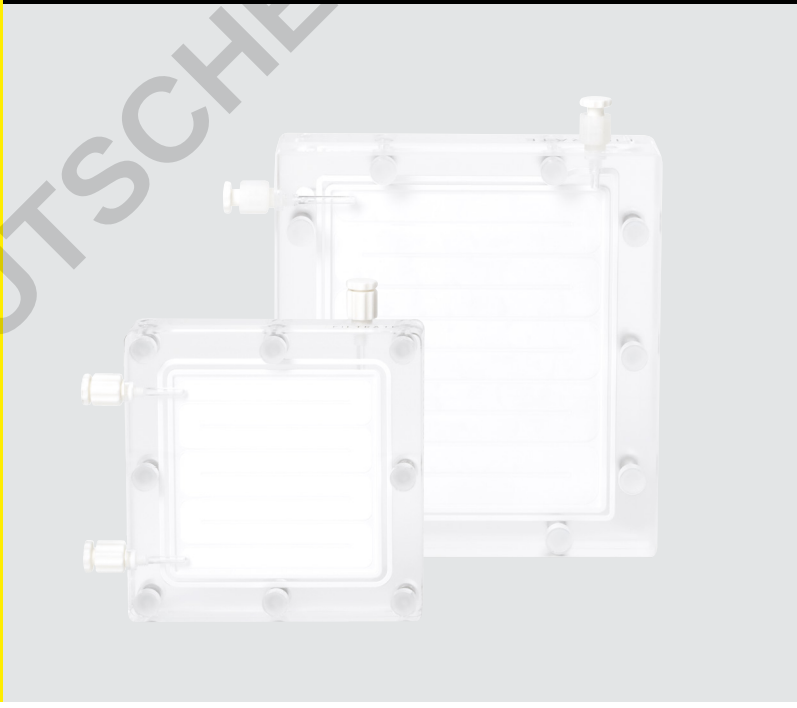
SARTORIUS

Product Datasheet



Vivaflow®

Ready to Flow: Simple and Reusable TFF for Research Laboratories

DOMINIQUE DUTSCHE

Product Information

Vivaflow® is the original plug-and-play tangential flow filtration (TFF) solution for handling samples up to 5 L in research and discovery laboratories.

For feed volumes 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.

A trusted partner in separation workflows for a quarter of a century, Vivaflow® features an all-in-one design with a unique switchback flow path that enables fast, low effort ultrafiltration and diafiltration using a standard pump. A choice of two membrane areas in multiple MWCOs suits many common sample types. The cassettes are also suitable for multiple runs without the need to replace the membranes, supporting greater process economy.

Supplied complete with a tubing kit, each cassette can be set up and run individually in ultrafiltration mode right out of the box. In addition, an enhanced selection of predefined tubing kits is available when tubing replacement, diafiltration, or running two cassettes in parallel is required.

Features and Benefits

Plug and Play
Link the cassette(s) simply and securely to a suitable pump and reservoirs, right out of the box.

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

High Performance
The original switchback flow path reduces the need for TFF process optimization.

Process Many Samples
PES or Hydrosart® RC and extended chemical and temperature resistance suit a range of processes.

Economical Handling
Robust cleaning process supports multiple runs without the need for membrane replacement.

