cobetter®
filtration

Biophsep
Hollow Fiber Filter

Biophsep
Hollow Fiber Filter

Product Features

- High flow rate, high filtration capacity
- Modified hydrophilic PES hollow fiber membrane provides low protein adsorption, less membrane fouling and easy cleaning
- Integrated device without additional assembly or device holder, quick installation and operation
- Re-washable with 0.5M NaOH solution
- Simple and reliable linear scale-up

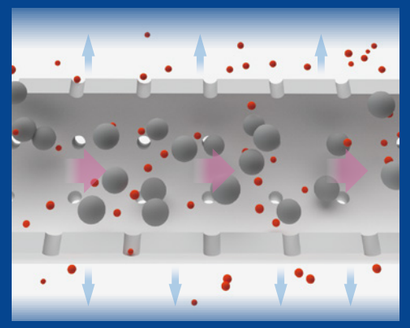
Cobetter Biophsep hollow fiber filter with good filtration resolution and low fouling , helps biopharmaceutical customers to improve product yield and filtration load, and reduce production costs.

Typical Use by Application

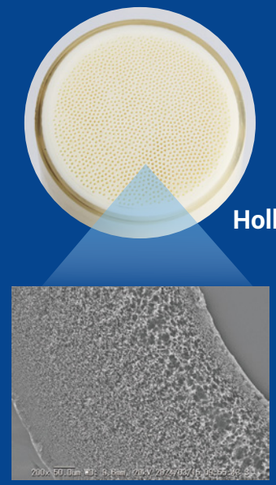
- Purification, concentration and diafiltration of vaccine
- Purification, concentration and diafiltration of viral vector
- Clarification of cells and bacterial in fermentation broth
- Recycling and washing of cells and bacteria
- Concentration and diafiltration of protein

Principle of Hollow Fiber Tangential Flow Filtration

The feed liquid flows parallel to the surface of the filtration membrane, continuously rinsing and sweeping the membrane surface. This effectively mitigates the formation of a filter cake layer and concentration polarization layer, thereby achieving higher filtration capacity and extending the membrane's service life.This separation technique relies on transmembrane pressure as the driving force, allowing only certain specific components of a mixture to pass through the membrane, while other substances are retained.



Hollow fibers contain open flow channel



The sponge-like porous structure provides a strong and durable membrane support, enabling the hollow fibers to withstand transmembrane pressures of up to 2.0 bar or higher. Each filter column undergoes rigorous integrity testing before leaving the factory.

Material Construction

Module Component	Material	Advantages and Functions
Hollow Fiber Membrane	mPES	The modified hydrophilic PES hollow fiber membrane features low adsorption, less membrane fouling and continuous high flow rate for faster processing time, the membrane is proved to effectively retain virus particles so as to achieve the purpose of concentration and buffer exchange.
Potting Glue	Polyurethane/Epoxy	Potting glue wraps each hollow fiber to provide support for the hollow fiber membrane, and at the same time completely separates the inlet flow channel and the permeate flow channel.
End Cap	White Polysulfone	Flow channel connection for liquid in and out, with good chemical compatibility.
Shell	Transparent Polysulfone	Connect the inlet and outlet caps to form an integrated assembly, while providing a flow channel for the permeate, with good chemical compatibility.

Comparison of the Product Lineup and Sterilization Methods

	Regular - Suitable for Chemical Cleaning	Heat Sterilization	Gamma Sterilization
			
Reusable	Yes	Yes	No, single-use
Form	PSU/PVC Shell	Stainless Steel Housing + Filter Cartridge or PSF Shell	CPC Sterile Connector / Bag + Filter Column
Pre-use Treatment	NaOH Sanitization for Pyrogen Removal	121°C,30 min	None, already sterilized
Typical Applications	E. coli biomass concentration (750kD/0.2μm)	Oncolytic bacteria concentration (750kD/0.2μm)	
	E. coli homogenate clarification (750kD/0.2μm)	Cell harvest and clarification (0.2/0.45μm)	
	Insulin protein crystallization recovery (0.45μm)	Polycystic liposome concentration and purification (0.2μm)	
	Virus/plasmid/recombinant protein/ microsphere concentration and diafiltration	Sterile clarification and purification of vaccines, monoclonal antibodies, recombinant proteins, and plasmids	
	LNP/exosome concentration and diafiltration (100/300kD)	Cell perfusion culture (0.2/0.45μm)	

Sterilization Method	Steam-In-Place	Gamma Sterilization
Sterilization Condition	121 °C, 30 min (No more than123°C)	25-45kGy radiation dose
Equipment	Some models require stainless steel housing	None, already sterilized
Cost	Moderate product cost High operation cost	High product cost Lower operation and time cost
Reusable	Yes, 10 cycles of SIP and CIP Max 30 cycles of repeated sterilization	No, single-use
Operation	**Complex** SIP, Integrity test, Cleaning and water flux test	**Simple** Pre-treated to reduce conductivity/TOC, Minimizes wetting and installation time, no need for sterilization and other procedures.

