

# Pure Water Membranes by Hydranautics

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# Pure Water Membranes by Hydranautics

For applications such as potable water, boiler feed, desalination, industrial process as well as food and beverage. Hydranautics - A Nitto Group Company, has become one of the most experienced manufacturers of reverse osmosis membranes.









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# **Typical Applications**

The growing demand for purified water has seen a dramatic increase in the use of reverse osmosis (RO) products throughout hundreds of industries. Producing water in its purest state, RO water provides consistent specified quality for many processes, from product make-up to power generation, drinking water to product rinsing.

Varying characteristics of RO membranes have created a vibrant and ever-expanding diversity of applications, each requiring different flow rates and performance specification to suit the user's needs.







## **Introducing Hydranautics**

Hydranautics uses state-of-the-art technology to manufacture a range of high-performance membrane products, making them one of the global leaders in membrane technology.



Nitto Denko Corporation, Hydranautic's parent company, is Japan's leading diversified materials manufacturer with the technical expertise to add various functionality to sheets, films and other materials using a range of technologies.

Hydranautics started in the RO water treatment field in 1980, becoming part of the Nitto Group company in 1987. With over 50 years experience combined and access to Nitto's knowledge base and advanced technology, Hydranautics is able to produce high quality, integrated membrane solutions by using cutting-edge polymer technology.



#### **Research and Development**

Hydranautics continues to produce effective and innovative membrane products for the water treatment industry by utilising two research and development centres based in the USA and Japan.



#### **Multi-location Manufacturing Facility**

To meet growing global demand in an efficient and timely manner, Nitto Global Membrane Division has three manufacturing locations; USA, Japan and China.

## Worldwide Manufacturing

The Nitto Global Membrane Division consists of the Hydranautics headquarters in the USA, a membrane manufacturing plant in Japan and an assembly facility in China, in addition to a network of offices and warehouses.



Oceanside, CA, USA Founded: 1963



Shiga, Japan Founded: 1986



Shanghai, China Founded: 2001



## **System Projection Software**

IMSDesign (Integrated Membrane Solutions Design) is an advanced sizing tool capable of quickly and accurately designing and analysing membrane-based systems.

Using IMSDesign Fileder can give users complete control to compare and analyse the information used in membrane selection and system design.

This control assures full client confidence in the projected performance of Hydranautics membrane.



## State-of-the-art Technology

Hydranautics applies Anti-Telescoping Devices and LD Technology<sup>™</sup> to its membranes, ensuring high performance with lower colloidal fouling and a reduced risk of membranes bursting.

#### **Anti-Telescoping Device**

In a conventional flush cut type membrane, there is no air release between the element and the vessel, leading to a large pressure difference, which can cause the membrane to burst. This results in having to feed water through the membrane slowly, increasing changeout times.

The 8" Hydranautics membranes benefit from an Anti-Telescoping Device (ATD), which releases the air between the element and the vessel. This prevents \_\_\_\_\_ the pressure difference from becoming too great, reducing both the risk of the membrane bursting and changeout times.



## The LD Technology™

When high performance is required under demanding conditions, the LD (Low Differential) reverse osmosis membrane elements from Hydranautics set a new standard for high performance with lower colloidal fouling. Using a larger 34mil feed channel spacer, LD membranes prevent suspended solids from fouling the active membrane area, meaning systems can run longer before requiring cleaning or changeout.

#### **Enhanced Membrane Chemistry**

- Increased chemical resistance and high pH tolerance
- Increases element life

#### **Innovative Spacer Design**

- Minimises trapping of small colloidal particles
- Reduces pressure losses
- Increases system efficiency

#### Patented Vented Seal Carrier

• Eliminates pressure shock damage during system start up

#### **Improved Performance**

- Reduces power consumption, saving energy costs and decreasing the carbon footprint of the system
- Reduced cleaning costs
- Improved permeate quality

# **Quality Assurance**

Hydranautics elements are 100% wet tested at point of manufacture, providing quality and performance upon installation, system start up and flushing.



Membrane elements are vacuum sealed in a polyethylene bag with less than 1% sodium meta-bisulfite solution, which is added to preserve the membranes. A heavy duty, rigid outer box and protective foam inserts add further layers of security during transportation and storage.

