

## Laboratory Filtration Products



Filtration and ultrafiltration are essential process steps in nearly all environmental, chemistry and bioscientific laboratory applications.

Sartorius supplies a wide range of individual filter papers, microporous membranes, filtration devices, ultrafiltration units and protein purification devices to suit these applications. This catalog provides a condensed overview of the Sartorius Lab Filtration product range. Please contact us directly for specialty catalogs – available for in-depth technical information.

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## ■ Ultrafiltration

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Ultrafiltration is a convective process using anisotropic semi-permeable membranes to separate macromolecular species and solvents – primarily on the basis of size. By allowing solvents and salts to pass the ultrafiltration membrane while macromolecules are hindered to pass it, they are being concentrated. However, ultrafiltration can also be applied in solvent exchange applications. Multiple concentration and refilling steps will progressively lead to a buffer exchange, replacing lengthy techniques like dialysis. Although ultrafiltration is not a standard method for separating and fractionating macromolecules, it can be used as such if the macromolecules differ at least 10 times in size. Ultrafiltration is a gentle, non-denaturing method that is more efficient and flexible than other processes.

#### Ultrafiltration Methods

Sartorius offers you a comprehensive range of ultrafiltration process methods for the concentration of your biological samples.

- Centrifugal Concentration  
(100  $\mu$ l to 100 mL Starting Volume)
- Pressure Ultrafiltration  
(5 mL to 100 mL Starting Volume)
- Crossflow (Tangential Flow)  
(100 mL to 5l Starting Volumes)
- Static Absorption  
(3 mL to 20 mL Starting Volume)

Further information about the operational methods can be found on page 8.

### Typical Applications for Ultrafiltration

- Concentration | desalting of proteins, enzymes, DNA, monoclonal antibodies, immunoglobulins, viruses and nanoparticles
- Bence Jones Protein concentration from urine samples prior to capillary electrophoresis
- Forensic DNA sample concentration prior to sequencing reaction
- Peptide fractionation in FASP (filter-aided sample preparation)
- Free drug | hormone assays
- Removal of primers from PCR amplified DNA
- Removal of labeled amino acids and nucleotides
- Deproteinization of samples
- General purpose laboratory concentration and desalting of proteins, enzymes, DNA, biomolecules, viruses, antibodies and immunoglobulins

### Membrane Performance Characteristics

Sartorius offers an extended range of membranes to cover the great majority of ultrafiltration requirements.

- Polyethersulfone (PES)
- Cellulose Triacetate (CTA)
- Hydrosart®
- Regenerated Cellulose (RC)

Further information about the properties of the different membrane types can be found on page 9.

### Process Optimization

When the highest recoveries are crucial, particularly with solute quantities in the microgram range, Sartorius recommends considering the following tips for optimal ultrafiltration results:

- Select the lowest MWCO membrane that suits your application. For the highest recovery, choose a membrane MWCO which is at least half of the molecular weight of the solute to be retained.
- Avoid over-concentration. The smaller the final concentrate volume, the more difficult it is to achieve complete recovery. If feasible, rinse the device with one or more drops of buffer after the first concentration cycle and then recover it again.
- Pretreat the device overnight in distilled water with a passivation solution such as 5% SDS, Tween 20 or Triton X. Rinse thoroughly before use.

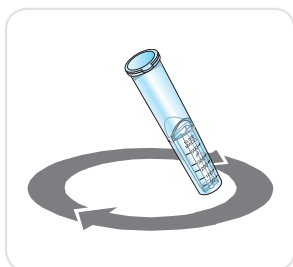




## Membrane Selection Guide

### Ultrafiltration Methods

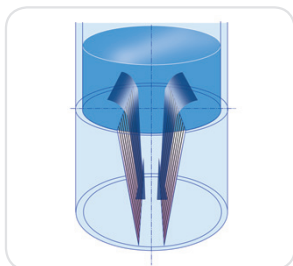
Sartorius offers you a comprehensive range of ultrafiltration process methods for the concentration of your biological samples. The guide below will help you select the most suitable device according to sample volume and available equipment, as well as your desired filtration speed and process control.



#### Centrifugal Concentration (100 µl to 100 mL Starting Volume)

Driven by the centrifugal force, ultrafiltration can be used to purify and concentrate proteins, macromolecules and nanoparticles. This gentle process is quick to set up and offers fast filtration speeds for most solutions. Sartorius offers seven

Vivaspin® devices and the Vivacell® 100 and Centriscart® I for protein concentration, as well as Vivacon® devices for DNA and peptide concentration | fractionation.



#### Pressure Ultrafiltration (5 mL to 100 mL Starting Volume)

Pressurized air or inert gas provide the filtration vector for pressure filtration. To speed up the filtration process, the pressurized Vivacell® 100 or the Vivaspin® 20 can be placed on an orbital laboratory shaker. Agitation helps to prevent membrane blocking and ensures high filtration speed. Vivaspin® 20, and Vivacell® 100 can be run with gas pressure. The Vivaspin® 20 can also be run by

pressure-fugation, a unique Sartorius method combining gas and pressure with centrifugation.

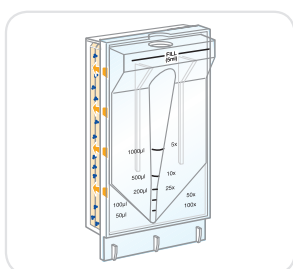
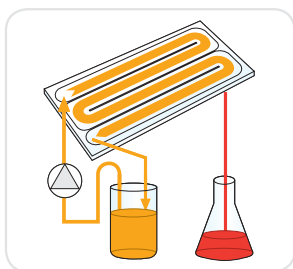
This is the fastest of all methods, providing process times that are typically 30 to 50 percent faster than centrifugation.



#### Crossflow (Tangential Flow) (100 mL to 5 L Starting Volumes)

The sample is pumped across an ultrafiltration membrane and then returned to the original reservoir by building up pressure at the outlet of the device. The solution is progressively concentrated as solvent and micromolecules pass

through the membrane into a separate filtrate vessel. Reusable Vivaflow® 50R and Vivaflow® 200, as well as disposable Vivaflow® 50, are offered for your dedicated laboratory crossflow filtration.



#### Static Absorption (3 mL to 20 mL Starting Volume)

This technique uses an absorbent cellulose pad mounted behind the ultrafiltration membrane to draw solvents and micromolecules through the membrane. The retained macromolecules thus concentrate at the bottom of the sample container.

No additional equipment is needed. These devices are ideal for clinical applications like urine concentration prior to further analysis. Both Vivapore® 5 and Vivapore® 20 offer this procedure.

**Membrane Performance Characteristics**

Sartorius offers an extended range of membranes to cover the great majority of ultrafiltration requirements. To select the most appropriate membranes for your application please refer to the following guide. Please note however that membrane behavior and ultimate performance, largely depends on the specific characteristics of the solution being processed. Where available alternatives membranes should be tested to optimize the process performance.

**Polyethersulfone (PES)**

Concentration | desalting of column eluates, cell culture supernatants, etc. This is a general purpose membrane that provides excellent performance with most solutions when retentate recovery is of primary importance. Polyethersulfone membranes are usually preferred for their low fouling characteristics, exceptional flux and broad pH range.

**Cellulose Triacetate (CTA)**

Free | bound drug studies and whenever the filtrate is being analyzed High hydrophilicity and very low non-specific binding characterize this membrane. Cast without any membrane support that could trap or bind passing micro solutes, these membranes are preferred for sample cleaning and protein removal and when high recovery of the filtrate solution is of primary importance.

**Regenerated Cellulose (RC)**

Concentration | desalting of general samples, such as cell culture supernatant, lysate solutions and column eluates. Excellent performance with proteins, antibodies, viruses and extracellular vesicles. A good choice for positively charged targets.

**Hydrosart®**

Concentration | desalting of column eluates, Hydrosart® membrane evaluation for upscaling Hydrosart® demonstrates the same properties as regenerated cellulose, but with the added benefit of enhanced performance characteristics and extremely low protein binding, making it the membrane of choice for applications such as concentration and desalting of immunoglobulin fractions.

**Membrane Selection Guide**

The molecular weight cut-off (MWCO) is the molecular weight of molecules (e.g. globular proteins) which are retained by the membrane to an extent of 90%. Therefore, to ensure the highest recovery, select a membrane with a MWCO that represents half the molecular weight of the solute to be retained.

Sartorius Vivaspin® ultrafiltration units are designed to concentrate protein solutions. Therefore, the membranes in the devices are tested for the retention of proteins and not the passage of proteins into the filtrate vessel. PES, RC and Hydrosart® membranes have support structures, which might lead to some loss of protein after the passage through the membrane.

Application	Recommended MWCO (Da):					
	<5,000	10,000	30,000	50,000	100,000	>300,000
Bacteria					•	•
DNA fragments		•	•	•	•	
Enzymes	•	•				
Growth factors	•	•				
mAB			•	•	•	
Nucleic acids	•	•	•	•	•	
Oligonucleotides	•					
Peptides	•					
Virus			•	•	•	
Yeast					•	•

## ■ Vivaspin<sup>®</sup> 500



### 100 $\mu$ L to 500 $\mu$ L Samples

Vivaspin<sup>®</sup> 500  $\mu$ L centrifugal filter units offer a simple, one-step procedure for sample preparation. They can effectively be used in fixed-angle rotors accepting 2.2 mL centrifuge tubes.

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

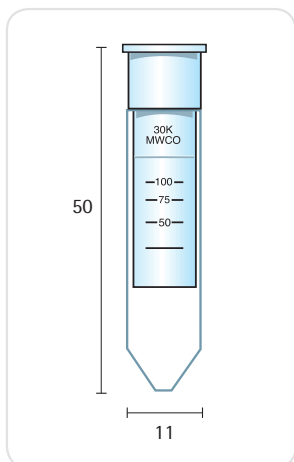
### □ Specifications

#### Vivaspin<sup>®</sup> 500

Concentrator capacity	Swing-bucket rotor	do not use
	Fixed-angle rotor	500 $\mu$ L
Dimensions	Total length	50 mm
	Width	11 mm
	Active membrane area	0.5 cm <sup>2</sup>
	Hold-up volume, membrane and support	< 5 $\mu$ L
	Dead-stop volume	5 $\mu$ L
Materials of construction	Body	Polycarbonate
	Filtrate vessel	Polypropylene
	Concentrator cap	Polycarbonate
	Membrane	Polyethersulfone



Please use a fixed angle rotor for 2 mL reaction vials.



### Typical Performance Characteristics

	Time to concentrate up to 30 $\times$ [min.] at 20°C and solute recovery %	
Rotor	Fixed angle	
Centrifugal force	12,000 g	
Start volume	500 $\mu$ l	
	Min.	Rec.
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	96%
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%



### □ Ordering Information

<b>Vivaspin® 500 Polyethersulfone</b>	<b>Qty./Pkg.</b>	<b>Prod. No.</b>
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 kDa, 10 kDa, 30 kDa, 50 kDa, 100 kDa)	25	VS01S1

Visit us at [www.sartorius.com/Vivaspin500](http://www.sartorius.com/Vivaspin500) to get additional info.  
Find instructions on how to use Vivaspin® 500 for

- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Concentration to a predefined volume
- Concentration of diluted samples with increased recovery



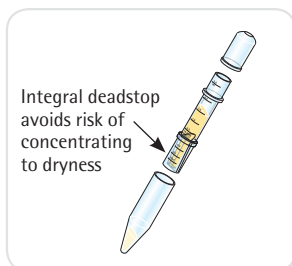
**Typical Performance Characteristics**

	<b>Time to concentrate up to 30× [min.] at 20°C and solute recovery %</b>	
	Min.	Rec.
Rotor	Fixed angle	
Centrifugal force	5,000 g	
Start volume	2 mL	
IgG 0.25 mg/mL (160,000 MW)		
20,000 MWCO CTA	6	97%
30,000 MWCO PES	10	96%
50,000 MWCO PES	10	96%
100,000 MWCO PES	8	95%

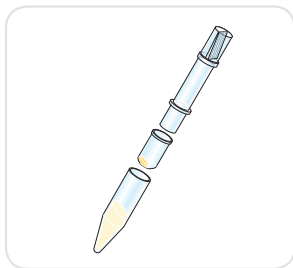
**Ordering Information**

<b>Vivaspin® 2 Polyethersulfone</b>	<b>Qty./Pkg.</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 kDa, 10 kDa, 30 kDa, 50 kDa, 100 kDa)	25	VS02S1





PES, CTA, or Hydrosart® membranes; Filtrate container fits standard 15 mL tube carriers



Direct pipette recovery or choice of reverse spinning concentrate into sample cap

Vivaspin® 2 Cellulose Triacetate	Qty./Pkg.	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® 2 Hydrosart®	Qty./Pkg.	Prod. No.
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

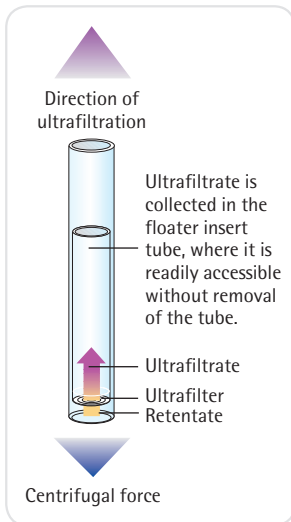
#### Ordering Tips

- Choose a membrane pore size at least 50% smaller than the size of the molecule to be retained.
- It is usually best to select polyethersulfone membranes to achieve the fastest concentrations.
- Usually choose cellulose triacetate for protein removal or ultrafiltrate recovery.
- Usually choose Hydrosart® membranes for the highest recovery with Ig fractions.

Visit us at [www.sartorius.com/Vivaspin2](http://www.sartorius.com/Vivaspin2) to get additional info.  
Find instructions on how to use Vivaspin® 2 for

- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Concentration of diluted samples with increased recovery
- Sample preparation for radio immunoassay

## Centrisart® I



Centrisart® I\* is a ready-to-use unit for small-volume, centrifugal ultrafiltration to separate proteins from low molecular weight substances in biological samples.

Centrisart® I features a unique design that enables ultrafiltration in the direction opposite to centrifugal force. This is so effective in preventing premature blockage of the filter that even whole blood samples can be deproteinized.

The ultrafiltrate is collected in the floater insert tube, where it is readily accessible without removing the tube.

Centrisart® I is ideal for the following applications:

- Drug binding studies
- Determination of metabolites in serum
- Protein removal from blood samples
- Cleaning of liposomes
- Virus removal

### Specifications

#### Centrisart® I

Concentrator capacity	Swing-bucket rotor	2.5 mL
	Fixed-angle rotor	2.5 mL
Dimensions	Total length	93 mm
	Width	14 mm
	Active membrane area	0.79 cm <sup>2</sup>
	Hold-up volume of membrane	< 5 µL
	Dead-stop volume	100 µL
Materials of construction	Centrifuge tube	Polystyrene
	Floater tube	Cellulose propionate
	Cap	Polyethylene
	Membrane	CTA, PES

#### Typical Performance Characteristics

	Time to filter 50% of sample volume	Time to filter 90% of sample volume	Passage of sample species volume
BSA 1.0 mg/mL (66,000 MW)			
5,000 MWCO	300 min	N   A	0%
10,000 MWCO	35 min	80 min	2%
20,000 MWCO	9 min	20 min	2%
IgG 0.25 mg/mL (160,000 MW)			
100,000 MWCO	13 min	35 min	3%
Blue Dextran 0.1 mg/mL (2,000,000 MW)			
300,000 MWCO	9 min	25 min	28%

2.5 mL samples were loaded into each device. The devices were centrifuged at 2,000 g until the required filtrate volumes had been reached.

\* Centrisart is a registered trademark in the U.S. and the European Union

### Ordering Information

	Qty./Pkg.	Prod. No.
5,000 MWCO CTA	12	13229-----E
10,000 MWCO CTA	12	13239-----E
20,000 MWCO CTA	12	13249-----E
100,000 MWCO PES	12	13269-----E
300,000 MWCO PES	12	13279-----E
Starter pack (3 units each of 5 kDa, 10 kDa, 20 kDa, 100 kDa)	12	13209-----E

### References

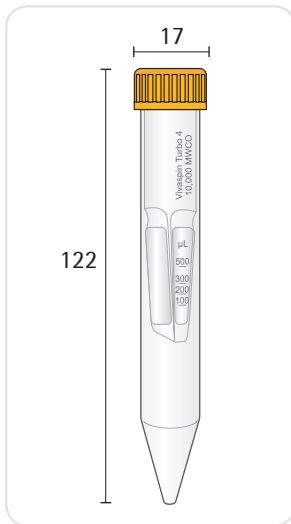
P. Nebinger and M. Koel:  
Determination of acyclovir by  
ultrafiltration and high-performance  
liquid chromatography.  
J. Chromatography 619, 342-344 (1993)

F. da Fonseca-Wollheim, K.-G. Heinze,  
K. Lomsky and H. Schreiner:  
Serum ultrafiltration for the elimination  
of endogenous interfering substances  
in creatinine determination.  
J. Clin. Chem. Clin. Biochem. 26, 523-525  
(1988)

R. H. Christenson, S. D. Studenberg,  
S. Beck-Davis and F. A. Sedor:  
Digoxin-like immunoreactivity  
eliminated from serum by centrifugal  
ultrafiltration before fluorescence  
polarization immunoassay of digoxin.  
Clinical Chemistry 33, 606-608 (1987)

Visit us at [www.sartorius.com/Centrisartl](http://www.sartorius.com/Centrisartl) to get additional info.  
Find instructions on how to use Centrisart® I for the high recovery  
of cationised protein.

## ■ Vivaspin® Turbo 4



### 2 mL to 4 mL Samples

Vivaspin® Turbo 4 is the newest member of the ultrafiltration family and allows the fastest sample concentration with the highest recoveries.

This device can handle up to 4 mL sample volumes in swing-bucket rotors and in fixed-angle rotors that accept 15 mL centrifuge tubes.

The Vivaspin® Turbo 4 optimized design and sleek internal profile ensure maximum process speeds all the way down to the last few microliters, resulting in more than 100-fold concentration.

The UV joining technology ensures smooth joint transition between the membrane and the plastic housing – allowing removal of the entire sample concentrated in the unique, pipette-friendly dead-stop pocket.

### □ Specifications

#### Vivaspin® Turbo 4

Concentrator capacity	Swing-bucket rotor	4 mL
	Fixed-angle rotor	4 mL
Dimensions	Total length	122.5 mm
	Width	17 mm
	Active membrane area	3.2 cm <sup>2</sup>
	Hold-up volume of membrane	< 10 µL
	Dead-stop volume swing-bucket rotor	40 µL
	Dead-stop volume fixed-angle rotor (25°)	60 µL
Materials of construction	Body	Styrene butadiene copolymer
	Filtrate vessel	Polypropylene
	Concentrator cap	Polypropylene
	Membrane	Polyethersulfone

### Typical Performance Characteristics

	Time to concentrate up to 30× [min.] at 20°C and solute recovery %			
	Swing out		Fixed angle (25°)	
Centrifuge speed	4,000 xg		7,500 xg	
Starting vol.	4 mL		4 mL	
	Min.	Rec.	Min.	Rec.
Cytochrome c (12,400 MW)				
3,000 MWCO PES	60	98%	80	96%
5,000 MWCO PES	40	95%	50	94%
Lysozyme (14,300 MW)				
3,000 MWCO PES	65	95%	70	93%
5,000 MWCO PES	50	94%	60	92%
α-Chymotrypsin (25,000 MW)				
10,000 MWCO PES	10	95%	8	95%
BSA (66,000 MW)				
10,000 MWCO PES	10	98%	7	97%
30,000 MWCO PES	8	96%	6	97%

**Performance Characteristics**

	<b>Time to concentrate up to 30× [min.] at 20°C and solute recovery %</b>			
	Min.	Rec.	Min.	Rec.
IgG (160,000 MW)				
30,000 MWCO PES	18	94%	13	92%
50,000 MWCO PES	16	93%	12	90%
100,000 MWCO PES*	17	94%	13	92%

\* 3,000 xg swing-out | 5,000 xg fixed angle

### Ordering Information

<b>Vivaspin® Turbo 4 Polyethersulfone</b>	<b>Qty./Pkg.</b>	<b>Prod. No.</b>
3,000 MWCO	25	VS04T91
3,000 MWCO	100	VS04T92
5,000 MWCO	25	VS04T11
5,000 MWCO	100	VS04T12
10,000 MWCO	25	VS04T01
10,000 MWCO	100	VS04T02
30,000 MWCO	25	VS04T21
30,000 MWCO	100	VS04T22
50,000 MWCO	25	VS04T31
50,000 MWCO	100	VS04T32
100,000 MWCO	25	VS04T41
100,000 MWCO	100	VS04T42

Visit us at [www.sartorius.com/VivaspinTurbo4](http://www.sartorius.com/VivaspinTurbo4) to get additional info.  
Find instructions on how to use Vivaspin® Turbo 4 for

- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Separation of proteins and metabolites for disease detection



## ■ Vivaspin® 6

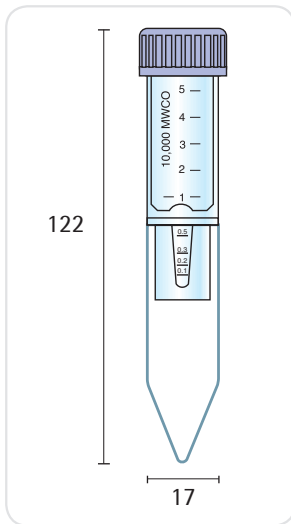


### 2 mL to 6 mL Samples

Vivaspin® 6 mL concentrators have been developed to offer increased volume flexibility and performance.

Vivaspin® 6 can process an impressive 6 mL in either swing-bucket or fixed-angle rotors accepting standard 15 mL conical bottom test tubes.

The Vivaspin® 6 features twin vertical membranes for unparalleled filtration speeds and 100× plus concentrations. The 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.



### □ Specifications

#### Vivaspin® 6

Concentrator capacity	Swing-bucket rotor	6 mL
	Fixed-angle rotor	6 mL
Dimensions	Total length	122 mm
	Width	17 mm
	Active membrane area	2.5 cm <sup>2</sup>
	Hold-up volume of membrane	< 10 µL
	Dead-stop volume	30 µL
Materials of construction	Body	Polycarbonate
	Filtrate vessel	Polycarbonate
	Concentrator cap	Polypropylene
	Membrane	Polyethersulfone

#### Typical Performance Characteristics

	Time to concentrate up to 30× [min.] at 20°C and solute recovery %			
	Swing bucket		25° Fixed angle	
Centrifugal force	3,000 g		7,500 g	
Start volume	6 mL		6 mL	
	Min.	Rec.	Min.	Rec.
Cytochrome c 0.25 mg/mL (12,400 MW)				
5,000 MWCO PES	–	–	90	97%
BSA 1.0 mg/mL (66,000 MW)				
5,000 MWCO PES	20	98%	12	98%
10,000 MWCO PES	13	98%	10	98%
30,000 MWCO PES	12	98%	9	97%
IgG 0.25 mg/mL (160,000 MW)				
30,000 MWCO PES	18	96%	15	95%
50,000 MWCO PES	17	96%	14	95%
100,000 MWCO PES	15	91%	12	91%
Latex beads 0.004% in DMEM + 10% FCS (0.055 µm)				
300,000 MWCO PES	–	–	25	99%
Latex beads 0.004% in DMEM + 10% FCS (0.24 µm)				
1,000,000 MWCO PES	–	–	4	99%
Yeast 1.0 mg/mL ( <i>S. Cerevisiae</i> )				
0.2 µm PES	4	97%	3	97%

### □ Ordering Information

<b>Vivaspin® 6 Polyethersulfone</b>	<b>Qty./Pkg.</b>	<b>Prod. No.</b>
3,000 MWCO	25	VS0691
3,000 MWCO	100	VS0692
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
300,000 MWCO	25	VS0651
300,000 MWCO	100	VS0652
1,000,000 MWCO	25	VS0661
1,000,000 MWCO	100	VS0662
0.2 µm	25	VS0671
0.2 µm	100	VS0672
Starter pack (5 of each 5 kDa, 10 kDa, 30 kDa, 50 kDa, 100 kDa)	25	VS06S1

Visit us at [www.sartorius.com/Vivaspin6](http://www.sartorius.com/Vivaspin6) to get additional info.  
Find instructions on how to use Vivaspin® 6 for

- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Concentration of diluted samples with increased recovery

## ■ Vivaspin® 15R

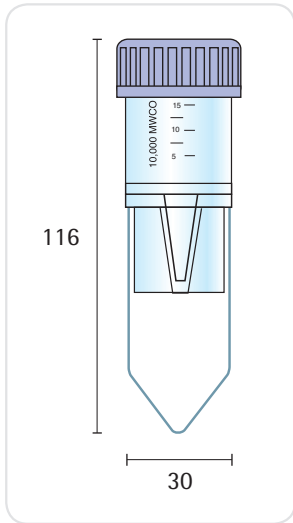


### 4 to 15 mL Samples

Vivaspin® 15R is designed for the volume segment of 2 to 15 mL and features a modified regenerated cellulose membrane; Hydrosart®. This membrane is ideal where extremely high recovery with very low adsorption is needed. Examples of these applications include desalting and concentration of Ig fractions.

### Advantages

- Ultimate recovery with low adsorption (95–98%)
- Exceptionally fast concentration time (30× in 15 min.)
- Convenient application protocol with easy handling
- Easy scale-up to Vivaflow 200 with Hydrosart® membrane for volumes up to 5 liters
- Very low hold-up volume (< 20 µL)



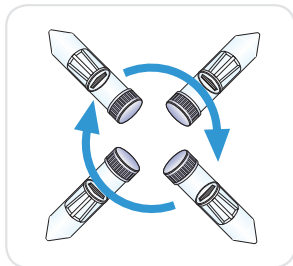
### □ Specifications

#### Vivaspin® 15R

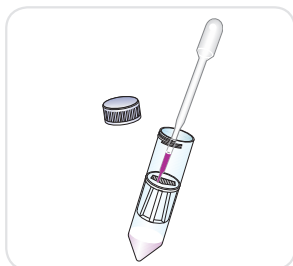
Concentrator capacity	Swing-bucket rotor	15 mL
	Fixed-angle rotor	12.5 mL
Dimensions	Total length	116 mm
	Width	30 mm
	Active membrane area	3.9 cm <sup>2</sup>
	Hold-up volume of membrane	< 20 µL
	Dead-stop volume	30 µL
Materials of construction	Body	Polycarbonate
	Filtrate vessel	Polypropylene
	Concentrator cap	Polypropylene
	Membrane	Hydrosart®

### Typical Performance Characteristics

	Time to concentrate up to 30× [min.] at 20°C and solute recovery %			
	Swing bucket		25° Fixed angle	
Rotor	Swing bucket		25° Fixed angle	
Centrifugal force	3,000 g		6,000 g	
Start volume	15 mL		12.5 mL	
	Min.	Rec.	Min.	Rec.
<b>Aprotinin 0.1 mg/mL*</b> (6,500 MW)				
5,000 MWCO	47	95%	45	95%
<b>Cytochrome c 0.25 mg/mL*</b> (12,400 MW)				
5,000 MWCO	45	96%	45	96%
10,000 MWCO	25	94%	18	94%
<b>α-Chymotrypsin 0.25 mg/mL*</b> (25,000 MW)				
5,000 MWCO	50	98%	45	98%
10,000 MWCO	25	98%	18	98%
<b>Ovalbumin 1.0 mg/mL*</b> (45,000 MW)				
10,000 MWCO	20	98%	14	98%
30,000 MWCO	15	94%	12	94%



Spin



Recover

**Performance Characteristics**

	<b>Time to concentrate up to 30× [min.] at 20°C and solute recovery %</b>			
	Min.	Rec.	Min.	Rec.
BSA 1.0 mg/mL* (66,000 MW) 30,000 MWCO	18	98%	15	98%
IgG 0.1 mg/mL* in DMEM (160,000 MW) 30,000 MWCO	30	98%	25	96%

\* proteins other than IgG made up in 50 mM potassium phosphate, 150 mM sodium chloride, pH 7.4

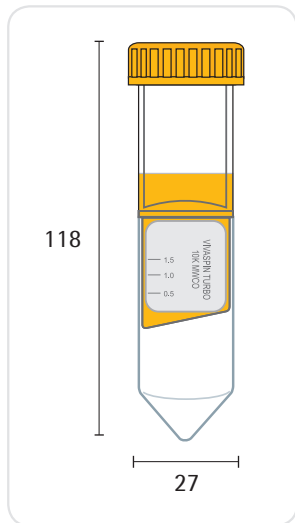
### Ordering Information

<b>Vivaspin® 15R Hydrosart®</b>	<b>Qty./Pkg.</b>	<b>Prod. No.</b>
2,000 MWCO	12	VS15RH91
2,000 MWCO	48	VS15RH92
5,000 MWCO	12	VS15RH11
5,000 MWCO	48	VS15RH12
10,000 MWCO	12	VS15RH01
10,000 MWCO	48	VS15RH02
30,000 MWCO	12	VS15RH21
30,000 MWCO	48	VS15RH22

Visit us at [www.sartorius.com/Vivaspin15R](http://www.sartorius.com/Vivaspin15R) to get additional info.  
Find instructions on how to use Vivaspin® 15R for

- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Concentration of diluted samples with increased recovery

## ■ Vivaspin® Turbo 15



### 4 to 15 mL Samples

Vivaspin® Turbo 15 enables the fastest sample concentration with the highest recoveries. This device can handle a sample volume of up to 15 mL in swing-bucket rotors and of up to 11 mL in fixed-angle rotors that accept 50 mL centrifuge tubes.

The UV joining technology ensures smooth joint transition between the membrane and the plastic housing – allowing removal of the entire sample concentrated in the unique, pipette-friendly dead-stop pocket.

The optimized design and sleek internal profile of the Vivaspin® Turbo 15 ensure maximum process speeds all the way down to the last few microliters, which results in more than 100-fold concentration.

### □ Specifications

#### Vivaspin® Turbo 15

Concentrator capacity	Swing-bucket rotor	15 mL
	Fixed-angle rotor (25°)	9 mL
Dimensions	Total length (concentrator insert)	77 mm
	Total length (in tube with cap)	118 mm
	Diameter (concentrator insert)	27 mm
	Active membrane area	7.2 cm <sup>2</sup>
	Hold-up volume of membrane	<10 µl
	Dead-stop volume for swing-bucket rotor	100 µl
	Dead-stop volume for fixed-angle rotor	60 µl
Materials	Body	Styrene butadiene copolymer
	Filtrate vessel	Polypropylene
	Concentrator cap	Polypropylene
	Membrane	Polyethersulfone (PES)

### Typical Performance Characteristics

	Time to concentrate up to 20× [min.] at 20°C and solute recovery %			
	Swing bucket		Fixed angle (25°)	
Centrifugal speed	4,000 g		4,000 g	
Start volume	15 mL		9 mL	
	Min.	Rec.	Min.	Rec.
<b>Cytochrome c* (12,400 MW)</b>				
3,000 MWCO PES	61	98%	86	97%
5,000 MWCO PES	30	98%	50	98%
<b>Lysozyme* (14,300 MW)</b>				
3,000 MWCO PES	56	98%	87	97%
5,000 MWCO PES	33	96%	50	96%
<b>α-Chymotrypsin** (25,000 MW)</b>				
10,000 MWCO PES	10	95%	10	95%
<b>BSA** (66,000 MW)</b>				
10,000 MWCO PES	10	99%	10	99%
30,000 MWCO PES	8	98%	10	98%



### Typical Performance Characteristics

	Time to concentrate up to 20× [min.] at 20°C and solute recovery %			
	Min.	Rec.	Min.	Rec.
IgG** (160,000 MW)				
30,000 MWCO PES	23	95%	17	95%
50,000 MWCO PES	20	94%	15	94%

\* 0.25 mg/mL

\*\* 1 mg/mL

### Ordering Information

Vivaspin® Turbo 15 Polyethersulfone	Qty./Pkg.	Prod. No.
3,000 MWCO	12	VS15T91
3,000 MWCO	48	VS15T92
5,000 MWCO	12	VS15T11
5,000 MWCO	48	VS15T12
10,000 MWCO	12	VS15T01
10,000 MWCO	48	VS15T02
30,000 MWCO	12	VS15T21
30,000 MWCO	48	VS15T22
50,000 MWCO	12	VS15T31
50,000 MWCO	48	VS15T32
100,000 MWCO	12	VS15T41
100,000 MWCO	48	VS15T42

Visit us at [www.sartorius.com/VivaspinTurbo15](http://www.sartorius.com/VivaspinTurbo15) to get additional info.  
Find instructions on how to use Vivaspin® Turbo 15 for

- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Concentration of diluted samples with increased recovery
- Concentration to a predefined volume
- Depyrogenation of the ultrafiltration devices
- Concentration of mammalian cell culture supernatants

## ■ Vivaspin® 20



### 5 to 20 mL Samples

Vivaspin® 20 mL centrifugal concentrators have been developed to offer increased volume flexibility and performance.

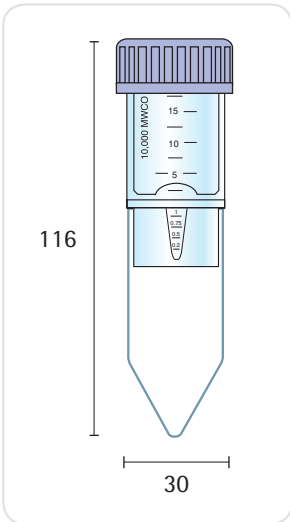
Vivaspin® 20 handles up to 20 mL in swing-bucket centrifuges and 14 mL in 25° fixed-angle rotors that accept 50 mL centrifuge tubes.

Featuring twin vertical membranes for unparalleled filtration speeds, the Vivaspin® 20 can achieve 100x plus concentrations.

The 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.



