

# Hollow fiber Start AXM and Start AXH cross flow cartridges

## CROSS FLOW FILTRATION

Hollow fiber Start AXM and Start AXH cross flow cartridges are self-contained, single-use filtration devices enabling process development and optimization of ultrafiltration (UF) and microfiltration (MF) operations for cell processing and upstream clarification of biopharmaceutical fluids (Fig 1). The cartridges are designed for small-scale processing, rapid laboratory concentration, and diafiltration of critical biological solutions in research-scale volumes.

Hollow fiber Start AXM and Start AXH cartridges offer the following benefits:

- Rapid concentration and diafiltration of biological fluids using open flow path design
- High product recoveries with low shear operation
- Integrated UNF fittings for feed, retentate, and permeate connection allow direct connection to ÄKTACrossflow™ and ÄKTA™ flux filtration systems
- Membrane areas of 40 cm<sup>2</sup> (AXH) or 50 cm<sup>2</sup> (AXM) allows direct performance comparison when evaluating multiple membrane pore sizes
- Standard path lengths of 30 and 60 cm enable accurate scale-up or scale-down studies

The Cytiva hollow fiber Start family comprises polysulfone (PS)-based membranes of seven UF molecular weight ratings and four MF micron ratings for processing of a wide range of cells, viruses, and biomolecules. These membranes exhibit sharp rejection curves, leading to reproducible, precise separations and maximized protein yield. Each membrane is identical to membranes of the Cytiva pilot- and process-scale hollow fiber cartridges, for relevance of performance data generated by using hollow fiber Start AXM and Start AXH cross flow cartridges.



**Fig 1.** Hollow fiber Start AXM and Start AXH cross flow cartridges.

## Specifications

Hollow fiber Start AXM and Start AXH enable process developers to perform initial filtration screenings for subsequent scaling to Cytiva's larger hollow fiber ultrafiltration and microfiltration membranes and system. Start AXM and Start AXH are also suitable for scale-down process optimization and troubleshooting experiments. These easy-to-use hollow fiber cartridges minimize membrane polarization caused by the "sweeping action" generated by a recirculation pump.

Hollow fiber Start AXM and Start AXH cross flow cartridges are designed for use with the fully automated ÄKTACrossflow and semiautomated ÄKTA flux cross flow filtration systems. The cartridges feature a small upstream hold-up volume to maximize product recovery and to favor low working volumes.

Specifications of hollow fiber Start AXM and Start AXH cross flow cartridges are listed in Table 1.

**Table 1.** Specifications of Start AXM and Start AXH cartridges**Physical specifications**

	<b>Start AXM</b>	<b>Start AXH</b>
Diameter	0.6 cm (0.25 in)	0.3 cm (0.125 in)
Path length	30 cm (12 in)	60 cm (24 in)
Connections		
Feed/retentate	UNF fitting	UNF fitting
Permeate	UNF fitting	UNF fitting
Membrane area (nominal)	50 cm <sup>2</sup> (7.75 in <sup>2</sup> )	40 cm <sup>2</sup> (6.2 in <sup>2</sup> )
Hold-up volume (nominal)		
Lumen side	1 to 1.5 mL	< 1 mL
Shell side	1 mL	< 1 mL
Materials of Construction		
Hollow fibers	Polysulfone	Polysulfone
Housing components	Polysulfone	Polysulfone
Potting	Epoxy	Epoxy
Fitting caps	Vinyl	Vinyl

**Nominal feed stream flow rates (mL/min)**

<b>Format</b>	<b>Nominal lumen i.d. (mm)</b>	<b>Shear rate ~2000 s<sup>-1</sup></b>	<b>Shear rate ~4000 s<sup>-1</sup></b>	<b>Shear rate ~8000 s<sup>-1</sup></b>	<b>Shear rate ~16 000 s<sup>-1</sup></b>
Start AXM	0.5	25	50	100	200
	0.75	40	80	160	320
	1.0	75	150	300	600
Start AXH	0.5	8.5	17	33	66

