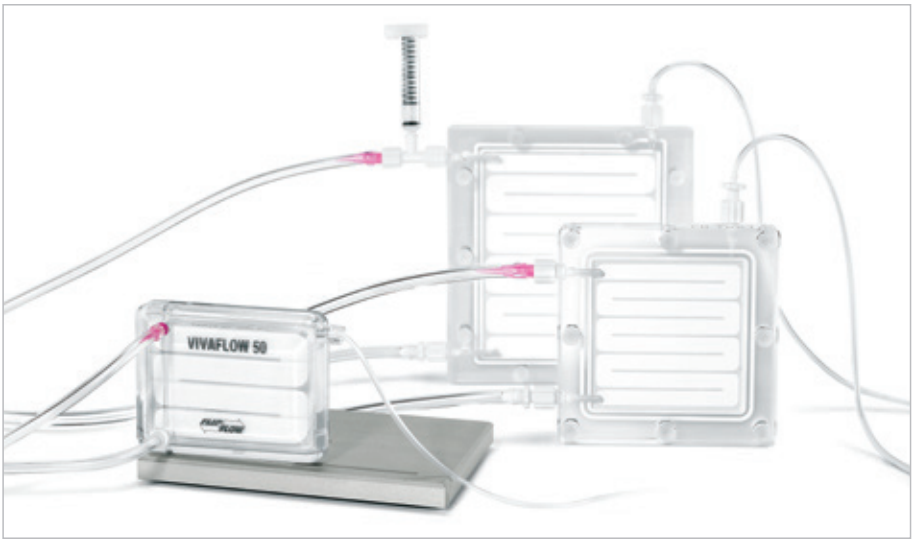
Vivaflow® 50 | 50R | 200

Unique, "Plug & Play" Laboratory Crossflow Devices

Crossflow Concentration



Crossflow Concentration

- Easy to Operate Using a Standard Pump
- Unique Volume Range from 0.1 l to 5 l
- Fast Concentration
- High Recoveries

Introduction
Vivaflow crossflow devices have been designed for use in research and are ideal for concentration and diafiltration of aqueous samples with volumes ranging from 100 ml to 5 l. They achieve concentrations of 10-fold to 50 fold, depending on the initial sample volume.

Plug and Play Convenience
The clear Vivaflow housing allows visual monitoring of the sample at all times. The devices are easy to set up and need only a standard peristaltic pump to operate.

Our Vivaflow range offers the right crossflow device for every concentration need:

Vivaflow 50 is a disposable, modular crossflow device, which can be easily scaled up to 6 units that run both in parallel and in series. Designed as unique interlocking modules, the units are conveniently connected in the required number on an aluminum stand according to the scaleup level required. Vivaflow 50 saves regeneration time and is the economical choice for concentration and buffer exchange of 0.1 ml to 3 l samples containing proteins, viruses and nanoparticles.

Vivaflow 50R is a reusable crossflow device featuring a unique, low-binding regenerated cellulose membrane, Hydrosart®. Therefore, it is the ideal choice for concentrating expensive samples like viruses and antibodies. Vivaflow 50R can be scaled up with one additional unit to increase the flow speed for concentrating initial sample volumes of up to 1 l.

Vivaflow 200, like Vivaflow 50R, is a reusable crossflow device, but is available in a choice of membranes: Hydrosart® and PES. This device is perfect for concentrating expensive samples like viruses and antibodies. Vivaflow 200 can be scaled up with one additional unit to increase the flow speed for concentrating initial sample volumes of up to 5 l.

Applications
Vivaflow devices lend themselves to a multitude of different concentration applications whenever larger volumes of sample need to be concentrated in a lab environment.

Typical applications and areas of use include the following:

- Antibody | recombinant protein concentration | diafiltration in biopharma research
- Concentration of small production lots of proteins for diagnostic purposes
- Concentration of viruses from cell culture supernatants or of environmental samples
- Nanoparticle concentration

Summary
Sartorius offers a complete range of Vivaflow crossflow devices for scientists and lab technicians who need to reliably concentrate or rebuffer and | or diafilter aqueous samples with initial volumes of up to 5 l. Unlike other crossflow cassettes on the market, Vivaflow is a dedicated laboratory product that meets the demand for ease of use without requiring any additional non-standard instrumentation. Just a standard laboratory peristaltic pump is all that is needed to operate Vivaflow units.