Serial Number Upon request, individual elements testing data can be retrieved with the unique identification number



**Product Code** Identifies the element type, diameter and length

## Inspected Every membrane is

individually inspected before final packaging and shipping

## **Membrane Comparison Chart**

The chart below identifies where enhanced Hydranautics technologies are available over your current membrane.

Hydranautics		Competitor Membranes				
	Membranes	DOW/Filmtec	AXEON	Toray	SUEZ	Oltremare
10	CPA7-LD-4040	TW30-4040	HR3-4040	TM710D	AG-90	BR2-4040
anes	ESPA2-LD-4040	LCHR-4040	HF6-4040	TMH10A	AK-90LE	LOW2-HR-4040
lemb	ESPA4-LD-4040	XLE-4040	HF4-4040	TMG10	AK4040	LOW4-4040
40 M	CPA2-4040	TW30-4040	HR3-4040	TM710D	AG-90	BR2-4040
4" 4C	LFC3-LD-4040	-	-	TML10D	AG-90 LF	FOUL1-4040
	SWC5-LD-4040	SW30-4040	-	-	AE-90	SEA5-4040
	CPA7-LD	ECO-PRO 400	-	TM720D-400	AG-400 34	BR3G-8040
	CPA7 MAX	ECO-PRO 440	-	TM720D-440	AG-440	BR34-8040
ranes	ESPA4 MAX	XLE-440	-	TMH20A-440	AK-440 LE	LOW44-8040
lemb	ESPA2-LD	ECO-400i	-	TM720L-400	AK-440	LOW2G-8040
3" 8040 M	ESPA2-LD MAX	HRLE-440i	-	TM720C-440	AK-440	LOW24-8040
	ESPA1	BW30LE-400	-	TMG20-400	AK-400	LOW1-8040
	LFC3-LD	BW30FR-400	-	TML20D-400	AG-400LF 34	FOUL1-8040
	SWC5-LD	SW30LE-400	-	TM820-400	AE-400,34	-

# **How to Select Your Hydranautics Membrane**

Three simple steps is all it takes to select your membrane.



## **Technology Options**

Each RO membrane can be categorised by its performance and core characteristics such as ion rejection, membrane permeability and fouling potential. To easily identify which membrane meets the criteria of a specific application and its requirements, the icons below have been used to represent the key characteristics.



**High Rejection** Reduce ionic loading to ion exchange to save chemical consumption.

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High Flow / Production Increased membrane durability and enhanced cleaning performance.



Low Fouling Lower colloidal fouling, lower differential pressure.



Sea Water Engineered to treat high salinity feedwaters.



Low Fouling | Sea Water

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## 4" 4040 Membranes 5.3-6.2 LPM

Established as the industry standard size for small commercial applications, the 4040 range from Hydranautics offers a variety of technologies such as high rejection, low operating pressure and low fouling properties. Each of these characteristics is engineered to suit the requirements of different markets.

Since its initial development in the 1950's reverse osmosis has become the recognised solution to produce purified water. Now used globally, membranes are being installed into an abundance of markets such as aquatics, food and beverage, hydroponics and semiconductors.



**Glass Wash** Reverse osmosis provides a spotfree rinse, eliminating the need for chemical detergents and additives. Membranes are typically installed

within integrated mobile systems.



Finishing

Whether for rinsing and drying of conductive components or top-up water for plating baths, RO quality water is used extensively in the finishing industry.



Pharmaceutical

Ultra pure water is typically used in the pharmaceutical industry, controlling all aspects of potential contamination as small as specific salts, metals and other ions.

#### Membrane Performance vs Price

The decision on which membrane is most suited to an application should always be based on the performance of the element, however price can also be an influencing factor, sometimes causing users to sacrifice performance over cost. For this reason, Fileder has levelled the playing field making all but the innovative CPA7, the low fouling LFC3 or the sea water SWC5 membranes the same price, ensuring your application can benefit from Hydranautics advanced technology.

