes membrane fouling and provides high speed concentrations, even with particle laden solutions.

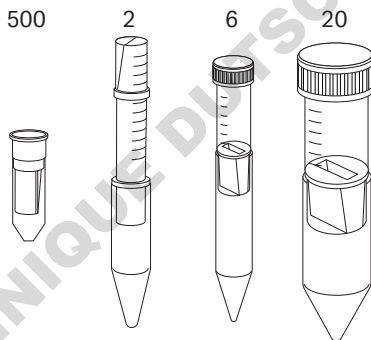


Fig 1. Vivaspin 500, 2, 6 and 20.

Vivaspin 500

Vivaspin 500 is suitable for sample volumes of 100 to 500 μL .

Vivaspin 500 can be used in a benchtop fixed angle rotor, accepting 2.2 mL centrifuge tubes.

Vivaspin 2

Vivaspin 2 is suitable for sample volumes of up to 2 mL.

Vivaspin 2 can effectively be used in either swing bucket or fixed angle rotor accepting 15 mL centrifuge tubes.

The Vivaspin 2 is specifically designed with low internal surface and membrane area in order to achieve superior recoveries from very dilute solutions.

Another feature of 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 the concentrate into the recovery cap which can then be sealed for storage.

Vivaspin 6

Vivaspin 6 is suitable for sample volumes of 2 to 6 mL.

Vivaspin 6 can effectively be used in either swing bucket or fixed angle rotor accepting 15 mL centrifuge tubes.

Vivaspin 6 features twin vertical membranes for unparalleled speed.

Vivaspin 20

Vivaspin 20 can handle samples up to 20 mL.

Vivaspin 20 features twin vertical membranes for unparalleled speed.

2 Required equipment

Pipettes

Pipettes for sample delivery and removal. For maximum recovery a thin gel loader type is recommended.

Centrifuges

Centrifuge with swing bucket of fixed angle (minimum 25°) rotor

Table 1. Centrifuge specifications for different Vivaspin concentrators.

Vivaspin	Centrifuge	Minimum rotor angle	Rotor cavity	Conical bottom tube size
500	Fixed angle	40°	11 mm Ø	2.2 mL
2	Fixed angle/ Swing bucket	25°	17 mm Ø	15 mL
6	Fixed angle/ Swing bucket	25°	17 mm Ø	15 mL
20	Fixed angle/ Swing bucket	25°	30 mm Ø	50 mL

Vivaspin 20 rotor compatibility

Vivaspin 20 (30 mm × 116 mm) is designed to fit into rotors that can accommodate Falcon 50 mL conical bottom tubes, for example:

- Beckman Allegra 25R with TS-5.1-500 swing-out rotor with BUC 5 buckets and 368327 adapters
- Beckman TA-10.250 25° fixed angle rotor with 356966 adapters

- Heraeus Multifuge 3 S-R with (Heraeus/Sorvall) 75006445 swing out rotor with 75006441 buckets and adapters for Falcon 50 mL conical bottom tubes.

These devices are not designed to fit into rotors that only accept round bottom 29 mm + 105 mm tubes, for example:

- Sorvall SS34
- Beckman JA 20.

3 Advice on handling

Storage conditions/shelf life

Vivaspin ultrafiltration spin columns should be stored at room temperature. The devices should be used before the expiry date printed on the box.

Flow rate

Filtration rate is affected by several parameters, including MWCO, porosity, sample concentration, viscosity, centrifugal force and temperature. Expect significantly longer spin times for starting solutions with over 5% solids.

When operating at 4°C, flow rates are approximately 1.5 times slower than at 25°C. Viscous solutions such as 50% glycerine will take up to 5 times longer to concentrate than samples in a predominantly buffer solution.

Prerinsing

Membranes fitted to Vivaspin concentrators contain trace amounts of glycerine and sodium azide. Should these interfere with analysis they can be removed by rinsing fill volume of buffer solution or deionized water through the concentrator. Decant filtrate and concentrate before processing sample solution. If you do not want to use the prerinsed device immediately, store it in the refrigerator with buffer or water covering the membrane surface. Do not allow the membrane to dry out.

