

## A Closer Look - RO membranes

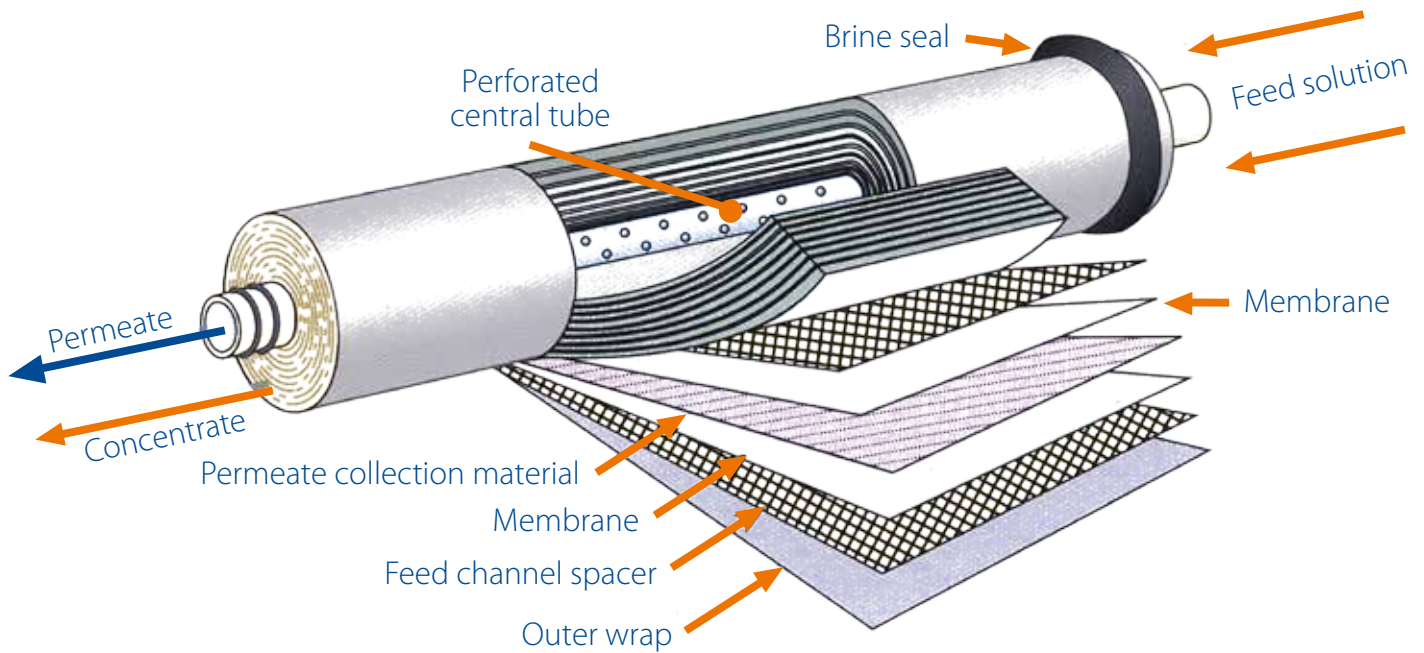
A reverse osmosis membrane is a highly effective purification method to remove salts and ions to produce pure water.

A spiral membrane is constructed with a number of membrane envelopes wound around a perforated central tube. The water is forced through the semi-permeable membrane which rejects the salt molecules leaving pure water on the other side. This pure water is called the permeate and spirals inward to the central tube for collection.

### Temperature correction factors

The production figures specified at an industry standard 25°C, to help estimate production rates at different application temperatures, the correction factors have been specified below.

°C	4	10	16	21	25	27	32
<b>Multiply</b>	0.48	0.60	0.73	0.88	1.00	1.06	1.26



### Importance of pre-filtration

The life of a membrane is directly linked to the quality of the water fed to it. By installing pre-filtration, premature blocking, scaling, fouling and damage from chemical attack can be avoided which ultimately prolongs the life of the membrane and reduces costs and downtime.

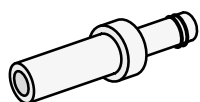
**Blocking** caused directly from particulate which should be removed using depth or surface media.