Vivaflow Working Principle

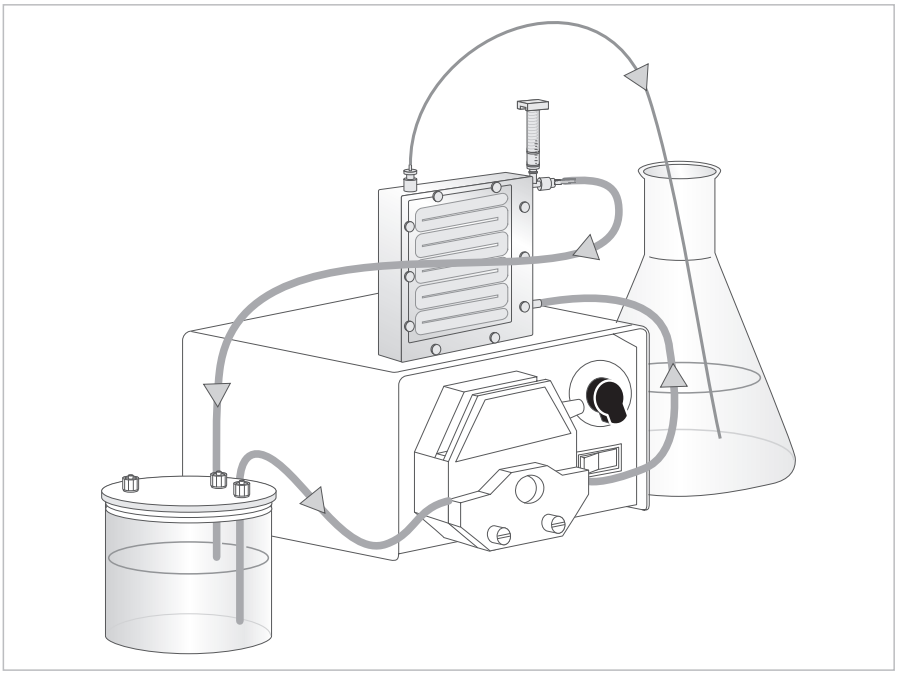


Diagram 1: Operating Vivaflow cassettes

Vivaflow cassettes are crossflow devices that contain an ultrafiltration membrane and are operated by using a standard peristaltic pump to recirculate a sample through them. The thin-channel, flip-flow recirculation path geometry of all Vivaflow modules provides high crossflow velocities with minimum pump speed requirements of 200 – 400 ml/min. A special flow restrictor at the outlet tubing readily generates back pressure in each cassette, resulting in the concentration of the sample and separation of sample constituents as the sample flows across the membrane. While the sample is recirculated by the pump, the filtrate is collected in a separate vessel. Concentration can be stopped anytime the desired volume is achieved.

A single 50 cm^2 module typically reduces 500 ml to 15 ml in less than 50 min. Virtually total recovery of the concentrate is achieved with a single rinse.

Guide to Selecting the Right Vivaflow Device

Sample Volume [l]	Vivaflow 50 No. of Units	Vivaflow 50R No. of Units	Vivaflow 200 No. of Units
0.1 – 0.25	1	1	NR
0.25 – 0.5	1 – 2	1 – 2	NR
0.5 – 1	2	2	1
1 – 2	3 – 4	NR	1
2 – 3	4 – 6	NR	2
3 – 4	NR	NR	2
4 – 5	NR	NR	2

NR: Not Recommended

Table 1: Overview of the optimal operating volumes for the various Vivaflow systems

Operating Conditions for Vivaflow 50, 50R and Vivaflow 200	
Pump flow	200–400 ml/min
Maximum pressure	4 bar (60 psi)
Pressure drop across inlet | outlet	0.5 bar (7 psi)
Maximum temperature	60˚C

