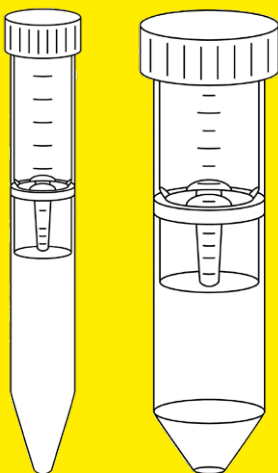


## Instructions for Use

# Vivaspin<sup>®</sup> 6 | 20

Centrifugal Ultrafiltration Units for General Laboratory Use



3104655-001-05



# SARTORIUS



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# 1 About these Instructions

## 1.1 Scope

These instructions are part of the product. These instructions apply to the following versions of the product:

<b>Vivaspin® 6</b>	<b>Quantity</b>	<b>Prod. no.</b>
3 kDa	25   100	VS0691   VS0692
5 kDa	25   100	VS0611   VS0612
10 kDa	25   100	VS0601   VS0602
30 kDa	25   100	VS0621   VS0622
50 kDa	25   100	VS0631   VS0632
100 kDa	25   100	VS0641   VS0642
300 kDa	25   100	VS0651   VS0652
1,000 kDa	25   100	VS0661   VS0662
0.2 µm	100	VS0672

<b>Vivaspin® 20</b>	<b>Quantity</b>	<b>Prod. no.</b>
3 kDa	12   48	VS2091   VS2092
5 kDa	12   48	VS2011   VS2012
10 kDa	12   48	VS2001   VS2002
30 kDa	12   48	VS2021   VS2022
50 kDa	12   48	VS2031   VS2032
100 kDa	12   48	VS2041   VS2042
300 kDa	12   48	VS2051   VS2052
1,000 kDa	12   48	VS2061   VS2062
0.2 µm	48	VS2072

## 1.2 Target Groups

The instructions are designed for the following target groups. The target groups must possess the knowledge listed below.

<b>Target Group</b>	<b>Knowledge and Qualifications</b>
Operator	The operator of the product is responsible for compliance with safety requirements and workplace safety regulations. The operator must ensure that anyone working with the product has access to the relevant information and is trained to work with the product.

## 1.3 Symbols Used

### 1.3.1 Warnings in Operation Descriptions

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#### **NOTICE**

Denotes a hazard that may result in property damage if it is not avoided.

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### 1.3.2 Other Symbols

- ▶ Required action: Describes actions that must be carried out. The actions in the sequence must be carried out in succession.
- ▷ Result: Describes the result of the actions carried out.

## 2 Safety Instructions

### 2.1 General functions

The product is intended for the ultrafiltration and | or diafiltration of biological and aqueous solutions. The sample solutions and volumes used must be suitable for the product.

The filtration process must be carried out in a centrifuge. Macromolecules that are sufficiently larger than the nominal pore size of the membrane are retained above the membrane and progressively concentrated. The vertical membrane inhibits membrane fouling while the built-in dead stop impedes concentration to dryness and loss of sample.

For Vivaspin® 20, the filtration process may alternatively be carried out by using gas pressure as well as by using a diafiltration cup. It is also possible to combine gas pressure with centrifugation (pressure-fugation).

If Vivaspin® 20 is used with a diafiltration cup: During filtration salts and other contaminating micromolecules can be removed from the sample by continuous diafiltration.

The product is supplied non-sterile. It is intended for single use and must be disposed of after one use.

The product is intended exclusively for use in accordance with these instructions. Any further use beyond this is considered improper.

### Operating Conditions for the Product

The product is intended for general laboratory use.

The product may only be used with the equipment and under the operating conditions described in the Technical Data section of these instructions.



## 2.2 Personnel Qualification

Persons without sufficient knowledge in the safe use of the device can injure themselves and others.

If a specific qualification is required for an activity: The target group is indicated. If no qualification is specified: The activity can be carried out by the target group "Operator".

## 2.3 Significance of these Instructions

Failure to follow the instructions might have serious consequences, e.g. danger to individuals.

- ▶ Read the instructions carefully and completely. The instructions for action build on each other.
- ▶ Ensure that the information contained in these instructions is available to all individuals working with the product.

## 2.4 Functionality of the Product

A damaged product or worn parts can lead to malfunctions or cause hazards which are difficult to identify.

- ▶ Only operate the product when it is safe and in perfect working order.

