



Nitto

HYDRANAUTICS
Nitto Group Company

**Membrane
Solutions
for the
Dairy Industry**



Hydranautics – Innovation for Customers

Hydranautics – A Nitto Group Company, the global leader in membrane innovations, uses cutting-edge technology to make life better around the world. Hydranautics entered the Reverse Osmosis (RO) water treatment field in 1970 and is one of the most respected and experienced firms in the membrane separations industry.

There are several process separation applications where Hydranautics' product offerings have been proven very beneficial such as whey and milk concentration, sugar fractionation, lactose reduction, bacterial reduction, clarification of enzyme streams, recovery of hydrolyzed proteins, etc.

Hydranautics is committed to innovation for its customers as dairy consumers become more informed and conscious of their diet and nutritional choices.

Membrane Applications in Dairy

Innovation is becoming increasingly important in the food industry, driven by consumers interested in dairy proteins for its long list of health benefits – from muscle building and exercise recovery to weight loss, satiety and healthy aging. The dairy industry is well positioned to capitalize on this trend due to the growth in consumer demand for foods which carry health benefits.

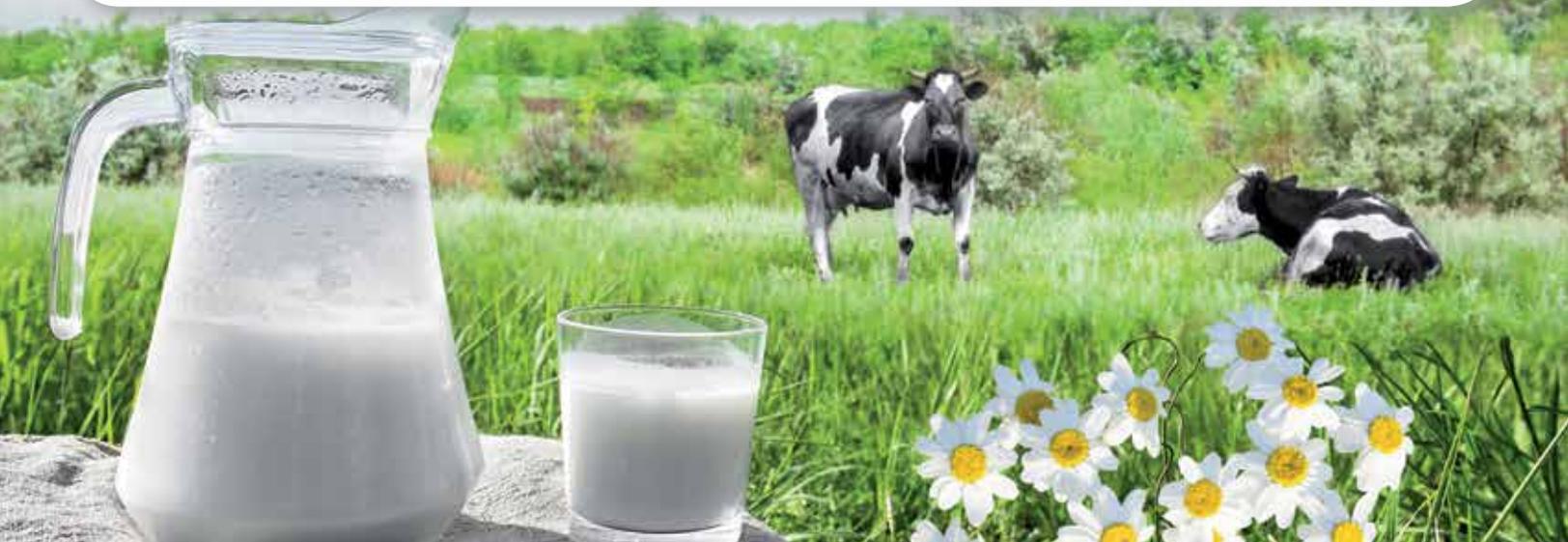
In the dairy processing industry, membrane separation technology is used to separate, and in some cases, purify an essential constituent of milk like fat, protein, lactose, minerals, etc. As each of these components have specific nutritional properties, fractionation of these components will enable pure ingredients to be produced that have the advantage of constant quality.