Diafiltration with Vivaflow Devices

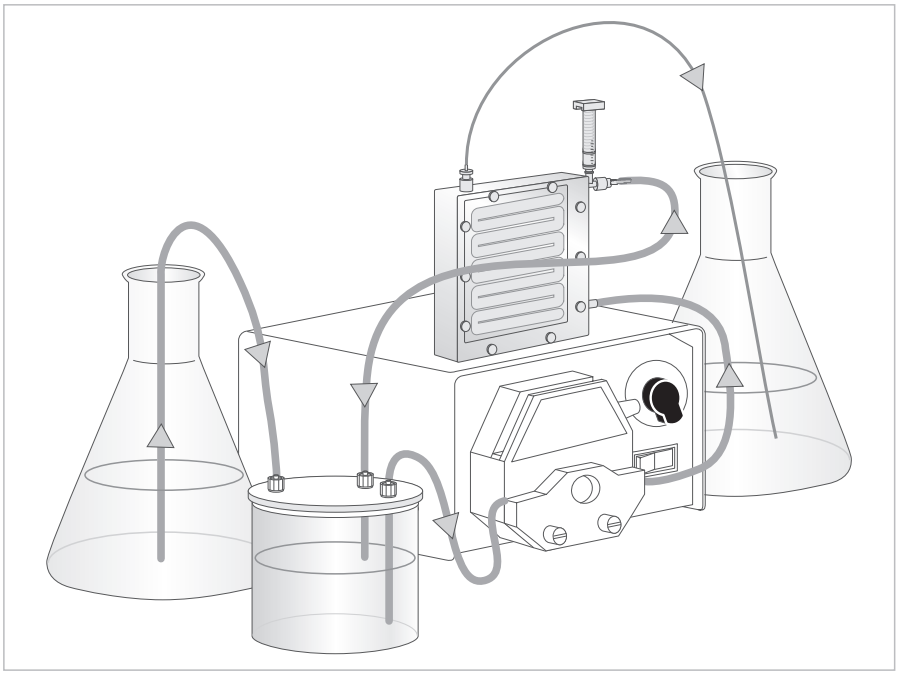


Diagram 2: Diafiltration with Vivaflow

Convenient Diafiltration with Vivaflow
Vivaflow crossflow devices are ideal not only for sample concentration. They are just as easy to use for buffer exchange and | or diafiltration.

The diafiltration reservoir (order number VFA006) makes both the concentration step and the subsequent diafiltration step exceptionally convenient. The sample is concentrated using the diafiltration reservoir to hold a sample. When the requested concentration has been achieved, a tube leading into an additional buffer vessel will transfer new buffer into the system as the filtration run continues. The sample concentration and volume remain constant because buffer is gradually exchanged with the volume in the new vessel.

Technical Specifications

	Vivaflow 50	Vivaflow 50R	Vivaflow 200
Materials of construction			
Main housing	Polycarbonate	Acrylic	Acrylic
Flow channel	TPX (PMP)	Acrylic	Acrylic
Membrane support	TPX (PMP)	Polypropylene	Polypropylene
Membrane seals and O rings	Silicone	Silicone	Silicone
Pressure indicator	Polypropylene, SS** spring	Polypropylene, SS** spring	Polypropylene, SS** spring
Flow restrictor	Polypropylene	Polypropylene	Polypropylene
Fittings	Nylon	Nylon	Nylon
Tubing	PVC (medical grade)	PVC (medical grade)	PVC (medical grade)
Dimensions			
Overall L | H | W	107 | 84 | 25 mm	100 | 100 | 24 mm	126 | 138 | 38 mm
Channel W | H	15 mm | 0.3 mm	7.5 | 0.4 mm	10 mm | 0.4 mm
Active membrane area	50 cm^2	50 cm^2	200 cm^2
Unrecoverable concentrate	1.5 ml	1.7 ml	5.3 ml
Hold-up volume (module)			
Min. recirculation volume	< 10 ml	10 ml	< 20 ml
Non-recoverable hold-up	< 0.5 ml	< 0.5 ml	< 1 ml
Operating Conditions			
Pump flow rate	200–400 ml/min	200–400 ml/min	200–400 ml/min
Maximum pressure	3 bar (45 psi)	3 bar (45 psi)*	3 bar (45 psi)*
Maximum temperature	60˚C	60˚C	60˚C

* Pressure drop across inlet | outlet 0.5 bar (7 psi)
** SS= Stainless steel

Operating Several Vivaflow Devices for Higher Concentration Speed and Throughput

Vivaflow 50

Vivaflow 50 cassettes are modular devices that can easily be scaled up to six devices in order to increase the maximum throughput within challenging timelines. Accelerated speed and throughput in all Vivaflow devices completely depend on, and are proportional, to their membrane area, as demonstrated in Diagram 3.

