

MicroKros® and MidiKros® Hollow Fiber Membranes for Tangential Laboratory Separations



Product Information & Operating Instructions



SPECTRUMLABS.COM
advancing the science of separation™

Table of Contents

Hollow Fiber Membranes for Tangential Flow Laboratory Separations	2
Spectrum Tangential Flow Hollow Fiber Membrane Technology for Microfiltration and Ultrafiltration	2
Benefits	2
Applications	3
Module Specifications	3
Figure 1 - MicroKros®	3
Figure 2 - MidiKros® & MidiKros® TC	4
Dry Membrane Preparation	4
Pre-flushed Membrane (wet) Preparation	5
Hollow Fiber Membrane Storage and Shelf Life	5
Instructions for Use	5
Setup Using Syringes	5
Figure 3	5
Crossflow Filtration	6
Diafiltration	6
Pump Operation	6
Ordering Information	7
MicroKros®	7
MidiKros®	10
MidiKros® TC	13
Membrane Compatibility Table	12

Hollow Fiber Membranes for Tangential Flow Laboratory Separations

The MicroKros® and the MidiKros® disposable filters are designed for crossflow membrane separation of small volumes. These are the first practical tangential flow devices for processing volumes as small as 2 ml. They are an ideal alternative to centrifugation for applications where pellet formation is undesirable. Flow can be supplied using either syringes or a peristaltic pump like the KRlli or KRI. The MicroKros® modules have a total membrane surface area ranging from 13 to 92 cm² to process volume ranging from 2 ml to 50 ml. The MidiKros® modules have a total membrane surface area of 75 to 610 cm² to process volumes from 20 ml to 200 ml.

Spectrum Tangential Flow Hollow Fiber Membrane Technology for Microfiltration and Ultrafiltration

Spectrum tangential flow membrane modules utilize advanced hollow fiber flow geometry in which every fluid path is identical in length and dimension. The membrane module housing is constructed of polysulfone with inlet and outlet ports for retentate. Either a syringe or a peristaltic pump drives the process fluid through the fiber lumen via the inlet port and out the outlet port. The retained solutes (retentate) are progressively concentrated and recirculated tangentially through the lumens. Solvent and small solutes (permeate) pass through the hollow fiber pores into the extracapillary side and out the filtrate port on the side. Uniform flow distribution makes it practical to process difficult streams such as those containing suspended solids, fibers, particles and cells.

Benefits

- Tangential flow reduces concentration polarization and enhances filtration rate.
- Hollow fiber membranes provide large surface areas in compact housings.
- Ready to use.
- Gentle protein, cell and particle washing without pellet formation.
- Materials are non-pyrogenic by LAL, low bioburden.
- Membranes are manufactured in a ISO Class 7 clean room under GMPs.

MicroKros® & MidiKros® Hollow Fiber Modules

- Meet USP class VI standard for biocompatibility.
- Priced for single use, membranes ensure consistent results and high product recovery.
- Animal Free

Applications

- Concentration of protein, antibodies and microbial cells.
- Diafiltration of proteins or uniform latex particles and other diagnostic particles.
- Clarification of lysates to remove cell debris from soluble proteins.
- Recovering serum from whole blood.
- Media clarification for hollow fiber bioreactors.
- Virus separation.

Module Specifications

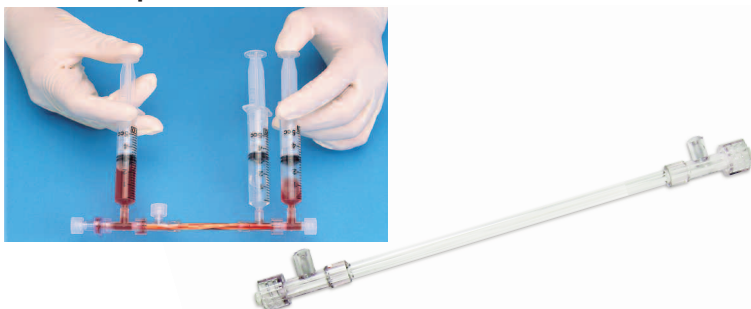


Figure 1. MicroKros® Module and MicroKros® module hand operation using syringes.

Specifications - MicroKros®

Housing:	Polysulfone
Connections:	Male Luer Lok (MLL) inlet and outlet, Female Luer Lok (FLL) filtrate
Potting:	Epoxy
Process Volume:	2 – 50 ml
Surface Area:	13 to 92 cm ²

Membrane	Fiber ID	MWCO
Modified Polyethersulfone (mPES)	0.5 mm	3 kD, 5 kD, 10 kD, 30 kD, 50 kD, 70 kD, 100 kD, 300 kD, 500 kD
	1.0 mm	3 kD, 10 kD, 30 kD, 50 kD, 70 kD, 100 kD, 300 kD, 500 kD
Mixed Cellulose Ester (ME)	0.6 mm	0.1 µm, 0.2 µm
	1.0 mm	0.2 µm
Polyethersulfone (PES)	0.5 mm	0.2 µm
	1.0 mm	0.2 µm, 0.5 µm
Polysulfone (PS)	0.5 mm	10 kD, 50kD, 500kD, 0.05 µm

MicroKros® & MidiKros® Hollow Fiber Modules



Figure 2. MidiKros® & MidiKros® TC module.

Specifications - MidiKros® & MidiKros® TC

Housing:	Polysulfone
Connections:	Female Luer Lok (FLL) inlet and outlet, Female Luer Lok (FLL) filtrate
Connections (TC):	1/2" Triclover (TC) inlet and outlet, Female Luer Lok (FLL) filtrate
Potting:	Epoxy
Process Volume:	20 – 200 ml
Surface Area:	75 to 610 cm ²

Membrane	Fiber ID	MWCO
Modified Polyethersulfone (mPES)	0.5 mm	3 kD, 5 kD, 10 kD, 30 kD, 50 kD, 70 kD, 100 kD, 300 kD, 500 kD
	1.0 mm	3 kD, 10 kD, 30 kD, 50 kD, 70 kD, 100 kD, 300 kD, 500 kD
Mixed Cellulose Ester (ME)	0.6 mm	0.1 µm, 0.2 µm
	1.00 mm	0.2 µm
Polyethersulfone (PES)	0.5 mm	0.2 µm
	1.0 mm	0.2 µm, 0.5 µm
Polysulfone (PS)	0.5 mm	10 kD, 50 kD, 500 kD, 0.05 µm

The MicroKros® and MidiKros® hollow fiber membrane modules are available wet or dry. Mixed Cellulose Ester (ME), Polyethersulfone (PES) modules and Modified Polyethersulfone (mPES) are packaged dry because the fibers are hydrophilic and do not need pre-flushing. However, the Polysulfone (PS) modules are hydrophobic and require preflushing. They are available wet in hydrogen peroxide to add convenience by eliminating the pre-flushing procedure.

Dry Membrane Preparation

For Mixed Cellulose Ester and Modified Polyethersulfone fibers, flush with 2 mL of water per cm² of surface area to remove trace levels of glycerin. For Polyethersulfone (PES) flush with 1 mL of water

MicroKros® & MidiKros® Hollow Fiber Modules

per cm² of surface area. For Polysulfone (PS) fibers, flush with 2 mL of 20% alcohol (isopropanol, ethanol or methanol) per cm² of surface area and follow by flushing with 2 mL of water per cm² of surface area to remove all alcohol.

Pre-flushed Membrane (wet) Preparation

Flush module with 2 mL per cm² of surface area with water or preferred buffer to remove hydrogen peroxide.

Storage and Shelf Life

Hollow Fiber modules both wet and dry should be stored at room temperature. If they are stored in a dry (50% R.H.) and cool (<95°F / 35°C) environment they will have a shelf life of three years.

Instructions for Use

Setup Using Syringes

To operate the MicroKros® module using syringes, connect an arm of each female luer tee to both male luer retentate ports of the module. Connect to the two remaining luer tee arms, a male luer cap and a male luer check valve. Connect a second male luer cap to the female end of the check valve. Connect luer syringes to the two open stems of the luer tees. One syringe contains the product to be processed, the second is empty. A third luer syringe and a male luer cap are connected to the two filtrate ports (Fig. 3).