Of the several separation technologies available, the membrane separation technology offers various advantages for the dairy food processing industry which include, separation of components at a lower temperature, separating the component in its native state, less energy use, etc.

Hydranautics for Dairy

At Hydranautics' R&D centers, we focus on technological advances, research and trials that drive and enable product innovation to offer the most effective products for the dairy industry. In addition to our products, we also offer unique custom technology solutions – Integrated Membrane Solutions (IMS) – for every requirement which combines a range of RO, NF, UF and MF membrane technologies to achieve the most comprehensive, effective, low-cost results in the industry. The key features and benefits of all Hydranautics dairy membranes are:

- ▶ All membranes and elements are manufactured using highly controlled, ISO 9001-compliant processes, ensuring the highest quality, most consistent and reliable performance available.
- ▶ All elements are automatically rolled on a proprietary, robotized machine. The result is a higher level of filtration and separations performance for our customers.
- ▶ Superior glue-line adhesion and strength, resulting in blister-free operation
- ▶ Tighter rolling and caging which provides greater structural reliability
- ▶ Maximum effective membrane area resulting in greater flow rates



DairyRO® & HYDRAPolish

High Performance Reverse Osmosis Membranes for the Dairy Industry

DairyRO and HYDRAPolish are USDA-accepted composite polyamide reverse osmosis elements of the net-wrapped, high flow full-fit design and hot water sanitizable type.

HYDRAPolish elements are designed specifically for continuous operation at high pressure, high temperature, or periodic heat sanitization at high temperature.

Key features:

- ▶ All components conform to FDA regulation CFR Title 21, "3A Sanitary Standards for Crossflow Membrane Modules, Number 45-02", EC Reg. No. 1935/2004, and EU Reg. No. 10/2011
- ▶ DairyRO-HF is a high-flow version using Hydranautics' patented technology which provides up to 25% greater process flow
- ▶ DairyRO-HS is a heat-sanitizable version using Hydranautics' patented technology which allows heat sanitization at 85°C
- ▶ DairyRO-HT is a high temperature, heat sanitizable version using Hydranautics' patented technology which allows for continuous operation at 70°C and heat sanitization at 85°C
- ▶ 100% testing of DairyRO membranes with 1500 ppm NaCl for flux and rejection compliance

Key DairyRO applications:

- ▶ Pre-concentration of milk or whey for reducing product transportation costs
- ▶ Lactose production
- ▶ Sweet / Acid whey concentration
- ▶ Concentration of UF permeate
- ▶ Milk and juice concentration

Key HYDRAPolish applications:

- ▶ RO permeate polishing
- ▶ Condensate polishing
- ▶ Pre-concentration of milk or whey for reducing product transportation costs
- ▶ Lactose production
- ▶ Juice concentration