Product Information

Ultrafiltration Hollow Fiber Filter (Suitable for Chemical Cleaning) Specifications（0.5 mm）

Module	Effective Length (cm)	Process Volume	MWCO	Fiber Inner Diameter (mm)	Effective Area (cm^2/m^2)	Fiber Number	Flow rate @2000s^{-1} (mL/min)	Flow rate @6000s^{-1} (mL/min)	Overall Dimension (mm*mm)	Inlet/ Outlet	Side Port
Mini	30	<300mL	3kD 5kD 10kD 30kD 50kD 100kD 300kD 500kD 750kD	0.5	**28**	6	9	27	10*346	Female Luer Lock	Female Luer Lock
	60	<600mL		0.5	**56**	6	9	27	10*646		
Minilab	30	<1L		0.5	**118**	25	37	110	10*346		
	60	<2L		0.5	**236**	25	37	110	10*646		
Lab	30	<2L		0.5	**236**	50	74	221	13*348	**0.5" TC** (Disk Outer Diameter 25mm)	**3/16" HB**
	60	<4L		0.5	**471**	50	74	221	13*648		
Lab+	30	<8L		0.5	0.08	180	265	794	18*355	**0.5" TC** (Disk Outer Diameter 25mm)	**3/8" HB**
	60	<16L		0.5	0.16	180	265	794	18*620		
Pilot	30	<15L		0.5	0.15	320	471	1413	33*361	**1.5" TC** (Disk Outer Diameter 50.5mm)	**0.5" TC** (Disk Outer Diameter 25mm)
	60	<30L		0.5	0.30	320	471	1413	33*661		
	110	<50L		0.5	0.55	320	471	1413	33*1161		
Pilot+	30	<15L		0.5	0.24	500	736	2206	33*361		
	60	<50L		0.5	0.47	500	736	2206	33*661		
	110	<80L		0.5	0.86	500	736	2206	33*1161		
MiniProcess	30	<75L		0.5	0.68	1450	2132	6397	47*400		
	60	<150L		0.5	1.37	1450	2132	6397	47*700		
	110	<250L		0.5	2.50	1450	2132	6397	47*1150		
MidProcess	30	<120L		0.5	1.22	2600	3824	11471	65*440		
	60	<200L		0.5	2.45	2600	3824	11471	65*740		
	110	<400L		0.5	4.29	2600	3824	11471	65*1190	**1.5" TC** (Disk Outer Diameter 50.5mm)	**1.0" TC** (Disk Outer Diameter 50.5mm)
Process	30	<200L		0.5	2.45	5200	7647	22941	89*477		
	60	<500L		0.5	4.90	5200	7647	22941	89*777		
	110	<800L		0.5	8.57	5200	7647	22941	89*1227		
Maxi	60	<800L		0.5	9.29	10200	15000	45000	117*760	**2.0" TC** (Disk Outer Diameter 64mm)	**1.5" TC** (Disk Outer Diameter 50.5mm)
	110	<1500L		0.5	16.81	10200	15000	45000	117*1230		

Product Information Ultrafiltration Hollow Fiber Filter (Suitable for Chemical Cleaning) Specifications（1.0 mm）

Module	Effective Length (cm)	Process Volume	MWCO	Fiber Inner Diameter (mm)	Effective Area (cm^2/m^2)	Fiber Number	Flow rate @2000s^{-1} (mL/min)	Flow rate @6000s^{-1} (mL/min)	Overall Dimension (mm*mm)	Inlet/ Outlet	Side Port
Mini	30	<300ml		1.0	**28**	3	35.3	106	10*346	Female Luer Lock	Female Luer Lock
	60	<600ml		1.0	**56**	3	35.3	106	10*646		
Minilab	30	<1L		1.0	**94**	10	118	353	10*346		
	60	<2L		1.0	**188**	10	118	353	10*646		
Lab	30	<2L		1.0	**170**	18	212	636	13*348	**0.5" TC** (Disk Outer Diameter 25mm)	**3/16" HB**
	60	<4L		1.0	**340**	18	212	636	13*648		
Lab+	30	<6L		1.0	0.05	60	706	2118	18*355	**0.5" TC** (Disk Outer Diameter 25mm)	**3/8" HB**
	60	<12L		1.0	0.10	60	706	2118	18*620		
Pilot	30	<15L	**3kD**	1.0	0.15	160	1884	5652	33*361		
	60	<30L	**5kD**	1.0	0.30	160	1884	5652	33*661		
	110	<50L	**10kD**	1.0	0.55	160	1884	5652	33*1161		
Pilot+	30	<15L	**30kD**	1.0	0.23	240	2824	8471	33*361	**1.5" TC** (Disk Outer Diameter 50.5mm)	**0.5" TC** (Disk Outer Diameter 25mm)
	60	<50L	**50kD**	1.0	0.45	240	2824	8471	33*661		
	110	<80L	**100kD**	1.0	0.83	240	2824	8471	33*1161		
MiniProcess	30	<75L	**300kD**	1.0	0.56	600	7059	21176	47*400		
	60	<150L	**500kD**	1.0	1.13	600	7059	21176	47*700		
	110	<250L	**750kD**	1.0	2.07	600	7059	21176	47*1150		
MidProcess	30	<120L		1.0	1.13	1200	14118	42353	65*440		
	60	<200L		1.0	2.26	1200	14118	42353	65*740		
	110	<400L		1.0	3.95	1200	14118	42353	65*1190	**1.5" TC** (Disk Outer Diameter 50.5mm)	**1.0" TC** (Disk Outer Diameter 50.5mm)
Process	30	<200L		1.0	2.08	2200	25880	77650	89*477		
	60	<500L		1.0	4.16	2200	25880	77650	89*777		
	110	<800L		1.0	7.25	2200	25880	77650	89*1227		
Maxi	60	<800L		1.0	8.20	4500	52941	158824	117*760	**2.0" TC** (Disk Outer Diameter 64mm)	**1.5" TC** (Disk Outer Diameter 50.5mm)
	110	<1500L		1.0	14.84	4500	52941	158824	117*1230		