Air pressure controller, VCA002



## □ Specifications

### Vivaspin® 20

Concentrator capacity	Swing-bucket rotor	20 mL
	Fixed-angle rotor	14 mL
	With pressure head	15 mL
Dimensions	Total length	116 mm
		125 mm with pressure head
	Width	30 mm
	Active membrane area	6.0 cm <sup>2</sup>
	Hold-up volume of membrane	< 20 µL
Materials of construction	Dead-stop volume	50 µL
	Body	Polycarbonate
	Filtrate vessel	Polycarbonate
	Concentrator cap	Polypropylene
	Pressure head	Acetal   Aluminum
	Membrane	Polyethersulfone

### Typical Performance Characteristics

Mode	Time to concentrate up to 30× [min.] at 20°C and solute recovery %			
	Centrifuge	Centrifuge	Bench top	Press-fuge
Rotor	Swing bucket	25° Fixed angle	Pressure	Swing bucket
Centrifugal speed   pressure	3,000 g	6,000 g	4 bar	3,000 g + 4 bar
Start volume	20 mL	14 mL	10 mL	10 mL

### More Process Flexibility

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

### Gas Pressure Filtration

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

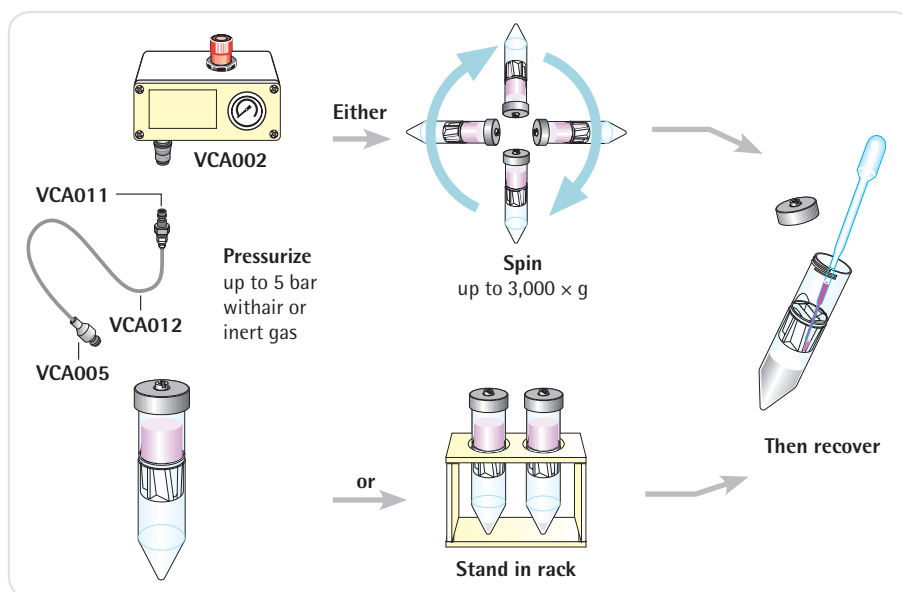
### Typical Performance Characteristics

	Time to concentrate up to 30× [min.] at 20°C and solute recovery %							
	Min.	Rec.	Min.	Rec.	Min.	Rec.	Min.	Rec.
Cytochrome c 0.25 mg/mL (12,400 MW)								
3,000 MWCO PES	110	97%	180	96%	60	96%	–	–
BSA 1.0 mg/mL (66,000 MW)								
5,000 MWCO PES	23	99%	29	99%	50	98%	14	98%
10,000 MWCO PES	16	98%	17	98%	32	97%	8	97%
30,000 MWCO PES	13	98%	15	98%	32	97%	8	97%
IgG 0.25 mg/mL (160,000 MW)								
30,000 MWCO PES	27	97%	20	95%	46	94%	13	97%
50,000 MWCO PES	27	96%	22	95%	46	93%	13	96%
100,000 MWCO PES	25	91%	20	90%	42	88%	12	94%
Latex beads 0.004% in DMEM + 10% FCS (0.055 µm)								
300,000 MWCO PES	20	99%	35	99%	10	99%	–	–
Latex beads 0.004% in DMEM + 10% FCS (0.24 µm)								
1,000,000 MWCO PES	4	99%	12	99%	4	99%	–	–
Yeast 1.0 mg/mL (S. Cerevisiae)								
0.2 µm PES	15	95%	5	95%	20	95%	2	95%

### Ordering Information

Vivaspin® 20 Polyethersulfone	Qty./Pkg.	Prod. No.
3,000 MWCO	12	VS2091
3,000 MWCO	48	VS2092
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
300,000 MWCO	12	VS2051
300,000 MWCO	48	VS2052
1,000,000 MWCO	12	VS2061
1,000,000 MWCO	48	VS2062
0.2 µm	12	VS2071
0.2 µm	48	VS2072
Starter pack (2 each of 5 kDa, 10 kDa, 30 kDa, 50 kDa, 100 kDa, 0.2 µm)	12	VS20S1

Vivaspin® 20 Accessories	Qty./Pkg.	Prod. No.
Air pressure controller (APC)	1	VCA002
Charge valve for pressure head	1	VCA005
Diafiltration cups	12	VSA005
Female connector	1	VCA010
Male connector	1	VCA011
4 mm OD pneumatic tube (3 m)	1	VCA012
Vivaspin® 20 pressure head	1	VCA200



Using the Vivaspin® 20 pressure cap

Visit us at [www.sartorius.com/Vivaspin20](http://www.sartorius.com/Vivaspin20) to get additional info.  
Find instructions on how to use Vivaspin® 20 for

- Desalting and buffer exchange
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Urine protein concentration
- Concentration of diluted samples with increased recovery
- The workflow in protein research laboratories

## ■ Vivaclear Centrifugal Filters



Vivaclear centrifugal filters are disposable microfiltration devices for the fast and reliable clarification|filtration of biological samples in the range 100  $\mu$ L to 500  $\mu$ L. They can be used in fixed-angle rotors accepting 2.2 mL centrifuge tubes.

### Product Features

- High-flux polyethersulfone membrane
- 0.8  $\mu$ m pore size
- Low hold-up volume (<5  $\mu$ L)
- Fast and reproducible performance

### Applications

- Clarification of samples before loading in Vivapure<sup>®</sup> protein purification spin columns
- Removal of particles and precipitates
- Filtration of plasma and serum
- Filtration of cells or cell debris

## □ Specifications

### Vivaclear Centrifugal Filters

Rotor	40–45° fixed-angle rotor, 500 $\mu$ L	
Pore size	0.8 $\mu$ m	
Dimensions	Total length	43 mm
	Filtrate collection tube diameter	11 mm
	Active membrane area	0.34 cm <sup>2</sup>
	Hold-up volume, membrane plus support	< 5 $\mu$ L
Materials of construction	Maximum RCF	2,000 $\times$ g
	Body	Polypropylene
	Membrane	Polyethersulfone
	Filtrate collection tube	Polypropylene

## □ Ordering Information

	Qty./Pkg.	Prod. No.
Vivaclear Mini 0.8 $\mu$ m PES	100	VK01P042



## ■ Vivacell 100



Vivacell 100 is a unique and innovative concentrator for volumes from 20 mL to 100 mL, and utilizes pressure, centrifuge or pressure-shake to rapidly concentrate even samples with very high-particle loading.

Vivacell 100 is designed for centrifugal concentration of samples up to 100 mL, which makes it the largest centrifugal unit available. At the same time, its new design allows for maximum centrifugal force of  $2,000 \times g$  to be used for even faster concentration.

The patented vertical membrane design ensures the highest performance and unmatched flexibility.

### Vivacell 100 Utilizes:

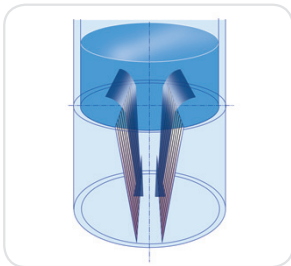
- Pressure
- Centrifuge
- Pressure-shake

Vivacell 100, when used as a centrifugal device, fits only into rotors that accept 250 mL bottles.

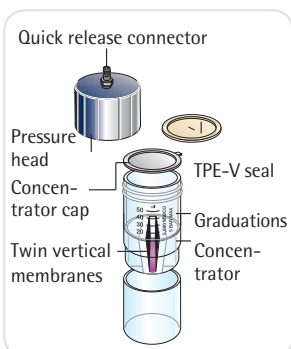
Vivacell 100 units can also be used for single or extremely sensitive samples in the pressurized mode only and left on a bench or placed on a swing-bucket laboratory shaker for faster concentration. It can also be kept in a pressurized mode in the refrigerator. Handling is facilitated by the use of quick connectors. In whichever mode Vivacell 100 is used, the vertical membrane design inhibits membrane fouling, while the built-in dead stop impedes concentration to dryness and loss of sample.



Air pressure controller, VCA002



Patented vertical membrane design



Filtrate container fits standard 250 mL rotors

## □ Specifications

### Vivacell 100

Concentrator capacity	Swing-bucket rotor	90 mL
	With pressure head	98 mL
Dimensions	Total length	123 mm centrifugal 197 mm with pressure head
	Width	62 mm
	Active membrane area	23.5 cm <sup>2</sup>
	Hold-up volume of membrane	< 250 µL
	Dead-stop volume	350 µL
Operating requirements	Rotor type	Swing-bucket
	Rotor cavity	To fit 250 mL (62 mm) centrifuge bottles (maximum cavity depth 105 mm)
	Maximum speed	2,000 g
	Maximum pressure	5 bar (75 psi)
Materials of construction	Body	Polycarbonate
	Filtrate vessel	Polycarbonate
	Concentrator cap	Polypropylene
	Pressure head seal	TPE-V
	Pressure head	Acetal
	Membrane	Polyethersulfone

**Typical Performance Characteristics**

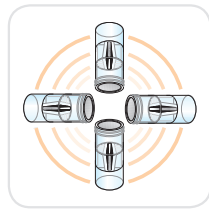
90 mL Start volume	Time to concentrate up to 30× [min.] at 20°C			
	In centrifuge 2,000 g swing-out rotor	As pressure cell 4 bar (60 psi) pressure	No agitation	Orbital shake
BSA 1.0 mg/mL (66,000 MW)				
5,000 MWCO PES	22	75	25	96%
10,000 MWCO PES	16	60	20	96%
30,000 MWCO PES	16	60	20	94%
IgG 0.25 mg/mL (160,000 MW)				
50,000 MWCO PES	20	70	30	94%
100,000 MWCO PES	20	85	30	90%
Latex beads 0.004% in DMEM + 10% FCS (0.055 µm)				
300,000 MWCO PES	35	–	120	99%
Latex beads 0.004% in DMEM + 10% FCS (0.24 µm)				
1,000,000 MWCO* PES	4	5	4	99%

\* 2,000 g in centrifuge, 2 bar (29 psi) pressure

### Ordering Information

Vivacell 100 Polyethersulfone with Polypropylene Concentrator Cap	Qty./Pkg.	Prod. No.
5,000 MWCO	2	VC1011
5,000 MWCO	10	VC1012
10,000 MWCO	2	VC1001
10,000 MWCO	10	VC1002
30,000 MWCO	2	VC1021
30,000 MWCO	10	VC1022
50,000 MWCO	2	VC1031
50,000 MWCO	10	VC1032
100,000 MWCO	2	VC1041
100,000 MWCO	10	VC1042
300,000 MWCO	2	VC1051
300,000 MWCO	10	VC1052
1,000,000 MWCO	2	VC1061
1,000,000 MWCO	10	VC1062
0.2 µm	2	VC1071
0.2 µm	10	VC1072

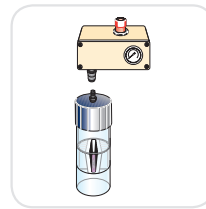
Vivacell 100 Accessories	Qty./Pkg.	Prod. No.
Air pressure controller (APC), complete with pressure gauge, regulator, over-pressure safety valve, female connector, 1 m extension line (4 mm pressure tubing) with male and female connectors and 1 m of 6 mm inlet tubing	1	VCA002
Female connector	1	VCA010
Male connector	1	VCA011
4 mm pressure tubing (3 m)	1	VCA012
Replacement seal made from TPE-V	10	VCA014
Vivacell 100 pressure head with replacement seals (5)	1	VCA800



#### Centrifuge

use with polypropylene concentrator cap in swing out rotor

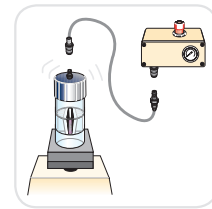
- Process convenience
- Low shear, non-foaming
- Less visual control



#### Pressure

use with pressure head VCA800

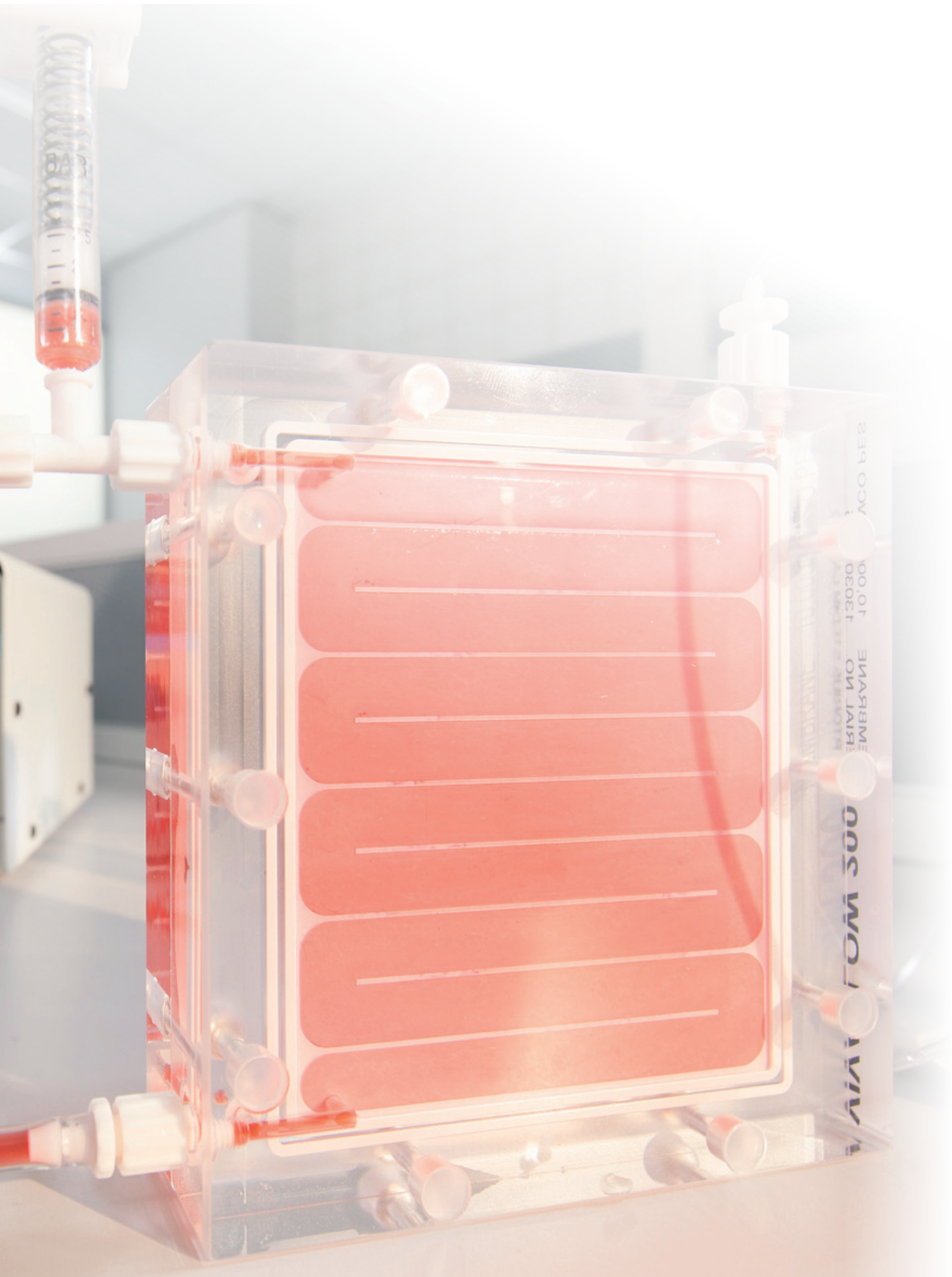
- Simplicity and the highest process control
- Ideal for refrigerated use
- Slower concentrations



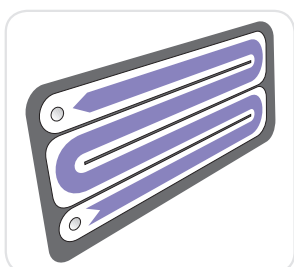
#### Pressure-Shake

use with pressure head VCA800

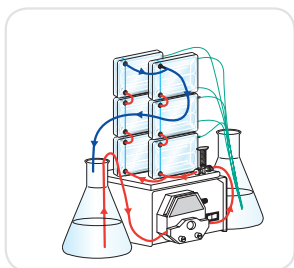
- Speed and process control
- Ideal for single samples



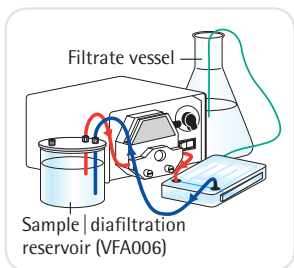
## ■ Vivaflow® 50



Flip-flow recirculation path



Multiple modules



Single module

### 100 mL to 3 L Samples

The unique, patented Vivaflow®\* 50 system provides ease of use, performance, flexibility and economy that are unrivaled by any laboratory or pilot-scale filtration system on the market.

### Unique Features

- The thin-channel, flip-flow recirculation path provides high crossflow velocities with minimum pump requirements
- No need for pressure holders
- Crystal clear for simple checking of remaining hold-up volume and membrane status
- Unique interlocking modules with series connectors for easy scale up
- Disposable

### Unique Performance

- A single 50 cm<sup>2</sup> module will typically reduce 500 mL to less than 15 mL in under 50 minutes
- Less than 10 mL minimum system recirculation for the highest concentrations
- Less than 500 µL non-recoverable hold-up volume
- Nearly total recoveries achievable with a single 10 mL rinse

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

## □ Specifications

### Vivaflow® 50

Dimensions	Overall L×H×W	107 mm × 84 mm × 25 mm
	Channel W×H	15 mm × 0.3 mm
	Active membrane area	50 cm <sup>2</sup>
	Hold-up volume (module)	1.5 mL
	Minimum recirculation volume	< 10 mL
	Non-recoverable hold-up	< 0.5 mL
Operating conditions	Pump flow	200 mL/min to 400 mL/min
	Maximum pressure	3 bar (45 psi)
	Maximum temperature	60°C
Materials of construction	Main housing	Polycarbonate
	Flow channel	TPX (PMP)
	Membrane support	TPX (PMP)
	Seals and O-rings	Silicone
	Pressure indicator	Polypropylene, SS spring
	Flow restrictor	Polypropylene
	Fittings	Nylon
	Tubing	PVC (medical grade)

\*) Vivaflow® is a registered trademark in the U.S., Japan and the European Union.

**Performance Characteristics**

	<b>Time to concentrate up to 20× [min.] at 3 bar inlet pressure, 20°C</b>			
	Single device 250 mL start volume	Three devices 1 L start volume	Solute recovery % Direct      10 mL rinse	
<b>BSA 1.0 mg/mL (66,000 MW)</b>				
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%
50,000 MWCO PES	20	29	92%	98%
<b>γ Globulins 1.0 mg/mL (160,000 MW)</b>				
100,000 MWCO PES	43	62	92%	98%
100,000 MWCO RC	40	58	92%	98%
<b>Yeast 1.0 mg/mL (S. Cerevisiae)</b>				
0.2 μm PES	33	47	92%	98%

**Ordering Information**

<b>Vivaflow® 50*</b>	<b>Qty./Pkg.</b>	<b>Prod. No.</b>
3,000 MWCO PES	2	VF05P9
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
1,000,000 MWCO PES	2	VF05P6
0.2 μm PES	2	VF05P7
100,000 MWCO RC	2	VF05C4

\*) Vivaflow® 50 modules include filtrate tube, size 16 peristaltic tubing, flow restrictors and fittings.

**Vivaflow® 50 Complete Set of Accessories**

Pump (230 V), Easy Load pump head (size 16), tubing, 500 mL sample   diafiltration reservoir, module stand, pressure indicator, T-connectors, series interconnectors	1	VFS502
Pump (115 V), Easy Load pump head (size 16), tubing, 500 mL sample   diafiltration reservoir, module stand, pressure indicator, T-connectors, series interconnectors	1	VFS504



**PVC Tubing and Fittings**

Size 16 PVC pump tubing (3 m, 3.2 × 1.6 mm)	VFA004
Flow restrictor set (2 × 0.4 mm, 0.6 mm, 0.8 mm)	VFA009
T-connectors for running 2 stacks (2 units)	VFA030
Series interconnectors (6 units)	VFA031
Female luer fittings (10 units)	VFA032
VF50 tubing kit (2 × 1 m size 16 PVC tubing with inlet fittings, 2 × 50 cm size 16 PVC tubing with 0.6 mm flow restrictors, 1 × series interconnector)	VFA034
Flow restrictor 0.6 mm (6 units)	VFA035

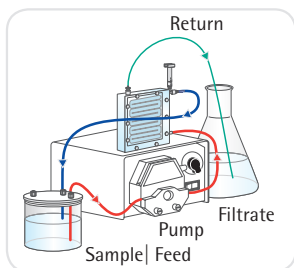
**Accessories**

Masterflex economy drive variable speed peristaltic pump (230 V)	VFP001
Masterflex economy drive variable speed peristaltic pump (115 V)	VFP002
500 mL sample and/or diafiltration reservoir	VFA006
Masterflex Easy Load pump head – size 16	VFA012
Vivaflow® 50 stand	VFA016
Pressure indicator (1 to 3 bar [15 psi to 45 psi])	VFA020

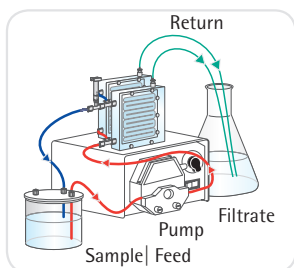
Visit us at [www.sartorius.com/Vivaflow50](http://www.sartorius.com/Vivaflow50) to get additional info. Here you can find instructions on how to use Vivaflow® 50 for

- Measurement of soluble trace metals in seawater
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses

## Vivaflow<sup>®</sup> 50R



Vivaflow<sup>®</sup> 50R – Single module



Vivaflow<sup>®</sup> 50R – Two modules

### 100 mL to 1 L Samples

Concentrate 100 mL to under 20 mL in just a few minutes or concentrate one liter 50 times in less than 60 minutes. Alternatively, speed up your process by using two Vivaflow<sup>®</sup> 50R units in parallel and concentrate 1 liters in under 30 min.

Vivaflow<sup>®</sup> 50R is a plug-and-play laboratory crossflow cassette for concentrating up to 1 L aqueous samples. The active membrane area per device is 50 cm<sup>2</sup>.

One unit comes with all the necessary accessories for running the device with a laboratory pump and a size 16 pump head. For speeding up concentration, two cassettes can be run simultaneously.

- Fast and easy protein sample concentration
- Reusable
- Concentrates volumes from 0.1 L to 1 L
- Optimal for concentration of culture supernatants and viruses
- The most compact crossflow cassette with a premium Hydrosart<sup>®</sup> membrane

## Specifications

### Vivaflow<sup>®</sup> 50R

Dimensions	Overall L × H × W	100 mm × 100 mm × 24 mm
	Channel W × H	7.5 mm × 0.4 mm
	Active membrane area	50 cm <sup>2</sup>
	Hold-up volume (module)	1.7 mL
	Min. recirculation volume	10 mL
Operating conditions	Non-recoverable hold-up	< 0.5 mL
	Pump flow	200 mL/min to 400 mL/min
	Maximum pressure	4 bar (60 psi)
Materials of construction	Maximum temperature	60°C
	Main housing	Acrylic
	Flow channel	Acrylic
	Membrane support	Polypropylene
	Seals and O-rings	Silicone
	Pressure indicator	Polypropylene, SS spring
	Flow restrictor	Polypropylene
Fittings	Nylon	
Tubing	PVC (medical grade)	

### Performance Characteristics

	Time to concentrate up to 20× [min.] at 3.0 bar inlet   2.5 bar outlet pressure, 20°C			
	Start volume	Average flux	Recovery %	
	250 mL	mL/min	Direct	25 mL rinse
Lysozyme 0.25 mg/mL (14,000 MW)				
5,000 MWCO Hydrosart <sup>®</sup>	70	3.4	96%	98%
10,000 MWCO Hydrosart <sup>®</sup>	23	10.3	94%	96%
BSA 1.0 mg/mL (66,000 MW)				
10,000 MWCO Hydrosart <sup>®</sup>	24	9.9	98%	> 99%
30,000 MWCO Hydrosart <sup>®</sup>	15	15.8	97%	> 99%
γ Globulins 1.0 mg/mL (150,000 MW)				
100,000 MWCO Hydrosart <sup>®</sup>	46	5.2	97%	> 99%

**Performance Characteristics**

	<b>Time to concentrate up to 20× [min.] at 3.0 bar inlet   2.5 bar outlet pressure, 20°C</b>			
	Start volume 250 mL	Average flux mL/min	Recovery % Direct	25 mL rinse
Start volume 1 L (one Vivaflow® 50R at 3 bar) 10,000 MWCO Hydrosart® BSA 1.0 mg/mL	95	10.0	98%	> 99%
Start volume 1 L (two Vivaflow® 50R in parallel at 3 bar) 10,000 MWCO Hydrosart® BSA 1.0 mg/mL	48	19.8	98%	> 99%

**Ordering Information**

<b>Vivaflow® 50R*</b>	<b>Qty./Pkg.</b>	<b>Prod. No.</b>
5,000 MWCO Hydrosart®	1	VF05H1
10,000 MWCO Hydrosart®	1	VF05H0
30,000 MWCO Hydrosart®	1	VF05H2
100,000 MWCO Hydrosart®	1	VF05H4

\*) Vivaflow® 50R modules include pressure indicator, flow restrictor and size 16 pvc peristaltic tubing and fittings.

**Vivaflow® 50R Complete Set of Accessories**

Pump (230 V), Easy Load pump head (size 16), tubing, 500 mL sample   diafiltration reservoir	1	VFS202
Pump (115 V), Easy Load pump head (size 16), tubing, 500 mL sample   diafiltration reservoir	1	VFS204

**Tubing and Fittings**

Size 16 pvc pump tubing and Luer fittings (3 m, 3.2 × 1.6 mm)	1	VFA004
T-connectors for running 2 units	2	VFA030
Flow restrictor set (2 × 0.4 mm, 0.6 mm, 0.8 mm)	6	VFA009
Female luer fittings – size 16	10	VFA032
Flow restrictors 0.6 mm	6	VFA035
Female luer fittings – size 15	10	VFA036

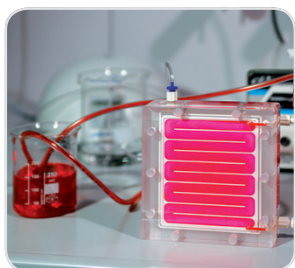
**Accessories**

Masterflex economy drive variable speed peristaltic pump (230 V)	1	VFP001
Masterflex economy drive variable speed peristaltic pump (115 V)	1	VFP002
500 mL sample and   or diafiltration reservoir	1	VFA006
Masterflex Easy Load pump head – size 16	1	VFA012

Visit us at [www.sartorius.com/Vivaflow50R](http://www.sartorius.com/Vivaflow50R) to get additional info.  
Here you can find instructions on how to use Vivaflow® 50R for

- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses

## ■ Vivaflow<sup>®</sup> 200



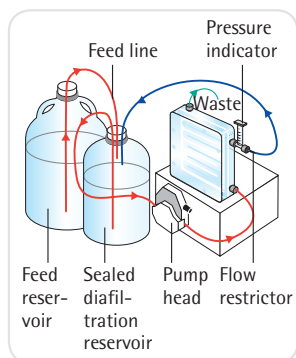
### 500 mL to 5 L Samples

Concentrate 250 mL to under 20 mL in just a few minutes or concentrate one liter 50 times in less than 30 minutes. Alternatively, use two Vivaflow<sup>®</sup> 200 units in parallel and concentrate 5 liters in under 75 minutes.

Nearly total sample recoveries can be expected with most solutions.

The standard economy package comes complete with tubing, pressure indicator, flow restrictor and high-pressure pump tubing. All you need is a peristaltic pump capable of handling 6.4 mm OD (size 16) tubing. Should your pump head require larger tubing, just use the interconnector provided to attach your own peristaltic tubing to this standard product.

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



Vivaflow<sup>®</sup> 200 setup for diafiltration

## □ Specifications

### Vivaflow 200

Dimensions	Overall L × H × W	126 mm × 138 mm × 38 mm
	Channel W × H	10 mm × 0.4 mm
	Active membrane area	200 cm <sup>2</sup>
	Hold-up volume (module)	5.3 mL
	Min. recirculation volume	< 20 mL
	Non-recoverable hold-up	< 2 mL
Materials of construction	Main housing	Acrylic
	Flow channel	Acrylic
	Membrane support	Polypropylene
	Seals and O-rings	Silicone
	Pressure indicator	Polypropylene, SS spring
	Flow restrictor	Polypropylene
	Fittings	Nylon
Tubing	PVC (medical grade)	
Operating conditions	Pump flow	200 mL/min to 400 mL/min
	Maximum pressure	4 bar (60 psi)
	Maximum temperature	60°C

**Performance Characteristics**

	<b>Time to concentrate up to 20× [min.] at 3 bar inlet pressure, 20°C</b>			
	Start volume 1 L	Average flux mL/min	Recovery % Direct	25 mL rinse
Lysozyme 0.25 mg/mL (14,000 MW)				
2,000 MWCO Hydrosart®	160	6	97%	> 99%
3,000 MWCO PES	180	5	97%	> 99%
BSA 1.0 mg/mL (66,000 MW)				
5,000 MWCO PES	29	33	98%	> 99%
5,000 MWCO Hydrosart®	70	14	98%	> 99%
10,000 MWCO PES	23	41	96%	> 99%
10,000 MWCO Hydrosart®	35	27	98%	
30,000 MWCO PES	25	38	96%	99%
30,000 MWCO Hydrosart®	20	48	96%	> 99%
50,000 MWCO PES	22	43	96%	98%
γ Globulins 1.0 mg/mL (average 160,000 MW)				
100,000 MWCO PES	54	18	96%	99%
Yeast 1.0 mg/mL (S. Cerevisiae)				
0.2 μm PES	11	86	92%	98%
Dilute solute concentration, start volume 1 L at 3 bar, 10,000 MWCO PES				
BSA 0.001 mg/mL	18	52	90%	98%
BSA 0.01 mg/mL	20	47	92%	98%
BSA 0.1 mg/mL	21	45	94%	99%
Start volume 5 L (two Vivaflow® 200 in parallel at 3 bar) 10,000 MWCO PES				
BSA 1.0 mg/mL (66,000 MW)	67	70	97%	> 99%

## □ Ordering Information

Vivaflow® 200*	Qty./Pkg.	Prod. No.
3,000 MWCO PES	1	VF20P9
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
0.2 µm PES	1	VF20P7
2,000 MWCO Hydrosart®	1	VF20H9
5,000 MWCO Hydrosart®	1	VF20H1
10,000 MWCO Hydrosart®	1	VF20H0
30,000 MWCO Hydrosart®	1	VF20H2
100,000 MWCO Hydrosart®	1	VF20H4

\*) Vivaflow® 200 modules include pressure indicator, flow restrictor and size 16 PVC peristaltic tubing and fittings.

### Vivaflow® 200 Complete Set of Accessories

Pump (230 V), Easy Load pump head (size 16), tubing, 500 mL sample   diafiltration reservoir	1	VFS202
Pump (115 V), Easy Load pump head (size 16), tubing, 500 mL sample   diafiltration reservoir	1	VFS204

### Accessories

Masterflex economy drive variable speed peristaltic pump (240 V)	VFP001
Masterflex economy drive variable speed peristaltic pump (115 V)	VFP002
500 mL sample and   or diafiltration reservoir	VFA006
Masterflex Easy Load pump head – size 16	VFA012
Masterflex Easy Load pump head – size 15	VFA013

### Tubing and Fittings

Size 15 PVC pump tubing and Luer fittings (3 m, 4.8 mm × 2.6 mm)	VFA003
Size 16 PVC pump tubing and Luer fittings (3 m, 3.2 mm × 1.6 mm)	VFA004
Y-connector (size 15 to 2 × size 16)	VFA005
Flow restrictor set (2 × 0.4 mm, 0.6 mm, 0.8 mm)	VFA009
Female luer fittings, size 16 (10 units)	VFA032
Flow restrictors 0.6 mm (6 units)	VFA035
Female luer fittings, size 15 (10 units)	VFA036

Visit us at [www.sartorius.com/Vivaflow200](http://www.sartorius.com/Vivaflow200) to get additional info.  
Find instructions on how to use Vivaflow® 200 for

- The measurement of soluble trace metals in seawater
- The workflow in protein research laboratories
- Preparation of biological nanoparticles and medical nanocarriers
- Concentration and purification of viruses
- Concentrating hybridoma supernatants prior to affinity chromatography

## ■ Vivapore® Solvent Absorption Concentrators



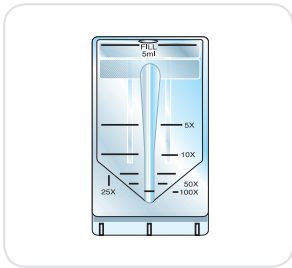
### 3 mL to 20 mL Samples

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.

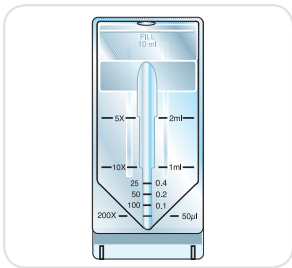
Just fill the unit with the solution to be concentrated, wait for the desired concentration level to be achieved and then pipette the concentrated sample from the bottom of the reservoir.

