

# Vivaspin

Vivaspin™ (Fig 1) sample concentrators are designed for fast, nondenaturing concentration of biological samples by membrane ultrafiltration. Up to 30-fold concentration of the sample can be achieved with recovery of the target molecule typically exceeding 95%. The entire process is performed in a single tube with an upper compartment containing sample and a lower compartment separated by a semipermeable membrane with a molecular weight cutoff (MWCO) selected by the user. Centrifugation is applied to force solvent through the membrane, leaving a more concentrated sample in the upper chamber.

Vivaspin sample concentrators cater for sample volumes from 100  $\mu$ l to 20 ml, with a range of molecular weight cutoff values from M, 3 000 to 100 000.

Vivaspin sample concentrators offer:

- One-step sample concentration in a single tube for minimal sample handling and reduced sample loss
- Patented dead-stop technology, which ensures that samples cannot be concentrated to dryness and enables direct concentrate recovery
- Vertical polyethersulfone membrane, which minimizes membrane blockage and tolerates high flow rates
- Easy, contact-free storage by reverse spinning the concentrate into the recovery cap (Vivaspin 2)
- Compatible pH range from pH 1 to 9

Vivaspin sample concentrators are a member of the Trap platform, which addresses the need for flexible, small-scale preparation of biological samples before downstream analyses such as gel electrophoresis, liquid chromatography (LC), mass spectrometry (MS), and LC-MS.



Fig 1. From left to right: Vivaspin 500, Vivaspin 2, Vivaspin 6, and Vivaspin 20.



## Choice of membranes with MWCOs from 3 000 to 100 000

Vivaspin offers a choice of membranes to cover different ultrafiltration requirements (Table 1). Concentration up to 30-fold can be achieved and typical recovery yields of concentrated samples are over 95%. For maximum recovery, select a MWCO value at least 50% smaller than the molecular size of the species of interest.

**Table 1.** Select the appropriate Vivaspin product from the intersection of the molecular weight cutoff value (MWCO value) and the volume range for your sample

Volume range	Product	MWCO value					
		3 000	5 000	10 000	30 000	50 000	100 000
100–500 µl	Vivaspin 500	28-9322-18	28-9322-23	28-9322-25	28-9322-35	28-9322-36	28-9322-37
400 µl to 2 ml	Vivaspin 2	28-9322-40	28-9322-45	28-9322-47	28-9322-48	28-9322-57	28-9322-58
2–6 ml	Vivaspin 6	28-9322-93	28-9322-94	28-9322-96	28-9323-17	28-9323-18	28-9323-19
5–20 ml	Vivaspin 20	28-9323-58	28-9323-59	28-9323-60	28-9323-61	28-9323-62	28-9323-63

## Features

### Vivaspin 500

Vivaspin 500 can be used in a benchtop fixed angle rotor that accepts 2.2 ml centrifuge tubes.

### Vivaspin 2

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

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

Vivaspin 2 offers the choice of either 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 of the sample.

### Vivaspin 6

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

Vivaspin 6 features twin vertical membranes for higher processing speed.

### Vivaspin 20

Vivaspin 20 features twin vertical membranes for higher processing speed.

## Characteristics

**Table 2.** Characteristics of Vivaspin sample concentrators

Membrane	Polyethersulfone (PES)			
Body	Polycarbonate			
Filtrate vessel	Polycarbonate			

Vivaspin	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 <sup>2</sup>	1.2 cm <sup>2</sup>	2.5 cm <sup>2</sup>	6.0 cm <sup>2</sup>
Hold-up volume of membrane	< 5 µl	< 10 µl	< 10 µl	< 20 µl
Dead-stop volume	5 µl	8 µl	30 µl	50 µl

## Performance characteristics

### Vivaspin 500

**Table 3.** Performance characteristics of Vivaspin 500

Protein Filter		Up to 30-fold sample concentration <sup>1</sup>	Recovery
<b>Aprotinin 0.25 mg/ml</b> (M <sub>r</sub> = 6 500)			
MWCO	3 000	30 min	96%
<b>BSA 1.0 mg/ml</b> (M <sub>r</sub> = 66 000)			
MWCO	5 000	15 min	96%
MWCO	10 000	5 min	96%
MWCO	30 000	5 min	95%
<b>IgG 0.25 mg/ml</b> (M <sub>r</sub> = 160 000)			
MWCO	30 000	10 min	96%
MWCO	50 000	10 min	96%
MWCO	100 000	10 min	96%