Product Description

Model	Feed spacer inches (cm)	Area ft ² (m ²)	Dimensions, inches (cm)			Max. feed flow gpm (m ³ /hr)	Max. pressure drop per element psi (MPa)
			Length	Diameter	Core tube dia.		
3838-30	0.030 (0.076)	80 (7.4)	38.0 (96.5)	3.78 (9.6)	0.83 (2.11)	30 (6.8)	15 (0.10)
3838-46	0.046 (0.117)	63 (5.9)	38.0 (96.5)	3.78 (9.6)	0.83 (2.11)	30 (6.8)	15 (0.10)
3838-65	0.065 (0.165)	50 (4.6)	38.0 (96.5)	3.78 (9.6)	0.83 (2.11)	30 (6.8)	15 (0.10)
3840-30	0.030 (0.076)	80 (7.4)	38.75 (98.4)	3.78 (9.6)	0.83 (2.11)	30 (6.8)	15 (0.10)
3840-46	0.046 (0.117)	63 (5.9)	38.75 (98.4)	3.78 (9.6)	0.83 (2.11)	30 (6.8)	15 (0.10)
8038-30	0.030 (0.076)	385 (36)	38.0 (96.5)	7.90 (20.1)	1.125 (2.86)	80 (18.2)	13 (0.09)
8038-46	0.046 (0.117)	300 (28)	38.0 (96.5)	7.90 (20.1)	1.125 (2.86)	80 (18.2)	13 (0.09)
8038-65	0.065 (0.165)	230 (21)	38.0 (96.5)	7.90 (20.1)	1.125 (2.86)	80 (18.2)	13 (0.09)
8040-30	0.030 (0.076)	385 (36)	40.0 (101.6)	7.90 (20.1)	1.125 (2.86)	80 (18.2)	13 (0.09)
HYDRAPolish 8*	0.030 (0.076)	360 (33)	40.0 (101.6)	7.90 (20.1)	1.125 (2.86)	80 (18.2)	13 (0.09)

*HYDRAPolish 8 is provided with one interconnector assembly, two anti-telescoping devices (ATDs), and one brine seal.

DairyNF™

High Flux, High Protein Rejection 200 Dalton Nanofiltration Membranes

DairyNF membranes are specifically designed for the separation of divalent anions and/or organic molecules greater than 200 Daltons from monovalent salts and lower molecular weight organics. They are widely used in the dairy industry for lactose concentration, demineralization and whey concentration.

Key features of DairyNF:

- ▶ All components conform to FDA regulation CFR Title 21, "3A Sanitary Standards for Crossflow Membrane Modules, Number 45-02", EC Reg. No. 1935/2004, and EU Reg. No. 10/2011
- ▶ 100% testing of membrane rolls with 2000 ppm MgSO₄ for flux and rejection compliance
- ▶ Ships dry for enhanced storage stability
- ▶ Excellent demineralization performance

Key applications of DairyNF:

- ▶ Whey and milk concentration
- ▶ De-salting (de-mineralization) of whey and other streams
- ▶ Recovery of hydrolyzed proteins and enzymes
- ▶ Purification / Concentration of various food and life science liquids



Product Description

DairyNF Model	Feed spacer inches (cm)	Area ft ² (m ²)	Dimensions, inches (cm)			Max. feed flow gpm (m ³ /hr)	Max. pressure drop per element psi (MPa)
			Length	Diameter	Core tube dia.		
3838-30	0.030 (0.076)	80 (7.4)	38.0 (96.5)	3.78 (9.6)	0.83 (2.11)	30 (6.8)	15 (0.10)
3838-46	0.046 (0.117)	63 (5.9)	38.0 (96.5)	3.78 (9.6)	0.83 (2.11)	30 (6.8)	15 (0.10)
3840-30	0.030 (0.076)	80 (7.4)	38.75 (98.4)	3.78 (9.6)	0.83 (2.11)	30 (6.8)	15 (0.10)
3840-46	0.046 (0.117)	63 (5.9)	38.75 (98.4)	3.78 (9.6)	0.83 (2.11)	30 (6.8)	15 (0.10)
8038-30	0.030 (0.076)	385 (36)	38.0 (96.5)	7.90 (20.1)	1.125 (2.86)	80 (18.2)	13 (0.09)
8038-46	0.046 (0.117)	300 (28)	38.0 (96.5)	7.90 (20.1)	1.125 (2.86)	80 (18.2)	13 (0.09)
8040-30	0.030 (0.076)	385 (36)	40.0 (101.6)	7.90 (20.1)	1.125 (2.86)	80 (18.2)	13 (0.09)
8040-46	0.046 (0.117)	300 (28)	40.0 (101.6)	7.90 (20.1)	1.125 (2.86)	80 (18.2)	13 (0.09)

SuPRO

Robust Microfiltration Membranes for the Most Difficult Applications

SuPRO membranes are polysulphone MF membranes with a 300K MWCO which provide high flow and rejection with excellent tensile strength. They are widely used for clarification applications especially in the sugar industry.