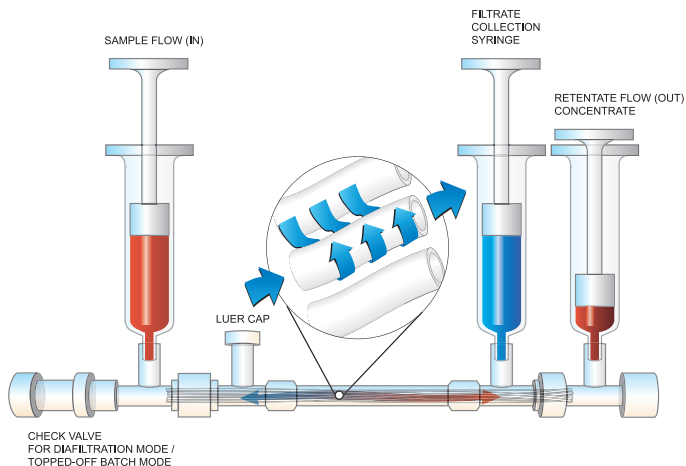


Figure 3. MicroKros® module hand operation mode.

MicroKros® & MidiKros® Hollow Fiber Modules

Crossflow Filtration

Tangential flow or crossflow filtration is initiated by applying pressure to the retentive syringe containing the process fluid, while allowing the other syringes to move freely. Fluid will flow through the lumen of the fibers from the full syringe downstream to the empty retentate syringe. Now apply pressure to the receiving syringe to change the direction of flow back to the originating syringe. This process is continued by applying pressure first to one syringe then to the other, repeatedly. Cell or particle-free filtrate is forced into the filtrate syringe. Note that it is important to apply pressure to only one retentate syringe at a time. Applying pressure to both syringes will induce backpressure and reduce the efficiency of crossflow filtration. Typical filtration rate varies from 1 ml/min - 5 ml/min depending on the membrane type.

Diafiltration

For washing cells or particles to remove unbound free protein, diafiltration can be performed as follows: Introduce 1 ml of the product to be washed (the volume will show as 0.5 ml on the syringes, as 0.5 ml is the hold-up volume of the module with the syringes attached). Add 4.5 ml of particle free buffer via the check valve. This step dilutes all components by 5.5 fold. Concentrate the cells or particles back to 1 mL (0.5 ml on the syringe) by the concentration techniques above. This step restores the original concentration of cells or particles while not concentrating surfactants, proteins or other solutes that freely permeate the membrane. By this procedure unwanted solutes are reduced in concentration by a factor of 5.5. Additional purification can be achieved by repeating the process. Final purification will be $5.5 * n$, where n is the number of times that the process is repeated.

Pump Operation

The MicroKros® can also be operated using a peristaltic pump. The MidiKros® modules can only be operated with a pump. This technique requires that either MicroKros® or MidiKros® modules be installed with tubing connecting the module inlet to the retentate outlet. The tubing must have a tee connecting the feed/buffer reservoir to the pump suction, and a capped connection for removing air in the pump discharge. Fluid is pumped in a closed loop across the membrane surface.

As filtrate is generated, more fluid is automatically drawn into the loop. Overall processing volume is equal to the holdup volume of

MicroKros® & MidiKros® Hollow Fiber Modules

the tubing plus the module retentate volume. It is possible to achieve retentate volumes as low as 2 ml by using short tubing.

Ordering Information

MicroKros®

Part Number	Membrane Chemistry		Fiber ID (mm)	Permeate			SA (cm ²)	
	MWCO			Inlet / Retentate	Condition	Effective Length (cm)		
C02-E003-05-N	3 kD	mPES	0.50	MLL	FLL	Dry	20.0	20
C02-E003-05-S	3 kD	mPES	0.50	MLL	FLL	Sterile	20.0	20
C02-E003-10-N	3 kD	mPES	1.00	MLL	FLL	Dry	20.0	13
C02-E003-10-S	3 kD	mPES	1.00	MLL	FLL	Sterile	20.0	13
C02-E005-05-N	5 kD	mPES	0.50	MLL	FLL	Dry	20.0	20
C02-E005-05-S	5 kD	mPES	0.50	MLL	FLL	Sterile	20.0	20
C02-E010-05-N	10 kD	mPES	0.50	MLL	FLL	Dry	20.0	20
C02-E010-05-S	10 kD	mPES	0.50	MLL	FLL	Sterile	20.0	20
C02-E010-10-N	10 kD	mPES	1.00	MLL	FLL	Dry	20.0	13
C02-E010-10-S	10 kD	mPES	1.00	MLL	FLL	Sterile	20.0	13
C02-E030-05-N	30 kD	mPES	0.50	MLL	FLL	Dry	20.0	20
C02-E030-05-S	30 kD	mPES	0.50	MLL	FLL	Sterile	20.0	20
C02-E030-10-N	30 kD	mPES	1.00	MLL	FLL	Dry	20.0	13
C02-E030-10-S	30 kD	mPES	1.00	MLL	FLL	Sterile	20.0	13
C02-E050-05-N	50 kD	mPES	0.50	MLL	FLL	Dry	20.0	20
C02-E050-05-S	50 kD	mPES	0.50	MLL	FLL	Sterile	20.0	20
C02-E050-10-N	50 kD	mPES	1.00	MLL	FLL	Dry	20.0	13
C02-E050-10-S	50 kD	mPES	1.00	MLL	FLL	Sterile	20.0	13
C02-E070-05-N	70 kD	mPES	0.50	MLL	FLL	Dry	20.0	20
C02-E070-05-S	70 kD	mPES	0.50	MLL	FLL	Sterile	20.0	20
C02-E070-10-N	70 kD	mPES	1.00	MLL	FLL	Dry	20.0	13
C02-E070-10-S	70 kD	mPES	1.00	MLL	FLL	Sterile	20.0	13
C02-E100-05-N	100 kD	mPES	0.50	MLL	FLL	Dry	20.0	20
C02-E100-05-S	100 kD	mPES	0.50	MLL	FLL	Sterile	20.0	20
C02-E100-10-N	100 kD	mPES	1.00	MLL	FLL	Dry	20.0	13
C02-E100-10-S	100 kD	mPES	1.00	MLL	FLL	Sterile	20.0	13
C02-E300-05-N	300 kD	mPES	0.50	MLL	FLL	Dry	20.0	20
C02-E300-05-S	300 kD	mPES	0.50	MLL	FLL	Sterile	20.0	20
C02-E300-10-N	300 kD	mPES	1.00	MLL	FLL	Dry	20.0	13
C02-E300-10-S	300 kD	mPES	1.00	MLL	FLL	Sterile	20.0	13
C02-E500-05-N	500 kD	mPES	0.50	MLL	FLL	Dry	20.0	20
C02-E500-05-S	500 kD	mPES	0.50	MLL	FLL	Sterile	20.0	20
C02-E500-10-N	500 kD	mPES	1.00	MLL	FLL	Dry	20.0	13
C02-E500-10-S	500 kD	mPES	1.00	MLL	FLL	Sterile	20.0	13
C02-M10U-06-N	0.1 µm	ME	0.63	MLL	FLL	Dry	20.0	20
C02-M10U-06-S	0.1 µm	ME	0.63	MLL	FLL	Sterile	20.0	20
C02-M20U-06-N	0.2 µm	ME	0.63	MLL	FLL	Dry	20.0	20
C02-M20U-06-S	0.2 µm	ME	0.63	MLL	FLL	Sterile	20.0	20
C02-M20U-10-N	0.2 µm	ME	1.00	MLL	FLL	Dry	20.0	13
C02-M20U-10-S	0.2 µm	ME	1.00	MLL	FLL	Sterile	20.0	13
C02-P20U-05-N	0.2 µm	PES	0.50	MLL	FLL	Dry	20.0	28
C02-P20U-05-S	0.2 µm	PES	0.50	MLL	FLL	Sterile	20.0	28
C02-P20U-10-N	0.2 µm	PES	1.00	MLL	FLL	Dry	20.0	13
C02-P20U-10-S	0.2 µm	PES	1.00	MLL	FLL	Sterile	20.0	13
C02-P50U-10-N	0.5 µm	PES	1.00	MLL	FLL	Dry	20.0	13
C02-P50U-10-S	0.5 µm	PES	1.00	MLL	FLL	Sterile	20.0	13

