

Hollow Fiber Modules for Fast and Gentle TFF

Data Sheet

Gamma-irradiated, plug-and-play setup with single-use efficiency

Spectrum® Hollow Fiber Filter Modules act as the filtration component for ultrafiltration, diafiltration and microfiltration processes of biologics. Fibers are secured in a housing, engineered for high pressure applications and manufactured according to ISO guidelines.

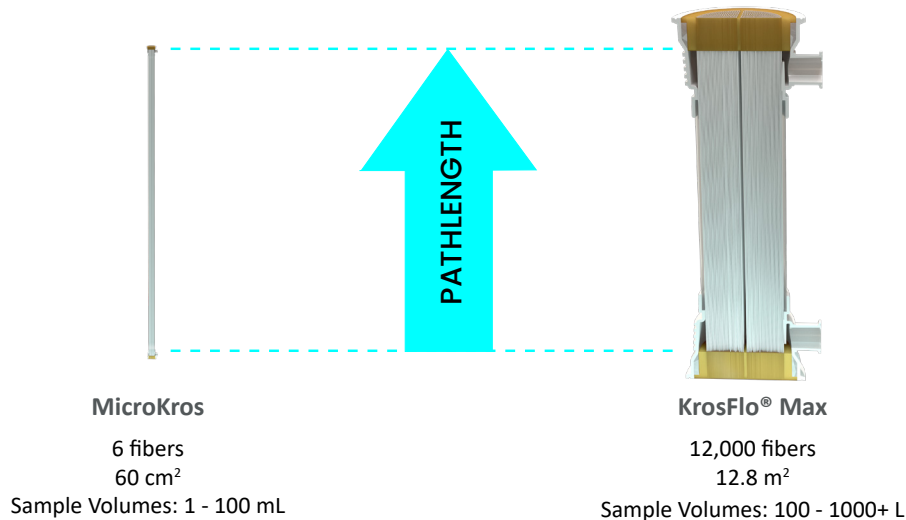
Processes and modalities change frequently. A broad range of module sizes, surface areas and membrane chemistries combine to create a library of over 1400 different configurations to meet evolving process needs.



Key Features

- Over 1400 configurations for wide applications
- Operate up to 30 psi
- Simple, fast and ready-to-use
- No external clamp or torque process required
- Easy to drain for when every drop counts
- Laminar flow for gentle processing of shear sensitive molecules
- Scale from 1 mL to 1000+ L
- Available with or without gamma-irradiation
- Every module integrity tested and serialized for full traceability
- Online tools for looking up hold-up volumes, choosing operating conditions, and performing key calculations are available on repligen.com.

Scale reproducibly by increasing fiber count and maintaining constant path length



*Surface area subject to change based on selected fiber and module length.

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repligen.com

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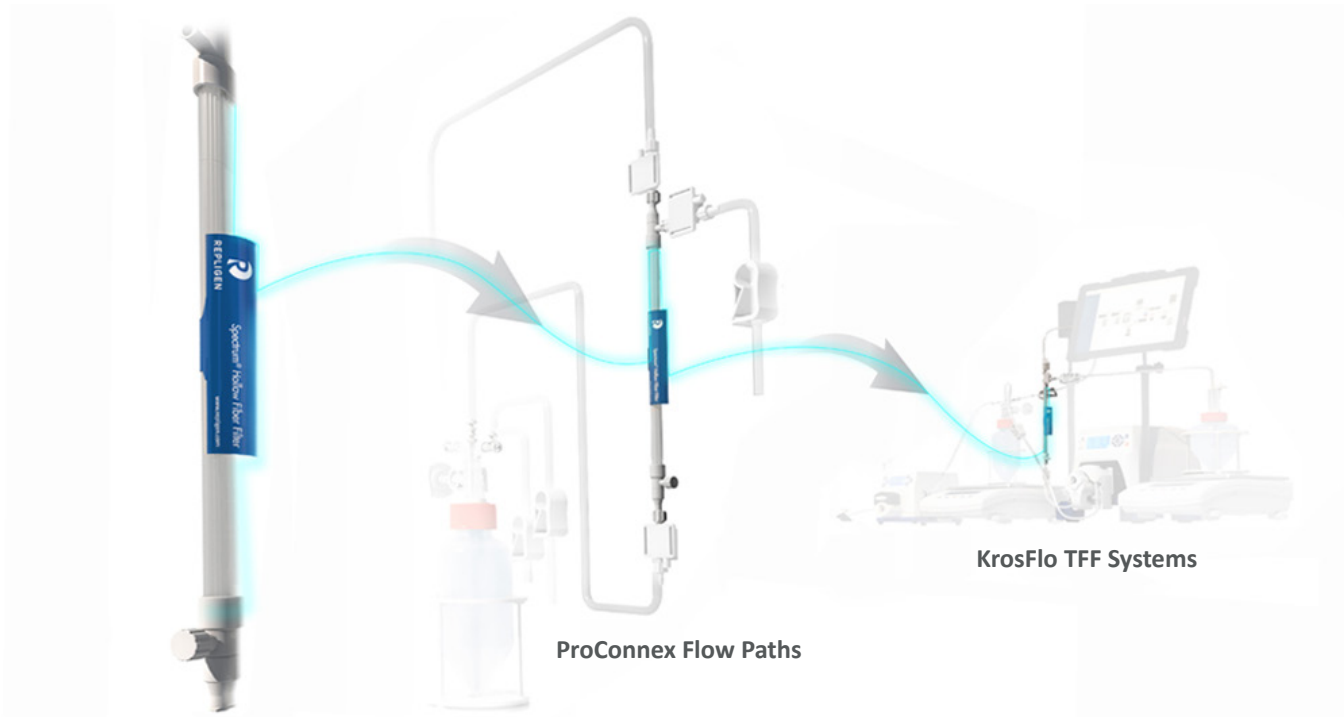
Plug and play gamma-irradiated filters into a complete solution

Spectrum Hollow Fibers Modules arrive gamma-irradiated and ready for use. The filter works together with a flow path as a complete solution. ProConnex® Flow Paths contain all required reservoirs, sensors, tubing and connectors and are designed to fit specific KrosFlo TFF Systems. To start a TFF run, simply remove the hollow fiber module from the double bag, connect it to an off-the-shelf ProConnex Flow Path and start your automated KrosFlo TFF System.

