

Water Spirals Portfolio



Leadership in Filtration

MANN+
HUMMEL

Reverse Osmosis and Nanofiltration Elements Portfolio

Reverse Osmosis Filtration

Reverse osmosis (RO) is a membrane filtration technology that effectively **removes ions such as sodium and chloride**, as well as organic molecules, including pesticides and herbicides. RO is widely used in various applications, including water and wastewater treatment, food and beverage processing, and pharmaceutical manufacturing.

Nanofiltration

Nanofiltration (NF) membranes are designed to **selectively remove large organic molecules and multivalent ions such as calcium and magnesium**. The combination of selective removal capabilities and low energy requirements makes NF membranes ideal for numerous drinking water applications, including water softening, decolorization, and micropollutant removal. In industrial applications, nanofiltration is particularly effective at removing specific components such as coloring agents in the textile industry.

RO and NF membranes are typically **made from thin-film composite (TFC) materials**. These membranes consist of a thin polyamide layer on top of a support layer made of polysulfone or polyethersulfone. RO and NF membranes are configured into modules that typically operate in crossflow mode, where the feed liquid is pumped across the surface of the membrane. This creates shear forces that help prevent fouling and scaling of the membrane, ensuring optimal performance and longevity.

MANN+HUMMEL Water & Membrane Solutions offers a **comprehensive portfolio of RO and NF membranes** to suit a **wide range of applications, sizes and configurations**. We also provide **customized solutions** tailored to meet specific requirements.

KEY ADVANTAGES:

- Effective removal of dissolved solids
- Versatile: suitable for various applications
- High-quality water production
- Cost-effective technology when compared to thermal processes



High Rejection Brackish Water RO Elements

Our high rejection brackish water reverse osmosis (BWRO) elements are manufactured using thin-film composite polyamide technology. The elements are **certified to NSF/ ANSI Standard 61/ and Halal**, making them suitable for both **industrial and drinking water applications**. They are available in 2.5", 4" and 8" sizes, as well as various other configurations to meet diverse needs.

APPLICATIONS:

- Municipal drinking water
- Semiconductor industry
- Pharma
- Food and beverage
- Boiler feed water

PRODUCT OFFERINGS:

- MICRODYN BW (identical to Oltremare BR2 and BR3)

Low Energy Brackish Water RO Elements

Our low energy elements offer the perfect balance of **low energy consumption and high rejection rates**, making them ideal for both newly designed systems and retrofitted installations. These elements are available in 2.5", 4", and 8" sizes, as well as various other configurations to meet specific application requirements.

APPLICATIONS:

- Ground and surface water treatment
- Highpurity industrial applications
- Municipal wastewater reclamation

PRODUCT OFFERINGS:

- MICRODYN XLE
- MICRODYN HRLE (identical to Oltremare LOW2)
- MICRODYN XRLE (identical to Oltremare LOW2HR)
- Oltremare LOW1
- Oltremare LOW3
- Oltremare LOW4
- Oltremare LOW7



Fouling Resistant Membranes

MANN+HUMMEL's fouling resistant membranes are specifically designed for **water reuse applications with high fouling potential, such as tertiary effluent treatment**. These membranes are also ideal for treating surface water with high organic content or industrial wastewater. The modules are available in 2.5", 4" and 8" sizes, as well as other configurations, they offer flexibility for diverse operational needs.

APPLICATIONS:

- Tertiary effluent / water reuse
- Industrial wastewater treatment
- Surface water with high fouling potential

PRODUCT OFFERINGS:

- MICRODYN FR (identical to Oltremare FOUL2 and FOUL1)

High Rejection / High Productivity Seawater RO Elements

Our High Rejection series of seawater reverse osmosis (SWRO) membranes is designed for **seawater desalination and other high-salinity water purification applications**, such as in industrial processes that require exceptional permeate water purity. The High Productivity series is ideal for applications demanding low energy consumption while maintaining reliable performance. Both series are available in 2.5", 4" and 8" sizes, along with other configurations to suit specific requirements.

APPLICATIONS:

- Conventional and hybrid seawater desalination plants
- Industrial water with high salinity

PRODUCT OFFERINGS:

- MICRODYN SWL (identical to Oltremare SEA2 and SEA5)
- MICRODYN SWM (identical to Oltremare SEA1)
- MICRODYN SWH (identical to Oltremare SEA4)

MANN+HUMMEL Water & Membrane Solutions provides sea water RO elements in different sizes, configurations and performances.



Cellulose Acetate Membranes

The TRISEP SB series features a **cellulose acetate/triacetate blend that offers an excellent combination of chlorine tolerance, solute rejection ,and fouling resistance**. This unique combination makes the SB series a perfect fit for applications with high biofouling potential. SB20 model delivers high rejection, while the SB50 model is design for higher flow. Both models are available in 2.5", 4" and 8" sizes, as well as various other configurations to meet specific needs.