MicroKros® & MidiKros® Hollow Fiber Modules

Part Number	Membrane Chemistry		Fiber ID (mm)	Permeate			SA (cm ²)	
	MWCO			Inlet / Retentate		Condition	Effective Length (cm)	
C02-S010-05-N	10 kD	PS	0.50	MLL	FLL	Dry	20.0	28
C02-S010-05-P	10 kD	PS	0.50	MLL	FLL	Pre-Wetted	20.0	28
C02-S010-05-S	10 kD	PS	0.50	MLL	FLL	Sterile	20.0	28
C02-S050-05-N	50 kD	PS	0.50	MLL	FLL	Dry	20.0	28
C02-S050-05-P	50 kD	PS	0.50	MLL	FLL	Pre-Wetted	20.0	28
C02-S050-05-S	50 kD	PS	0.50	MLL	FLL	Sterile	20.0	28
C02-S05U-05-N	0.05 µm	PS	0.50	MLL	FLL	Dry	20.0	28
C02-S05U-05-P	0.05 µm	PS	0.50	MLL	FLL	Pre-Wetted	20.0	28
C02-S05U-05-S	0.05 µm	PS	0.50	MLL	FLL	Sterile	20.0	28
C02-S500-05-N	500 kD	PS	0.50	MLL	FLL	Dry	20.0	28
C02-S500-05-P	500 kD	PS	0.50	MLL	FLL	Pre-Wetted	20.0	28
C02-S500-05-S	500 kD	PS	0.50	MLL	FLL	Sterile	20.0	28

MidiKros®

Part Number	Membrane Chemistry		Fiber ID (mm)	Permeate			SA (cm ²)	
	MWCO			Inlet / Retentate		Condition	Effective Length (cm)	
D02-E003-05-N	3 kD	mPES	0.50	FLL	FLL	Dry	20.0	115
D02-E003-05-S	3 kD	mPES	0.50	FLL	FLL	Sterile	20.0	115
D02-E003-10-N	3 kD	mPES	1.00	FLL	FLL	Dry	20.0	75
D02-E003-10-S	3 kD	mPES	1.00	FLL	FLL	Sterile	20.0	75
D02-E005-05-N	5 kD	mPES	0.50	FLL	FLL	Dry	20.0	115
D02-E005-05-S	5 kD	mPES	0.50	FLL	FLL	Sterile	20.0	115
D02-E010-05-N	10 kD	mPES	0.50	FLL	FLL	Dry	20.0	115
D02-E010-05-S	10 kD	mPES	0.50	FLL	FLL	Sterile	20.0	115
D02-E010-10-N	10 kD	mPES	1.00	FLL	FLL	Dry	20.0	75
D02-E010-10-S	10 kD	mPES	1.00	FLL	FLL	Sterile	20.0	75
D02-E030-05-N	30 kD	mPES	0.50	FLL	FLL	Dry	20.0	115
D02-E030-05-S	30 kD	mPES	0.50	FLL	FLL	Sterile	20.0	115
D02-E030-10-N	30 kD	mPES	1.00	FLL	FLL	Dry	20.0	75
D02-E030-10-S	30 kD	mPES	1.00	FLL	FLL	Sterile	20.0	75
D02-E050-05-N	50 kD	mPES	0.50	FLL	FLL	Dry	20.0	115
D02-E050-05-S	50 kD	mPES	0.50	FLL	FLL	Sterile	20.0	115
D02-E050-10-N	50 kD	mPES	1.00	FLL	FLL	Dry	20.0	75
D02-E050-10-S	50 kD	mPES	1.00	FLL	FLL	Sterile	20.0	75
D02-E070-05-N	70 kD	mPES	0.50	FLL	FLL	Dry	20.0	115
D02-E070-05-S	70 kD	mPES	0.50	FLL	FLL	Sterile	20.0	115
D02-E070-10-N	70 kD	mPES	1.00	FLL	FLL	Dry	20.0	75
D02-E070-10-S	70 kD	mPES	1.00	FLL	FLL	Sterile	20.0	75
D02-E100-05-N	100 kD	mPES	0.50	FLL	FLL	Dry	20.0	115
D02-E100-05-S	100 kD	mPES	0.50	FLL	FLL	Sterile	20.0	115
D02-E100-10-N	100 kD	mPES	1.00	FLL	FLL	Dry	20.0	75
D02-E100-10-S	100 kD	mPES	1.00	FLL	FLL	Sterile	20.0	75
D02-E300-05-N	300 kD	mPES	0.50	FLL	FLL	Dry	20.0	115
D02-E300-05-S	300 kD	mPES	0.50	FLL	FLL	Sterile	20.0	115
D02-E300-10-N	300 kD	mPES	1.00	FLL	FLL	Dry	20.0	75
D02-E300-10-S	300 kD	mPES	1.00	FLL	FLL	Sterile	20.0	75
D02-E500-05-N	500 kD	mPES	0.50	FLL	FLL	Dry	20.0	115