<sup>1</sup> Centrifugation time to achieve an up to 30-fold sample concentration with a start volume of 500 µl at 20°C (fixed angle 25° rotor)

### Vivaspin 6

**Table 5.** Performance characteristics of Vivaspin 6

Protein Filter	Up to 30-fold sample concentration <sup>1</sup>			
	Swing bucket rotor	Recovery	25° Fixed angle rotor	Recovery
<b>Cytochrome C 0.25 mg/ml</b> (M <sub>r</sub> = 12 400)				
MWCO	3 000	-	90 min	97%
<b>BSA 1.0 mg/ml</b> (M <sub>r</sub> = 66 000)				
MWCO	5 000	20 min	12 min	98%
MWCO	10 000	13 min	10 min	98%
MWCO	30 000	12 min	9 min	97%
<b>IgG 0.25 mg/ml</b> (M <sub>r</sub> = 160 000)				
MWCO	30 000	18 min	15 min	95%
MWCO	50 000	17 min	14 min	95%
MWCO	100 000	15 min	12 min	91%

<sup>1</sup> Centrifugation time to achieve an up to 30-fold sample concentration with a start volume of 6 ml at 20°C.

### Vivaspin 2

**Table 4.** Performance characteristics of Vivaspin 2

Protein Filter		Up to 30-fold sample concentration <sup>1</sup>	Recovery
<b>Aprotinin 0.25 mg/ml</b> (M <sub>r</sub> = 6 500)			
MWCO	3 000	50 min	96%
<b>BSA 1.0 mg/ml</b> (M <sub>r</sub> = 66 000)			
MWCO	5 000	12 min	98%
MWCO	10 000	8 min	98%
MWCO	30 000	8 min	97%
<b>IgG 0.25 mg/ml</b> (M <sub>r</sub> = 160 000)			
MWCO	30 000	10 min	96%
MWCO	50 000	10 min	96%
MWCO	100 000	8 min	95%

<sup>1</sup> Centrifugation time to achieve an up to 30-fold sample concentration with a start volume of 2 ml at 20°C (fixed angle 25° rotor)

### Vivaspin 20

**Table 6.** Performance characteristics of Vivaspin 20

Protein Filter	Up to 30-fold sample concentration <sup>1</sup>			
	Swing bucket rotor	Recovery	25° Fixed angle rotor	Recovery
<b>Cytochrome C 0.25 mg/ml</b> (M <sub>r</sub> = 12 400)				
MWCO	3 000	110 min	180 min	96%
<b>BSA 1.0 mg/ml</b> (M <sub>r</sub> = 66 000)				
MWCO	5 000	23 min	29 min	99%
MWCO	10 000	16 min	17 min	98%
MWCO	30 000	13 min	15 min	98%
<b>IgG 0.25 mg/ml</b> (M <sub>r</sub> = 160 000)				
MWCO	30 000	27 min	20 min	95%
MWCO	50 000	27 min	22 min	95%
MWCO	100 000	25 min	20 min	90%

<sup>1</sup> Centrifugation time to achieve an up to 30-fold sample concentration with a start volume of 20 ml (swing bucket rotor) or 14 ml (fixed angle 25° rotor) at 20°C.

## Chemical compatibility

Vivaspin concentrators are designed for use with biological fluids and aqueous solutions. Compatible pH range is from pH 1 to 9. For chemical compatibility, see Table 7.