#### **RO Pre-filtration**

Effective pre-filtration is essential for many applications including RO, where it is key to maximise membrane life. Highly sensitive RO membranes can be susceptible to premature fouling and oxidation damage from sediment, organics and chlorine which can significantly reduce pure water production and/or permeate quality. Typically feedwater with an SDI (Silt Density Index) less than 5 is recommended to ensure optimal membrane performance. To achieve this, for 4" membranes, Fileder recommends 5 micron 20" Large Diameter sediment removal (SPECTRUM PSP-5-20BB) followed by a high capacity activated carbon block for chlorine and organic protection (SCB-5-20BB).





# 4" Membranes

#### **Optimum Parameters**

Using the latest Hydranautics projection software, Fileder has highlighted the performance of each membrane at its recommended feed parameters (marked with a  $\langle \mathcal{I} \rangle$ ) as well as different operating criteria to show where each membrane can perform at its optimum as well as making individual element comparison easy and simple.

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on (PPM)			
,00	1500 🖈		
14.9	15.4		
5.8	5.8		
۶.5	99.5		

#### The Next Generation Membrane CPA7

The CPA7 series is the newest addition to the CPA range taking advantage of the latest manufacturing processes to deliver the highest salt rejection in the industry. These ultra-high rejection membranes are perfectly balanced, delivering high permeate flow whilst fulfilling the purest water quality requirements.

#### CPA7-LD-4040



The CPA7-LD is the perfect choice, delivering the best combination of high rejection and high flow capability with the added benefit of LD Technology<sup>™</sup> to minimise fouling.

	Feed Concentration (PPM)		
	500	1000	1500 🗮
Feed Pressure (bar)	14.5	15	15.5
Permeate Flow (LPM)	6.1	6.1	6.1
Rejection (%)	99.8	99.8	99.8

## CPA2-4040



CPA2 is a tried and tested product delivering the traditional balance between high permeate flow and high rejection at regular operating pressures of 15.5 bar.

	Feed Concentration (PPM)		
	500	1000	1500 🗮
Feed Pressure (bar)	14.4	14.9	15.4
Permeate Flow (LPM)	5.8	5.8	5.8
Rejection (%)	99.6	99.6	99.5



Membrane Media Composite Polyamide

Brine Seal Ethylene Propylene (EPR-80)



Max. Applied Pressure 41.4 bar (82.7 bar for SWC5-LD-4040) Max. Chlorine Concentration

< 0.1 ppm Max. Operating Temperature 45°C

Max. Feedwater Turbidity 1.0 NTU Max. Feedwater SDI 5.0 Max. Feed Flow 60 LPM Max. Pressure Drop for Each Element 1.0 bar

## **Performance Technologies**





Increased membrane durability and enhanced cleaning performance



Low Fouling Lower colloidal fouling, lower differential pressure



#### ESPA2-LD-4040



ESPA2 membranes provide optimum salt rejection and permeate flows at a lower operating pressure than the CPA range. They are chosen when lower permeate TDS and lower feed pressures are required.

	Feed Concentration (PPM)		
	500	1000	1500 🗮
Feed Pressure (bar)	9.6	10.1	10.6
Permeate Flow (LPM)	5.3	5.3	5.3
Rejection (%)	99.7	99.6	99.6

#### LFC3-LD-4040



LFC3 membranes combine the attributes of a neutral surface charge and hydrophilicity, providing significant reduction in fouling and increased membrane efficiency.

	Feed Concentration (PPM)		
	500	1000	1500 🗮
Feed Pressure (bar)	14.5	15	15.5
Permeate Flow (LPM)	5.5	5.5	5.5
Rejection (%)	99.8	99.7	99.7

**ESPA4-LD-4040** 



ESPA4 are the lowest feed pressure membranes in the range offering low energy consumption. This ultra-low operating pressure still delivers uncompromising high levels of salt rejection.

	Feed Concentration (PPM)		
	500 🗮	1000	1500
Feed Pressure (bar)	6.8	7.3	7.8
Permeate Flow (LPM)	6.2	6.2	6.2
Rejection (%)	99.1	99.0	98.8

#### SWC5-LD-4040



The SWC5-LD-4040 offers a simple solution to an often complex issue of treating high salinity feed water. Exceptional rejection rates provide low permeate TDS.

