SARTORIUS

Product Datasheet



Vivaflow® SU

Go Against the Flow: Intuitive, Effortless and Sustainable TFF for the Lab

DOMINIQUE DUTSCHE

Product Information

Vivaflow® SU is a next generation plug-and-play tangential flow filtration (TFF) cassette, for ultrafiltration and diafiltration of intermediate sample volumes. It has been specifically designed for ease of use in research and development laboratories.

For feed samples of 100 mL and more, concentration and buffer exchange using centrifugal ultrafilters is cumbersome, labor intensive and time consuming, leading to a decrease in productivity. However, TFF based on scale-down process technology is expensive, complicated and requires additional effort in process optimization.

Re-designed from the ground up, Vivaflow® SU features a new housing and flow path design, and offers an increased range of membrane materials and MWCOs. Compared to the previous generation cassettes, this results in enhanced ease of use and improved ultrafiltration and diafiltration performance for virtually any biomolecule.

In addition, single-use plastic waste has been minimized, with a lighter housing derived from renewable, ISCC PLUS certified sources. Together with paper-rich packaging and tailored tubing kits, this reduces the environmental impact of your research.

Features and Benefits

True Plug and Play
Link the cassettes quickly and securely to a suitable pump and reservoirs, right out of the box.

No Added Costs
All-in-one design avoids the need for expensive cassette holders and TFF equipment.

Performance Optimized
Advanced flow path and fixed occlusion restrictor eliminate the effort that is usually needed for TFF.

Process Any Molecule
High performance PES or Hydrosart® RC membranes ensure maximum recoveries.

Maintain Sample Integrity
Improve safety for you and your sample with no need for flushing or cleaning.

More Circularity, Less Waste
Supplied with only the tubing you need, each cassette contains 30.5% less plastic[1] and certified bio-circular housing[2].

Applications

Ultrafiltration
- Cell culture and process fluid clarification
- Protein, nucleic acid and virus concentration
- Nanoparticle separation and enrichment
- Fresh- and waste-water concentration
- Sample volume reduction

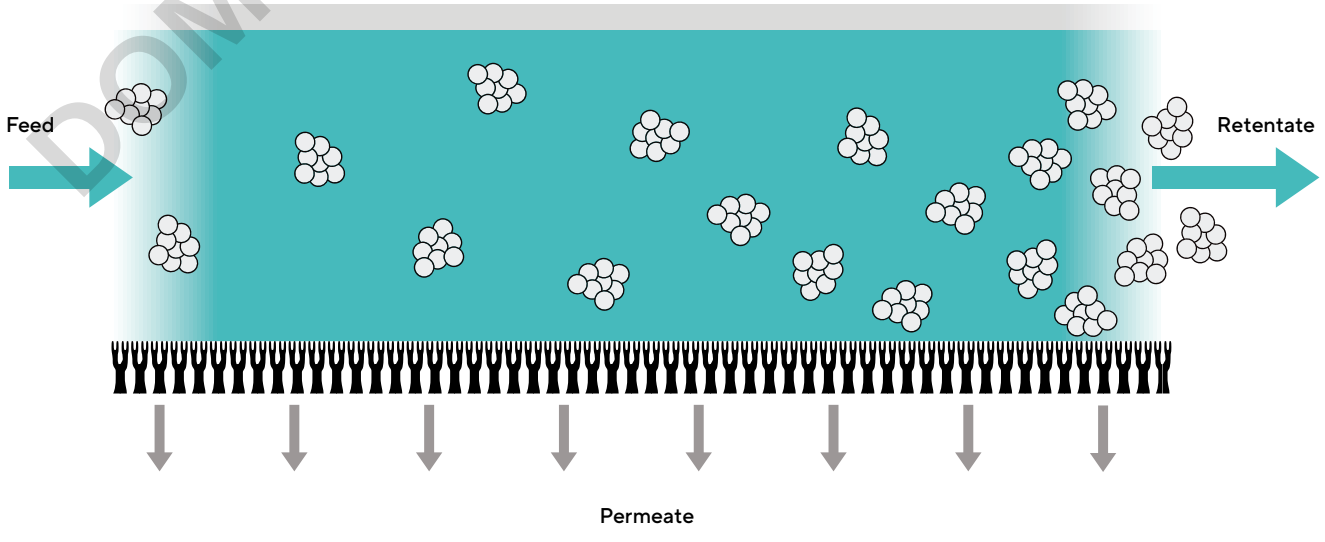
Diafiltration
- Protein solubilization and refolding
- Chromatography sample preparation
- Polishing and contaminant removal
- Therapeutic formulation development
- Protein-ligand binding studies