Shear rates based on a fluid viscosity of 1 cP

**Operating conditions**

	<b>Ultrafiltration</b>	<b>Microfiltration</b>
Temperature range	Up to 80°C	0.1 to 0.2 µm: up to 80°C 0.45 to 0.65 µm: up to 50°C
Maximum feed pressure	< 10°C: 5.2 barg (75 psig) 10°C-25°C: 4.5 barg (65 psig) 25°C-80°C: 3.4 barg (50 psig)	At 25°C: 0.1 µm: 2.1 barg (30 psig) 0.2 µm: 1.7 barg (25 psig) 0.45 µm: 1 barg (15 psig) 0.65 µm: 1 barg (15 psig)
Maximum transmembrane pressure	3000 – 30 000 NMWC <sup>†</sup> < 10°C: 4.1 barg (60 psig) 10°C to 25°C: 3.4 barg (50 psig) 25°C to 50°C: 3.1 barg (45 psig) 50°C to 80°C: 2.4 barg (35 psig)	100 000 to 750 000 NMWC <sup>†</sup> < 10°C: 3.4 barg (50 psig) 10°C to 25°C: 3.1 barg (45 psig) 25°C to 50°C: 2.4 barg (35 psig) 50°C to 80°C: 1.7 barg (25 psig)
Chlorine		
Sanitization	5 to 50 ppm	5 to 50 ppm
Cleaning (30 min, 50°C)	100 ppm	300 ppm
Continuous at 20°C	100 ppm	100 ppm
pH range	2 to 13	2 to 13

<sup>†</sup> Nominal molecular weight cut-off

# Applications

Typical application areas for hollow fiber Start AXM and Start AXH cross flow cartridges include:

- Cell harvesting and clarification
- Clarification of lysates
- Concentration, diafiltration, and purification of monoclonal antibodies, plasmids, proteins, viruses, vaccines, colloids, and plasma
- Removal of suspended solids
- Scale-up and scale-down studies

## Ordering information

### Hollow fiber Start AXM: 30 cm length, 50 cm<sup>2</sup> surface area, ultrafiltration

Model number	Pore size (NMWC)	No. of fibers	Code number
UFP-3-C-2U	3000	12	11-0005-43
UFP-10-C-2U	10 000	12	11-0005-44
UFP-30-C-2U	30 000	12	11-0005-45
UFP-100-C-2U	100 000	12	11-0005-46
UFP-300-C-2U	300 000	12	11-0005-47
UFP-500-C-2U	500 000	12	11-0005-48
UFP-500-E-2U	500 000	6	11-0005-49
UFP-750-C-2U	750 000	6	29-0082-69
UFP-750-E-2U	750 000	6	11-0005-50

### Hollow fiber Start AXM: 30 cm length, 50 cm<sup>2</sup> surface area, microfiltration

Model number	Pore size (µm)	No. of fibers	Code number
CFP-1-E-2U	0.1	6	11-0005-51
CFP-2-E-2U	0.2	6	11-0005-52
CFP-4-E-2U	0.45	6	11-0005-53
CFP-6-D-2U	0.65	8	11-0005-54

### Cell processing evaluation kit

CFP-CELL-KIT-2U <sup>†</sup>	11-0005-65
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<sup>†</sup> Contains 1 each of UFP-750-E-2U, CFP-1-E-2U, CFP-2-E-2U, CFP-4-E-2U, CFP-6-D-2U

### Hollow fiber Start AXH: 60 cm length, 40 cm<sup>2</sup> surface area, ultrafiltration

Model number	Pore size (NMWC)	No. of fibers	Code number
UFP-3-C-H24U	3000	4	11-0005-37
UFP-10-C-H24U	10 000	4	11-0005-38
UFP-30-C-H24U	30 000	4	11-0005-39
UFP-100-C-H24U	100 000	4	11-0005-40
UFP-300-C-H24U	300 000	4	11-0005-41
UFP-500-C-H24U	500 000	4	11-0005-42
UFP-750-C-H24U	750 000	4	29-0082-70

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