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Product type	Membrane	Module	MWCO	Fiber Inner Diameter	Effective Length	
HF Hollow Fiber	**E** PES	**MN** Mini **MI** Minilab **LA** Lab **LP** Lab+ **PI** Pilot **PP** Pilot+ **MP** Miniprocess **DP** Midprocess **PR** Process **MA** Maxi	**0003** 3kD **0005** 5kD **0010** 10kD **0030** 30kD **0050** 50kD **0100** 100kD **0300** 300kD **0500** 500kD **0750** 750kD	**05** 0.5mm **10** 1.0mm	**30** 30cm **60** 60cm **11** 110cm	P Pharmaceutical

Product Information Microfiltration Hollow Fiber Filter (Suitable for Chemical Cleaning) Specifications（1.0 mm）

Module	Effective Length (cm)	Process Volume	MWCO	Fiber Inner Diameter (mm)	Effective Area (cm^2/m^2)	Fiber Number	Flow rate @2000s^{-1} (mL/min)	Flow rate @6000s^{-1} (mL/min)	Overall Dimension (mm*mm)	Inlet/ Outlet	Side Port
Mini	30	<140mL	**M010=0.1μm** **M020=0.2μm** **M045=0.45μm** **M065=0.65μm** **M20R=0.2μm-R**	1.0	**28**	3	35	106	10*346	Female Luer Lock	Female Luer Lock
	60	<280mL		1.0	**56**	3	35	106	10*646		
Minilab	30	<375mL		1.0	**75**	8	94	282	10*346		
	60	<750mL		1.0	**150**	8	94	282	10*646		
Lab	30	<850mL		1.0	**170**	18	212	635	13*348	**0.5" TC** (Disk Outer Diameter 25mm)	**3/16" HB**
	60	<1700mL		1.0	**340**	18	212	635	13*648		
Lab+	30	<2.5L		1.0	0.05	60	706	2118	18*355	**0.5" TC** (Disk Outer Diameter 25mm)	**3/8" HB**
	60	<5.0L		1.0	0.10	60	706	2118	18*655		
Pilot	30	<6L		1.0	0.12	130	1529	4588	33*361		
	60	<12L		1.0	0.25	130	1529	4588	33*661		
	110	<22L		1.0	0.45	130	1529	4588	33*1161		
Pilot+	30	<7.5L		1.0	0.15	160	1882	5647	33*361	**1.5" TC** (Disk Outer Diameter 50.5mm)	**0.5" TC** (Disk Outer Diameter 25mm)
	60	<15L		1.0	0.30	160	1882	5647	33*661		
	110	<27L		1.0	0.55	160	1882	5647	33*1161		
MiniProcess	30	<20L		1.0	0.45	480	5647	16941	47*400		
	60	<45L		1.0	0.90	480	5647	16941	47*700		
	110	<80L		1.0	1.66	480	5647	16941	47*1150		
MidProcess	30	<45L		1.0	0.94	1000	11765	35294	65*440		
	60	<90L		1.0	1.88	1000	11765	35294	65*740		
	110	<170L		1.0	3.46	1000	11765	35294	65*1190	**1.5" TC** (Disk Outer Diameter 50.5mm)	**1.0" TC** (Disk Outer Diameter 50.5mm)
Process	30	<70L		1.0	1.41	1500	17647	52941	89*477		
	60	<140L		1.0	2.83	1500	17647	52941	89*777		
	110	<250L		1.0	5.18	1500	17647	52941	89*1227		
Maxi	60	<280L		1.0	5.65	3000	35294	105882	117*760	**2.0" TC** (Disk Outer Diameter 64mm)	**1.5" TC** (Disk Outer Diameter 50.5mm)
	110	<500L		1.0	10.37	3000	35294	105882	117*1230		

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Product type	Membrane	Module	MWCO	Fiber Inner Diameter	Effective Length	
HF Hollow Fiber	**E** PES	**MN** Mini **MI** Minilab **LA** Lab **LP** Lab+ **PI** Pilot **PP** Pilot+ **MP** Miniprocess **DP** Midprocess **PR** Process **MA** Maxi	**M010** 0.10μm **M020** 0.20μm **M045** 0.45μm **M065** 0.65m **M20R** 0.20μm-R	**10** 1.0mm	**30** 30cm **60** 60cm **11** 110cm	P Pharmaceutical

Biophsep
Heat Sterilization Hollow Fiber Filter

- Aseptic Process Assurance: For processes where bioburden cannot be sufficiently reduced using a 0.2 μm sterilizing-grade filter, heat sterilization hollow fiber filter can ensure aseptic operation.
- Reusable Design: The membranes can be cleaned and reused for multiple times, reducing overall operating costs.
- High Temperature and Pressure Resistance: Supports steam-in-place or autoclave.