Sterilization of polyethersulfone membranes

Vivaspin devices should not be autoclaved as high temperatures will substantially increase membrane MWCO. To sterilize, use a 70% ethanol solution or sterilizing gas mixture.

Chemical compatibility

Vivaspin concentrators are designed for use with biological fluids and aqueous solutions. Compatible pH range is pH 1 to 9. For chemical compatibility details, refer to Table 2 below.

Table 2. Vivaspin chemical compatibility (2 h contact time).

Solution	Compati bility¹	Solution	Compati bility¹
Acetic acid (25%)	Yes	Lactic acid (5%)	Yes
Acetone (10%)	No	Mercaptoethanol (1 M)	No
Acetonitrile (10%)	No	Nitric acid (10%)	Yes
Ammonium sulphate (saturated)	Yes	Phosphate buffer (1 M)	Yes
Benzene (100%)	No	Polyethylen glycol (10%)	Yes
n-Butanol (70%)	?	Pyridine (100%)	No

Chloroform (1%)	No	Sodium carbonate (20%)	Yes
Dimethyl formamide (10%)	?	Sodium deoxycholate (5%)	Yes
Dimethyl sulphoxide (5%)	Yes	Sodium dodecylsulfate (0.1 M)	Yes
Ethanol (70%)	Yes	Sodium hydroxide (2.5 M)	No
Ethyl acetate (100%)	No	Sodium hypochlorite (200 ppm)	Yes
Formaldehyde (30%)	Yes	Sodium nitrate (1%)	Yes
Formic acid (5%)	Yes	Sulfamic acid (5%)	Yes
Glycerine (70%)	Yes	Tetrahydrofuran (5%)	No
Guanidine HCl (6 M)	Yes	Toluene (1%)	No
Hydrocarbons, aromatic	No	Trifluoroacetic acid (10%)	Yes
Hydrocarbons, chlorinated	No	Tween 20 (0.1%)	Yes
Hydrochloric acid (1 M)	Yes	Triton X-100 (0.1%)	Yes
Imidazole (300 mM)	Yes	Urea (8 M)	Yes
Isopropanol (70%)	Yes		

¹ Yes indicates chemical compatibility and *No* indicates chemical incompatibility and that the solution is not recommended.

4 Safety precautions

Always use personal protection devices like gloves and safety glasses when handling Vivaspin products.

5 Concentration protocol

Step	Action
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- 1 Select the most appropriate membrane cut-off for your sample. For maximum recovery select a MWCO at least 50% smaller than the molecular size of the species of interest.
- 2 Fill concentrator with up to maximum volumes shown in Table 3 below. (Ensure lid is fully seated).

Table 3. Maximum sample volumes for different Vivaspin concentrators.

Vivaspin	Fixed angle	Swing bucket
500	500 μ L	Do not use
2	2 mL	3 mL
6	6 mL	6 mL
20	14 mL	20 mL

- 3 Insert the assembled concentrator into centrifuge.

Note:

If using a fixed angle rotor, angle concentrator so that the printed window faces upwards/outwards.

Step Action

- 4 Set centrifugation speed as recommended in Table 4 below, taking care not to exceed the maximum g-force indicated.

Table 4. Recommended maximum centrifugation speed (× g) for different Vivaspin concentrators.

	Vivaspin 500	Vivaspin 2	Vivaspin 6	Vivaspin 20
Fixed angle				
3000 to 50 000 MWCO	12 000 ¹	8000 ¹	8000 ¹	6000 ¹
100 000 MWCO	12 000 ¹	8000 ¹	6000	6000
Swing bucket				
3,000 to 50,000 MWCO	N.A.	4000	4000	4000 ¹
100 000 MWCO	N.A.	4000	4000	3000

¹ To maximize solute recovery recommended maximum spin speed has been adjusted (Nov 2018).

