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# Pure Water Membranes by Hydranautics

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# Pure Water Membranes by Hydranautics

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

SPECTRUM™ PENTAIR AXEON WATER TECHNOLOGIES Nitto HYDRANAUTICS Nitto Group Company

# Contents

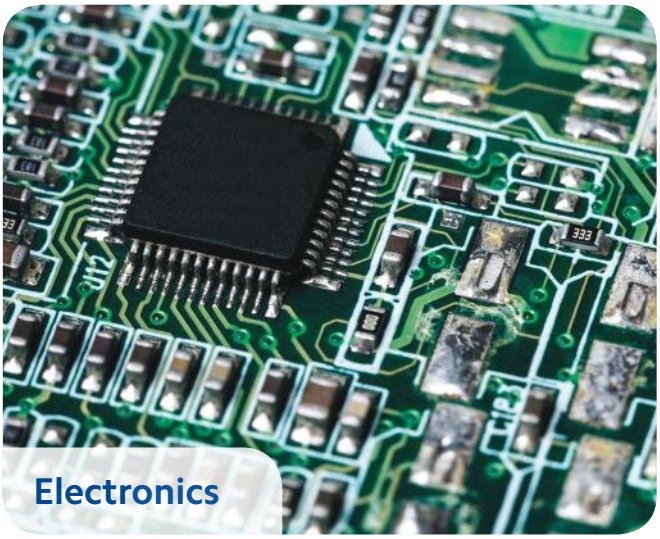




# Typical Applications

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.



Electronics

Spot-free rinse

Product make-up water

# 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 are 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

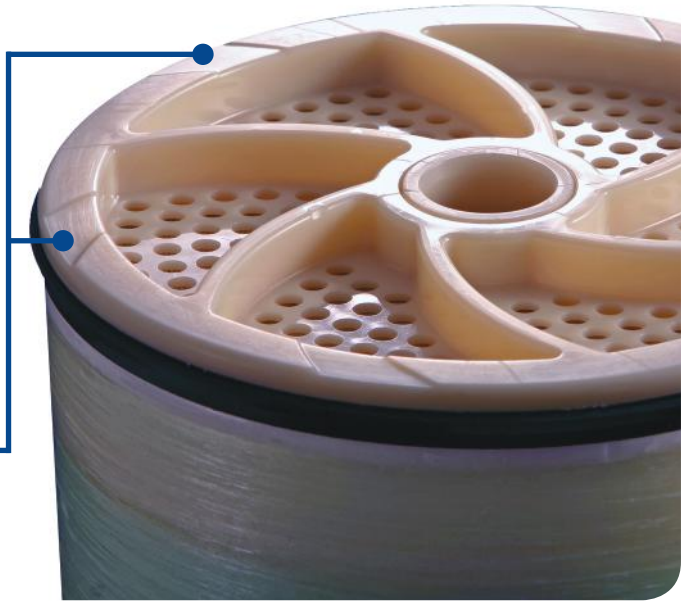
# State-of-the-art Technology

Hydranautics applies Anti-Telescoping Devices and LD Technology™ 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.

### 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

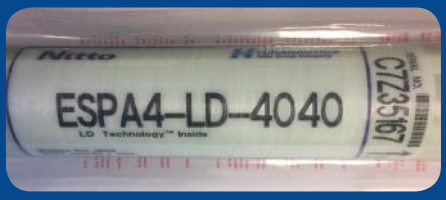
- Eliminates pressure shock damage during system start up

