

Laboratory Ultrafiltration: Product Qualification Guide

How to choose the best device for each lab ultrafiltration application

The guide below is designed to help ultrafiltration process developers, researchers, lab managers and any other end users, select the best Sartorius product range for their application. It focuses on the three critical aspects of selection: target type, target size and sample volume, whilst also highlighting what product range may be suitable for typical sample treatment and control processes, such as for sensitive samples and how to define a final concentrate volume.




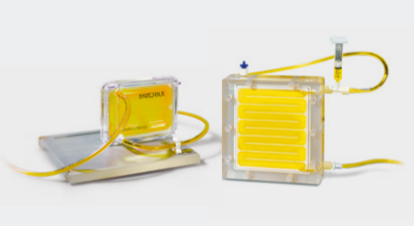
Some examples are also provided. It should be noted that this guide is based upon typical ultrafiltration models. Due to the variations within protein, membrane and inorganic chemistry, etc., we always recommend testing with sample devices prior to establishing a method.

How to use this guide:

Sample Parameter

Membrane | MCWO | Method | Product | Application

Typical Recommendation

Target Type	Protein (neutral or negatively charged)	Protein (positively charged)	Virus	Extracellular Vesicles	DNA RNA	Inorganics
	Membranes: Vertical Membrane ▪ PES, RC and CTA Products Available: Vivaspin® 500, Vivaspin® 2, 6 & 20, Vivaspin® Turbo 4 & 15 PES, Vivacell® 100, Vivaflow® 50 & 200	Membranes: Vertical Membrane ▪ Hydrosart® and RC Products Available: Vivaspin® 2, Vivaspin® Turbo 15 RC, Vivaflow® 50R & 200, Vivacon® 500 & 2, Centrisart® & 200	Membranes: Vertical Membrane ▪ Hydrosart®, PES and RC Products Available: Vivaspin® 500, Vivaspin® 2, 6 & 20, Vivaspin® Turbo 4 & 15 PES & RC, Vivacell® 100, Vivaflow® 50, 50R & 200	Membranes: Vertical Membrane ▪ Hydrosart®, PES and RC Products Available: Vivaspin® 500, Vivaspin® 2, 6 & 20, Vivaspin® Turbo 4 & 15 PES & RC, Vivacell® 100, Vivaflow® 50, 50R & 200	Membranes: Horizontal Membrane ▪ Hydrosart® and CTA Products Available: Centrisart®, Vivacon® 500 & 2	Membranes: Vertical Membrane ▪ Hydrosart®, PES and RC Products Available: Vivaspin® 500, Vivaspin® 2, 6 & 20, Vivaspin® Turbo 4 & 15 PES & RC, Vivacell® 100, Vivaflow® 50 & 200
Target Size*	<10 kDa	10 – 30 kDa	30 – 150 kDa	150 – 500 kDa	500 – 1000 kDa	>1000 kDa
	MCWOs: 2K, 3K Products Available: Vivaspin® 500, 2, 6, 15R, 20, Vivaspin® Turbo PES 4 & 15, Vivaflow® 50 & 200, Vivacon® 500 & 2, Vivapore® 5, 10 20	MCWOs: 2K, 5K Products Available: Vivaspin® 500, 2, 6, 15R, 20, Vivaspin® Turbo 4 & 15 PES & RC, Vivacell, Vivaflow® 50, 50R & 200, Centrisart®, Vivacon® 500 & 2	MCWOs: 7.5K, 10K, 30K, 50K Products Available: Vivaspin® 500, 2, 6, 15R, 20, Vivaspin® Turbo 4 & 15 PES & RC, Vivacell, Vivaflow® 50, 50R & 200, Centrisart®, Vivapore®, Vivacon® 500 & 2	MCWOs: 50K, 100K, 125K Products Available: Vivaspin® 500, 2, 6, 15R, 20, Vivaspin® Turbo 4 & 15 PES & RC, Vivacell, Vivaflow® 50, 50R & 200, Centrisart®, Vivacon® 500 & 2	MCWOs: 100K, 125K, 300K Products Available: Vivaspin® 500, 2, 6 & 20, Vivaspin® Turbo 4 & 15 PES & RC, Vivacell, Vivaflow® 50, 50R & 200, Centrisart®, Vivacon® 500 & 2	MCWOs: 300K, 1,000K, 0.2 um Products Available: Vivaspin® 500, 2, 6 & 20, Vivacell, Vivaflow® 50 & 200, Centrisart®, Vivacon® 500 & 2
Sample Volume	0.1 – 2.5 mL		2.5 – 20 mL		20 – 100 mL	50 – 5000 mL
	 Ultrafiltration Method: Centrifugal Products Available: Vivaspin® 500 & 2, Vivacon® 500 & 2, Centrisart®		 Ultrafiltration Method: Centrifugal, pressurization, static Products Available: Vivaspin® 6, 15R & 20, Vivaspin® Turbo 4 & 15 PES & RC, Centrisart®, Vivapore®		 Ultrafiltration Method: Centrifugal, pressurization Products Available: Vivacell 100	 Ultrafiltration Method: Tangential flow filtration (TFF) Products Available: Vivaflow® 50, 50R & 200
Treatment and Control	Buffer Exchange	Low Concentrations	Depyrogenation	Device Sanitization	Final Volume	Sensitive Samples