[1] Compared to first generation Vivaflow® cassettes with 50 cm² membrane area.
[2] We support the bioeconomy. An amount of bio-circular material equivalent to 79% of each Vivaflow® SU cassette is sourced and allocated to the plastic housing through the ISCC mass balance approach.

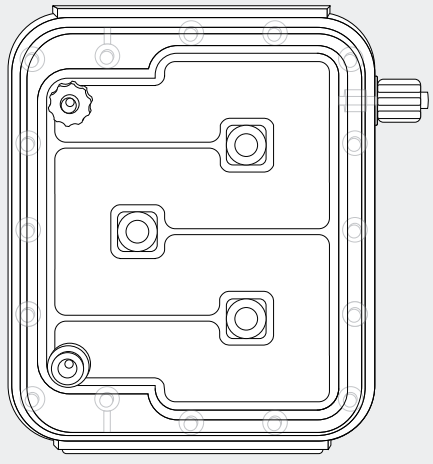
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Operating Principle

A sample (feed) is pumped through the cassette and flows parallel to the membrane surface. This allows continuous removal of solvent and low molecular weight contaminants (permeate), while flow dynamics at the membrane surface prevent fouling, polarization, and blocking. When the sample is recirculated between the cassette and feed reservoir, it is progressively concentrated (retentate).



Technical Specifications



98 × 13 × 116 mm
Overall dimensions (L × W × H)

130 g
Approximate weight

50 cm²
Membrane area

100 – 500 mL
Recommended feed volume[2]

10 mL
Minimum retentate volume

50X
Max. concentration factor[2]

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Materials

Fittings	Polyamide (PA) Polypropylene (PP)
Gasket	Silicone (SIL)
Housing	Polycarbonate (PC)
Membrane	Hydrosart® regenerated cellulose (RC) Polyethersulfone (PES)
Membrane support	Polyethylene (HDPE)
Pressure indicator	Polyamide (PA) Polyoxymethylene (POM) Polypropylene (PP) Silicone (SIL) Stainless steel (SS)
Reservoir[3]	Polyamide (PA) Polycarbonate (PC) Polyoxymethyene (POM) Polyvinyl chloride (PVC) Silicone (SIL)
Stand[3]	Aluminium (ALU)
Tubing	Polyvinyl chloride (PVC)
Packaging	Cardboard (PAP) Polyethylene (LDPE)

[2] For one cassette. Up to 1,000 mL feed volume and 100X concentration factor are possible when running two cassettes in series.
[3] Optional accessories.

Equipment Requirements

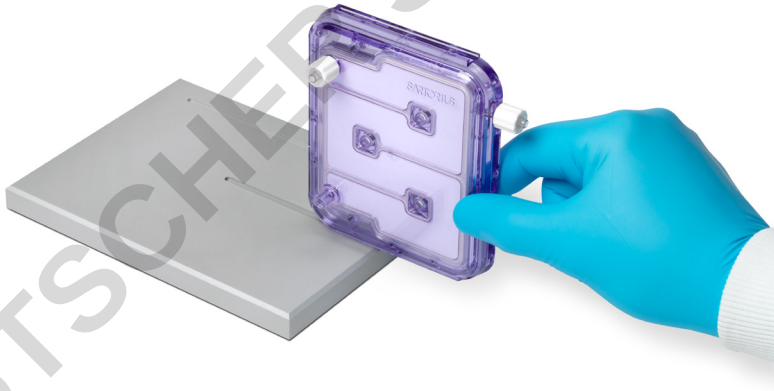
Peristaltic Pump
With a pump head for 1.6 mm wall thickness tubing.

Reservoirs | Vessels
For feed distribution[4] and permeate collection.