### 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

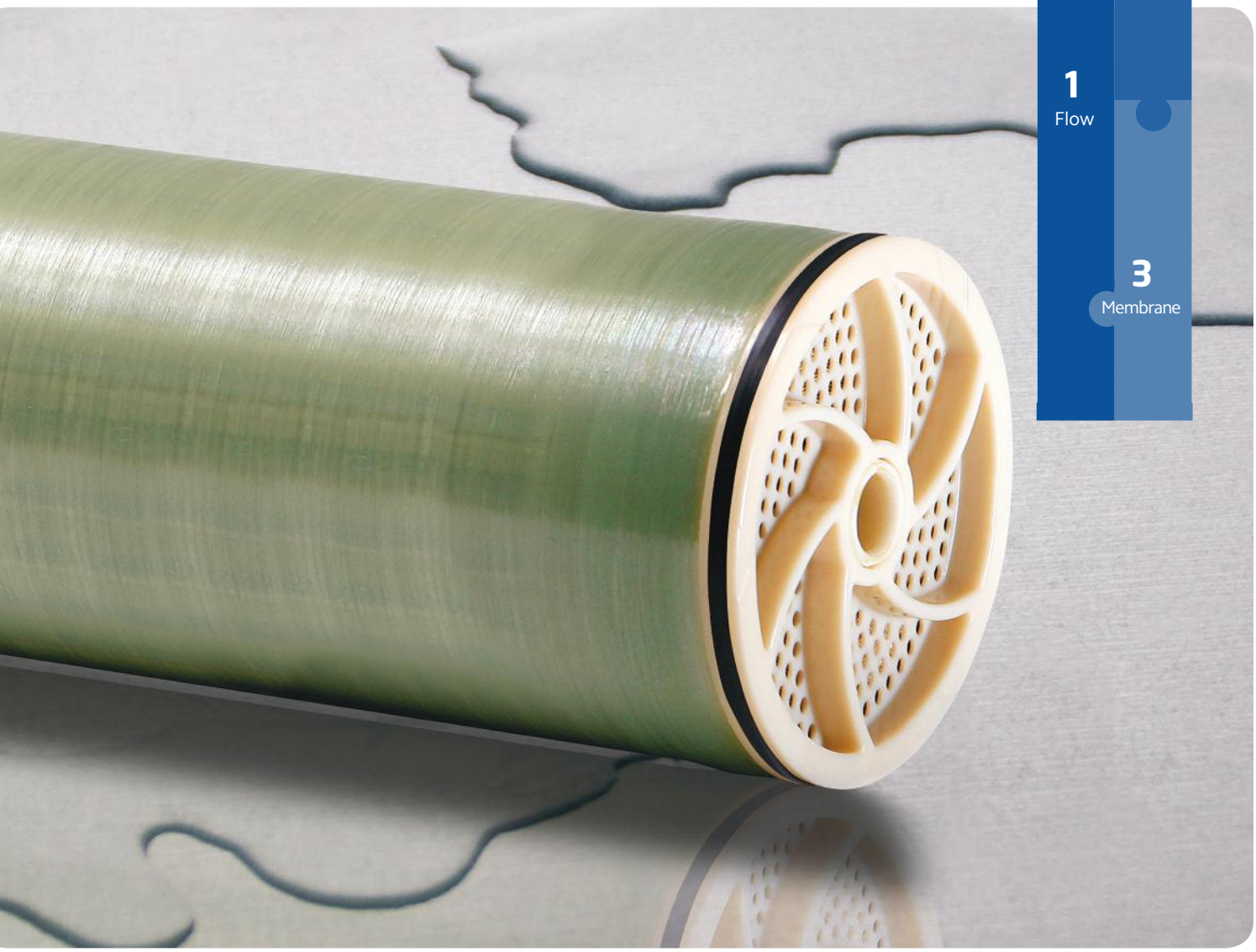
# Membrane Comparison Chart

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

| | Hydranautics Membranes | Competitor Membranes | | | | |
|---|---|---|---|---|---|---|
| | | DOW/Filmtec | AXEON | Toray | SUEZ | Oltremare |
| 4" 4040 Membranes | CPA7-LD-4040 | TW30-4040 | HR3-4040 | TM710D | AG-90 | BR2-4040 |
| | ESPA2-LD-4040 | LCHR-4040 | HF6-4040 | TMH10A | AK-90LE | LOW2-HR-4040 |
| | ESPA4-LD-4040 | XLE-4040 | HF4-4040 | TMG10 | AK4040 | LOW4-4040 |
| | CPA2-4040 | TW30-4040 | HR3-4040 | TM710D | AG-90 | BR2-4040 |
| | LFC3-LD-4040 | - | - | TML10D | AG-90 LF | FOUL1-4040 |