Vivapore® is ideal for general-purpose laboratory concentration and purification prior to further analysis. It is particularly suited for labile solutions that can denature with alternative shear- or pressure-inducing methods or that 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® 5



Vivapore® 10|20

### □ Specifications

	Vivapore® 5	Vivapore® 10 20
Membrane material	PES	PES
Membrane MWCO	7,500	7,500
Membrane surface area	20 cm <sup>2</sup>	28 cm <sup>2</sup>
Reservoir material	SAN	SAN
Volume range	1 mL to 5 mL	2 mL to 10 mL   20 mL*
Minimum concentrate volume	50 µL	50 µL
Vivapore® overall dimensions		
Width (mm)	42	46
Height (mm)	82	100

### Typical Performance Characteristics

Product	Time to concentrate up to 10× [min.]			Concentrate recovery %		
	VP5	VP10 20	VP10 20*	VP5	VP10 20	VP10 20*
Start volume	5 mL	10 mL	20 mL	5 mL	10 mL	20 mL
Cytochrome c (12,600 MW)	0.25 mg/mL	0.25 mg/mL	0.1 mg/mL	0.25 mg/mL	0.25 mg/mL	0.1 mg/mL
7,500 MWCO PES	35	75	150	90%	90%	92%
BSA (66,000 MW)						
7,500 MWCO PES	30	55	115	92%	92%	92%
IgG (160,000 MW)						
7,500 MWCO PES	40	70	160	75%	77%	78%

\* with additional reservoir

\*) to concentrate 20 mL please use the 10 mL expansion reservoir (VPA006)



**Performance Characteristics**

Product	Time to concentrate up to 50× [min.]			Concentrate recovery %		
	VP5	VP10 20	VP10 20*	VP5	VP10 20	VP10 20*
Start volume	5 mL	10 mL	20 mL	5 mL	10 mL	20 mL
Cytochrome c (12,600 MW) 7,500 MWCO PES	65	70	160	91%	88%	90%
BSA (66,000 MW) 7,500 MWCO PES	45	50	105	90%	90%	92%
IgG (160,000 MW) 7,500 MWCO PES	50	65	140	53%	65%	74%

\* with additional reservoir

**Ordering Information**

Vivapore® 5*	Qty./Pkg.	Prod. No.
7,500 MWCO PES	4	VP0503
7,500 MWCO PES	30	VP0501

\* includes stand and recovery pipettes

**Requires Stand**

7,500 MWCO PES	100	VP0502
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**Vivapore® 10|20\***

7,500 MWCO PES	4	VP2003
7,500 MWCO PES	30	VP2001

\* includes stand and recovery pipettes

**Requires Stand**

7,500 MWCO PES	100	VP2002
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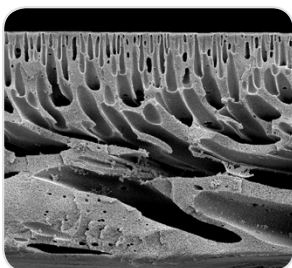
**Accessories**

Disposable stands for 4 units	6	VPA002
Plastic recovery pipettes (Vivapore® 10 20)	100	VPA005
10 mL expansion reservoir (Vivapore® 10 20)	10	VPA006
Plastic recovery pipettes (Vivapore® 5)	100	VPA007

Visit us at [www.sartorius.com/lab-filtration](http://www.sartorius.com/lab-filtration) to get additional info. Here you can find instructions on how to use Vivapore® Solvent Absorption Concentrators and Vivaspin® products for the concentration of urine samples.

## Ultrafiltration Membrane Filters

PES 146, CTA 145 and Hydrosart® 144



### Polyethersulfone (PES)

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 hydrophilic interactions and are usually preferred for their low fouling characteristics, exceptional flux and broad pH range.

### Cellulose Triacetate (CTA)

High hydrophilicity and exceptionally low non-specific binding characterize this membrane. Cast without any membrane

support that could trap or bind passing microsolute, these membranes are to be ideal for sample cleaning and protein removal and when high recovery of the filtrate solution is of primary importance.

### Hydrosart®

These membranes are also highly hydrophilic and are often preferred for their high protein recovery when processing very dilute solutions. Resistance to autoclaving, ease of cleaning and extended chemical resistance also characterize this type of membrane.

## Specifications

### Specifications for Polyethersulfone, Type 146

Thickness	120 µm	
pH range	1–14	
Water flux	MWCO 10,000	0.2 mL/min/cm <sup>2</sup>
Protein retention	Cytochrome C	95%

### Specifications for Cellulose Triacetate, Type 145

Thickness	120 µm	
pH range	4–8	
Water flux	MWCO 10,000	0.11 mL/min/cm <sup>2</sup>
Protein retention	Cytochrome C	90%

### Specifications for Hydrosart®, Type 144

Thickness	180 µm	
pH range	1–13	
Water flux	MWCO 10,000	0.08 mL/min/cm <sup>2</sup>
Protein retention	Cytochrome C	99%

## □ Ordering Information

### Polyethersulfone Membrane Filters, Type 146

Diameter in mm	MWCO	Qty./Pkg.	Prod. No.
47	1,000 daltons	10	14609--47-----D
63	1,000 daltons	10	14609--63-----D
76	1,000 daltons	10	14609--76-----D
25	5,000 daltons	10	14629--25-----D
47	5,000 daltons	10	14629--47-----D
63	5,000 daltons	10	14629--63-----D
76	5,000 daltons	10	14629--76-----D
25	10,000 daltons	10	14639--25-----D
63	10,000 daltons	10	14639--63-----D
76	10,000 daltons	10	14639--76-----D
150	10,000 daltons	10	14639-150-----D
25	30,000 daltons	10	14659--25-----D
63	30,000 daltons	10	14659--63-----D
76	30,000 daltons	10	14659--76-----D
25	50,000 daltons	10	14650--25-----D
47	50,000 daltons	10	14650--47-----D
76	50,000 daltons	10	14650--76-----D
25	300,000 daltons	10	14679--25-----D
47	300,000 daltons	10	14679--47-----D
76	300,000 daltons	10	14679--76-----D

### Cellulose Triacetate Membrane Filters, Type 145

Diameter in mm	MWCO	Qty./Pkg.	Prod. No.
25	5,000 daltons	10	14529--25-----D
47	5,000 daltons	10	14529--47-----D
25	10,000 daltons	10	14539--25-----D
47	10,000 daltons	10	14539--47-----D
50	10,000 daltons	10	14539--50-----D
25	20,000 daltons	10	14549--25-----D
43	20,000 daltons	10	14549--43-----D
47	20,000 daltons	10	14549--47-----D
47	20,000 daltons	100	14549--47-----N
63	20,000 daltons	10	14549--63-----D

**Hydrosart® Membrane Filters, Type 144**

<b>Diameter in mm</b>	<b>MWCO</b>	<b>Qty./Pkg.</b>	<b>Prod. No.</b>
25	5,000 daltons	10	14429--25-----D
44	5,000 daltons	10	14429--44-----D
63	5,000 daltons	10	14429--63-----D
76	5,000 daltons	10	14429--76-----D
25	10,000 daltons	10	14439--25-----D
47	10,000 daltons	10	14439--47-----D
63	10,000 daltons	10	14439--63-----D
76	10,000 daltons	10	14439--76-----D
25	30,000 daltons	10	14459--25-----D
47	30,000 daltons	10	14459--47-----D
63	30,000 daltons	10	14459--63-----D
76	30,000 daltons	10	14459--76-----D



## ■ Vivacon® 500

For DNA Sample Desalting and Concentration



### Reproducible DNA and Protein Sample Desalting and Concentration

Vivacon® 500 centrifugal concentrators offer the optimal solution for DNA and protein concentration and buffer exchange applications. For optimal performance with highly dilute samples, e.g. forensic samples, Vivacon® 500 incorporates the patented regenerated cellulose membrane Hydrosart®.

High recoveries and excellent reproducibilities are combined with convenience offered by the molecular weight cutoff printed on the individual Vivacon® 500 units.

As Vivacon® 500 can be respun after sample processing, this ensures complete concentrate recovery, which is especially important when working with low-sample concentrations.

### Vivacon® 500-PCR Grade

To use DNA amplification technologies, any traces of DNA originating from the equipment need to be eliminated.

Vivacon® 500-PCR Grade units are treated with ethylene oxide (ETO) in a validated process to deactivate all traces of DNA that might interfere with subsequent amplification procedures.

References: K. Shaw et al., Int. J. Legal Med. (2008) 122: 29–33

## □ Specifications

### Vivacon® 500

Concentrator capacity	Fixed-angle rotor	0.5 mL
Dimensions	Total length (concentration)	45 mm
	Total length (backspin)	47.5 mm
	Width	12.4 mm
	Active membrane area	0.32 cm <sup>2</sup>
	Hold-up volume of membrane and support	< 5 µL
	Dead-stop volume (40° rotor)	5 µL
Materials of construction	Body	Polycarbonate
	Filtrate vessel	Polypropylene
	Membrane	Hydrosart®, Cellulose Acetate

### Conversion Table for Hydrosart® MWCO to Nucleotide Cutoff

Membrane	MWCO	Double-Stranded Nucleotide Cutoff (bp)
Hydrosart®	2 kDa	> 10
Hydrosart®	10 kDa	> 30
Hydrosart®	30 kDa	> 50
Hydrosart®	50 kDa	> 300
Hydrosart®	100 kDa	> 600
Cellulose Acetate	125 kDa	> 650

**Performance Characteristics for DNA**

Start volume 0.5 mL, sample concentration 50 mg/mL.

	Sample size (bp)	Time to concentrate up to 30× [min.] at 20°C	Concentrate recovery %	g-force (xg)
2,000 MWCO	10	60 min.	93%	7,500
10,000 MWCO	30	25 min.	94%	7,500
30,000 MWCO	50	18 min.	88%	5,000
50,000 MWCO	300	18 min.	91%	5,000
100,000 MWCO	600	10 min.	87%	3,000
125,000 MWCO	650	12 min.	85%	2,000
125,000 MWCO	900	9 min.	94%	3,000

**Performance Characteristics for Proteins**

Start volume 0.5 mL, sample and concentration of proteins as specified in table.

	Sample	Time to concentrate up to 30× [min.] at 20°C	Concentrate recovery %	g-force (xg)
2,000 MWCO	0.25 mg/mL cytochrome c	30 min.	95%	14,000
10,000 MWCO	0.25 mg/mL cytochrome c	15 min.	92%	14,000
30,000 MWCO	1.0 mg/mL BSA	10 min.	95%	14,000
50,000 MWCO	1.0 mg/mL BSA	10 min.	92%	14,000
100,000 MWCO	1.0 mg/mL bovine IgG	11 min.	90%	8,000
125,000 MWCO	1.0 mg/mL bovine IgG	10 min.	81%	8,000

 **Ordering Information**

Vivacon® 500	Qty./Pkg.	Prod. No.
2,000 MWCO	25	VN01H91
2,000 MWCO	100	VN01H92
10,000 MWCO	25	VN01H01
10,000 MWCO	100	VN01H02
30,000 MWCO	25	VN01H21
30,000 MWCO	100	VN01H22
50,000 MWCO	25	VN01H31
50,000 MWCO	100	VN01H32
100,000 MWCO	25	VN01H41
100,000 MWCO	100	VN01H42
125,000 MWCO	25	VN01H81
125,000 MWCO	100	VN01H82



<b>Vivacon® 500</b>	<b>Qty./Pkg.</b>	<b>Prod. No.</b>
Sample kit L (4 units each of 2 kDa, 10 kDa, 30 kDa)	12	VN01HL12
Sample kit H (4 units each of 30 kDa, 50 kDa, 100 kDa)	12	VN01HH12
<b>Vivacon® 500-PCR Grade</b>	<b>Qty./Pkg.</b>	<b>Prod. No.</b>
30,000 MWCO	25	VN01H21ETO
30,000 MWCO	100	VN01H22ETO
50,000 MWCO	25	VN01H31ETO
50,000 MWCO	100	VN01H32ETO
100,000 MWCO	25	VN01H41ETO
100,000 MWCO	100	VN01H42ETO
125,000 MWCO	25	VN01H81ETO
125,000 MWCO	100	VN01H82ETO
<b>Accessories</b>	<b>Qty./Pkg.</b>	<b>Prod. No.</b>
Collection tube	100	VNCT01

Visit us at [www.sartorius.com/Vivacon500](http://www.sartorius.com/Vivacon500) to get additional info.  
Find instructions on how to use Vivacon® 500 for

- Primer removal after a PCR reaction
- Filter aided sample preparation (FASP) for proteomic analysis by mass spectrometry

## Vivacon® 2

For DNA Sample Desalting and Concentration



### Reproducible DNA Sample Desalting and Concentration

Vivacon® 2 centrifugal concentrators offer the optimal solution for DNA and protein concentration and buffer exchange applications. For optimal performance with highly dilute samples, e.g. forensic samples, Vivacon® 2 incorporates the patented regenerated cellulose membrane Hydrosart®.

High recoveries and excellent reproducibilities are combined with the convenience provided by the volume

graduation and molecular weight cutoff printed on the individual Vivacon® 2 units.

As Vivacon® 2 can be respun after sample processing, this ensures complete concentrate recovery, which is especially important when working with low-sample concentrations.

### Vivacon® 2-PCR Grade

Vivacon® 2-PCR Grade units are treated with ethylene oxide (ETO) in a validated process to deactivate all traces of DNA that might interfere with subsequent amplification procedures.

## Specifications

Concentrator capacity	Fixed-angle rotor	2 mL
Dimensions	Total length (concentration)	125 mm
	Total length (backspin)	115 mm
	Width	16 mm
	Active membrane area	0.95 cm <sup>2</sup>
	Hold-up volume membrane and support	10 µL
	Dead-stop volume (25° rotor)	55 µL
Materials of construction	Body	Polycarbonate
	Filtrate vessel	Polypropylene
	Backspin vial	Polypropylene
	Concentrator cap	Polypropylene
	Membrane	Hydrosart®, Cellulose Acetate

### Conversion Table for Hydrosart® MWCO to Nucleotide Cutoff

Membrane	MWCO	Double-Stranded Nucleotide Cutoff (bp)
Hydrosart®	2 kDa	> 10
Hydrosart®	10 kDa	> 30
Hydrosart®	30 kDa	> 50
Hydrosart®	50 kDa	> 300
Hydrosart®	100 kDa	> 600
Cellulose Acetate	125 kDa	> 650

### Performance Characteristics for DNA

Start volume 2 mL, sample concentration 50 mg/mL.

	Sample size (bp)	Time to concentrate up to 30× [min.] at 20°C	Concentrate recovery %	g-force (xg)
2,000 MWCO	10	120 min.	92%	7,500
10,000 MWCO	30	60 min.	94%	5,000
30,000 MWCO	50	60 min.	95%	2,500
50,000 MWCO	300	45 min.	96%	2,500
100,000 MWCO	600	30 min.	93%	2,500
125,000 MWCO	650	30 min.	88%	2,500
125,000 MWCO	900	30 min.	89%	2,500

**Performance Characteristics for Proteins**

Start volume 2 mL, sample and concentration of proteins as specified in table.

	<b>Sample</b>	<b>Time to concentrate up to 30× [min.] at 20°C</b>	<b>Concentrate recovery %</b>	<b>g-force (xg)</b>
2,000 MWCO	0.25 mg/mL cytochrome c	120 min.	95%	7,500
10,000 MWCO	0.25 mg/mL cytochrome c	90 min.	96%	5,000
30,000 MWCO	1.0 mg/mL BSA	40 min.	96%	5,000
50,000 MWCO	1.0 mg/mL BSA	30 min.	94%	5,000
100,000 MWCO	1.0 mg/mL bovine IgG	30 min.	92%	5,000
125,000 MWCO	1.0 mg/mL bovine IgG	27 min.	81%	5,000

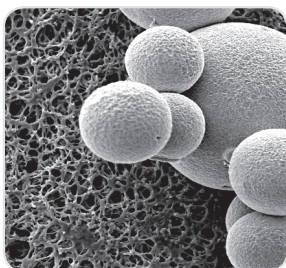
 **Ordering Information**

<b>Vivacon® 2</b>	<b>Qty./Pkg.</b>	<b>Prod. No.</b>
2,000 MWCO	25	VN02H91
2,000 MWCO	100	VN02H92
10,000 MWCO	25	VN02H01
10,000 MWCO	100	VN02H02
30,000 MWCO	25	VN02H21
30,000 MWCO	100	VN02H22
50,000 MWCO	25	VN02H31
50,000 MWCO	100	VN02H32
100,000 MWCO	25	VN02H41
100,000 MWCO	100	VN02H42
125,000 MWCO	25	VN02H81
125,000 MWCO	100	VN02H82
<b>Vivacon® 2-PCR Grade</b>	<b>Qty./Pkg.</b>	<b>Prod. No.</b>
30,000 MWCO	25	VN02H21ETO
30,000 MWCO	100	VN02H22ETO
50,000 MWCO	25	VN02H31ETO
50,000 MWCO	100	VN02H32ETO
100,000 MWCO	25	VN02H41ETO
100,000 MWCO	100	VN02H42ETO
125,000 MWCO	25	VN02H81ETO
125,000 MWCO	100	VN02H82ETO



## Vivapure®

### Ion Exchange Protein Purification Products



Chromatography gel beads (right) are shown on top of a membrane adsorber in this SEM. The membrane adsorber pores are more than 50 times larger than bead pores.

#### Fast and Easy-to-Use Spin Columns

Vivapure® Ion Exchange (IEX) spin columns are centrifugal devices that incorporate Sartobind® membrane adsorber technology as their chromatography matrix. Vivapure® IEX spin columns make protein purification as easy as filtration. The devices are ready to use and eliminate the risk of running dry. For many protein purification applications, they replace time-consuming and tedious column chromatography.

The rapid Vivapure® IEX 1-2-3 bind-wash-elute protocol especially lends itself to screening applications, where many different samples are processed in parallel.

#### The Sartobind® Membrane Adsorber Matrix

Sartobind® IEX membrane adsorbers are based on stabilized regenerated cellulose and exhibit a microporous structure with a pore size of  $>3 \mu\text{m}$ , which is orders of magnitude larger than conventional chromatographic gel materials. This allows molecules to be transported to the ligands immobilized on the membrane adsorber by convective flow, resulting in exceptionally high flow rates.

By contrast, gel chromatography is slowed down due to diffusion limitations, as the molecules need to enter the small bead pores in order to be bound by the ligands. The porous membrane adsorber enables fast, reproducible and scalable protein purification.

#### Fast and Simple-to-Use Spin Columns

- Devices are ready to use
- They make protein purification as simple as filtration

#### Reproducible Results

- No column packing necessary as the devices are ready to use
- Membrane adsorber spin columns cannot crack or run dry

#### Centrifugal Devices

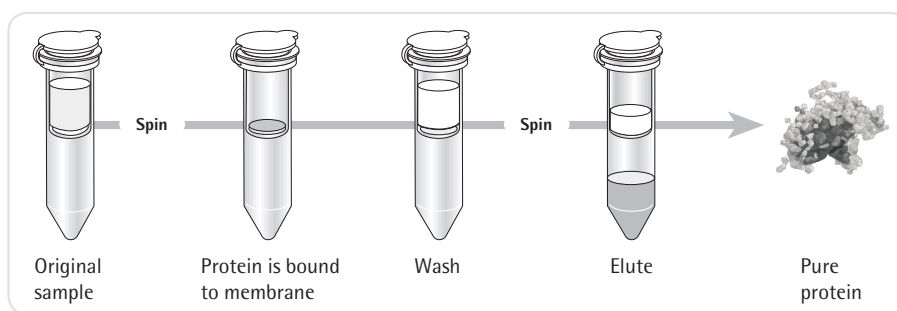
- Offer the possibility of working in parallel

#### Low Bed Volume

- Small membrane adsorber bed volumes allow working with lower buffer amounts, resulting in concentrated elution fractions

#### Scalable Product Range

- Process-scale modules are available with the same Sartobind® IEX membrane adsorber matrix



Fast and easy protein purification with Vivapure® spin columns



Vivapure® Mini-400 | 500 µL  
Binding capacities:  
1 mg to 4 mg



Vivapure® Maxi-19 | 20 mL  
Binding capacities:  
15 mg to 80 mg

## Specifications

### Available Formats

Vivapure® IEX Products	Application
Vivapure® Mini spin columns	<ul style="list-style-type: none"> <li>– Sample fractionation</li> <li>– Purification condition scouting</li> <li>– Small-scale purification</li> </ul>
Vivapure® Maxi spin columns	<ul style="list-style-type: none"> <li>– Large-scale sample fractionation</li> <li>– One-step protein purification   concentration</li> <li>– Polishing of His-tagged protein</li> </ul>

### Membrane Availability

Functional Groups	Ion Exchanger Type
Sulfonic acid (S)	Strong acidic cation exchanger: $R-CH_2-SO_3^-Na^+$
Quaternary ammonium (Q)	Strong basic anion exchanger: $R-CH_2-N^+-(CH_3)_3Cl^-$
Diethylamine (D)	Weak basic anion exchanger: $R-CH_2-NH^+-(CH_2H_5)_2$

### Performance Characteristics

Vivapure® Spin Columns	Protein Binding Capacity* (mg)	Max. Volume per Centrifuge Run Using a Swing-Out Rotor (ml)	Max. Volume per Centrifuge Using a Fixed-Angle Rotor Run (ml)
Vivapure® Mini H	4	0.4	
Vivapure® Maxi H	60 to 80	19	10.5

\* Actual yields depend on specific protein sample and selected pH and salt conditions.  
Yields established using 1 mg/mL BSA in 25 mM Tris/HCL pH 8.0 with Vivapure® Q & D spin columns and 1 mg/mL cytochrome c in 25 mM sodium acetate buffer pH 5.5 with Vivapure® S spin columns.

## Ordering Information

Description	Spin Columns	Centrifuge Tubes	Prod. No.
<b>Vivapure® Mini Ion Exchange Spin Columns (up to 0.5 mL)</b>			
Vivapure® Mini S&T Q H starter kit	16	32	VS-IX01SQ16
Vivapure® D Mini H	24	48	VS-IX01DH24
Vivapure® Q Mini H	24	48	VS-IX01QH24
Vivapure® S Mini H	24	48	VS-IX01SH24
<b>Vivapure® Maxi Ion Exchange Spin Columns (up to 20 mL)</b>			
Vivapure® D Maxi H	8	16	VS-IX20DH08
Vivapure® Q Maxi H	8	16	VS-IX20QH08
Vivapure® S Maxi H	8	16	VS-IX20SH08

## Virus Purification and Concentration

## ■ Vivapure<sup>®</sup> Virus Purification and Concentration Kits



Recombinant virus vectors are the preferred method for a wide range of gene delivery applications. Especially adenovirus type 5 and VSV-G pseudotyped lentivirus are two frequently utilized viral vectors for in vitro and in vivo applications.

### Recombinant Adenovirus Vectors

Recombinant adenovirus vectors are versatile tools in research and therapeutic applications for gene transfer and protein expression in cell lines that have low transfection efficiency with liposomes. After entering cells, the virus remains epichromosomal – i.e., does not integrate into the host chromosome, leaving the host genome unaffected. The delivery of RNAi into cells is becoming a major application for adenovirus vectors.

### Lentivirus Vectors

Lentivirus vectors are frequently used in gene transfer studies, due to their ability of gene transfer and integration into dividing and non-dividing cells. The pseudotyped envelope with vesicular stomatitis virus envelope G (VSV-G) protein broadens their target cell range. Lentiviral vectors have been shown to deliver genes into cell types (e.g. neurons, lymphocytes and macrophages) which other retrovirus vectors could not be used for. The lentivirus vector is increasingly used to integrate siRNA efficiently in a wide variety of cell lines and primary cells, both in vitro and in vivo.

### Rapid Virus Purification by Membrane Chromatography

The Sartobind<sup>®</sup> ion exchange membrane adsorber technology used in AdenoPACK and LentiSELECT is unique in its capability to efficiently and rapidly capture and recover large virus particles. Compared with chromatography media, membrane adsorbers provide large 3,000 nm pores, allowing unrestricted access and recovery of virus from the charged adsorber surface. Convective flow through the syringe filter devices provides high-speed separations not possible with traditional chromatography, cesium chloride density gradients and ultracentrifugation methods. Sartorius membrane adsorbers with porous matrices, high capacities, low differential pressures, high flow rates and low unspecific adsorption show excellent performance in small-scale virus purification. In addition, these syringe filter devices are scalable and comply with cGMP requirements for large-volume, high-performance separation, reducing final process time ten-fold.



## ■ Adenovirus Purification with Vivapure® AdenoPACK Kits

### AdenoPACK 20|100|500

The AdenoPACK adenovirus purification and concentration kits offer researchers who need to recover up to  $3 \times 10^{13}$  purified recombinant adenovirus particles for in vitro transfection a fast, safe and easy-to-use solution. The kits include all reagents and devices necessary for clarification, purification and concentration of adenovirus type 5 from HEK293 cell cultures – all within just two hours. These straightforward kits replace time-consuming and labor-intensive 48-hour CsCl density gradients.

AdenoPACK kits are offered as AdenoPACK 20, AdenoPACK 100 and AdenoPACK 500 for the purification and concentration of adenovirus type 5 from 20 mL to 500 mL cell cultures, resulting in  $1 \times 10^{11}$  to  $3 \times 10^{13}$  purified viral particles. For each sample volume, the most convenient handling method is provided for ultimate convenience.

To this end, preparations using AdenoPACK 20 are supplied in a spin column format for centrifuges. AdenoPACK 100 is a manually operated kit in a syringe filter format\* and AdenoPACK 500 is a pump-driven kit.

\*Vivapure® AdenoPACK 100 can be alternatively be operated with a laboratory pump or an infusion pump, for which protocols are provided on our web page at [www.sartorius-stedim.com](http://www.sartorius-stedim.com). Additionally, the tubes and adaptors needed for these operating modes can be ordered.

### AdenoPACK Advantages

#### Fast and Easy Virus Purification

- Purification completed in just 2 hours
- Convenient, over 10× faster alternative to CsCl density gradient

#### Quantitative Yields

- In contrast to CsCl density gradient, the complete cell culture is used for virus purification and not only the viral pellet

#### Flexible Product Range

- Applicable from initial construct screening to large-scale virus production

#### Complete Kit

- Including filtration devices, AdenoPACK units for virus purification, Vivaspin® and all buffers

#### Low Endotoxin Levels

- High cell viability and infection rates due to endotoxin levels of  $< 0.025$  EU/mL

## □ Specifications

### Adenovirus Purification Kit Specifications

Product	AdenoPACK 20	AdenoPACK 100	AdenoPACK 500
Sample size	20 mL cell culture	20 mL to 200 mL of cell culture	500 mL of cell culture
Number of purifications	6 × 20 mL	2 × 20 mL to 60 mL 1 × 200 mL	1 × 500 mL
Virus particles (VP) per mL	Typically up to $1 \times 10^{11}$ - $10^{12}$	Typically up to $1 \times 10^{13}$	Typically up to $3 \times 10^{13}$
VP/IU	50 to 100	20 to 50	20 to 50
Processing time	Typically one hour	Typically two hours	
Endotoxin level	$< 0.025$ EU/mL	$< 0.025$ EU/mL	$< 0.025$ EU/mL



## □ Ordering Information

### Vivapure® AdenoPACK 20

Vivapure® AdenoPACK 20	VS-AVPQ020
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Vivapure® AdenoPACK 20 RT*	VS-AVPQ022
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\* AdenoPACK 20 RT does not contain Benzonase®\*\*



### Vivapure® AdenoPACK 100

Vivapure® AdenoPACK 100	VS-AVPQ101
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Vivapure® AdenoPACK 100 RT*	VS-AVPQ102
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### AdenoPACK 100 Accessories

Pump tubing set for Vivapure® AdenoPACK 100	VS-AVPA001
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\* AdenoPACK 100 RT does not contain Benzonase®\*\*



### Vivapure® AdenoPACK 500

Vivapure® AdenoPACK 500	VS-AVPQ501
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Vivapure® AdenoPACK 500 RT*	VS-AVPQ502
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\* AdenoPACK RT-kits do not contain Benzonase®\*\*

\*\* Benzonase® is a registered trademark of Merck

## ■ Lentivirus Purification with the Vivapure® LentiSELECT Kit

### LentiSELECT 40|500|1000

The LentiSELECT kits for lentivirus purification and concentration offer researchers who need to recover up to  $5 \times 10^9$  infective lentivirus particles per mL for in vitro transfection or animal studies a fast and easy-to-use solution.

These straightforward kits replace time-consuming ultracentrifugation protocols, which typically take approximately one day for large sample volumes. Vivapure® LentiSELECT thus reduces purification time to just a few hours.

LentiSELECT kits are offered as LentiSELECT 40, LentiSELECT 500 and LentiSELECT 1000 for the purification and concentration of VSV-G pseudotyped lentivirus from 40 mL to 1,000 mL cell cultures, resulting in  $8 \times 10^8$  to  $1 \times 10^{10}$  purified infective particles. The most convenient handling method is provided for each sample volume. To this end, 40 mL sample volumes are processed manually with LentiSELECT 40, while LentiSELECT 500 and 1000 are pump-driven kits.

### LentiSELECT Advantages

#### Fast and Easy Virus Purification

- Purification completed in less than one to six hours, depending on sample volume
- Kit is as easy to use as filtration

#### No Need for Expensive Instruments

- Lentivirus purification with LentiSELECT is independent of equipment, such as ultracentrifuges

#### High Virus Purity

- Achieve pure virus based on a chromatographic method for your experiments instead of a crude and variable cell culture supernatant pellet

#### Optimal for Multiple Virus Construct Screening

With LentiSELECT 40, four purification runs can be conducted in parallel with one kit

#### Complete Kits

- Including LentiSELECT units for virus purification, Vivaspin® units for concentration| buffer exchange and all buffers and syringes necessary

#### Low Endotoxin Levels

- High cell viability and infection rates due to endotoxin levels of  $< 0.025$  EU/mL

## □ Specifications

Product	LentiSELECT 40	LentiSELECT 500	LentiSELECT 1000
Sample size	40 mL cell culture	500 mL of cell culture	1,000 mL of cell culture
Number of purifications	4 × 40 mL	1 × 500 mL	1 × 1,000 mL
Virus particles (VP) per mL	Typically up to $3 \times 10^9$	Typically up to $2-5 \times 10^9$	Typically up to $4-6 \times 10^9$
VP/IU	5 to 15	5 to 15	20 to 50
Processing time	Typically up to 45 min	Typically up to 3 hours	Typically up to 6 hours
Endotoxin level	$<0.025$ EU/mL	$<0.025$ EU/mL	$<0.025$ EU/mL



### □ Ordering Information

**Vivapure® LentiSELECT 40**

Vivapure® LentiSELECT 40

VS-LVPQ040

**Vivapure® LentiSELECT 500**

Vivapure® LentiSELECT 500

VS-LVPQ500

**Vivapure® LentiSELECT 1000**

Vivapure® LentiSELECT 1000

VS-LVPQ1000







## ■ Filtration Devices

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Syringe filters are used for many routine preparation steps in laboratories all over the world. They are convenient, ready-to-use disposables for sterile filtration of liquids and removal of particles from solutions and gases. Depending on the reagents filtered, syringe filters have to fulfill certain requirements to best serve customer's application. Sartorius offers Minisart® syringe filters and filters optimized for a wide range of relatively large volumes. The filters are clean and safe as they are virtually free of leachables and extractables and reliably remove particles and microorganisms with no leakage. If you need to rely on the quality of your filtrate – whether it needs to be sterile prior to use or particulate-free before analysis – field-proven, high-quality Sartorius filter syringes are the No. 1 choice for reliable, convenient preparation steps.

#### **Our Product Range**

Minisart® syringe filters feature a housing made of medical-grade acrylic (MBS), which makes them the perfect choice for sterile filtration and clarification of additives, buffers, reagents, liquids and gases. Their effective filtration area of 6.2 cm<sup>2</sup> for liquids is the largest among premium syringe filters. The combination of the MBS housing material and surfactant-free cellulose acetate, PES or PTFE membranes, provides the lowest non-specific binding. As a result, Minisart® delivers excellent performance in filtering liquids or gases for sterilization or particle removal prior to use.

Minisart® syringe filters with a polypropylene housing are optimized for filtration prior to analysis and withstand even harsh solvents and chemicals. Due to the typical range of volumes from less than 1 mL to 100 mL, these filters are available in three different diameters with an effective filtration area of 0.07 cm<sup>2</sup>, 1.7 cm<sup>2</sup> and 4.8 cm<sup>2</sup> for the optimum filter capacity and the lowest hold-up volume.



Sartorius has developed a new, easy-to-use and straightforward filtration setup. The manually operated Claristep® Filtration System consisting of a station and filter units offers a novel way for clarifying your samples prior to analysis.

Claristep® Filter units are processed without syringe and are made of the purest materials. Another major benefit is that the contact time of the samples with the filters and the caps is extremely short, ensuring optimal, contamination-free results. The Claristep® Station consists of a base, a lid and an exchangeable tray for easy and accurate positioning of sample vials and Claristep® Filter units.

Claristep® syringeless filter units with RC membranes are optimized for solvents and aqueous solutions. They provide maximum chemical compatibility and exceptionally low non-specific binding of analytes.

Sartolab® vacuum filtration devices with 0.1 µm and 0.22 µm PES membranes for convenient filtration of 150 mL up to 1 L are ready to use and sterile. Sartolab® RF is a complete system that includes a receiver flask. Sartolab® BT Sterile is a bottle top filter without a receiver flasks. This enables customers to use a receiver bottle of their choice and to even expand filtration capacity, depending on the particle load of the filtered liquid by filling more than one receiver flask. Sartolab® 150V is a disposable vacuum filter with a pleated 0.22 µm PES membrane, which is suitable for up to 15 L of liquid.

Sartolab® P20 pressure filtration devices with a 0.2 µm SFCA or 0.2 µm and 0.45 µm PES membrane are available with or without a glass fiber prefilter, depending on your needs. Sartolab P20 is designed for up to 3 L volumes and can also be used in-line. The polycarbonate housing and membrane components are ideal for filtering liquids. The glass fiber prefilter types are ideal for filtering environmental samples that have a high particle load prior to analyzing such samples.