*Gamma-irradiation optional.

Materials of Construction	
Housing	Polysulfone
Potting Material	Polyurethane
Membrane	4 options available mPES/ PES, PS or ME
Support Netting*	Polypropylene

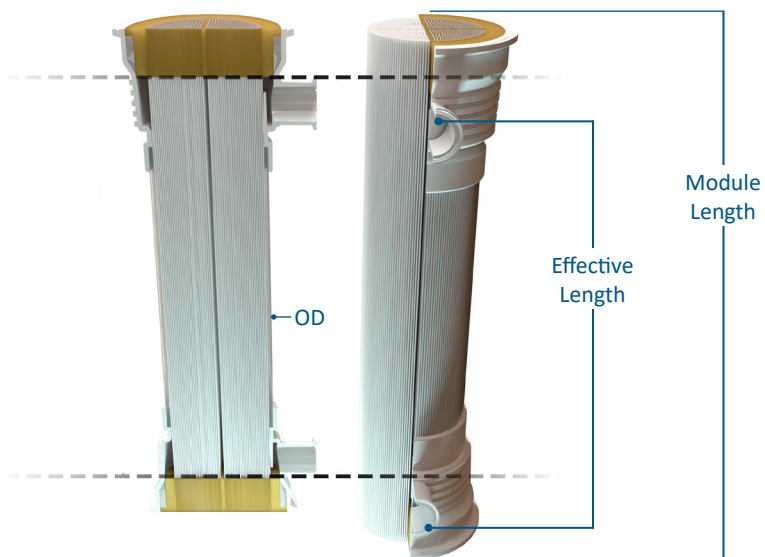
*K and X modules only.



Spectrum Hollow Fiber Modules

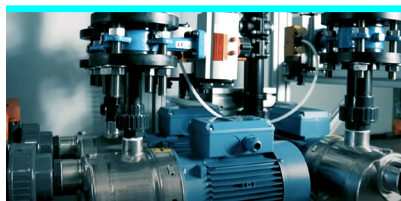
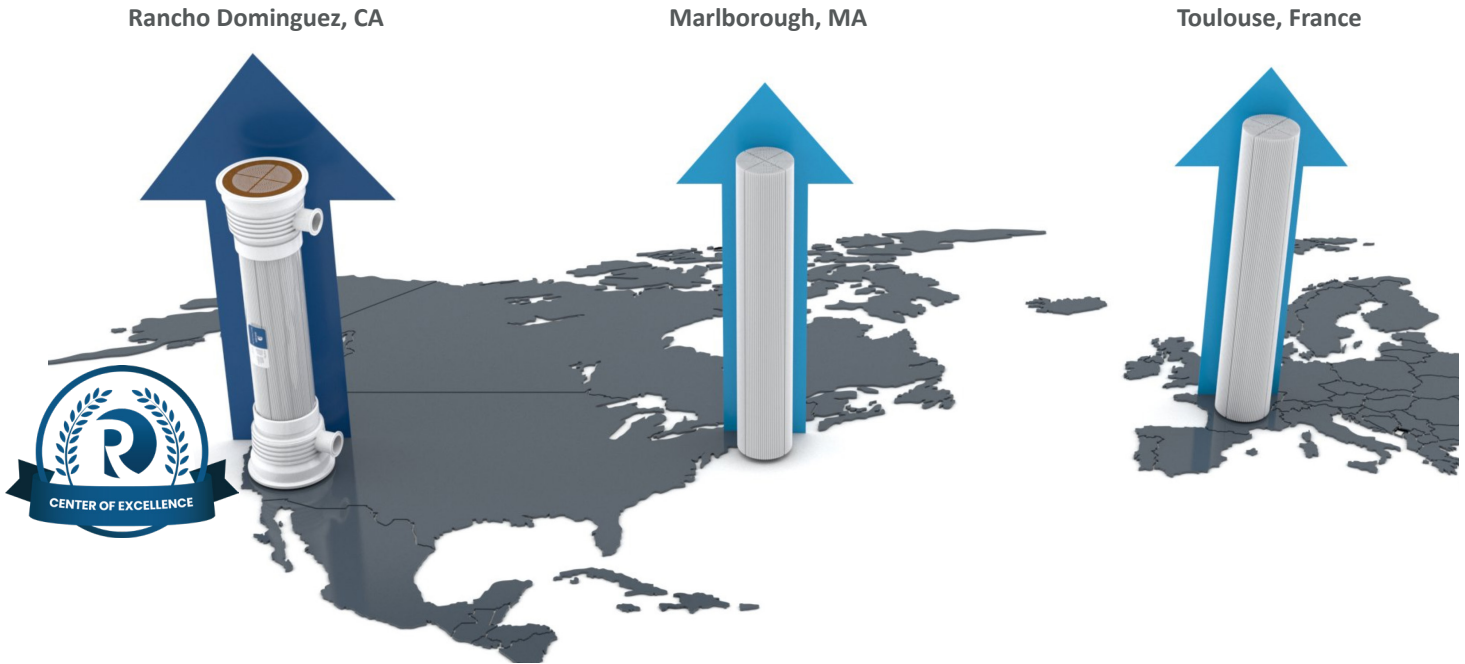
Important hollow fiber measurements

Hollow fiber filters contain several important measurements required when engineering a process. Total length is the span from one end of the module to the other. Effective length is the span between the two permeate ports. "OD" refers to the outer diameter of the module housing.