Applications

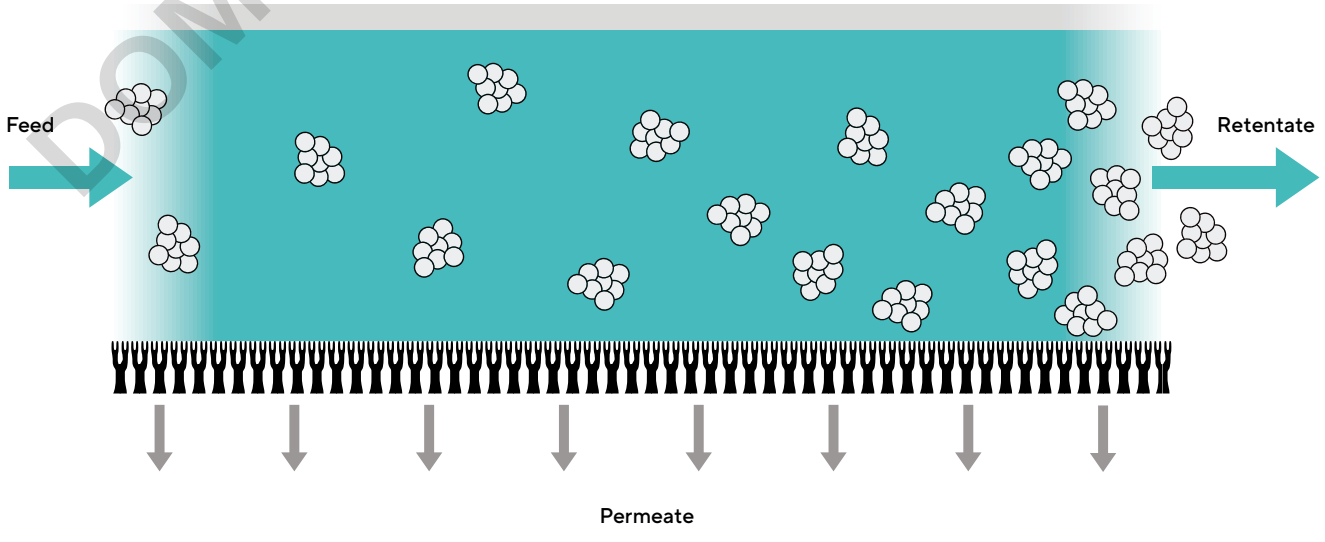
Ultrafiltration
- Cell culture and process fluid clarification
- Protein, nucleic acid and virus concentration
- Nanoparticle separation and enrichment
- Fresh- and waste-water concentration
- Sample volume reduction

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

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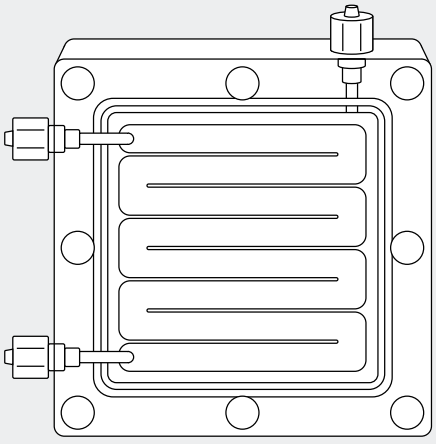
Operating Principle

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

50 cm² Cassettes



100 × 24 × 100 mm
Overall dimensions (L × W × H)

300 g
Approximate weight

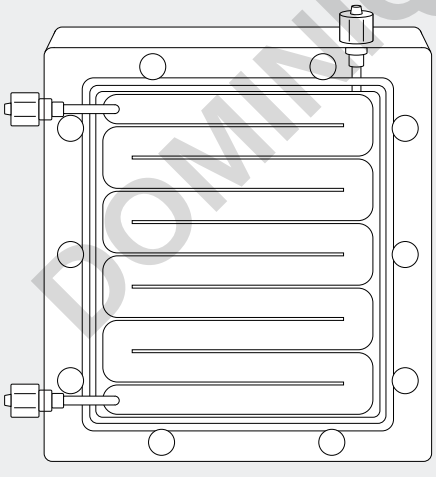
50 cm²
Membrane area

100 – 500 mL
Recommended feed volume[1]

10 mL
Minimum retentate volume

50X
Max. concentration factor[1]

200 cm² Cassettes



126 × 38 × 138 mm
Overall dimensions (L × W × H)

840 g
Approximate weight

200 cm²
Membrane area

500 – 2,500 mL
Recommended feed volume[1]

20 mL
Minimum retentate volume

125X
Max. concentration factor[1]

[1] For one cassette. Up to 1,000 | 5,000 mL feeds and 100X | 250X concentration factors are possible when running two 50 | 200 cm² cassettes in parallel, respectively.