APPLICATIONS:

- Demineralization of feed water with high biofouling potential

PRODUCT OFFERINGS:

- TRISEP SB20 and SB50

Oltremare Specialties

Oltremare elements are designed to **purify every type of water types, making them suitable for diverse industrial and commercial applications**. Whether your project requires a non-standard size or a specialized commercial element, Oltremare offers the perfect solution. Applications include spot-free rinse water and wash water recycling at car washes, drinking water treatment in self-service vending machines, RO drinking water production for residential use, ultra-high-pressure membranes for ZLD (Zero Liquid Discharge) and MLD (Minimal Liquid Discharge) applications, potable water production as well as many other applications.

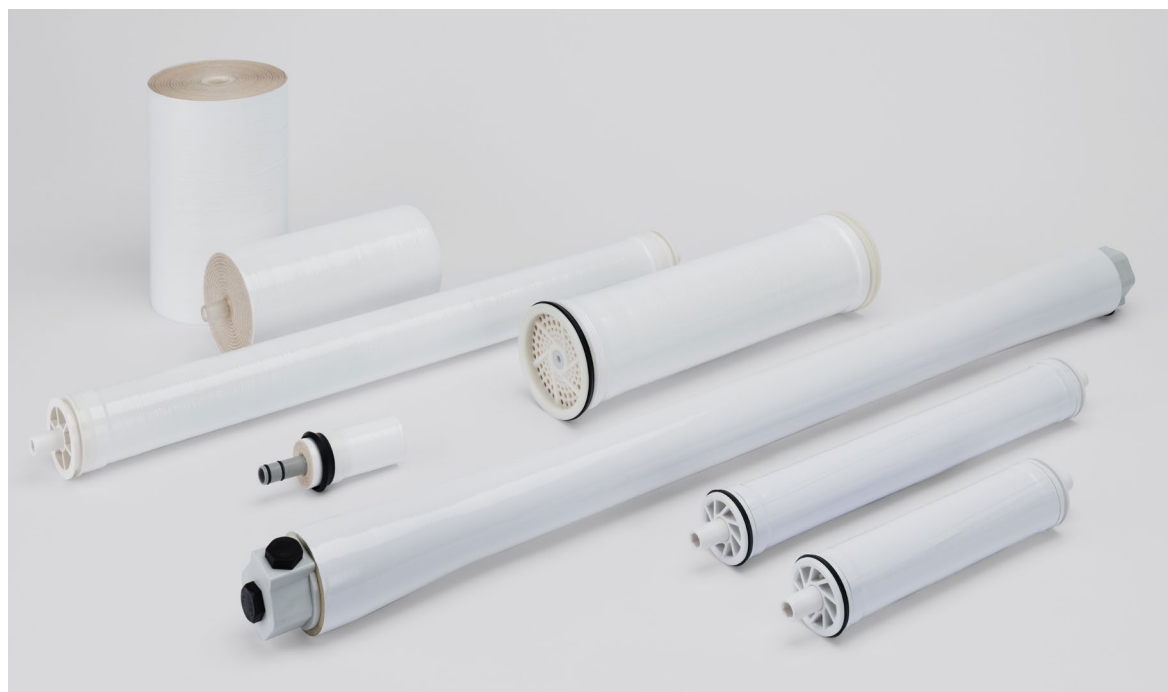
Our **compact elements** are simple to install and replace, and they are available as either an all-in-one vessel solution or an element-only option to fit your system requirements.

For private-label needs, Oltremare offers unparalleled **customization capabilities**. From standard and non-standard elements to commercial products designed for typical operating conditions, Oltremare delivers private-label spiral elements with fully customized labels approved by you.

PRODUCT OFFERINGS:

- Oltremare specialties with private labels and module custom design

MANN+HUMMEL Water & Membrane Solutions manufacturing is ISO 9001:2015 certified. Custom made designs with private label meet specific technical and brand requirements.