Step Action

- 5 Set centrifugation time (concentration time) after consulting Table 5 to Table 8 below for typical recoveries for various combinations of proteins, Vivaspin products and filters.

Table 5. Performance characteristics of Vivaspin 500.

Protein/filter	Up to 30 × sample concentration¹	Recovery
Aprotinin 0.25 mg/mL (6500 MW)		
3000 MWCO	30 min	96%
BSA 1.0 mg/mL (66 000 MW)		
5000 MWCO	15 min	96%
10 000 MWCO	5 min	96%
30 000 MWCO	5 min	95%
IgG 0.25 mg/mL (160 000 MW)		
30 000 MWCO	10 min	96%
50 000 MWCO	10 min	96%
100 000 MWCO	10 min	96%

¹ Centrifugation time to achieve an up to 30 × sample concentration with a start volume of 500 µL at 20°C.

Table 6. Performance characteristics of Vivaspin 2.

Protein/filter	Up to 30 × sample concentration¹	Recovery
Aprotinin 0.25 mg/mL (6,500 MW)		
3000 MWCO	50 min	96%
BSA 1.0 mg/mL (66 000 MW)		

Step Action

5000 MWCO	12 min	98%
10 000 MWCO	8 min	98%
30 000 MWCO	8 min	97%
IgG 0.25 mg/mL (160 000 MW)		
30 000 MWCO	10 min	96%
50 000 MWCO	10 min	96%
100 000 MWCO	8 min	95%

¹ Centrifugation time to achieve an up to 30 × sample concentration with a start volume of 2 mL at 20°C.

Table 7. Performance characteristics of Vivaspin 6.

Protein/filter	Up to 30 × sample concentration ¹			
	Swing bucket	Recovery	25° Fixed angle	Recovery
Cytochrome C 0.25 mg/mL (12 400 MW)				
3000 MWCO	-	-	90 min	97%
BSA 1.0 mg/mL (66 000 MW)				
5000 MWCO	20 min	98%	12 min	98%
10 000 MWCO	13 min	98%	10 min	98%
30 000 MWCO	12 min	98%	9 min	97%
IgG 0.25 mg/mL (160 000 MW)				
30 000 MWCO	18 min	96%	15 min	95%
50 000 MWCO	17 min	96%	14 min	95%
100 000 MWCO	15 min	91%	12 min	91%

¹ Centrifugation time to achieve an up to 30 × sample concentration with a start volume of 6 mL at 20°C.

Step Action

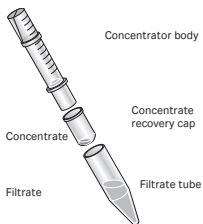
Table 8. Performance characteristics of Vivaspin 20.

Protein/filter	Up to 30 × sample concentration ¹			
	Swing bucket	Recovery	25° Fixed angle	Recovery
Cytochrome C 0.25 mg/mL (12 400 MW)				
3000 MWCO	110 min	97%	180 min	96%
BSA 1.0 mg/mL (66 000 MW)				
5000 MWCO	23 min	99%	29 min	99%
10 000 MWCO	16 min	98%	17 min	98%
30 000 MWCO	13 min	98%	15 min	98%
IgG 0.25 mg/mL (160 000 MW)				
30 000 MWCO	27 min	97%	20 min	95%
50 000 MWCO	27 min	96%	22 min	95%
100 000 MWCO	25 min	91%	20 min	90%

¹ Centrifugation time to achieve an up to 30 × sample concentration with a start volume of 20 mL (swing bucket rotor) or 14 mL (fixed angle 25° rotor) at 20°C.

- 6 Concentrate samples by using centrifugation speed and time set in steps 4 and 5.
 - 7 Remove assembly and recover sample from the bottom of the concentrate pocket with a pipette. The filtrate tube can be sealed for storage.
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6 Reverse spin protocol (Vivaspin 2)



Depending on user preference and need for sample storage, the concentrate can be reverse spun into the concentrate recovery cap.