### Typical Applications for Filtration Devices

- Sterile filtration of liquids and gases with virtually no effect on the ingredients
- Particle removal from liquids and gases prior to downstream processes
- Venting of vials, bottles, containers, bags and bioreactors and fermenters
- Removal of precipitates and coagulates from solutions prior to use

## ■ Minisart® Syringe Filters

### Removal of Particles and Microorganisms from Liquids and Gases

Sartorius offers Minisart® syringe filters for a wide range of applications. The filters are clean and safe as they are virtually free of leachables and extractables. In addition, they reliably remove particles and microorganisms – without any leakage. Minisart® with a polypropylene housing is optimized for filtration prior to analysis and withstands even harsh solvents and chemicals. Minisart® with a housing made of medical-grade acrylic (MBS) is the perfect choice for sterile filtration and clarification of additives, buffers, reagents, liquids and gases.

### ■ A Full Range of Filters Dedicated for Various Filtration Applications



#### Sample Preparation HPLC | UHPLC | Analytics

Elimination of particles from your samples prior to HPLC or other chromatographic analysis is essential in order to maintain the integrity of your chromatography column and to maximize its operating lifetime. Minisart® syringe filters optimized for sample preparation consist of a

polypropylene housing and membrane components featuring maximum chemical compatibility and minimum extractables to ensure excellent results. Due to the typical range of volumes from less than 1 mL to 100 mL, these filters are available in three different diameters with an effective filtration area of 0.07 cm<sup>2</sup>, 1.7 cm<sup>2</sup> and 4.8 cm<sup>2</sup>. For a selection guide, please see page 65.



#### Filtration of Aqueous Liquids Clarification | Sterile Filtration

For clarification and sterilization of liquids, filtration is the optimal method. It removes all microorganisms and particles reliably, without any effects on the ingredients due to adsorption or decomposition. For optimal results, Minisart® syringe filters with an MBS housing provide a choice of

membranes with pore sizes ranging from 0.1 µm to 5 µm for high flow rates and the lowest adsorption characteristics. The effective filtration area of 6.2 cm<sup>2</sup> for the fastest filtration is the largest among premium syringe filters available, and the MBS housing is color-coded for easy pore size identification. For a list of the types offered, please see page 69.



#### Sterile Filtration and Sterile Venting Applications

Minisart® syringe filters are ideal for clarification of liquids laden with particles. For sterilization and removal of particles from air and other gases, syringe filters are optimal for sterile venting of containers, bioreactors,

fermenters and tubing systems in medical devices. Minisart® syringe filters are available with a wide choice of membranes, connectors and housing materials. For a list of the types offered, please see page 72.

## Minisart® Selection Guide





Please refer to Minisart® RC, NY or SRP for the highest chemical compatibility on page 67.

Please refer to Minisart® NML or Minisart® High Flow on page 70.

Several additional Minisart® units for venting and special purposes are shown on page 74.

Sample Composition	Aqueous		Aqueous   Solvents		
	All Aqueous Solutions Buffers, Protein Analysis	All Aqueous Solutions Tissue Culture Media	Aqueous   Solvent Mixtures   Solvents	Solvent Mixtures   Solvents	Solvents   Gases   Acids   Bases
	SFCA Surfactant-Free Cellulose Acetate	PES Polyethersulfone	RC Regenerated Cellulose	NY Polyamide, Nylon	PTFE Polytetrafluoroethylene
	Hydrophilic				Hydrophobic

Pore Sizes	Sterilization		Sample Preparation   Clarification   Particle Removal					Prefiltration
	Small Bacteria Mycoplasma Colloids >0.1	UHPLC, etc. (Columns <3 µm Particles) Bacteria	HPLC, etc. (Columns >3 µm Particles) Particles	Particles Yeast Cells	Particles Yeast Cells	Particles Yeast Cells Platelets	Large Particles Grit, Cells	Glass Prefilter Glass+Membrane Highly Particle-laden Samples
	0.1 µm	0.2 µm	0.45 µm	0.65 µm	0.8 µm	1.2 µm	5 µm	GF (Glass Fiber)

Sample Volumes				
	1 mL to 200 mL	1 mL to 100 mL	0.5 mL to 15 mL	0.05 mL to 1 mL
	28 mm for up to 200 mL	25 mm for up to 100 mL	15 mm for up to 15 mL	4 mm for up to 1 mL



## Sample Preparation for Analytical Procedures

### Reliable Removal of Particles and Microorganisms from Liquids and Gases

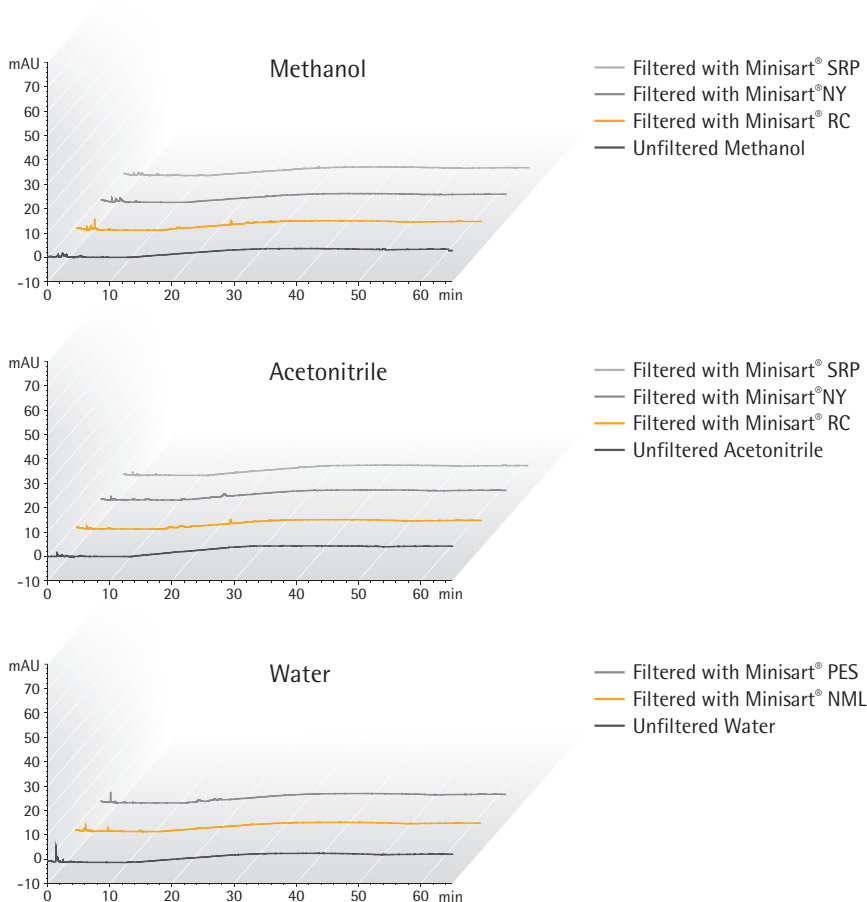
Particle removal by filtration before analysis substantially increases the lifetime of your columns. Minisart® RC is optimized for aqueous liquids and solvents and is compatible with DMSO, other amides, ketones, esters and ethers. Minisart® NY is exceptionally pure compared with other common polyamide (nylon) filters and competitor products. For this product raw materials are used which do not interfere with standard analytical methods.

Our coating-free hydrophobic PTFE membrane used in Minisart® SRP is suitable for venting applications and leachables-free clarification of exceptionally harsh chemicals.

#### Minisart® Features

- Low adsorption of analytes
- Maximum chemical compatibility
- Minimum extractables or leachables
- Bidirectional use possible
- 100% optical integrity test

### HPLC Certification



### HPLC Procedure

Column C18: 250 × 4.6 mm, Flow Rate: 1 mL/min, Wavelength: 220 nm

HPLC Injection Volume: 20 µL, Analysis Time: 65 min, Temperature: 40°C, Mobile Phases:

A) Acetonitrile | B) Water, Gradient: Hold 60% A for 10 min, 60% to 95% A in 20 min, 95% to 100% A in 35 min

## Sample Preparation for Chromatography

## □ Ordering Information

**Dia. in mm | EFA<sup>1</sup> Membrane Housing Pore Size Connector Outlet Color | Printing Sterile\* Qty./Pkg. Order No.**

**Minisart® RC (Regenerated Cellulose)**

25 mm	RC	PP	0.2 µm	Male Luer Slip	White, Printed	Yes	50	17764-----ACK
25 mm	RC	PP	0.2 µm	Male Luer Slip	White, Printed	No	50	17764-----K
25 mm	RC	PP	0.2 µm	Male Luer Slip	White, Printed	No	200	17764-----S
25 mm	RC	PP	0.2 µm	Male Luer Slip	White, Printed	No	500	17764-----Q
25 mm	RC	PP	0.45 µm	Male Luer Slip	White, Printed	No	50	17765-----K
25 mm	RC	PP	0.45 µm	Male Luer Slip	White, Printed	No	200	17765-----S
25 mm	RC	PP	0.45 µm	Male Luer Slip	White, Printed	No	500	17765-----Q
15 mm	RC	PP	0.2 µm	Male Luer Slip	White, Printed	Yes	50	17761-----ACK
15 mm	RC	PP	0.2 µm	Male Luer Slip	White, Printed	No	50	17761-----K
15 mm	RC	PP	0.2 µm	Male Luer Slip	White, Printed	No	500	17761-----Q
15 mm	RC	PP	0.45 µm	Male Luer Slip	White, Printed	No	50	17762-----K
15 mm	RC	PP	0.45 µm	Male Luer Slip	White, Printed	No	500	17762-----Q
4 mm	RC	PP	0.2 µm	Male Luer Slip	Blue Tray	No	50	17821-----K
4 mm	RC	PP	0.2 µm	Male Luer Slip	Blue Tray	No	500	17821-----Q
4 mm	RC	PP	0.45 µm	Male Luer Slip	Yellow Tray	No	50	17822-----K
4 mm	RC	PP	0.45 µm	Male Luer Slip	Yellow Tray	No	500	17822-----Q

**Minisart® SRP (Hydrophobic PTFE)**

25 mm	PTFE	PP	0.2 µm	Male Luer Slip	White, Printed	Yes	50	S7575-----FXOSK
25 mm	PTFE	PP	0.2 µm	Male Luer Slip	White, Printed	No	50	17575-----K
25 mm	PTFE	PP	0.2 µm	Male Luer Slip	White, Printed	No	200	17575-----S
25 mm	PTFE	PP	0.2 µm	Male Luer Slip	White, Printed	No	500	17575-----Q
25 mm	PTFE	PP	0.45 µm	Male Luer Slip	White, Printed	No	50	17576-----K
25 mm	PTFE	PP	0.45 µm	Male Luer Slip	White, Printed	No	200	17576-----S
25 mm	PTFE	PP	0.45 µm	Male Luer Slip	White, Printed	No	500	17576-----Q
15 mm	PTFE	PP	0.2 µm	Male Spike	White, Printed	No	50	17558-----K
15 mm	PTFE	PP	0.2 µm	Male Spike	White, Printed	No	500	17558-----Q
15 mm	PTFE	PP	0.2 µm	Male Luer Slip	White, Printed	Yes	50	17573-----ACK
15 mm	PTFE	PP	0.2 µm	Male Luer Slip	White, Printed	No	50	17573-----K
15 mm	PTFE	PP	0.2 µm	Male Luer Slip	White, Printed	No	500	17573-----Q
15 mm	PTFE	PP	0.45 µm	Male Spike	White, Printed	No	50	17559-----K
15 mm	PTFE	PP	0.45 µm	Male Spike	White, Printed	No	500	17559-----Q
15 mm	PTFE	PP	0.45 µm	Male Luer Slip	White, Printed	No	50	17574-----K
15 mm	PTFE	PP	0.45 µm	Male Luer Slip	White, Printed	No	500	17574-----Q
4 mm	PTFE	PP	0.2 µm	Male Luer Slip	Blue Tray	No	500	17844-----Q
4 mm	PTFE	PP	0.45 µm	Male Luer Slip	Yellow Tray	No	50	17820-----K
4 mm	PTFE	PP	0.45 µm	Male Luer Slip	Yellow Tray	No	500	17820-----Q

**Dia. in mm | EFA<sup>1</sup> Membrane Housing Pore Size Connector Outlet Color | Printing Sterile\* Qty./Pkg. Order No.**

**Minisart® NY (Nylon) and NY25 Plus (Glass Fiber 0.7 µm<sup>2</sup> + Nylon)**

25 mm	Nylon	PP	0.2 µm	Male Luer Slip	White, Printed	Yes	50	17845-----ACK
25 mm	Nylon	PP	0.2 µm	Male Luer Slip	White, Printed	No	500	17845-----Q
25 mm	Nylon	PP	0.45 µm	Male Luer Slip	White, Printed	Yes	50	17846-----ACK
25 mm	Nylon	PP	0.45 µm	Male Luer Slip	White, Printed	No	500	17846-----Q
15 mm	Nylon	PP	0.2 µm	Male Luer Slip	White, Printed	No	50	1776B-----K
15 mm	Nylon	PP	0.2 µm	Male Luer Slip	White, Printed	No	500	1776B-----Q
15 mm	Nylon	PP	0.45 µm	Male Luer Slip	White, Printed	No	50	1776C-----K
15 mm	Nylon	PP	0.45 µm	Male Luer Slip	White, Printed	No	500	1776C-----Q
25 mm	GF+Nylon	PP	0.2 µm	Male Luer Slip	White, Printed	No	50	1784B-----K
25 mm	GF+Nylon	PP	0.2 µm	Male Luer Slip	White, Printed	No	500	1784B-----Q
25 mm	GF+Nylon	PP	0.45 µm	Male Luer Slip	White, Printed	No	50	1784C-----K
25 mm	GF+Nylon	PP	0.45 µm	Male Luer Slip	White, Printed	No	500	1784C-----Q

\* Sterile Minisart® syringe filters are individually packaged. If not stated otherwise, Minisart® units have been sterilized by ethylene oxide.

Non-sterilized Minisart® units: RC, PTFE and nylon can be sterilized by autoclaving at 121°C for 30 min/or by using ethylene oxide (EO).

<sup>1</sup> Diameter of EFA – Effective Filtration Area

<sup>2</sup> 0.7 µm = GF particle retention ≠ pore size!

For technical product specifications, please see page 76.



0.1  
0.45  
0.22

Minisart® High Flow with PES



5.0  
1.2  
0.8  
0.65  
0.45  
0.2

Minisart® NML with SFCA



Minisart® HY with PTFE

## Clarification and Sterilization by Filtration

### Filtration Is the Optimal Method for Clarification and Sterilization of Liquids and Gases

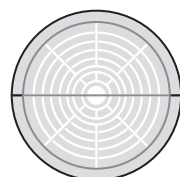
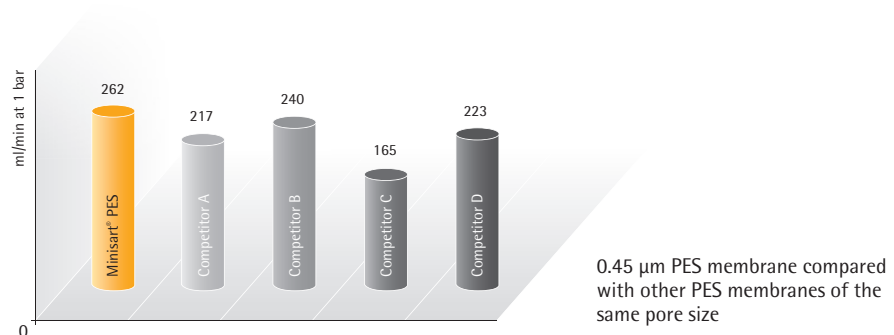
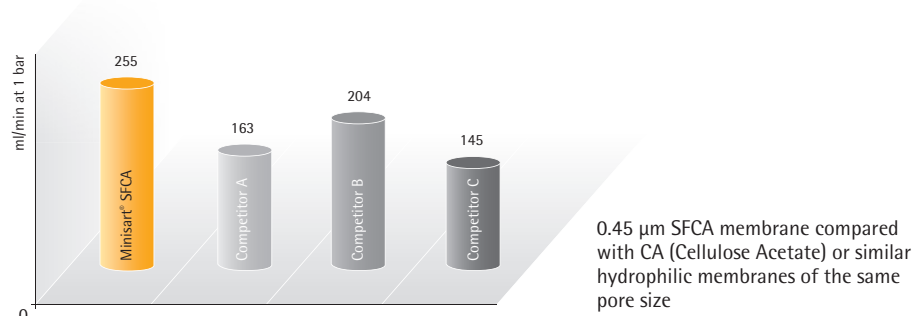
Sterilization by filtration is the fastest method for removal of bacterial cells from liquids, while minimizing the effects on ingredients. Minisart® NML with surfactant-free cellulose acetate (SFCA) is the best choice for all aqueous solutions with a pH of 4 to 8. It combines fast flow rates with an exceptionally pure and leachables-free membrane and is available in many different pore sizes – also for the removal of larger particles. Minisart® High Flow with polyethersulfone (PES) is optimal for delivering the highest flow rates and for a broad pH compatibility range from 1 to 13. Due to the asymmetric membrane structure, the PES surface virtually behaves like a prefilter. Both Minisart® types – NML and High Flow – can be sterilized by

ethylene oxide (EO) or gamma irradiation and are suitable for gluing and assembling on tubing. Minisart HY with hydrophobic PTFE membrane is the perfect choice for oily solutions or gases.

#### Minisart® Features

- The largest effective filtration area (EFA) of 6.2 cm<sup>2</sup> for NML and High Flow
- The lowest adsorption
- Superior flow rate
- High total throughput
- Low hold-up volume
- Minimum extractables
- PVC-free
- Gamma-irradiated or EO-sterilized
- Bidirectional use possible
- 100% optical integrity test

### Water Flow Rates at 1 bar (mL/min); 15.4 psi; 0.45 µm Hydrophilic Membranes



28 mm EFA  
33 mm housing diameter  
(for NML and High Flow)



## Preparation of Aqueous Liquids

## □ Ordering Information

Dia. in mm   EFA <sup>1</sup>	Membrane	Housing	Pore Size	Connector Outlet	Color   Printing	Sterile*	Qty./ Pkg.	Order No.
<b>Minisart® High Flow (PES – Polyethersulfone)</b>								
28 mm	PES	MBS	0.1 µm	Male Luer Lock	Dark Red	Yes	50	16553-----K
28 mm	PES	MBS	0.22 µm	Male Luer Lock	Royal Blue	Yes#	50	16532-----GUK
28 mm	PES	MBS	0.22 µm	Male Luer Lock	Royal Blue	Yes	50	16532-----K
28 mm	PES	MBS	0.22 µm	Male Luer Slip	Royal Blue	Yes	50	16541-----K
28 mm	PES	MBS	0.22 µm	Male Luer Lock	Royal Blue	No	500	16532-----Q
28 mm	PES	MBS	0.22 µm	Male Luer Slip	Royal Blue	No	500	16541-----Q
28 mm	PES	MBS	0.45 µm	Male Luer Lock	Amber	Yes	50	16537-----K
28 mm	PES	MBS	0.45 µm	Male Luer Lock	Amber	No	500	16537-----Q
28 mm	PES	MBS	0.45 µm	Male Luer Slip	Amber	Yes#	50	16533-----GUK
28 mm	PES	MBS	0.45 µm	Male Luer Slip	Amber	Yes	50	16533-----K
28 mm	PES	MBS	0.45 µm	Male Luer Slip	Amber	No	500	16533-----Q
<b>Minisart® NML (SFCA – Surfactant-free Cellulose Acetate)</b>								
28 mm	SFCA	MBS	0.2 µm	Male Luer Lock	Blue	Yes	50	S6534-----FMOSK
28 mm	SFCA	MBS	0.2 µm	Male Luer Lock	Blue	Yes#	50	S6534-----FMGUK
28 mm	SFCA	MBS	0.2 µm	Male Luer Lock	Blue	No	500	S6534-----FX--Q
28 mm	SFCA	MBS	0.2 µm	Male Luer Slip	Blue	Yes	50	S7597-----FXOSK
28 mm	SFCA	MBS	0.2 µm	Male Luer Slip	Blue	No	500	S7597-----FX--Q
28 mm	SFCA	MBS	0.45 µm	Male Luer Lock	Yellow	Yes	50	S6555-----FMOSK
28 mm	SFCA	MBS	0.45 µm	Male Luer Lock	Yellow	Yes#	50	S6555-----FMGUK
28 mm	SFCA	MBS	0.45 µm	Male Luer Lock	Yellow	No	500	S6555-----FM--Q
28 mm	SFCA	MBS	0.45 µm	Male Luer Slip	Yellow	Yes	50	S7598-----FXOSK
28 mm	SFCA	MBS	0.45 µm	Male Luer Slip	Yellow	No	500	S7598-----FX--Q
28 mm	SFCA	MBS	0.65 µm	Male Luer Slip	Pink	Yes	50	16569-----K
28 mm	SFCA	MBS	0.8 µm	Male Luer Lock	Green	Yes	50	16592-----K
28 mm	SFCA	MBS	0.8 µm	Male Luer Lock	Green	Yes#	50	16592-----GUK
28 mm	SFCA	MBS	0.8 µm	Male Luer Lock	Green	No	500	16592-----Q
28 mm	SFCA	MBS	1.2 µm	Male Luer Lock	Red	Yes	50	17593-----K
28 mm	SFCA	MBS	1.2 µm	Male Luer Lock	Red	No	500	17593-----Q
28 mm	SFCA	MBS	5 µm	Male Luer Lock	Brown	Yes	50	S7594-----FMOSK
28 mm	SFCA	MBS	5 µm	Male Luer Lock	Brown	No	500	17594-----Q

Dia. in mm   EFA <sup>1</sup>	Membrane	Housing	Pore Size	Connector Outlet	Color   Printing	Sterile*	Qty./ Pkg.	Order No.
<b>Minisart® NML Plus (Glass Fiber 0.7 µm<sup>2</sup> + SFCA)</b>								
28 mm	GF+SFCA	MBS	0.2 µm	Male Luer Lock	Blue	Yes	50	17823-----K
28 mm	GF+SFCA	MBS	0.2 µm	Male Luer Lock	Blue	No	500	17823-----Q
28 mm	GF+SFCA	MBS	0.45 µm	Male Luer Lock	Yellow	Yes	50	17829-----K
28 mm	GF+SFCA	MBS	0.45 µm	Male Luer Lock	Yellow	No	500	17829-----Q
28 mm	GF+SFCA	MBS	1.2 µm	Male Luer Lock	Red	No	500	17825-----Q
28 mm	GF	MBS	0.7 µm <sup>2</sup>	Male Luer Lock	White	No	50	17824-----K
28 mm	GF	MBS	0.7 µm <sup>2</sup>	Male Luer Lock	White	No	500	17824-----Q

#### Minisart® HY (hydrophobic PTFE), for Venting and Gas Filtration

26 mm	PTFE	MBS	0.2 µm	Male Luer Lock	Clear	Yes	50	S6596-----FMOSK
26 mm	PTFE	MBS	0.2 µm	Male Luer Lock	Clear	No	500	S6596-----FM--Q

\* Sterilized Minisart® units are individually packaged. If not stated otherwise, Minisart® are sterilized by ethylene oxide.

#-Mark indicates sterilization by gamma irradiation.

Non-sterilized Minisart® units: High Flow, NML, NML Plus and HY can be sterilized by ethylene oxide; High Flow, NML and NML Plus can also be sterilized by gamma irradiation

<sup>1</sup> Diameter of EFA – Effective Filtration Area

<sup>2</sup> 0.7 µm = GF particle retention ≠ pore size!

For technical product specifications, please see page 78.





Minisart® available in many configurations

## Special Applications – Sterile Filtration and Sterile Venting

### Choose from a Broad Range of Pore Sizes, Materials and Formats

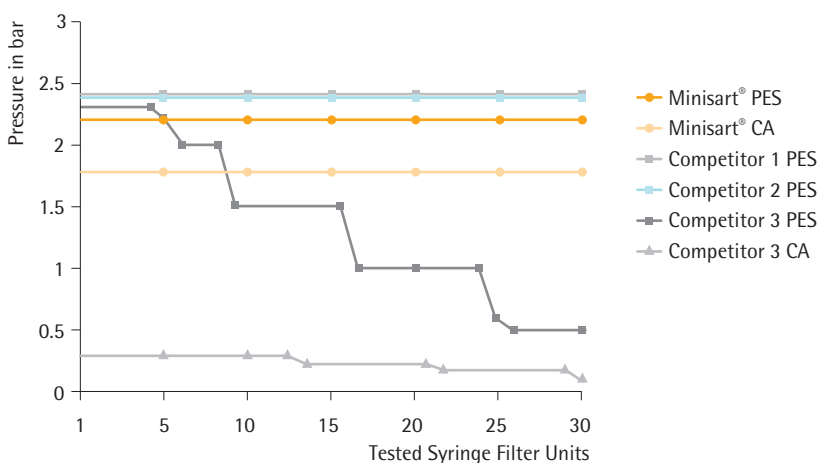
Bacterial cell removal or particulate removal from liquids can easily be performed with Minisart® syringe filters. Minisart® has a minimal effect on the ingredients of a filtered solution. Minisart® NML and Ophthalsart with surfactant-free cellulose acetate (SFCA) and Minisart® HY and SRP with hydrophobic PTFE are frequently used for sterile filtration of aqueous and oily solutions and other liquids. Minisart® NML with a 5 µm pore size removes particulates or coagulates, offering the highest total throughput under sterile conditions – without any early clogging. Hydrophobic PTFE filters are suitable for venting purposes and are additionally available in special

formats with activated carbon.

#### Minisart® Features

- 100% optical integrity test
- Low adsorption
- Minimum extractables
- Particulate-free
- PVC-free
- Gamma-irradiated or EO-sterilized
- Bidirectional use possible
- Many configurations available

#### Pressure-Hold Test



Method: Pressure-hold tests were performed by connecting pre-wetted syringe filter units to a 10-fold pressure device with a pressure gauge. The pressure applied equaled 4/5 of the bubble point. Units failed the test if they released air bubbles before reaching 4/5 of the minimum bubble point. These units were remeasured to determine at which pressure air bubbles appear.

Result: Testing the pressure-hold capability of syringe filters revealed that many competitor 3's filters are dysfunctional and not intact. Filtration performed with such filters will result in unsterile filtrates or filtrates without an appropriately reduced level of particles.



## Minisart® Syringe Filters – Special

## □ Ordering Information

Dia. in mm   EFA <sup>1</sup>	Membrane	Housing	Pore Size	Connector Outlet	Color   Printing	Sterile**	Qty./ Pkg.	Order No.
<b>Minisart® NML (SFCA – Cellulose Acetate) Aqueous Filtration</b>								
28 mm	SFCA	MBS	0.2 µm	Male Luer Lock	Blue	Yes	50	16534-----K*
28 mm	SFCA	MBS	0.2 µm	Male Luer Lock	Blue	Yes#	50	16534-----GUK*
28 mm	SFCA	MBS	0.2 µm	Male Luer Lock	Blue	No	500	16534-----Q*
28 mm	SFCA	MBS	0.2 µm	Male Luer Slip	Blue	Yes	50	17597-----K*
28 mm	SFCA	MBS	0.2 µm	Male Luer Slip	Blue	No	500	17597-----Q*
28 mm	SFCA	MBS	0.45 µm	Male Luer Lock	Yellow	Yes	50	16555-----K*
28 mm	SFCA	MBS	0.45 µm	Male Luer Lock	Yellow	Yes#	50	16555-----GUK*
28 mm	SFCA	MBS	0.45 µm	Male Luer Lock	Yellow	No	500	16555-----Q*
28 mm	SFCA	MBS	0.45 µm	Male Luer Slip	Yellow	Yes	50	17598-----K*
28 mm	SFCA	MBS	0.45 µm	Male Luer Slip	Yellow	No	500	17598-----Q*
28 mm	SFCA	MBS	5 µm	Male Luer Lock	Brown	Yes	50	17594-----K*
<b>Minisart® Ophthalmart (SFCA – Cellulose Acetate) Aqueous Filtration</b>								
28 mm	Ophthalmart	MBS	0.2 µm	Male Luer Slip	Pink	Yes	50	17528-----K*
<b>Minisart® High Flow (PES – Polyethersulfone) Aqueous Filtration</b>								
28 mm	PES	MBS	0.1 µm	Male Luer Lock	Dark Red	Yes	50	16553-----K
<b>Minisart® PES (Polyethersulfone) Aqueous Filtration</b>								
15 mm	PES	PP	0.22 µm	Male Luer Slip	White	Yes	50	1776D-----ACK
15 mm	PES	PP	0.22 µm	Male Luer Slip	White	No	50	1776D-----Q
<b>Minisart® PES (hydrophobic PES), for Venting and Gas Filtration</b>								
25 mm	PES	PP	0.2 µm	Male Luer Slip	White	No	50	1757H-----K
25 mm	PES	PP	0.2 µm	Male Luer Slip	White	No	500	1757H-----Q
25 mm	PES	PP	0.2 µm	Hose Barb <sup>b</sup>	White	No	50	1757G-----K
25 mm	PES	PP	0.2 µm	Hose Barb <sup>b</sup>	White	No	500	1757G-----Q
<b>Minisart® Air (Hydrophobic PTFE) Venting</b>								
15 mm	PTFE	MBS	0.2 µm	Male Luer Slip	Yellow	No	500	1751A-----Q
15 mm	PTFE	MBS	0.2 µm	Male Luer Slip + Needle	Yellow	Yes#	50	16596-----HNK
<b>Minisart® HY (hydrophobic PTFE), for Venting and Gas Filtration</b>								
26 mm	PTFE	MBS	0.2 µm	Male Luer Lock	Clear	Yes	50	16596-----HYK*
26 mm	PTFE	MBS	0.2 µm	Male Luer Lock	Clear	No	500	16596-----HYQ*
26 mm	PTFE	MBS	0.2 µm	Male Luer Lock <sup>a</sup>	Clear	No	500	16599-----HYQ*
26 mm	PTFE	MBS	1 µm	Male Luer Lock	Clear	No	500	1659A-----HYQ

**Minisart® Acticosart** with Dome Reservoir and Hydrophobic PTFE for Venting and Ultracleaning of Gases

26 mm	Active Carbon	MBS	0.45 µm	Male Luer Slip <sup>a</sup>	Blue	No	500	17840-----Q
Dia. in mm   EFA <sup>1</sup>	Membrane	Housing	Pore Size	Connector Outlet	Color   Printing	Sterile**	Qty./ Pkg.	Order No.

**Minisart® SRP** (Hydrophobic PTFE) Venting & Gas Filtration

25 mm	PTFE	PP	0.2 µm	Male Luer Slip	White, Printed	Yes	50	17575-----ACK*
25 mm	PTFE	PP	0.2 µm	Hose Barb	White	No	500	1757A-----Q

\* Article numbers are only available in EU/EEA and registered countries.

\*\* Sterilized Minisart® units are individually packaged. If not stated otherwise, Minisarts are sterilized by ethylene oxide.

#-mark indicates sterilization by gamma irradiation

Non-sterilized Minisart® units: SFCA can be sterilized by ethylene oxide or gamma irradiation. PTFE can be sterilized by ethylene oxide.

<sup>a</sup> Connector inlet: Male Luer slip (all other Minisart® types have female luer lock inlets)

<sup>b</sup> Hose barbs, inlet and outlet, 4 - 6 mm stepped

<sup>1</sup> Diameter of EFA – Effective Filtration Area

For technical product specifications, please see pages 76 and 78.

Do you need other quantities per package?

Are you looking for special versions or do you have requirements?

Do you need other inlet and | or outlet connectors?

Please contact us to learn more about additional Minisart® configurations that are available.



## Minisart® with Polypropylene Housing

### □ Specifications

#### Minisart® RC | SRP | NY | PES with 4 | 15 | 25 mm Diameter Membrane Filtration Area

Housing material	Polypropylene (PP)
Membranes	RC = Regenerated Cellulose   NY = Polyamide   SRP = Hydrophobic PTFE = Polytetrafluoroethylene   PES = Polyethersulfone
Glass fiber prefilter	NY Plus: Ultrapure quartz, 0.7 µm particle retention
Application limits	Max. recommended operating pressure 4.5 bar   65 psi
Housing burst pressure	>7 bar   102 psi
Max. temperature	121 °C, 30 min (autoclavable)
Sterilization	Non-sterile Minisart® can be autoclaved or sterilized by ethylene oxide (EO)

Minisart® Membrane Types	RC 0.2 µm	RC 0.2 µm	RC 0.45 µm	SRP 0.2 µm	SRP 0.45 µm
Non-sterile packs: 50 (K), 200 (S), 500 (Q), 1000 (R)   sterile packs: individual packaged, 50 (ACK)	K   S   Q   R	ACK	K   S   Q   R	K   S   Q   ACK	K   S   Q
<b>Bubble point (≥)</b>	With water 3.0 bar   44 psi	With water 4.6 bar   67 psi	With water 2.0 bar   29 psi	With ethanol 1.1 bar   16 psi	With ethanol 0.9 bar   13 psi

#### Flow rate, 4 mm dia. = 0.07 cm<sup>2</sup> filter area | Hold-up volume<sup>1</sup>: 5 µL to 10 µL (► mL/min)

- For water at 1 bar	0.5	-	1.5	- <sup>3</sup>	- <sup>3</sup>
- For methanol at 1 bar	1.5	-	3.0	2.0	4.5
- For air at 0.1 bar	- <sup>2</sup>	-	- <sup>2</sup>	30	60

#### Flow rate, 15 mm dia. = 1.7 cm<sup>2</sup> filter area | Hold-up volume<sup>1</sup>: 30 µL to 100 µL (► mL/min)

- For water at 1 bar	20	10	40	- <sup>3</sup>	- <sup>3</sup>
- For methanol at 1 bar	55	25	105	55	150
- For air at 0.1 bar	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	800	1600

#### Flow rate, 25 mm dia. = 4.8 cm<sup>2</sup> filter area | Hold-up volume<sup>1</sup>: 100 µL to 200 µL (► mL/min)

- For water at 1 bar	80	50	160	- <sup>3</sup>	- <sup>3</sup>
- For methanol at 1 bar	160	90	325	160	260
- For air at 0.1 bar	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	1800	3000

<b>Water penetration point</b>	-	-	-	>4.0 bar   58 psi <sup>3</sup>	>3.0 bar   44 psi <sup>3</sup>
<b>Sterile filtration capability acc. to the bacteria challenge text</b>	No <sup>5</sup>	Yes	No	Yes	No
<b>Pyrogen-free according to the USP</b>				Yes	
<b>Cytotoxicity (17575-ACK)</b>	No inhibition with MRC-5 (human lung cells) and L929				



Minisart® Membrane Types	NY 0.2 µm	NY 0.45 µm	NY Plus 0.2 µm	NY Plus 0.45 µm	PES 0.2 µm	Hydrophobic PES 0.2 µm
Non-sterile packs: 50 (K), 200 (S), 500 (Q), 1000 (R)   sterile packs: individual packaged, 50 (ACK)	K   Q   R   ACK	K   Q   R   ACK	K   Q	K   Q	K   Q   ACK	K   Q
<b>Bubble point (≥)</b>	With water 3.0 bar   44 psi	With water 2.0 bar   29 psi	With water 3.0 bar   44 psi	With water 2.0 bar   29 psi	With water 3.2 bar   46 psi	With ethanol 0.95 bar   14 psi
<b>Flow rate, 4 mm dia. = 0.07 cm<sup>2</sup> filter area   Hold-up volume<sup>1</sup>: 5 µL to 10 µL (► mL/min)</b>						
- For water at 1 bar	-	-	-	-	1.5	-
- For methanol at 1 bar	-	-	-	-	- <sup>4</sup>	-
- For air at 0.1 bar	-	-	-	-	- <sup>2</sup>	-
<b>Flow rate, 15 mm dia. = 1.7 cm<sup>2</sup> filter area   Hold-up volume<sup>1</sup>: 30 µL to 100 µL (► mL/min)</b>						
- For water at 1 bar	20	40	-	-	40	-
- For methanol at 1 bar	40	110	-	-	- <sup>4</sup>	-
- For air at 0.1 bar	- <sup>2</sup>	- <sup>2</sup>	-	-	- <sup>2</sup>	-
<b>Flow rate, 25 mm dia. = 4.8 cm<sup>2</sup> filter area   Hold-up volume<sup>1</sup>: 100 µL to 200 µL (► mL/min)</b>						
- For water at 1 bar	50	100	50	100	100	-
- For methanol at 1 bar	70	200	70	200	- <sup>4</sup>	- <sup>4</sup>
- For air at 0.1 bar	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	- <sup>2</sup>	1200
<b>Water penetration point</b>	-	-	-	-	-	>3 bar   44 psi <sup>3</sup>
<b>Sterile filtration capability acc. to the bacteria challenge test</b>	Yes	No	Yes	No	Yes	Yes
<b>Pyrogen-free according to the USP</b>						-
<b>Cytotoxicity (17575-ACK)</b>	No inhibition with MRC-5 (human lung cells) and L929					

<sup>1</sup> Hold-up volume after air purge

<sup>2</sup> Hydrophilic membranes can filter dry air or gas but become impermeable to air or gas when wetted!

