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Technical data and operating instructions

## Vivaspin<sup>®</sup> 500 $\mu$ l and 2 ml

Vivaspin<sup>®</sup> 500 and 2 10K devices for in vitro diagnostic use

Vivaspin<sup>®</sup> 500 and 2 3K, 5K, 30K, 50K, 100K, 300K, 1000K and 0.2  $\mu$ m devices for research use only; not for use in diagnostic procedures

For French, Italian, and Spanish manuals, please go to [www.sartorius.com/en/product-family/product-family-detail/m-centrisart-i/](http://www.sartorius.com/en/product-family/product-family-detail/m-centrisart-i/)



85030-511-58

# Vivaspin® 500 µl and 2 ml – Introduction

## Storage conditions | shelf life

Vivaspin® ultrafiltration spin columns should be stored at 15–30°C. The devices should be used before the expiry date printed on the box.

## Introduction

Vivaspin® Concentrators are disposable ultrafiltration devices for the concentration of biological samples. Vivaspin® 500 is suitable for sample volumes of 100–500 µl and the Vivaspin® 2 can handle samples up to 2 ml. Vivaspin® 2 can effectively be used in either swing bucket or fixed angle rotor accepting 15 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.

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

## CE

The Vivaspin® 500 & 2 product line includes 9 different cutoffs (Molecular Weight Cutoff, MWCO):

- Vivaspin® 500 & 2 3K device: 3,000 MWCO
- Vivaspin® 500 & 2 5K device: 5,000 MWCO
- Vivaspin® 500 & 2 10K device: 10,000 MWCO
- Vivaspin® 500 & 2 30K device: 30,000 MWCO
- Vivaspin® 500 & 2 50K device: 50,000 MWCO
- Vivaspin® 500 & 2 100K device: 100,000 MWCO
- Vivaspin® 500 & 2 100K device: 300,000 MWCO
- Vivaspin® 500 & 2 100K device: 1000,000 MWCO
- Vivaspin® 500 & 2 100K device: 0.2 µm

Vivaspin® 500 & 2 10K filter devices are for in vitro diagnostic use and can be used to concentrate serum, urine, cerebrospinal fluid, and other body fluids prior to analysis. Vivaspin® 500 & 2 3K, 5K, 30K, 50K, 100K, 300K, 1.000K and 0.2 µm filter devices are for research use only and not for use in diagnostic procedures. The Vivaspin® 500 & 2 devices are supplied non-sterile and are for single use only.

### Vivaspin® 2

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.

### Membrane Alternatives

In addition to the proven high flux polyethersulfone (PES) membrane range which is recommended with most solutions, Vivaspin® 2 is additionally offered with cellulose triacetate (CTA) and Hydrosart®.

CTA is particularly recommended when high recovery of the filtrate solution is of primary importance. Hydrosart® is a stabilised cellulose based membrane that has been optimised for the biotechnological industry. The Hydrosart® membrane is a stable polymer that features a broad pH range. Hydrosart® is also extremely hydrophilic, making it non-protein binding, virtually non-foul, and has extremely high flux. Hydrosart® is available in 5k, 10k, and 30k molecular weight cutoffs.

Please note that membrane behaviour largely depends on the specific characteristics of the solution being processed. Sartorius Stedim Biotech recommends that users experiment with alternative membranes in seeking to optimise their process performance.

### Equipment Required

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

| Device        | Carrier Required |
|---------------|------------------|
| Vivaspin® 500 | 2.2 ml/11 mm Ø   |
| Vivaspin® 2   | 15 ml/17 mm Ø    |

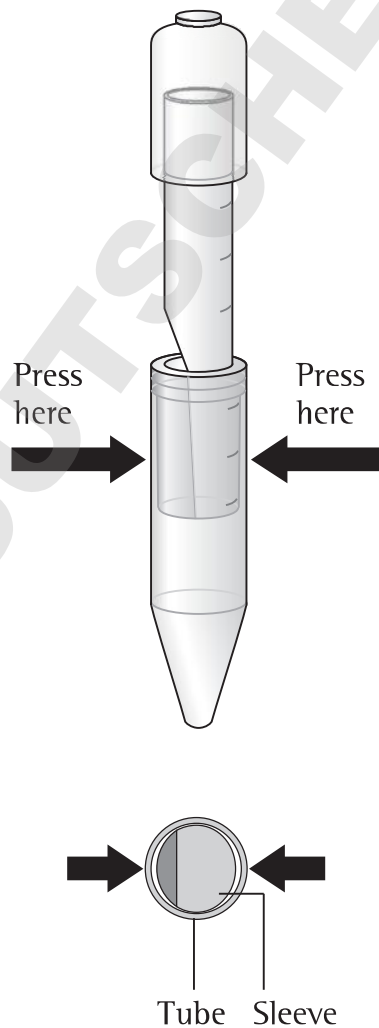
2. Pipettes for sample delivery and removal. For maximum recovery a thin gel loader type is recommended.