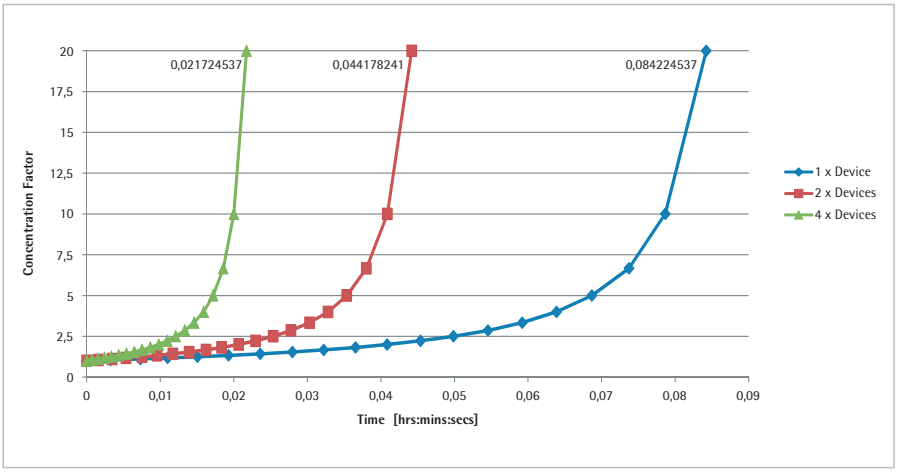


Diagram 3: Accurate scaleup of Vivaflow 50, as shown here for one to four units

Setting Up Multiple Vivaflow Cassettes

Vivaflow 50

The membrane area is easy to expand by attaching several Vivaflow 50 units featuring a unique interlocking mechanism. Up to three devices can be stacked, thus increasing the throughput in series. When more than three devices are connected, two separate stacks must be used. As a result, these devices operate both in parallel and in series.
However, this does not have any effect on the performance of the Vivaflow 50 devices, as this configuration ensure that flow remains completely proportional to the membrane surface area. Diagram 4 and Table 2 provide an overview on how to scale up Vivaflow 50 along with the accessories required.

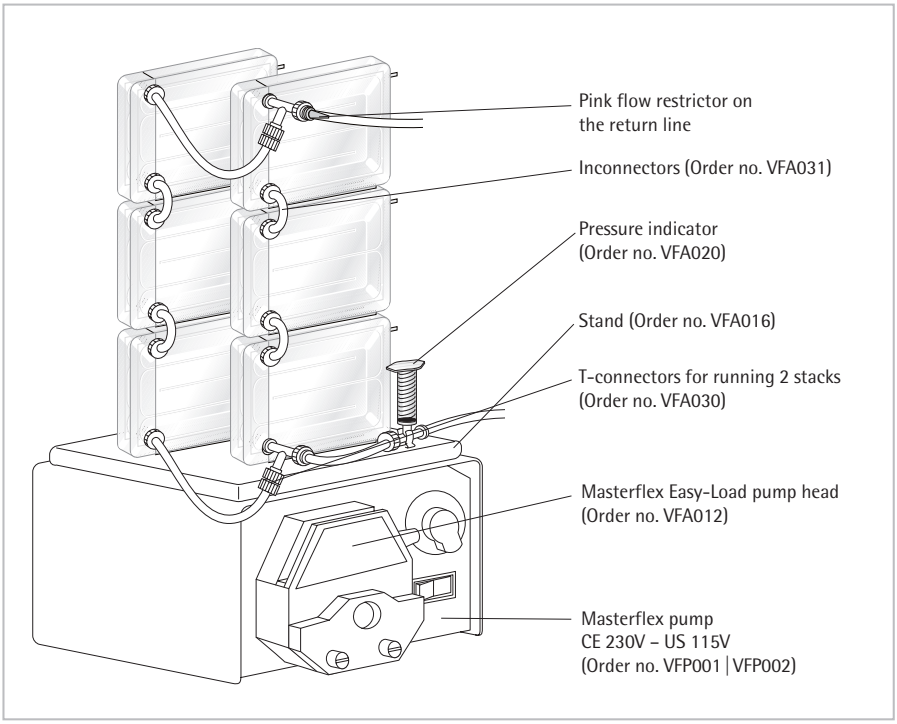


Diagram 4: System components for setting up multiple Vivaflow 50 cassettes

Choosing the components for operating 1 to 6 Vivaflow 50 units

	Order No.	1 VF 50	2 VF 50	3 VF50	4 VF50	5 VF50	6 VF50
Masterflex pump	FP001 | VFP002	1	1	1	1	1	1
Masterflex Easy-Load pump head size 16	VFA012	1	1	1	1	1	1
Pressure indicator	VFA020	optional	1	1	1	1	1
Interconnectors	VFA031	–	(1)* Available in the package	(2)* Available in the package	(2)* Available in the package	(3)* Available in the package	4 (3) Available in the package – Additional VFA031 needed
T-connector	VFA030	–	–	–	1 pkg.**	1 pkg.**	1 pkg.**
Vivaflow 50 stand	VFA016	optional	1	1	1	1	1
Diafiltration reservoir	VFA006	optional	optional	optional	optional	optional	optional
Operating mode		Single	Serial	Serial	Serial and parallel	Serial and parallel	Serial and parallel

* No additional purchase is necessary. One series interconnector is included in a package of two Vivaflow 50 devices.
** One package of T-connectors contains two T-connectors.