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Materials

Fittings	Polyamide (PA) Polypropylene (PP)
Gasket	Silicone (SIL)
Housing	Polymethyl pentene (PMP)
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[2]	Polyamide (PA) Polycarbonate (PC) Polyoxymethyene (POM) Polyvinyl chloride (PVC) Silicone (SIL)
Tubing	Polyvinyl chloride (PVC)
Packaging	Cardboard (PAP) Polyethylene (LDPE) Polyurethane (PU)

Equipment Requirements

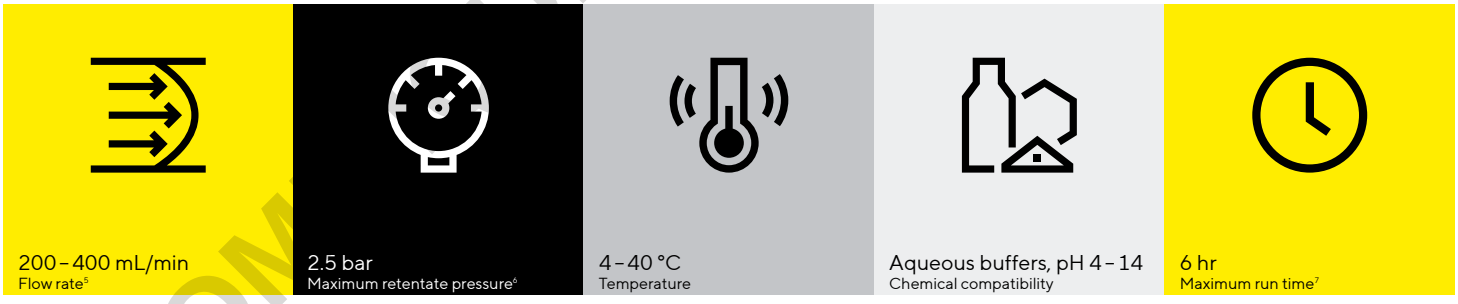
Operation	Pump drive, pump head[3]
Feed distribution | permeate collection	Reservoirs[4] or vessels

Sterilization

Thermal sterilization is not recommended. The feed reservoir, tubing and cassettes may be sanitized by flushing with 0.5 M NaOH or 70% ethanol for 5-10 minutes, followed by rinsing with sterile water or buffer.

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Operating Conditions



[2] Optional accessory.
[3] A pump head for 1.6 mm wall thickness (WT) tubing (order number VF-APH0001-1) is suitable for most setups. When running 2x cassettes with 200 cm² membrane area in parallel, a pump head for 2.4 mm WT tubing (order number VF-APH0002-1) is required.
[4] A feed reservoir (order number VF-ARV0500-1) is required for feed distribution during continuous diafiltration.
[5] A flow rate of 500 – 900 mL/min is recommended when running 2x cassettes with 200 cm² membrane area in parallel.
[6] Cassettes with 200 cm² membrane area may be run up to a maximum retentate pressure of 3.5 bar.
[7] If a longer run time is necessary, reposition the feed tubing in the pump head to ensure even wear. Tubing kits should not be used for multiple runs.

System Setup

Ultrafiltration and Diafiltration

The flow path and fixed occlusion restrictor in Vivaflow® provide high crossflow velocities and transmembrane pressures that reduce user effort and ensure high product recovery. 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. In addition, the Vivaflow® feed reservoir (order number VF-ARV0500-1) makes both ultrafiltration and diafiltration exceptionally convenient. Combined with a length of tubing (order number VF-ATD0001-1) and a separate vessel containing the exchange buffer, airtight sealing in the reservoir supports continuous diafiltration — a gentle and efficient alternative to dialysis.