| 8" 8040 Membranes | CPA7-LD | ECO-PRO 400 | - | TM720D-400 | AG-400 34 | BR3G-8040 |
| | CPA7 MAX | ECO-PRO 440 | - | TM720D-440 | AG-440 | BR34-8040 |
| | ESPA4-LD | LE-400 | - | TMH20A-400 | AK-400 LE | LOW4G-8040 |
| | ESPA4 MAX | XLE-440 | - | TMH20A-440 | AK-440 LE | LOW44-8040 |
| | ESPA2-LD | ECO-400i | - | TM720L-400 | AK-440 | LOW2G-8040 |
| | 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 |

# 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.

### High Flow / Production

Increased membrane durability and enhanced cleaning performance.

### Low Fouling

Lower colloidal fouling, lower differential pressure.

## 1 Flow

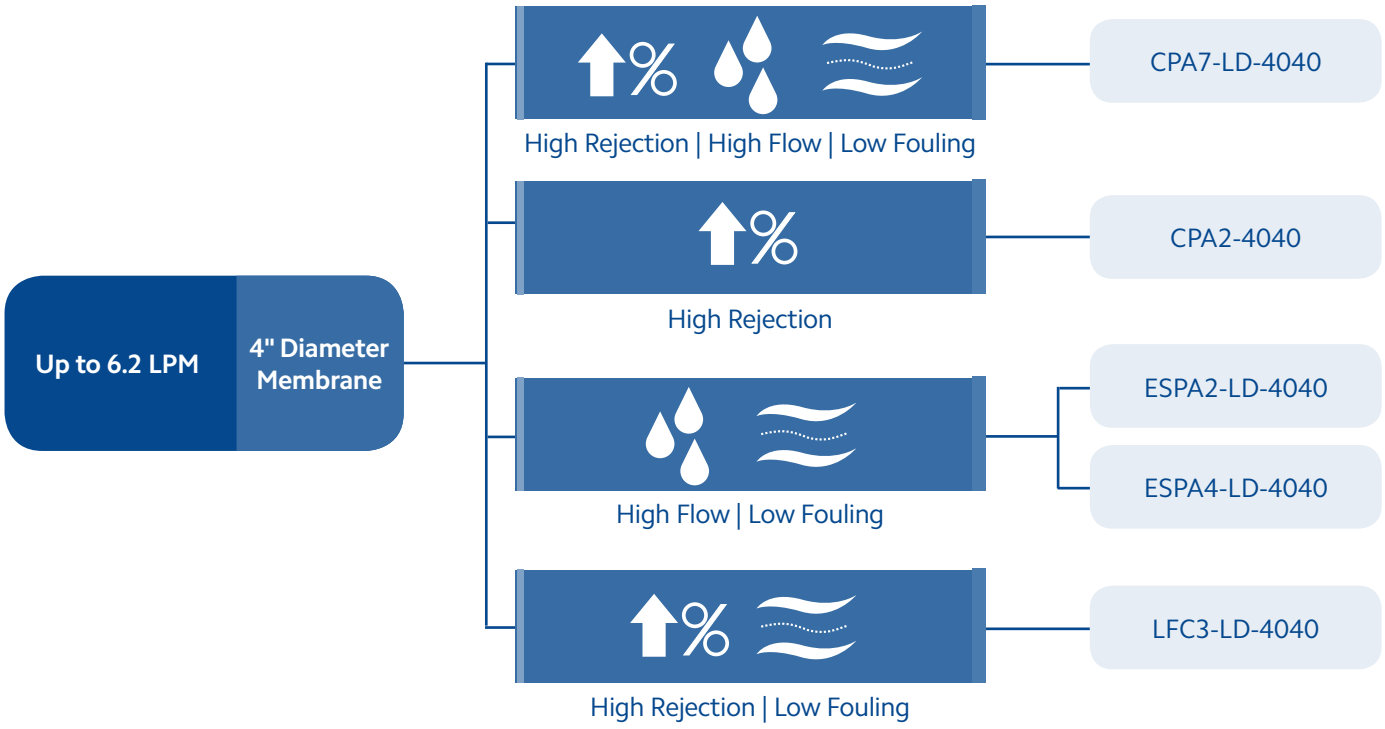
Select the diameter based on the expected flow rate of the application.

