SPIRAPRO™ 4” PHARMACEUTICAL GRADE NF ELEMENTS

Selective Rejection 4” Nanofiltration Spiral Element Series

PRODUCT DESCRIPTION

Membrane Chemistry:	Proprietary TFC® polyamide
Membrane Type:	SR™3 – selective rejection nanofiltration Observed molecular weight cut-off: 200 daltons
Construction:	Sanitary spiral wound with net outerwrap
Regulatory Status:	Have passed USP Class VI testing for element components. Conform to FDA food-contact regulations (CFR Title 21).
Applications:	Desalting and separation of antibiotics and API’s
Options:	Feed Spacer: N (31 mil) or V (46 mil)

NOMINAL PERFORMANCE*

Part Numbers	Model	Minimum Rejection (%)	Active Membrane Area ft^2	(m^2)	Feed Spacer mil	(mm)
8383817	SPIRAPRO 3838 SR3-NYV	99.0	76	(7.1)	31	0.8
8383819	SPIRAPRO 3838 SR3-VYV	99.0	61	(5.7)	46	1.1

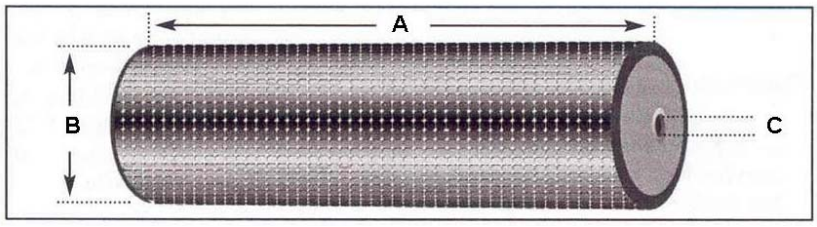
* Test conditions: 5,000 mg/l $MgSO_4$ in deionized water at 95 psi (6.5 bar) applied pressure, 10% recovery, 77°F (25°C), pH 7.5

OPERATING AND DESIGN INFORMATION*

Typical Operating Pressure:	200 - 450 psi (13.8 - 31.0 bar)
Maximum Operating Pressure:	650 psi (44.8 bar)
Operating Temperature Range:	40 - 122°F (5 - 50°C)
Cleaning Temperature Range:	95 - 122°F (35 - 50°C)
Allowable pH - Continuous Operation:	3.0 - 10.0
Allowable pH - Clean-In-Place (CIP):	1.8 - 11.0
Design Pressure Drop Per Element:	6 - 10 psi (0.4 - 0.7 bar)
Design Pressure Drop Per Vessel:	30 - 50 psi (2.1 - 3.4 bar)

* Consult KMS Process Technology Group for specific applications.

NOMINAL DIMENSIONS



Part Numbers	Model	A inches (mm)	B inches (mm)	C inches (mm)
8383817	SPIRAPRO 3838 SR3-NYV	38.0 (965)	3.8 (96.0)	0.831 (21.1)
8383819	SPIRAPRO 3838 SR3-VYV	38.0 (965)	3.8 (96.0)	0.831 (21.1)

SPIRAPRO™ 4” PHARMACEUTICAL GRADE NF ELEMENTS

Membrane Characteristics:

- SR™3 elements are selected when desalting and organic concentration is the objective. Selective rejection membranes provide high retention of divalent salts, proteins, and sugars while preferentially passing monovalent salts such as sodium chloride.

Operating Limits:

- Operating Pressure: Maximum operating pressure for the SR3 membranes is 650 psi (44.8 bar). Actual operating pressure is dependent upon system flux rate (appropriate for feed source) as well as feed, recovery and temperature conditions.
- Permeate Pressure: Permeate pressure should not exceed baseline (concentrate) pressure at any time (including online, off-line and during transition). Reverse pressure will damage the element.
- Differential Pressure: Maximum differential pressure limit is 12 psi (0.8 bar) per element. Maximum differential pressure for any length vessel is 60 psi (4.1 bar).
- Temperature: Maximum operating and cleaning temperature is 122°F (50°C).
- pH: Allowable range for continuous operation is 3.0 to 10.0. Allowable pH range for cleaning is 1.8 to 11.0.

Water Quality for Cleaning & Diafiltration:

- Turbidity and SDI: Maximum feed turbidity is 1 NTU. Maximum feed Silt Density Index (SDI) is 5.0 (15-minute test).
- Guidelines: Please refer to the KMS “Water Quality Guidelines for CIP and Diafiltration” for more detailed information.

Chlorine and Chemical Exposure:

- SR3 membranes have a free chlorine tolerance rating of 1,000 ppm-hours at 77°F (25°C), pH 8.
- The maximum continuous chlorine exposure limit is 0.2 ppm.
- Sodium metabisulfite (without catalysts such as cobalt) is the preferred chemical to eliminate free chlorine or similar oxidizers in the feed.
- Chlorine tolerance for SR3 membranes may be significantly reduced if catalyzing metals such as iron are present or if the feed pH and/or temperature conditions are different than stated.

Cationic Polymers and Surfactants:

SR3 membranes may be irreversibly fouled if exposed to cationic (positively charged) polymers or surfactants. Exposure to these chemicals during operation or cleaning is not recommended and will void the warranty.

Lubricants:

For element installation, use only water or glycerin to lubricate seals. The use of petroleum or vegetable-based oils or solvents may damage the element and will void the warranty.

Storage Solution:

The SR3 elements are stored in Sodium metabisulfite. Refer to KMS RO/NF cleaning procedures to rinse the element prior to use.

Supplemental Technical Bulletins:

- RO/NF Module Cleaning Procedures

Water Quality Guidelines for CIP and Diafiltration

Service and Ongoing Technical Support:

Koch Membrane Systems (KMS) has an experienced staff of professionals available to assist end-users and OEM’s for optimization of existing systems and support with the development of new applications. Along with the availability of supplemental technical bulletins, KMS also offers a complete line of KOCHKLEEN® cleaning and maintenance chemicals.

KMS Capability

KMS is the leader in crossflow membrane technology, manufacturing reverse osmosis, nanofiltration, microfiltra-tion, and ultrafiltration membranes and membrane systems. The industries served include food, dairy and beverage, semiconductors, automotive, water and wastewater, chemical and general manufacturing. KMS adds value by providing top quality membrane products and by sharing experience in the design and supply of thousands of crossflow membrane systems worldwide.

Koch Membrane Systems, Inc., www.kochmembrane.com
Corporate Headquarters: 850 Main Street, Wilmington, Massachusetts 01887-3388, USA, Tel. Toll Free: 1-888-677-5624, Telephone: 1-978-694-7000, Fax: 1-978-657-5208
European Headquarters: Koch Chemical Technology Group Ltd., The Granary, Telegraph Street, Stafford ST17 4AT, United Kingdom, Telephone: +44-178-527-2500, Fax: +44-178-522-3149

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03/12 Rev 12-1