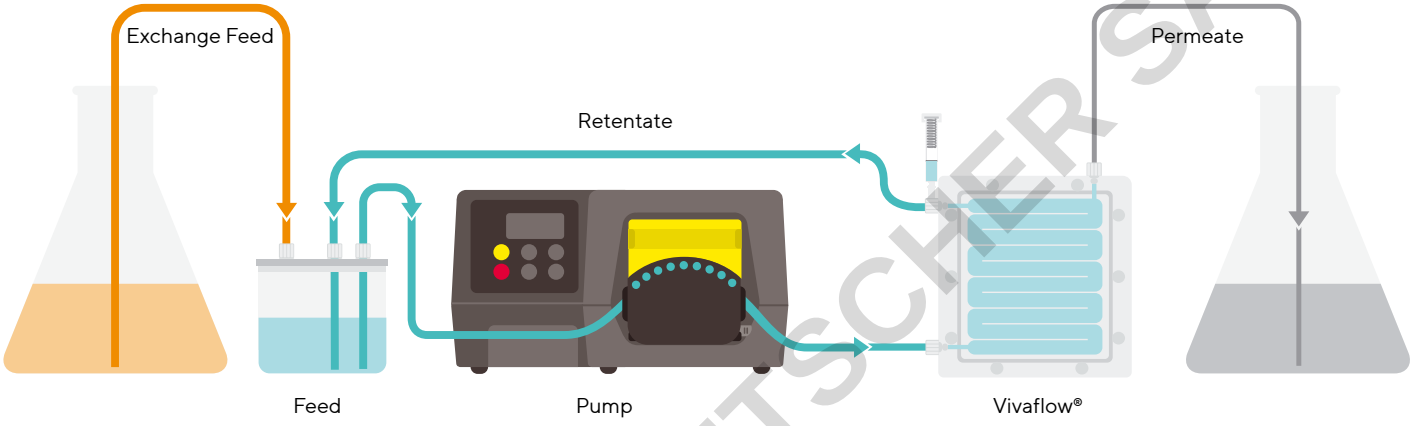


Figure 1: Vivaflow® cassettes are supplied ready to use for ultrafiltration and only require the addition of a length of tubing with a second feed vessel, orange, for diafiltration.

Reuse and Scale Up

To reduce operating costs, Vivaflow® cassettes can be used for multiple TFF runs with a simple cleaning process that avoids the need for awkward membrane replacement. When reusing cassettes, the supplied tubing kit should be replaced to ensure consistent flow rates and prevent sample loss (order number VF-ATI0011-1). In addition, optional tubing kits can be used to run two Vivaflow® cassettes in parallel. This is recommended when processing larger feed volumes or when increased processing speed is required for smaller samples. Simply order the tubing kit for parallel operation of your chosen cassettes (order numbers VF-ATP0011-1 or VF-ATP0012-1 for 50 cm² or 200 cm² cassettes, respectively).

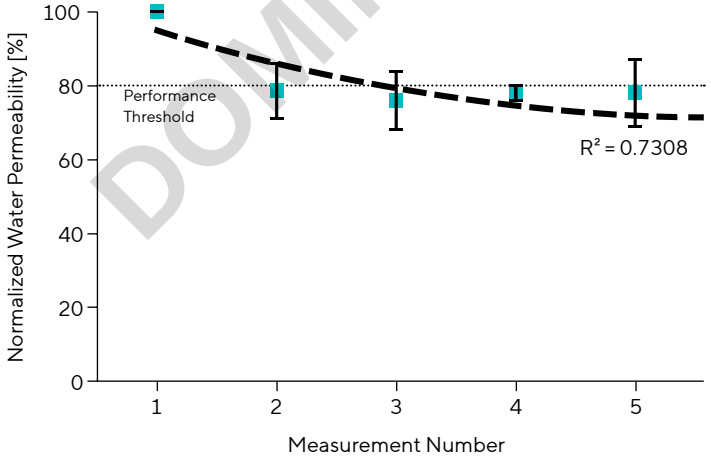


Figure 2: Filtration performance is maintained after cleaning to support reuse of each cassette for 2-5 runs (process conditions: 50 cm² cassettes were used to concentrate several 0.4 L feeds containing 1 mg/mL BSA up to 10X and cleaned with 0.5 M NaOH after each run (n=2)).