Typical Applications

- Yeast, oncolytic bacteria, and other cell harvesting/purification
- Polycystic liposome concentration and diafiltration
- Continuous cell perfusion culture
- Aseptic concentration of lentivirus and adenovirus vaccines
- Aseptic purification of monoclonal antibodies and recombinant proteins

Operating Conditions

Max Operating	80 °C	
Max Operating Pressure	0.2MPa	
Sterilization	Steam in place	Can be steam sterilized 10 cycles for 30 minutes at 123±0.5°C
	Autoclave	Can be autoclaved 30 cycles for 30minutes at 121°C

Product Information Heat Sterilization Hollow Fiber Filter Specifications（1.0 mm）

Module	Effective Length (cm)	Process Volume	MWCO	Fiber Inner Diameter (mm)	Effective Area (cm^2/m^2)	Fiber Number	Flow rate @2000s^{-1} (mL/min)	Flow rate @6000s^{-1} (mL/min)	Overall Dimension (mm*mm)	Inlet/ Outlet	Side Port
Mini	30	<250mL		1.0	**28**	3	35	106	10*346	Luer Connection Female	Luer Connection Female
	60	<500mL		1.0	**56**	3	35	106	10*646		
Minilab	30	<750mL		1.0	**75**	8	94	282	10*346		
	60	<1.5L		1.0	**150**	8	94	282	10*646		
Lab	30	<1.5L		1.0	**170**	18	212	635	13*348	**0.5" TC** (Disk Outer Diameter 25mm)	**3/16" HB**
	60	<3L		1.0	**340**	18	212	635	13*648		
Lab+	30	<5L		1.0	0.05	60	706	2118	18*355	**0.5" TC** (Disk Outer Diameter 25mm)	**3/8" HB**
	60	<10L		1.0	0.10	60	706	2118	18*655		
Pilot	30	<10L		1.0	0.12	130	1529	4588	33*361		
	60	<20L		1.0	0.25	130	1529	4588	33*661		
	110	<40L	**006R=6kD-R**	1.0	0.45	130	1529	4588	33*1161		
Pilot+	30	<15L	**010R=10 kD-R**	1.0	0.15	160	1882	5647	33*361	**1.5" TC** (Disk Outer Diameter 50.5mm)	**0.5" TC** (Disk Outer Diameter 25mm)
	60	<30L	**100R=100 kD-R**	1.0	0.30	160	1882	5647	33*661		
	110	<50L	**500R=500 kD-R**	1.0	0.55	160	1882	5647	33*1161		
MiniProcess	30	<40L	**750R=750 kD-R**	1.0	0.45	480	5647	16941	47*400		
	60	<90L	**M010=0.10 μm**	1.0	0.90	480	5647	16941	47*700		
	110	<160L	**M020=0.20 μm**	1.0	1.66	480	5647	16941	47*1150		
MidProcess	30	<90L	**M045=0.45 μm**	1.0	0.94	1000	11765	35294	65*440		
	60	<180L	**M065=0.65 μm**	1.0	1.88	1000	11765	35294	65*740		
	110	<340L	**M20R=0.20 μm-R**	1.0	3.46	1000	11765	35294	65*1190	**1.5" TC** (Disk Outer Diameter 50.5mm)	**1.0" TC** (Disk Outer Diameter 50.5mm)
Process	30	<150L		1.0	1.41	1500	17647	52941	89*477		
	60	<300L		1.0	2.83	1500	17647	52941	89*777		
	110	<500L		1.0	5.18	1500	17647	52941	89*1227		
Maxi	60	<500L		1.0	5.65	3000	35294	105882	117*760	**2.0" TC** (Disk Outer Diameter 64mm)	**1.5" TC** (Disk Outer Diameter 50.5mm)
	110	<1000L		1.0	10.37	3000	35294	105882	117*1230		
Column Mid CD Stainless Steel Housing	60	<200L		1.0	2.37	1450	17059	51176	75.5*632	**1.5" TC** (Disk Outer Diameter 50.5mm) SS housing required	**1.5" TC** (Disk Outer Diameter 50.5mm) SS housing required
Column Max CM Stainless Steel Housing	60	<400L		1.0	4.20	2550	30000	90000	101.5*622	**2.0" TC** (Disk Outer Diameter 64mm) SS housing required	**1.5" TC** (Disk Outer Diameter 50.5mm) SS housing required

□□ Product type	□ Membrane	□□ Module	□□□□ MWCO	□□ Fiber Inner Diameter	□□ Effective Length	A Sterilization	P
HF Hollow Fiber	E PES	MN Mini	006R 6kD-R	10 1.0mm	30 30cm	A Heat Sterilization	P Pharmaceutical
		MI Minilab	010R 10kD-R		60 60cm		
		LA Lab	100R 100kD-R		11 110cm		
		LP Lab+	500R 500kD-R				
		PI Pilot	750R 750kD-R				
		PP Pilot+	M010 0.10μm				
		MP Miniprocess	M20R 0.20μm-R				
		DP Midprocess	M020 0.20μm				
		PR Process	M045 0.45μm				
		MA Maxi	M065 0.65μm				
		CD Column Mid					
		CM Column Max					

Product Information

Heat Sterilization Hollow Fiber Filter Specifications (1.5 mm)