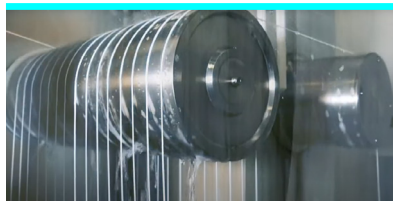


A strong supply chain built for now and the future

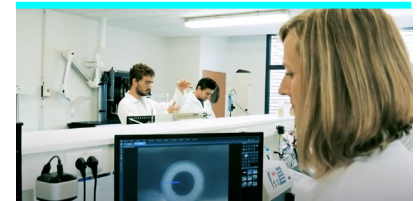
Supply chain strength for high volume products, such as filters, is a critical attribute when selecting for a process. Repligen is the only global manufacturer of hollow fibers with multiple plants on multiple continents. This supply chain has been built for the future with capacity for both current market demand and the projected growth.



Rancho Dominguez, CA (USA)



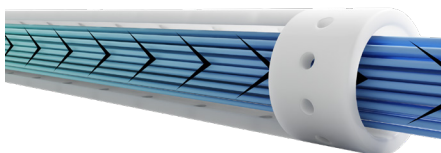
Marlborough, MA (USA)



Toulouse, Occitania (France)

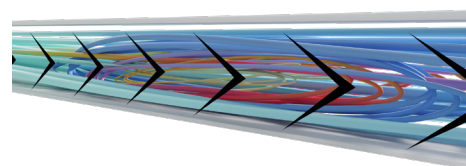
Laminar flow for high flux with low shear

Hollow fibers possess a smooth internal wall and tubular channel geometry, that promotes laminar flow with high flux. The low shear and turbulence of **laminar flow** helps maintain the integrity of shear sensitive modalities such as lentivirus.



Laminar flow

Flow is primarily straight and streamlined.



Turbulent flow

Irregular, chaotic flow creates eddies that change flow in both magnitude and direction.

Product Parameters by Scale

Scale	Module Family	Processing Volumes	Filter Effective Length	Module Length	Surface Area	Module External Diameter	Connector Type		Fittings Kit	
							Feed/Retentate	Permeate		
Lab	MicroKros	1 - 100 mL	7.9 in (20 cm)	9.1 in (23 cm)	0.0140 - 0.0301 ft ² (13 - 28 cm ²)	0.18 in (0.46 cm)	MLL	FL	ACPX-CD	
			16.3 in (41.5 cm)	17.7 in (45 cm)	0.0280 - 0.0635 ft ² (26 - 59 cm ²)					
			25.6 in (65 cm)	26.8 in (68 cm)	0.0441 - 0.0990 ft ² (41 - 92 cm ²)					
	MidiKros	100 mL - 3 L	7.9 in (20 cm)	9.8 in (25 cm)	0.0807 - 0.2045 ft ² (75 - 190 cm ²)	0.375 in (0.95 cm)	FLL	FLL	ACPX-CD	
			16.3 in (41.5 cm)	17.7 in (45 cm)	0.1668 - 0.4198 ft ² (155 - 390 cm ²)					
	MidiKros TC	100 mL - 3 L	7.9 in (20 cm)	9.1 in (23 cm)	0.0807 - 0.2045 ft ² (75 - 190 cm ²)	0.375 in (0.95 cm)	1/2 in TC	FLL	ACPX-T-01N	
			16.3 in (41.5 cm)	17.3 in (44 cm)	0.1668 - 0.4198 ft ² (155 - 390 cm ²)					
	MiniKros Sampler	3 L - 15 L	7.9 in (20 cm)	9.8 in (25 cm)	0.51 - 1.08 ft ² (470 - 1,000 cm ²)	0.738 in (1.87 cm)	3/4 in TC	3/4 in TC	ACPX-S-01N	
			16.3 in (41.5 cm)	18.5 in (47 cm)	1.05 - 2.37 ft ² (980 - 2,200 cm ²)					
			25.6 in (65 cm)	27.6 in (70 cm)	1.61 - 3.66 ft ² (1,500 - 3,400 cm ²)					
	Pilot	MiniKros	5 L - 50 L	7.9 in (20 cm)	9.8 in (25 cm)	1.67 - 3.34 ft ² (1,550 - 3,100 cm ²)	1.305 in (3.31 cm)	1.5 in TC	3/4 in TC	ACPX-N
				16.3 in (41.5 cm)	18.1 in (46 cm)	3.5 - 7 ft ² (3,250 - 6,500 cm ²)				
25.6 in (65 cm)				27.6 in (70 cm)	5.49 - 10.76 ft ² (5,100 - 10,000 cm ²)					
Production	KrosFlo	10 - 100 L	7.9 in (20 cm)	9.1 in (23 cm)	8.45 - 17.22 ft ² (7,850 - 16,000 cm ²)	2.75 in (6.98 cm)	3 in TC	1.5 in TC	ACPX-K	
			16.3 in (41.5 cm)	18.1 in (46 cm)	17.76 - 34.98 ft ² (16,500 - 32,500 cm ²)					
			25.6 in (65 cm)	27.2 in (69 cm)	27.45 - 54.9 ft ² (25,500 - 51,000 cm ²)					
	KrosFlo Max	100 L - 1000 L+	16.3 in (41.5 cm)	20.3 in (51.5 cm)	46.28 - 111.94 ft ² (43,000 - 104,000)	4.57 in (11.61 cm)	6 in TC	1.5 in TC	ACPX-X2-01N	
			19.7 in (50 cm)	23.6 in (60 cm)	55.97 - 134.55 ft ² (52,000 - 125,000 cm ²)					
			26.8 in (68 cm)	30.7 in (78 cm)	76.42 - 184.06 ft ² (71,000 - 171,000 cm ²)					
			42.5 in (108 cm)	46.5 in (118 cm)	121.63 - 136.81 ft ² (113,000 - 127,100 cm ²)					