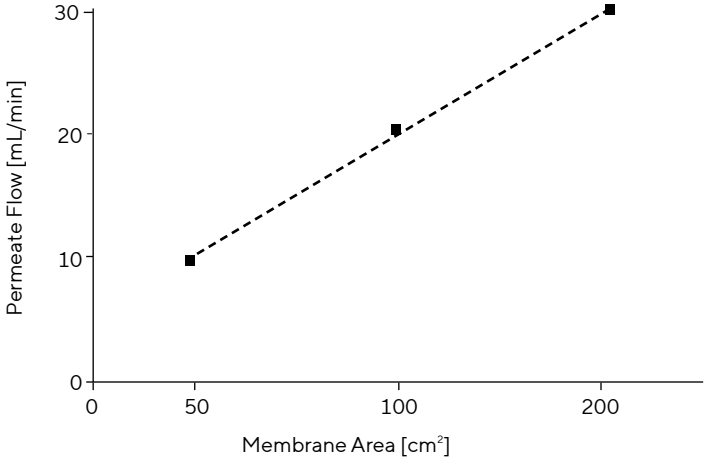


Figure 3: Linear increase in permeate flow when doubling membrane area (process conditions: 1 L feeds containing 1 mg/mL BSA were concentrated up to 20X using 10 kDa RC cassette(s) at up to 3.5 bar (retentate), at 20 °C).

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Typical Performance

Typical permeate flow and retention rates for biomolecules concentrated up to 20X. Process conditions: samples were concentrated at operating pressures up to 3.5 bar (retentate), at 20°C. Permeate volumes were measured periodically throughout each run, and solute recovery was determined before and after a 25 mL flush with sample buffer.

50 cm² Cassettes with 250 mL Feeds

MWCO	Feed Material	Membrane	Permeate Flow	Recovery (Direct | Flush)
5 kDa	Lysozyme (14.3 kDa)	RC	3.4 mL/min	96 | 98%
10 kDa	Lysozyme (14.3 kDa)	RC	10.3 mL/min	94 | 96%
	Bovine serum albumin (66 kDa)	RC	9.9 mL/min	98 | 99%
30 kDa	Bovine serum albumin (66 kDa)	RC	15.8 mL/min	97 | 99%
100 kDa	Immunoglobulins (150 kDa)	RC	5.2 mL/min	97 | 99%

200 cm² Cassettes with 1 L Feeds

MWCO	Feed Material	Membrane	Permeate Flow	Recovery (Direct | Flush)
2 kDa	Lysozyme (14.3 kDa)	RC	6 mL/min	97 | 99%
3 kDa	Lysozyme (14.3 kDa)	PES	5 mL/min	97 | 99%
5 kDa	Bovine serum albumin (66 kDa)	PES	33 mL/min	98 | 99%
		RC	14 mL/min	98 | 99%
10 kDa	Bovine serum albumin (66 kDa)	PES	41 mL/min	96 | 99%
		RC	27 mL/min	98 | 99%
30 kDa	Bovine serum albumin (66 kDa)	PES	38 mL/min	96 | 99%
		RC	48 mL/min	96 | 99%
50 kDa	Bovine serum albumin (66 kDa)	PES	43 mL/min	96 | 98%
100 kDa	Immunoglobulins (150 kDa)	PES	18 mL/min	96 | 99%
		RC	21 mL/min	96 | 99%
0.2 µm	*S. cerevisiae* (5 – 10 µm)	PES	86 mL/min	92 | 98%