Module	Effective Length (cm)	Process Volume	MWCO	Fiber Inner Diameter (mm)	Effective Area (cm^2/m^2)	Fiber Number	Flow rate @2000s^{-1} (mL/min)	Flow rate @6000s^{-1} (mL/min)	Overall Dimension (mm*mm)	Inlet/ Outlet	Side Port
Mini	30	<140mL	M045=0.45μm	1.5	**28**	2	79	238	10*346	Female Luer Lock	Female Luer Lock
	60	<280mL		1.5	**56**	2	79	238	10*646		
Minilab	30	<210mL		1.5	**42**	3	119	357	10*346		
	60	<420mL		1.5	**84**	3	119	357	10*646		
Lab	30	<500mL		1.5	**99**	7	278	834	13*348	**0.5" TC** (Disk Outer Diameter 25mm)	**3/16" HB**
	60	<1L		1.5	**198**	7	278	834	13*648		
Lab+	30	<1.2L		1.5	**240**	17	675	2025	18*355	**0.5" TC** (Disk Outer Diameter 25mm)	**3/8" HB**
	60	<2.4L		1.5	**480**	17	675	2025	18*655		
Pilot	30	<2.5L		1.5	0.05	35	1390	4169	33*361		
	60	<5L		1.5	0.10	35	1390	4169	33*661		
	110	<9L		1.5	0.18	35	1390	4169	33*1161	**1.5" TC** (Disk Outer Diameter 50.5mm)	**0.5" TC** (Disk Outer Diameter 25mm)
MiniProcess	30	<11L		1.5	0.22	155	6154	18463	47*400		
	60	<22L		1.5	0.44	155	6154	18463	47*700		
	110	<40L		1.5	0.80	155	6154	18463	47*1150		
MidProcess	30	<23L		1.5	0.46	325	12904	38713	65*440		
	60	<46L		1.5	0.92	325	12904	38713	65*740		
	110	<84L		1.5	1.68	325	12904	38713	65*1190	**1.5" TC** (Disk Outer Diameter 50.5mm)	**1.0" TC** (Disk Outer Diameter 50.5mm)
Process	30	<35L		1.5	0.73	520	20647	61941	89*477		
	60	<70L		1.5	1.47	520	20647	61941	89*777		
	110	<130L		1.5	2.69	520	20647	61941	89*1227		
Maxi	60	<135L		1.5	2.71	960	38118	114353	117*760	**2.0" TC** (Disk Outer Diameter 64mm)	**1.5" TC** (Disk Outer Diameter 50.5mm)
	110	<250L		1.5	4.97	960	38118	114353	117*1230		

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Product type	Membrane	Module	MWCO	Fiber Inner Diameter	Effective Length	Sterilization	
HF Hollow Fiber	**E** PES	**MN** Mini **MI** Minilab **LA** Lab **LP** Lab+ **PI** Pilot **MP** Miniprocess **DP** Midprocess **PR** Process **MA** Maxi	**M045** 0.45μm	**15** 1.5mm	**30** 30cm **60** 60cm **11** 110cm	**A** Heat Sterilization	**P** Pharmaceutical

Biophsep Gamma Sterilization Hollow Fiber Filter

Designed for single use, eliminating the need for post-use CIP cleaning, regeneration, and cleaning validation. This significantly saves operational time and avoids the risk of cross-contamination.

Pre-treated to reduce TOC and conductivity levels, effectively minimizing endotoxin and bioburden. No need for pre-use alkaline washing to remove pyrogens, enabling rapid experimental setup.

Each filter is individually packaged and gamma-irradiated before shipment to ensure sterility.

Typical Applications

- Yeast, oncolytic bacteria, and other cell harvesting/purification
- Continuous cell perfusion culture
- Aseptic concentration of plasmids and mRNA in CGT applications
- Aseptic purification of recombinant proteins

Product Features

- Pre-sterilized with gamma irradiation at an intensity of 25–45 kGy
- Pre-treated to reduce conductivity and TOC residue, minimizing wetting and shortening installation time
- Single-use design eliminates the need for post-use CIP cleaning

Product Information Gamma Sterilization Hollow Fiber Filter Specifications (0.5 mm)

Module	Effective Length (cm)	Process Volume	MWCO	Fiber Inner Diameter (mm)	Effective Area (cm^2/m^2)	Fiber Number	Flow rate @2000s^{-1} (mL/min)	Flow rate @6000s^{-1} (mL/min)	Overall Dimension (mm*mm)	Inlet/ Outlet	Side Port
Mini	30	<300mL		0.5	**28**	6	9	27	10*346	Female Luer Lock	Female Luer Lock
	60	<600mL		0.5	**56**	6	9	27	10*646		
Minilab	30	<1L		0.5	**118**	25	37	110	10*346		
	60	<2L		0.5	**236**	25	37	110	10*646		
Lab	30	<2L		0.5	**236**	50	74	221	13*348	**0.5" TC** (Disk Outer Diameter 25mm)	**3/16" HB**
	60	<4L		0.5	**471**	50	74	221	13*648		
Lab+	30	<8L		0.5	0.08	180	265	794	18*355	**0.5" TC** (Disk Outer Diameter 25mm)	**3/8" HB**
	60	<16L		0.5	0.16	180	265	794	18*620		
Pilot	30	<15L	**3kD**	0.5	0.15	320	471	1413	33*361		
	60	<30L	**5kD**	0.5	0.30	320	471	1413	33*661		
	110	<50L	**10kD**	0.5	0.55	320	471	1413	33*1161		
Pilot+	30	<15L	**30kD**	0.5	0.24	500	736	2206	33*361	**1.5" TC** (Disk Outer Diameter 50.5mm)	**0.5" TC** (Disk Outer Diameter 25mm)
	60	<50L	**50kD**	0.5	0.47	500	736	2206	33*661		
	110	<80L	**100kD**	0.5	0.86	500	736	2206	33*1161		
MiniProcess	30	<75L	**300kD**	0.5	0.68	1450	2132	6397	47*400		
	60	<150L	**500kD**	0.5	1.37	1450	2132	6397	47*700		
	110	<250L	**750kD**	0.5	2.50	1450	2132	6397	47*1150		
MidProcess	30	<120L		0.5	1.22	2600	3824	11471	65*440		
	60	<200L		0.5	2.45	2600	3824	11471	65*740		
	110	<400L		0.5	4.29	2600	3824	11471	65*1190	**1.5" TC** (Disk Outer Diameter 50.5mm)	**1.0" TC** (Disk Outer Diameter 50.5mm)
Process	30	<200L		0.5	2.45	5200	7647	22941	89*477		
	60	<500L		0.5	4.90	5200	7647	22941	89*777		
	110	<800L		0.5	8.57	5200	7647	22941	89*1227		
Maxi	60	<800L		0.5	9.29	10200	15000	45000	117*760	**2.0" TC** (Disk Outer Diameter 64mm)	**1.5" TC** (Disk Outer Diameter 50.5mm)
	110	<1500L		0.5	16.81	10200	15000	45000	117*1230		