**Table 7.** Vivaspin chemical compatibility (2 h contact time)

Solution	Compatibility <sup>1</sup>	Solution	Compatibility <sup>1</sup>
Acetic acid (25%)	Yes	Lactic acid (5%)	Yes
Acetone (10%)	No	Mercaptoethanol (1 M)	No
Acetonitrile (10%)	No	Nitric acid (10%)	Yes
Ammonium sulfate (saturated)	Yes	Phosphate buffer (1 M)	Yes
Benzene (100%)	No	Polyethylene glycol (10%)	Yes
Chloroform (1%)	No	Pyridine (100%)	No
Dimethyl sulfoxide (5%)	Yes	Sodium carbonate (20%)	Yes
Ethanol (70%)	Yes	Sodium deoxycholate (5%)	Yes
Ethyl acetate (100%)	No	Sodium dodecylsulfate (0.1 M)	Yes
Formaldehyde (30%)	Yes	Sodium hydroxide (2.5 M)	No
Formic acid (5%)	Yes	Sodium hypochlorite (200 ppm)	Yes
Glycerine (70%)	Yes	Sodium nitrate (1%)	Yes
Guanidine HCl (6 M)	Yes	Sulfamic acid (5%)	Yes
Hydrocarbons, aromatic	No	Tetrahydrofuran (5%)	No
Hydrocarbons, chlorinated	No	Toluene (1%)	No
Hydrochloric acid (1 M)	Yes	Trifluoroacetic acid (10%)	Yes
Imidazole (300 mM)	Yes	Tween™ 20 (0.1%)	Yes
Isopropanol (70%)	Yes	Triton™ X-100 (0.1%)	Yes
		Urea (8 M)	Yes

<sup>1</sup> Yes indicates chemical compatibility and No indicates chemical incompatibility and that the solution is not recommended

## Ordering information

Product	Pack size	Code No.
Vivaspin 500 MWCO 3 000	25	28-9322-18
Vivaspin 500 MWCO 5 000	25	28-9322-23
Vivaspin 500 MWCO 10 000	25	28-9322-25
Vivaspin 500 MWCO 30 000	25	28-9322-35
Vivaspin 500 MWCO 50 000	25	28-9322-36
Vivaspin 500 MWCO 100 000	25	28-9322-37
Vivaspin 2 MWCO 3 000	25	28-9322-40
Vivaspin 2 MWCO 5 000	25	28-9322-45
Vivaspin 2 MWCO 10 000	25	28-9322-47
Vivaspin 2 MWCO 30 000	25	28-9322-48
Vivaspin 2 MWCO 50 000	25	28-9322-57
Vivaspin 2 MWCO 100 000	25	28-9322-58
Vivaspin 6 MWCO 3 000	25	28-9322-93
Vivaspin 6 MWCO 5 000	25	28-9322-94
Vivaspin 6 MWCO 10 000	25	28-9322-96
Vivaspin 6 MWCO 30 000	25	28-9323-17
Vivaspin 6 MWCO 50 000	25	28-9323-18
Vivaspin 6 MWCO 100 000	25	28-9323-19
Vivaspin 20 MWCO 3 000	12	28-9323-58
Vivaspin 20 MWCO 5 000	12	28-9323-59
Vivaspin 20 MWCO 10 000	12	28-9323-60
Vivaspin 20 MWCO 30 000	12	28-9323-61
Vivaspin 20 MWCO 50 000	12	28-9323-62
Vivaspin 20 MWCO 100 000	12	28-9323-63

Related product	Pack size	Code No.
PD-10 Desalting Columns	30	17-0851-01
PD SpinTrap™ G-25	50	28-9180-04
PD MultiTrap™ G-25	4 × 96-well filter plates	28-9180-06
PD MiniTrap™ G-25	50	28-9180-07
PD MidiTrap™ G-25	50	28-9180-08
PD MiniTrap G-10	50	28-9180-10
PD MidiTrap G-10	50	28-9180-11

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GE Healthcare Bio-Sciences AB  
Björkgatan 30  
751 84 Uppsala  
Sweden



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This product is covered by US patent No. 5,647,990, second patent pending, and their equivalents in other countries.

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GE Healthcare Limited, Amersham Place, Little Chalfont, Buckinghamshire, HP7 9NA, UK

GE Healthcare Bio-Sciences Corp., 800 Centennial Avenue, P.O. Box 1327, Piscataway, NJ 08855-1327, USA

GE Healthcare Europe GmbH, Munzinger Strasse 5, D-79111 Freiburg, Germany

GE Healthcare Bio-Sciences KK, Sanken Bldg., 3-25-1, Hyakunincho, Shinjuku-ku, Tokyo, 169-0073 Japan