MicroKros® & MidiKros® Hollow Fiber Modules

Part Number	Membrane Chemistry		Permeate				SA (cm ²)	
	MWCO	Fiber ID (mm)	Inlet / Retentate		Effective Length (cm)			
					Condition			
D02-E500-05-S	500 kD	mPES	0.50	FLL	FLL	Sterile	20.0	115
D02-E500-10-N	500 kD	mPES	1.00	FLL	FLL	Dry	20.0	75
D02-E500-10-S	500 kD	mPES	1.00	FLL	FLL	Sterile	20.0	75
D02-M10U-06-N	0.1 µm	ME	0.63	FLL	FLL	Dry	20.0	105
D02-M10U-06-S	0.1 µm	ME	0.63	FLL	FLL	Sterile	20.0	105
D02-M20U-06-N	0.2 µm	ME	0.63	FLL	FLL	Dry	20.0	105
D02-M20U-06-S	0.2 µm	ME	0.63	FLL	FLL	Sterile	20.0	105
D02-M20U-10-N	0.2 µm	ME	1.00	FLL	FLL	Dry	20.0	94
D02-M20U-10-S	0.2 µm	ME	1.00	FLL	FLL	Sterile	20.0	94
D02-P20U-05-N	0.2 µm	PES	0.50	FLL	FLL	Dry	20.0	140
D02-P20U-05-S	0.2 µm	PES	0.50	FLL	FLL	Sterile	20.0	140
D02-P20U-10-N	0.2 µm	PES	1.00	FLL	FLL	Dry	20.0	88
D02-P20U-10-S	0.2 µm	PES	1.00	FLL	FLL	Sterile	20.0	88
D02-P50U-10-N	0.5 µm	PES	1.00	FLL	FLL	Dry	20.0	88
D02-P50U-10-S	0.5 µm	PES	1.00	FLL	FLL	Sterile	20.0	88
D02-S010-05-N	10 kD	PS	0.50	FLL	FLL	Dry	20.0	190
D02-S010-05-P	10 kD	PS	0.50	FLL	FLL	Pre-Wetted	20.0	190
D02-S010-05-S	10 kD	PS	0.50	FLL	FLL	Sterile	20.0	190
D02-S050-05-N	50 kD	PS	0.50	FLL	FLL	Dry	20.0	190
D02-S050-05-P	50 kD	PS	0.50	FLL	FLL	Pre-Wetted	20.0	190
D02-S050-05-S	50 kD	PS	0.50	FLL	FLL	Sterile	20.0	190
D02-S05U-05-N	0.05 µm	PS	0.50	FLL	FLL	Dry	20.0	190
D02-S05U-05-P	0.05 µm	PS	0.50	FLL	FLL	Pre-Wetted	20.0	190
D02-S05U-05-S	0.05 µm	PS	0.50	FLL	FLL	Sterile	20.0	190
D02-S500-05-N	500 kD	PS	0.50	FLL	FLL	Dry	20.0	190
D02-S500-05-P	500 kD	PS	0.50	FLL	FLL	Pre-Wetted	20.0	190
D02-S500-05-S	500 kD	PS	0.50	FLL	FLL	Sterile	20.0	190
D04-E003-05-N	3 kD	mPES	0.50	FLL	FLL	Dry	41.5	235
D04-E003-05-S	3 kD	mPES	0.50	FLL	FLL	Sterile	41.5	235
D04-E003-10-N	3 kD	mPES	1.00	FLL	FLL	Dry	41.5	155
D04-E003-10-S	3 kD	mPES	1.00	FLL	FLL	Sterile	41.5	155
D04-E005-05-N	5 kD	mPES	0.50	FLL	FLL	Dry	41.5	235
D04-E005-05-S	5 kD	mPES	0.50	FLL	FLL	Sterile	41.5	235
D04-E010-05-N	10 kD	mPES	0.50	FLL	FLL	Dry	41.5	235
D04-E010-05-S	10 kD	mPES	0.50	FLL	FLL	Sterile	41.5	235
D04-E010-10-N	10 kD	mPES	1.00	FLL	FLL	Dry	41.5	155
D04-E010-10-S	10 kD	mPES	1.00	FLL	FLL	Sterile	41.5	155
D04-E030-05-N	30 kD	mPES	0.50	FLL	FLL	Dry	41.5	235
D04-E030-05-S	30 kD	mPES	0.50	FLL	FLL	Sterile	41.5	235
D04-E030-10-N	30 kD	mPES	1.00	FLL	FLL	Dry	41.5	155
D04-E030-10-S	30 kD	mPES	1.00	FLL	FLL	Sterile	41.5	155
D04-E050-05-N	50 kD	mPES	0.50	FLL	FLL	Dry	41.5	235
D04-E050-05-S	50 kD	mPES	0.50	FLL	FLL	Sterile	41.5	235
D04-E050-10-N	50 kD	mPES	1.00	FLL	FLL	Dry	41.5	155
D04-E050-10-S	50 kD	mPES	1.00	FLL	FLL	Sterile	41.5	155
D04-E070-05-N	70 kD	mPES	0.50	FLL	FLL	Dry	41.5	235
D04-E070-05-S	70 kD	mPES	0.50	FLL	FLL	Sterile	41.5	235
D04-E070-10-N	70 kD	mPES	1.00	FLL	FLL	Dry	41.5	155
D04-E070-10-S	70 kD	mPES	1.00	FLL	FLL	Sterile	41.5	155
D04-E100-05-N	100 kD	mPES	0.50	FLL	FLL	Dry	41.5	235
D04-E100-05-S	100 kD	mPES	0.50	FLL	FLL	Sterile	41.5	235
D04-E100-10-N	100 kD	mPES	1.00	FLL	FLL	Dry	41.5	155
D04-E100-10-S	100 kD	mPES	1.00	FLL	FLL	Sterile	41.5	155
D04-E300-05-N	300 kD	mPES	0.50	FLL	FLL	Dry	41.5	235
D04-E300-05-S	300 kD	mPES	0.50	FLL	FLL	Sterile	41.5	235

MicroKros® & MidiKros® Hollow Fiber Modules

Part Number	Membrane Chemistry		Permeate			Effective Length (cm)		SA (cm ²)
	MWCO	Fiber ID (mm)	Inlet / Retentate	Condition				
D04-E300-10-N	300 kD	mPES	1.00	FLL	FLL	Dry	41.5	155
D04-E300-10-S	300 kD	mPES	1.00	FLL	FLL	Sterile	41.5	155
D04-E500-05-N	500 kD	mPES	0.50	FLL	FLL	Dry	41.5	235
D04-E500-05-S	500 kD	mPES	0.50	FLL	FLL	Sterile	41.5	235
D04-E500-10-N	500 kD	mPES	1.00	FLL	FLL	Dry	41.5	155
D04-E500-10-S	500 kD	mPES	1.00	FLL	FLL	Sterile	41.5	155
D04-M10U-06-N	0.1 µm	ME	0.63	FLL	FLL	Dry	41.5	215
D04-M10U-06-S	0.1 µm	ME	0.63	FLL	FLL	Sterile	41.5	215
D04-M20U-06-N	0.2 µm	ME	0.63	FLL	FLL	Dry	41.5	215
D04-M20U-06-S	0.2 µm	ME	0.63	FLL	FLL	Sterile	41.5	215
D04-M20U-10-N	0.2 µm	ME	1.00	FLL	FLL	Dry	41.5	195
D04-M20U-10-S	0.2 µm	ME	1.00	FLL	FLL	Sterile	41.5	195
D04-P20U-05-N	0.2 µm	PES	0.50	FLL	FLL	Dry	41.5	290
D04-P20U-05-S	0.2 µm	PES	0.50	FLL	FLL	Sterile	41.5	290
D04-P20U-10-N	0.2 µm	PES	1.00	FLL	FLL	Dry	41.5	180
D04-P20U-10-S	0.2 µm	PES	1.00	FLL	FLL	Sterile	41.5	180
D04-P50U-10-N	0.5 µm	PES	1.00	FLL	FLL	Dry	41.5	180
D04-P50U-10-S	0.5 µm	PES	1.00	FLL	FLL	Sterile	41.5	180
D04-S010-05-N	10 kD	PS	0.50	FLL	FLL	Dry	41.5	390
D04-S010-05-P	10 kD	PS	0.50	FLL	FLL	Pre-Wetted	41.5	390
D04-S010-05-S	10 kD	PS	0.50	FLL	FLL	Sterile	41.5	390
D04-S050-05-N	50 kD	PS	0.50	FLL	FLL	Dry	41.5	390
D04-S050-05-P	50 kD	PS	0.50	FLL	FLL	Pre-Wetted	41.5	390
D04-S050-05-S	50 kD	PS	0.50	FLL	FLL	Sterile	41.5	390
D04-S05U-05-N	0.05 µm	PS	0.50	FLL	FLL	Dry	41.5	390
D04-S05U-05-P	0.05 µm	PS	0.50	FLL	FLL	Pre-Wetted	41.5	390
D04-S05U-05-S	0.05 µm	PS	0.50	FLL	FLL	Sterile	41.5	390
D04-S500-05-N	500 kD	PS	0.50	FLL	FLL	Dry	41.5	390
D04-S500-05-P	500 kD	PS	0.50	FLL	FLL	Pre-Wetted	41.5	390
D04-S500-05-S	500 kD	PS	0.50	FLL	FLL	Sterile	41.5	390
D06-E003-05-N	3 kD	mPES	0.50	FLL	FLL	Dry	65.0	370
D06-E003-05-S	3 kD	mPES	0.50	FLL	FLL	Sterile	65.0	370
D06-E003-10-N	3 kD	mPES	1.00	FLL	FLL	Dry	65.0	245
D06-E003-10-S	3 kD	mPES	1.00	FLL	FLL	Sterile	65.0	245
D06-E005-05-N	5 kD	mPES	0.50	FLL	FLL	Dry	65.0	370
D06-E005-05-S	5 kD	mPES	0.50	FLL	FLL	Sterile	65.0	370
D06-E010-05-N	10 kD	mPES	0.50	FLL	FLL	Dry	65.0	370
D06-E010-05-S	10 kD	mPES	0.50	FLL	FLL	Sterile	65.0	370
D06-E010-10-N	10 kD	mPES	1.00	FLL	FLL	Dry	65.0	245
D06-E010-10-S	10 kD	mPES	1.00	FLL	FLL	Sterile	65.0	245
D06-E030-05-N	30 kD	mPES	0.50	FLL	FLL	Dry	65.0	370
D06-E030-05-S	30 kD	mPES	0.50	FLL	FLL	Sterile	65.0	370
D06-E030-10-N	30 kD	mPES	1.00	FLL	FLL	Dry	65.0	245
D06-E030-10-S	30 kD	mPES	1.00	FLL	FLL	Sterile	65.0	245
D06-E050-05-N	50 kD	mPES	0.50	FLL	FLL	Dry	65.0	370
D06-E050-05-S	50 kD	mPES	0.50	FLL	FLL	Sterile	65.0	370
D06-E050-10-N	50 kD	mPES	1.00	FLL	FLL	Dry	65.0	245
D06-E050-10-S	50 kD	mPES	1.00	FLL	FLL	Sterile	65.0	245
D06-E070-05-N	70 kD	mPES	0.50	FLL	FLL	Dry	65.0	370
D06-E070-05-S	70 kD	mPES	0.50	FLL	FLL	Sterile	65.0	370
D06-E070-10-N	70 kD	mPES	1.00	FLL	FLL	Dry	65.0	245
D06-E070-10-S	70 kD	mPES	1.00	FLL	FLL	Sterile	65.0	245
D06-E100-05-N	100 kD	mPES	0.50	FLL	FLL	Dry	65.0	370
D06-E100-05-S	100 kD	mPES	0.50	FLL	FLL	Sterile	65.0	370
D06-E100-10-N	100 kD	mPES	1.00	FLL	FLL	Dry	65.0	245