Product Information Gamma Sterilization Hollow Fiber Filter Specifications (1.0 mm)

Module	Effective Length (cm)	Process Volume	MWCO	Fiber Inner Diameter (mm)	Effective Area (cm^2/m^2)	Fiber Number	Flow rate @2000s^{-1} (mL/min)	Flow rate @6000s^{-1} (mL/min)	Overall Dimension (mm*mm)	Inlet/ Outlet	Side Port
Mini	30	<300ml		1.0	**28**	3	35.3	106	10*346	Female Luer Lock	Female Luer Lock
	60	<600ml		1.0	**56**	3	35.3	106	10*646		
Minilab	30	<1L		1.0	**94**	10	118	353	10*346		
	60	<2L		1.0	**188**	10	118	353	10*646		
Lab	30	<2L		1.0	**170**	18	212	636	13*348	**0.5" TC** (Disk Outer Diameter 25mm)	**3/16" HB**
	60	<4L		1.0	**340**	18	212	636	13*648		
Lab+	30	<6L		1.0	0.05	60	706	2118	18*355	**0.5" TC** (Disk Outer Diameter 25mm)	**3/8" HB**
	60	<12L		1.0	0.10	60	706	2118	18*620		
Pilot	30	<15L	**3kD**	1.0	0.15	160	1884	5652	33*361		
	60	<30L	**5kD**	1.0	0.30	160	1884	5652	33*661		
	110	<50L	**10kD**	1.0	0.55	160	1884	5652	33*1161		
Pilot+	30	<15L	**30kD**	1.0	0.23	240	2824	8471	33*361	**1.5" TC** (Disk Outer Diameter 50.5mm)	**0.5" TC** (Disk Outer Diameter 25mm)
	60	<50L	**50kD**	1.0	0.45	240	2824	8471	33*661		
	110	<80L	**100kD**	1.0	0.83	240	2824	8471	33*1161		
MiniProcess	30	<75L	**300kD**	1.0	0.56	600	7059	21176	47*400		
	60	<150L	**500kD**	1.0	1.13	600	7059	21176	47*700		
	110	<250L	**750kD**	1.0	2.07	600	7059	21176	47*1150		
MidProcess	30	<120L		1.0	1.13	1200	14118	42353	65*440		
	60	<200L		1.0	2.26	1200	14118	42353	65*740		
	110	<400L		1.0	3.95	1200	14118	42353	65*1190	**1.5" TC** (Disk Outer Diameter 50.5mm)	**1.0" TC** (Disk Outer Diameter 50.5mm)
Process	30	<200L		1.0	2.08	2200	25880	77650	89*477		
	60	<500L		1.0	4.16	2200	25880	77650	89*777		
	110	<800L		1.0	7.25	2200	25880	77650	89*1227		
Maxi	60	<800L		1.0	8.20	4500	52941	158824	117*760	**2.0" TC** (Disk Outer Diameter 64mm)	**1.5" TC** (Disk Outer Diameter 50.5mm)
	110	<1500L		1.0	14.84	4500	52941	158824	117*1230		

□□	□	□□	□□□□	□□	□□	□	P
Product type	**Membrane**	**Module**	**MWCO**	**Fiber Inner Diameter**	**Effective Length**	**Sterilization**	
HF Hollow Fiber	**E** PES	**MN** Mini	**0005** 5K	**05** 0.5mm	**30** 30cm	**G** Resistant to gamma irradiation sterilization	**P** Pharmaceutical
		MI Minilab	**0010** 10K	**10** 1.0mm	**60** 60cm	**S** Sterile	
		LA Lab	**0030** 30K		**11** 110cm		
		LP Lab+	**0050** 50K				
		PI Pilot	**0100** 100K				
		PP Pilot+	**0300** 300K				
		MP Miniprocess	**0500** 500K				
		DP Midprocess	**0750** 750K				
		PR Process					
		MA Maxi					

Key Figures

Shear Rate

The circulating flow rate of the hollow fiber depends on the product tolerance to the shear rate, in generally it will be set at 2000/s to 10000/s, which is much smaller than the shear rate generated by the turbulent flow on the surface of the cassette screen.

For general materials, we usually choose a shear rate of 4000/s to 6000/s;

If the product is sensitive to shear force (such as lentivirus, coronavirus or macromolecular protein expressed by animal cells, large plasmids and LNP, etc.), the shear rate needs to be reduced to 2000/s;

If the product is with good resistance to shear force (such as small molecular proteins expressed by bacteria, etc.) shear rate could be increased to 8000/s to 10000/s.