**Scaling** from Calcium and Magnesium ions happens when the water is considered hard and softeners are recommended to remove these elements.

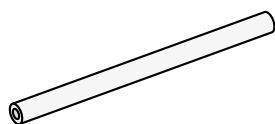
**Fouling** occurs due to organics contained which Carbon treatment removes.

**Chemical** attack is most commonly associated with Chlorine content which can be treated with Carbon.

### Common parts associated with membrane fitting



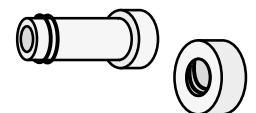
Product end adaptor (PEA)



Spacer tube



Interconnector



Dead end plug (DEP)  
male or female versions

## We supply an impressive range of membranes from the world's leading manufacturers.

These membrane elements are used in water purification and desalination systems for producing high quality RO product water from virtually any water source including surface water, mains water, borehole and well water, brackish water or sea water. They are resistant to chemical and pH swings to ensure maximum productivity and the highest mineral separation levels.



The SPECTRUM™ range of elements boast excellent average rejection rates of 99% plus the ability to operate at pressures as low as 6.9 Bar. Constructed with some of the highest grade membrane media available throughout the range and benefiting from options of specialist sizes for specific applications.



AXEON, a leader in the manufacture of pure water membranes, use their expertise to deliver a range with extraordinarily high rejection rates to safeguard application requirements. Ultra-low pressure membranes are also included in this range, resulting in major energy savings while still delivering excellent production rates.



Since entering the reverse osmosis water treatment field in 1970, Hydranautics has been committed to the highest standards of technology research, product excellence and customer satisfaction. Hydranautics is now one of the most respected and experienced firms in the membrane separations industry.

Hydranautics products are currently in use on seven continents throughout the world for such diverse applications as potable water, boiler feed water, industrial process water, wastewater treatment, surface water treatment, seawater desalination, electronic rinse water, agricultural irrigation and pharmaceuticals.



Bringing together experienced professionals and advanced technologies to solve the world's most complex challenges related to water availability, quality, productivity, the environment and energy. GE offers the most comprehensive set of solutions, helping customers manage and optimize their water resources and process challenges across industries.



## Membrane Comparison

### Ultra Low Energy

HF5-2514 HF5-2521 HF5-2540 HF5-4014 HF5-4021 HF5-4040

- Significantly reduces energy consumption
- Offsets negative effects of cold water permeate production

Operating a reverse osmosis system was once seen as a costly, inefficient method of producing purified water. Using ultra low energy membranes can dispel these myths by significantly improving overall system performance and drastically reducing operating cost. Traditional membrane elements operate between 10.3 – 15.5 bar. Ultra low energy membranes offer running pressures as low as 5.5 bar whilst maintaining a typical rejection rate of 98.5%. Perfectly suited to counter the negative effects of cold feed water temperatures on RO permeate water production and providing a simple solution to boosting the output of existing systems, the ultra low energy range provide high flow rates at even lower operating pressures.

The AXEON HF5 range of membranes are the only elements on the market that provide all the benefits of a standard low energy RO membrane while operating at this 5.5 bar specification.

### Low Energy

HF4-2521 HF4-2540 HF4-4014 HF4-4021 HF4-4040  
SRO-4040-2500-LE ESPA3-4040

- Reduced energy consumption
- Lower operating costs and system wear and tear

Providing typical rejection rates of 98-99%, low energy membranes have become the new industry standard for commercial reverse osmosis elements. The permeate production and rejection rates of this range, coupled with the low operating pressures, result in a line of products that have become hugely successful across the reverse osmosis market. Available in a range of sizes and from a variety of trusted brands, we have a selection of membranes required to maintain system performance and on-going cost benefits.

### High Rejection Low Energy

AK-90 AK-365 AK-400 AK-440 ESPA1 ESPA2 ESPA2 MAX

- Combines high water quality with low operational costs

Using improved membrane media in the construction of these elements, the high rejection, low energy membranes have managed to combine the salt separation usually associated with high pressure membranes with the low operating pressures are expected from energy efficient systems. Boasting rejection rates up to 99.6% and operating pressures as low as 7.9 bar, this range of membranes offer a premium solution to producing high quality water at low operational costs.