	Feed Concentration (PPM)			
	16000	24000	32000 🗮	
Feed Pressure (bar)	38	46	55	
Permeate Flow (LPM)	4.6	4.6	4.6	
Rejection (%)	99.71	99.7	99.7	

## Test Conditions\*

**Operating Temperature** 25°C

**pH Range** 6.5-7.0

Permeate Recovery

\*The specified performance is based on data taken after approximately 30 minutes of operation. Actual testing of elements may be done at conditions which vary from these exact values; in which case, the performance is normalised back to these standard conditions. Permeate flow for individual elements may vary ±15% from the value specified.



Elements are enclosed in a sealed polyethylene bag containing <1.0% sodium meta-bisulfite solution and protected by a rigid outer box.

Available to purchase individually or as a box: SINGLE QTY: 1 (4kg) BOX QTY: 4 (16kg)

#### Shelf Life

36 months from date of manufacture. For General Storage Procedures refer to: http://membranes.com/knowledge-center/ technical-service-bulletin-tsb/

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## 8" 8040 Membranes 26.3-34.7 LPM

Used to treat water from virtually any water source, 8" membranes are used in purification and desalination systems as a reliable solution to high production and stringent water quality requirements. Benefiting from decades of research and development, Hydranautics membranes continue to lead the market.

8" Membrane elements continuously meet and satisfy the increasing demands of the water treatment industry through exceptional product quality, outstanding performance and with some of the highest salt rejection rates in the industry.

#### **The Next Generation Membrane CPA7**

The CPA7 series is the newest addition to the CPA range utilising the latest manufacturing processes to deliver the highest salt rejection in the industry. These ultra-high rejection membranes are perfectly balanced delivering high permeate flow whilst fulfilling the purest water quality requirements.



**Power Generation** Steam generation plants typically use RO quality water to reduce the amount of scale forming ions in the water, preventing the number of boiler blow down required to maintain the system.



Food and Beverage

Consistent and controllable water quality is paramount to ensure physical characteristics of endproduct such as appearance, smell and taste are maintained at the required standard.



**Brackish Water Treatment** 

Private water supplies offer an economic source of water but are subject to varying quality. Fluctuations in contaminants such as iron, manganese and sulphate can be treated using specially designed LFC3-LD reverse osmosis membranes.

## **RO Pre-filtration**

Effective pre-filtration is essential for many applications including RO, where it is key to maximise membrane life. RO membranes can be susceptible to premature fouling and oxidation damage from sediment, organics and chlorine which can significantly reduce pure water production and/or permeate quality. Typically feedwater with an SDI (Silt Density Index) less than 5 is recommended to ensure optimal membrane performance. To achieve this, Fileder recommends 5 micron sediment removal (SPECTRUM PSP). For chlorinated feedwater supplies, the SCB-S activated cabon block, purposely designed for high capacity SPECTRUM multi-round housings should be installed after the sediment stage to target chlorine and organics.



# Dimensions

## 8" Membranes

#### **Optimum Parameters**

Using the latest Hydranautics projection software, Fileder has highlighted the performance of each membrane at its recommended feed parameters (marked with a  $\langle \mathcal{I} \rangle$ ) as well as different operating criteria to show where each membrane can perform at its optimum as well as making individual element comparison easy and simple.

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#### **CPA7-LD**

CPA7-LD is the latest generation product in the range delivering high permeate flows coupled wit

the highest salt rejection in the industry.

	Feed Concentration (PPM)			
	500	1000	1500 🖈	
Feed Pressure (bar)	14.5	15	15.5	
Permeate Flow (LPM)	30.2	30.2	30.2	
Rejection (%)	99.8	99.8	99.8	

#### ESPA1

The original low energy element, the ESPA1 has high permeability which means it can produce large volumes of high quality water from low TDS feed waters.

	Feed	Concentration (	entration (PPM) 1000 1500 ≮				
	500	1000	1500 🗮				
Feed Pressure (bar)	9.5	10	10.5				
Permeate Flow (LPM)	31.5	31.5	31.5				
Rejection (%)	99.5	99.4	99.3				

## ESPA4 MAX

Maximising surface area in this high energy saving element, the ESPA4 MAX has one of the highest permeate production in the industry and is ideally suited where volume of product water is a priority.