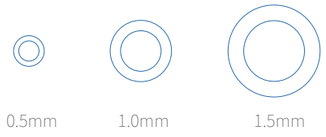
Fiber Inner Diameter

Module with fiber of 1.0mm ID is ideal for product with high cell density or high solid content or high viscosity.

Module with fiber of 0.5mm ID is widely used in most application scenarios to improve mass transfer efficiency.

Only module with fiber of 1.0mm ID is autoclavable, as steam cannot enter the fiber of 0.5mm ID effectively.

Diagram



MWCO

Sufficient separation efficiency and the risks of fouling should both be taken into consideration when choosing MWCO.

To minimize the risk of fouling that inevitably occurs during membrane processing, it is advisable to choose membranes with relatively smaller pore sizes, as long as the separation efficiency and flux are maintained. This helps reduce the intrusion of impurity particles into the membrane pores, thus extending the membrane's service life.

Common processing scenarios are as following:
· Pyrogen removal of small molecule in Chinese medicines : 5kD, 10kD
· Ultrafiltration and concentration of mABs, buffer exchange : 30kD, 50kD
· Concentration, purification and removal of virus : 100kD, 300kD, 500kD, 750kD
· Clarification of recombinant protein, antibody : 500kD, 750kD
· Concentration for bacteria: 500kD, 750kD
· Clarification of lysate: 0.2μm, 0.45μm, 0.65μm

Effective Length

The process scale-up feature of hollow fibers is that: direct process scale-up can be carried out as long as the effective length is kept the same.

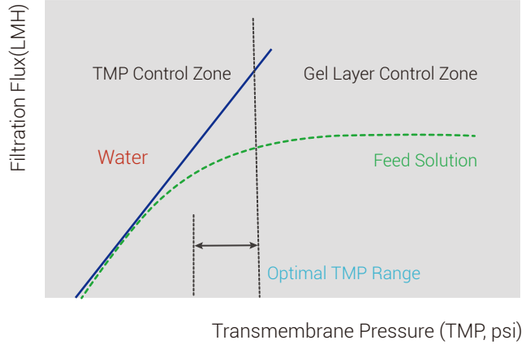
On the opposite, due to the significant pressure drop difference between inlet and outlet existed in different lengths, the internal pressure and flow velocity distribution of the flow channel also change correspondingly, so linear scale-up can not be performed on devices with different length. When processing with more fouling and high viscosity product, it is preferred to choose module with shorter length.

Process Development Workflow for Tangential Flow Hollow Fiber Filtration

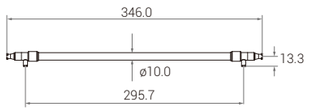
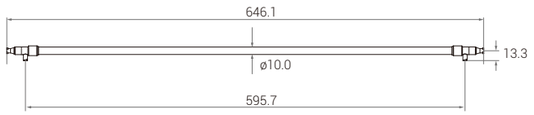
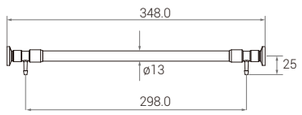
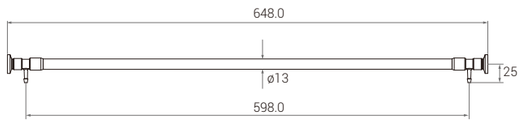
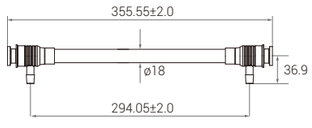
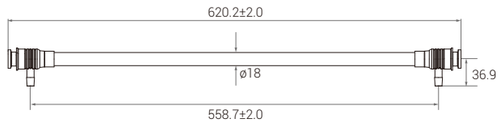
1. Product Selection	· MWCO · Inner Diameter · Effective Length	· The membrane pore size should be 5–10 times larger than the target molecule to pass through the membrane · The membrane pore size should be 1/3 to 1/5 of the target molecule to be retained
2. Shear Rate	· Product Tolerance · System Pump Speed	· On the premise of not damaging product activity and meeting system requirements, choose the highest possible shear rate
3. Process Specs	· TTMP Optimization · Rinsing Method · UF/DF Ratio	· Use appropriate transmembrane pressure and rinsing/washing method to improve filtration efficiency.
4. Cleaning Validation	· Type of Cleaning Agent · Cleaning Temperature · Cleaning Time	· A water flux recovery rate greater than 70% is considered indicative of reusability.

$$Shear\ Rate = \frac{4Q}{n\pi r^3} \qquad TMP = \frac{(P_F + P_R)}{2} - P_p \qquad Flux = \frac{Permeate\ flow}{Area}$$

