MemFlux™ Tangential Flow Ultrafiltration Cassette

▶ User Manual



Membrane Solutions

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1. Product Information

1.1 Product Overview



Membrane Solutions provides a simple, convenient, and safe single use TFF (tangential flow filtration) ultrafiltration solution. The MemFlux™ Tangential Flow Ultrafiltration Cassette is specifically designed for small scale laboratory filtration and process development, focusing on the biopharmaceutical field to enable simple and efficient purification and concentration of biological products. It is widely used in biopharmaceutical filtration applications such as purification and concentration of proteins and recombinant proteins, buffer exchange and filtration, and selective separation during vaccine production.

Features

- **Ultra-simple operation:** Ready-to-use design, easy replacement.
- **Modular expandability:** Supports 1–6 cassettes in series for linear scale up of separation efficiency.
- **Low hold up, high recovery:** Special internal flow path design improves concentration and purification efficiency.
- **High-performance PES membrane:** Multiple MWCO options to meet different target product purification requirements.
- **Safe and reliable:** High air-tightness, low extractables, high compatibility, complies with biopharmaceutical safety standards.

Applications

- Purification and concentration of monoclonal antibodies (mAbs) and recombinant proteins
- Concentration and diafiltration of vaccines and conjugated products
- Separation and purification of blood products
- Separation of liquid samples with a size difference greater than 3-fold

1.2 Technical Parameters

Materials of Construction	Main housing	Polycarbonate (PC)
	Flow channel	Polypropylene (PP)
	Membrane	Polyethersulfone (PES)
	Seals and O rings	Medical grade silicone
	Flow restrictor and Fittings	Polypropylene (PP)
	Tubing	Polyvinyl chloride (PVC)
Dimensions	Overall L × H × W	115×90×22 mm
	Effective filtration area	50 cm^2
	Hold up volume (single cassette)	3 mL
	Min recirculation volume	<20 mL
	Non recoverable hold up	<1 mL
Operating Conditions	Maximum operating pressure	3 bar
	Maximum operating temperature	40°C

1.3 Product Components and Accessories

Product Applications

Each box of MemFlux™ Tangential Flow Ultrafiltration Cassette contains the following components

Item	Quantity
MemFlux™ Tangential Flow Ultrafiltration Cassette	2 pcs
Tubing with flow restrictor (80 cm)	2 pcs
Standard tubing (80 cm)	2 pcs
Dual adaptor connecting tubing	1 pc
Luer plugs	4 pcs

Note: For connecting more than three cassettes in series, an additional tubing kit is recommended.
Model and Accessory Information: For a complete list of cassette models and optional accessories (peristaltic pump, accessory kit, etc.), please refer to **Chapter 5 – Ordering Information.**

User-supplied equipment

- Peristaltic pump (compatible with tubing of 1.6 mm wall thickness)
- Pressure indicator (range 0–4 bar)
- Sample bottle or reservoir (250 mL to 3 L recommended)

2. Operating Instructions

2.1 System Setup

1. Check packaging integrity and confirm that all items are present: 2 cassettes, 1 accessory kit.
2. Open the cassette sealed bag. Inspect the cassette for any defects, cracks, or contamination. Ensure it is intact.
3. Open the accessory sealed bag. Verify that all tubing is present: 2 × 80 cm tubing with restrictor, 2 × 80 cm standard tubing, 1 × dual-adaptor connecting tubing.
4. Assemble the recirculation system (refer to the diagram below):
   - Red tubing (standard tubing): feed line
   - Blue tubing (tubing with restrictor): return line
   - Green tubing (cassette-attached tubing): permeate line

