

KrosFlo® FS TFF Systems

Data Sheet

KrosFlo FS TFF Systems are optimized to achieve volumes between 140 mL to 500 L. Lower hold-up volumes are possible with customized configurations. The Quattroflow® 150SU pump in the KrosFlo FS-15 TFF System delivers flow rates up to 3 LPM and pressures up to 4 bar, supporting flat sheet cassettes up to 0.3 m² at optimal conditions*. The Quattroflow® QF1200SU pump in the KrosFlo FS-500 TFF System delivers flow rates up to 18 LPM and pressures up to 4 bar, supporting flat sheet cassettes up to 1.5 m²*.

KrosFlo FS-500 TFF System



Components

- | | |
|--|--|
| 1. KF Comm 2 Software | 7. TangenX® Flat Sheet Cassette Assembly |
| 2. 4 Piston Diaphragm Pump | 8. ProConnex® Flow Path |
| 3. Auxiliary Pump | 9. Permeate Flow Sensor |
| 4. Automatic Back pressure Valve (ABV) | 10. Stir Plate (Optional) |
| 5. Scale | 11. FS-500 Base Plate |
| 6. Konduit | 12. Reservoir |

*Maximum membrane area assumptions based on the utilization of 100 kd high flux membrane, and highest recommended retentate recirculation rates (8 LPM/m²) for Repligen TangenX TFF Cassettes.

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KrosFlo FS-15 TFF System

Components

1. KF Comm 2 Software
2. 4 Piston Diaphragm Pump
3. Automatic Back pressure Valve (ABV)
4. TangenX Flat Sheet Cassette Assembly
5. Auxiliary Pump
6. Scale
7. Konduit



Process Sequence Modes

M Mode: Manual Mode

Automated Methods:

- C Mode: Concentration
- D Mode: Diafiltration
- C/D Mode: Concentration / Dialfiltration
- C/D/C Mode: Initial Concentration /Dialfiltration/ Final Concentration
- C/D/D/C Mode: Initial Concentration /Dialfiltration 1/Dialfiltration 2/ Final Concentration
- CFC Mode: Constant Feed Concentration
- CF/D/C Mode: Constant Feed / Dialfiltration / Final Concentration
- Control mode (Vacuum Mode)
- Flushing Mode
- Normalized Water Permeability Mode
- Cleaning Mode
- Flux Excursion Mode

Process Alarms & Interlocks:

KrosFlo FS-500 System provides the following alarm controls:

Feed and Permeate Pressure: The system will provide alarm and/or shut down when preset pressure specifications are reached or exceeded.

Permeate Mass: Permeate scale is used to determine permeate flow rate and accordingly control the pump speed/flow rate. The system will provide alarm and/or shut down when preset target weight specifications are reached or exceeded.

Feed Mass: (Upper and Lower) The system will provide alarm and/or shut down when preset target weight specifications are reached or exceeded.

UV/Auxiliary: The system will provide alarm and/or shut down when limits are reached or exceeded.

The KrosFlo FS-500 TFF System is ideal for pilot scale, high pressure microfiltration and ultrafiltration applications due to its compact footprint and versatility.

Pump Mode	Feed Scale	Permeate Scale	Auxiliary Pump 1	Auxiliary Pump 2
M /Manual	X	X	O	O
C Mode	O	X	O	O
D Mode	O	X	X	O
C/D Mode	X	X	X	O
C/D/C Mode	X	X	X	O
C/D/D/C Mode	X	X	X	X
CFC Mode	X	X	X	O
CF/D/C Mode	X	X	X	X
C/D/C/D Mode	X	X	X	X

X = Required

O = Optional depending on permeate flow control requirements of the process

Auxiliary Pumps

Up to two (2) 300 rpm, 600 rpm or 650 rpm auxiliary pumps can be added to the KrosFlo® FS TFF System.

- **Dialfiltration Pump(s):** Replenishes loss feed reservoir volume during dialfiltration function
- **Continuous Feed Pump:** Feeds fluid from larger external vessel into the primary feed vessel during CF or CFC modes.
- **Permeate Pump:** Control permeation rate for MF applications; Auxiliary Pump 2 in most process modes.