	Feed	Concentration (	(PPM)
	500 🗮	1000	1500
Feed Pressure (bar)	7	7.4	7.9
Permeate Flow (LPM)	34.7	34.7	34.7
Rejection (%)	99.1	99.0	98.8



Membrane Media Composite Polyamide

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Brine Seal Ethylene Propylene (EPR-80)



Max. Applied Pressure 41.4 bar (82.7bar for SWC5-LD)

Max. Chlorine Concentration < 0.1 ppm

Max. Operating Temperature 45°C Max. Feedwater Turbidity

Max. Feedwater SDI Max. Feed Flow 284 LPM

Max. Pressure Drop for Each Element 1.0 bar





The CPA7 MAX uses 440ft<sup>2</sup> of CPA7 membrane to hich provides exceptional permeate flow rates and ion rejection.

h	produce an element w
	permeate flow rates ar

**CPA7 MAX** 

	Feed Concentration (PPM)						
	500	1000	1500 🗮				
Feed Pressure (bar)	14.5	15	15.5				
Permeate Flow (LPM)	33.2	33.2	33.2				
Rejection (%)	99.8	99.8	99.8				

## **Performance Technologies**





Increased membrane durability and enhanced cleaning performance



Low Fouling Lower colloidal fouling, lower differential pressure



#### ESPA2-LD



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ESPA2 membranes provide optimum salt rejection and permeate flows at a lower operating pressure than the CPA range. They are chosen when lower permeate TDS and lower feed pressures are required.

	Feed	Concentration (	(PPM)
	500	1000	1500 🗮
Feed Pressure (bar)	9.4	9.9	10.4
Permeate Flow (LPM)	26.3	26.3	26.3
Rejection (%)	99.7	99.7	99.6

## LFC3-LD

LFC3 membranes combine the attributes of a neutral surface charge and hydrophilicity, this provides significant reduction in fouling and increases the membrane's efficiency.

	Feed	Concentration (	(PPM)
	500	1000	1500 🗮
Feed Pressure (bar)	14.5	15.0	15.5
Permeate Flow (LPM)	28.8	28.8	28.8
Rejection (%)	99.8	99.7	99.7

#### **ESPA2-LD MAX**



The first of its kind to combine LD technology in a 440ft<sup>2</sup> membrane, the ESPA2-LD MAX offers low feed pressure, low fouling and exceptional permeate production.

	Feed Concentration (PPM)							
	500	1000	1500 🗮					
Feed Pressure (bar)	9.4	9.9	10.3					
Permeate Flow (LPM)	31.5	31.5	31.5					
Rejection (%)	99.7	99.6	99.6					

## SWC5-LD



Utilising low differential LD technology, the SWC5-LD minimises colloidal fouling whilst providing optimum salt rejection and permeate flows from seawater fed systems.

	Feed	Concentration (	(PPM)
	16000	24000	32000 🗮
Feed Pressure (bar)	36	46	55
Permeate Flow (LPM)	23.7	23.7	23.7
Rejection (%)	99.8	99.8	99.8

## Test Conditions\*

**Operating Temperature** 25°C

**pH Range** 6.5-7.0

Permeate Recovery

\*The specified performance is based on data taken after approximately 30 minutes of operation. Actual testing of elements may be done at conditions which vary from these exact values; in which case, the performance is normalised back to these standard conditions. Permeate flow for individual elements may vary ±15% from the value specified.



Elements are enclosed in a sealed polyethylene bag containing <1.0% sodium meta-bisulfite solution and protected by a rigid outer box.

Available to purchase individually or as a pallet: SINGLE QTY: 1 (16kg) PALLET QTY: 16 (256kg)

#### Shelf Life

36 months from date of manufacture. For General Storage Procedures refer to: http://membranes.com/knowledge-center/ technical-service-bulletin-tsb/

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Depth Filtration	Filter Housings and Systems	Carbon & Water Treatment Cartridges	Bag Filtration	Reverse Osmosis Systems	Pressure Vessels & Media	High Flow Filtration	Water Softeners	Stainless Steel Cartridges	UV Systems	Food Service	Large Diameter Filtration	Filtration & Water Treatment Rental	Installation & Servicing
<b>Solution</b>						🔏 fileder							

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