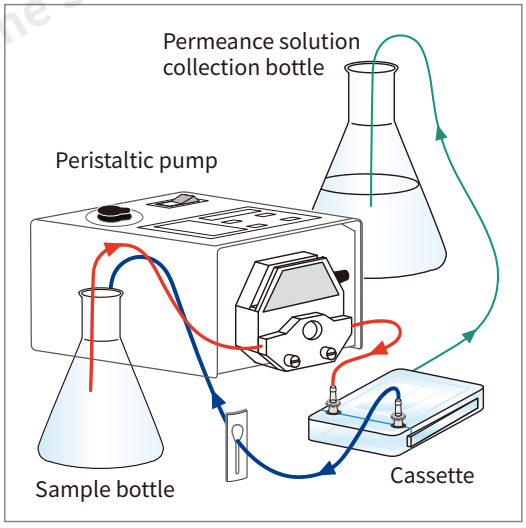


Figure 1 Single module operation

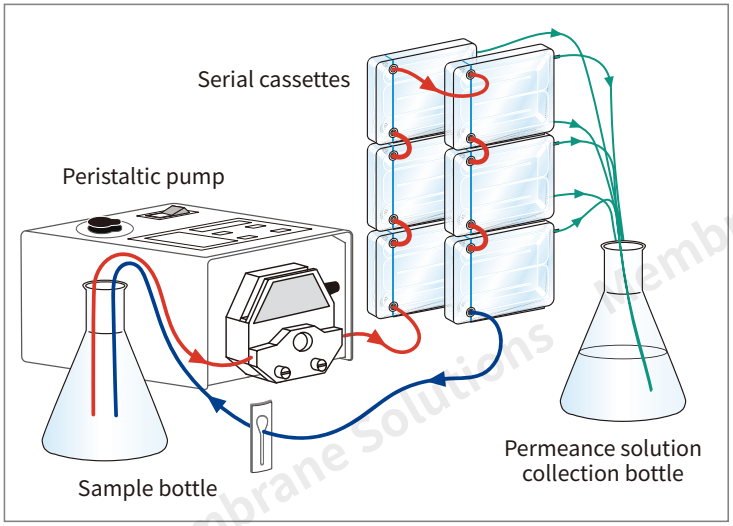


Figure 2 Multi-module operation

2.2 Pre-Cleaning

1. Add 250 mL of ultrapure water to the sample bottle. Turn on the peristaltic pump and purge all air from the cassette and tubing.
2. Adjust the flow restrictor to maintain a recirculation pressure of 1 bar. Allow the permeate to flow into a collection bottle.
3. Circulate for 10 minutes, then release the restrictor to relieve the recirculation pressure.
4. Remove the feed tubing from the sample bottle to drain the system. Turn off the pump after all water has been emp tied.

2.3 Sample Filtration

1. Add the solution to be filtered into the pre-cleaned sample bottle. Insert the feed and return tubing.
2. Start the peristaltic pump to introduce the sample into the cassette. Purge any air from the tubing and cassette.
3. Adjust the restrictor to control the recirculation pressure ⩽ 3 bar (start at 1 bar for initial trials).
4. Perform concentration. To improve concentration efficiency, release the restrictor for 1 minute every 30 minutes to flush the system.
5. After concentration, release the restrictor and circulate for 5 minutes, then recover the concentrated sample. To maximize sample recovery, add 20 mL of buffer, circulate for 5 minutes, and combine the recovered solution.

2.4 Cleaning and Storage

Standard cleaning procedure

Step	Solution	Operation	Pressure
1	250 mL ultrapure water (rinse residual protein)	3 min rinse + 10 min recirculation	1 bar
2	250 mL 0.1 M NaOH* (cleaning)	30 min recirculation	1 bar
3	250 mL ultrapure water (remove NaOH)	5 min recirculation	1 bar
4	Storage solution (see table below)	Fill system with storage solution, seal ports with Luer plugs	/

***Preparation of cleaning solution:** Weigh 4 g of NaOH and dissolve in 1 L of purified water to obtain 0.1 M NaOH solution.

⚠**Important:** Do not immerse the cassette entirely in NaOH solution. Only internal recirculation cleaning is permitted.

Storage Methods

Duration	Storage Solution	Remarks
Short term	Ultrapure water	Storage duration should not exceed 24 hours.
Long term	10% glycerol + 1.5% sodium bisulfite mixed solution	The storage duration should not exceed 2 months, or the storage solution should be replaced every 2 months.

Note: Sodium bisulfite inhibits microbial growth; glycerol keeps the membrane moist. Replace the storage solution periodically to maintain membrane performance.