Cassette Stand
Available as an optional accessory[5], for a tidy set up.

Sterilization

Thermal sterilization and the use of acidic, caustic or oxidizing agents are not recommended. The feed reservoir, tubing and cassettes may be sanitized by flushing with 70% ethanol for 5-10 minutes, followed by rinsing with sterile water of buffer.



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Operating Conditions

200 – 400 mL/min	2.5 bar	4 – 40 °C	Aqueous buffers, pH 4 – 9	6 hr
Flow rate	Maximum retentate pressure	Temperature	Chemical compatibility	Maximum run time[6]

[4] A feed reservoir (order number VF-ARV0500-1) is required for feed distribution during continuous diafiltration.
[5] A cassette stand (order number VF-AST0001-1) is especially recommended when running two cassettes in series.
[6] If a longer run time is necessary, reposition the feed tubing in the pump head to ensure even wear.

System Setup

Ultrafiltration

The unique flow path and fixed occlusion restrictor in Vivaflow® SU ensure optimal crossflow velocity and transmembrane pressure (TMP) without applying excessive shear stress to the sample. This substantially reduces user effort by eliminating the need to calculate and optimize feed flow rate, TMP and permeate flux. It also ensures high product recovery due to gentle filtration conditions compared to centrifugal ultrafiltration. Furthermore, as the process is pump driven, it can be stopped as soon as the desired retentate or permeate volume has been reached by simply stopping the pump flow.

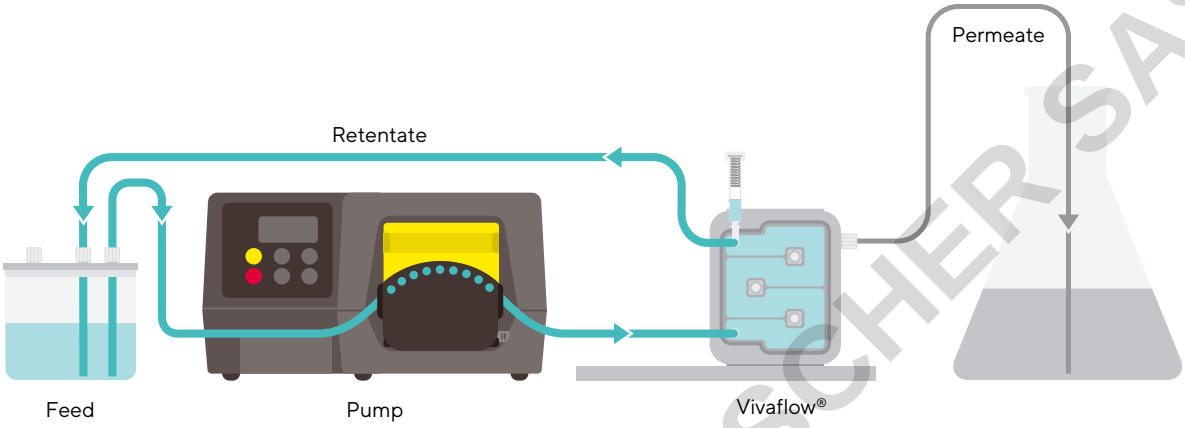


Figure 1: Vivaflow® SU cassettes are ready to use for ultrafiltration by simply connecting them to a suitable pump, feed reservoir and permeate collection vessel.

Diafiltration

The Vivaflow® feed reservoir (order number VF-ARV0500-1) makes both ultrafiltration and diafiltration exceptionally convenient. First, a sample is concentrated to the desired final volume. Then, a length of tubing (order number VF-ATD0001-1) is placed into a separate vessel containing the exchange buffer and linked to the feed reservoir. Airtight sealing in the lid of the feed reservoir enables continuous diafiltration – as the original buffer continues to permeate the ultrafiltration membrane, it is replaced with an equivalent volume of exchange buffer. This is a gentle and efficient method of buffer exchange, desalting or refolding, which reduces reagent and water consumption and avoids sample dilution.

