

Mustang™ Q

MEMBRANE CHROMATOGRAPHY

For capture or impurity removal from screening to large scale applications, Mustang™ membrane chromatography products are ready-to-use chromatography membrane adsorbers with bed volumes ranging from approximately 1 mL to 5 L. They are designed for capturing targeted molecules or for the removal of impurities in bioprocesses, from laboratory to manufacturing scale.

These ion exchange supports are polyethersulfone (PES)-based membranes, with 0.8 µm pore size, and a cross-linked polymeric coating of quaternary amine functional groups. They provide high dynamic binding capacity, especially for large molecules.

The multi-layer membrane construction is held at constant thickness/bed depth from the laboratory scale to the largest industrial process-scale capsule. Additionally, Mustang membrane chromatography products are more compact than other membrane adsorbers or conventional beaded sorbents, providing significant savings in buffer volume requirements.

The range is complemented by AcroPrep™ 96-well plates with Mustang membranes, to allow a quick screening of the conditions before scaling up using the 1 mL capsule. Mustang Q membrane products are available as single-use or reusable capsules.

They are manufactured to ISO 9000 standards and meet the USP <88> biological reactivity tests, *in vivo*, in accordance with requirements for Class VI-50°C plastics.

Mustang Q membrane products:

- Reduce process times through use of high volumetric flow rates and not using cleaning-in-place (CIP) when used as single-use.
- Improve process economics through increased throughput and reduced buffer consumption.
- Enhance process flexibility through a small operation footprint
- Facilitate productivity increase by linking units in parallel or series.



Fig 1. Mustang Q membrane chromatography product formats.

Product description

- **AcroPrep Advance multiwell plate with Mustang Q membrane for screening and optimization** – these 96-well plates equipped with four layers of the Mustang Q membrane, equivalent to 14 μ L of membrane per well, can be used either manually or connected to an automated system, e.g., Freedom EVO Platform (Tecan Group). The design decreases the risk of cross-contamination and reduces hold-up volume (3 to 5 μ L).
- **Mustang Q XT Acrodisc units for easy scale up or scale down of a purification process** – these units consist of 16 layers of Mustang Q membrane in a capsule of approximately 1 mL bed volume. Binding capacity is around 70 mg/mL BSA membrane volume (around 60 mg per unit).
- **Single-use product range: Mustang Q CLM05, CL3 and NP capsules** – these capsules, from 10 to 780 mL bed volume, can be autoclaved or sanitized before use.
- **Reusable product range: Mustang Q XT capsules** – these capsules, available in 5, 140, and 5000 mL bed volume, cover a flow range from 3 to 3000 L/h. They can be easily cleaned using 1 M NaOH and assembled in parallel or in series.
- Also available is a stand assembly designed to hold up to three Mustang Q XT5000 capsules of 5 L membrane volume.

Table 1. Specifications of Mustang Q product range.

	AcroPrep Advance multiwell plate with Mustang Q membrane	Mustang Q XT Acrodisc unit	Mustang Q membrane capsules					
			CLM05, CL3 ⁽¹⁾		NP6, NP7, NP8 ⁽¹⁾		Mustang Q XT5	Mustang Q XT140
			Single-use			Reusable		
Membrane volume	14 µL / well	0.86 mL	10, 60 mL	260, 520, 780 mL		5 mL	140 mL	5 L
Number of layers	4	16	16			16		
Maximum differential pressure	NA	1 barg (15 psig) at 10 mL/min	4 barg (59.5 psig) at 38°C			5 barg (75 psig) ⁽²⁾ at 38°C	3 barg (43.5 psig) at 38°C	
Maximum operating pressure		4 barg (60 psig)						
Geometry/frontal surface area	0.25 cm² flat sheet	25 mm ID 4.90 cm² flat sheet	44 cm² pleated	264 cm² pleated	1144, 2288, 3432 cm² pleated	22 cm² flat sheet	616 cm² Ultipleat cartridge	2.2 m² Ultipleat cartridge
Connections	NA	Luer lock	38 mm (1.5 in.) sanitary flange			Female M6 thread	12.7 mm (0.5 in.) sanitary flange	38 mm (1.5 in.) sanitary flange
Cleaning-in-place (CIP)	NA	1 M NaOH	1 M NaOH for one cycle only, or autoclavable at 121°C, 30 min, one cycle only			1 M NaOH		

⁽¹⁾ CL capsules = Novasip™ capsules with Mustang Q membrane, NP capsules = Kleenpak™ Nova capsules with Mustang Q membrane