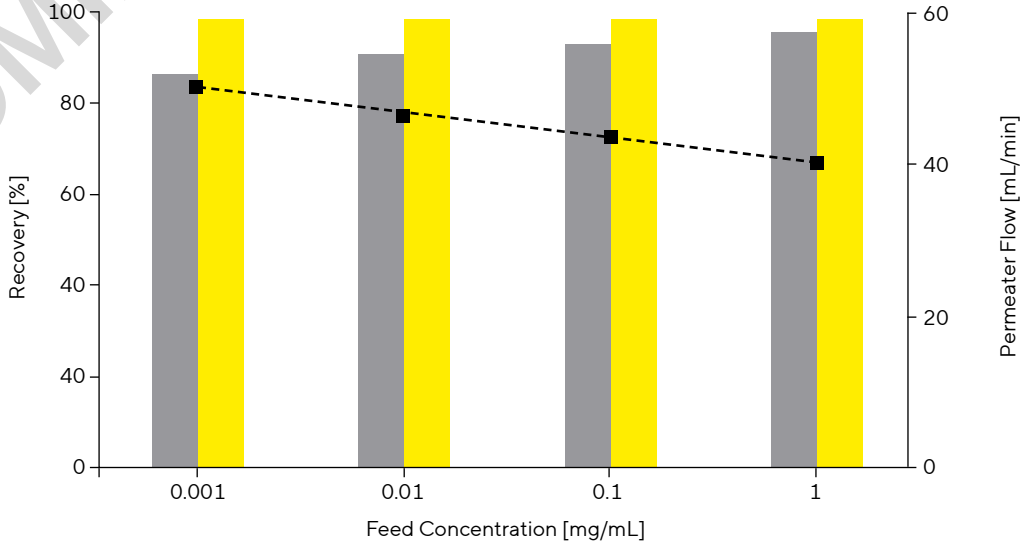


Figure 4: Impact of feed concentration on recovery (direct, grey, or with 25 mL flush, yellow) and permeate flow, black (process conditions: 1 L feeds containing 0.001 – 1 mg/mL BSA were concentrated up to 20X using 200 cm² cassettes with 10 kDa PES at 3.5 bar (retentate), at 20 °C).

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Ordering Information

Package Contents for Cassettes, Equipment and Accessories

Description	Package Contents	Order No
Vivaflow® cassettes	1 unit 1 tubing kit[8] 1 quick start guide	See below
Peristaltic pump	1 unit 1 country-specific power lead 1 user guide	VF-APD0001-1
Peristaltic pump head for 1.6 mm WT tubing	1 unit 1 user guide	VF-APH0001-1
Peristaltic pump head for 2.4 mm WT tubing	1 unit 1 user guide	VF-APH0002-1
Feed reservoir, 500 mL	1 unit	VF-ARV0500-1
Flow restrictors, 0.4 and 0.8 mm	1 unit/each	VF-AC-0002-V
Tubing for diafiltration	1 diafiltration tube	VF-ATD0001-1
Tubing for individual cassettes	1 feed tube (1.6 mm WT) 1 permeate tube 1 retentate tube 1 pressure indicator 2 Luer fittings	VF-ATI0011-1
Tubing for 2x 50 cm² cassettes in parallel	1 feed tube (1.6 mm WT) 2 permeate tubes 1 retentate tube 2 T-connectors 1 pressure indicator 2 Luer fittings	VF-ATP0011-1
Tubing for 2x 200 cm² cassettes in parallel	1 Y-connector (feed tube, 2.4 mm WT) 2 permeate tubes 1 retentate tube 1 T-connector 1 pressure indicator 2 Luer fittings	VF-ATP0012-1

Vivaflow® Cassettes

Membrane Material	MWCO	Recommended Feed Volume[9] 100 – 500 mL	500 – 2,500 mL
Hydrosart® regenerated cellulose (RC)	**2 kDa**	-	VF20H9
	5 kDa	VF05H1	VF20H1
	10 kDa	VF05H0	VF20H0
	30 kDa	VF05H2	VF20H2
	100 kDa	VF05H4	VF20H4
Polyethersulfone (PES)	**3 kDa**	-	VF20P9
	5 kDa	-	VF20P1
	10 kDa	-	VF20P0
	30 kDa	-	VF20P2
	50 kDa	-	VF20P3
	100 kDa	-	VF20P4
	0.2 µm	-	VF20P7

[8] Includes 1x feed tube (1.6 mm WT), 1x permeate tube,1x retentate tube, and 1x pressure indicator, for running the cassette individually.
[9] For one cassette. 500 - 1,000 | 2,500 - 5,000 mL feeds can be processed by running two 50 | 200 cm² cassettes in parallel, respectively.

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