<sup>3</sup> Hydrophobic membranes cannot be wetted with aqueous solutions unless you overcome their water penetration point or pre-wet them using an organic solvent (e.g. ethanol)

<sup>4</sup> PES is suitable for solutions only containing up to 30% MeOH

<sup>5</sup> According to the bacterial challenge test (BCT) with 10<sup>7</sup> Brevundimonas diminuta. Non-sterile RC Minisart® types are optimized for sample preparation and are not suitable for sterile filtration according to the bacteria challenge test. All other non-sterile Minisart® types with 0.2 mm pore size can be sterilized by autoclaving or EO before use for sterile filtration.

## Minisart® with MBS Housing

### □ Specifications

**Minisart® High Flow | NML | NML Plus** with 28 mm accessible membrane filtration area diameter, 100 µL to 150 µL hold-up volume<sup>1</sup>

**Minisart® HY | Acticosart** with 26 mm accessible membrane filtration area diameter, 100 µL to 150 µL hold-up volume<sup>1</sup>

**Minisart® Air** with 15 mm accessible membrane filtration area diameter, 100 µL hold-up volume<sup>1</sup>

Housing material	Methacrylate butadiene styrene (MBS)
Membranes	High Flow: PES = Polyethersulfone NML: (SF) CA = (Surfactant-free) Cellulose Acetate NML Plus: (SF) CA = (Surfactant-free) Cellulose Acetate HY   Acticosart   Air: Hydrophobic PTFE = Polytetrafluoroethylene
Glass fiber pre-filter	NML Plus: Binder-free GF, 0.7 µm particle retention
Application limits	High Flow: Max. recommended operating pressure 6.0 bar   87 psi NML, NML Plus, HY, Air: Max. recommended operating pressure 4.5 bar   65 psi Acticosart: Max. recommended operating pressure 1 bar   14.5 psi
Housing burst pressure	> 7 bar   102 psi (not determined for Acticosart)
Max. temperature	60°C, not autoclavable
Sterilization	Non-sterile Minisart® High Flow, NML and NML Plus can be or sterilized by ethylene oxide (EO) or by gamma sterilization Non-sterile Minisart® HY, Acticosart, Air* can be sterilized by ethylene oxide (EO)

Minisart® Membrane Types	PES 0.1 µm	PES 0.2 µm	PES 0.45 µm	CA 0.2 µm	CA 0.45 µm	CA 0.65 µm	CA 0.8 µm	CA 1.2 µm	CA 5.0 µm
Non-sterile packages: 500 (Q, HYQ), 1000 (R), sterile packs: individually packaged, 50 (K, GUK, HYK, HNK)	K	K   GUK   Q	K   GUK   Q	K   GUK   Q	K   GUK   Q	K	K   GUK   Q	K   Q	K   Q
<b>Bubble point (≥)</b>	With water 5.0 bar   73 psi	With water 3.2 bar   46 psi	With water 2.0 bar   29 psi	With water 3.2 bar   46 psi	With water 2.0 bar   29 psi	With water 1.3 bar   19 psi	With water 0.8 bar   12 psi	With water 0.7 bar   10 psi	With water 0.4 bar   6 psi

### Flow Rate for<sup>2|3</sup> (► mL/min)

28 mm dia. for water at 1 bar	40	140	220	60	160	250	400	500	600
15 mm dia. for air at 0.1 bar	-	-	-	-	-	-	-	-	-
26 mm dia. for air at 0.1 bar	-	-	-	-	-	-	-	-	-

<b>Water penetration point</b>	-	-	-	-	-	-	-	-	-
<b>Sterile filtration capability<sup>4</sup> acc. to the bacteria challenge test</b>	Yes	Yes	No	Yes	No	No	No	No	No
<b>Pyrogen-free according to the USP</b>				Yes	Yes				Yes
<b>Cytotoxicity</b>	No inhibition with MRC-5 (human lung cells) and L929								

Minisart® Membrane Type	GF + CA 0.2 µm	GF + CA 0.45 µm	GF + CA 1.2 µm	GF 0.7 µm	PTFE 0.2 µm	PTFE 1.0 µm	Acticosart	PTFE (Air) 0.2 µm
Non-sterile packages: 500 (Q, HYQ), 1000 (R), sterile packs: individually packaged, 50 (K, GUK, HYK, HNK)	K   Q	K   Q	Q	K   Q	HYK   HYQ	HYQ	Q	Q   HNK
<b>Bubble point (≥)</b>	With water 3.2 bar   46 psi	With water 2.0 bar   29 psi	With water 0.7 bar   10 psi	With water 0.5 bar   7 psi	With ethanol 1.4 bar   20 psi	With ethanol 0.5 bar   7 psi	With ethanol 0.9 bar   13 psi	With ethanol 1.0 bar   14 psi
<b>Flow rate for<sup>2 3</sup> (► mL/min)</b>								
28 mm dia. for water at 1 bar	60	160	350	450	-	-	-	-
15 mm dia. for air at 0.1 bar	-	-	-	-	-	-	-	800
26 mm dia. for air at 0.1 bar	-	-	-	-	2000	4000	2300	-
<b>Water penetration point</b>	-	-	-	-	> 4.0 bar   58 psi <sup>3</sup>	> 1.5 bar   22 psi <sup>3</sup>	N.a.	> 3.0 bar   44 psi <sup>3</sup>
<b>Sterile filtration capability<sup>4</sup> according to the bacteria challenge test</b>	Yes	No	No	No	Yes	No	N.a.	Yes
<b>Pyrogen-free according to the USP</b>	Yes							
<b>Cytotoxicity</b>	No inhibition with MRC-5 (human lung cells) and L929							

<sup>1</sup> Hold-up volume after air purge

<sup>2</sup> Hydrophilic membranes can filter dry air or gas but become impermeable to air or gas when wetted!

<sup>3</sup> Hydrophobic membranes cannot be wetted with aqueous solutions unless you overcome their water penetration point.

<sup>4</sup> According to bacterial challenge test (BCT) with 10<sup>7</sup> Brevundimonas diminuta. All non-sterile Minisart® types listed above can be sterilized according to the method recommended in this table.

\* Minisart® Air can be sterilized by gamma rays according to the following parameters: Range 25 – 40 kGy (validated with 50 kGy).

## Claristep® Filtration System

The Power of Simplicity



The Claristep® Station consists of a base, a lid and an exchangeable tray for easy and accurate positioning of sample vials and Claristep® Filter units.

The patent-pending design features unique grooves in the station's lid and matching guide ridges on Claristep® Filter units to enable intuitively correct alignment and convenient handling of the system.

Preparing samples by clarification is an essential step prior to nearly all analytical techniques, such as high pressure liquid chromatography (HPLC). This filtration step to eliminate particles is crucial for maintaining the integrity of chromatography columns and for maximizing their operating life time.

In addition, as the sensitivity of automated analytical instruments continues to improve, they increasingly require less volume to operate in order to maximize throughput. Therefore, fast clarification of small volumes that does not add leachables or extractables to the original sample is indispensable for achieving the best analytical results.

To meet these requirements, Sartorius has developed a new, easy-to-use and straightforward filtration setup. The manually operated Claristep® Filtration System consisting of a station and filter units offers a novel way for clarifying your samples prior to analysis.

- Up to 8 samples are processed simultaneously
- No syringe required
- No need for a vacuum source or a power supply
- For low sample volumes ranging from 60 µL to 600 µL
- Hold-up volume < 30 µL



The grooves automatically guide the filter unit caps into the correct positions for simultaneous and accurate cap closure.



Claristep® Filter units are made of the purest materials. Another major benefit is that the contact time of the samples with the filters and the caps is extremely short, ensuring optimal, contamination-free results. Filtered liquids are collected in any 12 × 32 mm outer diameter vials of your choice based on the analytical method to be performed.

## ■ Sample Preparation for Analytics

### Use the Most Ergonomic Clarification Solution

Filter 8 samples simultaneously – without needing any power supply or a vacuum | pressure source. Simply place the filters on

your vials, gently close the station and press on the station lid to filter – that's it!



1. Close the station lid. The grooves align the caps automatically, securely sealing every single Claristep® Filter unit for the most convenient processing.



2. Apply slight uniform pressure with your hand to start sample clarification. You will feel a certain resistance while liquid is pressed through each membrane.



3. Press down on the station lid so that the left and right corners touch the base plate. Hold the lid in place for 3 seconds to ensure all sample liquid is filtered through.



Claristep® Filter units press liquid through each membrane by an air pocket that forms over each filter unit when the station lid is closed. This air pocket is released when you stop holding down the lid – you will feel it in your fingertips!



Before clarification, the samples are pipetted in the filter reservoir.



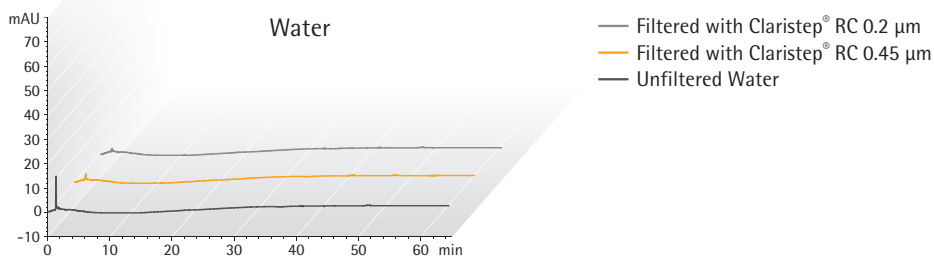
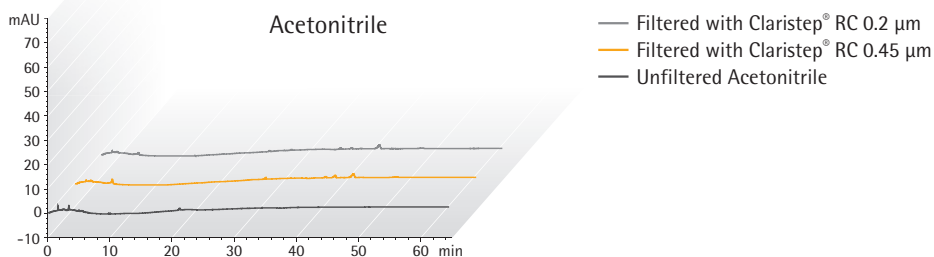
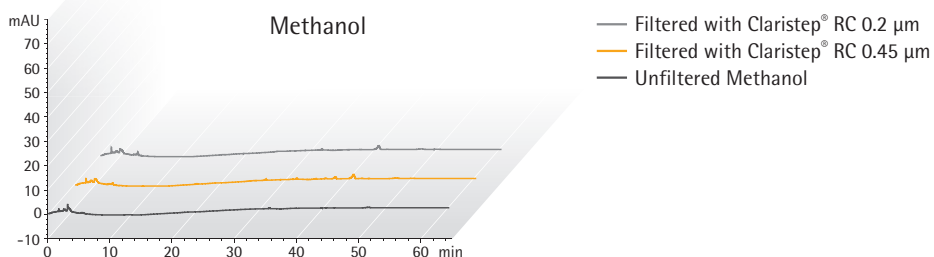
After clarification, the filtrates are collected in sample vials.

## Reliable Removal of Particles

### Filter Samples Without Adding Extractables and Leachables

Claristep® Filter units with RC membranes are optimized for solvents and aqueous solutions. They provide maximum chemical compatibility and exceptionally low non-specific binding of analytes.

### HPLC Certification



### HPLC Procedure

**Column:** C18: 5 µm × 250 mm × 4.0 mm, Flow Rate: 1 mL/min, Wavelength: 220 nm

**Injection Volume:** 20 µL, Analysis Time: 65 min, Temperature: 40°C, Mobile Phases:

A) Acetonitrile | B) Water, Gradient: Hold 60% A for 10 min, 60% to 100% A in 20 min, 100% A for 30 min

## Sample Preparation Techniques

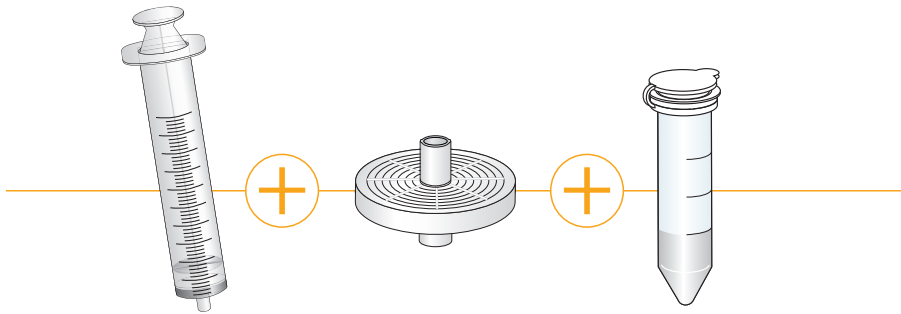
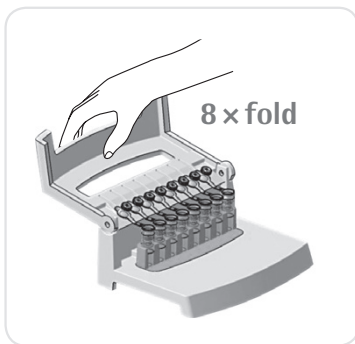
### Choose the Best Solution for Your Needs

Do you process dozens of samples each day? A syringeless solution will help you reduce time, effort and waste – and minimize hand stress. If you need to analyze only a few samples a day, you will benefit from our proven combination of a syringe and syringe filter. The choice is all yours!

### Claristep® Filtration System

or

### Syringe Filters for processing one sample at a time



## Analytical Sample Volumes Run Small

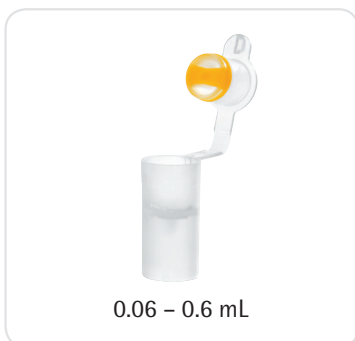
### Get the Particle-free Volume You Really Need

If you need to fill only 12×32 mm vials, a syringeless solution will help you save time and reduce sample loss!

### Syringeless Solution

or

### Different Diameters for different sample volumes







Claristep® Filters are available in a choice of two pore sizes

## □ Ordering Information

### Claristep® Filters

Ø mm   EFD <sup>1</sup>	Membrane	Housing	Pore Size	Sterile	Qty   Pk	Order No.
9.7 mm	RC	PP	0.2 µm	No	96	17C07FT---96
9.7 mm	RC	PP	0.2 µm	No	480	17C07FT--480
9.7 mm	RC	PP	0.45 µm	No	96	17C06FT---96
9.7 mm	RC	PP	0.45 µm	No	480	17C06FT--480

<sup>1</sup> Effective Filtration Diameter  
RC = Regenerated Cellulose

### Claristep® System

Name	Qty   Pk	Order No.
Claristep® Station complete	1	17C--M8
Claristep® Single Tray	1	17C--S1



The Tray can be removed and exchanged



12 × 32 mm sample vials

### Additional Components Needed

The free choice of 12 × 32 mm sample vials and lids is enabling you to choose the right vial for your particular sample and application, e.g. for light sensitive substances you can use brown glass. For small sample volumes you can use vessels with inlays. You can use glass or plastic, screw caps and | or slid lids – whatever you prefer.



## ■ Sartolab® P20 and Sartolab® P20 Plus

Sterile Filtration of Sample Volumes of Up to 5 Liters



### Using Sartolab® P20 or Sartolab® P20 Plus in Available Systems

#### Systems with Luer Lock Connectors

Sartolab® units with a luer lock inlet fit directly onto the corresponding connectors of tubing from peristaltic pumps. This configuration can also be used with luer lock syringes.



#### Systems with Tubing

If the liquid to be filtered will be pumped through open tubing from a pressure tank or a peristaltic pump, then a Sartolab® unit with a hose nipple inlet is required. The stepwise increase in diameter of the nipple, from 6 mm to 12 mm, makes it suitable for a wide range of tubing.

#### Application

The Sartolab® P20 is a ready-to-use pressure filtration unit for sterile filtration of media and aqueous solutions in batches ranging from 100 mL to 5 L. For media that contain sera and difficult-to-filter solutions, a Sartolab® P20 Plus unit with an incorporated prefilter is also available.

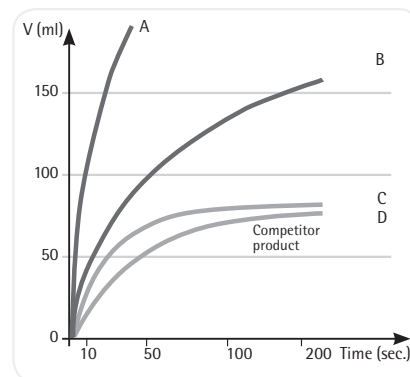
#### Security

The effectiveness of every batch of 0.2 µm cellulose acetate membranes for sterile filtration is confirmed by bacteria challenge tests (HIMA) using *Brevundimonas diminuta*. Only biosafe

material is used in the filtration units; they have been proven non-toxic by passing the USP plastics test for toxicity. Tests with MRC-5 human lung cells on cellulose acetate membranes and glass fiber prefilters showed no cytotoxic effects. Finished units are also tested for their sterile filtration capability and for housing and membrane integrity.

#### Fast Filtration

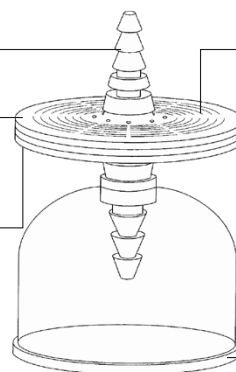
The combination of a large filtration area (20 cm<sup>2</sup>) and the optimal design of the filter support guarantees high flow rates with high total throughputs. Automatic venting of any trapped air through the PTFE membrane-protected vent ports ensures that the entire filter surface is used for effective filtration.



Choice of inlet connector, hose nipple or luer lock

With or without binder-free glass fiber prefilter

Polycarbonate housing and surfactant-free cellulose acetate membrane filter



20 cm<sup>2</sup> filter area, optimal flow path and automatic venting

Outlet side with protective filling bell

## □ Specifications

### Technical Specifications for Sartolab® P20 and Sartolab® P20 Plus Units with SFCA Membrane and PTFE Venting

Properties	Description	
	Sartolab® P20 18052 18053	Sartolab® P20 Plus 18056 18058
Filter material	SFCA, type 12587, 0.2 µm pore size and PTFE	SFCA, type 12587 0.2 µm pore size plus GF, 100% free of binding agents and PTFE
Housing material	Polycarbonate	Polycarbonate
Color code	Transparent	Transparent
Filter diameter	61 mm	61 mm
Connector inlet	Female luer lock or stepped hose nipple with 6 mm to 12 mm outer diameter	Female luer lock or stepped hose nipple with 6 mm to 12 mm outer diameter
Connector outlet	Hose nipple	Hose nipple
Filling bell	Yes	Yes
Filtration area	20 cm <sup>2</sup>	20 cm <sup>2</sup>
Hold-up volume before bubble point	1 mL	Approx 1.5 mL
Housing burst pressure	> 5 bar   72.5 psi	> 5 bar   72.5 psi
Bubble point	≥ 3.2 bar   46.4 psi	≥ 3.2 bar   46.4 psi
Max. recommended inlet pressure	3 bar   43.5 psi	3 bar   43.5 psi
Flow rate for water	≥ 250 mL/min at Δp = 1 bar   14.5 psi	≥ 250 mL/min at Δp = 1 bar   14.5 psi
Filtration range	100 mL to max. 5 L	100 mL to max. 10 L
pH-range	4–8	4–8
Non-specific protein adsorption	No loss of protein detectable (filtration of γ globulin, method acc. to Bradford)	< 80 µg/cm <sup>2</sup> (filtration of γ globulin, method acc. to Bradford)
Sterilization	EO sterilization	EO sterilization
Biosafety	Class VI Plastics Test	Class VI Plastics Test
Operating instructions	Directions for use included in each box	Directions for use included in each box

### Technical Specifications for Sartolab® P20 and Sartolab® P20 Plus Units with PES Membrane

	Sartolab® P20 18075	Sartolab® P20 Plus 18068	Sartolab® P 20 Plus 18076
Filter material	PES, type 15407 MI 0.2 µm pore size	PES, 0.2 µm pore size plus GF, 100% free of binding agents	PES, 0.45 µm pore size plus GF, 100% free of binding agents
Housing material	Polycarbonate	Polycarbonate	Polycarbonate
Color code	Transparent	Transparent	Transparent
Filter diameter	61 mm	61 mm	61 mm
Connector inlet	Female luer lock	Female luer lock	Stepped hose nipple with 6 mm to 12 mm outer diameter
Connector outlet	Hose nipple	Hose Nipple	Hose nipple
Filling bell	No	Yes	No
Filtration area	20 cm <sup>2</sup>	20 cm <sup>2</sup>	20 cm <sup>2</sup>
Hold-up volume before bubble point	1 mL	Approx 1.5 mL	1 mL
Housing burst pressure	> 5 bar   72.5 psi	> 5 bar   72.5 psi	> 5 bar   72.5 psi

Properties	Description		
	Sartolab® P20 Plus 18068	Sartolab® P20 18075	Sartolab® P20 Plus 18076
Bubble point	≥ 3.2 bar   46.4 psi	≥ 3.2 bar   46.4 psi	≥ 2.2 bar   46.4 psi
Max. recommended inlet pressure	3 bar   43.5 psi	3 bar   43.5 psi	3 bar   43.5 psi
Flow rate for water	400 mL/min at Δp = 1 bar   14.5 psi	400 mL/min at Δp = 1 bar   14.5 psi	> 600 mL/min at Δp = 1 bar   14.5 psi
Filtration range	100 mL – max. 10 L	100 mL – max. 5 L	100 mL – max. 5 L
pH range	1 to 8	1 to 8	1 to 8
Non-specific protein adsorption	< 80 µg/cm <sup>2</sup> (filtration of γ globulin, method acc. to Bradford)	No loss of protein detectable (filtration of γ globulin, method acc. to Bradford)	No loss of protein detectable (filtration of γ globulin, method acc. to Bradford)
Sterilization	EO sterilization	EO sterilization	–
Biosafety	Class VI Plastics Test	Class VI Plastics Test	Class VI Plastics Test
Operating instructions	Directions for use included in each box	Directions for use included in each box	Directions for use included in each box

## □ Ordering Information

Type	Membrane	Housing	Pore Size	Inlet	Outlet	Sterile	Qty./Pkg.	Order No.
<b>Sartolab® P20</b>								
	SFCA	PC	0.2 µm	Hose Barb	Hose Barb	Yes	10	18052-----D
	SFCA	PC	0.2 µm	Luer Lock	Hose Barb	Yes	10	18053-----D
	PES	PC	0.2 µm	Luer Lock	Hose Barb	Yes	10	18075-----D <sup>1</sup>
<b>Sartolab® P20 Plus</b>								
	SFCA + GF	PC	0.2 µm	Hose Barb	Hose Barb	Yes	10	18056-----D
	SFCA + GF	PC	0.2 µm	Luer Lock	Hose Barb	Yes	10	18058-----D
	PES + GF	PC	0.2 µm	Luer Lock	Hose Barb	Yes	10	18068-----D
	PES + GF	PC	0.45 µm	Hose Barb	Hose Barb	No	100	18076-----N <sup>1</sup>
	GF*	PC	n.a.	Luer Lock	Hose Barb	No	10	18072-----D <sup>1</sup>

SFCA – Cellulose Acetate, PES – Polyethersulfone, GF – Glass Fiber Prefilter, PC – Polycarbonate  
GF\* – Glass Fiber Filter only

<sup>1</sup> without filling bell

## ■ Sartolab® RF|BT

### Disposable Filter Systems and Bottle-Top Filters



Sartolab® single-use sterile filter systems and bottle-top filters are designed for the vacuum filtration of tissue culture media and components, biological fluids, and other aqueous solutions.

The Sartolab® single-use 150 mL, 250 mL, 500 mL and 1,000 mL bottles are designed as storage containers for sterile media, buffers, or other aqueous solutions.



These products are for laboratory use only and not for human parenteral applications.

#### Materials

The filter funnels, dust covers and receiver bottles are manufactured from virgin, heavy metal-free polystyrene. The tubing adapters, filter adapters, and the plug seal caps are made of heavy metal-free polyethylene. Sartolab® filter systems are available with polyethersulfone and cellulose acetate membranes. All units are sterilized by gamma irradiation.

#### Performance

The filter units contain membranes integrally sealed to a support grid designed to maximize flow and reduce foaming and protein denaturation.

The membranes are compatible with most aqueous solutions and tested for use in cell culture applications.

#### Filter Systems

The filter adapter utilizes a gasket design to ensure a vacuum-tight seal on the receiver | storage bottle. Each filter unit also contains a convenient tubing adapter that will fit most vacuum hoses.

The bottles are single-use containers.

They cannot withstand autoclaving or use at temperatures greater than 70°C. The suitability of the bottles for storage of solutions below 0°C depends both on the solution and the storage conditions. Many aqueous solutions, including culture media, have been successfully frozen and stored at temperatures down to -20°C. However, a trial run under actual conditions is strongly recommended to test the suitability of the bottles for frozen storage.

## □ Specifications

Pore Size	Membrane Material	Characteristics
0.1 µm	Polyethersulfone	Very low protein binding and low extractables, fast flow rate
0.2 µm	Polyethersulfone	Very low protein binding and low extractables, fast flow rate
0.45 µm	Cellulose Acetate	Optimized for aqueous liquids, very low nonspecific binding

### Bottle-Top Filters

The filter adapter is available with a 45 mm thread finish, and is designed to ensure a vacuum-tight seal on customer-supplied bottles with the appropriate thread finish. Each filter unit also contains a tubing adapter that will fit most vacuum hoses.

### Chemical Compatibility

The mechanical strength, color, appearance, and dimensional stability of filter systems, bottle-top filters and plastic bottles are affected to varying degrees by the chemicals with which they come in contact. Specific operating conditions, especially temperature, will also affect their chemical resistance. A table is provided to serve as a general guideline for the chemical resistance of Sartolab® single-use sterile filters and bottles.

### Chemical Resistance of Sartolab® Filters

Chemical Class	Membrane (PES)	Membrane (CA)	Housing (PS)
Weak Acids	3	2	1
Strong Acids	3	2	2
Alcohols	2	2	2
Aldehydes	3	3	3
Aliphatic Amines	1	3	3
Aromatic Amines	3	3	3
Bases	3	3	1
Esters	3	3	3
Hydrocarbons	3	2	3
Ketones	3	3	3

Key: 1. recommended

2. may be suitable for some applications; a trial run is recommended

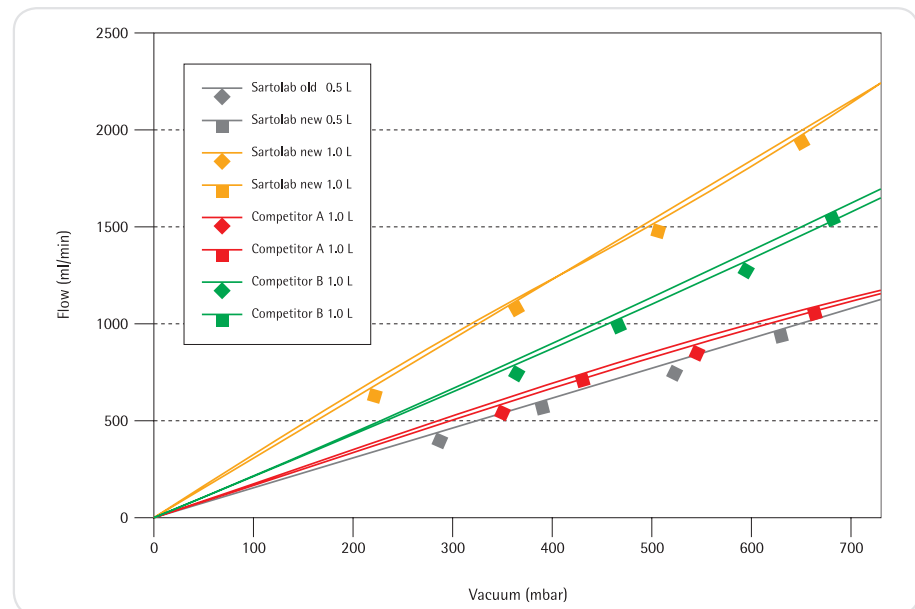
3. not recommended. PS, polystyrene; PES, polyethersulfone; CA, cellulose acetate.



## Ordering Information

Volume	Membrane	Filter Area	Qty./Pkg.	Order No.
<b>Sartolab® RF Filtration System Including Collection Bottle</b>				
150 mL	0.22 µm PES	18 cm <sup>2</sup>	12	180C1-----E
250 mL	0.22 µm PES	24 cm <sup>2</sup>	12	180C7-----E
500 mL	0.22 µm PES	39 cm <sup>2</sup>	12	180C2-----E
1,000 mL	0.22 µm PES	62 cm <sup>2</sup>	12	180C3-----E
1,000 mL	0.1 µm PES	62 cm <sup>2</sup>	12	180C8-----E
250 mL	0.45 µm CA	24 cm <sup>2</sup>	12	180A1-----E
500 mL	0.45 µm CA	39 cm <sup>2</sup>	12	180A2-----E
1,000 mL	0,45 µm CA	62 cm <sup>2</sup>	12	180A3-----E
<b>Sartolab® BT Bottle-Top Filters Without Integrated Collection Bottle</b>				
150 mL	0.22 µm PES	18 cm <sup>2</sup>	48	180C4-----K
500 mL	0.22 µm PES	39 cm <sup>2</sup>	12	180C5-----E
1,000 mL	0.22 µm PES	62 cm <sup>2</sup>	12	180C6-----E
500 mL	0.45 µm CA	39 cm <sup>2</sup>	12	180A4-----E

## Water Throughput



## ■ Sartolab® RF 50

Vacuum filtration unit for volumes of up to 50 mL



Sartolab® RF 50 vacuum filtration units are single-use units, designed for the filtration of sample volumes of up to 50 mL. They are available either with a 0.22 or a 0.45 µm polyethersulfone membrane which have been developed and manufactured by Sartorius at its own facilities.

Both membranes provide fastest flow rates due to their asymmetric structure and ensure lowest protein binding as well as low extractables. The 0.22 µm version is ideal for sterile filtration of cell cultures, buffers and aqueous solutions; the 0.45 µm for clarification. Both versions are individually-packed, sterile and ready to use.

Sartolab® RF 50 vacuum filtration unit is composed of a funnel, with dust cover, a 50 mL conical tube with graduation and writing field as well as a tubing connector for vacuum connection and a screw cap to store your filtrate in the conical tube. The design of the yellow adapter connecting the funnel to the conical tube ensures a vacuum-tight seal and enables the filtration unit to be used on the Sartolab® MultiStation for filtration of up to 6 samples in parallel with one vacuum source.