Cleanliness Acceptance Criterion

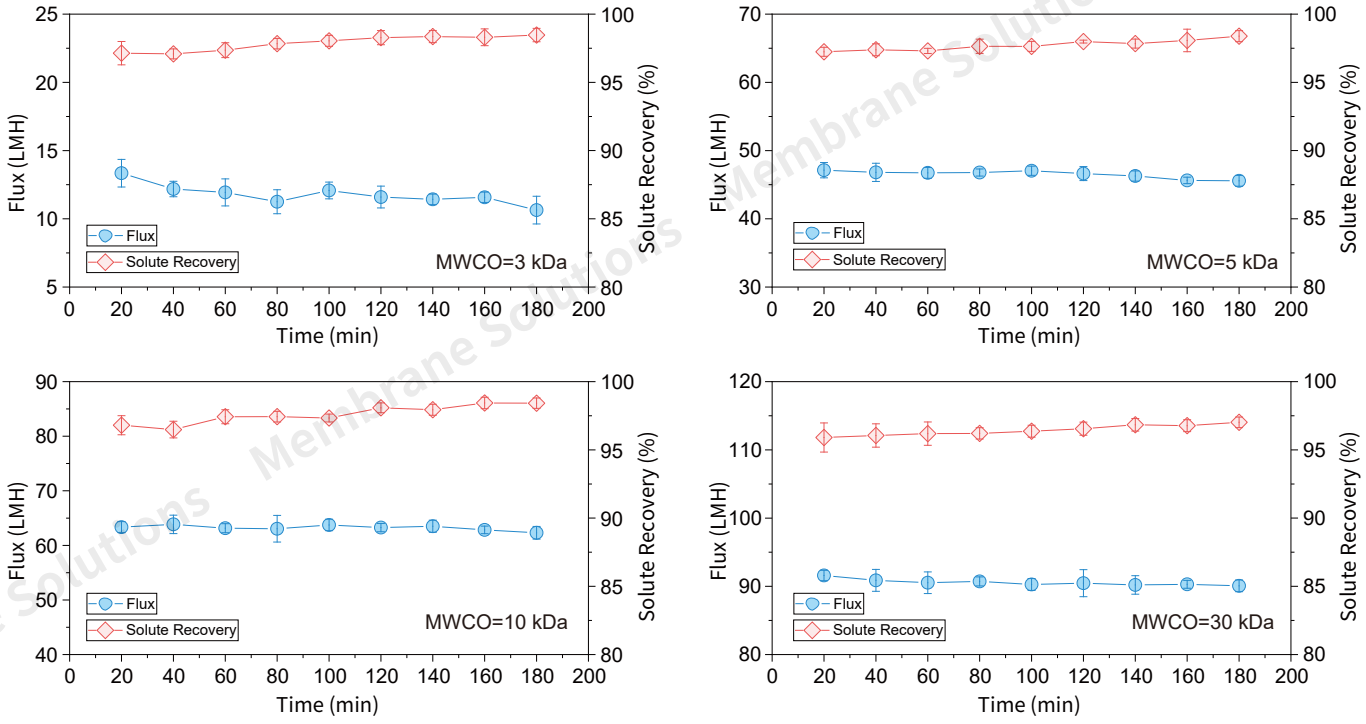
After cleaning, measure the pure water flux at 1 bar. If the flux recovers to ⩾ 90% of the initial flux, the cleaning is considered satisfactory.

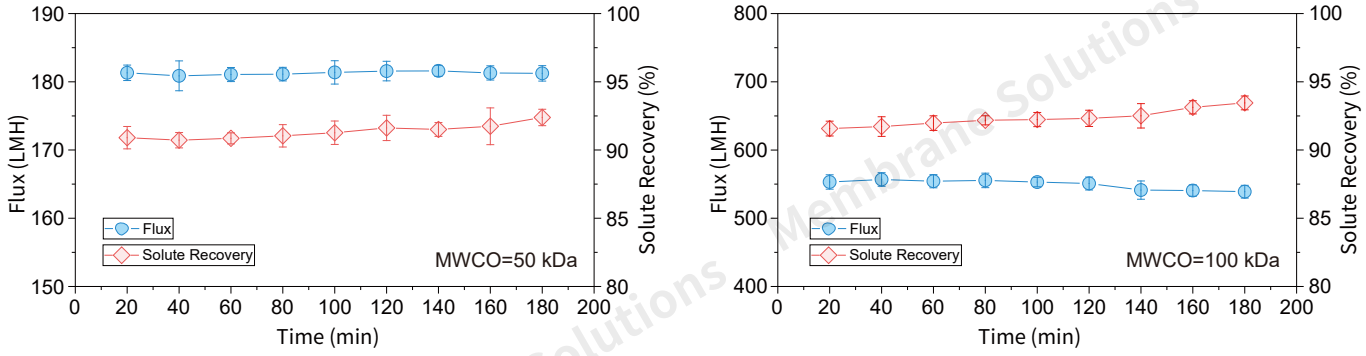
3. Performance Data

3.1 Standard Protein Retention and Recovery Rate

Protein & Concentration	MW (Da)	Model (MWCO)	Protein Retention Rate (%)	Protein Recovery Rate(%)	Time to concentrate to 20× (min)
Cytochrome C (0.5 mg/ mL)	12,400	5kDa	>95	>90	49
Ovalbumin(1mg/mL)	45,000	10kDa	>95	>85	46
Cytochrome C(0.5 mg / mL)	12,400		>95	>90	44
BSA (1 mg/mL)	67,000	30kDa	>95	>90	42
Ovalbumin (1 mg / mL)	45,000		>95	>90	42
IgG (0.5 mg/mL)	156,000	50kDa	>90	>85	35
BSA (1 mg/mL)	67,000		>95	>90	38
Ovalbumin (1 mg / mL)	45,000		<85	<80	36
Thyroglobulin (0.5 mg / mL)	677,000	100kDa	>90	>85	32
IgG (0.5 mg/mL)	156,000		>85	>75	30