Product Parameters by Module Family

Module Family	Fiber ID	Fiber Count	Filter Effective Length	Surface Area
MPES - Modified Polyethersulfone				
MicroKros	0.5 mm	6	7.9 in (20 cm) 16.3 in (41.5 cm) 25.6 in (65 cm)	0.022 ft ² (20 cm ²) 0.043 ft ² (40 cm ²) 0.065 ft ² (60 cm ²)
	0.75 mm	3	7.9 in (20 cm) 16.3 in (41.5 cm) 25.6 in (65 cm)	0.016 ft ² (15 cm ²) 0.032 ft ² (30 cm ²) 0.048 ft ² (45 cm ²)
	1 mm	2	7.9 in (20 cm) 16.3 in (41.5 cm) 25.6 in (65 cm)	0.014 ft ² (13 cm ²) 0.028 ft ² (26 cm ²) 0.044 ft ² (41 cm ²)
MidiKros/MidiKros TC	0.5 mm	36	7.9 in (20 cm) 16.3 in (41.5 cm) 25.6 in (65 cm)	0.124 ft ² (115 cm ²) 0.253 ft ² (235 cm ²) 0.398 ft ² (370 cm ²)
	0.75 mm	18	7.9 in (20 cm) 16.3 in (41.5 cm) 25.6 in (65 cm)	0.091 ft ² (85 cm ²) 0.188 ft ² (175 cm ²) 0.296 ft ² (275 cm ²)
	1 mm	12	7.9 in (20 cm) 16.3 in (41.5 cm) 25.6 in (65 cm)	0.081 ft ² (75 cm ²) 0.167 ft ² (155 cm ²) 0.264 ft ² (245 cm ²)
MiniKros Sampler	0.5 mm	250	7.9 in (20 cm) 16.3 in (41.5 cm) 25.6 in (65 cm)	0.85 ft ² (790 cm ²) 1.722 ft ² (1,600 cm ²) 2.799 ft ² (2,600 cm ²)
	0.75 mm	110	7.9 in (20 cm) 16.3 in (41.5 cm) 25.6 in (65 cm)	0.56 ft ² (520 cm ²) 1.157 ft ² (1,075 cm ²) 1.83 ft ² (1,700 cm ²)
	1 mm	78	7.9 in (20 cm) 16.3 in (41.5 cm) 25.6 in (65 cm)	0.527 ft ² (490 cm ²) 1.076 ft ² (1,000 cm ²) 1.722 ft ² (1,600 cm ²)
MiniKros	0.5 mm	830	7.9 in (20 cm) 16.3 in (41.5 cm) 25.6 in (65 cm)	2.799 ft ² (2,600 cm ²) 5.813 ft ² (5,400 cm ²) 9.149 ft ² (8,500 cm ²)
	0.75 mm	400	7.9 in (20 cm) 16.3 in (41.5 cm) 25.6 in (65 cm)	1.938 ft ² (1,800 cm ²) 4.198 ft ² (2,390 cm ²) 6.566 ft ² (6,100 cm ²)
	1 mm	250	7.9 in (20 cm) 16.3 in (41.5 cm) 25.6 in (65 cm)	1.668 ft ² (1,550 cm ²) 3.498 ft ² (3,250 cm ²) 5.49 ft ² (5,100 cm ²)

