

Novel filtration technology for large modality upstream process intensification

TFDF® (Tangential Flow Depth Filtration) Technology intensifies upstream processes through cell expansion, cell wash or perfusion for large biomolecules such as Lentivirus, Adenovirus, Adeno associated virus (AAV), exosomes and more. The thick-walled 2 - 5 µm tubular filter captures cells and cell debris with negligible product retention. Operation in tangential mode reduces fouling associated with concentration polarization. The combination produces a high-flux, high-capacity solution. Incorporation of the filter into a single-use, Gamma-irradiated ProConnex® Flow Path with integrated sensors provide rapid validation and seamless operation on a KrosFlo® TFDF® System programmed with application-specific process control logic.

TFDF® Filter



Sweeping action for reduced concentration polarization and fouling

ProConnex® TFDF® Flow Path



Closed, Gamma-irradiated and customizable flow paths

KrosFlo® TFDF® System



Integrated hardware, software and flow path

Synergistic benefits

- **Upstream intensification** of large molecules
- **Short, highly-interconnected paths** do not retain product
- **2 - 5 micron pore size** for large biomolecules

KrosFlo® TFDF® Systems

The KrosFlo® TFDF® System delivers application-specific process control logic for optimal TFDF® process performance. Systems scale from 1 L to 2000 L in a small footprint of 1 m² for both pilot (31 inch x 42 inch) and process (37 inch x 42 inch) systems.



KrosFlo® TFDF® Lab System

Standard configuration



KrosFlo® TFDF® Pilot System

Customizable configuration

Single skid



Dual skid



KrosFlo® TFDF® Process System

Customizable single or dual skids

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Closed, single-use, complete flow paths

for optimized TFDF®

The single-use, Gamma-irradiated and closed ProConnex® Flow Path with integrated sensors enable seamless intensification using a KrosFlo® TFDF® (Tangential Flow Depth Filtration) System. ProConnex® TFDF® Flow Paths arrive dry, sodium hydroxide, glycerin, preservative and ethanol free for a zero flush start state. Feed stream enters the bottom port. Retentate travels through the lumen and exits the top of the tube. Permeate exits the enclosure through the lower permeate port.



ProConnex® TFDF® Flow Paths include:

- TFDF® Filter
- Disposable pump head
- Integrated sensors
- Tubing
- Aseptic connectors

To ensure linear scalability from 1 to 2000 L, the number of tubes per enclosure and the tube length increases. Tube length increases from 20 cm to 108 cm. The effective length of the filter may be less than the physical length of the filter. The number of tubes increases from 1 - 40 per enclosure.



Number of tubes	1	3	5	10	14	40
Surface area (cm ²)	3 - 150	450	750	1500	2100	6000

Length (cm)	20, 36	108
Surface Area (cm ²)	3, 30, 50	150

Actual products subject to change. All images shown for reference only.