Table 2: System components for setting up multiple Vivaflow 50 cassettes

Choosing the components for operating 2 Vivaflow 50R or 2 Vivaflow 200 units

	Order No.	1 VF 50R	2 VF 50R	1 VF200	2 VF200
Masterflex pump	VFP001|VFP002	1	1	1	1
Masterflex easy load pump head Size 16	VFA012	1	1	1	–
Masterflex easy load pump head Size 15	VFA013	–	–	–	1
Pressure Indicator	VFA020	Available in package	Available in package	Available in package	Available in package
Y-Connector	VFA005	–	–	–	1
T-Connector	VFA030	–	1	–	
Diafiltra. reservoir	VFA006	optional	optional	optional	–
Operation mode		Single	Series	Series	Series

Table 3: System components for setting up 2 Vivaflow 50R and 2 Vivaflow 200 cassettes

Vivaflow 50R and Vivaflow 200
The throughput for Vivaflow 50R and Vivaflow 200 can be increased and the filtration time reduced by adding another unit to the setup. Table 3 shows the additional components required for scaling up either system.

Diagram 5 and diagram 6 sketch the setting of two Vivaflow 50R and two Vivaflow 200, showing all necessary accessories and connectors.

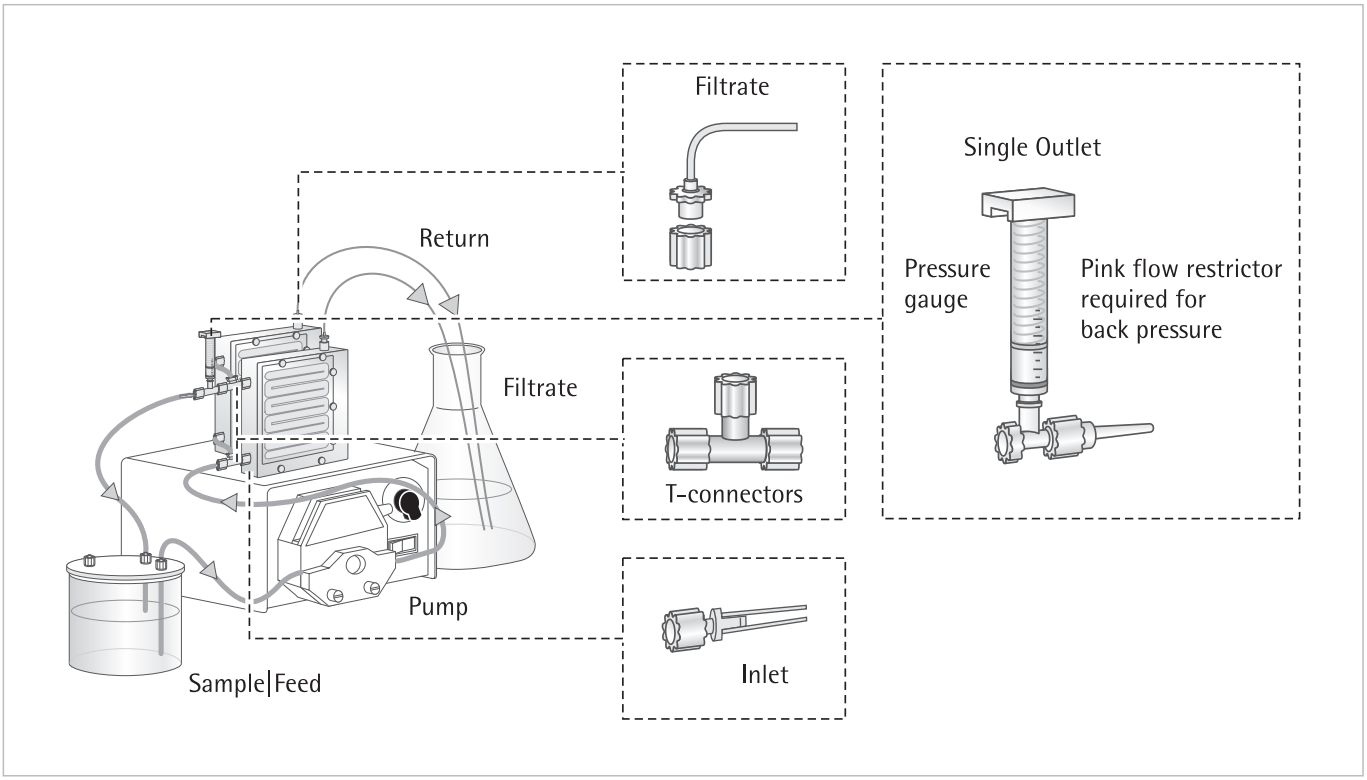


Diagram 5: Setting up two Vivaflow 50R devices

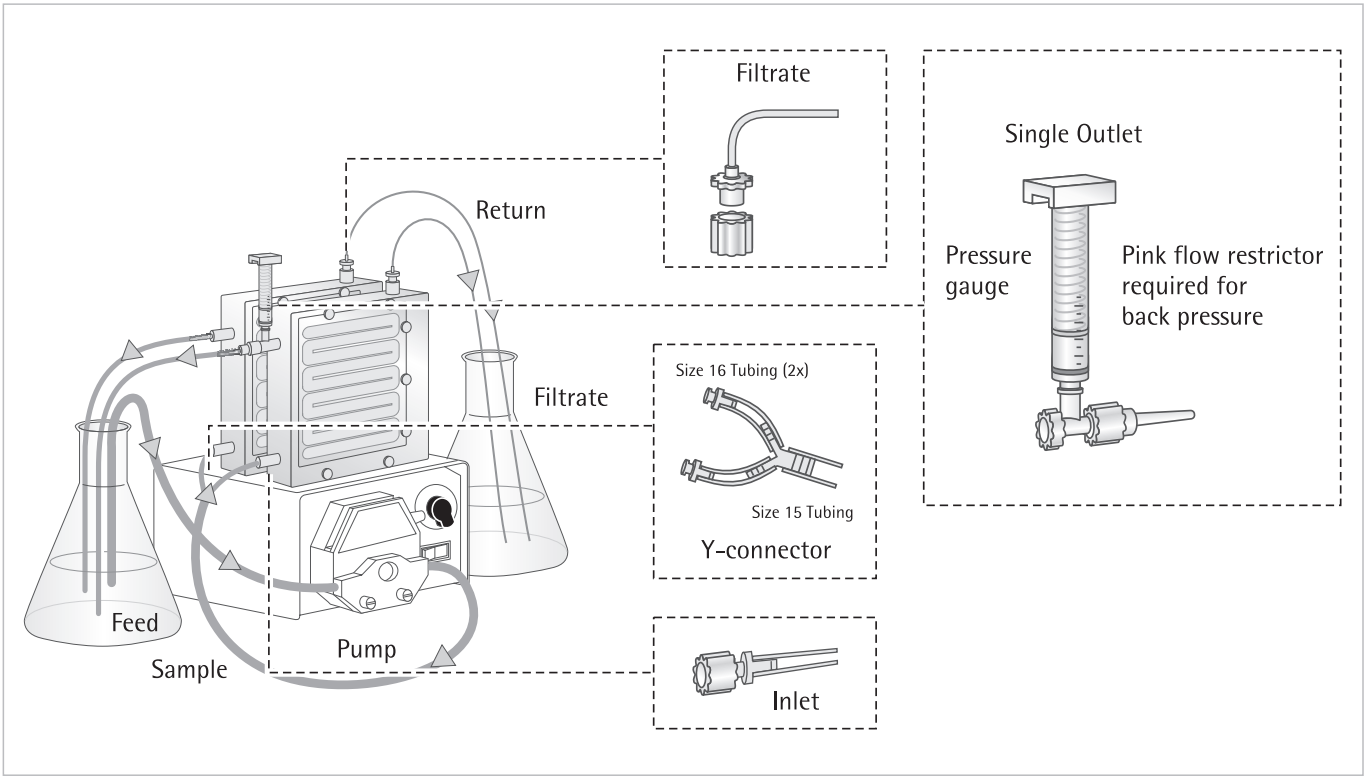


Diagram 6: Setting up two Vivaflow 200 devices

Performance Characteristics for Vivaflow 50

	Time needed to achieve a 20-fold concentration (in minutes) at 3 bar (45 psi) inlet pressure, 20°C			
	Single Device	Three Devices	Solute Recovery in %	
	250 ml Initial Vol. in Min.	1 L Initial Vol. in Min.	Direct	10 ml Rinse
BSA 1.0 mg/ml (66,000 MW)				
5,000 MWCO PES	34	49	96%	> 99%
10,000 MWCO PES	22	32	94%	> 99%
30,000 MWCO PES	22	32	92%	99%
50,000 MWCO PES	20	29	92%	98%
γ Globulins 1.0 mg/ml				
100,000 MWCO PES	43	62	92%	98%
100,000 MWCO RC	40	58	92%	98%
Yeast, 1.0 mg/ml (S. cerevisiae)				
0.2 µm PES	33	47	92%	98%