## Operation

1. Select the most appropriate membrane 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 1. (Ensure lid is fully seated).
3. Insert assembled concentrator into centrifuge (when fixed angle rotors are used, angle concentrator so that the printed window faces upwards | outwards).
4. Centrifuge at speeds recommended in table 2, taking care not to exceed the maximum g force indicated by membrane type and MWCO.
5. Once the desired concentration is achieved, (see tables 3a & 3b for guide to concentration times), remove assembly and recover sample from the bottom of the concentrate pocket with a pipette.

### Removing the Vivaspin® 2 body from the filtrate tube

The sleeve (seen from the end) is oval in cross section. The tube is round in cross section to give a tight fit to the sleeve. To release the tube from the sleeve, you must pinch the tube – to press it into an oval shape – before removing it with a twisting action.

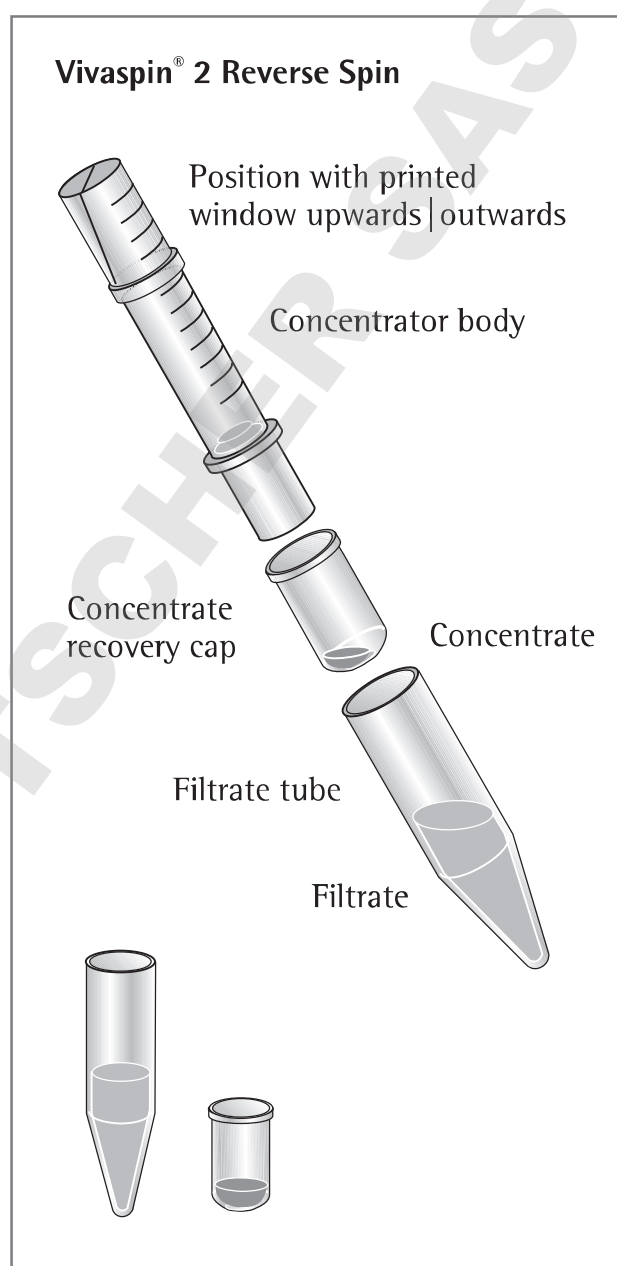


### Reverse spin with Vivaspin® 2

Depending on user preference and need for sample storage, the concentrate can be reverse spun into the concentrate recovery cap (when fixed angle rotors are used, angle concentrator so that the printed window faces upwards|outwards). In this procedure remove filtrate tube, invert the concentrator body, insert concentrate recovery cap into filtrate tube and then spin at up to 3,000 g for 2 minutes.