Module Family	Fiber ID	Fiber Count	Filter Effective Length	Surface Area
MPES - Modified Polyethersulfone (continued)				
KrosFlo	0.5 mm	4000	7.9 in (20 cm)	13.455 ft ² (12,500 cm ²)
			16.3 in (41.5 cm)	27.986 ft ² (26,000 cm ²)
			25.6 in (65 cm)	44.132 ft ² (41,000 cm ²)
KrosFlo	0.75 mm	1900	7.9 in (20 cm)	9.688 ft ² (9,000 cm ²)
			16.3 in (41.5 cm)	19.913 ft ² (18,500 cm ²)
			25.6 in (65 cm)	31.215 ft ² (29,000 cm ²)
KrosFlo	1 mm	1250	7.9 in (20 cm)	8.45 ft ² (7,850 cm ²)
			16.3 in (41.5 cm)	17.76 ft ² (16,500 cm ²)
			25.6 in (65 cm)	27.448 ft ² (25,500 cm ²)
KrosFlo Max	0.5 mm	12000	16.3 in (41.5 cm)	83.958 ft ² (78,000 cm ²)
			19.7 in (50 cm)	101.181 ft ² (94,000 cm ²)
			26.8 in (68 cm)	137.778 ft ² (128,000 cm ²)
	0.75 mm	5000	16.3 in (41.5 cm)	52.635 ft ² (48,900 cm ²)
			19.7 in (50 cm)	62.431 ft ² (58,000 cm ²)
			26.8 in (68 cm)	86.111 ft ² (80,000 cm ²)
1 mm	3330	42.5 in (108 cm)	136.809 ft ² (127,100 cm ²)	
		16.3 in (41.5 cm)	46.285 ft ² (43,000 cm ²)	
		19.7 in (50 cm)	55.972 ft ² (52,000 cm ²)	
1 mm	3330	26.8 in (68 cm)	76.424 ft ² (71,000 cm ²)	
		42.5 in (108 cm)	121.632 ft ² (113,000 cm ²)	
PES - Polyethersulfone				
MicroKros	0.5 mm	9	7.9 in (20 cm)	0.003 ft ² (28 cm ²)
MidiKros/MidiKros TC			16.3 in (41.5 cm)	0.064 ft ² (59 cm ²)
			25.6 in (65 cm)	0.099 ft ² (92 cm ²)
			7.9 in (20 cm)	0.151 ft ² (140 cm ²)
MiniKros Sampler			16.3 in (41.5 cm)	0.312 ft ² (290 cm ²)
			25.6 in (65 cm)	0.495 ft ² (460 cm ²)
			7.9 in (20 cm)	1.076 ft ² (1,000 cm ²)
MiniKros			16.3 in (41.5 cm)	2.368 ft ² (2,200 cm ²)
	25.6 in (65 cm)	3.66 ft ² (3,400 cm ²)		
	7.9 in (20 cm)	3.337 ft ² (3,100 cm ²)		
KrosFlo	16.3 in (41.5 cm)	6.997 ft ² (6,500 cm ²)		
	25.6 in (65 cm)	10.764 ft ² (10,000 cm ²)		
	7.9 in (20 cm)	17.222 ft ² (16,000 cm ²)		
KrosFlo	16.3 in (41.5 cm)	34.983 ft ² (32,500 cm ²)		
	25.6 in (65 cm)	54.896 ft ² (51,000 cm ²)		
	16.3 in (41.5 cm)	98.167 ft ² (91,200 cm ²)		
KrosFlo Max	19.7 in (50 cm)	118.403 ft ² (110,000 cm ²)		
	26.8 in (68 cm)	161.459 ft ² (150,000 cm ²)		

Module Family	Fiber ID	Fiber Count	Filter Effective Length	Surface Area
PES - Polyethersulfone (continued)				
MicroKros	1 mm	2	7.9 in (20 cm)	0.014 ft ² (13 cm ²)
			16.3 in (41.5 cm)	0.028 ft ² (26 cm ²)
			25.6 in (65 cm)	0.044 ft ² (41 cm ²)
MidiKros/MidiKros TC		14	7.9 in (20 cm)	0.194 ft ² (180 cm ²)
			16.3 in (41.5 cm)	0.095 ft ² (88 cm ²)
			25.6 in (65 cm)	0.312 ft ² (290 cm ²)
MiniKros Sampler		75	7.9 in (20 cm)	0.506 ft ² (470 cm ²)
	16.3 in (41.5 cm)		1.055 ft ² (980 cm ²)	
	25.6 in (65 cm)		1.615 ft ² (1,500 cm ²)	
MiniKros	250	7.9 in (20 cm)	1.69 ft ² (1,570 cm ²)	
		16.3 in (41.5 cm)	3.509 ft ² (3,260 cm ²)	
		25.6 in (65 cm)	5.49 ft ² (5,100 cm ²)	
KrosFlo	1250	7.9 in (20 cm)	8.45 ft ² (7,850 cm ²)	
		16.3 in (41.5 cm)	17.76 ft ² (16,500 cm ²)	
		25.6 in (65 cm)	27.448 ft ² (25,500 cm ²)	
KrosFlo Max	3350	16.3 in (41.5 cm)	46.823 ft ² (43,500 cm ²)	
		19.7 in (50 cm)	56.51 ft ² (52,500 cm ²)	
		26.8 in (68 cm)	76.962 ft ² (71,500 cm ²)	
		42.5 in (108 cm)	122.17 ft ² (113,500 cm ²)	
ME - Mixed Cellulose Ester				
MicroKros	0.63 mm	5	7.9 in (20 cm)	0.022 ft ² (20 cm ²)
			16.3 in (41.5 cm)	0.044 ft ² (41 cm ²)
			25.6 in (65 cm)	0.07 ft ² (65 cm ²)
	1 mm	2	7.9 in (20 cm)	0.014 ft ² (13 cm ²)
			16.3 in (41.5 cm)	0.028 ft ² (26 cm ²)
			25.6 in (65 cm)	0.044 ft ² (41 cm ²)
MidiKros/MidiKros TC	0.63 mm	26	7.9 in (20 cm)	0.113 ft ² (105 cm ²)
			16.3 in (41.5 cm)	0.231 ft ² (215 cm ²)
			25.6 in (65 cm)	0.361 ft ² (335 cm ²)
	1 mm	15	7.9 in (20 cm)	0.21 ft ² (195 cm ²)
			16.3 in (41.5 cm)	0.101 ft ² (94 cm ²)
			25.6 in (65 cm)	0.328 ft ² (305 cm ²)
MiniKros Sampler	0.63 mm	180	7.9 in (20 cm)	0.775 ft ² (720 cm ²)
			16.3 in (41.5 cm)	1.615 ft ² (1,500 cm ²)
			25.6 in (65 cm)	2.53 ft ² (2,350 cm ²)
	1 mm	80	7.9 in (20 cm)	0.538 ft ² (500 cm ²)
			16.3 in (41.5 cm)	1.13 ft ² (1,050 cm ²)
			25.6 in (65 cm)	1.776 ft ² (1,650 cm ²)

