

Vivascience Vivaflow 50

Vivaflow 50 is a novel (patent pending) disposable modular tangential flow system that offers significantly faster concentration performance with less hold up than comparable systems. This is achieved by the use of a unique "flip-flow" thin channel flow path that combines greatly increased cross-flow turbulence with unusually low pump requirements.

Starting volumes as low as 100 ml can be concentrated down to less than 10 ml in just a few minutes. In less than 45 minutes, one module will reduce 500 ml to under 20 ml; six inter-linked modules will concentrate 3 litres over 50 times in 60 mins.

Choosing the most appropriate membrane

Vivascience offers high performance Polyethersulfone and Regenerated Cellulose membrane alternatives, giving a combination of high flux and low protein binding with very low levels of non-specific adsorption.

Polyethersulfone membranes exhibit no hydrophobic or hydrophilic interactions and are usually preferred for their low fouling characteristics, broad pH range, and durability. A range of cut offs is available from 5,000 MWCO to 0.2 μm .

Regenerated Cellulose membranes are hydrophilic and are usually preferred for their high selectivity and ease of cleaning. 10,000, 30,000, and 100,000 MWCO are available.

For maximum retention, select a membrane cut-off that is at least 50 % lower than the molecular weight of the species of interest.



Equipment Supplied

- 2 x Vivaflow 50 tangential flow filtration modules with filtrate tubing.
- 2 x 1 m size 16 PVC tubing with luer inlet fitting
- 2 x 0.5 m size 16 PVC tubing with 0.6 mm flow restrictor
- 1 x Series interconnector to link modules if desired.

Linked modules

1. Peristaltic pump-head accepting size 16 tubing, delivering 480 ml/min. (VFA012 or equivalent), and a variable speed peristaltic pump capable of providing this flow rate. (VFP001 or equivalent)
2. Vivaflow 50 Stand (Product No. VFA016)
3. Series Interconnectors (Product No. VFA031)
4. T Connectors (Product No. VFA030)
5. Suitable containers for the sample and filtrate.

Equipment Required

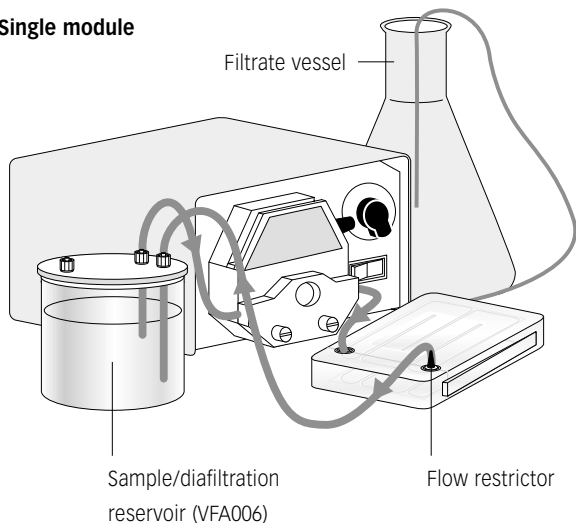
Single module

1. Peristaltic pump-head accepting size 16 tubing, delivering 480 ml/min. (VFA012 or equivalent), and a variable speed peristaltic pump capable of providing this flow rate. (VFP001 or equivalent).
2. Suitable containers for the sample and filtrate.

Optional Equipment

- Pressure indicator (1-3 bar) (Product No. VFA020)
- For concentration/diafiltration of small volumes, the 500 ml Sample reservoir (VFA006) is recommended.
- The Vivaflow 50 system is available as a complete kit containing: Pump and pump head, stand, pressure indicator, 500ml sample reservoir and all tubes and fittings required. (Product No. VFS502)