# 3 Product Description

## 3.1 Vivaspin® 6

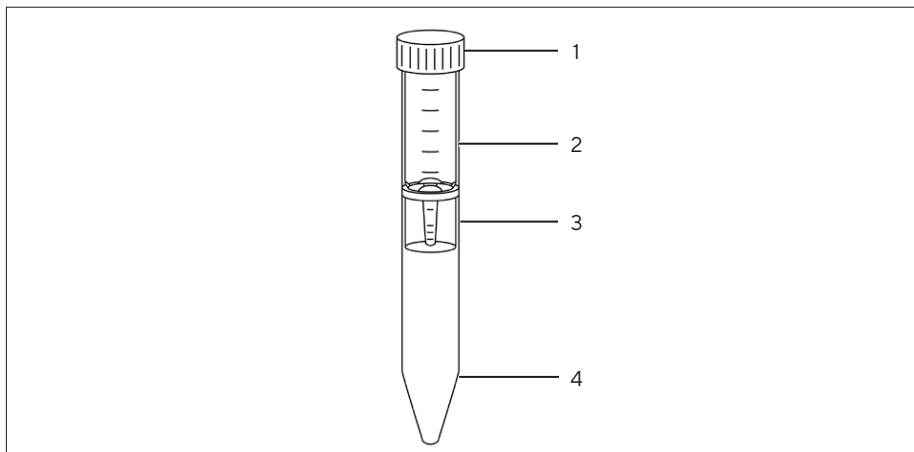


Fig. 1: Product overview (example)

Pos.	Description
1	Concentrator cap
2	Concentrator
3	Twin vertical membranes
4	Filtrate container

## 3.2 Vivaspin® 20

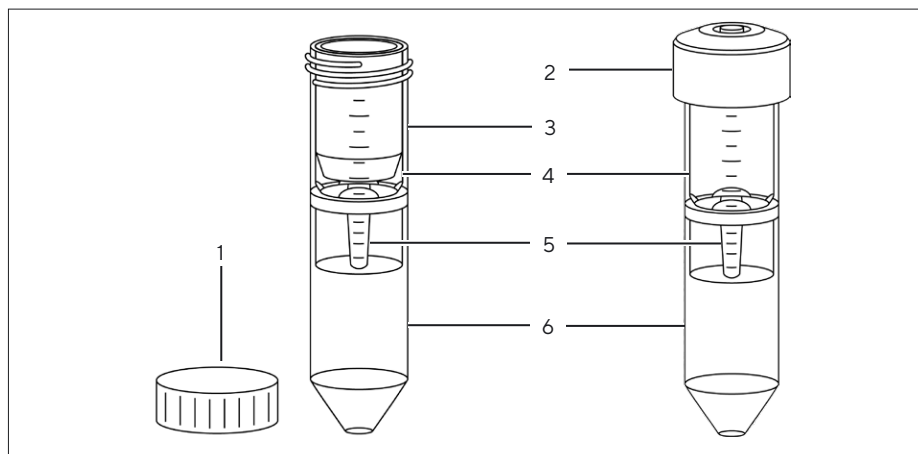









Fig.2: Product overview (example)

Pos.	Description
1	Concentrator cap
2	Pressure cap (optional accessory, VCA200)
3	Diafiltration cup (optional accessory, VSA005)
4	Concentrator
5	Twin vertical membranes
6	Filtrate container

### 3.3 Product Symbols

Symbol	Definition
	Catalogue number
	Do not reuse
	Use by
	Batch code
	Manufacturer
	Temperature limitation
	Non-sterile product

## 4 Process Preparation

### 4.1 Scope of Delivery

Article	Qty
Product packed in a cardboard box	
Vivaspin® 6	25 or 100
Vivaspin® 20	12 or 48
Instructions for Use	1

### 4.2 Unpacking

#### Procedure

- ▶ **NOTICE** Risk of product malfunctions due to exceeding the usability!  
Check the usability of the product (see specification on packaging).  
Dispose of products for which the usability has been exceeded.
- ▶ Unpack the product.

# 5 Operation

## 5.1 Filtration in Centrifuges

### 5.1.1 Pre-Rinsing the Product

Membranes in the product may contain traces of glycerin. If this substance can interfere with the analysis of the sample: The membranes may be rinsed before filtration.