Nano Filtration Membranes

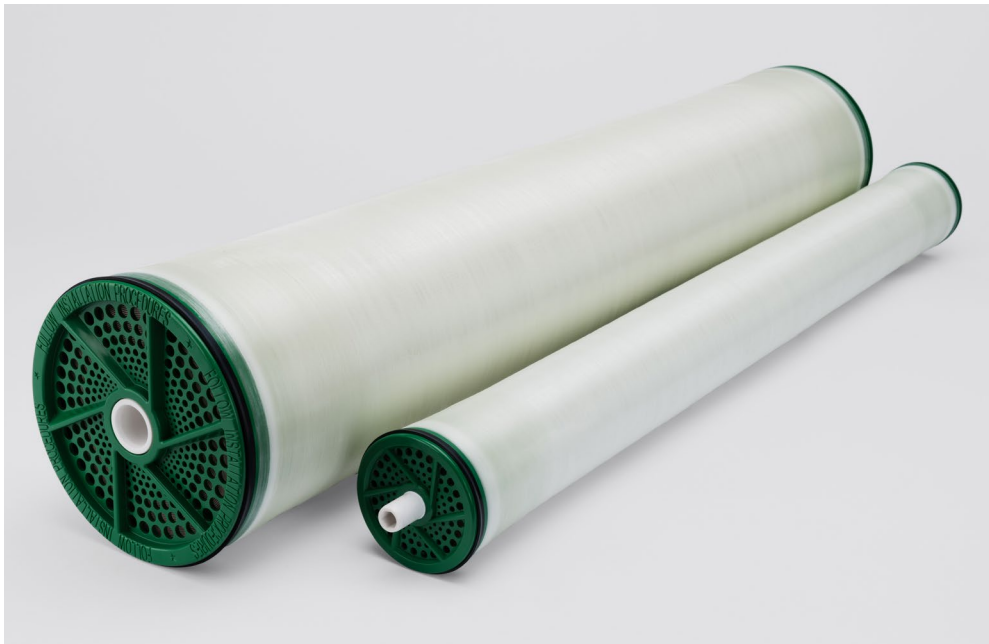
Our **less dense NF7** membrane selectively **rejects divalent and polyvalent ions** while allowing monovalent ions to pass through. In contrast, the **dense NF9** membrane provides **very high rejection (including NaCl)** even at low pressures. Both models are available in 2.5", 4", and 8" sizes, along with other configurations to meet specific application needs.

APPLICATIONS:

- Removal of TOC (Total Organic Carbon), NOM (Natural Organic Matter) and many other organics
- Water softening
- Industrial water reuse
- Magnesium recovery from seawater

PRODUCT OFFERINGS:

- MICRODYN NF7 (identical to Oltremare NANO7)
- MICRODYN NF9 (identical to Oltremare NANO9)



MANN+HUMMEL Water & Membrane Solutions NF portfolio offers a unique combination of selective rejection and high flow.

Should you need any additional information, please consult:

<https://water-membrane-solutions.mann-hummel.com/en.html>

STANDARD 8" and 4" MODELS OFFERING
(*additional size and custom-made elements are available)