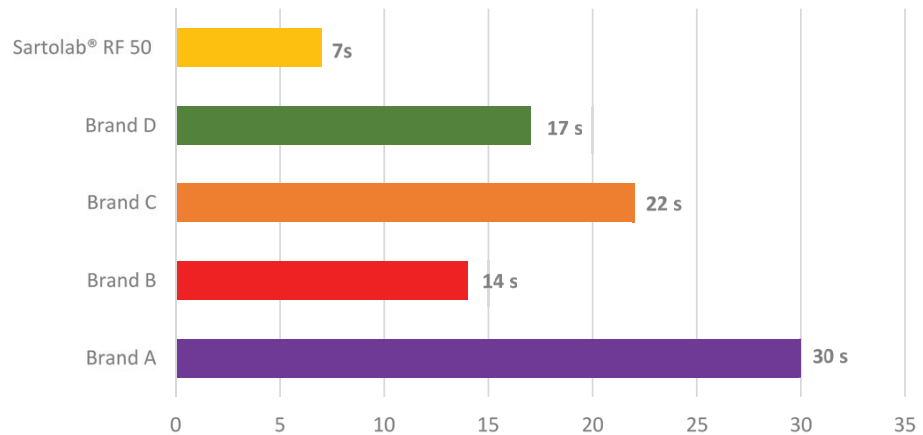
Sartolab® RF 50 can also be used alone when connecting the tubing connector delivered with each unit to your vacuum source.

The tubing connector and the screw cap for the conical tube are individually wrapped to maintain sterility until needed.

### User Benefits

- Highest flow rates with an asymmetric membrane and a large surface area
- No loss of protein with a very low protein binding membrane
- Low dead volume thanks to an optimized membrane support
- Minimized risks of contamination with a complete ready-to-use unit (no further transfer of liquid for storage necessary)
- Designed as standalone system or for a parallel filtration of up to 6 samples with Sartolab® MultiStation

**Filtration of 50 mL cell media + 10 % FBS in a 50 mL vacuum filtration unit (0.22 µm)**



### Materials

Funnel with dust cover	Styrene-acrylonitrile (SAN)
Membrane filter	0.22 µm polyethersulfone (order no. 180E01)
Funnel adapter	0.45 µm polyethersulfone (order no. 180F01)
Tubing connector for vacuum connection	Polyethylene
Conical tube	Polyethylene
Conical tube cap	Polypropylene

### Specifications

Membrane diameter	58.5 mm
Effective filtration area	21 cm <sup>2</sup>
Hold-up volume	1.2 mL
Filtration capacity	50 mL
Size of the 50 mL conical tube	Height: 115.5 mm External/internal diameter: 29.5 mm/27.48mm
Autoclavable	No
Sterilization method	E-Beam (beta) irradiation
Storage temperature of the conical tube	-80°C to max. 100°C
Packaging	Single-packaged, sterile
Operating pressure	-350 to -700 mbar

### Ordering Information

Description	Quantity	Order Number
Sartolab® RF 50, 0.22 µm, PES	24 units	180E01-----2
Sartolab® RF 50, 0.45 µm, PES	24 units	180F01-----2

## ■ Sartolab® Multistation

For hands-free parallel filtration of up to 6 samples



Sartolab® MultiStation is a stand specially designed to hold 1 to 6 vacuum filtration units, allowing simultaneous filtration of up to 6 samples.

The MultiStation is permanently connected to your vacuum source. Easily install your vacuum filtration units in the MultiStation for quick and easy filtration of samples without the need for installation of extra connectors and time-consuming stabilization.

Sartolab® MultiStation works with our Sartolab® RF 50 vacuum filtration units; the funnel adapter of these units is designed to fit perfectly in the bracket of the MultiStation.

With one click, connect the filtration unit to the device, assuring perfect filter stability. With a second click, engage the vacuum automatically and begin filtering.

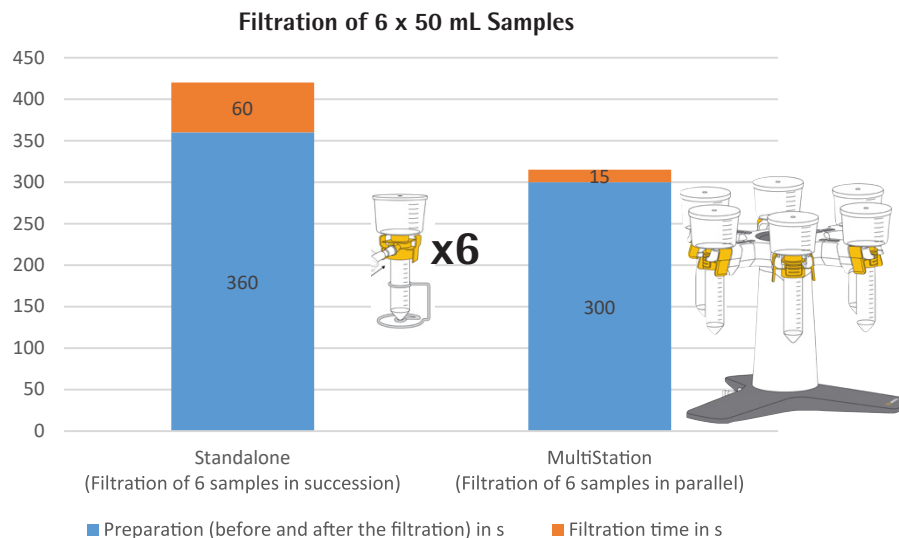
Easily manipulate your samples with the rotating, multi-directional head, and easily keep track of your samples during filtration with the numbered brackets

### User Benefits

- Single vacuum source enables simultaneous filtration of up to 6 samples
- Time-saving (no installation time for each filter unit before use)
- Hands-free filtration



**The MultiStation advantage: Using the Sartolab® MultiStation to filter 6 x 50 mL samples saves handling time compared to standalone filtration**



### □ Specifications

Material (visible parts)	ABS/Aluminum/Stainless steel
Dimensions (Length x Width x Height)	307 x 348 x 281 mm
Weight	4.6 kg
Tubing connector	Designed for tubing with an inner diameter between 4 and 10 mm and with a wall thickness of minimum 3 mm

### □ Ordering Information

Description	Quantity	Order Number
Sartolab® MultiStation	1 unit	SDLC01

## ■ Sartoclear Dynamics® Lab P15

Clarification and Sterile Filtration of up to 15 mL Mammalian Cell Culture in One Step



Sartoclear Dynamics® Lab P15 is a new kit for single step harvesting of 15 mL animal cell cultures with even high cell densities. With this kit, the clarification and sterile filtration of mammalian cell culture is performed in a single pressure filtration step. Inspired by the plasma industry, Sartoclear Dynamics® is based on the principles of body feed filtration.

This ready to use kit combines a 20 mL syringe pre-filled with a 0.5 g filter aid and an integrated filter\* for sterile filtration. The filter aid facilitates filtration through the sterile filter while allowing complete protein recovery.

A convenient filling tube can be connected to the syringe, for the easy recovery of samples from 50 mL Falcon tubes or ambr® 15 bioreactors.

As a result, this method replaces centrifugation and subsequent sterile filtration steps, leading to clarified and sterilized cell culture harvest in minutes. Your cell culture harvest will be available for following sample concentration by ultrafiltration and downstream analytics in no time.

Sartoclear® Dynamics Lab P15 Features:

- Single step mammalian cell culture harvest
- Designed for cell densities up to  $20 \times 10^6$  cells and even more
- Fast and effortless filtration
- Optimized for cell culture harvest from ambr® 15 bioreactors

\* The sterile filter included in the kit contains a  $0.2 \mu\text{m}$  polyethersulfone membrane and a prefilter made of 100 % high-purity quartz: The choice of these materials, along with the larger surface area of the filter, enables higher flow rates.

### ■ Quick and Easy Filtration



1. Fill the syringe with cell culture broth.



2. Shake the syringe to mix the broth with the filter aid.



3. Connect the sterile filter to the syringe and filter.

### Typical Results

Cell Type	Cell Density	Viability	Mab concentration before filtration	Mab concentration after filtration	Recovery Rate
CHO DG44	16 × 10 <sup>6</sup> cells/mL	78%	6.02 g/L	5.77 g/L	96%
CHO DG44	38 × 10 <sup>5</sup> cells/mL	48%	0.43 g/L	0.43 g/L	100%

### Specifications

#### DE Syringe

Syringe material	Syringe barrel and plunger rod: polypropylene; stopper: latex-free elastomer
Syringe Cap	Polyamide
Filling tube material	Polypropylene
Filter aid	0.5 g highly pure diatomaceous earth (Celpure® C300 – pharmaceutical-grade*)

#### Sterile Filter

Housing material	Polycarbonate
Prefilter material	100% high-purity quartz, binder-free
Filter material	0.2 µm polyethersulfone
Filter diameter	61 mm
Filtration area	20 cm <sup>2</sup>
Connector inlet	Female luer lock
Connector outlet	Hose barb
Hold-up volume	Approx. 3 mL
Housing burst pressure	> 5 bar   72.5 psi
Packaging	Individually packed
Sterilization	EO sterilization

### Ordering Information

Product Name	Number of units per box	Order No.
Sartoclear Dynamics® Lab P15	6 × 20 mL syringes, pre-filled with 0.5 g DE, including caps and filling tubes 6 × sterile filters	SDLP--0015-----C

\* Celpure® is a trademark of Advanced Minerals



## ■ Sartoclear Dynamics® Lab V

Clarification and Sterile Filtration of 50 mL up to 1 L Mammalian Cell Culture in One Step



Sartoclear Dynamics® Lab V kits enable clarification and sterile filtration to be performed in a single step. These kits simplify the cell harvesting process by fully eliminating the centrifugation step otherwise needed for clarification. As a result, they enable cell cultures to be efficiently clarified and sterilized in minutes – quickly and easily.

Sartoclear Dynamics® Lab kits have been designed and optimized for harvesting mammalian cell cultures, such as CHO, HEK, hybridomas and many others, with cell densities of up to  $20 \times 10^6$  cells/mL.

Each kit provides filter aid pouches for clarification and Sartolab® RF vacuum filtration units for sterile filtration. The filter aid used in Sartoclear Dynamics® Lab products is made of highly-pure diatomaceous earth (DE) that is insoluble and inert. It is packed in ready-to-use pouches in pre-wetted condition to prevent the release of dust particles. The DE pouches are gamma-irradiated to rule out any contamination.

Sartoclear® Dynamics Lab V Features:

- Single step mammalian cell culture harvest
- Designed for cell densities up to  $20 \times 10^6$  cells
- Fast and effortless filtration

### ■ Quick and Easy Filtration



1. Attach the Sartolab® RF unit to a vacuum source. Pour the filter aid into your cell culture.



2. Mix to homogenize. Pour the cell culture and filter aid mixture into the Sartolab® RF first ...



3. ... then filter by simply starting the pump.
4. After 5–15 min, the sample will be available for subsequent downstream processing steps, such as protein purification and concentration.
5. Parallel Filtration of 50 mL samples with the Sartolab® MultiStation

### Typical Results

Cell Type	Cell Density	Viability	mAb concentration before filtration	Mab concentration after filtration	Recovery Rate	Turbidity
CHO	14.46×10 <sup>6</sup> cells/mL	85.2%	5.2 g/L	5.15 g/L	99%	18 NTU
HEK	8×10 <sup>6</sup> cells/mL	70%	0.035 g/L	0.034 g/L	97%	8 NTU

### Specifications

#### Clarification

Pouches of Filter Aid

Diatomaceous Earth (DE)	1 g, 5 g or 10 g highly pure diatomaceous earth, (Celpure® C300 – pharmaceutical grade)*, mixed with water in a ratio of 1 DE: 1.25 ultrapure water
Packaging   Sterilization	Dust-free, gamma irradiated pouches

#### Filtration

Vacuum filtration units with receiver flasks (Sartolab® RF)

Funnel, dust cover, receiver bottles	Heavy metal-free polystyrene
Filter adapter, tubing adapter, cap	Heavy metal-free polyethylene
Filter material	0.22 µm polyethersulfone
Packaging   Sterilization	Single-packaged, sterile

#### Filtration

Vacuum filtration units with conical tube (Sartolab® RF 50)

Funnel, dust cover	Styrene-acrylonitrile (SAN)
Funnel adapter, tubing connector, cap	Heavy metal-free polyethylene
Conical tube	Polypropylene
Filter material	0.22 µm polyethersulfone (order no. 180E01) 0.45 µm polyethersulfone (order no. 180F01)
Packaging	Single-packaged, sterile

\* Celpure® is a trademark of Advanced Minerals

Each Sartoclear Dynamics® Lab V kit is comprised of pouches of filter aid and Sartolab® RF vacuum filtration units that match your needs. Find the right kit in just two easy steps:

1. Determine the volume range of your sample to be filtered.
2. Then reference it to the cell density of your cell culture.

Volume*	Cell density**		
	< 5 million cells/mL	5–10 million cells/mL	10–20 million cells/mL
≤ 50 mL	SDLV-0050-01E0-2		SDLV-0050-02E0-2
> 50–150 mL	SDLV-0150-02C--E		SDLV-0150-05C--2
150–250 mL	SDLV-0250-05C--2		SDLV-0250-10C--2
250–500 mL	SDLV-0500-05C--2	SDLV-0500-10C--2	SDLV-0500-20C--E
500–1000 mL	SDLV-1000-10C--2	SDLV-1000-20C--E	SDLV-1000-40C--E

\* Especially for cultures with high cell densities (>10 million cells/mL) > 50, we recommend that you use a Sartolab® RF unit nominally rated for the next higher volume of the solution to be filtered as it will accelerate your filtration run (larger membrane surface area | higher quantity of DE).

\*\* Tested with CHO cell lines with a cell viability of approx. 85%

## □ Ordering Information

Description	Qty. of Units	Order No.
<b>Sartoclear Dynamics® Lab V50 Kits – 0.22 µm PES</b>		
<b>Sartoclear Dynamics Lab V, 50 mL, 1 g</b>		
Filtration of up to 50 mL with 1 g of DE per unit Contents: 1 × 180E01-----2 (24 × Sartolab® RF 50, 0.22 µm PES) 1 × SDLKG-01.0-----2 (24 × pouches of filter aid, 1 g)	24	SDLV-0050-01E0-2
<b>Sartoclear Dynamics Lab V, 50 mL, 2 g</b>		
Filtration of up to 50 mL with 2 g of DE per unit Contents: 1 × 180E01-----2 (24 × Sartolab® RF 50, 0.22 µm PES) 2 × SDLKG-01.0-----2 (48 × pouches of filter aid, 1 g)	24	SDLV-0050-02E0-2
<b>Sartoclear Dynamics® Lab V50 Kits – 0.45 µm PES</b>		
<b>Sartoclear Dynamics Lab V, 50 mL, 1 g</b>		
Filtration of up to 50 mL with 1 g of DE per unit Contents: 1 × 180F01-----2 (24 × Sartolab® RF 50, 0.45 µm PES ) 1 × SDLKG-01.0-----2 (24 × pouches of filter aid, 1 g)	24	SDLV-0050-01F0-2
<b>Sartoclear Dynamics Lab V, 50 mL, 2 g</b>		
Filtration of up to 50 mL with 2 g of DE per unit Contents: 1 × 180F01-----E (24 × Sartolab® RF 50, 0.45 µm PES) 2 × SDLKG-01.0-----2 (48 × pouches of filter aid, 1 g)	24	SDLV-0050-02F0-2
<b>Sartoclear Dynamics® Lab V150 Kits</b>		
<b>Sartoclear Dynamics® Lab V, 150 mL, 2 g</b>		
Filtration of up to 150 mL with 2 g of DE per unit Contents: 1 × 180C1-----E (12 × Sartolab® RF 150, 0.22 µm PES) 1 × SDLKG-01.0-----2 (24 × pouches of filter aid, 1 g)	12	SDLV-0150-02C--E
<b>Sartoclear Dynamics® Lab V, 150 mL, 5 g</b>		
Filtration of up to 150 mL with 5 g of DE per unit Contents: 2 × 180C1-----E (24 × Sartolab® RF 150, 0.22 µm PES) 1 × SDLKG-05.0-----2 (24 × pouches of filter aid, 5 g)	24	SDLV-0150-05C--2

Description	Qty. of Units	Order No.
<b>Sartoclear Dynamics® Lab V250 Kits</b>		
<b>Sartoclear Dynamics® Lab V, 250 mL, 5 g</b>		
Filtration of up to 250 mL with 5 g of DE per unit Contents: 2 × 180C7-----E (24 × Sartolab® RF 250, 0.22 µm PES) 1 × SDLKG-05.0-----2 (24 × pouches of filter aid, 5 g)	24	SDLV-0250-05C--2
<b>Sartoclear Dynamics® Lab V, 250 mL, 10 g</b>		
Filtration of up to 250 mL with 10 g of DE per unit Contents: 2 × 180C7-----E (24 × Sartolab® RF 250, 0.22 µm PES) 1 × SDLKG-10.0-----2 (24 × pouches of filter aid, 10 g)	24	SDLV-0250-10C--2
<b>Sartoclear Dynamics® Lab V500 Kits</b>		
<b>Sartoclear Dynamics® Lab V, 500 mL, 5 g</b>		
Filtration of up to 500 mL with 5 g DE per unit Contents: 2 × 180C2-----E (24 × Sartolab® RF 500, 0.22 µm PES) 1 × SDLKG-05.0-----2 (24 × pouches of filter aid, 5 g)	24	SDLV-0500-05C--2
<b>Sartoclear Dynamics® Lab V, 500 mL, 10 g</b>		
Filtration of up to 500 mL with 10 g DE per unit Contents: 2 × 180C2-----E (24 × Sartolab® RF 500, 0.22 µm PES) 1 × SDLKG-010.0-----2 (24 × pouches of filter aid, 10 g)	24	SDLV-0500-10C--2
<b>Sartoclear Dynamics® Lab V, 500 mL, 20 g</b>		
Filtration of up to 500 mL with 20 g DE per unit Contents: 1 × 180C2-----E (12 × Sartolab® RF 500, 0.22 µm PES) 1 × SDLKG-010.0-----2 (24 × pouches of filter aid, 10 g)	12	SDLV-0500-20C--E
<b>Sartoclear Dynamics® Lab V1000 Kits</b>		
<b>Sartoclear Dynamics® Lab V, 1,000 mL, 10 g</b>		
Filtration of up to 1 L with 10 g of DE per unit Contents: 2 × 180C3-----E (24 × Sartolab® RF 1000, 0.22 µm PES) 1 × SDLKG-10.0-----2 (24 × pouches of filter aid, 10 g)	24	SDLV-1000-10C--2
<b>Sartoclear Dynamics® Lab V, 1,000 mL, 20 g</b>		
Filtration of up to 1 L with 20 g of DE per unit Contents: 1 × 180C3-----E (12 × Sartolab® RF 1000, 0.22 µm PES) 1 × SDLKG-10.0-----2 (24 × pouches of filter aid, 10 g)	12	SDLV-1000-20C--E
<b>Sartoclear Dynamics® Lab V, 1,000 mL, 40 g</b>		
Filtration of up to 1 L with 40 g of DE per unit Contents: 1 × 180C3-----E (12 × Sartolab® RF 1000, 0.22 µm PES) 2 × SDLKG-10.0-----2 (48 × pouches of filter aid, 10 g)	12	SDLV-1000-40C--E



	Material							Minisart® Types										
	PES membrane	SFCA membrane	PTFE membrane	RC membrane	Nylon membrane	GF depth filter	Housing MBS	Housing PP	Minisart® HighFlow	Minisart® NML Ophthalsart	Minisart® NML Plus	Minisart® NML GF	Minisart® HY	Minisart® Air	Minisart® RC	Minisart® NY	Minisart® NY Plus	Minisart® SRP
<b>Filter Membrane</b>	PES	SFCA	PTFE	RC	PA				PES	SFCA	SFCA		PTFE	RC	PA	PA	PTFE	PES
<b>Prefilter</b>						GF			-	-	GF	GF	-	-	-	GF	-	-
<b>Housing Material</b>							MBS	PP	MBS	MBS	MBS	MBS	MBS	PP	PP	PP	PP	PP
<b>Solvents (continued)</b>																		
Pyridine	-	-	++	++	++	++	-	++	-	-	-	-	++	++	++	++	++	-
Carbon tetrachloride	-	-	++	++	++	++	-	+	-	-	-	-	+	+	+	+	+	-
Tetrahydrofuran	-	-	++	++	++	++	-	++	-	-	-	-	++	++	++	++	++	-
Toluene	-	+	++	++	++	++	-	+	-	-	-	-	+	+	+	+	+	-
Trichloroethane	-	-	++	++	+	++	-	+	-	-	-	-	+	+	+	+	+	-
Trichloroethylene	-	+	++	++	++	++	-	+	-	-	-	-	+	+	+	+	+	-
Xylene	-	+	++	++	++	++	-	+	-	-	-	-	+	+	+	+	+	-
<b>Acids</b>																		
Acetic acid, 25%	+	+	++	++	-	++	+	++	+	+	+	+	+	++	-	-	++	+
Acetic acid, 80%	-	-	++	+	-	++	-	+	-	-	-	-	+	-	-	-	+	-
Hydrofluoric acid, 25%	+	-	++	+	-	++	+	+	+	-	-	+	+	+	-	-	+	+
Hydrofluoric acid, 50%	+	-	++	+	-	++	-	+	-	-	-	-	+	-	-	-	+	+
Perchloric acid, 25%	-	-	++	-	-	++	-	+	-	-	-	-	-	-	-	-	+	-
Phosphoric acid, up to 10%	+	+	++	-	-	++	+	+	+	+	+	+	-	-	-	-	+	+
Phosphoric acid, 86%	+	+	++	-	-	++	-	+	-	-	-	-	-	-	-	-	+	+
Nitric acid, 30%	+	-	++	-	-	++	+	+	+	-	-	+	+	-	-	-	+	+
Nitric acid, conc.	-	-	++	-	-	++	-	-	-	-	-	-	-	-	-	-	-	-
Hydrochloric acid, 15%	++	+	++	-	-	++	+	+	+	+	+	+	+	-	-	-	+	+
Hydrochloric acid, 20%	++	-	++	-	-	++	+	+	+	-	-	+	+	-	-	-	+	+
Sulfuric acid, 25%	+	-	++	+	-	++	++	++	+	-	-	++	++	+	-	-	++	+
Sulfuric acid, 98%	-	-	++	-	-	++	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroacetic acid, 25%	-	-	++	++	-	++	-	+	-	-	-	-	+	-	-	-	+	-
<b>Bases</b>																		
Ammonia, 1N	++	+	++	+	++	++	+	++	+	+	+	+	+	+	++	++	++	++
Ammonium hydroxide, 25%	+	+	++	+	++	+	-	+	-	-	-	-	+	+	+	+	+	+
Potassium hydroxide, 32%	++	-	++	-	+	+	-	++	-	-	-	-	-	+	+	+	++	++
Sodium hydroxide, 1N	++	-	++	+	++	+	-	++	-	-	-	-	+	++	+	+	++	++
Sodium hydroxide, 32%	++	-	++	-	+	-	-	+	-	-	-	-	+	-	-	-	+	+
<b>Aqueous solutions</b>																		
Formaldehyde, 30%	+	++	++	+	++	++	+	+	+	+	+	+	+	+	+	+	+	+
Sodium hypochlorite, 5%	++	-	++	-	-	++	+	+	+	-	-	+	+	-	-	-	+	+
Hydrogen peroxide, 35%	++	-	++	-	-	++	+	++	+	-	-	+	+	-	-	-	++	++
<b>pH range</b>																		
pH 1 to 14	-	-	++	-	-	++	-	++										
pH 1 to 13	++	-	++	-	-	++	-	++										
pH 3 to 14	+	-	++	+	++	++	-	++										
pH 3 to 12	++	-	++	++	++	++	+	++										
pH 4 to 8	++	++	++	++	++	++	++	++										

**Legend**

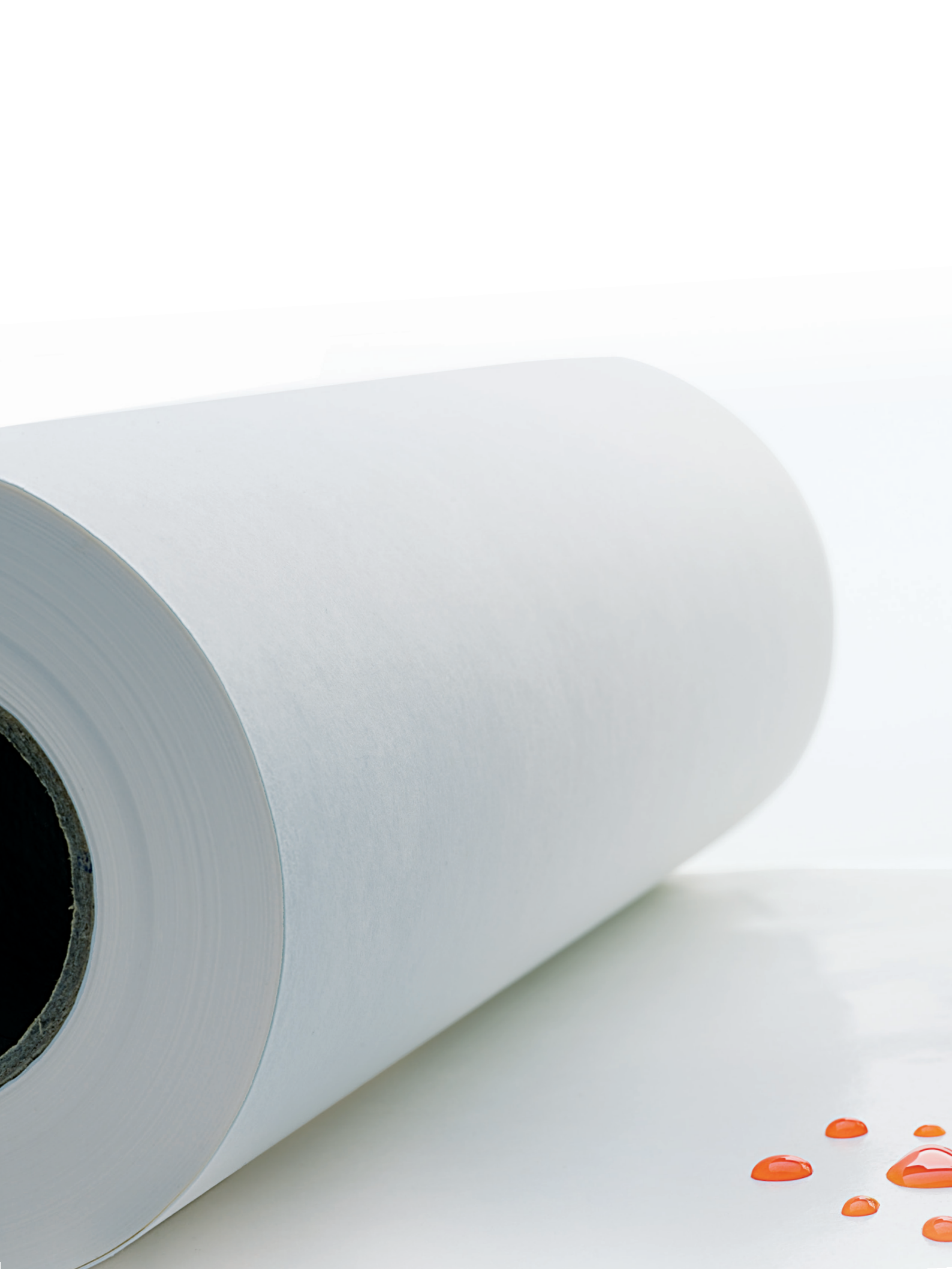
High compatibility

Limited compatibility

Not compatible

<sup>1</sup> Gamma irradiation feasible for Minisart® Air

Contact time: 24 hours at 20°C. Chemical compatibilities can be influenced by various factors. Therefore, we recommend that you confirm compatibility with the liquid you want to filter by performing a trial filtration run before you start your actual filtration.





## ■ Basic Filtration

### Table of Contents

108 Filter Papers

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136 Combisart® Manifolds





Filters are indispensable for your routine work in laboratory and industrial applications. Sartorius supplies you with a broad range of filters for a myriad of filtration tasks and supports you with all your filtration challenges.

Our Product Range Covers:

- Filter papers
- Glass and quartz microfiber filters
- Membrane filters
- Blotting & chromatography papers & membranes
- Filtration equipment

#### **Quality Assurance and Quality Control**

Sartorius pays particular attention to continuous in-process quality control. Regular checks and exact analyses of the raw materials and each finished product assure constant high quality and product uniformity. We meet the requirements set forth by the ISO 9001 quality management system and the ISO 14001 environmental management system.

### How Do Filter Papers Work?

Filter papers are depth filters. Their efficiency is influenced by various parameters: the mechanical particulate retention, adsorption, pH, surface properties, thickness and strength of the filter paper as well as the shape, density and quantity of particles to be retained. The precipitates deposited on the filter form a "cake layer" which – depending on its density – increasingly affects the progress of an ongoing filtration and decisively affects the retention capability. Therefore, it is essential to select the perfect filter paper to ensure the best filtration results. This choice depends on the filtration method as well as on the amount and properties of the medium to be filtered, the size of the particulate solids to be removed and the required degree of clarification.

### How Do Membrane Filters Work?

Membrane filters retain particles larger than their pore sizes. Smaller particles pass through the membrane or are captured in the membrane. Such filters are used for the filtration of smaller particles and for critical applications such as sterility testing. The choice of the right membrane type depends on the specifications of the solution to be filtered. The most important parameters for this are adsorption, chemical compatibility and the particle size to be retained.










## Ash-free Filter Papers

### For Quantitative and Gravimetric Analyses

These filter papers are used for quantitative and gravimetric analyses as well as for pressure or vacuum filtration. They are made out of 100% cotton linters with an  $\alpha$ -cellulose content of >98% and are acid-washed to make the papers ashless and achieve high purity.

#### Typical Values

Grade	Weight (g/m <sup>2</sup> )	Thickness (mm)	Particle Retention (μm)	Filtration (s)	Precipitates	Properties
 388	84	0.21	12 to 15	10	Coarse crystalline	Wide-pore, loose structure, fast filtering
 389	84	0.19	8 to 12	20	Medium-fine crystalline	Medium- to wide-pore, medium fast filtering
 389 F	84	0.19	8 to 12	20	Medium-fine crystalline	Medium- to wide-pore, medium fast filtering
 392	84	0.17	5 to 8	50	Fine crystalline	Medium dense, medium fast filtering
 390	84	0.16	3 to 5	100	Fine crystalline	Narrow-pore, dense, slow filtering
 391	84	0.15	2 to 3	180	Very fine crystalline	Fine-pore, dense, very slow filtering
 393	100	0.17	1 to 2	300	Very fine crystalline	Very fine-pore, very dense, very slow filtering

#### Ordering Information

##### Filter Discs, 100 Pieces

Dia. in mm	Grade 388	Grade 389	Grade 389 F	Grade 390	Grade 391	Grade 392	Grade 393
55	FT-3-101-055	FT-3-102-055	FT-3-112-055	FT-3-103-055	FT-3-104-055	FT-3-105-055	FT-3-127-055
70	FT-3-101-070	FT-3-102-070		FT-3-103-070	FT-3-104-070	FT-3-105-070	FT-3-127-070
90	FT-3-101-090	FT-3-102-090	FT-3-112-090	FT-3-103-090	FT-3-104-090	FT-3-105-090	FT-3-127-090
110	FT-3-101-110	FT-3-102-110	FT-3-112-110	FT-3-103-110	FT-3-104-110	FT-3-105-110	FT-3-127-110
125	FT-3-101-125	FT-3-102-125	FT-3-112-125	FT-3-103-125	FT-3-104-125	FT-3-105-125	FT-3-127-125
150	FT-3-101-150	FT-3-102-150	FT-3-112-150	FT-3-103-150	FT-3-104-150	FT-3-105-150	FT-3-127-150
185	FT-3-101-185	FT-3-102-185	FT-3-112-185	FT-3-103-185	FT-3-104-185	FT-3-105-185	FT-3-127-185
240	FT-3-101-240	FT-3-102-240		FT-3-103-240	FT-3-104-240	FT-3-105-240	FT-3-127-240

##### Folded Filters, 100 Pieces

Dia. in mm	Grade 388	Grade 389	Grade 389 F	Grade 390	Grade 391	Grade 392
110	FT-4-101-110	FT-4-102-110		FT-4-103-110	FT-4-104-110	FT-4-105-110
125	FT-4-101-125	FT-4-102-125		FT-4-103-125	FT-4-104-125	FT-4-105-125
150	FT-4-101-150	FT-4-102-150		FT-4-103-150	FT-4-104-150	FT-4-105-150
185	FT-4-101-185	FT-4-102-185	FT-4-112-185	FT-4-103-185	FT-4-104-185	FT-4-105-185
240	FT-4-101-240	FT-4-102-240			FT-4-104-240	

##### Sheets in 580 × 580 mm, 100 Pieces

Grade 388	Grade 389	Grade 390	Grade 391	Grade 392	Grade 393
FT-2-101-580580	FT-2-102-580580	FT-2-103-580580	FT-2-104-580580	FT-2-105-580580	FT-2-127-580580

Other dimensions are available on request

## Wet-strengthened Filter Papers

### For Qualitative Analyses

These qualitative filter papers are essentially used for analytical purposes and routine analyses, whenever no gravimetric analyses are required. They are wet-strengthened and can be used for pressure and vacuum filtration. They are made of refined pulp and linters with an >95%  $\alpha$ -cellulose content and are very pure with an ash content  $\leq 0.1\%$ .