Auxiliary Pumps



Tubing Size and Type	Tubing Flow Range	KrosFlo KR Jr 300 RPM ACJR-U10-R	KrosFlo KR1 600 RPM AR1-U20-01R	I/P Series 650 RPM ACM3-U10
L/S 13	0.36 to 36 mL/min	✓	✓	
L/S 14	1.3 to 130 mL/min	✓	✓	
L/S 16	4.8 to 480 mL/min	✓	✓	
L/S 25	10 to 1000 mL/min	✓	✓	
L/S 17	17 to 1700 mL/min		✓	
L/S 18	23 to 2300 mL/min		✓	
L/S 15	10 to 1000 (11 to 1100) ¹ mL/min		✓	
L/S 24	17 to 1700 (18 to 1800) ¹ mL/min		✓	
L/S 35	23 to 2300 (26 to 2600) ¹ mL/min		✓	
L/S 36	29 to 2900 (34 to 3400) ¹ mL/min		✓	
I/P 26	0.12 to 4 LPM			✓
I/P 70	0.24 to 8 ² LPM			✓
I/P 73	0.2 to 8 LPM			✓
I/P 82	0.4 to 13 LPM			✓
I/P 88	0.4 to 17 ² LPM			✓
I/P 89	0.52 to 19 ² LPM			✓

¹ High Performance pump head required to achieve flow rate value in (). Requires part number ACR2-H4I-01N or -01R.

² High Performance pump head required, part number ACM3-PHP-01N.

Auxiliary Scales

These process scales are accurate, stable, rugged, and versatile—which makes it a dynamic instrument highly suitable for the varied application environments of TFF processes.



Description	KrosFlo Auxiliary Scale SCL-0020-SCLR	KrosFlo Auxiliary Scale SCL-0060-SCLR	KrosFlo Floor Scale SCL-0200-SCLR & SCL-0600-SCLR	
Maximum Capacity	20,000 g	60,000 g	200,000 g	600,000 g
Readability	0.1 g	1 g	10 g	20 g
Linearity	±0.3 g	Approximately ±2 g	±100 g	±300 g
Display	LCD (with back light)	LCD (with back light)	LCD (with back light)	
Keypad	5 keys	5 keys	5 keys	
Protection Class	IP 43	IP 43	IP 43	
Power Consumption	1.32VA	1.32VA	1.32VA	
Power Supply	Pump station (direct connection)	Pump station (direct connection)	Pump station (direct connection)	
Weighing Pan Dimensions	7.7" x 7.7" (19.5 x 19.5 cm)	15.8" x 19.7" (40.1 x 50 cm)	33" x 34" (84 x 86 cm)	
Weighing Device Dimensions	13" x 8" x 3.8" (35.0 x 20.3 x 35.0 cm)	21.5" x 24.25" x 8" (54.6 x 61.6 x 20.3 cm)	67" x 41" x 3" (170 x 104 x 8 cm)	

One process scale is required to operate the FS as a complete automated system.

- **Feed Scale:** Weighs feed reservoir to monitor Concentration and Dialfiltration functions
- **Permeate Scale (optional):**
 - Weighs permeate reservoir to monitor Concentration and Dialfiltration function
 - Permeate Scale interfaces with the system and converts change in mass over time to flux rate of the TFF process

Note: Permeate flow meter is provided with FS-500 system and may be utilized in place of permeate scale to determine flow rates and volumetric throughput (totalizer).