Module Family	Fiber ID	Fiber Count	Filter Effective Length	Surface Area	
ME - Mixed Cellulose Ester (continued)					
MiniKros	0.63 mm	590	7.9 in (20 cm)	2.53 ft ² (2,350 cm ²)	
			16.3 in (41.5 cm)	5.274 ft ² (4,900 cm ²)	
			25.6 in (65 cm)	8.234 ft ² (7,650 cm ²)	
	1 mm	260	7.9 in (20 cm)	1.776 ft ² (1,650 cm ²)	
			16.3 in (41.5 cm)	3.66 ft ² (3,400 cm ²)	
			25.6 in (65 cm)	5.705 ft ² (5,300 cm ²)	
KrosFlo	0.63 mm	3000	7.9 in (20 cm)	12.917 ft ² (12,000 cm ²)	
			16.3 in (41.5 cm)	26.91 ft ² (25,000 cm ²)	
			25.6 in (65 cm)	41.979 ft ² (39,000 cm ²)	
	1 mm	1300	7.9 in (20 cm)	8.826 ft ² (8,200 cm ²)	
			16.3 in (41.5 cm)	18.299 ft ² (17,000 cm ²)	
			25.6 in (65 cm)	28.524 ft ² (26,500 cm ²)	
KrosFlo Max	0.63 mm	9000	16.3 in (41.5 cm)	79.653 ft ² (74,000 cm ²)	
			19.7 in (50 cm)	95.799 ft ² (89,000 cm ²)	
			26.8 in (68 cm)	130.243 ft ² (121,000 cm ²)	
	1 mm	3500	16.3 in (41.5 cm)	48.976 ft ² (45,000 cm ²)	
			19.7 in (50 cm)	59.201 ft ² (55,000 cm ²)	
			26.8 in (68 cm)	80.729 ft ² (75,000 cm ²)	
			42.5 in (108 cm)	127.552 ft ² (118,500 cm ²)	
PS - Polysulfone					
MicroKros	0.50 mm	9	7.9 in (20 cm)	0.030 ft ² (28 cm ²)	
			16.3 in (41.5 cm)	0.064 ft ² (59 cm ²)	
			25.6 in (65 cm)	0.099 ft ² (92 cm ²)	
MidiKros/MidiKros TC			60	7.9 in (20 cm)	0.205 ft ² (190 cm ²)
				16.3 in (41.5 cm)	0.420 ft ² (390 cm ²)
				25.6 in (65 cm)	0.657 ft ² (610 cm ²)
MiniKros Sampler			330	7.9 in (20 cm)	1.076 ft ² (1,000 cm ²)
	16.3 in (41.5 cm)	2.368 ft ² (2,200 cm ²)			
	25.6 in (65 cm)	3.660 ft ² (3,400 cm ²)			
MiniKros	1000	7.9 in (20 cm)	3.337 ft ² (3,100 cm ²)		
		16.3 in (41.5 cm)	6.997 ft ² (6,500 cm ²)		
		25.6 in (65 cm)	10.764 ft ² (10,000 cm ²)		
KrosFlo	5000	7.9 in (20 cm)	17.222 ft ² (16,000 cm ²)		
		16.3 in (41.5 cm)	34.983 ft ² (32,500 cm ²)		
		25.6 in (65 cm)	54.896 ft ² (51,000 cm ²)		
KrosFlo Max	16000	16.3 in (41.5 cm)	111.945 ft ² (104,000 cm ²)		
		19.7 in (50.0 cm)	134.549 ft ² (125,000 cm ²)		
		26.8 in (68.0 cm)	184.063 ft ² (171,000 cm ²)		

Product Parameters by Chemistry

Membrane Chemistry	MWCO	Lumen ID		
		0.50	0.75	1.00
mPES	3 kD	•		•
	5 kD	•		•
	10 kD	•		•
	30 kD	•		•
	50 kD	•		•
	70 kD	•		•
	100 kD	•		•
	300 kD	•		•
	500 kD	•		•
	750 kD	•		•
	0.65 µm		•	

Membrane Chemistry	MWCO	Lumen ID	
		0.50	1.00
PES	0.20 µm	•	•
	0.50 µm		•

Membrane Chemistry	MWCO	Lumen ID
		0.50
PS	10 kD	•
	50 kD	•
	500 kD	•
	0.05 µm	•

Membrane Chemistry	MWCO	Lumen ID	
		0.63	1.00
ME	0.10 µm	•	
	0.20 µm	•	•

Part Number Keys

Each of the four chemistries has available module sizes, effective lengths, MWCOs and inner diameters. Determine the part number for a module by combining the 6 components in sequence from Module Family to Packaging.

K	02	E	100	05	N
Module Family	Effective Length	Membrane Type	MWCO Rating	Fiber Inner Lumen Diameter	Packing
C = MicroKros	02 = 20 cm	E = mPES (Modified Polyethersulfone)	UF (Ultrafiltration)	05 = 0.5 mm	N = Normal/Dry
D = MidiKros	04 = 41.5 cm	P = PES (Polyethersulfone)	003 = 3 kD	06 = 0.63 mm (ME Only)	S = Sterile
T = MidiKros TC	06 = 65 cm	S = PS (Polysulfone)	005 = 5 kD	07 = 0.75 mm (MF Only)	P = Pre-wetted (PS Only)
S = MiniKros Sampler	KrosFlo Max Only	M = ME (Mixed Cellulose Ether)	010 = 10 kD	10 = 1.0 mm	
N = MiniKros	04 = 41.5 cm		030 = 30 kD		
K = KrosFlo	05 = 50 cm		050 = 50 kD		
X = KrosFlo Max	06 = 68 cm		070 = 70 kD		
	10 = 108 cm		100 = 100 kD		
			300 = 300 kD		
			500 = 500 kD		
			750 = 750 kD		
			MF (Macrofiltration)		
			05U = 0.05 µm		
			10U = 0.10 µm		
			20U = 0.20 µm		
			50U = 0.50 µm		
			65U = 0.65 µm		