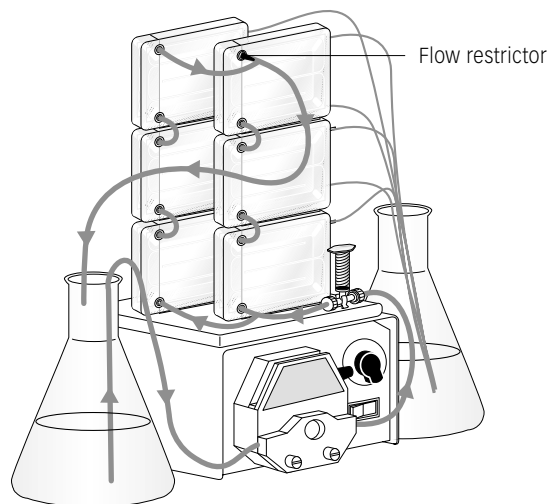
Single module



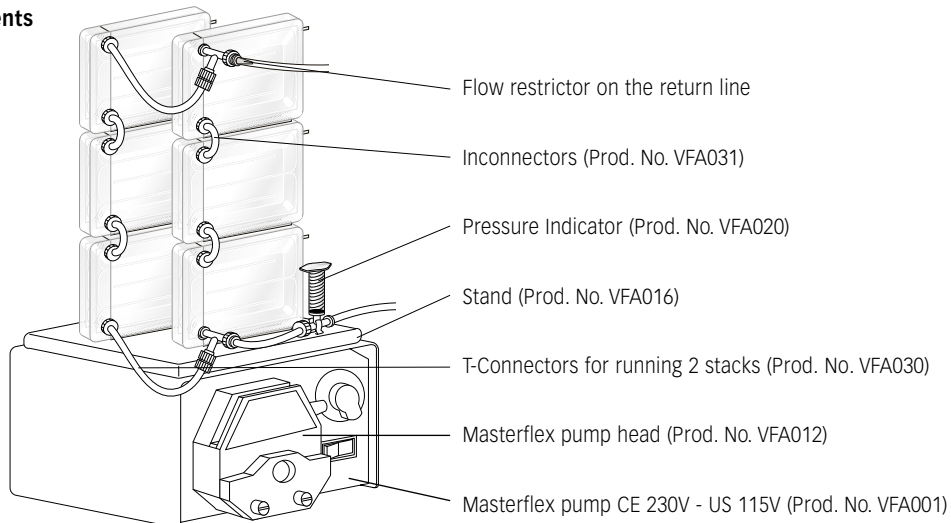
1. Set up the system as illustrated opposite.
Note the positioning of the flow restrictor on the return line.
2. Vivaflow membranes contain trace amounts of glycerine and sodium azide. To remove these chemicals and to check the security of the tube connections, it is recommended to rinse the module, and to test the system at full pressure before introducing the sample.
3. Place 500 ml deionised water in a suitable reservoir. The Vivaflow 500 ml sample/diafiltration reservoir (prod. no. VFA006) is recommended.
4. Pump liquid through the system to purge any air pockets. The recirculation rate should be in the range 200-400 ml/min, and suitable flow should exit the filtrate line. If used, the pressure indicator (prod. no. VFA020), should read approximately 2.5 bar.
5. Allow 400 ml to pass into the filtrate vessel. Check for any leakage at tubing connection points. Drain the system and empty or replace the filtrate vessel, (see recovery section). The system is now ready for use.