### Desalting | Buffer Exchange

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



### Equipment required

### Vivaspin® 500

### Vivaspin® 2

### Centrifuge

Rotor type

Fixed angle

Swing bucket or Fixed angle

Minimum rotor angle

40°

25°

Rotor cavity

To fit 2.2 ml (11 mm) conical bottom tubes

To fit 15 ml (17 mm) conical bottom tubes

### Concentrate recovery

Pipette type

Fixed or variable volume

Fixed or variable volume

Recommended tip

Thin gel loader type

Thin gel loader type

## Technical Specifications

**Table 1: Technical specifications**

|                                      | Vivaspin® 500       | Vivaspin® 2         |
|--------------------------------------|---------------------|---------------------|
| <b>Concentrator capacity</b>         |                     |                     |
| Swing bucket rotor                   | do not use          | 3 ml                |
| Fixed angle rotor                    | 500 µl              | 2 ml                |
| <b>Dimensions</b>                    |                     |                     |
| Total length                         | 50 mm               | 126 mm              |
| Width                                | 11 mm               | 17 mm               |
| Active membrane area                 | 0.5 cm <sup>2</sup> | 1.2 cm <sup>2</sup> |
| Hold-up volume, membrane and support | < 5 µl              | < 10 µl             |
| Dead stop volume*                    | 5 µl                | 8 µl                |
| <b>Materials of construction</b>     |                     |                     |
| Body                                 | Polycarbonate       | Polycarbonate       |
| Filtrate vessel                      | Polypropylene       | Polycarbonate       |
| Membrane                             | Polyethersulfone    | PES, CTA, HY        |

**Table 2: Recommended Spin Speed (x g)**

| Device        | Vivaspin® 500 | Vivaspin® 2 |              |
|---------------|---------------|-------------|--------------|
|               | Fixed angle   | Fixed angle | Swing bucket |
| 3–50,000 PES  | 15,000        | 12,000      | 4,000        |
| > 100,000 PES | 15,000        | 9,000       | 4,000        |
| 5–20,000 CTA  | –             | 8,000       | 4,000        |
| Hydrosart®    | –             | 8,000       | 4,000        |

\* Dead stop volume as designed in moulding tool. This volume may vary depending on sample, sample concentration, operation temperature and centrifuge rotor.

## Usage Tips

### 1. 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.

### 2. Pre-rinsing

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 deionised water through the concentrator. Decant filtrate and concentrate before processing sample solution. If you do not want to use the pre-rinsed device immediately, store it in the refrigerator with buffer or water covering the membrane surface. Please do not allow the membrane to dry out.

### 3. Sterilisation of Polyethersulfone Membranes

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

### 4. Chemical Compatibility

Vivaspin® concentrators are designed for use with biological fluids and aqueous solutions. For chemical compatibility details, refer to table 4.

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## Performance Characteristics

Table 3a: Performance Characteristics Vivaspin® 500

|                                 | Time to concentrate up to 30x [min.] at 20°C | Concentrate recovery % |
|---------------------------------|--|------------------------|
| <b>Start volume</b>             | 500 µl                                       | 500 µl                 |
| Aprotinin 0.25 mg/ml (6,500 MW) |  |                        |
| 3,000 MWCO PES                  | 30   | 96%                    |
| BSA 1.0 mg/ml (66,000 MW)       |  |                        |
| 5,000 MWCO PES                  | 15   | 96%                    |
| 10,000 MWCO PES                 | 5  | 96%                    |
| 30,000 MWCO PES                 | 5  | 95%                    |
| IgG 0.25 mg/ml (160,000 MW)     |  |                        |
| 30,000 MWCO PES                 | 10   | 96%                    |
| 50,000 MWCO PES                 | 10   | 96%                    |
| 100,000 MWCO PES                | 10   | 96%                    |



**Table 3b: Performance Characteristics Vivaspin® 2**

|   | Time to concentrate up to 30x [min.] at 20°C | Concentrate recovery % |
|---|--|------------------------|
| <b>Start volume</b>                         | 2 ml   | 2 ml                   |
| <b>Insulin chain A 0.1 mg/ml (2,535 MW)</b> |  |                        |
| 2,000 MWCO Hydrosart®                       | 35   | 95%                    |
| <b>Aprotinin 0.25 mg/ml (6,500 MW)</b>      |  |                        |
| 3,000 MWCO PES                              | 50   | 96%                    |
| <b>BSA 1.0 mg/ml (66,000 MW)</b>            |  |                        |
| 5,000 MWCO PES                              | 12   | 98%                    |
| 5,000 MWCO CTA                              | 50   | 96%                    |
| 5,000 MWCO Hydrosart®                       | 22   | 98%                    |
| 10,000 MWCO PES                             | 8  | 98%                    |
| 10,000 MWCO CTA                             | 10   | 96%                    |
| 10,000 MWCO Hydrosart®                      | 12   | 98%                    |
| 20,000 MWCO CTA                             | 5  | 96%                    |
| 30,000 MWCO PES                             | 8  | 97%                    |
| 30,000 MWCO Hydrosart®                      | 5  | 97%                    |
| <b>IgG 0.25 mg/ml (160,000 MW)</b>          |  |                        |
| 20,000 MWCO CTA                             | 6  | 97%                    |
| 30,000 MWCO PES                             | 10   | 96%                    |
| 50,000 MWCO PES                             | 10   | 96%                    |
| 100,000 MWCO PES                            | 8  | 95%                    |