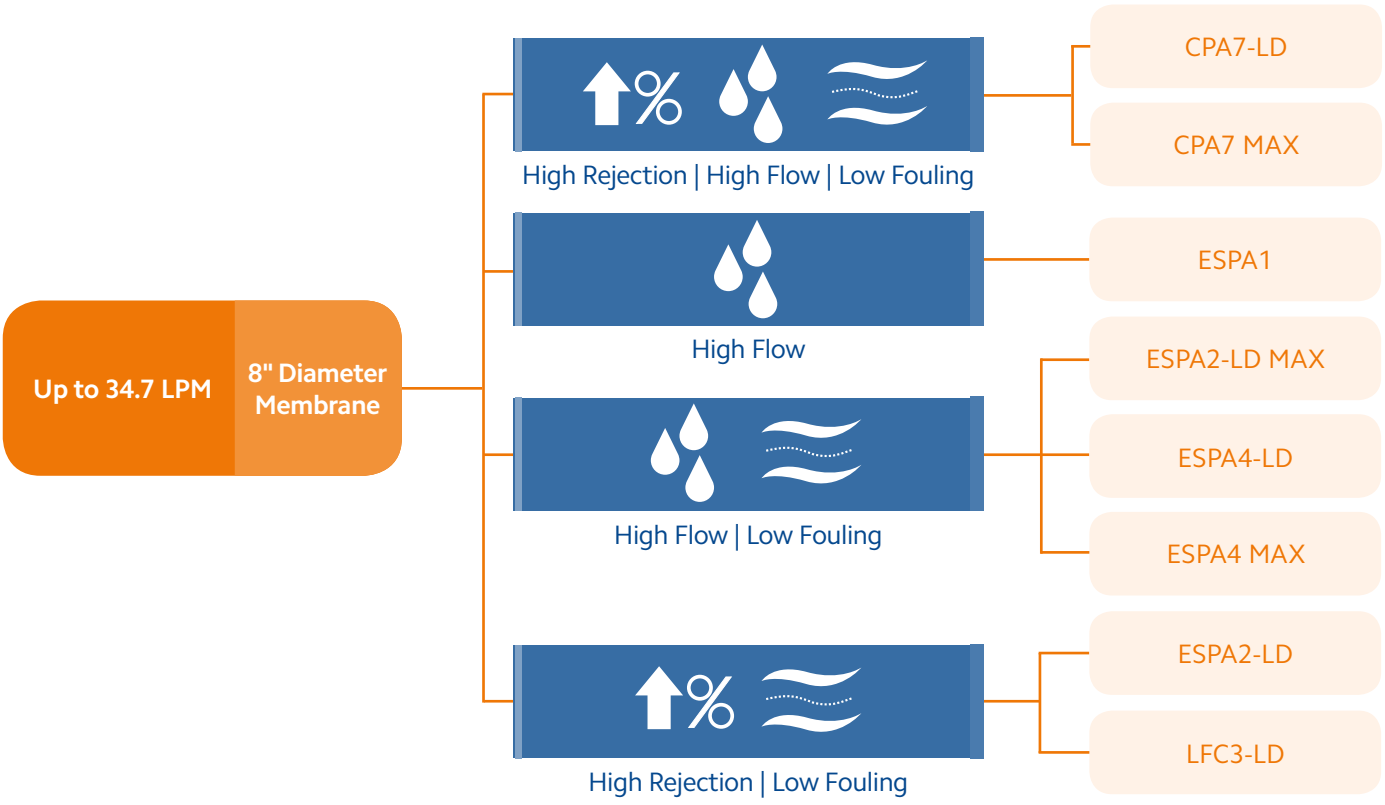
## 2 Performance

Choose the performance combinations based on rejection, production or fouling rate.