MicroKros® & MidiKros® Hollow Fiber Modules

Part Number	Membrane Chemistry		Fiber ID (mm)	Permeate			Effective Length (cm)	SA (cm ²)
	MWCO			Inlet / Retentate	Condition			
D06-E100-10-S	100 kD	mPES	1.00	FLL	FLL	Sterile	65.0	245
D06-E300-05-N	300 kD	mPES	0.50	FLL	FLL	Dry	65.0	370
D06-E300-05-S	300 kD	mPES	0.50	FLL	FLL	Sterile	65.0	370
D06-E300-10-N	300 kD	mPES	1.00	FLL	FLL	Dry	65.0	245
D06-E300-10-S	300 kD	mPES	1.00	FLL	FLL	Sterile	65.0	245
D06-E500-05-N	500 kD	mPES	0.50	FLL	FLL	Dry	65.0	370
D06-E500-05-S	500 kD	mPES	0.50	FLL	FLL	Sterile	65.0	370
D06-E500-10-N	500 kD	mPES	1.00	FLL	FLL	Dry	65.0	245
D06-E500-10-S	500 kD	mPES	1.00	FLL	FLL	Sterile	65.0	245
D06-M10U-06-N	0.1 µm	ME	0.63	FLL	FLL	Dry	65.0	335
D06-M10U-06-S	0.1 µm	ME	0.63	FLL	FLL	Sterile	65.0	335
D06-M20U-06-N	0.2 µm	ME	0.63	FLL	FLL	Dry	65.0	335
D06-M20U-06-S	0.2 µm	ME	0.63	FLL	FLL	Sterile	65.0	335
D06-M20U-10-N	0.2 µm	ME	1.00	FLL	FLL	Dry	65.0	305
D06-M20U-10-S	0.2 µm	ME	1.00	FLL	FLL	Sterile	65.0	305
D06-P20U-05-N	0.2 µm	PES	0.50	FLL	FLL	Dry	65.0	460
D06-P20U-05-S	0.2 µm	PES	0.50	FLL	FLL	Sterile	65.0	460
D06-P20U-10-N	0.2 µm	PES	1.00	FLL	FLL	Dry	65.0	290
D06-P20U-10-S	0.2 µm	PES	1.00	FLL	FLL	Sterile	65.0	290
D06-P50U-10-N	0.5 µm	PES	1.00	FLL	FLL	Dry	65.0	290
D06-P50U-10-S	0.5 µm	PES	1.00	FLL	FLL	Sterile	65.0	290
D06-S010-05-N	10 kD	PS	0.50	FLL	FLL	Dry	65.0	610
D06-S010-05-P	10 kD	PS	0.50	FLL	FLL	Pre-Wetted	65.0	610
D06-S010-05-S	10 kD	PS	0.50	FLL	FLL	Sterile	65.0	610
D06-S050-05-N	50 kD	PS	0.50	FLL	FLL	Dry	65.0	610
D06-S050-05-P	50 kD	PS	0.50	FLL	FLL	Pre-Wetted	65.0	610
D06-S050-05-S	50 kD	PS	0.50	FLL	FLL	Sterile	65.0	610
D06-S05U-05-N	0.05 µm	PS	0.50	FLL	FLL	Dry	65.0	610
D06-S05U-05-P	0.05 µm	PS	0.50	FLL	FLL	Pre-Wetted	65.0	610
D06-S05U-05-S	0.05 µm	PS	0.50	FLL	FLL	Sterile	65.0	610
D06-S500-05-N	500 kD	PS	0.50	FLL	FLL	Dry	65.0	610
D06-S500-05-P	500 kD	PS	0.50	FLL	FLL	Pre-Wetted	65.0	610
D06-S500-05-S	500 kD	PS	0.50	FLL	FLL	Sterile	65.0	610

MidiKros® TC

Part Number	Membrane Chemistry		Fiber ID (mm)	Permeate			Effective Length (cm)	SA (cm ²)
	MWCO			Inlet / Retentate	Condition			
T02-E003-05-N	3 kD	mPES	0.50	1/2" TC	FLL	Dry	20.0	115
T02-E003-05-S	3 kD	mPES	0.50	1/2" TC	FLL	Sterile	20.0	115
T02-E003-10-N	3 kD	mPES	1.00	1/2" TC	FLL	Dry	20.0	75
T02-E003-10-S	3 kD	mPES	1.00	1/2" TC	FLL	Sterile	20.0	75
T02-E005-05-N	5 kD	mPES	0.50	1/2" TC	FLL	Dry	20.0	115
T02-E005-05-S	5 kD	mPES	0.50	1/2" TC	FLL	Sterile	20.0	115
T02-E010-05-N	10 kD	mPES	0.50	1/2" TC	FLL	Dry	20.0	115
T02-E010-05-S	10 kD	mPES	0.50	1/2" TC	FLL	Sterile	20.0	115
T02-E010-10-N	10 kD	mPES	1.00	1/2" TC	FLL	Dry	20.0	75
T02-E010-10-S	10 kD	mPES	1.00	1/2" TC	FLL	Sterile	20.0	75
T02-E030-05-N	30 kD	mPES	0.50	1/2" TC	FLL	Dry	20.0	115