## Chemical Compatibility

**Table 4: Chemical Compatibility (2hr contact time)**

| <b>Solutions</b>              | <b>PES</b>    | <b>CTA</b>    | <b>HY</b>     |
|-------------------------------|---------------|---------------|---------------|
| <b>Compatible pH range</b>    | <b>pH 1–9</b> | <b>pH 4–8</b> | <b>pH 1–9</b> |
| Acetic Acid (25.0%)           | OK            | NO            | OK            |
| Acetone (10.0%)               | NO            | NO            | NO            |
| Acetonitrile (10.0%)          | NO            | NO            | NO            |
| Ammonium Hydroxide (5.0%)     | ?             | OK            | OK            |
| Ammonium Sulphate (saturated) | OK            | ?             | ?             |
| Benzene (100%)                | NO            | NO            | NO            |
| n-Butanol (70%)               | ?             | NO            | ?             |
| Chloroform (1.0%)             | NO            | NO            | NO            |
| Dimethyl Formamide (10.0%)    | ?             | NO            | NO            |
| Dimethyl Sulfoxide (5.0%)     | OK            | NO            | NO            |
| Ethanol (70.0%)               | OK            | OK            | OK            |
| Ethyl Acetate (100%)          | NO            | NO            | NO            |
| Formaldehyde (30%)            | OK            | OK            | OK            |
| Formic Acid (5.0%)            | OK            | ?             | OK            |
| Glycerine (70%)               | OK            | OK            | OK            |
| Guanidine HCl (6 M)           | OK            | ?             | OK            |
| Hydrocarbons, aromatic        | NO            | NO            | NO            |
| Hydrocarbons, chlorinated     | NO            | NO            | NO            |
| Hydrochloric Acid (1 M)       | OK            | NO            | OK            |
| Imidazole (300 mM)            | OK            | NO            | ?             |
| Isopropanol (70%)             | OK            | OK            | OK            |
| Lactic Acid (5.0%)            | OK            | NO            | OK            |
| Mercaptoethanol (1.0 M)       | NO            | NO            | OK            |
| Methanol (60%)                | ?             | ?             | OK            |
| Nitric Acid (10.0%)           | OK            | NO            | NO            |

| <b>Solutions</b>                   | <b>PES</b>    | <b>CTA</b>    | <b>HY</b>     |
|------------------------------------|---------------|---------------|---------------|
| <b>Compatible pH range</b>         | <b>pH 1–9</b> | <b>pH 4–8</b> | <b>pH 1–9</b> |
| Phenol (1.0%)                      | ?             | ?             | NO            |
| Phosphate Buffer (1.0 M)           | OK            | OK            | OK            |
| Polyethylene Glycol (10%)          | OK            | ?             | ?             |
| Pyridine (100%)                    | NO            | NO            | NO            |
| Sodium Carbonate (20%)             | OK            | NO            | ?             |
| Sodium Deoxycholate (5.0%)         | OK            | ?             | ?             |
| Sodium Dodecylsulfate (0.1 M)      | OK            | OK            | OK            |
| Sodium Hydroxide (2.5 M)           | NO            | NO            | NO            |
| Sodium Hypochlorite (200 ppm)      | OK            | NO            | NO            |
| Sodium Nitrate (1.0%)              | OK            | ?             | OK            |
| Sulfamic Acid (5.0%)               | OK            | NO            | ?             |
| Tetrahydrofuran (5.0%)             | NO            | NO            | NO            |
| Toluene (1.0%)                     | NO            | NO            | NO            |
| Trifluoroacetic Acid (10%)         | OK            | NO            | OK            |
| Tween <sup>®*</sup> 20 (0.1%)      | OK            | OK            | OK            |
| Triton <sup>®**</sup> X-100 (0.1%) | OK            | OK            | OK            |
| Urea (8 M)                         | OK            | ?             | OK            |

OK = Acceptable ? = Questionable NO = Not recommended

\* Triton<sup>®</sup> is a registered trademark of Union Carbide Corp.