## 3 Membrane

Select the membrane based on suitability for the flow rate and application.



# 4" 4040 Membranes

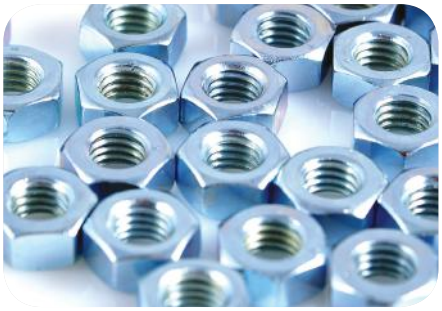
## 5.3-6.2 LPM

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 spot-free 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 to control all aspects of potential contamination as small as specific salts, metals and other ions.

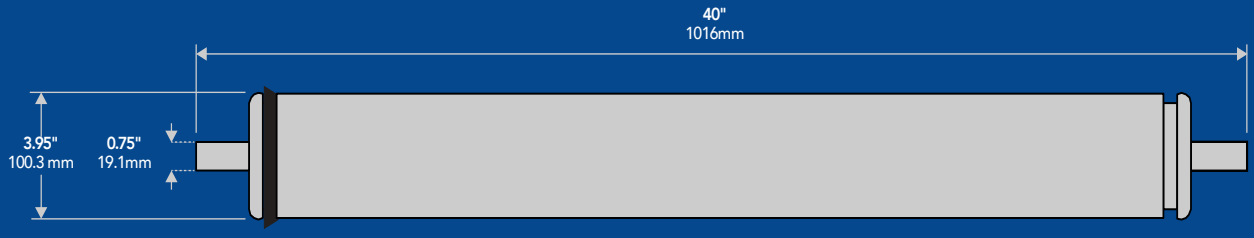
## Membrane Performance vs Price

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 and specialist LFC3 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 specified 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).


## Dimensions



# 4" Membranes

## Optimum Parameters

Using the latest Hydranautics projection software, Fileder have highlighted the performance of each membrane at its recommended feed parameters (marked with a ☆) 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.

The following data is based on Hydranautics projection software at 15% recovery, 25°C feed water temperature and pH 6.5 - 7.


## 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 is a sixth generation membrane delivering ultra-high purity water even under challenging feedwater conditions. The CPA7-LD specifically is the perfect choice delivering the best combination of high rejection and high flow capability with the added benefit of LD Technology™ 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 |