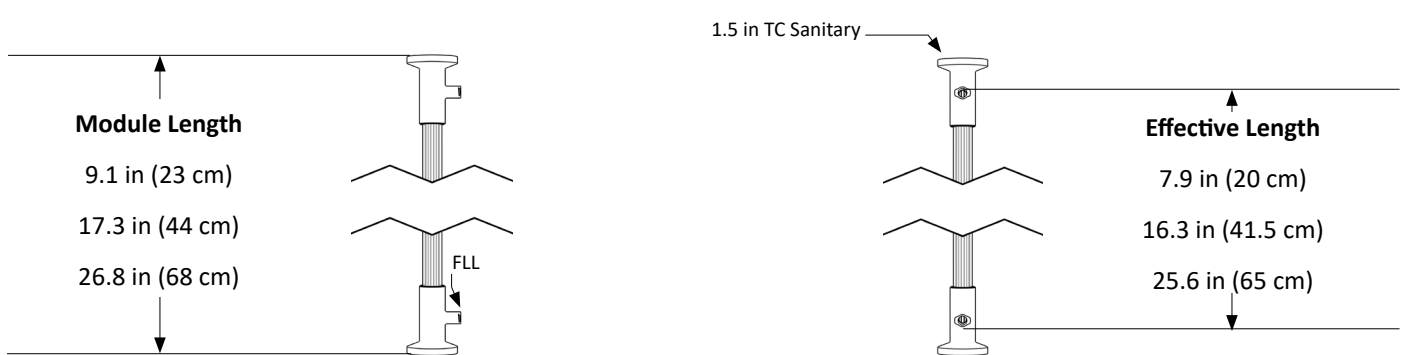
Module Dimensions

Development of complete process and flow path requirements may require specific values for the hollow fiber module. Engineering drawing contain values for module length and filter effective length.