#### Procedure

- ▶ Remove the concentrator cap.
- ▶ Use a pipette to apply a filling volume of buffer solution or deionized water into the concentrator.
- ▶ Replace the concentrator cap.
- ▶ Wash the buffer solution or deionized water through the membranes by centrifugation.
- ▶ Empty the concentrator and filtrate container.
- ▶ If the pre-rinsed product is not used immediately: Cover the surface of the membrane with buffer solution or water and store the product in the refrigerator. The membranes must not dry out.

### 5.1.2 Sanitizing the Product

The product can be sanitized before use. The sanitizing method must be suitable for the product (see Chapter "8.6 Sanitizing Methods", page 26).

#### Procedure

- ▶ Remove the concentrator cap.
- ▶ Sanitize the product using the desired sanitizing method.
- ▶ Empty the product.

### 5.1.3 Applying the Sample

It is recommended that a pipette is used to apply the sample into the product. The pipette must be compatible with the product (see Chapter “8.5.1 Pipettes”, page 26).

Please ensure that the molecular weight cut-off (MWCO) of the product is suitable for the size of the target molecule to be concentrated. In order to ensure maximum recovery of the target molecule, it is recommended to select a MWCO that is at least 50% below the size of the target molecule.

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## NOTICE

### Risk of product malfunctions due to using unsuitable samples!

- ▶ Only pour suitable samples into the product (see Chapter “8.7 Chemical Compatibility”, page 27).

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## NOTICE

### Risk of product malfunctions or damage to the centrifuge due to exceeding the maximum filling volume!

- ▶ Do **not** exceed the maximum filling volume (see Chapter “8.4 Operating conditions”, page 24).
- 

## Procedure

- ▶ Check whether the MWCO of the product is suitable for the application.
- ▶ Remove the concentrator cap.
- ▶ Apply the sample into the product using a pipette. Comply with the maximum filling volume.
- ▶ Replace the concentrator cap.

## 5.1.4 Inserting the Product into the Centrifuge

### Procedure

- ▶ **NOTICE** Risk of product malfunctions or damage to the centrifuge! Only use the product in suitable centrifuges (see Chapter “8.5.2 Centrifuges”, page 26).
- ▶ Insert the product into the centrifuge.
- ▶ If a centrifuge with fixed-angle rotor is used: Place the product into the centrifuge so that the printed volume graduations on the concentrator are facing upwards.

## 5.1.5 Performing Filtration

### Procedure

- ▶ **NOTICE** Risk of product malfunctions or damage to the centrifuge. Comply with the approved centrifugation limit values (see Chapter “8.4.2 Centrifugation Limit Values”, page 25).
- ▶ Centrifuge the product in the centrifuge until the desired concentration level is achieved.

## 5.1.6 Removing the Sample

### Procedure

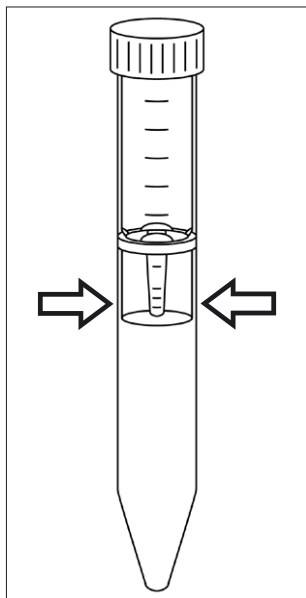
- ▶ If the filtration or concentration is complete: Remove the product from the centrifuge.
- ▶ Remove the concentrator cap.
- ▶ Recover the sample from dead stop pocket of the concentrator using a pipette.
- ▶ If the membrane was pre-rinsed before filtration: Decant the filtrate and concentrate.



### 5.1.7 Removing the Concentrator from the Filtrate Container

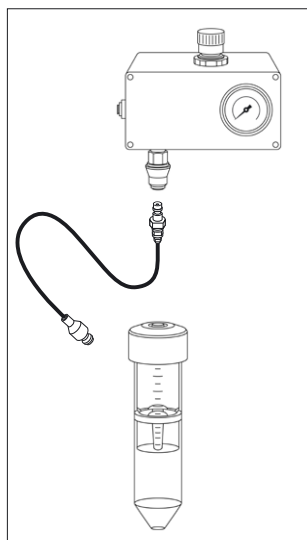
#### Procedure

- ▶ To release the tube from the concentrator, pinch the tube on either side of the printed volume graduations – to press it into an oval shape – before removing it with a twisting action.