Performance Characteristics for Vivaflow 50R

	Time to concentrate up to 20x (min) at 3.0 bar inlet | 2.5 bar outlet pressure, 20°C			
	Initial Volume	Average Flux	Reovery in %	
	250 ml	ml/min	Direct	25 ml Rinse
Lysozyme, 0.25 mg/ml (14,000 MW)				
5,000 MWCO Hydrosart®	70	3.4	96%	98%
10,000 MWCO Hydrosart®	23	10.3	94%	96%
BSA 1.0 mg/ml (66,000 MW)				
10,000 MWCO Hydrosart®	24	9.9	98%	> 99%
30,000 MWCO Hydrosart®	15	15.8	97%	> 99%
γ Globulins 1.0 mg/ml (150,000 MW)				
100,000 MWCO Hydrosart®	46	5.2	97%	> 99%
Initial volume 1 liter (one Vivaflow 50R at 3 bar) 10,000 MWCO Hydrosart®				
BSA 1.0 mg/ml	95	10.0	98%	> 99%
Initial volume 1 liter (two Vivaflow 50R in parallel at 3 bar) 10,000 MWCO Hydrosart®				
BSA 1.0 mg/ml	48	19.8	98%	> 99%

Performance Characteristics for Vivaflow 200

	Time to achieve a 20-fold concentration (in minutes) at 3 bar (45 psi) inlet pressure, 20°C			
	Initial Volume	**Average Flux**	**Recovery in %**	
	1 Liter	**ml/min**	**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%	> 99%
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%
100,000 MWCO Hydrosart®	45	21	96%	99%
Yeast, 1.0 mg/ml (S. cerevisiae)				
0.2 µm PES	11	86	92%	98%
Dilute solute concentration, initial volume 1 liter 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 liters (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

	Quantity	Order No.
Vivaflow 50 include filtrate tube, size 16 peristaltic tubing, flow restrictor and fittings and 1 × series interconnector		
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
0.2 µm (PES)	2	VF05P7
100,000 MWCO (RC)	2	VF05C4
Vivaflow 50 complete system comprises		
Pump (240 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
Vivaflow 50R modules include pressure indicator, flow restrictor and size 16 PVC peristaltic tubing and fittings		
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 200 modules include pressure indicator, flow restrictor and size 16 PVC peristaltic tubing and fittings		
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	VF20C4

	Quantity	Order No.
Vivaflow 50R | 200 complete system comprises		
Pump (240 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
Vivaflow 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 15		VFA013
Masterflex Easy Load pump head – size 16		VFA012
Vivaflow 50 stand		VFA016
Pressure indicator (1 – 3 bar)		VFA020
Vivaflow 50 accessories for operating > 2 devices		
T-connectors for running 2 stacks	2	VFA030
Series interconnectors	6	VFA031
Pressure indicator (1 – 3 bar)	1	VFA020
Vivaflow 50R accessories for operation of two modules		
T-connector	2	VFA030
Vivaflow 200 accessories for operating two modules		
Y-connector (size 15 to 2 × size 16, Luer fittings)	1	VFA005
Masterflex Easy-Load pump head – size 15	1	VFA013

For a complete set of accessories, please see our website or our Lab Filtration catalogue.

Sales and Service Contacts

For further contacts, visit www.sartorius.com

Europe

Germany
Sartorius Stedim Biotech GmbH
August-Spindler-Strasse 11
37079 Goettingen

Phone +49.551.308.0
Fax +49.551.308.3289

Sartorius Stedim Systems GmbH
Robert-Bosch-Strasse 5 – 7
34302 Guxhagen

Phone +49.5665.407.0
Fax +49.5665.407.2200

France
Sartorius Stedim FMT S.A.S.
ZI Les Paluds
Avenue de Jouques – CS 91051
13781 Aubagne Cedex

Phone +33.442.845600
Fax +33.442.845619

Sartorius Stedim France SAS
ZI Les Paluds
Avenue de Jouques – CS 71058
13781 Aubagne Cedex

Phone +33.442.845600
Fax +33.442.846545

Austria
Sartorius Stedim Austria GmbH
Franzosengraben 12
1030 Vienna

Phone +43.1.7965763.18
Fax +43.1.796576344

Belgium
Sartorius Stedim Belgium N.V.
Leuvensesteenweg, 248/B
1800 Vilvoorde

Phone +32.2.756.06.80
Fax +32.2.756.06.81

Hungary
Sartorius Stedim Hungária Kft.
Kagyló u. 5
2092 Budakeszi

Phone +36.23.457.227
Fax +36.23.457.147

Italy
Sartorius Stedim Italy S.p.A.
Via dell'Antella, 76/A
50012 Antella-Bagno a Ripoli (FI)

Phone +39.055.63.40.41
Fax +39.055.63.40.526

Netherlands
Sartorius Netherlands B.V.

