



Aquaporin Inside®

CLEAR
Reverse Osmosis
Membranes

The CLEAR series

Aquaporin Inside® CLEAR (High-Capacity Low-Energy Advanced Reverse Osmosis), is a series of membrane elements developed by Aquaporin for water treatment in industrial, municipal and commercial water applications.

The CLEAR membrane series features the world’s first and only biomimetic brackish water reverse osmosis (RO) membranes. With Aquaporin Inside® Technology embedded and optimized element design, the products deliver to the users:



Best in-class permeate flow rate

Lower operation pressure and higher output



Great rejection of contaminants

Retrofit into existing systems and deliver high quality permeate



Reliable performance

Stable flux and energy consumption during long-term operation



Get your RO system Optimized in Energy Consumption

Today’s municipalities and industries face the critical challenge of ensuring clean water in processes without excessive energy consumption and resource depletion. The Aquaporin Inside® CLEAR membrane series makes this possible.

The membranes are ideal for optimization of reverse osmosis systems and enabling operators to increase flow, lower operating pressure and reduce carbon footprint, without compromising permeate quality.

Suitable applications

The CLEAR series is designed for industry and business with strong sustainability consciousness in water reuse and energy savings. Suitable applications include, but are not limited to the following:

Demineralized rinse water

Demineralized rinse water is essential to ensure production of high-quality products in many manufacturing processes. CLEAR elements enable energy-efficient demineralization processes in a range of industries, including chemical, electroplating, metal coating, and plastics.

Make-up and process water

Industries such as automotive, semiconductor, chemical and pharmaceutical use vast amounts of water. Wastewater from these industries can have a significant environmental impact if not treated sufficiently. CLEAR elements reduce energy consumption in these wastewater recycling processes. And, to reduce water consumption, the recycled water can be used as utility make-up water (in heat exchangers and cooling towers) or supplied back to selected manufacturing processes.

Municipal drinking water

Many countries rely on RO processes to purify municipal drinking water. CLEAR elements strike an ideal balance between membrane lifetime, energy consumption, and permeate water quality in the RO treatment process.

Compact commercial solutions

To prevent scaling and provide the best customer experience, many commercial applications need compact reverse osmosis systems to demineralize the supply water. These applications include humidification, spot-free car washing, window washing, ice-making and steam generation. With CLEAR elements installed, these systems can be operated with extra-low energy consumption and a high-quality output.

Key benefits



OPEX saving

Low energy consumption meaning reduced electricity bill



Peace of mind

Dedicated technical support and industry standard warranties on all products



Short lead time

Ready stocks to meet immediate demand



CO₂ emission reduction

More energy efficient and lower environmental impact

The CLEAR products

The CLEAR series include 6 main types:

CLEAR Eco
Super low-energy membrane, highest permeate flow rate in the market

CLEAR Ultra
Ultra low-energy membrane, maximizing energy saving for water reuse

CLEAR Plus
Low-energy membrane, fine balance between energy saving and permeate quality

CLEAR Plus FR
Low-energy membrane with fouling resistance, more durable and sustainable solution

CLEAR Classic
BW membrane for challenging water conditions, meet stringent permeate quality requirement

CLEAR Classic HR
High rejection BW membrane, offering the highest purity permeate for demanding applications