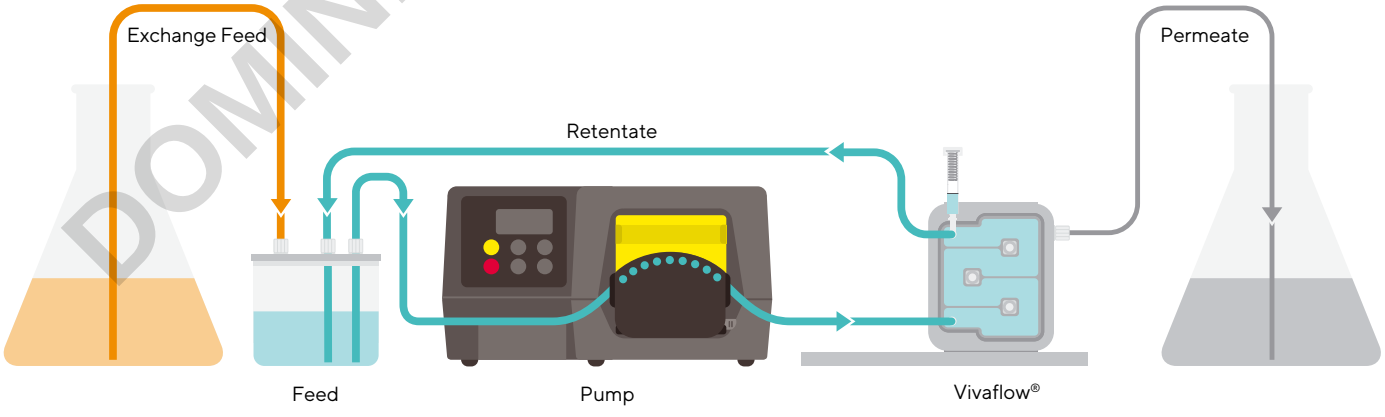


Figure 2: To perform diafiltration, all that is required is to add a second feed vessel containing 5X diavolumes of exchange buffer and a length of tubing, orange, to the ultrafiltration setup.

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Scale Up

The modular design of Vivaflow® SU allows up to two cassettes to be run in series. This supports increased throughput for feed volumes up to 1 L, or increased processing speed for smaller samples. To run two cassettes in series, select the membrane material and molecular weight cut-off that best suits your sample and order the cassettes that are supplied with a serial tubing kit (order numbers ending in -SV).

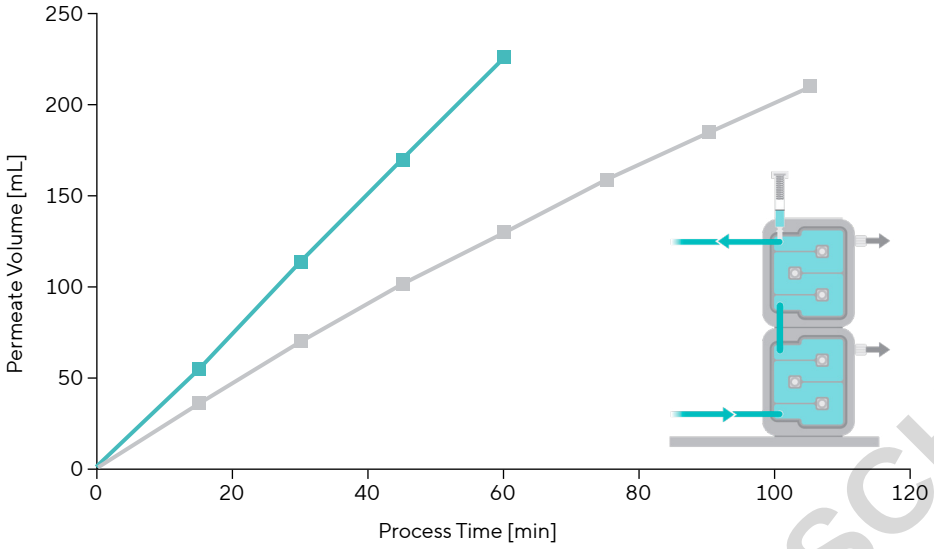


Figure 3: The time to produce a given permeate volume is halved when running two cassettes in series (as shown in the inset), teal, compared to running one cassette, grey (process conditions: lysozyme concentrated using 5 kDa PES at 2.5 bar retentate pressure, at 20 °C (n = 3)).