#### Typical Values

Grade	Weight (g/m <sup>2</sup> )	Thickness (mm)	Particle Retention ( $\mu\text{m}$ )	Filtration (s)	Precipitates	Properties
1288	84	0.21	12 to 15	10	Coarse crystalline	Wide-pore, loose structure, fast filtering
1289	84	0.21	8 to 12	20	Medium-fine crystalline	Medium- to wide-pore, medium fast filtering
1292	84	0.17	5 to 8	50	Fine crystalline	Medium dense, medium fast filtering
1290	84	0.15	3 to 5	100	Fine crystalline	Narrow-pore, dense, slow filtering
1291	84	0.15	2 to 3	180	Very fine crystalline	Fine-pore, dense, very slow filtering
293	80	0.15	1 to 2	300	Very fine crystalline	Very fine-pore, very dense, very slow filtering

#### Ordering Information

##### Filter Discs, 100 Pieces

Dia. in mm	Grade 1288	Grade 1289	Grade 1290	Grade 1291	Grade 1292	Grade 293
55	FT-3-206-055	FT-3-207-055	FT-3-208-055	FT-3-209-055	FT-3-210-055	FT-3-211-055
70	FT-3-206-070	FT-3-207-070	FT-3-208-070	FT-3-209-070	FT-3-210-070	FT-3-211-070
90	FT-3-206-090	FT-3-207-090	FT-3-208-090	FT-3-209-090	FT-3-210-090	FT-3-211-090
110	FT-3-206-110	FT-3-207-110	FT-3-208-110	FT-3-209-110	FT-3-210-110	FT-3-211-110
125	FT-3-206-125	FT-3-207-125	FT-3-208-125	FT-3-209-125	FT-3-210-125	FT-3-211-125
150	FT-3-206-150	FT-3-207-150	FT-3-208-150	FT-3-209-150	FT-3-210-150	FT-3-211-150
185	FT-3-206-185	FT-3-207-185	FT-3-208-185	FT-3-209-185	FT-3-210-185	FT-3-211-185
240	FT-3-206-240	FT-3-207-240	FT-3-208-240	FT-3-209-240	FT-3-210-240	

##### Folded Filters, 100 Pieces

Dia. in mm	Grade 1288	Grade 1289	Grade 1290	Grade 1291	Grade 1292	Grade 293
110	FT-4-206-110	FT-4-207-110	FT-4-208-110	FT-4-209-110	FT-4-210-110	
125	FT-4-206-125	FT-4-207-125	FT-4-208-125	FT-4-209-125	FT-4-210-125	FT-4-211-125
150	FT-4-206-150	FT-4-207-150	FT-4-208-150	FT-4-209-150	FT-4-210-150	FT-4-211-150
185	FT-4-206-185	FT-4-207-185	FT-4-208-185	FT-4-209-185	FT-4-210-185	FT-4-211-185
240	FT-4-206-240	FT-4-207-240	FT-4-208-240	FT-4-209-240	FT-4-210-240	FT-4-211-240

##### Sheets in 580 × 580 mm, 100 Pieces

Grade 1288	Grade 1289	Grade 1290	Grade 1291	Grade 1292	Grade 293
FT-2-206-580580	FT-2-207-580580	FT-2-208-580580	FT-2-209-580580	FT-2-210-580580	FT-2-211-580580

Other dimensions are available on request

## High-Purity Filter Papers

### For Qualitative Analyses

These paper grades are used for analytical purposes that require a low ash content. Grades 292 and 292a are especially suitable for soil analyses because they are low in nitrogen. For phosphate or sodium determination, we recommend grades 131 and 132.

#### Typical Values

Grade	Weight (g/m <sup>2</sup> )	Thickness (mm)	Particle Retention (µm)	Filtration (s)	Material
292	87	0.18	5 to 8	45	Cotton linters, low-nitrogen and nitrates, ash content ≤ 0.06% according to DIN 54370
292a	97	0.19	4 to 7	60	Cotton linters, low-nitrogen and nitrates, ash content ≤ 0.06% according to DIN 54370
132	80	0.17	5 to 7	55	Cotton linters and refined pulp, low-phosphate and low-potassium, ash content < 0.02% according to DIN 54370
131	80	0.16	3 to 5	100	Cotton linters and refined pulp, low-phosphate and low-potassium, ash content < 0.02% according to DIN 54370

#### Ordering Information



##### Filter Discs, 100 Pieces

Dia. in mm	Grade 131	Grade 132	Grade 292	Grade 292a
55		FT-3-329-055	FT-3-205-055	FT-3-215-055
70		FT-3-329-070	FT-3-205-070	FT-3-215-070
90		FT-3-329-090	FT-3-205-090	FT-3-215-090
110		FT-3-329-110	FT-3-205-110	FT-3-215-110
125	FT-3-351-125	FT-3-329-125	FT-3-205-125	FT-3-215-125
150		FT-3-329-150	FT-3-205-150	FT-3-215-150
185		FT-3-329-185	FT-3-205-185	FT-3-215-185
240		FT-3-329-240	FT-3-205-240	FT-3-215-240



##### Folded Filters, 100 Pieces

Dia. in mm	Grade 131	Grade 132	Grade 292	Grade 292a
110	FT-4-351-110	FT-4-329-110	FT-4-205-110	FT-4-215-110
125	FT-4-351-125	FT-4-329-125	FT-4-205-125	FT-4-215-125
150	FT-4-351-150	FT-4-329-150	FT-4-205-150	FT-4-215-150
185	FT-4-351-185	FT-4-329-185	FT-4-205-185	FT-4-215-185
240		FT-4-329-240	FT-4-205-240	FT-4-215-240



##### Sheets in 580 × 580 mm, 100 Pieces

Grade 292	Grade 292a
FT-2-205-580580	FT-2-215-580580

Other dimensions are available on request

## Filter Papers

### For Qualitative-Technical Analyses

These filter papers are used for routine analyses like clarification, determination of substances, but also as discs with a center hole for technical applications. Grades with a wet burst resistance > 30 kPa are referred to as wet-strengthened and are therefore suitable for pressure or vacuum filtration. They are made of refined pulp and linters with an > 95%  $\alpha$ -cellulose content, are very pure with an ash content between <0.1 to 0.15%. Below you will find an overview of the most commonly used grades.

#### Typical Values

Grade	Surface	Weight (g/m <sup>2</sup> )	Thickness (mm)	Particle Retention ( $\mu$ m)	Filtration (s)	Wet Burst Resistance (kPa)	Properties
3 hw	Smooth	65	0.14	8 to 12	20	40	Medium fast filtering, filter paper for routine work in the lab
4 b	Smooth	75	0.15	8 to 12	22	> 15	Medium fast filtering, filtration of coarse precipitates, wick paper for seed testing
603/N	Crêped	75	0.25	> 15	8	$\geq$ 50	Fast filtering, filtration of sugar solutions
6	Smooth	80	0.17	10 to 13	15	30	Fast filtering, degassing beer before analysis, clarification of spirits
100/N	Smooth	85	0.18	6 to 8	30	80	Medium fast filtering, ash content <0.1%, low potassium and sodium content, determination of the sugar content
5 H/N	Crêped	85	0.28	> 40	3	$\geq$ 40	Very fast filtering, wide-pore, filtration of essential oils
3 S/h	Smooth	200	0.36	5 to 7	55	15	Medium fast to slow filtering, narrow-pore, re-wet test for diapers

#### Ordering Information

##### Filter Discs

Dia. in mm	Grade 3 hw (100 Pieces)	Grade 4 b (100 Pieces)	Grade 603/N (100 Pieces)	Grade 6 (100 Pieces)	Grade 100/N (100 Pieces)	Grade 5 H/N (100 Pieces)	Grade 3 S/h (50 Pieces)
55	FT-3-303-055	FT-3-309-055		FT-3-312-055	FT-3-328-055		FT-3-307-055
70	FT-3-303-070	FT-3-309-070		FT-3-312-070	FT-3-328-070		
90	FT-3-303-090	FT-3-309-090	FT-3-335-090	FT-3-312-090	FT-3-328-090	FT-3-423-090	FT-3-307-090
110	FT-3-303-110	FT-3-309-110	FT-3-335-110	FT-3-312-110	FT-3-328-110		FT-3-307-110
125	FT-3-303-125	FT-3-309-125	FT-3-335-125	FT-3-312-125	FT-3-328-125	FT-3-423-125	FT-3-307-125
150	FT-3-303-150	FT-3-309-150	FT-3-335-150	FT-3-312-150	FT-3-328-150	FT-3-423-150	FT-3-307-150
185	FT-3-303-185	FT-3-309-185	FT-3-335-185	FT-3-312-185	FT-3-328-185	FT-3-423-185	FT-3-307-185
240	FT-3-303-240	FT-3-309-240	FT-3-335-240	FT-3-312-240	FT-3-328-240	FT-3-423-240	FT-3-307-240

##### Folded Filters, 100 Pieces

Dia. in mm	Grade 3 hw	Grade 4 b	Grade 603/N	Grade 6	Grade 100/N	Grade 5 H/N
125	FT-4-303-125	FT-4-309-125	FT-4-335-125	FT-4-312-125		FT-4-423-125
150	FT-4-303-150	FT-4-309-150	FT-4-335-150	FT-4-312-150	FT-4-328-150	FT-4-423-150
185	FT-4-303-185	FT-4-309-185	FT-4-335-185	FT-4-312-185		FT-4-423-185
240	FT-4-303-240	FT-4-309-240	FT-4-335-240	FT-4-312-240	FT-4-328-240	FT-4-423-240
270	FT-4-303-270	FT-4-309-270	FT-4-335-270	FT-4-312-270	FT-4-328-270	FT-4-423-270
320	FT-4-303-320	FT-4-309-320	FT-4-335-320	FT-4-312-320	FT-4-328-320	FT-4-423-320

##### Sheets in 580 × 580 mm, 100 Pieces

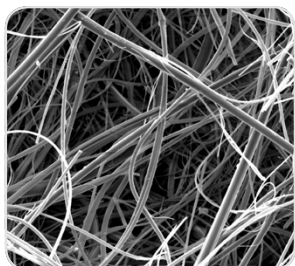
Grade 3 hw	Grade 4 b	Grade 603/N	Grade 6	Grade 100/N	Grade 5 H/N
FT-2-303-580580	FT-2-309-580580	FT-2-335-580580	FT-2-312-580580	FT-2-328-580580	FT-2-423-580580

Other dimensions are available on request



## ■ Glass Microfiber Filters

### Without Binder



Binder-free glass microfiber filters are recommended for analytical and gravimetric analyses and also as prefilters. These filters combine fast flow rates with high load capacity and the retention of very fine

particles; they are biologically inert, are resistant to most chemicals and withstand temperatures up to 500°C (grade 550-HA up to 550°C).

### □ Typical Values

Grade	Weight (g/m <sup>2</sup> )	Thickness (mm)	Penetration 0.3 μm (%)*	Particle retention in liquids (μm)	Filtration speed (mL/min)	Fulfills the requirements in EN 872:2005 (weigh loss)
MGA	54	0.23	< 0.001	1.6	510	Yes
MGB	143	0.70	< 0.001	1.0	210	
MGC	54	0.24	< 0.001	1.2	335	Yes
MGD	120	0.47	< 0.1	2.7	920	
MGF	75	0.38	< 0.001	0.7	110	
MGG	64	0.28	≤ 0.001	1.5	600	
13440	88	0.44		0.7	120	Yes
MG 160	75	0.35	< 0.002	1.2	400	
MG 550-HA	65	0.27		1.5	400	

\* Measurement according to EN 143 (0.3 μm, 5.3 cm/s, paraffin oil)

### □ Ordering Information

#### ○ Filter Discs

Dia. in mm	MGA (100 Pieces)	MG 160 (50 Pieces)	MGB (50 Pieces)	MGC (100 Pieces)	MGD (50 Pieces)
21			FT-3-1102-021		
25	FT-3-1101-025		FT-3-1102-025	FT-3-1103-025	FT-3-1104-025
37	FT-3-1101-037	FT-3-01110-037			
47	FT-3-1101-047	FT-3-01110-047	FT-3-1102-047	FT-3-1103-047	FT-3-1104-047
50	FT-3-1101-050	FT-3-01110-050	FT-3-1102-050	FT-3-1103-050	FT-3-1104-050
55	FT-3-1101-055		FT-3-1102-055	FT-3-1103-055	
70	FT-3-1101-070	FT-3-01110-070	FT-3-1102-070	FT-3-1103-070	FT-3-1104-070
80	FT-3-1101-080				
90	FT-3-1101-090	FT-3-01110-090	FT-3-1102-090	FT-3-1103-090	FT-3-1104-090
100	FT-3-1101-100	FT-3-01110-100	FT-3-1102-100	FT-3-1103-100	FT-3-1104-100
110	FT-3-1101-110	FT-3-01110-110	FT-3-1102-110	FT-3-1103-110	FT-3-1104-110
125	FT-3-1101-125		FT-3-1102-125	FT-3-1103-125	FT-3-1104-125
150	FT-3-1101-150		FT-3-1102-150	FT-3-1103-150	FT-3-1104-150
293					FT-3-1104-293

Dia. in mm	MGF (100 Pieces)	MGG (100 Pieces)	MG 550-HA (100 Pieces)	13440*
24			FT-3-01147-024	
25	FT-3-1105-025	FT-3-1106-025		
42				13440--42-----Q
44				13440--44-----Q
47	FT-3-1105-047	FT-3-1106-047	FT-3-01147-047	13440--47-----Q
50	FT-3-1105-050	FT-3-1106-050	FT-3-01147-050	13440--50-----Q
55	FT-3-1105-055	FT-3-1106-055	FT-3-01147-055	
70	FT-3-1105-070	FT-3-1106-070	FT-3-01147-070	
90	FT-3-1105-090	FT-3-1106-090	FT-3-01147-090	
100				13440-100-----K
110	FT-3-1105-110	FT-3-1106-110	FT-3-01147-110	
125	FT-3-1105-125	FT-3-1106-125	FT-3-01147-125	
130				13440-130-----K
150	FT-3-1105-150	FT-3-1106-150		13440-150-----K
293	FT-3-1105-293			13440-293-----K

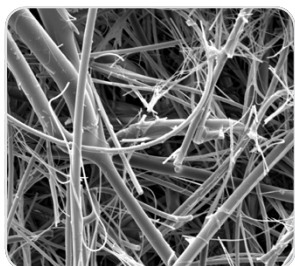
\* Q = 500 pieces | K = 50 pieces

Other dimensions as well as sheets are available on request



## Glass Microfiber Filters

With Binder



These filters are mostly used either for monitoring air and gas or as a prefilter. They are manufactured with synthetic binding agents to ensure that the filter has a defined strength.

They are mechanically and chemically stable, have a temperature resistance up to 180°C and – depending on the binding agent used – are either hydrophobic or hydrophilic.

### Typical Values

Grade	Weight (g/m <sup>2</sup> )	Thickness (mm)	Penetration 0.3 µm (%)*	Pressure drop 5.3 cm/s (Pa)	Binding agent
MG 227/1/60	60	0.32	< 0.5	260	Hydrophobic
13430	220	1.25	0.02	360	Hydrophilic
13400	73	0.39	0.015	363	Hydrophilic
MG 227	75	0.40	< 0.01	350	Hydrophobic
MG 161	75	0.40	≤ 0.002	≤ 580	Hydrophilic
MG 400	80	0.38	< 0.001	400	Hydrophilic
MG 1387/1	90	0.37	≤ 0.003	400	Hydrophilic

\* Tested and classified according to the Standard EN 143

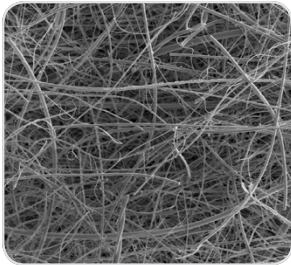
### Ordering Information

#### Filter Discs

Dia. in mm	MG 221/1/60 (100 Pieces)	13430**	13400**	MG 227 (100 Pieces)	MG 1387/1 (50 Pieces)
13			13400--13-----S		
20			13400--20-----S		
25			13400--25-----Q		
42			13400--42-----Q		
44			13400--44-----Q		
45			13400--45-----Q		FT-3-01125-045
47		13430--47-----S	13400--47-----Q	FT-3-01120-047	FT-3-01125-047
50			13400--50-----Q		FT-3-01125-050
55				FT-3-01120-055	FT-3-01125-055
80			13400--80-----N		
100		13430-100-----K	13400-100-----K		
110				FT-3-01120-110	FT-3-01125-110
120			13400-120-----K		
124		13430-124-----K	13400-124-----K		
125					FT-3-01125-125
127		13430-127-----K	13400-127-----K		
130		13430-130-----K	13400-130-----K		FT-3-01125-130
142		13430-142-----K	13400-142-----K		
150	FT-3-01124-150		13400-150-----K		
293		13430-293-----K	13400-293-----K		

\*\* K = 50 pieces, N = 100 pieces, Q = 500 pieces, S = 200 pieces  
Other dimensions as well as sheets are available on request

## ■ Quartz Microfiber Filters



The quartz microfiber material of the Sartorius pre-heated filters, grade Q3400, is made of high-purity quartz microfibers without any addition of glass microfibers or binding agents. In addition, the Q3400 filter grade is tempered to remove all chemically combined water and to give the filters

excellent weight and dimensional stability. Sartorius filters are especially suitable for emissions monitoring at temperatures of up to 900°C and wherever filters of the highest purity are needed.

### □ Typical Values

Grade	Material	Weight (g/m <sup>2</sup> )	Thickness (mm)	Penetration, 0.3 µm 15 cm/s*	Temperature Resistance
Q3400	100% Quartz microfiber silicium dioxide (SiO <sub>2</sub> )	85	0.43	<0.002	up to 900°C

\* Tested and classified according to the Standard EN 143

### □ Ordering Information

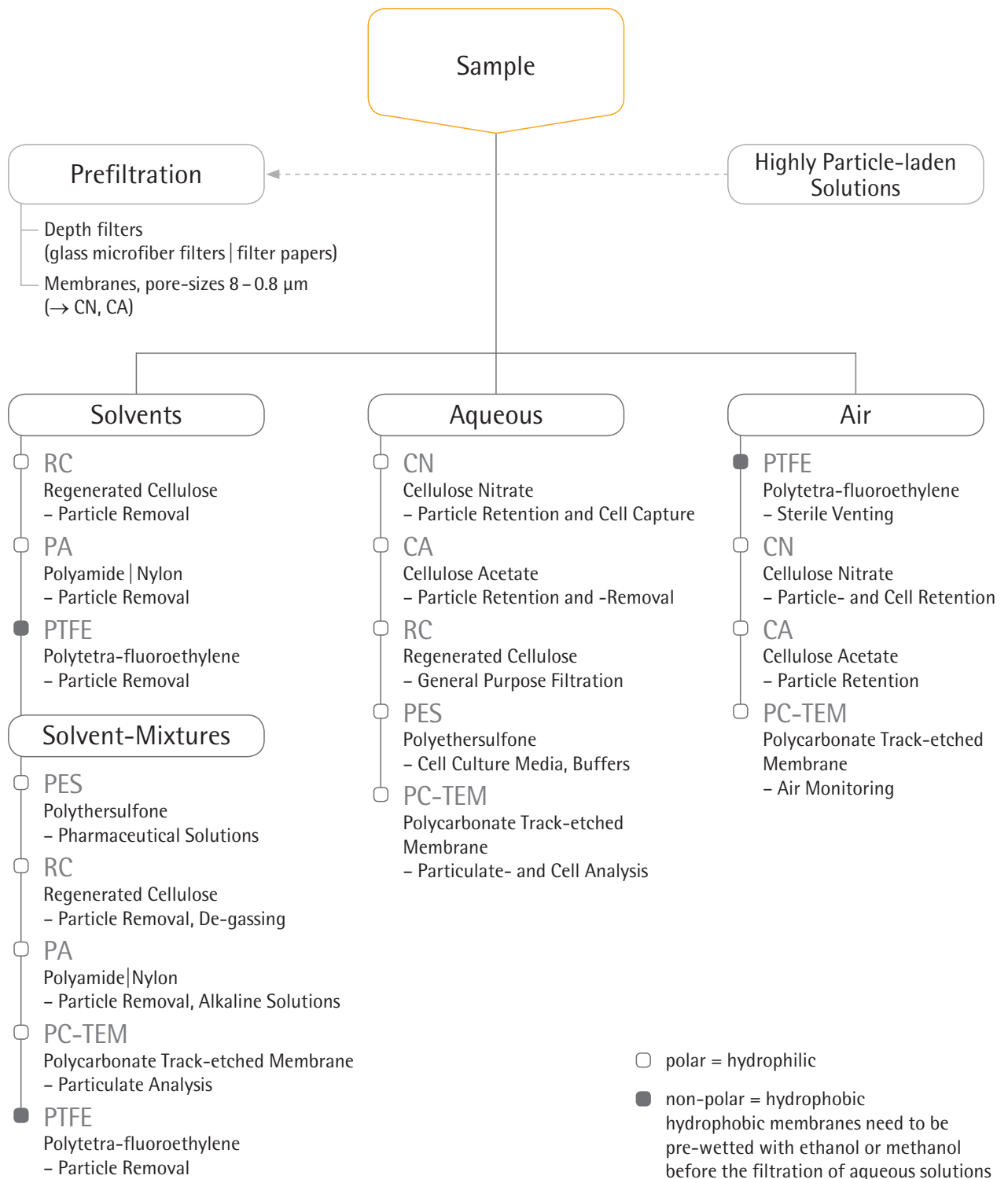
#### ○ Filter Discs

Dia. in mm	Q3400
20	Q3400--20-----G
25	Q3400--25-----G
30	Q3400--30-----G
37	Q3400--37-----G
45	Q3400--45-----G
47	Q3400--47-----G
50	Q3400--50-----G
82	Q3400--82-----N
90	Q3400--90-----N
142	Q3400-142-----K
150	Q3400-150-----K

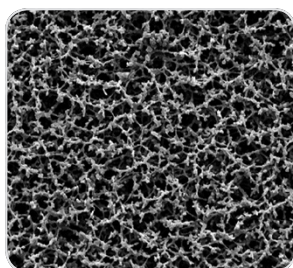
\* G = 25 pieces, K = 50 pieces, N = 100 pieces  
Other dimensions as well as sheets are available on request



## Membrane Filtration – Quick Selection Guide



## Cellulose Nitrate (Mixed Cellulose Ester)



Cellulose nitrate membrane filters are indicated for many general laboratory applications where a membrane with a high non-specific adsorption is suitable. They are hydrophilic, have high flow rates thanks to their symmetric structure and are compatible with aqueous solutions

(pH 4 to 8), hydrocarbons and several other organic solvents. The cellulose nitrate membranes are available in different pore sizes from 0.2  $\mu\text{m}$  to 8  $\mu\text{m}$ .

### Typical Values

Type	Pore Size ( $\mu\text{m}$ )	Thickness ( $\mu\text{m}$ )	Bubble Point (bar)	Water Flow Rate (mL/min/cm <sup>2</sup> /bar)	Burst Pressure (bar)
11327	0.2	130	4.2	25	$\geq 0.35$
11306	0.45	130	2.4	70	$\geq 0.3$
11305	0.65	130	2	130	$\geq 0.25$
11304	0.8	130	1.4	200	$\geq 0.2$
11303	1.2	130	1	200	$\geq 0.2$
11302	3	130	0.5	430	$\geq 0.2$
11342	5	130	0.5	570	$\geq 0.15$
11301	8	130	0.3	750	$\geq 0.1$

### Ordering Information

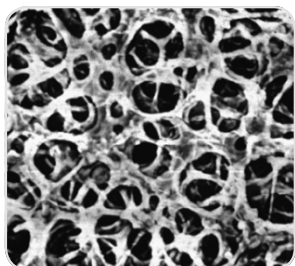
#### Filter Discs

Dia. in mm	11301 (8 $\mu\text{m}$ )*	11302 (3 $\mu\text{m}$ )*	11303 (1.2 $\mu\text{m}$ )*	11304 (0.8 $\mu\text{m}$ )*
13	11301--13-----N	11302--13-----N	11303--13-----N	11304--13-----N
20				11304--20-----N
25	11301--25-----N	11302--25-----N	11303--25-----N	11304--25-----N
37	11301--37-----N			11304--37-----N
47	11301--47-----N	11302--47-----N	11303--47-----N	11304--47-----N
50	11301--50-----N	11302--50-----N	11303--50-----N	11304--50-----N
70	11301--70-----G			
90		11302--90-----G	11303--90-----G	11304--90-----G
100	11301-100-----N	11302-100-----G	11303-100-----G	11304-100-----G
142	11301-142-----G	11302-142-----G	11303-142-----G	11304-142-----G
293	11301-293-----G	11302-293-----G	11303-293-----G	11304-293-----G
Dia. in mm	11305 (0.65 $\mu\text{m}$ )*	11306 (0.45 $\mu\text{m}$ )*	11327 (0.2 $\mu\text{m}$ )*	11342 (5 $\mu\text{m}$ )*
13	11305--13-----N	11306--13-----N	11327--13-----N	11342--13-----N
20		11306--20-----N		
25	11305--25-----N	11306--25-----N	11327--25-----N	11342--25-----N
37		11306--37-----N		
47	11305--47-----N	11306--47-----N	11327--47-----N	11342--47-----N
50	11305--50-----N	11306--50-----N		11342--50-----N
85		11306--85-----N		
90		11306--90-----N		11342--90-----G
100	11305-100-----N	11306-100-----N		11342-100-----G
110		11306-110-----N		
142	11305-142-----N	11306-142-----N	11327-142-----N	11342-142-----N
293	11305-293-----G	11306-293-----G		11342-293-----G

\* G = 25 pieces, N = 100 pieces

Other dimensions and packaging units are available on request

## Cellulose Acetate



Cellulose acetate membranes combine high flow rates and thermal stability with very low adsorption characteristics, and are therefore excellently suited for use in pressure filtration devices. They are hydrophilic, have high flow rates thanks to their symmetric structure and are compatible with aqueous solutions

(pH 4–8), oils, alcohols and other organic solvents. The 0.2  $\mu\text{m}$  membrane is the filter of choice for sterile filtration of aqueous solutions, such as nutrient media, buffers and sera. The cellulose acetate membranes are available in different pore sizes from 0.2 to 5  $\mu\text{m}$ .

### Typical Values

Type	Pore Size ( $\mu\text{m}$ )	Thickness ( $\mu\text{m}$ )	Bubble Point (bar)	Water Flow Rate (mL/min/cm <sup>2</sup> /bar)	Burst Pressure (bar)
11107	0.2	120	2.9	24	0.8
11106	0.45	120	1.9	69	0.7
11105	0.65	120	1.5	115	0.7
11104	0.8	120	1	200	0.5
12303	1.2	140	0.8	320	0.4
12342	5	140	0.4	570	0.25

### Ordering Information

#### Filter Discs

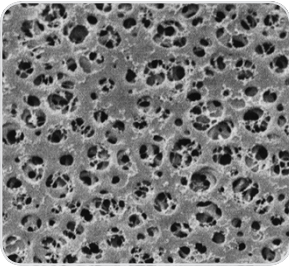
Dia. in mm	11104 (0.8 $\mu\text{m}$ )*	11105 (0.65 $\mu\text{m}$ )*	11106 (0.45 $\mu\text{m}$ )*	11107 (0.2 $\mu\text{m}$ )*	12303 (1.2 $\mu\text{m}$ )*	12342 (5 $\mu\text{m}$ )*
13	11104--13-----N		11106--13-----N	11107--13-----N		
25	11104--25-----N	11105--25-----N	11106--25-----N	11107--25-----N	12303--25-----N	12342--25-----N
30			11106--30-----N	11107--30-----N		
37			11106--37-----N			
45						
47	11104--47-----N	11105--47-----N	11106--47-----N	11107--47-----N	12303--47-----N	12342--47-----N
50	11104--50-----N	11105--50-----N	11106--50-----N	11107--50-----N	12303--50-----N	
70						
85			11106--85-----N			
90	11104--90-----N	11105--90-----G	11106--90-----G	11107--90-----G		
100			11106-100-----N	11107-100-----N	12303-100-----G	
110			11106-110-----N			
142	11104-142-----N	11105-142-----N	11106-142-----N	11107-142-----N	12303-142-----G	12342-142-----G
293	11104-293-----G	11105-293-----G	11106-293-----G	11107-293-----G	12303-293-----G	12342-293-----G

\* G = 25 pieces, N = 100 pieces

Other dimensions and packaging units are available on request



## ■ Regenerated Cellulose



The very low adsorption membranes are hydrophilic, solvent-resistant (pH 3-12) and therefore suited for the particle removal from solvents. The membrane is reinforced with nonwoven cellulose. They are available in two pore sizes: 0.45  $\mu\text{m}$  and 0.2  $\mu\text{m}$ .

### □ Typical Values

Type	Pore Size ( $\mu\text{m}$ )	Thickness ( $\mu\text{m}$ )	Bubble Point (bar)	Water Flow Rate (mL/min/cm <sup>2</sup> /bar)
18407	0.2	170	4.4	15
18406	0.45	170	2.9	30

### □ Ordering Information

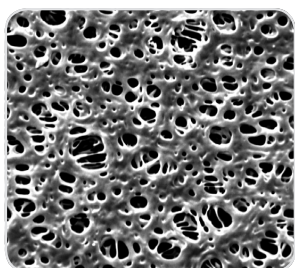
#### ○ Filter Discs

Dia. in mm	18406 (0.45 $\mu\text{m}$ )*	18407 (0.2 $\mu\text{m}$ )*
13	18406--13-----N	18407--13-----N
25	18406--25-----N	18407--25-----N
47	18406--47-----N	18407--47-----N
50	18406--50-----N	18407--50-----N
90	18406--90-----G	
100	18406-100-----G	18407-100-----G
142	18406-142-----G	18407-142-----G
293	18406-293-----G	18407-293-----G

\* G = 25 pieces, N = 100 pieces

Other dimensions and packaging units are available on request

## ■ Polyethersulfone



Polyethersulfone (PES) membrane filters are hydrophilic, have high flow rates, a low non-specific protein adsorption and are chemically resistant over a pH range of 1 – 14. They are therefore recommended

for the filtration of aqueous solutions as well for protein filtration. Furthermore, the low level of extractables makes them suitable for environmental analysis.

### □ Typical Values

Type	Pore Size (µm)	Thickness (µm)	Bubble Point (bar)	Water Flow Rate (mL/min/cm <sup>2</sup> /bar)	Burst Pressure (bar)
15458	0.1	150	3.8	10	≥ 0.6
15407MI	0.2	150	3.5	25	≥ 0.5
15406	0.45	150	2.6	46	≥ 0.5

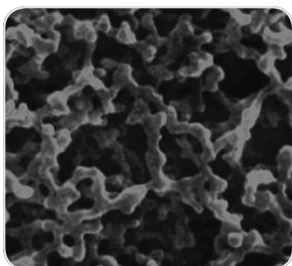
### □ Ordering Information

#### ○ Filter Discs

Dia. in mm	15406 (0.45 µm)*	15407MI (0.2 µm)*	15458 (0.1 µm)*
25	15406--25-----N	15407--25----MIN	15458--25-----N
47	15406--47-----N	15407--47----MIN	15458--47-----N
50	15406--50-----N	15407--50----MIN	15458--50-----N
90		15407--90----MIK	
142	15406-142-----G	15407-142----MIG	15458-142-----G
293		15407-293----MIG	15458-293-----G

\*G = 25 pieces, K = 50 pieces, N = 100 pieces  
Other dimensions are available on request

## ■ Polyamide



Polyamide membrane filters are hydrophilic and chemically resistant to alkaline solutions and organic solvents. They are therefore recommended for the particle removal from aqueous solutions and

solvents for analytical determination such as HPLC, for the sterile filtration of these liquids as well as for applications where a membrane with a relatively high non-specific adsorption is suitable.

### □ Typical Values

Type	Pore Size (μm)	Thickness (μm)	Bubble Point (bar)	Water Flow Rate (mL/min/cm <sup>2</sup> /bar)	Burst Pressure (bar)
25007	0.2	115	3.2	15	≥ 0.25
25006	0.45	115	2.3	35	≥ 0.23

### □ Ordering Information

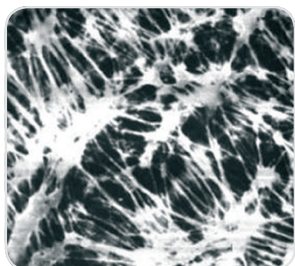
#### ○ Filter Discs

Dia. in mm	25006 (0.45 μm)*	25007 (0.2 μm)*
13	25006--13-----N	25007--13-----N
25	25006--25-----N	25007--25-----N
47	25006--47-----N	25007--47-----N
50	25006--50-----N	25007--50-----N
90	25006--90-----G	25007--90-----G
142	25006-142-----N	25007-142-----N
293	25006-293-----N	25007-293-----N

\* G = 25 pieces, N = 100 pieces

Other dimensions and packaging units are available on request

## Hydrophobic PTFE



The main application of these membrane filters is the filtration of air, gases or chemicals. They are made of PTFE (polytetra-fluorethylene) only and are therefore permanently hydrophobic. Unlike other (hydrophilic) filter types, they are not wetted by air humidity, allowing unhindered passage of air at low differential pressures as well. PTFE

membrane filters have an excellent chemical compatibility (pH 1 to 14), so that they are also used for the filtration of solvents and acids, to which other filter types are not resistant. Due to their hydrophobic characteristics, they must be pre-wetted with ethanol or methanol before the filtration of aqueous media.

### Typical Values

Type	Pore Size (µm)	Thickness (µm)	Bubble Point (bar)	Isopropanol Flow Rate (mL/min/cm <sup>2</sup> /bar)
11807	0.2	65	1.4	11
11806	0.45	80	0.9	20
11803	1.2	100	0.45	80
11842	5	100	0.10	250

### Ordering Information

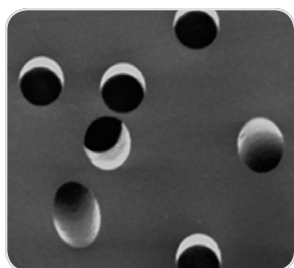
#### Filter Discs

Dia. in mm	11803 (1.2 µm)*	11806 (0.45 µm)*	11807 (0.2 µm)*	11842 (5 µm)*
13	11803--13-----N	11806--13-----N	11807--13-----N	
25	11803--25-----N	11806--25-----N	11807--25-----N	11842--25-----N
37	11803--37-----N	11806--37-----N		
42				11842--42-----N
47	11803--47-----N	11806--47-----N	11807--47-----N	11842--47-----N
50	11803--50-----N	11806--50-----N	11807--50-----N	11842--50-----N
90	11803--90-----G	11806--90-----G	11807--90-----G	
100	11803-100-----G	11806-100-----G	11807-100-----G	11842-100-----G
142	11803-142-----G	11806-142-----G	11807-142-----G	11842-142-----G
293	11803-293-----G	11806-293-----G	11807-293-----G	11842-293-----G

\* G= 25 pieces, N= 100 pieces

Other dimensions and packaging units are available on request

## Polycarbonate Track-Etched



Those white and hydrophilic polycarbonate track-etched membranes are manufactured from high grade polycarbonate film using track-etch technology. Their capillary pore structure is uniform and precise, with a narrow pore size distribution to retain particles on their surface. Track-etched membranes are an excellent choice for accurate fractionation of particulates because of their precise pore size.