## 5.2 Filtration using Gas Pressure

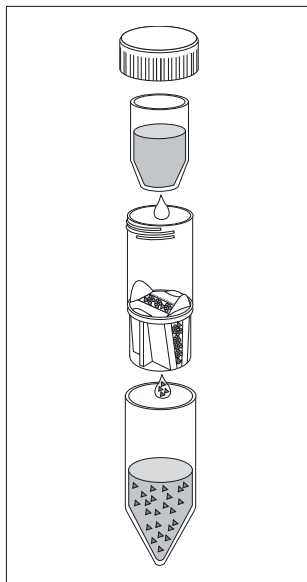
### Procedure



- ▶ **NOTICE** Risk of product malfunctions. Comply with the approved pressurization limit values (see Chapter “8.4.3 Pressurization Limit Values”, page 25).
- ▶ Follow the instructions in section 5.1.3 to apply the sample.
- ▶ Replace the standard concentrator cap with a pressure cap and hand tighten to ensure an air tight seal.
- ▶ When using the Air Pressure Controller (APC): Replace the female coupling on the extension line with the appropriate charge valve (VCA005) and insert this into the inlet valve of the pressure cap to pressurize the product.
- ▶ Stand the product in a centrifuge tube rack until the sample is concentrated to the desired level. Alternatively, insert the product into a centrifuge and centrifuge the product until the desired concentration level is achieved.
- ▶ If the filtration or concentration is complete: De-pressurize the product by unscrewing the pressure cap.
- ▶ Recover the sample from dead stop pocket of the concentrator using a pipette.

## 5.3 Continuous Diafiltration (Vivaspin® 20 only)

### Procedure



- ▶ Apply up to 2 mL of sample into the concentrator. If the sample for diafiltration has a larger volume: Concentrate the sample to 2 mL and decant the filtrate.
- ▶ Insert a diafiltration cup into the concentrator and fill it with 10 mL buffer solution.
- ▶ Replace the concentrator cap.
- ▶ Insert the product into the centrifuge and centrifuge the product until diafiltration is complete.
- ▷ Salts and contaminants are progressively cleared through membrane and into filtrate vessel.
- ▶ Remove the product from the centrifuge.
- ▶ Remove the concentrator cap and the diafiltration cup.
- ▶ Recover the sample from dead stop pocket of the concentrator using a pipette.

## 5.4 Desalting or Buffer Exchange

### Procedure

- ▶ Concentrate the sample to the desired level.
- ▶ Remove the concentrator cap.
- ▶ Discard the filtrate.
- ▶ Refill the concentrator with an appropriate exchange buffer.
- ▶ Concentrate the sample again.
- ▶ Repeat the process until the original buffer and | or contaminating microsolite has been sufficiently removed.
- ▶ If the desalting or buffer exchange is complete: Recover the sample.

# 6 Storage

## 6.1 Storing the Product

If the product has been unpacked and membranes have been pre-rinsed: The membranes must be protected against drying out. For this purpose, the membranes must be stored in a moist and cool condition.

---

### NOTICE

#### **Risk of damage to the product due to improper storage!**

- ▶ Comply with the storage specifications.
- 

#### Procedure

- ▶ If the product is packaged: Store the product in the packaging.
- ▶ If the product has been unpacked and the membranes have been pre-rinsed:
  - ▶ Remove the concentrator cap.
  - ▶ Cover the membranes with buffer solution or water.
  - ▶ Replace the concentrator cap.
- ▶ Store the product according to the ambient conditions (see Chapter “8.3 Ambient Conditions”, page 24).

# 7 Disposal

## 7.1 Decontaminating the Product

If the product has come into contact with hazardous substances: Steps must be taken to ensure proper decontamination and declaration. The operator of the product is responsible for adhering to local government regulations on the proper decontamination and declaration for transport and disposal.

### Procedure

- ▶ If the product has come into contact with hazardous substances: Decontaminate the product.

## 7.2 Disposing of the Product

The product must be disposed of properly. The packaging is made of environmentally friendly materials that can be used as secondary raw materials.

### Requirements

The product must be decontaminated.

### Procedure

- ▶ Dispose of the product in accordance with local government regulations.
- ▶ Dispose of the packaging in accordance with local government regulations.