Key features of SuPRO:

- ▶ All components conform to FDA regulation CFR Title 21, "3A Sanitary Standards for Crossflow Membrane Modules, Number 45-02", EC Reg. No. 1935/2004, and EU Reg. No. 10/2011
- ▶ Net-wrapped hydrophilic polysulfone element (0.1 microns) with non-woven PET backing, PVDF alternative with 100K size
- ▶ 100% vacuum decay testing to ensure performance integrity

Key applications of SuPRO:

- ▶ Cold sanitation and clarification of cheese brine
- ▶ Milk / Whey defatting
- ▶ Casein concentration

Product Description

SuPRO Model	Feed spacer inches (cm)	Area ft ² (m ²)	Dimensions, inches (cm)			Max. feed flow gpm (m ³ /hr)	Max. pressure drop per element psi (MPa)
			Length	Diameter	Core tube dia.		
3838-30	0.030 (0.076)	80 (7.4)	38.0 (96.5)	3.78 (9.6)	0.83 (2.11)	30 (6.8)	15 (0.10)
3838-46	0.046 (0.117)	60 (5.6)	38.0 (96.5)	3.78 (9.6)	0.83 (2.11)	30 (6.8)	15 (0.10)
3838-65	0.065 (0.165)	45 (4.2)	38.0 (96.5)	3.78 (9.6)	0.83 (2.11)	30 (6.8)	15 (0.10)
6338-30	0.030 (0.076)	200 (18.6)	38.0 (96.5)	6.36 (16.2)	1.138 (2.89)	70 (15.8)	15 (0.10)
6338-46	0.046 (0.117)	150 (13.9)	38.0 (96.5)	6.36 (16.2)	1.138 (2.89)	70 (15.8)	15 (0.10)
6338-65	0.065 (0.165)	120 (11.1)	38.0 (96.5)	6.36 (16.2)	1.138 (2.89)	70 (15.8)	15 (0.10)
8038-30	0.030 (0.076)	360 (33)	38.0 (96.5)	7.90 (20.1)	1.125 (2.86)	80 (18.2)	13 (0.09)
8038-46	0.046 (0.117)	280 (26)	38.0 (96.5)	7.90 (20.1)	1.125 (2.86)	80 (18.2)	13 (0.09)
8038-65	0.065 (0.165)	215 (20)	38.0 (96.5)	7.90 (20.1)	1.125 (2.86)	80 (18.2)	13 (0.09)

Our Global Presence

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Hydranautics Advantages

Research and Development: Utilizing our R&D centers in USA and Japan, our consistent focus on technology continues to produce the most innovative and effective membrane products for the dairy industry.

Multi-location Manufacturing Facility: Our manufacturing locations in Oceanside, USA; Shiga, Japan and Shanghai, China enable efficient & timely response to meet our customers' growing global demand.

Assuring Unmatched Quality: The quality and reliability of our membranes has been confirmed by acknowledging and continually renewing ISO certificates; ensuring the highest quality and most consistent, reliable performance available.

Integrated Membrane Solution (IMS): Hydranautics offers the largest line of membrane products and services in the industry. Hydranautics' IMS combines a range of membranes technologies – RO, NF, UF and MF – to achieve the most comprehensive, effective and low-cost ownership.

Responsive Service Team: Our skilled engineers and technicians assist you in designing a robust membrane system that is aligned to your requirements. Through our global network of local experts we provide comprehensive technical and customer service 24/7.



For more information on DairyUF (high performance ultrafiltration membranes), please contact Hydranautics sales representative.