MicroKros® & MidiKros® Hollow Fiber Modules

Part Number	Membrane Chemistry		Permeate				SA (cm ²)	
	MWCO	Fiber ID (mm)	Inlet / Retentate		Effective Length (cm)			
					Condition			
T02-E030-05-S	30 kD	mPES	0.50	1/2" TC	FLL	Sterile	20.0	115
T02-E030-10-N	30 kD	mPES	1.00	1/2" TC	FLL	Dry	20.0	75
T02-E030-10-S	30 kD	mPES	1.00	1/2" TC	FLL	Sterile	20.0	75
T02-E050-05-N	50 kD	mPES	0.50	1/2" TC	FLL	Dry	20.0	115
T02-E050-05-S	50 kD	mPES	0.50	1/2" TC	FLL	Sterile	20.0	115
T02-E050-10-N	50 kD	mPES	1.00	1/2" TC	FLL	Dry	20.0	75
T02-E050-10-S	50 kD	mPES	1.00	1/2" TC	FLL	Sterile	20.0	75
T02-E070-05-N	70 kD	mPES	0.50	1/2" TC	FLL	Dry	20.0	115
T02-E070-05-S	70 kD	mPES	0.50	1/2" TC	FLL	Sterile	20.0	115
T02-E070-10-N	70 kD	mPES	1.00	1/2" TC	FLL	Dry	20.0	75
T02-E070-10-S	70 kD	mPES	1.00	1/2" TC	FLL	Sterile	20.0	75
T02-E100-05-N	100 kD	mPES	0.50	1/2" TC	FLL	Dry	20.0	115
T02-E100-05-S	100 kD	mPES	0.50	1/2" TC	FLL	Sterile	20.0	115
T02-E100-10-N	100 kD	mPES	1.00	1/2" TC	FLL	Dry	20.0	75
T02-E100-10-S	100 kD	mPES	1.00	1/2" TC	FLL	Sterile	20.0	75
T02-E300-05-N	300 kD	mPES	0.50	1/2" TC	FLL	Dry	20.0	115
T02-E300-05-S	300 kD	mPES	0.50	1/2" TC	FLL	Sterile	20.0	115
T02-E300-10-N	300 kD	mPES	1.00	1/2" TC	FLL	Dry	20.0	75
T02-E300-10-S	300 kD	mPES	1.00	1/2" TC	FLL	Sterile	20.0	75
T02-E500-05-N	500 kD	mPES	0.50	1/2" TC	FLL	Dry	20.0	115
T02-E500-05-S	500 kD	mPES	0.50	1/2" TC	FLL	Sterile	20.0	115
T02-E500-10-N	500 kD	mPES	1.00	1/2" TC	FLL	Dry	20.0	75
T02-E500-10-S	500 kD	mPES	1.00	1/2" TC	FLL	Sterile	20.0	75
T02-M10U-06-N	0.1 µm	ME	0.63	1/2" TC	FLL	Dry	20.0	105
T02-M10U-06-S	0.1 µm	ME	0.63	1/2" TC	FLL	Sterile	20.0	105
T02-M20U-06-N	0.2 µm	ME	0.63	1/2" TC	FLL	Dry	20.0	105
T02-M20U-06-S	0.2 µm	ME	0.63	1/2" TC	FLL	Sterile	20.0	105
T02-M20U-10-N	0.2 µm	ME	1.00	1/2" TC	FLL	Dry	20.0	94
T02-M20U-10-S	0.2 µm	ME	1.00	1/2" TC	FLL	Sterile	20.0	94
T02-P20U-05-N	0.2 µm	PES	0.50	1/2" TC	FLL	Dry	20.0	140
T02-P20U-05-S	0.2 µm	PES	0.50	1/2" TC	FLL	Sterile	20.0	140
T02-P20U-10-N	0.2 µm	PES	1.00	1/2" TC	FLL	Dry	20.0	88
T02-P20U-10-S	0.2 µm	PES	1.00	1/2" TC	FLL	Sterile	20.0	88
T02-P50U-10-N	0.5 µm	PES	1.00	1/2" TC	FLL	Dry	20.0	88
T02-P50U-10-S	0.5 µm	PES	1.00	1/2" TC	FLL	Sterile	20.0	88
T02-S010-05-N	10 kD	PS	0.50	1/2" TC	FLL	Dry	20.0	190
T02-S010-05-P	10 kD	PS	0.50	1/2" TC	FLL	Pre-Wetted	20.0	190
T02-S010-05-S	10 kD	PS	0.50	1/2" TC	FLL	Sterile	20.0	190
T02-S050-05-N	50 kD	PS	0.50	1/2" TC	FLL	Dry	20.0	190
T02-S050-05-P	50 kD	PS	0.50	1/2" TC	FLL	Pre-Wetted	20.0	190
T02-S050-05-S	50 kD	PS	0.50	1/2" TC	FLL	Sterile	20.0	190
T02-S05U-05-N	0.05 µm	PS	0.50	1/2" TC	FLL	Dry	20.0	190
T02-S05U-05-P	0.05 µm	PS	0.50	1/2" TC	FLL	Pre-Wetted	20.0	190
T02-S05U-05-S	0.05 µm	PS	0.50	1/2" TC	FLL	Sterile	20.0	190
T02-S500-05-N	500 kD	PS	0.50	1/2" TC	FLL	Dry	20.0	190
T02-S500-05-P	500 kD	PS	0.50	1/2" TC	FLL	Pre-Wetted	20.0	190
T02-S500-05-S	500 kD	PS	0.50	1/2" TC	FLL	Sterile	20.0	190
T04-E003-05-N	3 kD	mPES	0.50	1/2" TC	FLL	Dry	41.5	235
T04-E003-05-S	3 kD	mPES	0.50	1/2" TC	FLL	Sterile	41.5	235
T04-E003-10-N	3 kD	mPES	1.00	1/2" TC	FLL	Dry	41.5	155
T04-E003-10-S	3 kD	mPES	1.00	1/2" TC	FLL	Sterile	41.5	155
T04-E005-05-N	5 kD	mPES	0.50	1/2" TC	FLL	Dry	41.5	235
T04-E005-05-S	5 kD	mPES	0.50	1/2" TC	FLL	Sterile	41.5	235
T04-E010-05-N	10 kD	mPES	0.50	1/2" TC	FLL	Dry	41.5	235
T04-E010-05-S	10 kD	mPES	0.50	1/2" TC	FLL	Sterile	41.5	235

MicroKros® & MidiKros® Hollow Fiber Modules

Part Number	Membrane Chemistry		Permeate				SA (cm ²)	
	MWCO	Fiber ID (mm)	Inlet / Retentate		Condition	Effective Length (cm)		
T04-E010-10-N	10 kD	mPES	1.00	1/2" TC	FLL	Dry	41.5	155
T04-E010-10-S	10 kD	mPES	1.00	1/2" TC	FLL	Sterile	41.5	155
T04-E030-05-N	30 kD	mPES	0.50	1/2" TC	FLL	Dry	41.5	235
T04-E030-05-S	30 kD	mPES	0.50	1/2" TC	FLL	Sterile	41.5	235
T04-E030-10-N	30 kD	mPES	1.00	1/2" TC	FLL	Dry	41.5	155
T04-E030-10-S	30 kD	mPES	1.00	1/2" TC	FLL	Sterile	41.5	155
T04-E050-05-N	50 kD	mPES	0.50	1/2" TC	FLL	Dry	41.5	235
T04-E050-05-S	50 kD	mPES	0.50	1/2" TC	FLL	Sterile	41.5	235
T04-E050-10-N	50 kD	mPES	1.00	1/2" TC	FLL	Dry	41.5	155
T04-E050-10-S	50 kD	mPES	1.00	1/2" TC	FLL	Sterile	41.5	155
T04-E070-05-N	70 kD	mPES	0.50	1/2" TC	FLL	Dry	41.5	235
T04-E070-05-S	70 kD	mPES	0.50	1/2" TC	FLL	Sterile	41.5	235
T04-E070-10-N	70 kD	mPES	1.00	1/2" TC	FLL	Dry	41.5	155
T04-E070-10-S	70 kD	mPES	1.00	1/2" TC	FLL	Sterile	41.5	155
T04-E100-05-N	100 kD	mPES	0.50	1/2" TC	FLL	Dry	41.5	235
T04-E100-05-S	100 kD	mPES	0.50	1/2" TC	FLL	Sterile	41.5	235
T04-E100-10-N	100 kD	mPES	1.00	1/2" TC	FLL	Dry	41.5	155
T04-E100-10-S	100 kD	mPES	1.00	1/2" TC	FLL	Sterile	41.5	155
T04-E300-05-N	300 kD	mPES	0.50	1/2" TC	FLL	Dry	41.5	235
T04-E300-05-S	300 kD	mPES	0.50	1/2" TC	FLL	Sterile	41.5	235
T04-E300-10-N	300 kD	mPES	1.00	1/2" TC	FLL	Dry	41.5	155
T04-E300-10-S	300 kD	mPES	1.00	1/2" TC	FLL	Sterile	41.5	155
T04-E500-05-N	500 kD	mPES	0.50	1/2" TC	FLL	Dry	41.5	235
T04-E500-05-S	500 kD	mPES	0.50	1/2" TC	FLL	Sterile	41.5	235
T04-E500-10-N	500 kD	mPES	1.00	1/2" TC	FLL	Dry	41.5	155
T04-E500-10-S	500 kD	mPES	1.00	1/2" TC	FLL	Sterile	41.5	155
T04-M10U-06-N	0.1 µm	ME	0.63	1/2" TC	FLL	Dry	41.5	215
T04-M10U-06-S	0.1 µm	ME	0.63	1/2" TC	FLL	Sterile	41.5	215
T04-M20U-06-N	0.2 µm	ME	0.63	1/2" TC	FLL	Dry	41.5	215
T04-M20U-06-S	0.2 µm	ME	0.63	1/2" TC	FLL	Sterile	41.5	215
T04-M20U-10-N	0.2 µm	ME	1.00	1/2" TC	FLL	Dry	41.5	195
T04-M20U-10-S	0.2 µm	ME	1.00	1/2" TC	FLL	Sterile	41.5	195
T04-P20U-05-N	0.2 µm	PES	0.50	1/2" TC	FLL	Dry	41.5	290
T04-P20U-05-S	0.2 µm	PES	0.50	1/2" TC	FLL	Sterile	41.5	290
T04-P20U-10-N	0.2 µm	PES	1.00	1/2" TC	FLL	Dry	41.5	180
T04-P20U-10-S	0.2 µm	PES	1.00	1/2" TC	FLL	Sterile	41.5	180
T04-P50U-10-N	0.5 µm	PES	1.00	1/2" TC	FLL	Dry	41.5	180
T04-P50U-10-S	0.5 µm	PES	1.00	1/2" TC	FLL	Sterile	41.5	180
T04-S010-05-N	10 kD	PS	0.50	1/2" TC	FLL	Dry	41.5	390
T04-S010-05-P	10 kD	PS	0.50	1/2" TC	FLL	Pre-Wetted	41.5	390
T04-S010-05-S	10 kD	PS	0.50	1/2" TC	FLL	Sterile	41.5	390
T04-S050-05-N	50 kD	PS	0.50	1/2" TC	FLL	Dry	41.5	390
T04-S050-05-P	50 kD	PS	0.50	1/2" TC	FLL	Pre-Wetted	41.5	390
T04-S050-05-S	50 kD	PS	0.50	1/2" TC	FLL	Sterile	41.5	390
T04-S05U-05-N	0.05 µm	PS	0.50	1/2" TC	FLL	Dry	41.5	390
T04-S05U-05-P	0.05 µm	PS	0.50	1/2" TC	FLL	Pre-Wetted	41.5	390
T04-S05U-05-S	0.05 µm	PS	0.50	1/2" TC	FLL	Sterile	41.5	390
T04-S500-05-N	500 kD	PS	0.50	1/2" TC	FLL	Dry	41.5	390
T04-S500-05-P	500 kD	PS	0.50	1/2" TC	FLL	Pre-Wetted	41.5	390
T04-S500-05-S	500 kD	PS	0.50	1/2" TC	FLL	Sterile	41.5	390
T06-E003-05-N	3 kD	mPES	0.50	1/2" TC	FLL	Dry	65.0	370
T06-E003-05-S	3 kD	mPES	0.50	1/2" TC	FLL	Sterile	65.0	370
T06-E003-10-N	3 kD	mPES	1.00	1/2" TC	FLL	Dry	65.0	245
T06-E003-10-S	3 kD	mPES	1.00	1/2" TC	FLL	Sterile	65.0	245
T06-E005-05-N	5 kD	mPES	0.50	1/2" TC	FLL	Dry	65.0	370