Product	Identical to	Nominal Rejection	Minimum Rejection	Area m² (ft²)	Flow m³/d (gpd)
BRACKISH WATER RO					
MICRODYN 4040-ULE	Oltremare LOW3 -4040	98.8%	98.0%	7.9 (85)	11.4 (3000)
MICRODYN 8040-ULE-400		98.8%	98.0%	37.2 (400)	53 (14000)
MICRODYN 8040-ULE-440		98.8%	98.0%	40.9 (440)	57 (15000)
MICRODYN 8040-BW-365	Oltremare BR2-8040	99.5%	99.2%	34 (365)	37.9 (10000)
MICRODYN 8040-BW-400	Oltremare BR3-8040	99.5%	99.2%	37.2 (400)	41.6 (11000)
MICRODYN 8040-BW-400/34	Oltremare BR3G-8040	99.5%	99.2%	37.2 (400)	41.6 (11000)
MICRODYN 8040-BW-440	Oltremare BR34-8040	99.5%	99.2%	40.9 (440)	45.6 (12000)
Oltremare FOUL1-4040		99.4%	99.0%	7.9 (85)	7.6 (2000)
MICRODYN 8040-FR-400	Oltremare FOUL1-8040	99.5%	99.0%	37.2 (400)	40 (10500)
MICRODYN 8040-FR-400/34	Oltremare FOUL2G-8040	99.5%	99.0%	37.2 (400)	40 (10500)
MICRODYN 4040-XLE		99.2%	99.0%	7.9 (85)	9.8 (2600)
MICRODYN 8040-XLE-400		99.2%	99.0%	37.2 (400)	45.4 (12000)
MICRODYN 8040-XLE-440		99.2%	99.0%	40.9 (440)	50 (13200)
MICRODYN 4040-XRLE	Oltremare LOW2-HR-4040	99.65%	99.40%	7.9 (85)	7.2 (1900)
MICRODYN 8040-XRLE-400	Oltremare LOW2-HR-8040	99.65%	99.40%	37.2 (400)	35.9 (9500)
MICRODYN 8040-XRLE-400/34	Oltremare LOW2G-HR-8040	99.65%	99.40%	37.2 (400)	35.9 (9500)
MICRODYN 8040-XRLE-440	Oltremare LOW24-HR-8040	99.65%	99.40%	40.9 (440)	39.7 (10500)
MICRODYN 4040-LE		99.3%	98.8%	7.9 (85)	8.3 (2200)
MICRODYN 8040-LE-400		99.3%	98.8%	37.2 (400)	40 (10550)
MICRODYN 8040-LE-400/34		99.3%	98.8%	37.2 (400)	40 (10550)
MICRODYN 8040-LE-440		99.3%	98.8%	40.9 (440)	43.9 (11550)
Oltremare LOW1-4040		99.5%	99.2%	7.9 (85)	9.8 (2600)
Oltremare LOW1-8040		99.3%	99.0%	37.2 (400)	45.4 (12000)
Oltremare LOW1G-8040		99.3%	99.0%	37.2 (400)	45.4 (12000)
Oltremare LOW14-8040		99.3%	99.0%	40.9 (440)	50 (13200)
MICRODYN 4040-HRLE	Oltremare LOW2-4040	99.5%	99.3%	7.9 (85)	7.9 (2100)
MICRODYN 8040-HRLE-400	Oltremare LOW2-8040	99.5%	99.3%	37.2 (400)	39.7 (10500)
MICRODYN 8040-HRLE-400/34	Oltremare LOW2G-8040	99.5%	99.3%	37.2 (400)	39.7 (10500)
MICRODYN 8040-HRLE-440	Oltremare LOW24-8040	99.5%	99.3%	40.9 (440)	43.5 (11500)
MICRODYN 4040-XLE	Oltremare LOW4-4040	99.2%	99.0%	7.9 (85)	9.8 (2600)
MICRODYN 8040-XLE-400	Oltremare LOW4-8040	99.2%	99.0%	37.2 (400)	45.4 (12000)
MICRODYN 8040-XLE-440	Oltremare LOW44-8040	99.2%	99.0%	40.9 (440)	50.0 (13200)
Oltremare LOW7 4040		99.2%	99.0%	7.9 (85)	9.5 (2500)
Oltremare LOW7 4040XL		99.2%	99.0%	9.8 (105)	11.7 (3100)
SEAWATER RO					
Oltremare SEA2-4040		99.4%	99.2%	7.9 (85)	7.4 (1950)
MICRODYN 4040-SWL	Oltremare SEA5-4040	99.75%	99.4%	7.9 (85)	7.4 (1950)
MICRODYN 8040-SWL-400/34	Oltremare SEA5G-8040	99.65%	99.2%	37.2 (400)	34.1 (9000)
MICRODYN 8040-SWL-440	Oltremare SEA54-8040	99.65%	99.2%	40.9 (440)	37.5 (9900)
MICRODYN 8040-SWM-400/34	Oltremare SEA1G-8040	99.75%	99.65%	37.2 (400)	28 (7500)
MICRODYN 8040-SWM-440	Oltremare SEA14-8040	99.75%	99.65%	40.9 (440)	30.2 (8000)
MICRODYN 4040-SWH		99.8%	99.6%	7.9 (85)	6.4 (1700)
MICRODYN 8040-SWH-400/34	Oltremare SEA4G	99.8%	99.7%	37.2 (400)	22.7 (6000)
MICRODYN 8040-SWH-440	Oltremare SEA44	99.8%	99.7%	40.9 (440)	25.0 (6600)
NANOFILTRATION					
MICRODYN NF7-4040	Oltremare NANO7-4040	97.0%		7.9 (85)	9.5 (2500)
MICRODYN NF7-8040	Oltremare NANO7-8040	97.0%		37.2 (400)	47.3 (12500)
MICRODYN NF9-4040	Oltremare NANO9-4040	97.0%		7.9 (85)	7.6 (2000)
MICRODYN NF9-8040	Oltremare NANO9-8040	97.0%		37.2 (400)	40 (9500)
CELLULOSE ACETATE					
TRISEP PLT 4040-SB20-31		98.0%	97.0%	7.4 (80)	6.1 (1600)
TRISEP 4040-SB20-TSA		98.0%	97.0%	7.4 (80)	6.1 (1600)
TRISEP 8040-SB20-TPA		98.0%	97.0%	30.2 (325)	24.6 (6500)
TRISEP 8040-SB20-TSA		98.0%	97.0%	32.5 (350)	26.5 (7000)
TRISEP 8040-SB20-TSFA		98.0%	97.0%	32.5 (350)	26.5 (7000)
TRISEP PLT 4040-SB50-31		96.0%	92.5%	7.4 (80)	7.6 (2000)
TRISEP 4040-SB50-TSA		96.0%	92.5%	7.4 (80)	7.6 (2000)
TRISEP 8040-SB50-TSA		96.0%	92.5%	32.5 (350)	32.2 (8500)

For test conditions of the elements please refer to the technical data sheet of each module available at <https://water-membrane-solutions.mann-hummel.com/en/products/ro-reverse-osmosis.html>

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