### High Rejection

AG-90 AG-365 AG-400 AG-440

- Highest water quality with high flow and high rejection

With the highest salt rejection figures of all the membrane types, the high rejection range is largely seen as the leading industry standard for tap and brackish water treatment. Running at 15.5 bar across the range and providing typical rejection rates up to 99.8%, these elements are capable of producing extremely high quality water, ideal for use in applications such as boiler feed water, process water and electrical finishing.

### Low Fouling

ESPA2-LD-4040 ESPA1-LD-4040 ESPA4-LD-4040 AG-400-34 LFC3-LD

- Reduced operational costs with less frequent maintenance schedule
- Increased membrane durability and life

With varying feed water sources comes the challenge of different water qualities and contaminants. Improving membrane technology has led to the need for a range of membranes that can provide the performance of standard reverse osmosis membranes coupled with the ability to handle contaminants that are commonly known to foul the membrane surface and reduce membrane performance. Using different techniques, such as a thicker feed channel spacer, this range of membranes maintain high rejection rates while offering an extended service life.

# All membrane varieties - one single supplier



## Product information

Product Code	Permeate Flow lph (m <sup>3</sup> /day)	Avg. Rejection (%)	Pressure (bar)	Size (")	Area (ft <sup>2</sup> )	Box Quantity	Weight (kg)
<b>2.5" Membranes</b>							
HF5-2514	35 (0.8)	98.5	5.5	2.4 x 14	10	6	6
HF4-2521	63 (1.5)	99	6.9	2.4 x 21	14	6	6
HF5-2521	63 (1.5)	98.5	5.5	2.4 x 21	16	6	6
HF4-2540	134 (3.2)	99	6.9	2.4 x 40	29	6	12
HF5-2540	134 (3.2)	98.5	5.5	2.4 x 40	31	6	12
<b>4" Membranes</b>							
HF4-4014	95 (2.3)	99	6.9	3.95 x 14	22	6	12
HF5-4014	95 (2.3)	98.5	5.5	3.95 x 14	24	6	12
HF4-4021	158 (3.8)	99	6.9	3.95 x 21	34	6	12
HF5-4021	158 (3.8)	98.5	5.5	3.95 x 21	42	6	12
AG-90	347 (8.3)	99.8	15.5	3.95 x 40	90	4	16
ESPA2-LD-4040	300 (7.2)	99.6	10.3	3.95 x 40	80	4	16
AK-90	347 (8.3)	99.5	7.9	3.95 x 40	90	4	16
ESPA1-LD-4040	410 (9.8)	99.3	10.3	3.95 x 40	80	4	16
ESPA4-LD-4040	394 (9.5)	99.2	6.9	3.95 x 40	80	4	16
SRO-4040-2500-LE	395 (9.5)	99	6.9	3.94 x 40	87	4	16
HF4-4040	394 (9.5)	99	6.9	3.95 x 40	87	4	16
HF5-4040	394 (9.5)	98.5	5.5	3.95 x 40	90	4	16
ESPA3-4040	473 (11.4)	98.5	10.3	3.95 x 40	85	4	16
SRO-4611-1200-LE	190 (4.5)	99	15.5	4.60 x 11	40	4	8
<b>8" Membranes</b>							
AG-365	1520 (36.3)	99.8	15.5	7.95 x 40	365	16	256
AG-400-34	1660 (39.7)	99.8	15.5	7.95 x 40	400	16	256
AG-440	1820 (43.5)	99.8	15.5	7.95 x 40	440	16	256
AK-365	1520 (36.3)	99.5	7.9	7.95 x 40	365	16	256
AK-400	1660 (39.7)	99.5	7.9	7.95 x 40	400	16	256
AK-440	1820 (43.5)	99.5	7.9	7.95 x 40	440	16	256
ESPA1	1893 (45.4)	99.3	10.5	7.95 x 40	400	16	256
ESPA2	1420 (34.1)	99.6	10.5	7.95 x 40	400	16	256
ESPA2 MAX	1893 (45.4)	99.6	10.5	7.95 x 40	440	16	256
LFC3-LD	1735 (41.6)	99.7	15.5	7.95 x 40	400	16	256