MicroKros® & MidiKros® Hollow Fiber Modules

Part Number	Membrane Chemistry		Permeate				SA (cm ²)	
	MWCO	Fiber ID (mm)	Inlet / Retentate		Condition	Effective Length (cm)		
T06-E005-05-S	5 kD	mPES	0.50	1/2" TC	FLL	Sterile	65.0	370
T06-E010-05-N	10 kD	mPES	0.50	1/2" TC	FLL	Dry	65.0	370
T06-E010-05-S	10 kD	mPES	0.50	1/2" TC	FLL	Sterile	65.0	370
T06-E010-10-N	10 kD	mPES	1.00	1/2" TC	FLL	Dry	65.0	245
T06-E010-10-S	10 kD	mPES	1.00	1/2" TC	FLL	Sterile	65.0	245
T06-E030-05-N	30 kD	mPES	0.50	1/2" TC	FLL	Dry	65.0	370
T06-E030-05-S	30 kD	mPES	0.50	1/2" TC	FLL	Sterile	65.0	370
T06-E030-10-N	30 kD	mPES	1.00	1/2" TC	FLL	Dry	65.0	245
T06-E030-10-S	30 kD	mPES	1.00	1/2" TC	FLL	Sterile	65.0	245
T06-E050-05-N	50 kD	mPES	0.50	1/2" TC	FLL	Dry	65.0	370
T06-E050-05-S	50 kD	mPES	0.50	1/2" TC	FLL	Sterile	65.0	370
T06-E050-10-N	50 kD	mPES	1.00	1/2" TC	FLL	Dry	65.0	245
T06-E050-10-S	50 kD	mPES	1.00	1/2" TC	FLL	Sterile	65.0	245
T06-E070-05-N	70 kD	mPES	0.50	1/2" TC	FLL	Dry	65.0	370
T06-E070-05-S	70 kD	mPES	0.50	1/2" TC	FLL	Sterile	65.0	370
T06-E070-10-N	70 kD	mPES	1.00	1/2" TC	FLL	Dry	65.0	245
T06-E070-10-S	70 kD	mPES	1.00	1/2" TC	FLL	Sterile	65.0	245
T06-E100-05-N	100 kD	mPES	0.50	1/2" TC	FLL	Dry	65.0	370
T06-E100-05-S	100 kD	mPES	0.50	1/2" TC	FLL	Sterile	65.0	370
T06-E100-10-N	100 kD	mPES	1.00	1/2" TC	FLL	Dry	65.0	245
T06-E100-10-S	100 kD	mPES	1.00	1/2" TC	FLL	Sterile	65.0	245
T06-E300-05-N	300 kD	mPES	0.50	1/2" TC	FLL	Dry	65.0	370
T06-E300-05-S	300 kD	mPES	0.50	1/2" TC	FLL	Sterile	65.0	370
T06-E300-10-N	300 kD	mPES	1.00	1/2" TC	FLL	Dry	65.0	245
T06-E300-10-S	300 kD	mPES	1.00	1/2" TC	FLL	Sterile	65.0	245
T06-E500-05-N	500 kD	mPES	0.50	1/2" TC	FLL	Dry	65.0	370
T06-E500-05-S	500 kD	mPES	0.50	1/2" TC	FLL	Sterile	65.0	370
T06-E500-10-N	500 kD	mPES	1.00	1/2" TC	FLL	Dry	65.0	245
T06-E500-10-S	500 kD	mPES	1.00	1/2" TC	FLL	Sterile	65.0	245
T06-M10U-06-N	0.1 µm	ME	0.63	1/2" TC	FLL	Dry	65.0	335
T06-M10U-06-S	0.1 µm	ME	0.63	1/2" TC	FLL	Sterile	65.0	335
T06-M20U-06-N	0.2 µm	ME	0.63	1/2" TC	FLL	Dry	65.0	335
T06-M20U-06-S	0.2 µm	ME	0.63	1/2" TC	FLL	Sterile	65.0	335
T06-M20U-10-N	0.2 µm	ME	1.00	1/2" TC	FLL	Dry	65.0	305
T06-M20U-10-S	0.2 µm	ME	1.00	1/2" TC	FLL	Sterile	65.0	305
T06-P20U-05-N	0.2 µm	PES	0.50	1/2" TC	FLL	Dry	65.0	460
T06-P20U-05-S	0.2 µm	PES	0.50	1/2" TC	FLL	Sterile	65.0	460
T06-P20U-10-N	0.2 µm	PES	1.00	1/2" TC	FLL	Dry	65.0	290
T06-P20U-10-S	0.2 µm	PES	1.00	1/2" TC	FLL	Sterile	65.0	290
T06-P50U-10-N	0.5 µm	PES	1.00	1/2" TC	FLL	Dry	65.0	290
T06-P50U-10-S	0.5 µm	PES	1.00	1/2" TC	FLL	Sterile	65.0	290
T06-S010-05-N	10 kD	PS	0.50	1/2" TC	FLL	Dry	65.0	610
T06-S010-05-P	10 kD	PS	0.50	1/2" TC	FLL	Pre-Wetted	65.0	610
T06-S010-05-S	10 kD	PS	0.50	1/2" TC	FLL	Sterile	65.0	610
T06-S050-05-N	50 kD	PS	0.50	1/2" TC	FLL	Dry	65.0	610
T06-S050-05-P	50 kD	PS	0.50	1/2" TC	FLL	Pre-Wetted	65.0	610
T06-S050-05-S	50 kD	PS	0.50	1/2" TC	FLL	Sterile	65.0	610
T06-S05U-05-N	0.05 µm	PS	0.50	1/2" TC	FLL	Dry	65.0	610
T06-S05U-05-P	0.05 µm	PS	0.50	1/2" TC	FLL	Pre-Wetted	65.0	610
T06-S05U-05-S	0.05 µm	PS	0.50	1/2" TC	FLL	Sterile	65.0	610
T06-S500-05-N	500 kD	PS	0.50	1/2" TC	FLL	Dry	65.0	610
T06-S500-05-P	500 kD	PS	0.50	1/2" TC	FLL	Pre-Wetted	65.0	610
T06-S500-05-S	500 kD	PS	0.50	1/2" TC	FLL	Sterile	65.0	610