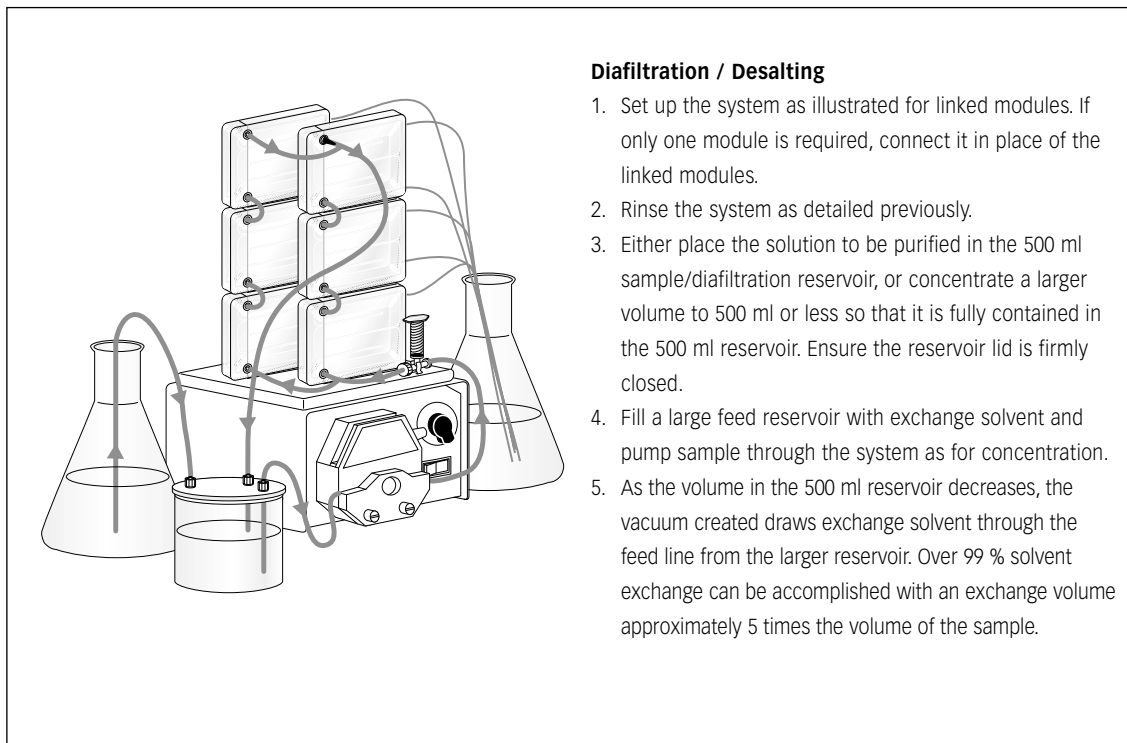
Linked modules

1. Set up the system as illustrated opposite.
Link the required number of modules by sliding the tongue and groove edges together. Note the positioning of the flow restrictor on the return line.
2. Use series interconnectors, (prod. no. VFA031), to connect a single row of modules.
3. In addition, use T connectors, (prod. no. VFA030), to connect two rows of modules in parallel.
4. The flow path of the system can be configured to suit the membrane / sample combination. Most solutions are better suited by modules connected in parallel. Very low viscosity solutions favour modules connected only in series.
Rinse the system as detailed under single module operation.



System Components





Diafiltration / Desalting

1. Set up the system as illustrated for linked modules. If only one module is required, connect it in place of the linked modules.
2. Rinse the system as detailed previously.
3. Either place the solution to be purified in the 500 ml sample/diafiltration reservoir, or concentrate a larger volume to 500 ml or less so that it is fully contained in the 500 ml reservoir. Ensure the reservoir lid is firmly closed.
4. Fill a large feed reservoir with exchange solvent and pump sample through the system as for concentration.
5. As the volume in the 500 ml reservoir decreases, the vacuum created draws exchange solvent through the feed line from the larger reservoir. Over 99 % solvent exchange can be accomplished with an exchange volume approximately 5 times the volume of the sample.

Concentration

1. Fill the feed reservoir with sample solution. When initial volumes larger than 500 ml are required, place 500 ml in the sample / diafiltration reservoir, the remaining volume in another suitable container and connect the vessels as detailed in the diafiltration section. Alternatively, use a larger container for the entire sample volume and immerse the feed and return lines directly into the liquid.
2. Pump liquid through the system. The recirculation rate should be in the range 200-400 ml/min, and suitable flow should exit the filtrate line. If used, the pressure indicator, (prod. no. VFA020), should read approximately 2.5 bar.

3. Concentrate the sample to the desired volume.



WARNING: *Do not run the same section of tubing through the pump head for longer than six hours, over use of tubing will result in significant pressure drop and ultimately, failure.*

4. When the desired volume has been reached, reduce the recirculation rate to 20-40 ml/min and recirculate the concentrated sample for 1-2 minutes to maximise recovery.

Recovery

1. Disconnect the feed line from the lid of the 500 ml reservoir or when using a different container, remove the feed line from the sample.
2. Pump residual system volume back into the reservoir/container. (When parallel modules are used with viscous solutions, ensure that all modules are empty by pinching the tubing between each of the stacks of modules in turn).
3. For a more complete sample recovery rinse approximately 5-10 ml per module of water or sample buffer through the system, and recover as before.