KrosFlo FS 15 and FS 500 TFF System Specifications

	Description	KrosFlo FS 15 TFF Systems	KrosFlo FS 500 TFF Systems
Filter	Filter Mode	¹ Flat Sheet Cassettes	
	Recommended Process Volume*	150 ml - 15 L	1.25 L - 500 L
	Filter Surface Area*	0.1 m ² - 0.3 m ²	0.5 m ² - 1.5 m ²
Provided Equipment	Main Drive/Pump Head	Quattroflow® QF1505U-up to 3.0 LPM Single-use pump head insert	Quattroflow® QF12000SU-up to 18.0 LPM Single-use pump head insert
	System Scales	Two (2) scales included. Capacity up to 20,000 g, Readability 0.1 g 7.7" x 7.7" (17.8cm x 17.8 cm) Platform	One (1) scale included Capacity up to 60,000 g, Readability 1 g 15.8" x 29.7" (40 cm x 50 cm) Platform
	KrosFlo® KR Jr Auxiliary Pump	Yes	N/A
	KrosFlo® KR1 Auxiliary Pump	Yes	Yes
	I/P	Selectable in manual mode only	Yes
	Cassette Hardware	TangenX® SIUS® Hardware (spare) (TSLDI-2BMC) and Insert (TFPLS-SA08)	Cassette Clamp (TSPDI-4BMC) and Filter Plate Insert (TFP75-SE16)
	Tablet HMI	MICROSOFT® SURFACE PRO® with Licensed proprietary KF Comm 2 Data Acquisition Software	
	Automatic Back pressure Control Valve (ABV)	Controls user-set process pressure profile, TMP, ΔP, retentate permeate pressures control	
	Pressure Transducers are included on System ProConnex® Flow Paths	Luer-style, polysulfone. Up to three (3) single-use sensors. Pressure range of -7 to 75 psi (-0.48 to 5.2 bar)	Three (3) single-use sensors, polysulfone sanitary fitting, flowthrough. Pressure range of -7 to 75 psi (-0.48 to 5.2 bar)
	Permeate Flowmeter and Totalizer	N/A	In-line Flowmeter and Totalizer intended for permeate use
	Auxiliary Component Octopus Cable	Allows for connectivity of auxiliary components, pressure transducers	
	Flow Path	TangenX SIUS PD Filter plate insert (TFPLS-SA08), QF1505U single-use pump head, and ProConnex Single-use High Pressure Flow Path	TangenX SIUS PD Filter plate insert (TFP75-SE16), QF12000SU single-use pump head, ProConnex single-use high pressure flow path, open system, terminal plugs 1200SU
	Reservoirs	Standard 1 L polypropylene flat bottom containers, ported cap with inlets, bottom drain, stir bar	Standard 20 L polypropylene flat bottom feed container, ported cap with inlets, bottom drain
	Mixing	Stir plate 250 RPM	Digital Magnetic Stirrers 1000 RPM - 230/100 V, 1000 RPM - 120/100 V (purchased separately)
Enclosures	IP33 rated enclosure wipe down cleanable		

¹ Can be adapted for hollow fiber use.

*Actual process volume and filter surface area may vary depending on process variables.

KrosFlo FS 15 and FS 500 TFF System Specifications

	Description	KrosFlo FS 15 TFF Systems	KrosFlo FS 500 TFF Systems
Options	UV, Conductivity and Temperature	The Konduit base model provides real-time conductivity, UV (A280 or A260 Inputs) and temperature integrated monitoring	
	Operating temperature	0 - 40° C	
	Environmental requirements	0 - 40° C, Relative humidity 10 - 90%	
	Sterile Flow Paths (Optional)	Single-use high pressure ProConnex® Flow Paths for TangenX SIUS Gamma Cassettes (QF150SU), single-use pump head, single-use tubing, sterile connectors, gamma-irradiated closed system	ProConnex Flow Paths for TangenX SIUS Gamma Cassettes (QF1200SU), single-use pump head, single-use tubing, sterile connectors, gamma-irradiated closed system
	Auxiliary Pumps (Optional)	KrosFlo Research I (KR1), 600 RPM, flowrates up to 2.3 LPM KrosFlo Jr (KR1), 300 RPM, flowrates up to 0.3 LPM	I/P Series, integrated, 650 RPM, flowrates up to 17 LPM KrosFlo Research I (KR1), 600 RPM, flowrates up to 2.3 LPM
	KF Comm 2 and KF Comm 2C Software	Proprietary software for intuitive operation, real time tracking and data analysis Optional 21 CFR Part 11 compliance package	
Utilities	Power	2.24 @ 115 V, or 1.14 @ 230 V (current, max) 100 to 260 Vrms @ 50/60 Hz (Universal Input)	1.1A @ 230 V (current, max) 90 to 260 Vrms @ 50/60 Hz (Universal Input)
	Compliance	UL and CE System Certification; EN61010-1 (EU Low Voltage Directive) and ENG1326 (EU EMC Directive), RoHS compliance	
Dimensions	Main Drive Dimensions	L 14" x W 8" x H 8" (35.6 x 20.3 x 20.3 cm)	25" x 11" x 13" (63.5 x 27.9 x 33.0 cm)
	Main Drive weight	30.7 lbs (67.5 Kg)	58.5 lbs (26.53 Kg)
Ordering	FS-15 System Part Numbers	SYFS-015-2 SYFS-015-2C	SYFS-500-2 SYFS-500-2C
	Software	KF Comm 2 KF Comm 2C	KF Comm 2 KF Comm 2C
	Flow Path Configuration	Terminal end plug non-irradiated	Terminal end plug non-irradiated
Service	Installation, Testing and Training 1 day per system	SV-IT-FS15-1 (1 day)	SV-IT-FS500-1 (1 day)
	Installation and Operation	SV-10Q-FS15-1 (Qualification IOQ)	SV-10Q-FS500-1 (Qualification IOQ)

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