MicroKros® & MidiKros® Hollow Fiber Modules

Membrane Compatibility Table

This chemical resistance chart is intended for use as a guide, not as a guarantee of chemical compatibility. Variables in temperature, concentrations, durations of exposure and other factors may affect the use of the product. It is recommended to test under your own conditions.

The following codes are used to rate chemical resistance:

- R** Recommended
- L** Limited Exposure
- NR** Not Recommended
- U** Unknown

	Polysulfone (PS)			Polysulfone (PS)			
	Polyethersulfone (PES)			Polyethersulfone (PES)			
	Mixed Cellulose Ester (ME)			Mixed Cellulose Ester (ME)			
Acetic acid (diluted-5%)	L	R	R	1,4 Dioxane	NR	L	L
Acetic acid (med conc-25%)	NR	R	R	Ethers	NR	NR	NR
Acetic acid (glacial)	NR	R	R	Ethyl acetate	NR	NR	NR
Acetone	NR	NR	NR	Ethyl Alcohol	L	R	R
Acetonitrile	NR	NR	NR	Ethyl alcohol (15%)	R	R	R
Ammonium hydroxide (diluted)	NR	R	R	Ethyl alcohol (95%)	L	L	L
Ammonium hydroxide (med conc)	NR	R	R	Ethylene dichloride	NR	NR	NR
Amyl acetate	NR	NR	NR	Ethylene glycol	L	R	R
Amyl alcohol	L	L	L	Ethylene oxide	NR	R	R
Aniline	NR	NR	NR	Formaldehyde (2%)	L	R	R
Benzene	NR	L	L	Formaldehyde (30%)	L	R	R
Benzyl alcohol	NR	NR	NR	Formic acid (25%)	NR	R	R
Boric acid	R	R	R	Formic Acid (50%)	NR	R	R
Brine	R	R	R	Freon®	R	R	R
Bromoform	NR	NR	NR	Gasoline	R	L	L
Butyl acetate	NR	NR	NR	Glycerine	R	R	R
Butyl alcohol	L	R	R	Glycerol	R	R	R
Butyl cellosolve	NR	NR	NR	Hexane	R	R	R
Butyraldehyde	NR	NR	NR	Hexanol	L	R	R
Carbon tetrachloride	NR	NR	NR	Hydrochloric acid (diluted-5%)	R	R	R
Cellosolve	NR	R	R	Hydrochloric acid (med conc-25%)	NR	R	R
Chloracetic acid	NR	NR	NR	Hydrochloric acid (con-37%)	NR	R	R
Chloroform	L	L	L	Hydrofluoric acid (25%)	NR	L	L
Chromic acid	NR	NR	NR	Hydrogen peroxide (30%)	R	R	R
Cresol	NR	NR	NR	Iodine solutions	NR	NR	NR
Cyclohexane	L	L	L	Isobutyl alcohol	R	R	R
Cyclohexanone	NR	NR	NR	Isopropanol	L	R	R
Diacetone alcohol	NR	NR	NR	Isopropyl acetate	NR	NR	NR
Dichloromethane	L	L	L	Isopropyl alcohol	L	R	R
Dimethyl formamide	NR	NR	NR	Isopropyl ether	L	R	R
Dimethylsulfoxide	NR	NR	NR	Jet Fuel 640A	R	R	R

MicroKros® & MidiKros® Hollow Fiber Modules

	Polysulfone (PS)			Polysulfone (PS)			
	Polyethersulfone (PES)			Polyethersulfone (PES)			
	Mixed Cellulose Ester (ME)			Mixed Cellulose Ester (ME)			
Kerosene	R	R	R	Potassium hydroxide (1N)	L	NR	NR
Lactic acid	R	R	R	Potassium hydroxide (25%)	NR	R	R
Methyl acetate	NR	NR	NR	Potassium hydroxide (50%)	NR	R	R
Methyl alcohol	L	L	L	Propanol	R	R	R
Methyl alcohol (98%)	L	R	R	Pyridine	NR	NR	NR
Methyl cellosolve	L	R	R	Silicone oil	R	R	R
Methyl Chloride	NR	NR	NR	Sodium hydroxide (0.1N)	L	R	R
Methyl ethyl ketone	NR	NR	NR	Sodium hydroxide (diluted-5%)	NR	R	R
Methyl formate	NR	NR	NR	Sodium hydroxide (25%)	NR	R	R
Methyl isobutyl ketone	NR	NR	NR	Sodium hydroxide (conc-50%)	NR	R	R
Methylene chloride	L	L	L	Sodium Hydroxide (Concentrated)	NR	R	R
N-Methyl-2-Pyrrolidone	NR	NR	NR	Sodium Hypochlorite	R	R	R
Mineral spirits	R	R	R	Sulfuric acid (diluted-5%)	L	R	R
Monochlorobenzene	L	NR	NR	Sulfuric acid (med conc-25%)	NR	R	R
Nitric acid (diluted-5%)	L	R	R	Sulfuric acid (6N)	NR	R	R
Nitric acid (med conc-25%)	NR	R	R	Sulfuric Acid (concentrated)	NR	R	R
Nitric acid (6N)	NR	R	R	Tetrahydrofuran	NR	NR	NR
Nitric acid (conc-70%)	NR	NR	NR	Toluene	R	L	L
Nitric acid (concentrated)	NR	R	R	Trichloroacetic acid (25%)	NR	R	R
Nitrobenzene	NR	NR	NR	Trichlorobenzene	NR	NR	NR
Nitropropane	NR	NR	NR	Trichloroethane	L	L	L
Oils, mineral	R	R	R	Trichloroethylene	R	R	R
Pentane	R	R	R	Triethylamine	NR	NR	NR
Perchloric acid (25%)	NR	NR	NR	Turpentine	NR	NR	NR
Perchloroethylene	NR	NR	NR	Urea	R	R	R
Petroleum based oils	R	R	R	Urea (6N)	NR	NR	NR
Petroleum ether	R	R	R	Water	R	R	R
Phenol (0.5%)	R	R	R	Xylene	NR	NR	NR
Phenol (10%)	NR	L	L				
Phosphoric acid (25%)	NR	R	R				

Contact Information:

THE AMERICAS

Spectrum Laboratories Inc.

voice (800) 634-3300 (US & Canada)
(310) 885-4600 (world-wide)
fax (800) 445-7330 (US & Canada)
(310) 885-4666 (world-wide)
e-mail customerservice@spectrumlabs.com

EUROPE

Spectrum Europe B.V.

voice 00 31 (0)76 5719 419
fax 00 31 (0)76 5719 772
e-mail info@spectrumlabs.eu
web www.spectrumlabs.eu

JAPAN

Spectrum Japan

voice +81-77-552-7820
fax +81-77-552-7826
e-mail spectrum.jp@spectrumlabs.com
web www.spectrumlabs.jp

CHINA

Spectrum China

voice (+86) 21 68810228
400-6284448 (toll-free Mainland China)
fax (+86) 21 60919246
e-mail spectrum.cn@spectrumlabs.com
web www.spectrumlabs.cn