⁽²⁾ 13.5 barg (196 psig) when used with the XT jacket

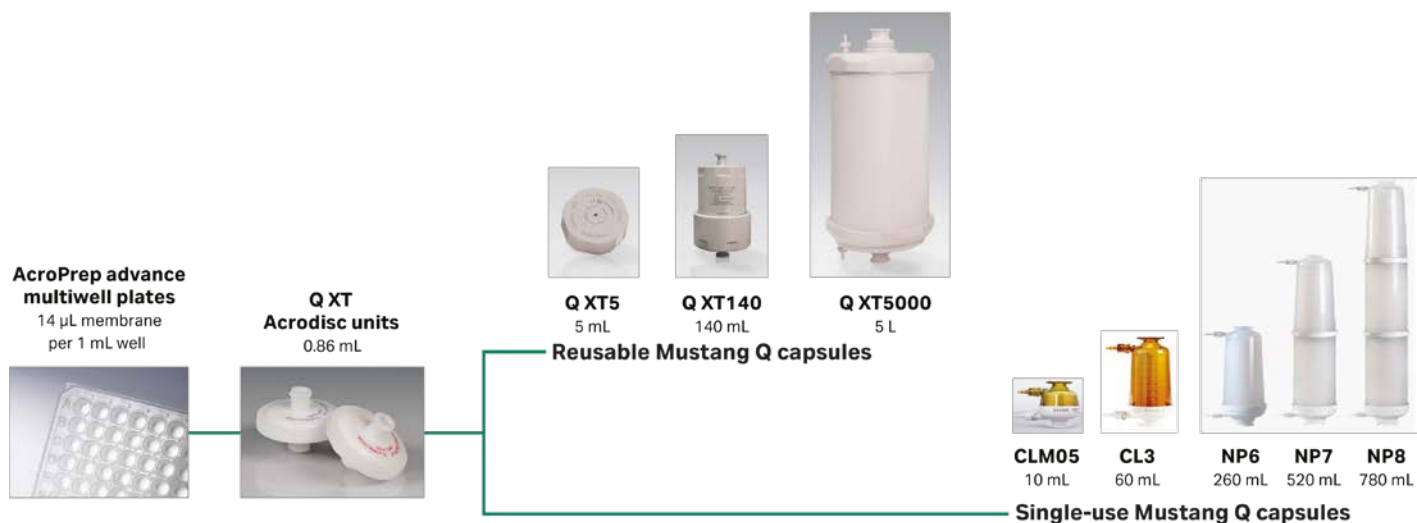


Fig 2. Mustang Q membrane chromatography product range and membrane volumes.

Benefits

- High binding efficiency – Mustang Q capsules exhibit high capacities per volume with high flow rates at low pressure drops, allowing binding of charged biomolecules in a single pass.
- Speed – high flow rates enable the processing of large volumes. Mustang capsules typically operate at 10 membrane volumes (MV)/min flow rates (50 L/min for an XT5000 module) making membrane chromatography 20 to 50 times faster than conventional chromatography sorbents.
- Scalability and flexibility – a range of capsule sizes accommodates various volumes and capacities required in biopharmaceutical processing, from process development to full-scale manufacturing. Depending on the type, capsules can be single-use or reused after cleaning.
- Convenience – ready-to-use capsules eliminate need for packing/unpacking. If used as single-use, there are no cleaning or cross-contamination issues.
- Lower cost of operation – membrane capsules offer lower operating and capital investment costs than conventional columns that require packing.
- Reduced buffer consumption – small capsule footprint requires significantly less buffer.
- Easy scale up – each Mustang Q membrane capsule is made of the same 16-layer membrane bed height to maintain scalability for dynamic binding capacity.

Applications

- Contaminant removal for DNA, virus, host cell proteins and endotoxin when used as a polishing step (e.g., rec proteins, monoclonal antibodies (mAbs) processes from CHO, *E. coli*)
- Virus, plasmid purification (e.g., adenovirus/baculovirus for gene therapy, influenza viruses for vaccine manufacturing)
- Large molecule purification (e.g., factor VIII, IgM)
- Oligonucleotide purification
- Column guard to enhance selectivity of subsequent chromatography steps (e.g., before a protein A column)

Ordering information

Product	Pkg	Product code
Mustang products		
AcroPrep Advance multiwell plates, Mustang Q membrane, 350 µL	10/pkg	8071
AcroPrep Advance multiwell plates, Mustang Q membrane, 1 mL	5/pkg	8071
Mustang Q XT Acrodisc unit	4/pkg	MSTGXT25Q16
Mustang Q XT5 capsule	1/pkg	XT5MSTGQPM6
Mustang Q XT140 capsule	1/pkg	XT140MSTGQP05
Mustang Q XT5000 capsule	1/pkg	XT5000MSTGQP1
Mustang Q capsule, 10 mL	1/box	CLM05MSTGQP1
Mustang Q capsule, 60 mL	1/box	CL3MSTGQP1
Mustang Q capsule, 260 mL	1/box	NP6MSTGQP1
Mustang Q capsule, 520 mL	1/box	NP7MSTGQP1
Mustang Q capsule, 780 mL	1/box	NP8MSTGQP1
Mustang Q XT5000 stand and lifting handle assembly		
Stand base unit (lower section)	1/pkg	XT5000B100
Top (upper) section	1/pkg	XT5000T100
Lifting handle	1/pkg	XT5000H100

Please contact us for more information on the XT5000 capsules stand, and for other cartridges and configurations.

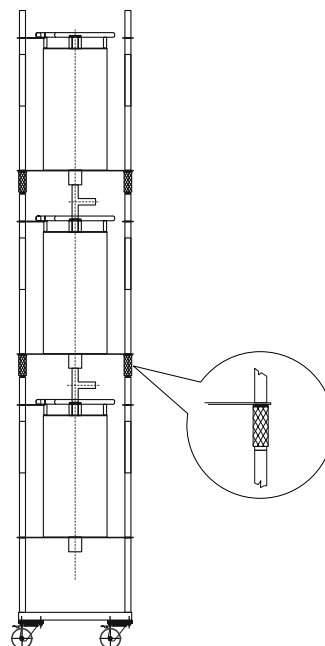


Fig 3. Mustang Q XT5000 stand.

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