### Materials of Construction

**Membrane Media**
Composite Polyamide

**Brine Seal**
Ethylene Propylene (EPR-80)

### Specification

**Max. Applied Pressure**
41.4 bar

**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

### High Rejection
Reduced salt passage for high purity requirements

### High Flow/Production
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 |

## 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 |

## 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 |

## 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 |

## Test Conditions*

**Operating Temperature**
25°C

**pH Range**
6.5-7.0

**Permeate Recovery**
15%

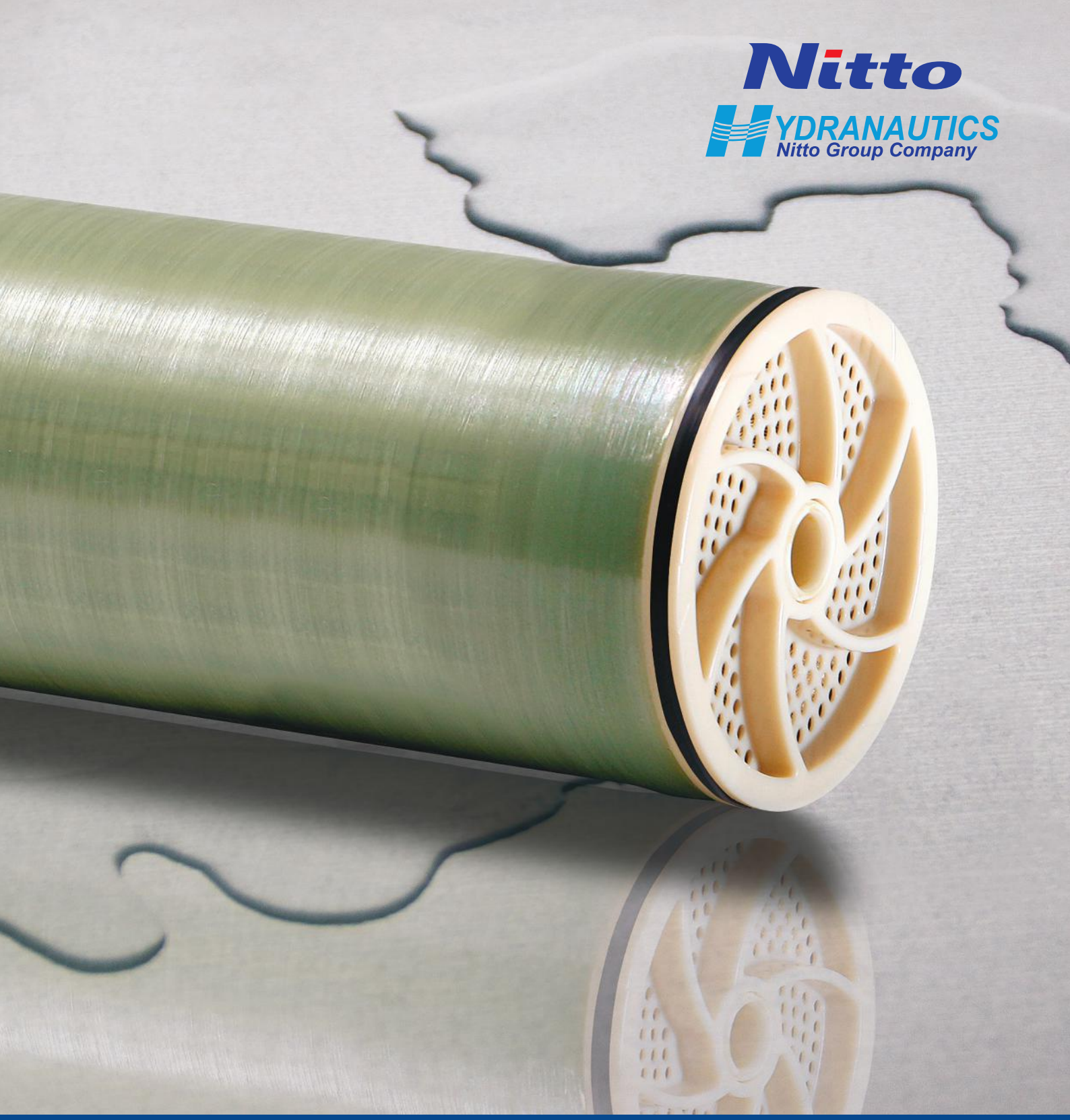
*The specified performance is based on data taken after approximately 30 minutes of operation. Actual testing of elements may be done at conditions which vary from these exact values; in which case, the performance is normalised back to these standard conditions. Permeate flow for individual elements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

## Packaging

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/




# 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 boilers required to maintain the system.

### Food and Beverage

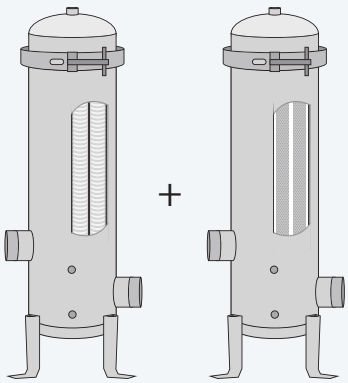
Consistent and controllable water quality is paramount to ensure physical characteristics of end-product such as appearance, smell and taste are maintained at the required standard.