# 8 Technical Specifications

## 8.1 Dimensions

	Vivaspin® 6		Vivaspin® 20	
	Unit	Value	Unit	Value
Length x Diameter	mm	122 x 17	mm	116 x 30 125 x 30 (with pressure cap)
Active membrane surface	cm <sup>2</sup>	2.5	cm <sup>2</sup>	6.0
Weight	g	10	g	25

## 8.2 Materials

	Vivaspin® 6	Vivaspin® 20
Concentrator   Filtrate container	Polycarbonate	Polycarbonate
Concentrator cap	Polypropylene	Polypropylene
Pressure cap	-	Polyoxymethylene/ Aluminium
Membrane	Polyethersulfone	Polyethersulfone

## 8.3 Ambient Conditions

	Unit	Value
Storage temperature		
When packed	°C	+15 - +30
When unpacked, with membranes kept moist	°C	+2 - +8

## 8.4 Operating conditions

### 8.4.1 Filtration Volumes

	Unit	Centrifuge with swing bucket rotor	Centrifuge with fixed-angle rotor (25°)
	Unit	Value	Value
<b>Vivaspin® 6</b>			
Filling volume, maximum	mL	6	6
Membrane hold-up volume, minimum	µL	< 10	< 10
Dead stop volume <sup>1</sup>	µL	30	30
<b>Vivaspin® 20</b>			
Filling volume, maximum	mL	20	14
Filling volume with pressure cap, maximum	mL	15	-
Membrane hold-up volume, minimum	µL	< 20	< 20
Dead stop volume <sup>1</sup>	µL	50	50

<sup>1</sup>The dead stop volume may vary depending on the type and concentration of the sample, operating temperature and | or centrifuge rotor



### 8.4.2 Centrifugation Limit Values

		Centrifuge with swing bucket rotor	Centrifuge with fixed angle rotor
	Unit	Value	Value
Vivaspin® 6			
3 - 50 kDa PES	<i>g</i>	4,000	8,000
100 kDa - 0.2 µm PES	<i>g</i>	4,000	6,000
Vivaspin® 20			
3 - 50 kDa PES	<i>g</i>	4,000	6,000
100 kDa - 0.2 µm PES	<i>g</i>	3,000	6,000

### 8.4.3 Pressurization Limit Values

		Pressure	Pressure-Fuge with swing bucket rotor
	Unit	Value	Value
Vivaspin® 20			
3 - 50 kDa PES	bar	5	5
	<i>g</i>	-	3,000
100 kDa- 0.2 µm PES	bar	5	5
	<i>g</i>	-	2,000

## 8.5 Equipment Required

### 8.5.1 Pipettes

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Pasteur pipette, variable volume or fixed volume pipette for sample application and concentrate or filtrate retrieval.

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### 8.5.2 Centrifuges

Centrifuge with swing bucket rotor or fixed-angle rotor (minimum 25°) accepting conical base tubes.

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	Required carriers	
	Unit	Value
<b>Vivaspin® 6</b>		
Volume	mL	15
Diameter	mm	17
<b>Vivaspin® 20</b>		
Volume	mL	50
Diameter	mm	30

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### 8.5.3 Using gas pressure

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<b>Vivaspin® 20</b>	
Approved devices	<ul style="list-style-type: none"> <li>- Pressure cap</li> <li>- Charge valve for pressure cap</li> <li>- Air Pressure Controller or suitable pressure regulator</li> </ul>

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## 8.6 Sanitizing Methods

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Rinsing with 70% ethanol or with sanitizing gas mixture, e.g. ethylene oxide

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**Not** suitable for autoclaving

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## 8.7 Chemical Compatibility

Chemical, biological and aqueous solutions with appropriate compatibility for the materials of the product (2 hr contact time)

Examples of compatible chemical solutions

Acetic Acid (25%)	Lactic Acid (5%)
Acetone (10%)	Mercaptoethanol (10 mM)
Acetonitrile (10%)	Methanol (60%)
Ammonium Hydroxide (5%)	Nitric Acid (10%)
Ammonium Sulphate (saturated)	Phenol (1%)
Benzene (100%)	Phosphate Buffer (1 M)
n-Butanol (70%)	Polyethylene Glycol (10%)
Chloroform (1%)	Pyridine (100%)
Dimethyl Formamide (10%)	Sodium Carbonate (20%)
Dimethyl Sulfoxide (5%)	Sodium deoxycholate (5%)
Ethanol (70%)	Sodium dodecylsulfate (0.1 M)
Ethyl Acetate (100%)	Sodium Hydroxide (2 M)
Formaldehyde (30%)	Sodium Hypochlorite (200 ppm)
Formic acid (5%)	Sodium Nitrate (1%)
Glycerine (70%)	Sulfamic Acid (5%)
Guanidine HCl (6 M)	Tetrahydrofuran (5%)
Hydrocarbons, aromatic	Trifluoroacetic Acid (10%)
Hydrocarbons, chlorinated	Triton <sup>®*</sup> X-100 (0.1%)
Hydrochloric Acid (1 M)	Tween <sup>®**</sup> 20 (0.1%)
Imidazole (500 mM)	Urea (8 M)
Isopropanol (70%)	