Phone +31.30.60.53.001
Fax +31.30.60.52.917

info.netherlands@sartorius.com

Poland
Sartorius Stedim Poland Sp. z o.o.
ul. Wrzesinska 70
62-025 Kostrzyn

Phone +48.61.647.38.40
Fax +48.61.879.25.04

Russian Federation
LLC "Sartorius ICR"
Uralskaya str. 4, Lit. B
199155, Saint-Petersburg

Phone +7.812.327.5.327
Fax +7.812.327.5.323

Spain
Sartorius Stedim Spain SA
C/Isabel Colbrand 10,
Oficina 70
Polígono Industrial de Fuencarral
28050 Madrid

Phone +34.90.2110935
Fax +34.91.3589623

Switzerland
Sartorius Stedim Switzerland AG
Ringstrasse 24 a
8317 Tagelswangen

Phone +41.52.354.36.36
Fax +41.52.354.36.46

U.K.
Sartorius Stedim UK Ltd.
Longmead Business Centre
Blenheim Road, Epsom
Surrey KT19 9 QQ

Phone +44.1372.737159
Fax +44.1372.726171

America

USA
Sartorius Stedim North America Inc.
5 Orville Drive, Suite 200
Bohemia, NY 11716

Toll-Free +1.800.368.7178
Fax +1.631.254.4253

Argentina
Sartorius Argentina S.A.
Int. A. Ávalos 4251
B1605ECS Munro
Buenos Aires

Phone +54.11.4721.0505
Fax +54.11.4762.2333

Brazil
Sartorius do Brasil Ltda
Avenida Senador Vergueiro 2962
São Bernardo do Campo
CEP 09600-000 - SP- Brasil

Phone +55.11.4362.8900
Fax + 55.11.4362.8901

Mexico
Sartorius de México S.A. de C.V.
Circuito Circunvalación Poniente
No. 149
Ciudad Satélite
53100, Estado de México
México

Phone +52.5555.62.1102
Fax +52.5555.62.2942

Asia | Pacific

Australia
Sartorius Stedim Australia Pty. Ltd.
Unit 5, 7-11 Rodeo Drive
Dandenong South Vic 3175

Phone +61.3.8762.1800
Fax +61.3.8762.1828

China
Sartorius Stedim Biotech (Beijing) Co. Ltd.
No. 33 Yu'an Road
Airport Industrial Park Zone B
Shunyi District, Beijing 101300

Phone +86.10.80426516
Fax +86.10.80426580

Sartorius Stedim Biotech (Beijing) Co. Ltd.
Shanghai Branch Office
3rd Floor, North Wing, Tower 1
No. 4560 Jin Ke Road
Pudong District, Shanghai 201210

Phone +86.21.68782300
Fax +86.21.68782332 | 68782882

Sartorius Stedim Biotech (Beijing) Co. Ltd.
Guangzhou Representative Office
Unit K, Building 23
Huihua Commerce & Trade Building
No. 80 Xianlie Middle Road
Guangzhou 510070

Phone +86.20.37618687 | 37618651
Fax +86.20.37619051

India
Sartorius Stedim India Pvt. Ltd.
#69/2-69/3, NH 48, Jakkasandra
Nelamangala Tq
562 123 Bangalore, India

Phone +91.80.4350.5250
Fax +91.80.4350.5253

Japan
Sartorius Stedim Japan K.K.
4th Fl., Daiwa Shinagawa North Bldg.
8-11, Kita-Shinagawa 1-chome
Shinagawa-ku, Tokyo, 140-0001 Japan

Phone +81.3.4331.4300
Fax +81.3.4331.4301

Malaysia
Sartorius Stedim Malaysia Sdn. Bhd.
Lot L3-E-3B, Enterprise 4
Technology Park Malaysia
Bukit Jalil
57000 Kuala Lumpur, Malaysia

Phone +60.3.8996.0622
Fax +60.3.8996.0755

Singapore
Sartorius Stedim Singapore Pte. Ltd.
1 Science Park Road,
The Capricorn, #05-08A,
Singapore Science Park II
Singapore 117528

Phone +65.6872.3966
Fax +65.6778.2494

South Korea
Sartorius Korea Biotech Co., Ltd.
8th Floor, Solid Space B/D,
PanGyoYeok-Ro 220, BunDang-Gu
SeongNam-Si, GyeongGi-Do, 463-400

Phone +82.31.622.5700
Fax +82.31.622.5799

www.sartorius.com

Specifications subject to change without notice. Printed and copyrighted by Sartorius Stedim Biotech GmbH. | W
Publication No.: SL-2078-e140402 · Order No.: 85037-542-12 · Ver. 04 | 2014