Track-etch technology offers the user distinct performance advantages when excellent surface capture and high sample visibility are required. Their main applications are particulate analysis, epifluorescence microscopy, fluid clarification, cytology, cell biology, bioassays, water microbiology and environmental analysis.

### Typical Values

Type	Pore Size (µm)	Thickness (µm)	Bubble Point (bar)	Water Flow Rate (mL/min/cm <sup>2</sup> /0.7 bar)	Burst Pressure (bar)
23058	0.1	25	7.0	≥ 0.5	≥ 0.7
23007	0.2	25	3.5	≥ 10	≥ 0.7
23006	0.4	25	2.0	≥ 30	≥ 0.7
23004	0.8	25	0.6	≥ 40	≥ 0.7

### Ordering Information

#### Filter Discs, 100 Pieces

Dia. in mm	23004 (0.8 µm)	23006 (0.4 µm)	23007 (0.2 µm)	23058 (0.1 µm)
25	23004--25-----N	23006--25-----N	23007--25-----N	23058--25-----N
47		23006--47-----N	23007--47-----N	23058--47-----N
50			23007--50-----N	

Other dimensions are available on request

## Blotting | Chromatography Papers



These papers are made of cotton linters only with  $\alpha$ -cellulose content of > 98%. These highly pure papers are not only ideal for blotting and chromatography, but also for a

wide range of absorption applications like those common in the life sciences and diagnostics. Below you will find an overview of the most commonly used grades.

### Typical Values

Grade	Weight (g/m <sup>2</sup> )	Thickness (mm)	Capillary Rise (mm/30 min)	Capillary Rise (mm/10 min)	Properties
FN 4	125	0.24	95		Chromatography paper, ash content < 0.04%
FN 7	150	0.32	145		Chromatography paper, ash content < 0.04%
FN 30	320	0.90	240		Chromatography paper, ash content < 0.04%, paper for antibiotic test strips
FN 100	195	0.35	115	70	The most commonly used chromatography and blotting paper
BF 3	330	0.76	30	130	Blotting paper to increase and maintain the transport of liquids

### Ordering Information



Sheets in 580 × 600 mm

Grade FN 4 (100 Sheets)	Grade FN 7 (50 Sheets)	Grade FN 30 (25 Sheets)	Grade FN 100 (50 Sheets)	Grade BF 3 (50 Sheets)
FT-2-504-580600N	FT-2-507-580600K	FT-2-526-580600G	FT-2-527-580600K	FT-2-520-580600K

Other dimensions and shapes are available on request

## ■ Nitrocellulose Membrane for Blotting



Sartorius nitrocellulose membranes are available in two pore sizes, 0.22  $\mu\text{m}$  and 0.45  $\mu\text{m}$ . Both versions combine the advantages of high protein binding capacity with low background and high membrane stability, which ensures easy handling. Due to its large surface area, the 0.22  $\mu\text{m}$

membrane version is recommended for small proteins. Sartorius blotting membranes are ideal for western blotting, DNA blotting as well as dot or slot blots. They have been optimized for all protein blotting systems, such as electrotransfer, semi-dry or simple capillary blotting.

### □ Typical Values

	0.22 $\mu\text{m}$	0.45 $\mu\text{m}$
Material	Cellulose nitrate	Cellulose nitrate
Thickness	130 $\mu\text{m}$	130 $\mu\text{m}$
Water flow rate	27 mL/(min.cm <sup>2</sup> bar)	70 mL/(min.cm <sup>2</sup> bar)
Bubble point	4.4 bar	2.4 bar
Wettability in water	$\leq 1$ s	$\leq 1$ s
Extractable content in water	$\leq 1\%$	$\leq 1\%$
Burst pressure	0.8 bar	0.2 bar
Binding capacity for IgG	200 $\mu\text{g}/\text{cm}^2$	200 $\mu\text{g}/\text{cm}^2$

### □ Ordering Information

	Roll Size	Order No.
NC 0.22 $\mu\text{m}$	30 cm $\times$ 3 m	11327-----41BL
NC 0.45 $\mu\text{m}$	30 cm $\times$ 3 m	11306-----41BL

All indicated data to be understood as typical average values



## ■ Re-usable, 13 mm Syringe Filter Holders

For the Ultracleaning of Small Volumes Up to About 10 mL



### PTFE Holder for Solvents and Chemicals

Made completely of PTFE, this holder is unaffected by chemicals and contains no trace elements which could be released into the liquid being filtered. It is therefore extremely well suited for particle removal from samples and reagents for analytical methods, such as NMR samples. Other

benefits of this application are the low hold-up volume, the easy cleaning and the drying at a temperature of 180°C. The construction of the holder ensures leak proof sealing without a sealing ring, and avoids twisting of the membrane filter when the top is tightened onto the base.



### □ Specifications

Connectors	Female Luer Lock inlet, luer slip outlet
Chemical compatibility	As for PTFE
Filtration area	0.5 cm <sup>2</sup>
Materials	PTFE top and bottom parts
Max. operating pressure	5 bar   500 kPa   72.5 psi
Membrane filter diameter	13 mm
Sterilization	By autoclaving (max. 134°C) or by dry heat (max. 180°C)
Hold-up volume	Less than 0.03 mL after overcoming the bubble point (0.3 mL before)

### □ Ordering Information

Description	Order No.
13 mm PTFE Syringe Filter Holder	16574



### Polycarbonate Holder for Aqueous Solutions

This inexpensive filter holder is made of clear, autoclavable polycarbonate. The silicone gasket enables a leak-free

filtration at pressures of up to 7 bar by simply screwing it together manually. Filter supports in the top and bottom parts allow filtration in either direction.

### □ Specifications

Connectors	Female Luer Lock inlet, luer slip outlet
Chemical compatibility	As for polycarbonate and silicone
Filtration area	0.5 cm <sup>2</sup>
Materials	Polycarbonate top and bottom part, silicone gasket
Max. operating pressure	7 bar   700 kPa   101.5 psi
Membrane filter diameter	13 mm
Sterilization	By autoclaving at 121°C
Hold-up volume	Less than 0.2 mL after overcoming the bubble point (0.3 mL before)

### □ Ordering Information

Description	Order No.
13 mm Polycarbonate Syringe Filter Holder, pack of 12	16514-----E
Silicon gasket, 10 × 14.9 × 0.5 mm, pack of 10	6980569

## ■ Re-usable 25 mm Syringe Filter Holders

For the Ultracleaning and Sterilizing Filtration of Volumes of Up to About 100 mL



### Stainless Steel Holder for Solvents and Chemicals

Made of stainless steel, this holder is heat-resistant, and the chemical compatibility depends only on the inserted filter type.

The top part can easily be mounted on the bottom part using the enclosed tightening tool. Filter supports in the top and bottom parts allow filtration in either direction.

### □ Specifications

Connectors	Female Luer Lock inlet, luer slip outlet
Chemical compatibility	As for stainless steel
Filtration area	3 cm <sup>2</sup>
Materials	Stainless steel (1.4305) top and bottom parts
Max. operating pressure	7 bar   700 kPa   101.5 psi
Membrane filter diameter	25 mm
Sterilization	By autoclaving (max. 134°C) or by dry heat (max. 180°C)
Hold-up volume	Less than 0.1 mL after overcoming the bubble point (0.3 mL before)

### □ Ordering Information

Description	Order No.
25 mm Stainless Steel Holder	16214
Tightening tool, Polyman 24/5	6980595



### Polycarbonate Holder for Aqueous Solutions

This inexpensive filter holder is made of clear, autoclavable polycarbonate. The silicone gasket enables a leak-free filtration

at pressures of up to 7 bar by simply screwing it together manually. Filter supports in the top and bottom parts allow filtration in either direction.

### □ Specifications

Connectors	Female Luer Lock inlet, luer slip outlet
Chemical compatibility	As for polycarbonate and silicone
Filtration area	3 cm <sup>2</sup>
Materials	Polycarbonate top and bottom parts, silicone gasket
Max. operating pressure	7 bar   700 kPa   101.5 psi
Membrane filter diameter	25 mm
Sterilization	By autoclaving at 121°C
Hold-up volume	Less than 0.3 mL after overcoming the bubble point (0.6 mL before)

### □ Ordering Information

Description	Order No.
25 mm Polycarbonate Syringe Filter Holder, pack of 12	16517-----E
Silicone gasket, 20.5 × 26.5 × 0.5 mm, pack of 10	6980570

## 25 mm Glass Vacuum Filter Holder

For Hybridization Tests, Particle Testing and Clarification



This filter holder is available in two versions differing from each other only in the type of the filter support. The filter with glass frit ensures uniform distribution of retained particles and is therefore recommended when the residue on the filter surface is of interest. Because it is easy to clean, the device with the PTFE-coated screen support is preferable when the filtrate is required, or when liquids difficult to remove from glass frits must be examined. The PTFE ring, which holds the

glass frit and the screen support, allows for the autoclaving of the devices with a filter in position and protects the edge of the glass frit from breakage and potential leakage. It has a rim around the upper edge to simplify the positioning of the membrane filter when inserted and a silicone O-ring in the underside for a leak-proof seal on the filtrate side. The funnel-shaped top part simplifies filling in the sample.

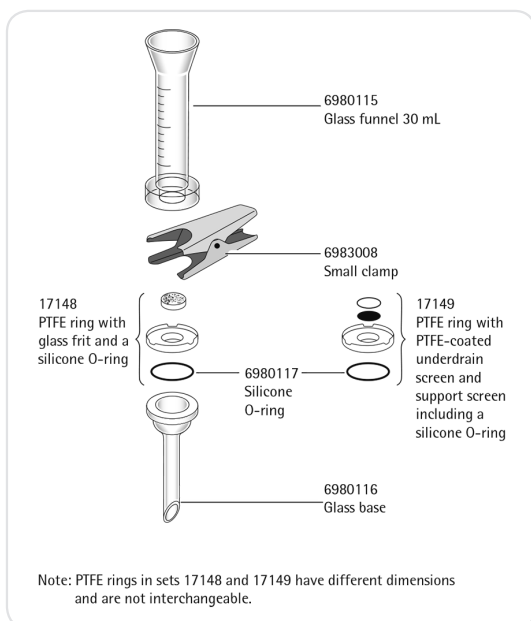
### Specifications

Outlet spout	12 mm dia.
Parts and materials	Borosilicate glass funnel and base PTFE   glass filter support (type 16306) or PTFE   stainless steel filter support, coated with PTFE (type 16315) Silicone O-ring 25 × 3 mm Anodized Aluminium clamp
Chemical compatibility	As for glass, PTFE and silicone. The silicone O-ring can be replaced by a fluoroelastomer O-ring (order no. 00118)
Funnel capacity	30 mL
Filtration area	3 cm <sup>2</sup>
Max. operating pressure	Only for vacuum
Suitable membrane filter diameter	25 mm (or 24 mm)
Sterilization	By autoclaving (max. 134°C) or by dry heat (max. 180°C)

### Ordering Information

Description	Order No.
Glass vacuum filtration holder for 25 mm (or 24 mm) membrane filter, with glass frit filter support	16306
Glass vacuum filtration holder for 25 mm (or 24 mm) membrane filter, with PTFE-coated screen filter support	16315

Replacement parts are shown in the diagram.



## 50 mm Glass Vacuum Filter Holder

For Particle Testing or Clarification and Sterile Filtration

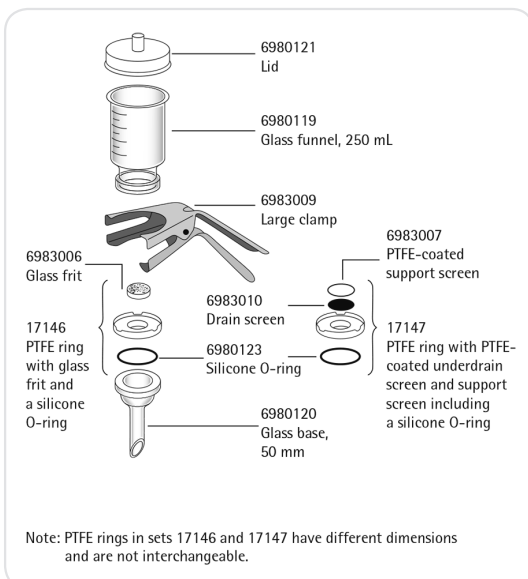


This filter holder is available in two versions differing from each other only in the type of the filter support. The device with glass frit ensures uniform distribution of retained particles and is therefore recommended, when the residue on the filter surface is of interest. Because it is easy to clean, the device with the PTFE-coated screen support is preferable when the filtrate is required, or when liquids difficult to remove from

glass frits must be examined. The PTFE ring, which holds the glass frit and the screen support, allows the autoclaving of the devices with a filter in position and protects the edge of the glass frit from breakage and potential leakage. It has a rim around the upper edge to simplify the positioning of the membrane filter when inserted and a silicone O-ring in the underside for a leak-proof seal on the filtrate side.

### Specifications

Outlet spouts	15 mm dia.
Parts and materials	Borosilicate glass funnel and base Silicone caoutchouc lid PTFE   glass filter support (type 16307) or PTFE   stainless steel filter support, coated with PTFE (type 16316) Silicone O-ring 45 × 3 mm Anodized Aluminium clamp
Chemical compatibility	As for glass, PTFE and silicone. The silicone O-ring can be replaced by a fluoroelastomer O-ring (order no. 00124).
Funnel capacity	250 mL
Filtration area	12.5 cm <sup>2</sup>
Max. operating pressure	Only for vacuum
Suitable membrane filter diameter	50 mm (or 47 mm)
Sterilization	By autoclaving (max. 134°C) or by dry heat (max. 180°C)



### Ordering Information

Description	Order No.
Glass vacuum filtration holder for 50 mm (or 47 mm) membrane filter, with glass frit filter support	16307
Glass vacuum filtration holder for 50 mm (or 47 mm) membrane filter, with PTFE-coated screen filter support	16316

Replacement parts are shown in the diagram.

## ■ All-Glass Vacuum Filter Holder

For Analytical Determinations, Particle Removal from Solvents



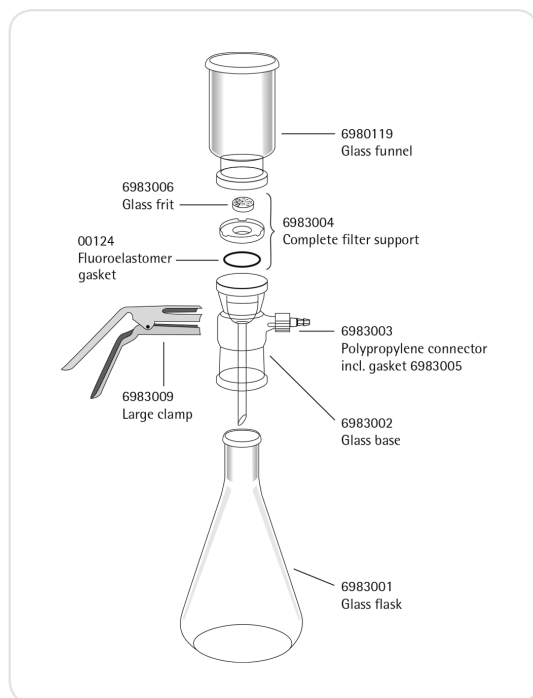
All areas, where liquid and device can come into direct contact, are made of glass or PTFE. The device, in combination with solvent-resistant, hydrophilic RC-membranes, is therefore ideal for ultracleaning and degassing solvents and solvent mixtures for HPLC, GC and AA. Convenience of handling is ensured by several beneficial features. A 6 mm wide

non-ground rim above the ground glass neck of the suction flask prevents the filtrate from contacting grease on the ground glass surface and so avoids its contamination while being poured out of the flask. The hose nipple connector is made of polypropylene for safe connection of the vacuum hose. The filtrate outlet spout ends well below the entrance to this hose nipple.



### □ Specifications

Parts and materials	Borosilicate glass funnel, base and flask, sintered glass frit in a PTFE ring and fluoroelastomer O-ring (45 × 3 mm) underneath, anodized aluminium clamp
Chemical compatibility	As for glass and PTFE
Funnel capacity	250 mL
Capacity of the filtrate flask	1 liter
Filtration area	12.5 cm <sup>2</sup>
Max. operating pressure	Only for vacuum
Suitable membrane filter diameter	50 mm (or 47 mm), 40 or 42 mm prefilter
Sterilization (without connector)	By autoclaving (max. 134°C) or by dry heat (max. 180°C)



### □ Ordering Information

Description	Order No.
All-glass vacuum filter holder for 50 mm (or 47 mm) membrane filter, with vacuum-resistant flask, capacity 1 liter	16309

Replacement parts are shown in the diagram.

## Polycarbonate In-Line Filter Holder

For the Filtration of Liter Volumes of Aqueous Solutions



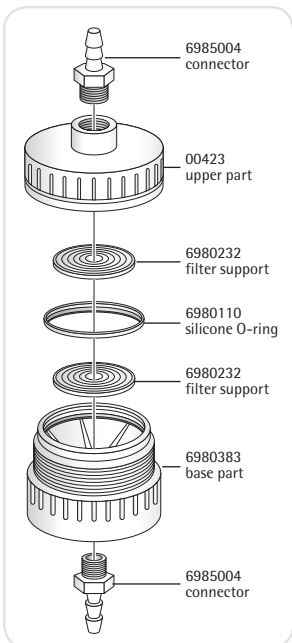
This holder is made of stable, autoclavable polycarbonate. This practical holder is suitable for many simple laboratory filtrations. It can be connected to a peristaltic pump or a pressure container. The bell-shaped base protects the filtrate from repeated contamination while flowing in a receiver. The holder is characterized

by an excellent resistance to pressure and density setting by simple hand-tightening. The transparent top part allows the visual control of the correct fit of the O-ring. The hose nipples can be replaced by luer connectors to use it as a large area syringe filter holder.



### Specifications

Chemical compatibility	As for polycarbonate, polypropylene and silicone
Filtration area	12.5 cm <sup>2</sup>
Weight	83 g
Threads for connectors	M 12 × 1 female thread
Materials	Polycarbonate top part, base part and hose nipple, polypropylene filter support, silicone O-ring (40 × 5 mm)
Max. operating pressure	7 bar   700 kPa   101.5 psi
Suitable membrane filter diameter	50 mm (40 or 42 mm prefilter)
Sterilization	By autoclaving at 121°C The material withstands repeated cycles, provided aggressive cleaning agents are completely washed off and that the boiler water does not contain anti-corrosive or anti-scaling additives.



### Ordering Information

Description	Order No.
Polycarbonate in-line filter holder for 50 mm membrane filter, pack of 5.	16508-----B

Replacement parts are shown in the diagram.

## 25 mm Stainless Steel Filter Holder

For In-Line Filtration



The G $\frac{1}{4}$  connection threads with density barrel, guarantee leak-proof sealing of the hose nipple and the holder without sealing rings. Other connectors, available as accessories, fit the holder onto reducing

valves or pumps with G $\frac{3}{8}$  female thread order no. 01029) or onto pressure tanks with G $\frac{3}{8}$  male thread (order no. 00177).

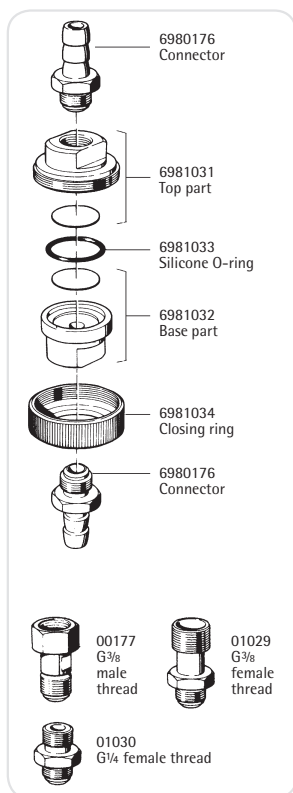
### Specifications

Connectors	Hose nipples DN10
Filtration area	3 cm <sup>2</sup>
Weight	ca. 170 g
Materials	Stainless steel, except silicone O-ring (21 × 2 mm) and aluminium closing ring
Max. operating pressure	5 bar   500 kPa   72.5 psi
Suitable membrane filter	25 mm (20 mm prefilter for the filtration of liquids only)
Sterilization	By autoclaving (max. 134°C) or by dry heat (max. 180°C)

### Ordering Information

Description	Order No.
Stainless steel pressure filter holder for 25 mm dia. membrane filter.	16251

Replacement parts are shown in the diagram.



## 47 mm Stainless Steel Filter Holder

For In-Line Filtration



The filter holder is suitable for a pressure of up to 20 bar. The inlet side valve is convenient for the intermittent run-off of waste water. Other connectors, available as accessories, fit the holder onto reducing

valves or pumps with G<sup>3</sup>/<sub>8</sub> female thread (order no. 17089) or onto pressure tanks with G<sup>3</sup>/<sub>8</sub> male thread (order no. 17069) or on taps with G<sup>3</sup>/<sub>4</sub> male thread (order no. 17068).

### Specifications

Connectors	Hose nipples DN10
Connection thread	M12 × 1
Filtration area	13 cm <sup>2</sup>
Weight	ca. 490 g
Materials	Stainless steel, except silicone O-ring (42 × 3 mm), PTFE and fluoroelastomer valve seals
Max. operating pressure	20 bar   2,000 kPa   290 psi
Suitable membrane filter	47 mm (40 or 42 mm prefilter)
Sterilization	By autoclaving (max. 134°C) or by dry heat (max. 180°C)

### Ordering Information

Description	Order No.
Stainless steel filter holder for 47 mm membrane filter (with adapter M12 × 1 male thread to hose barb DN10, Mat. 316, ref. 6980801) – Replacement parts are shown in the diagram	16254
Stainless steel filter holder for 47 mm membrane filter (with adapter M12 × 1 male thread to hose barb DN 4 to 5, Mat. 316, ref. 6981132)	16278
Stainless steel back pressure screen	6980721-----1
Stainless steel filter support screen	6980180-----1
Stainless steel underdrain screen	00181
Stainless steel connector M12 × 1 male thread to hose barb DN 4-5	6981132
Adapter Quick connect nipple length 60 mm male part to male thread M12 × 1, Mat 316	17090-----1

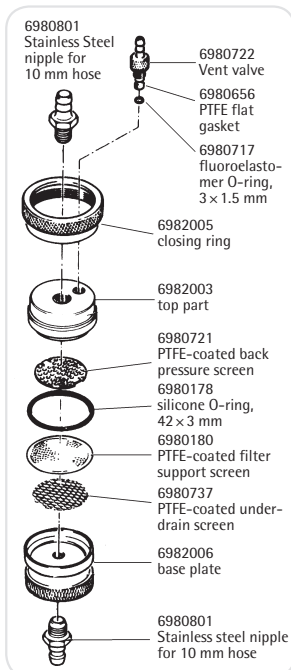
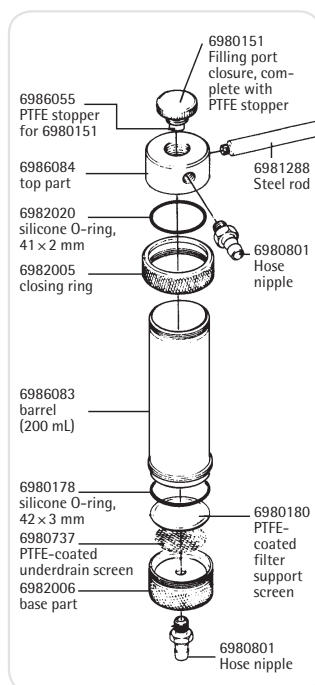


Diagram for 16254



## Stainless Steel Pressure Filter Holder

For the Filtration of Up to 5 Liter Volumes



A practical filter holder for many laboratory filtrations. It can be attached to a tripod with the help of a steel rod which can be screwed in. The hose nipple is screwed into the side of the top part, leaving room for a large filling opening. This makes pouring in the sample easier, and the sample can be refilled without removing the tube connection to the pressure source. Leak-proof sealing is achieved by

hand-tightening the closing ring. For the filtration of small volumes (up to about 200 ml of soil samples or viscous liquids, such as oils), the holder is connected directly to a pressure source. For the filtration of up to 5 liter volumes of relatively easily filterable liquids (e.g. buffer solutions, solutions for cell counters and tissue culture solutions), it is used in combination with a pressure tank.

### Specifications

Chemical compatibility	As for stainless steel, PTFE and silicone. If required, the silicone O-ring in the filter support can be replaced by a fluoroelastomer O-ring 00179 or a PTFE O-ring 17038 (by reducing the max. operating pressure to 4 bar   58 psi); the silicone O-ring in the top part can be replaced by a fluoroelastomer O-ring 17145.
Filtration area	13 cm <sup>2</sup>
Weight	960 g
Threads for connectors	M 12 × 1 female thread
Materials	Top part, barrel, base part, corrugated iron, closing ring, closure cap, back pressure screen and stainless steel hose nipples 1.4401 (AISI 316), PTFE-coated stainless steel filter support, silicone O-rings, 41 × 2 mm (top part) and 42 × 3 mm (filter support), PTFE-sealing (cap).
Max. operating pressure	10 bar   1,000 kPa   145 psi
Suitable membrane filter diameter	47 mm (40 or 42 mm prefilter)
Sterilization	By autoclaving (max 134°C) or by dry heat (180°C)

### Ordering Information

Description	Order No.
Stainless steel pressure filter holder	16249
Stainless steel pressure filter holder with double jacket	16249-----3

### Replacement Parts

Description	Order No.
Fluoroelastomer O-ring, 42 × 3 mm	00179
PTFE O-ring, 42 × 3 mm	17038
Fluoroelastomer O-ring for upper part, 41 × 2 mm	17145

Other replacement parts are shown in the diagram or on page 2.

## ■ Chemical-resistant PTFE Filter Holder

For the Filtration of Aggressive Liquids



The holder hinders the release of trace elements into the filtrate and is resistant to almost all chemicals. The fluoroelastomer O-ring in the top part allows easy hand tightening, and can be replaced by a PTFE

O-ring, order no. 17039. The 6 mm outlet nipple is an integral part of the base, the 10 mm inlet hose nipple can be replaced by a G<sup>3</sup>/<sub>8</sub> connector, order no. 17051.

### □ Specifications

Chemical compatibility	As for PTFE and fluoroelastomer
Filtration area	12.5 cm <sup>2</sup>
Thread for inlet connector	M 14 × 1.5 male thread
Materials	Top part, barrel, base part: corrugated iron, hose nipples and filter support with 40 × 3.5 mm O-ring: PTFE, locking rings: aluminium 39 × 3.5 mm fluoroelastomer O-ring (top part)
Max. operating pressure	5 bar   500 kPa   72.5 psi
Suitable membrane filter diameter	47 mm
Sterilization	By autoclaving (max 134°C) or by dry heat (180°C)

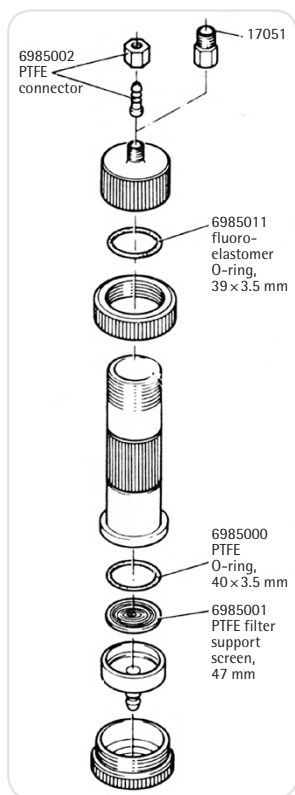
### □ Ordering Information

Description	Order No.
PTFE pressure filter holder, 47 mm, with 200 mL capacity.	16579

### Replacement Parts

Description	Order No.
PTFE O-ring, 39 × 3.5 mm	17039

Other replacement parts are shown in the diagram.



## Combisart® Manifolds

1-, 3- and 6-Branch



Made of high-grade stainless steel (B.S. 304S3 | AISI 304); accommodates any type of vacuum funnel. Stainless steel three-way valves (taps) allow the vacuum for each filter holder to be individually

controlled and each holder to be sterilely vented. The low height of the manifold ports is particularly advantageous for working on a clean bench.

### Ordering Information

Combisart® Manifolds, without Base Support and Frit	Order No.
Combisart® 1-branch manifold	16844
Combisart® 3-branch manifold	16842
Combisart® 6-branch manifold	16843

Combisart® Sets, Stainless Steel Capacity	Order No.
1-branch 1 × 100 mL	16844-CS
1-branch 1 × 500 mL	16845-CS
3-branch 3 × 100 mL	16824-CS
3-branch 3 × 500 mL	16828-CS
6-branch 6 × 100 mL	16832-CS
6-branch 6 × 500 mL	16831-CS

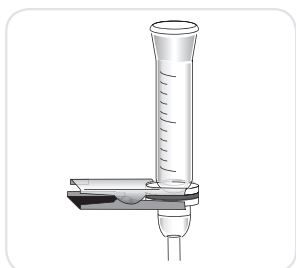
In each set stainless steel funnels with lids are preassembled.

### Accessories and Replacement Parts

Description	Pack Size	Order No.
Plug, conical, to close the venting hole beside the 3-way valve	10	6980225
Silicone O-ring for manifold female threads	3	6980235
Rubber tubing, 1 m	1	16623

## ■ Glass Filter Holders; 30, 250 mL

For Particle Counting



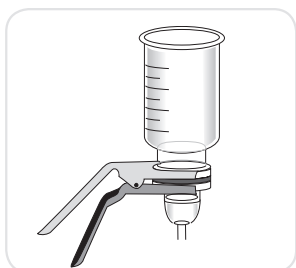
### Glass Filter Holders

Two compact vacuum filter holders for easy particulate analysis. Both the top and bottom part of the filter holders are easily and securely fastened together using the

metal clamp. The centering rim on the filter support ensures correct positioning of the membrane filter. The glass frit filter support guarantees uniform distribution of retained particles on the filter surface.

### □ Ordering Information

Description		Order No.
Glass filter holder	30 mL	16306
Filter diameter	25 mm (or 24 mm)	
Filtration area	3 cm <sup>2</sup>	
Capacity	30 mL	
Outlet	12 mm outer diameter	
Glass filter holder	250 mL	16307
Filter diameter	47 mm (or 50 mm)	
Filtration area	12.5 cm <sup>2</sup>	
Capacity	250 mL	
Outlet	15 mm outer diameter	

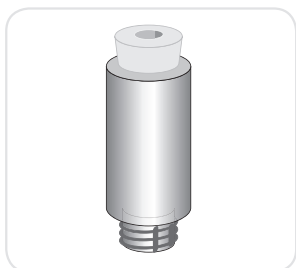


### Adapter, 16836 | Adapter, 16837

For use of a glass filter holder, 16306 or 16307, on a Combisart® stainless steel manifold.

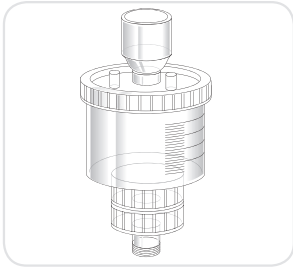
### □ Ordering Information

Description	Order No.
Adapter with 11 mm opening in stopper; for using filter holder 16306 on a Combisart® manifold	16836
Replacement stopper for 16836	00280
Adapter with 14 mm opening in stopper; for using filter holder 16307 on a Combisart® manifold	16837
Replacement stopper for 16837	00281



## Polycarbonate Filter Holders

For Particle Counting

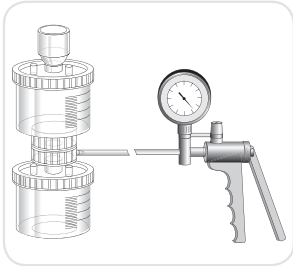


### Polycarbonate Filter Holder, 250 mL

This reusable, practical filter holder made of autoclavable plastic is ideal for analytical testing outside the laboratory. For use with 47 mm membrane filters.

Outlet: TR 20×2 mm male thread

### Ordering Information



#### Description

#### Order No.

Polycarbonate filter holder without receiver flask

16511

Polycarbonate filter holder with receiver flask

16510

Hand vacuum pump with gauge and 60 cm PVC tubing

16673

## ■ Ready-to-Use Biosart® 250 Funnels

For Particle Counting



### Biosart® 250 Funnel

The Biosart® 250 Funnel has been specially designed for analytical quality assurance. The sterile 250 mL plastic funnel guarantees fast filtration and high sample

throughputs during routine testing. Its large inner diameter allows high flow rates, and the tapered inner walls permit thorough flushing of the funnel, after filtration.

### □ Ordering Information

Description	Order No.
Biosart® 250 Funnel, 50 units, sterile-packaged	16407-25-ALK



### Single Support, 16840

For adapting a Biosart® 250 Funnel for use on a Combisart® stainless steel manifold.

### □ Ordering Information

Description	Order No.
Stainless steel filter support for stainless steel manifold.	16840

### Replacement

Description	Order No.
Stainless steel frit for 50 mm membrane filters	6980102
Stainless steel frit for 47 mm membrane filters	6980103
Silicone flat gasket underneath the frit	6980124
PTFE flat gasket underneath the frit	6980104
Silicone O-ring for 16840 male thread	6980274

# Notes

# Notes





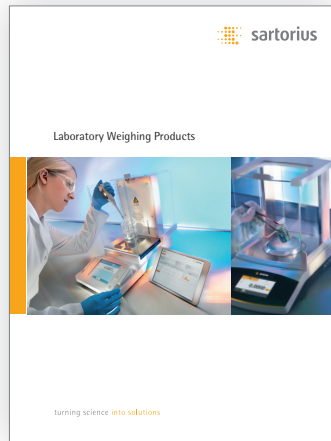
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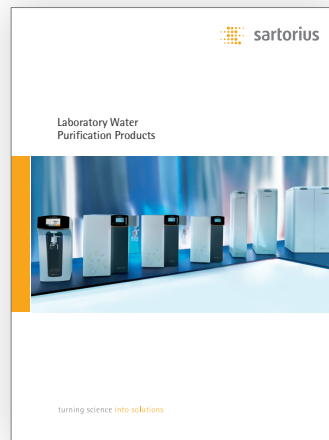
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