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

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

## 8.8 Typical Performance Characteristics

### 8.8.1 Vivaspin® 6

Time to concentrate up to 30x at 20°C				
Rotor	Swing bucket		Fixed angle (25°)	
Start volume	6 mL		6 mL	
	Time (min)	Solute Recovery	Time (min)	Solute Recovery
Cytochrome c 0.25 mg/mL (12.4 kDa)				
3 kDa PES	-	-	90	97%
BSA 1.0 mg/mL (66 kDa)				
5 kDa PES	20	98%	12	98%
10 kDa PES	13	98%	10	98%
30 kDa PES	12	98%	9	97%
IgG 0.25 mg/mL (160 kDa)				
30 kDa PES	18	96%	15	95%
50 kDa PES	17	96%	14	95%
100 kDa PES	15	91%	12	91%
Latex beads 0.004% in DMEM + 10% FCS (0.055 µm)				
300 kDa PES	-	-	25	99%
Latex beads 0.004% in DMEM + 10% FCS (0.24 µm)				
1,000 kDa PES	-	-	4	99%
Yeast 1.0 mg/mL ( <i>S. cerevisiae</i> )				
0.2 µm PES	4	97%	3	97%

## 8.8.2 Vivaspin® 20

Time to concentrate up to 30x at 20°C								
Mode	Centrifuge		Centrifuge		Bench top		Pressure-fuge	
Rotor	Swing bucket		Fixed angle (25°)		Pressure		Swing bucket	
Start volume	20 mL		14 mL		10 mL		10 mL	
	Time (min)	Solute Re-covery	Time (min)	Solute Re-covery	Time (min)	Solute Re-covery	Time (min)	Solute Re-covery
Cytochrome c 0.25 mg/mL (12:4 kDa)								
3 kDa PES	110	97%	180	96%	60	96%	-	-
BSA 1.0 mg/mL (66 kDa)								
5 kDa PES	23	99%	29	99%	50	98%	14	98%
10 kDa PES	16	98%	17	98%	32	97%	8	97%
30 kDa PES	13	98%	15	98%	32	97%	8	97%
IgG 0.25 mg/mL (160 kDa)								
30 kDa PES	27	97%	20	95%	46	94%	13	97%
50 kDa PES	27	96%	22	95%	46	93%	13	96%
100 kDa PES	25	91%	20	90%	42	88%	12	94%

Time to concentrate up to 30x at 20°C								
Mode	Centrifuge		Centrifuge		Bench top		Pressure-fuge	
Rotor	Swing bucket		Fixed angle (25°)		Pressure		Swing bucket	
Start volume	20 mL		14 mL		10 mL		10 mL	
	Time (min)	Solute Re-covery	Time (min)	Solute Re-covery	Time (min)	Solute Re-covery	Time (min)	Solute Re-covery
Latex beads 0.004% in DMEM + 10% FCS (0.055 µm)								
300 kDa PES	20	99%	35	99%	10	99%	-	-
Latex beads 0.004% in DMEM + 10% FCS (0.24 µm)								
1,000 kDa PES	4	99%	12	99%	4	99%	-	-
Yeast 1.0 mg/mL ( <i>S. cerevisiae</i> )								
0.2 µm PES	15	95%	5	95%	20	95%	2	95%

## 9 Ordering Information

<b>Vivaspin® 20 accessories</b>	<b>Quantity</b>	<b>Prod. no.</b>
Air pressure controller (APC)	1	VCA002
Charge valve for pressure cap VCA200	1	VCA005
Diafiltration cups	12	VSA005
Female coupling	1	VCA010
Male coupling	1	VCA011
Replacement extension line	1	VCA012
Vivaspin® 20 pressure cap	1	VCA200

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Masculine or feminine forms are used to facilitate legibility in these instructions and always simultaneously denote all genders.

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