\*\* Tween<sup>®</sup> is a registered trademark of ICI Americas Inc.

## Ordering Information

### Ordering Tips

- 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 Hydrosart® membranes for highest recovery with Ig fractions.

| Vivaspin® 500 Polyethersulfone                        | Qty per box | Prod. no. |
|---|-------------|-----------|
| 3,000 MWCO  | 25          | VS0191    |
| 3,000 MWCO  | 100         | VS0192    |
| 5,000 MWCO  | 25          | VS0111    |
| 5,000 MWCO  | 100         | VS0112    |
| 10,000 MWCO   | 25          | VS0101    |
| 10,000 MWCO   | 100         | VS0102    |
| 30,000 MWCO   | 25          | VS0121    |
| 30,000 MWCO   | 100         | VS0122    |
| 50,000 MWCO   | 25          | VS0131    |
| 50,000 MWCO   | 100         | VS0132    |
| 100,000 MWCO  | 25          | VS0141    |
| 100,000 MWCO  | 100         | VS0142    |
| 300,000 MWCO  | 25          | VS0151    |
| 300,000 MWCO  | 100         | VS0152    |
| 1,000,000 MWCO  | 25          | VS0161    |
| 1,000,000 MWCO  | 100         | VS0162    |
| 0.2 µm  | 25          | VS0171    |
| 0.2 µm  | 100         | VS0172    |
| Starter pack (5 of each 5 k, 10 k, 30 k, 50 k, 100 k) | 25          | VS01S1    |











| <b>Vivaspin® 2 Polyethersulfone</b>                   | <b>Qty per box</b> | <b>Prod. no.</b> |
|---|--------------------|------------------|
| 3,000 MWCO  | 25                 | VS0291           |
| 3,000 MWCO  | 100                | VS0292           |
| 5,000 MWCO  | 25                 | VS0211           |
| 5,000 MWCO  | 100                | VS0212           |
| 10,000 MWCO   | 25                 | VS0201           |
| 10,000 MWCO   | 100                | VS0202           |
| 30,000 MWCO   | 25                 | VS0221           |
| 30,000 MWCO   | 100                | VS0222           |
| 50,000 MWCO   | 25                 | VS0231           |
| 50,000 MWCO   | 100                | VS0232           |
| 100,000 MWCO  | 25                 | VS0241           |
| 100,000 MWCO  | 100                | VS0242           |
| 300,000 MWCO  | 25                 | VS0251           |
| 300,000 MWCO  | 100                | VS0252           |
| 1,000,000 MWCO  | 25                 | VS0261           |
| 1,000,000 MWCO  | 100                | VS0262           |
| 0.2 µm  | 25                 | VS0271           |
| 0.2 µm  | 100                | VS0272           |
| Starter pack (5 of each 5 k, 10 k, 30 k, 50 k, 100 k) | 25                 | VS02S1           |

| <b>Vivaspin® 2 Cellulose triacetate</b> | <b>Qty per box</b> | <b>Prod. no.</b> |
|---|--------------------|------------------|
| 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           |

| <b>Vivaspin® 2 Hydrosart®</b> | <b>Qty per box</b> | <b>Prod. no.</b> |
|-------------------------------|--------------------|------------------|
| 2,000 MWCO                    | 25                 | VS02H91          |
| 2,000 MWCO                    | 100                | VS02H92          |
| 5,000 MWCO                    | 25                 | VS02H11          |
| 5,000 MWCO                    | 100                | VS02H12          |
| 10,000 MWCO                   | 25                 | VS02H01          |
| 10,000 MWCO                   | 100                | VS02H02          |
| 30,000 MWCO                   | 25                 | VS02H21          |
| 30,000 MWCO                   | 100                | VS02H22          |

### In Vitro Diagnostic Product Labeling

The following table defines the symbols found on Vivaspin® 500 & 2 10K device labels.

| <b>Symbol</b>   | <b>Definition</b>                  | <b>Symbol</b>   | <b>Definition</b>      |
|---|------------------------------------|---|------------------------|
|  | In vitro diagnostic medical device |  | Date of manufacture    |
|  | Catalogue number                   |  | Manufacturer           |
|  | Do not reuse                       |  | Temperature limitation |
|  | Use by                             |  | Non-sterile product    |
|  | Batch code                         |  | CE conformity marking  |

Made in UK  
Sartorius Stedim Lab Ltd  
Sperry Way  
Stonehouse Park  
Gloucestershire  
GL10 3UT, UK

[www.sartorius-stedim.com](http://www.sartorius-stedim.com)

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