Specifications

	KrosFlo® TFDF® System type		Lab System		Pilot System		Process System	
Filters	Recommended process volume - rProtein and Gene Therapy	< 1 L	2 - 3 L GT vol	5 L GT vol	< 50 L	< 500 L	< 2000 L	
	TFDF® Filter surface area	3 cm²	30 cm²	50 cm²	150 cm²	450 cm²	2100 cm²	6000 cm²
Provided equipment	TFDF® Filter part number	TFDF-3	TFDF-30	ProConnex®	N/A	N/A	N/A	
	ProConnex® TFDF® Flow Path part number	STDFDCL15110S	STDFDCL15546S	STDFDCL15111S	STDFDCL15112S	*	*	*
Options	Feed pump - Magnetic levitating pump (1)	10 LPM recommended, 20 LPM maximum						
	Auxiliary pumps (2)	Maximum 340 ml/min with 4.8 mm ID and 1.6 mm thick tube						
Utilities	Controller	PLC						
	User interface (HMI)	12" Color touch screen						
Dimensions	Operating temperature	5 - 40° C						
	Environmental requirements	5 - 50° C, Relative humidity 10 - 90 % (Non condensing)		5 - 50° C, Relative humidity 10 - 90 % (Non condensing)		5 - 50° C, Relative humidity 10 - 90 % (Non condensing)		5 - 50° C, Relative humidity 10 - 90 % (Non condensing)
Ordering	Enclosure material of construction	Powder coated aluminum (enclosure), Delrin and powder coated/anodized aluminum						
	Connectivity - Pressure sensor range	Up to 5 single-use sensors / -7 to 75 psi (-0.48 to 5.2 bar)		Up to 5 single use sensors / -7 to 75 psi (-0.48 to 5.2 bar)		Up to 5 single use sensors / -7 to 75 psi (-0.48 to 5.2 bar)		Up to 5 single use sensors / -7 to 75 psi (-0.48 to 5.2 bar)
Service	Connectivity - Weighing scales	Up to 2 (20 Kg) scales						
	Stand	Normal position		Extended position		N/A		N/A
Options	Turbidity sensor	1 Turbidity Photometer transmitter with 880 nm light source optional						
	Feed flow meter	Clamp on flow sensor for 9/16" OD tubing						
Utilities	Permeate flow measurement	Permeate weigh scale						
	Power	110 - 240 V AC, 1 Phase, 50/60 Hz						
Dimensions	Compliance	UL and CE Certified						
	Controller	16 x 13 x 21 in (40 x 33 x 53 cm)		11 x 11 x 19 in (28 x 28 x 48 cm)		11 x 11 x 39 in (28 x 28 x 99 cm)		N/A
Ordering	Pump station	34 lbs (15.5 kg)						
	Controller weight	20 lbs (9 kg)						
Service	Pump station weight	TFDFLP2S2F1T0NCFRS						
	System part number	Controller - PLC, HMI - 12" Color TFT 800x600 SVGA, Power supply, Analog/Digital I/O Modules, Pump Station - MagLev pump (1), Peristaltic pumps (2), Pressure transmitter boards (2) to support max. 5 SU Pressure sensors, weight transmitters (2), Flow transmitters (1), 20 Kg scales (2), Optional 60 Kg scale - PN: SCL-0060-SCLR						
Service	Installation, test and basic user training (1 day)	SV-IT-TFDF-LAB-1		SV-IT-TFDF-PLT-1		SV-IT-TFDF-PRO-1		
	Installation, test, IQOQ and basic user training	SV-IT-TFDF-LAB-10Q-1		SV-IT-TFDF-PLT-10Q-1		SV-IT-TFDF-PRO-10Q-1		
Factory warranty + 1 year extended warranty		SV-WA-TFDF-LAB-1+1YR-1 for KrosFlo® TFDF® Lab System						

* Contact your Repligen sales representative to customize your TFDF® System.

Specifications

ProConnex® TDF® Flow Path	Lab-scale			Pilot-scale		Process-scale	
	Filter	Flow path	Flow path	Flow path	Flow path	Flow path	Flow path
Type	3, 30	3', 30", 50"	150	450, 750, 1500	2100, 6000		
Surface area (cm ²)	1	1	1	3, 5, 10	14, 40		
Fibers	20	20, 36	108	108	108		
Total filter length (cm)	2, 20	2, 20, 36	108	108	108		
Effective length (cm)	1	1	1	3, 5, 10	14, 40		
Number of tubes	Yes	Yes	Yes	No	No		
Standard configuration made to stock	N/A	Yes	Yes	Yes	Yes		
Customizable	TFDF-3, TDF-30	STDFCL15110S [†] STDFCL15546S ^{**} STDFCL15111S ^{***}	STDFCL15112S	-	-		
Part number							
ProConnex Flow Paths							

Actual products subject to change. All images shown for reference only. [†]Recommended process volumes for mAb use 3 cm² per 1 L process volume. Gene Therapy (Lentivirus applications) use 30 cm² for 2 - 3 L batch-size.

Product Contact Materials of Construction	
TDF filter module	Polysulfone, polypropylene, polyethylene terephthalate, urethane
Gaskets	Platinum cured silicone
Reducers	Polysulfone
Tubing	Platinum-cured silicone, C-Flex ^{®†} , PharmaMed ^{®**}
Aseptic connectors	Polycarbonate, platinum-cured silicone, polyethylene
Manifold	PVDF
	Pump head
	Pressure sensors
	Connectors, hosebarb adaptors
	Air filter
	Various fittings**

*Materials of construction vary based on scale and subject to change based on customer specific designs. [†]Lab-scale only. ^{**}Pilot and process scales only.