| | Product name | Permeate flow rate (GPD) | Typical rejection | Minimum rejection | Test conditions |
|------------------|---|--------------------------|-------------------|-------------------|--------------------------------------|
| CLEAR Eco | Aquaporin Inside® CLEAR Eco 4040 | 2,800 | | | |
| | Aquaporin Inside® CLEAR Eco 4040XL | 3,300 | | | |
| | Aquaporin Inside® CLEAR Eco 8040-400 | 13,500 | 98.5% | 97.0% | 500 ppm NaCl 100 psi (6.9 bar) |
| | Aquaporin Inside® CLEAR Eco 8040-440 | 15,000 | | | |
| CLEAR Ultra | Aquaporin Inside® CLEAR Ultra 4040 | 2,600 | | | |
| | Aquaporin Inside® CLEAR Ultra 4040XL | 3,100 | | | |
| | Aquaporin Inside® CLEAR Ultra 8040-400 | 12,500 | 99.2% | 98.0% | 500 ppm NaCl 100 psi (6.9 bar) |
| | Aquaporin Inside® CLEAR Ultra 8040-440 | 13,500 | | | |
| CLEAR Plus | Aquaporin Inside® CLEAR Plus 4040 | 2,100 | | | |
| | Aquaporin Inside® CLEAR Plus 4040XL | 2,500 | | | |
| | Aquaporin Inside® CLEAR Plus 8040-400 | 10,500 | 99.2% | 98.5% | 2,000 ppm NaCl 125 psi (8.6 bar) |
| | Aquaporin Inside® CLEAR Plus 8040-440 | 11,500 | | | |
| CLEAR Plus FR | Aquaporin Inside® CLEAR Plus FR 4040 | 1,800 | | | |
| | Aquaporin Inside® CLEAR Plus FR 4040XL | 2,100 | | | |
| | Aquaporin Inside® CLEAR Plus FR 8040-400 | 9,000 | 99.2% | 98.5% | 2,000 ppm NaCl 125 psi (8.6 bar) |
| | Aquaporin Inside® CLEAR Plus FR 8040-440 | 10,000 | | | |
| CLEAR Classic | Aquaporin Inside® CLEAR Classic 4040 | 2,800 | | | |
| | Aquaporin Inside® CLEAR Classic 4040XL | 3,200 | | | |
| | Aquaporin Inside® CLEAR Classic 8040-400 | 13,000 | 99.6% | 99.0% | 2,000 ppm NaCl 225 psi (15.5 bar) |
| | Aquaporin Inside® CLEAR Classic 8040-440 | 14,000 | | | |
| CLEAR Classic HR | Aquaporin Inside® CLEAR Classic HR 4040 | 2,600 | | | |
| | Aquaporin Inside® CLEAR Classic HR 4040XL | 2,800 | | | |
| | Aquaporin Inside® CLEAR Classic HR 8040-400 | 11,600 | 99.8% | 99.6% | 2,000 ppm NaCl 225 psi (15.5 bar) |
| | Aquaporin Inside® CLEAR Classic HR 8040-440 | 12,800 | | | |

The stated product performance are tested at 25°C (77°F), 15% recovery, pH 7-8. Individual element permeate flow may vary ±15%. Permeate flow rate and rejection are stated after a minimum of 60 min operation. For more information, please refer to the element datasheets at aquaporin.com/products/brackish-water-ro-membranes

Core Technology

Aquaporin Inside® - a drop of nature

Over the course of billions of years, nature has developed unique water channels known as aquaporins. Aquaporins are water channel proteins that are found in all living organisms, from mangrove trees to human kidneys, where they are responsible for rapid water transportation across cell membranes.

Our core technology replicates nature's way of filtering water by incorporating the aquaporin water channels into a filtration membrane. The result is a natural water purification technology – Aquaporin Inside® - or as we like to call it: A drop of nature.