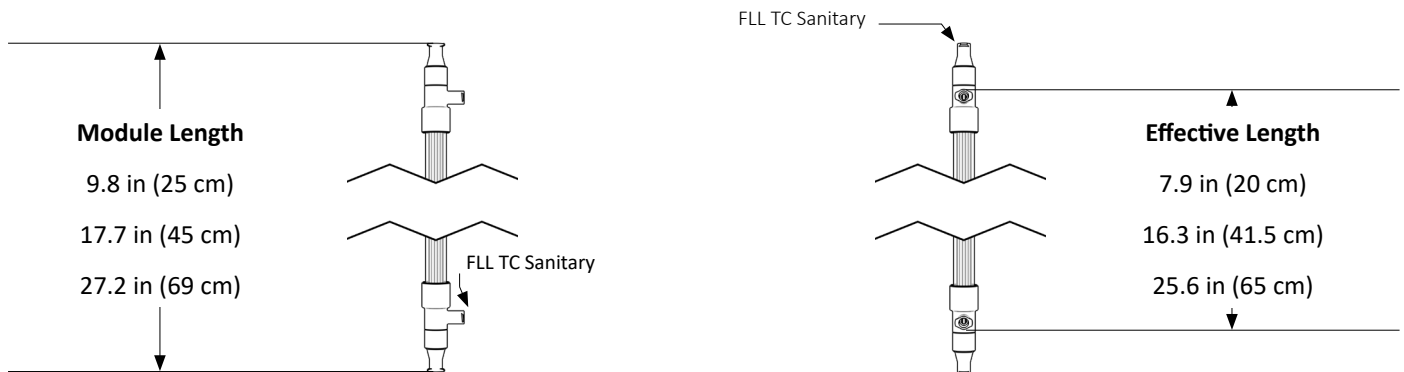
MicroKros



MidiKros TC

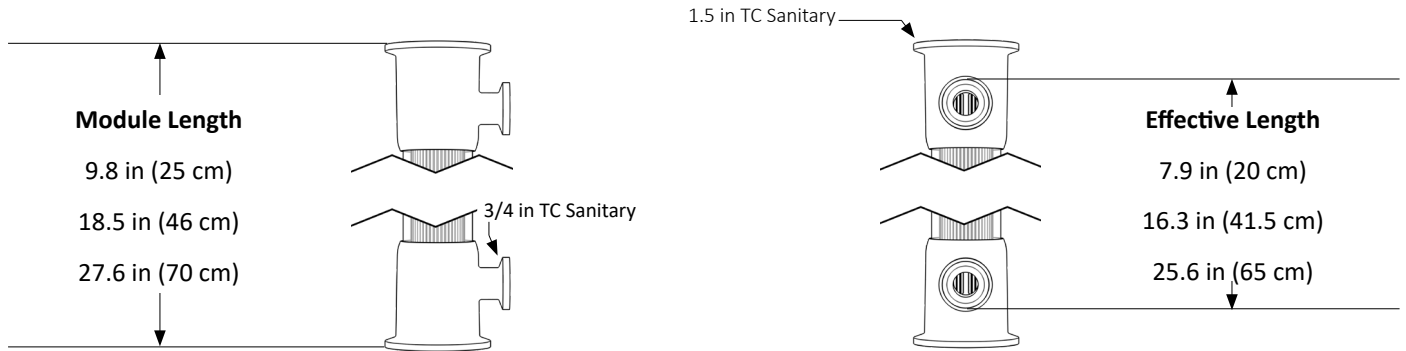


MidiKros

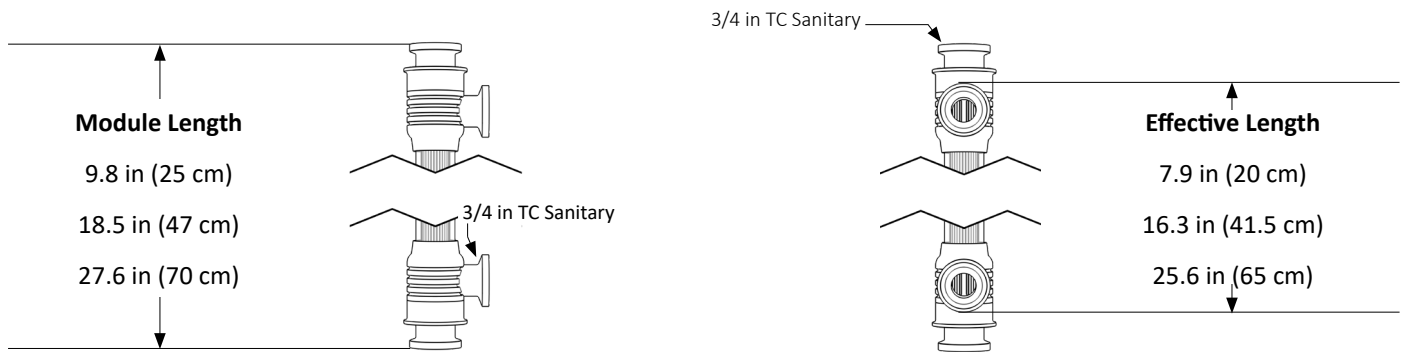


Module Dimensions (continued)

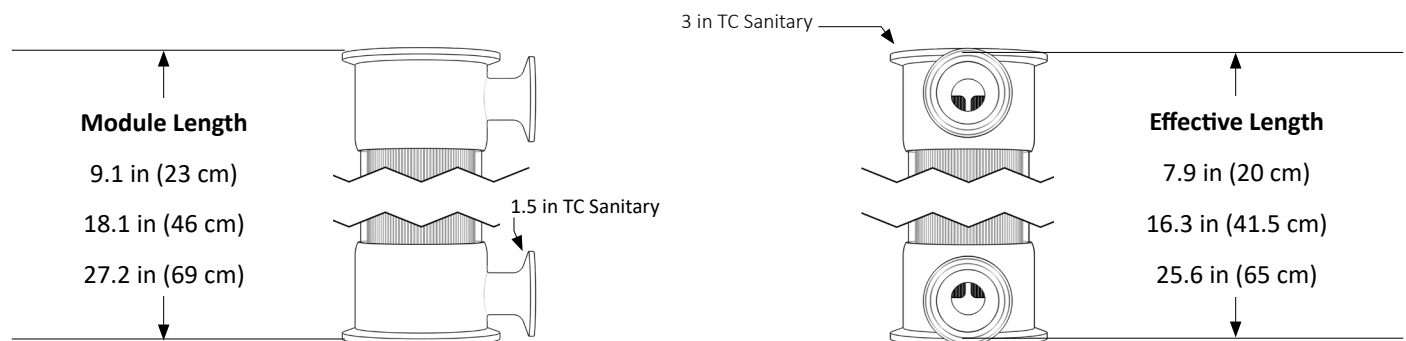
MiniKros



MiniKros Sampler

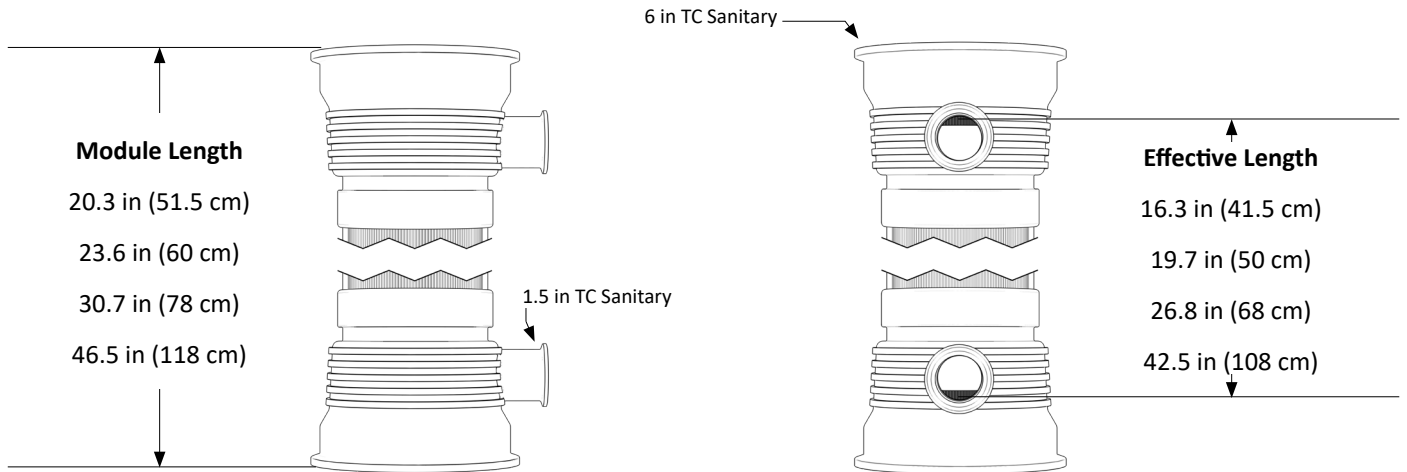


KrosFlo



Module Dimensions (continued)

KrosFlo Max



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