Typical Performance

Typical permeate flow and retention rates for biomolecules concentrated up to 10X. Process conditions: Samples were concentrated at operating pressures up to 2.5 – 3 bar on the retentate, at 20 °C. Permeate volumes were measured periodically throughout each run, and retention rates were determined after flushing the cassettes with 10 mL sample buffer at the end of each run (n = 26 for 30 kDa RC, n = 3 for all other membranes).

MWCO	Feed Material	Membrane	Permeate Flow	Retention Rate
2 kDa	Vitamin B12 (1.2 kDa)	RC	1.7 mL/min	94%
5 kDa	Lysozyme (14.3 kDa)	PES	2.0 mL/min	99%
		RC	3.7 mL/min	99%
10 kDa	Alpha-chymotrypsin (25 kDa)	PES	10 mL/min	99%
		RC	12 mL/min	98%
30 kDa	Bovine serum albumin (66 kDa)	PES	22 mL/min	99%
		RC	27 mL/min	99%
50 kDa	Immunoglobulins (150 kDa)	PES	10 mL/min	99%
100 kDa	Immunoglobulins (150 kDa)	PES	11 mL/min	98%
		RC	10 mL/min	98%
300 kDa	Latex beads (0.25 µm)	PES	20 mL/min	>99%
		RC	16 mL/min	>99%
1,000 kDa	Latex beads (0.25 µm)	PES	66 mL/min	>99%
0.2 µm	*S. cerevisiae* (5 – 10 µm)	PES	70 mL/min	99%

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Ordering Information

Package Contents for Cassettes, Equipment and Accessories

Description	Package Contents	Order No
Vivaflow® SU cassettes	2 units 1 tubing kit[7] 1 quick start guide	See below
Peristaltic pump	1 unit 1 power cable with region-specific plug	VF-APD0001-1
Peristaltic pump head for 1.6 mm WT tubing	1 unit 1 user guide	VF-APH0001-1
Feed reservoir, 500 mL	1 unit	VF-ARV0500-1
Cassette stand	1 unit	VF-AST0001-1
Tubing for diafiltration	1 unit	VF-ATD0001-1



Figure 4: Vivaflow® SU package contents for running each cassette individually, as recommended for feed volumes from 100 to 500 mL, left, or both cassettes in series, as recommended for feed volumes from 500 to 1,000 mL, right.

Vivaflow® SU Cassettes

Membrane Material	MWCO	Recommended Feed Volume 100 – 500 mL	 500 – 1,000 mL
Hydrosart® regenerated cellulose (RC)	**2 kDa**	VF-S050H0002-IV	VF-S050H0002-SV
	5 kDa	VF-S050H0005-IV	VF-S050H0005-SV
	10 kDa	VF-S050H0010-IV	VF-S050H0010-SV
	30 kDa	VF-S050H0030-IV	VF-S050H0030-SV
	100 kDa	VF-S050H0100-IV	VF-S050H0100-SV
	300 kDa	VF-S050H0300-IV	VF-S050H0300-SV
Polyethersulfone (PES)	**5 kDa**	VF-S050P0005-IV	VF-S050P0005-SV
	10 kDa	VF-S050P0010-IV	VF-S050P0010-SV
	30 kDa	VF-S050P0030-IV	VF-S050P0030-SV
	50 kDa	VF-S050P0050-IV	VF-S050P0050-SV
	100 kDa	VF-S050P0100-IV	VF-S050P0100-SV
	300 kDa	VF-S050P0300-IV	VF-S050P0300-SV
	1,000 kDa	VF-S050P1000-IV	VF-S050P1000-SV
	0.2 µm	VF-S050P2000-IV	VF-S050P2000-SV

[7] Includes 2x feed tubes (1.6 mm WT), 2x permeate tubes, 2x retentate tubes and 2x pressure indicators, for running each cassette individually (100-500 mL recommended feed volume), or 1x feed tube (1.6 mm WT), 1x serial connector, 2x permeate tubes, 1x retentate tube and 1x pressure indicator, for running both cassettes in series (500-1,000 mL recommended feed volume).

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