3.2 Pure Water Flux

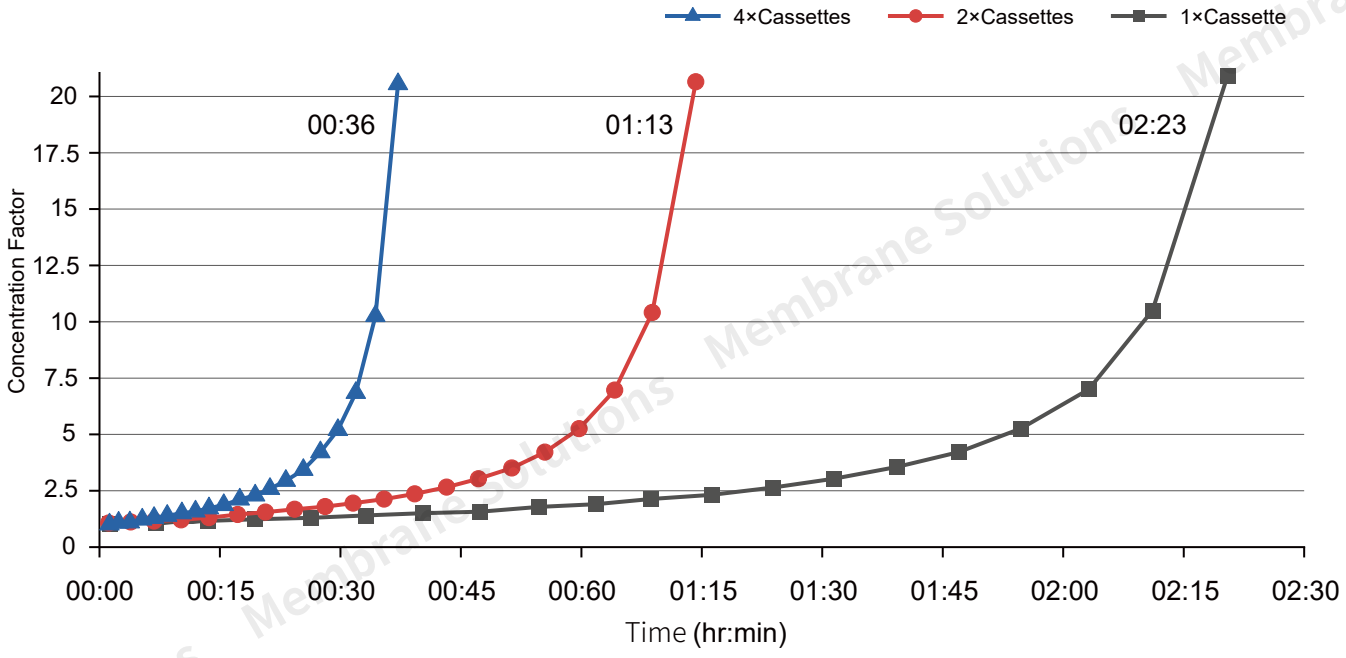




Test conditions: 3 bar, 20°C

3.3 Multi-Module Tandem Performance

The MemFlux™ tangential flow ultrafiltration cassette is modular and supports multiple cassettes in series. This increases the maximum throughput to up to 3 L and accelerates processing speed in proportion to the membrane area. When using 1–4 cassettes in series, processing speed increases significantly, suitable for large-volume sample processing.



3.4 Chemical Compatibility

Legend: √ = Good compatibility; ⚠ = Limited use (test before use); × = Not recommended

Solution	PES
Acetic acid (25%)	√
Acetone	×
Ammonium hydroxide (5%)	√
Ammonium sulfate	√
DMEM	√
Ethanol (70%)	√
Ethyl acetate	×
Formaldehyde (30%)	√
Formic acid (5%)	√
Guanidine HCl (6 M)	√
Hydrocarbons, aromatic	×
Hydrocarbons, chlorinated	×
Hydrochloric acid (1 M)	√
Isopropanol	√
Lactic acid (5%)	×
β Mercaptoethanol (10 mM)	√
Methanol (60%)	√
n Butanol (70%)	√

Solution	PES
Peracetic acid (0.2%)	√
Phenol (1%)	√
Phosphate buffer (1 M)	√
Pyridine	×
RPMI - 1640	√
Sodium azide	√
Sodium deoxycholate (5%)	√
Sodium hydroxide (1 M)	×
Sodium hydroxide (0.1 M)	×
Sodium hypochlorite (0.02%)	⚠
Sodium nitrate	×
Sulfamic acid (5%)	√
Surfactant (0.1%)	√
Toluene	×
Trichloroacetic acid (10%)	×
Trifluoroacetic acid (10%)	√
Urea (8 M)	√

4. Frequently Asked Questions (FAQ)

Q1: How to select the appropriate transmembrane pressure?