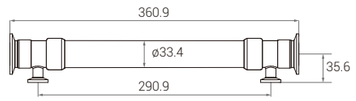
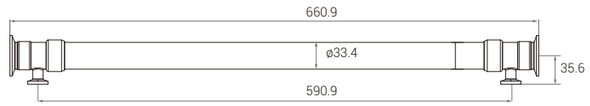
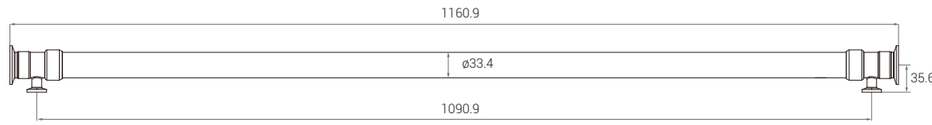
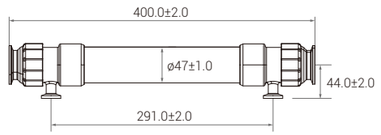
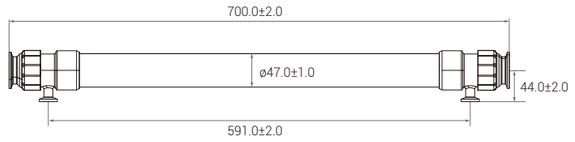
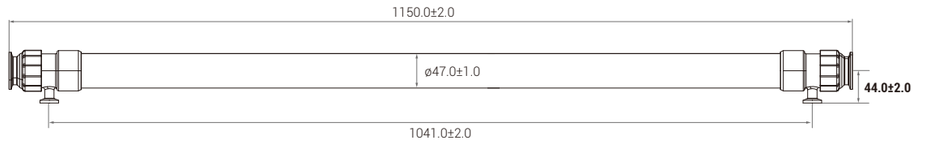
TMP Shift Optimization Diagram



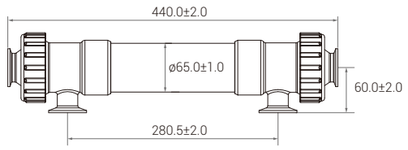
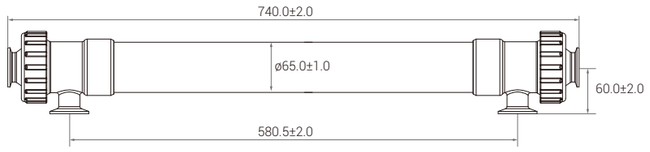
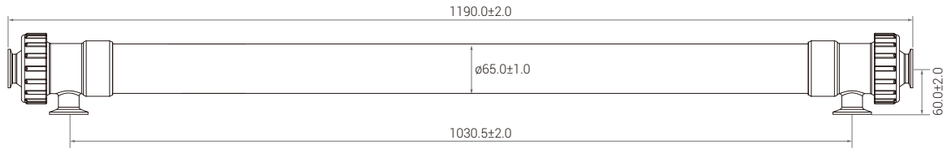
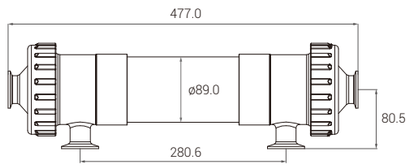
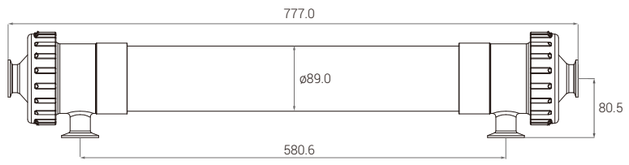
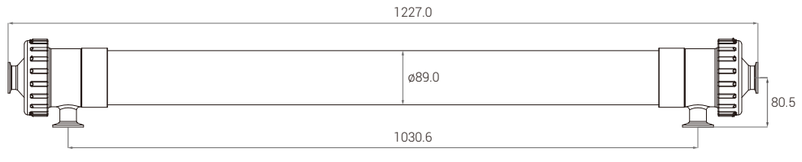
Overall Dimension

	MI-Minilab -30cm
	MI-Minilab-60cm
	Lab-30cm
	Lab-60cm
	Lab⁺-30cm
	Lab⁺-60cm

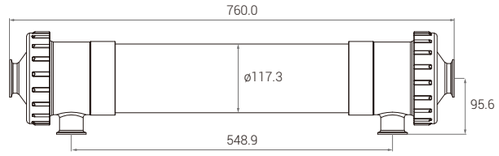
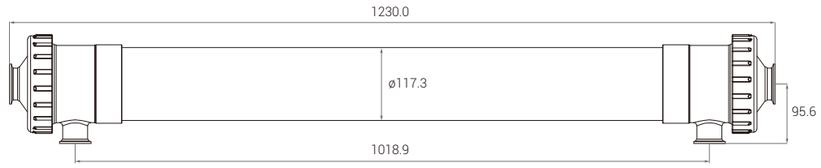
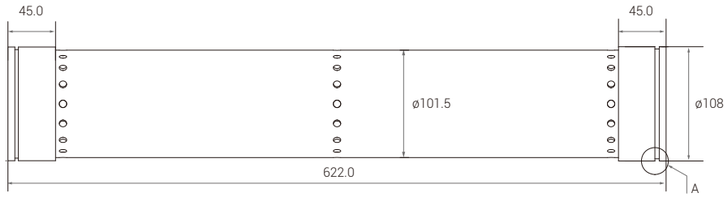
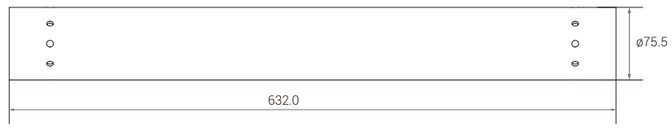
Overall Dimension

	**Pilot / Pilot⁺ - 30cm**
	**Pilot / Pilot⁺ - 60cm**
	**Pilot / Pilot⁺ -110cm**
	**Mini-Process 30cm**
	**Mini-Process 60cm**
	**Mini-Process 110cm**

Overall Dimension

	**Mid-Process 30cm**
	**Mid-Process 60cm**
	**Mid-Process 110cm**
	**Process- 30cm**
	**Process 60cm**
	**Process 110cm**

Overall Dimension

	**Maxi - 60cm**
	**Maxi - 110cm**
	**Column Max**
	**Column Mid**

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