If fixed angle rotors are used, angle concentrator so that the printed window faces upwards/ outwards).

Step	Action
1	Remove filtrate tube.
2	Invert the concentrator body (position with printed window upwards/ outwards).
3	Insert concentrate recovery cap into filtrate tube.
4	Spin at up to 3000 × g for 2 minutes. The concentrate recovery cap and filtrate tube can be sealed for storage.

7 Desalting/buffer exchange protocol

Step	Action
1	Concentrate sample to desired level.
2	Empty filtrate container.

Step Action

- 3 Refill concentrator with an appropriate solvent.
- 4 Concentrate the sample again and repeat the process until the concentration of contaminating microsolutes is sufficiently reduced.

Typically 3 wash cycles will remove 99% of initial salt content.

8 Characteristics

Membrane	Polyethersulfone (PES)			
Body	Polycarbonate			
Filtrate vessel	Polycarbonate			
	500	2	6	20
Concentrator capacity, swing bucket rotor	Do not use	3 mL	6 mL	20 mL
Concentrator capacity, fixed angle rotor	500 µL	2 mL	6 mL	14 mL
Length	50 mm	126 mm	122 mm	116 mm
Width	11 mm	17 mm	17 mm	30 mm
Active membrane area	0.5 cm ²	1.2 cm ²	2.5 cm ²	6.0 cm ²
Hold up volume of membrane	< 5 µL	< 10 µL	< 10 µL	< 20 µL
Dead stop volume	5 µL	8 µL	30 µL	50 µL

9 Ordering information

Product	Pack size	Product code
Vivaspin 500, 3000 MWCO	25 concentrators	28932218
Vivaspin 500, 5000 MWCO	25 concentrators	28932223

Vivaspin 500, 10 000 MWCO	25 concentrators	28932225
Vivaspin 500, 30 000 MWCO	25 concentrators	28932235
Vivaspin 500, 50 000 MWCO	25 concentrators	28932236
Vivaspin 500, 100 000 MWCO	25 concentrators	28932237
Vivaspin 2, 3 000 MWCO	25 concentrators	28932240
Vivaspin 2, 5 000 MWCO	25 concentrators	28932245
Vivaspin 2, 10 000 MWCO	25 concentrators	28932247
Vivaspin 2, 30 000 MWCO	25 concentrators	28932248
Vivaspin 2, 50 000 MWCO	25 concentrators	28932257
Vivaspin 2, 100 000 MWCO	25 concentrators	28932258
Vivaspin 6, 3 000 MWCO	25 concentrators	28932293
Vivaspin 6, 5 000 MWCO	25 concentrators	28932294
Vivaspin 6, 10 000 MWCO	25 concentrators	28932296
Vivaspin 6, 30 000 MWCO	25 concentrators	28932317
Vivaspin 6, 50 000 MWCO	25 concentrators	28932318
Vivaspin 6, 100 000 MWCO	25 concentrators	28932319
Vivaspin 20, 3 000 MWCO	12 concentrators	28932358
Vivaspin 20, 5 000 MWCO	12 concentrators	28932359
Vivaspin 20, 10 000 MWCO	12 concentrators	28932360
Vivaspin 20, 30 000 MWCO	12 concentrators	28932361
Vivaspin 20, 50 000 MWCO	12 concentrators	28932362
Vivaspin 20, 100 000 MWCO	12 concentrators	28932363

Related product	Pack size	Product code
PD-10 Desalting Columns	30	17085101
PD SpinTrap™ G-25	50	28918004
PD MultiTrap™ G-25	4 x 96-well filter plates	28918006
PD MiniTrap™ G-25	50	28918007
PD MidiTrap™ G-25	50	28918008
PD MiniTrap G-10	50	28918010
PD MidiTrap G-10	50	28918011

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