	Key Points: To maintain buffer balance, de-salt, prevent precipitation, to replace with different buffer. Diafiltration allows for simultaneous buffer exchange and concentration Process Available: Diafiltration cup with Vivaspin® 20, diafiltration reservoir with Vivaflow® 50, 50R & 200. Application Note: <input checked="" type="checkbox"/>	Key Points: Samples with low concentrations rely on near 100% recovery, preventing non-specific absorption is key for this Process Available: Passivation through rinsing with non interfering protein and buffer solutions (e.g. BSA, Tween 20, SDS). Available with all products. Application Note: <input checked="" type="checkbox"/>	Key Points: Removal of endotoxins (lipopolysaccharides) from concentrate samples, may utilise an NaOH addition step. Process Available: NaOH treatment followed by washes, concentration and buffer exchange. Available in products resistant to NaOH; Vivaspin® Turbo 4 & 15 PES & RC, Vivaflow® 50R & 200 Application Note: <input checked="" type="checkbox"/>	Key Points: Reduction of bioburden and contaminating microbes. Level of reduction to be determined by user testing. Process Available: Pre-rinse with 70% ethanol or Sanitization through EtO gas treatment. Available to all products excluding Vivacell and Vivaflow (separate cleaning processes) Application Note: TBA	Key Points: Varying speeds of concentration make it hard to judge time to reach a final volume. Process Available: Pre-filling the filtrate tube limits the volume of concentration, thereby define the final concentrated volume. Available to all centrifugal concentration products. Application Note: <input checked="" type="checkbox"/>	Key Points: Changing transmembrane pressures can incur shear stress and degrade sensitive biomolecule targets. Process Available: Pressurization and TFF ultrafiltration methods give stable transmembrane pressure and flux compared to centrifugal. Available in Vivacell & Vivaflow® products Application Note: TBA
Example Applications	1. Monoclonal Antibodies	2. Bence Jones Protein	3. Lentivirus	4. DNA PCR Primers		
	Application: Concentration for purification Target Type: IgG1, IgG2a, IgG2b, IgG3 Target Size: 150 kDa Sample Volume: 3 L Product Used: 30K PES Vivaflow® 200 Treatment and Control Processes: Prerinsing with 2 L DI water to remove storage buffer and to perform integrity check. Result: 98% concentration recovery from 3 L Hybridoma cell culture supernatant at 20 – 25 mL/min (two hours), concentrating 10 fold from 30 mg/L to >300 mg/L	Application: Concentration for urine protein electrophoresis and sample diagnosis Target Type: Monoclonal FLC (BJP) Target Size: 20 – 25 kDa Sample Volume: 10 mL Product Used: 10K PES Vivaspin® 20 Treatment and Control Processes: Buffer exchange for sample de-salting Results: a 92% recovery with 200 fold conc. factor in ~45 minutes, providing sufficient concentration to show clear visible bands results from UPE and capillary electrophoresis	Application: Polishing after AEX chromatography Target Type: Lentivirus viral vector Target Size: ~100 nm Sample Volume: 20 mL Product Used: IVD 100K PES Vivaspin® 20 Treatment and Control Processes: Desalting in parallel concentration with diafiltration cup Results: 78 – 143 fold concentrations of 20 mL samples within 34 – 40 minutes, increasing particle numbers from 6.1×10^7 to 3.0×10^9 recovery after purification.	Application: Conc. of target primers and removal of interfering short bp primers Target Type: dsDNA Target Size: 300 bp Sample Volume: 1800 uL Product Used: 30K Vivacon® 2 Treatment and Control Processes: Results: Near total removal (> 95%) of primer DNA and near total retention of 300 bp molecules, within a 20 minute spin time and a total 40 minute procedure time		