### Brackish Water Treatment

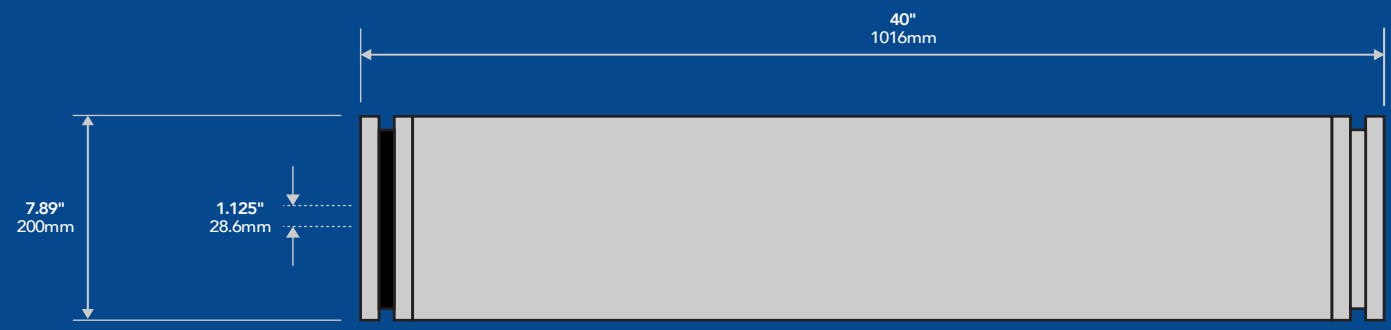
Private water supplies offer an economic source of water but are subject to varying quality. Fluctuations in contaminants such as iron, manganese and sulphate can be treated using reverse osmosis.

## 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 specified for 8" membranes, Fileder recommends 5 micron sediment removal (SPECTRUM PSP) followed by a high capacity activated carbon block for chlorine and organic protection (SCB or PCB) suitable for use in SPECTRUM multi-round housings.



## Dimensions



# 8" Membranes

## Optimum Parameters

Using the latest Hydranautics projection software, Fileder have highlighted the performance of each membrane at its recommended feed parameters (marked with a ☆) 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.

The following data is based on Hydranautics projection software at 15% recovery, 25°C feed water temperature and pH 6.5 - 7.


## CPA7-LD

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

## CPA7 MAX

The CPA7 MAX uses 440ft$^2$ of CPA7 membrane to produce an element which provides exceptional permeate flow rates and ion rejection.

| | 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 |

## ESPA4-LD

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) | 7.0 | 7.4 | 7.9 |
| Permeate Flow (LPM) | 31.7 | 31.7 | 31.7 |
| Rejection (%) | 99.1 | 99 | 98.8 |

## 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 |

## Materials of Construction

**Membrane Media**
Composite Polyamide

**Brine Seal**
Ethylene Propylene (EPR-80)

## Specification

**Max. Applied Pressure**
41.4 bar

**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**
284 LPM

**Max. Pressure Drop for Each Element**
1.0 bar

# Performance Technologies

### High Rejection
Reduced salt passage for high purity requirements

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

### Low Fouling
Lower colloidal fouling, lower differential pressure

## ESPA2-LD

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 |

## ESPA2-LD MAX

The first of its kind to combine LD technology in a 440ft$^2$ 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 |

## 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 (PPM) | | |
|---|---|---|---|
| | 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 |

## 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 |

## Test Conditions*

**Operating Temperature**
25°C

**pH Range**
6.5-7.0

**Permeate Recovery**
15%

*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.

## Packaging

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/

Product Brochures




- Depth Filtration
- Reverse Osmosis Components
- Stainless Steel Filter Housings
- Plastic Filter Housings
- Carbon & Resin Cartridges
- 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

Application Brochures




- Solutions for Bacteria and Parasites
- Solutions for Hospitals
- Solutions for Beverage Production
- Solutions for Food and Dairy Production
- Solutions for Chemical Production
- Solutions for Microelectronics
- Solutions for Buildings and Facilities Management
- Solutions for Surface Finisihing

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