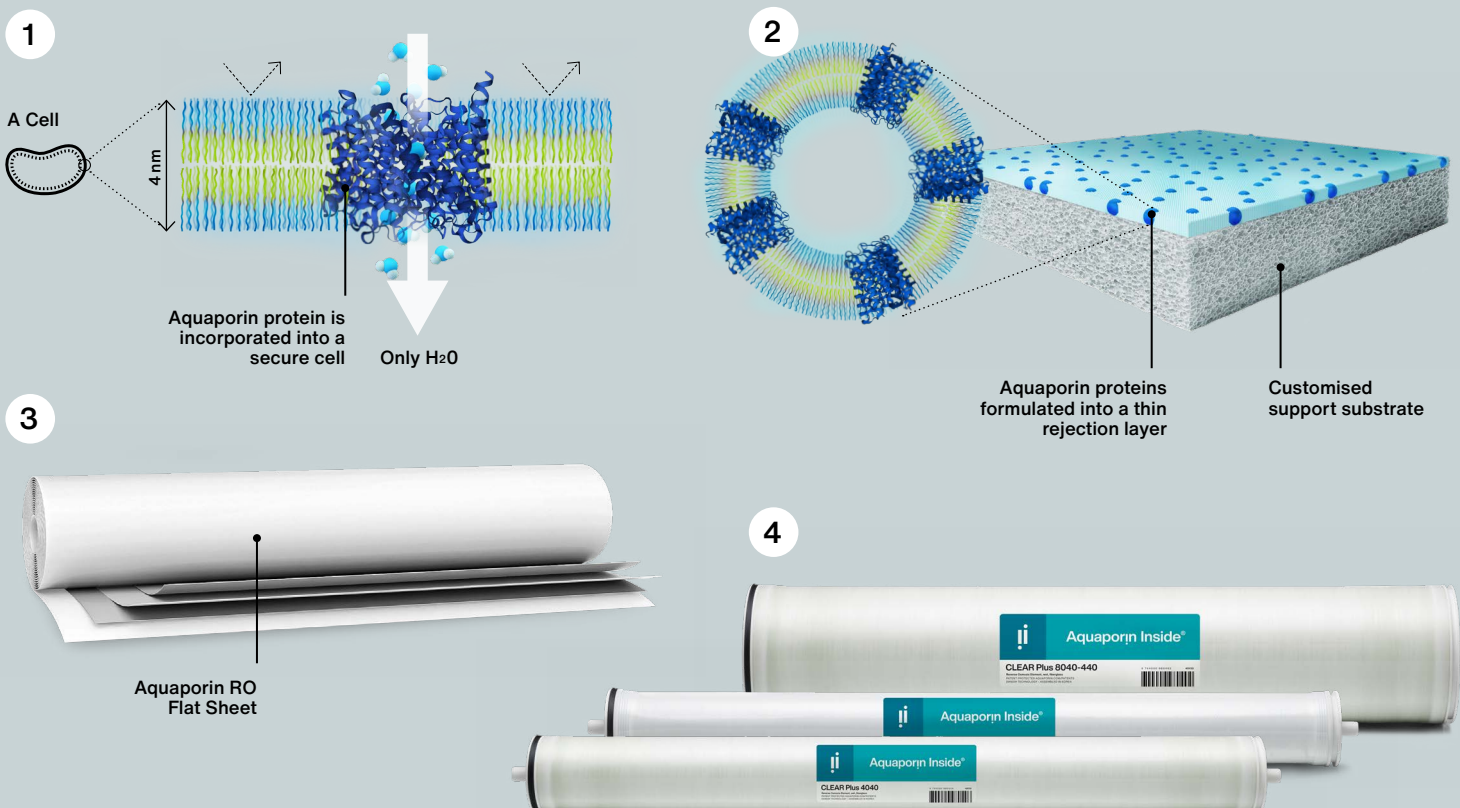
In simple terms, traditional synthetic water filtration membranes are dense polymeric sheets containing tiny pores. These pores only allow very small particles to pass through but are not selective to water molecules. In contrast, Aquaporin Inside® membranes harness nature's tremendous capability for selective molecule transport. The membranes mimic the outside of a cell, with aquaporin proteins in a stabilizing membrane layer.

Thanks to their specialized natural architecture, these aquaporin proteins allow only water to pass through. This makes them faster and more selective than traditional synthetic water filtration membranes.

We are the first and only company in the world to incorporate this natural technology into membrane products, to enable fast, energy-efficient and natural water filtration in a wide range of applications, from industrial effluent treatment to food & beverage concentration and household water purification. In CLEAR products, Aquaporin Inside® Technology integrate and stabilize the aquaporin proteins in the membrane, which ensure that:

- **the protein remains functional for the entire membrane lifetime**
- **the membrane carries comparable chemical tolerance level with conventional RO membranes**

To find out more about our biomimetic technology, visit aquaporin.com/inside



Who is Aquaporin?

Aquaporin is an innovative water technology company dedicated to natural water treatment with operations in Denmark (HQ), Singapore, Turkey, the United States, and China.

Aquaporin works to preserve the Earth's most valuable resource - water - by combining advanced bioengineering, open innovation, and natural aquaporins, nature's own water purifiers, which they embed into water purification membranes and solutions.

Our proprietary technology, Aquaporin Inside®, is based on Nobel Prize-winning research and used to clean and reuse water in industries, in our homes, and even by NASA in space. Aquaporin works with customers and partners around the globe to responsibly treat industrial wastewater, concentrate food and beverage products, and enhance drinking water quality and accessibility.

OFFICE LOCATIONS



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Aquaporin Inside®