Table 1: Technical Specifications

Specifications	
Active Membrane Area	50 cm ²
Hold up Volume (module)	1.5 ml
Min Recirculation Volume	<10 ml
Non Recoverable Hold-up	<0.5 ml
Materials of Construction	
Main Housing	Polycarbonate
Flow Channel	TPX (PMP)
Seals and O Rings	Silicone
Pressure Indicator	Polypropylene, SS Spring,
Restrictor	Polypropylene
Fittings	Nylon
Tubing	PVC (medical grade)
Dimensions	
Overall L/H/W	107/84/25 mm
Channel W/H	15 mm/0.3 mm
Operating Conditions	
Pump Flow	200-400 ml/min
Maximum Pressure	3 bar (45 psi)
Maximum Temperature	60° C

Ordering Information

VivaFlow 50 Includes filtrate tube, size 16 peristaltic tubing, flow restrictor and fittings

	Pack Size	Prod. No.
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
10,000 MWCO (RC)	2	VF05C0
30,000 MWCO (RC)	2	VF05C2
100,000 MWCO (RC)	2	VF05C4
VivaFlow 50 PVC Tubing and Fittings		
VF50 Tubing Kit (2 x 1 m size 16 PVC tubing with inlets fittings, 2 x 50 cm size 16 PVC Tubing with 0.6 mm flow restrictors, 1 x series inlet connections)		VFA034
Size 16 PVC pump tubing (3 metres, 3.2 x 1.6 mm)		VFA004
Female Luer fittings (10 pieces)		VFA032
Series Interconnectors (6 pieces)		VFA031
T Connectors for running 2 stacks (2 pieces)		VFA030
Flow restrictor set (2 x 0.4, 0.6, 0.8 mm)		VFA009
Flow restrictor 0.6 mm (6 pieces)		VFA035
VivaFlow 50 Accessories		
Masterflex Economy Drive Variable Speed Peristaltic Pump (CE 230V - US 115V)		VFP001
Masterflex Easy Load Pump Head - Size 16		VFA012
500 ml Sample and/or Diafiltration Reservoir		VFA006
Vivaflow 50 Stand		VFA016
Pressure Indicator (1-3 bar)		VFA020

Table 2: Performance Characteristics

20 X Concentration min.	Single Device	Three Devices	Solute Recovery %	
3 bar inlet pressure at 20° C	250 ml Start Vol. min.	1 L Start Vol. 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 %
10,000 MWCO RC	38	55	96 %	> 99 %
30,000 MWCO PES	22	32	92 %	99 %
30,000 MWCO RC	13	21	96 %	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 %

Table 3: Chemical Compatibility

Solution	PES	RC	Solution	PES	RC
Acetic Acid (25 %)	OK	OK	n-Butanol (70 %)	OK	OK
Acetone (10 %)	NO	NO	Peracetic Acid (0.2 %)	OK	OK
Ammonium Hydroxide (5 %)	OK	OK	Phenol (1 %)	OK	?
Ammonium Sulfate sat.	OK	OK	Phosphate Buffer (1 M)	OK	OK
Aprotic Solvents (5 %)	NO	NO	Pyridene (100 %)	NO	NO
Ethanol (70 %)	OK	OK	Sodium Azide (25 %)	OK	OK
Ethyl Acetate (100 %)	NO	NO	Sodium Deoxycholate (5 %)	OK	OK
Formaldehyde (30 %)	OK	OK	Sodium Hydroxide (2.5 M)	OK	NO
Formic Acid (5 %)	OK	OK	Sodium Hypochlorite (0.02 %)	OK	?
Guanidine HCl (6 M)	OK	OK	Sodium Oxide (0.25 %)	OK	OK
Hydrocarbons, Aromatic	NO	NO	Sodium Nitrate (1 %)	NO	NO
Hydrocarbons, Chlorinated	NO	NO	Sulfamic Acid (5 %)	OK	NO
Hydrochloric Acid (1 M)	OK	NO	Surfactants (0.1 %)	OK	OK
Isopropanol (70 %)	NO	NO	Toluene (1 %)	NO	NO
Lactic Acid (5 %)	OK	OK	Trichloroacetic Acid (10 %)	NO	?
Mercaptoethanol (1 M)	NO	?	Trifluoroacetic Acid (10 %)	OK	NO
Methanol (60 %)	OK	OK	Urea (8 M)	OK	OK

OK = Acceptable ? = Questionable NO = Not recommended

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Technical data and operating instructions.
For in vitro use only.