A: Transmembrane pressure depends on feed rate, solution viscosity, membrane pore size, and restrictor adjustment. We recommend 1–2 bar (max 3 bar). For first time use, start at 1 bar and increase gradually based on permeate flow.

Q2: What flow rate should be set for the peristaltic pump?

A: Recommended flow rate: 200–400 mL/min. Higher flow rates provide higher transmembrane pressure and better filtration efficiency.

Q3: How to perform a water flux test?

A: Set a suitable feed rate, adjust the restrictor to achieve 1 bar transmembrane pressure, measure the permeate volume (L), then divide by membrane area (m^2) and time (h) to obtain LMH.

Q4: How to maximize recovery of target molecules?

A: After concentration, rinse the cassette and tubing with a small volume of buffer, then combine the rinse with the retentate. Typically >95% of the initial sample can be recovered.

Q5: How to select the correct membrane pore size?

A: For ultrafiltration concentration, choose an MWCO 3–5 times smaller than the target protein (e.g., for a 150 kDa protein, use 30 kDa or 50 kDa cassette). For clarification (e.g., E. coli/yeast lysate, CHO cell culture media), choose 0.22 μm or 0.45 μm.

Q6: Should I run a single cassette or multiple cassettes in series?

A: Use a single cassette for initial trials or sample volume ⩽ 300 mL. For sample volumes up to 1 L or to increase processing speed, connect cassettes in series.

Q7: Do I need extra accessories to connect two cassettes?

A: No. Each box already includes the necessary tubing for series connection.

Q8: Can the cassette be reused?

A: Yes, but no more than 3 times is recommended. Actual reuse number depends on the sample.

Q9: Can the pump tubing be reused?

A: Pump tubing wears out under peristaltic action. Replace every 2–3 runs.

Q10: How is the chemical compatibility?

A: Stable in most common aqueous buffers and some solvents (e.g., 70% ethanol). See Section 3.4.

Q11: How to handle leakage?

A: Leakage occurs in two scenarios. Please refer to the following table based on the observed phenomenon.

Case 1 – Target molecule appears in the permeate

Possible Cause	Solution
Incorrect MWCO selection	Choose an MWCO 3–5 times smaller than the target. For example: For a 150 kDa protein, a 30 kDa or 50 kDa cassette is recommended.
Chemical incompatibility damaging the membrane	Refer to the chemical compatibility table in Section 4 to confirm whether the membrane material is compatible with the solution.
Over reused cassette, enlarged pores	It is recommended to reuse each cassette no more than 3 times, or replace it with a new cassette.

Case 2 – Visible liquid seepage from the cassette housing

Possible Cause	Solution
Clogged permeate outlet causing pressure build up	Carefully insert a syringe needle into the permeate outlet and gently clear the blockage (be careful not to use excessive force to avoid damaging the cassette).
Loose Luer connections	Use a clamp to appropriately tighten the connection, being careful not to overtighten as this may cause cracking.
Pump tubing fatigue leading to leakage at fittings	It is recommended to replace the peristaltic pump tubing every 1–2 uses, as tubing under prolonged pressure will lose its elasticity.

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5. Ordering Information

5.1 Cassette Model List

Model	MWCO(MWCO)	Quantity (pcs/box)
FMCE003LA50	3kDa	2
FMCE005LA50	5kDa	2
FMCE010LA50	10kDa	2
FMCE030LA50	30kDa	2
FMCE050LA50	50kDa	2
FMCE100LA50	100kDa	2
FMCE300LA50	300kDa	2

5.2 Optional Accessories List

型 号	名称	规格
FMCELA	System Setup Accessory Kit	Pressure gauge × 1, stand × 2, beaker × 2, connector × 2
PPS350	Peristaltic Pump	Speed: 0.1–350 rpm; Flow: 0.08–930 mL/min
PPC600	Digital Peristaltic Pump	Speed: 0.1–300 rpm; Flow: 0.007–1440 mL/min

Lab Ultrafiltration Series



Ultrafiltration Centrifuge Tube | Ultrafiltration Cup | Ultrafiltration Cassette

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