THE MEMCOR® MEMBRANE SYSTEM

THE INNOVATIVE DESALINATION PRE-TREATMENT SOLUTION
A HISTORY OF INNOVATION

For over 25 years, MEMCOR, an Evoqua brand, has been at the forefront of technology innovation for the water re-use and drinking water industries, gaining preference on a global scale by developing low pressure (LP) ultra-filtration and micro-filtration membrane systems. These systems minimise environmental impact, while maximising safety, constructability and affordability for a wide range of municipal and industrial applications. Extensive knowledge and experience in ultra-filtration and micro-filtration membrane technology is being used to meet the needs of an even larger market, by providing a chemical-free pre-filtration solution for seawater desalination to the new generation of large-scale desalination plants.

MUNICIPALITIES AND INDUSTRIES IN NEED OF FRESH WATER OPTIONS

With major municipalities and vital industrial mining and infrastructure teams all seeking access to large volumes of potable and process water, desalination had become an increasingly popular way to meet and respond to rising demand. But as regulations on water production continue to tighten, they challenged the limits of conventional reverse osmosis (RO) pre-treatment methods. Compared to most pre-treatment technologies, the MEMCOR® membrane system from Evoqua offers essential performance and cost advantages over conventional methods, to ensure safe, reliable water, day after day. With a capacity of more than 950 MLD (250 MGD) within the newest urban desalination plants, high permeability MEMCOR membrane systems are meeting demand while reducing their environmental footprint by using less energy and creating less industrial waste.

OPTIMISE YOUR RO DESALINATION PROCESS

The conventional RO process consists of thin membranes that are subject to fouling due to materials present in seawater such as biological matter, grit particles, algae and minerals. Membrane pre-treatment improves RO system efficiency by lowering suspended solids, turbidity and the silt density index (SDI). The improved source water quality allows an RO system to operate with less downtime, reducing the need for chemical cleaning and extending the life of both RO membranes and your plant.

Key Advantages
An RO desalination process with membrane pre-treatment provides:
• A physical barrier to prevent pathogens, bacteria, turbidity and suspended solids without the need for chemical pre-treatment
• Flexibility to handle changing feed water conditions and capacity demand increases
• A simple, automated operation ensuring system integrity is met and allowing operators advance notice of potential maintenance
• The lowest life-cycle costs compared to most conventional RO pre-treatment technologies

As an innovative provider of cost effective and environmentally friendly RO pre-treatment solutions, the expertise of Evoqua provides unparalleled personal support to cover the entire life-cycle of desalination plants and projects – from consulting and installation to maintenance programs and efficiency maximisation.
THE MEMCOR® MEMBRANE SYSTEM ADVANTAGE

Compared to conventional technologies such as dual media filtration (DMF), LP MEMCOR® membrane systems from Evoqua offers distinct advantages:

- A simple construction that minimises setup time
- Smaller size for easy transportation
- Virtually no chemicals required (except for cleaning)
- Consistently lower SDI results in fewer fouled systems
- No requirement for expensive super duplex backwash pumps (CP pressure systems)

IMPROVEMENTS THAT RESULT IN AFFORDABILITY

MEMCOR systems are the only systems available in both submerged and pressurised system configurations. By close-coupling the LP membrane system to the RO high pressure pumps, MEMCOR membrane systems reduce capital costs considerably, including:

- Largest block design in the market with 960 modules reducing footprint and minimising ancillaries
- No requirement for intermediate storage tank
- No cartridge filters required
- Reduced plant downtime
- Improved efficiency achieved by a design that allows removal of a set of pumps

LOW PRESSURE MEMBRANE EVOLUTION

Low pressure (LP) membrane systems evolved from initial research and development in the 1960s, to relatively high cost initial applications in the 1980s, to widespread use at the turn of the century.

1989 – LP membrane systems started in very low capacity / high value pharmaceutical and hospital markets with M1 micro-filtration modules. The product quickly grew in size and capacity to the M2 series.

1995 – The CMF product was introduced with the M10 and M10C high area modules.

2002 – Larger capacity plants were required and the submerged (CS) product was developed.

2003 – Evoqua introduced high permeability MEMCOR polyvinylidene fluoride (PVdF) ultra-filtration membranes to the market.

2006 – The pressure (CP) product was released, allowing pressure systems to be used in large-scale water treatment plants.

Today – MEMCOR membrane systems have achieved worldwide preference as an easy-to-implement, easy-to-operate system, with a minimal impact on the environment and your long-term operating budget.

Worldwide, MEMCOR membrane systems treat over 1,000 MLD (264 MGD) of water in desalination applications and over 65,000 MLD (17,171 MGD) in all other applications.
CUSTOMISED SYSTEMS TO MEET YOUR NEEDS

From compact and factory assembled XP and XS systems to scalable and easily assembled CP and CS custom systems, Evoqua offers the widest range of pressurised and submerged LP membrane systems in the water treatment industry, specifically configured to the requirements of any facility with unparalleled service and industry expertise.

PRESSURISED SYSTEMS
MEMCOR® pressurised membrane systems operate in a closed environment. Feedwater is pressurised through the units at 30 – 40 psi (200 – 275 kPa). Higher pressures can be used if additional residual pressure is needed for applications in a close coupled system, such as pre-treatment to RO. The system has fully-automated processes including backwash, cleaning and membrane integrity testing. All membrane modules are individually isolatable, ensuring consistent operation.

SUBMERGED SYSTEMS
MEMCOR® submerged membrane systems operate in an open tank design. Feedwater typically flows by gravity into the membrane cell. A suction pump draws filtrate water through the membranes at up to 12 psi (83 kPa). Submerged systems are ideal for retrofitting existing basins and increasing capacity in a small footprint. The system has fully-automated processes including backwash, cleaning and membrane integrity testing. Membrane modules can be isolated in groups of four, or clovers.

Typically, conversion from conventional filter basin systems to a membrane based system will almost double the capacity of a plant within the same footprint.
**MEMCOR® CP SYSTEM**
Pressurised Component System

The modular, “building block” configuration of the MEMCOR® CP simplifies design, installation and expansion. Individually isolatable modules and reduced valves allow for easy operation. This low maintenance, pressurised system features a scalable Plug and Play design and unlike its competition, the MEMCOR CP requires no backwash pump, reducing the number of supporting valves and components while providing ease of operation. With a hydraulic capacity of up to 56 MLD (15 MGD) from a single 11.4 m x 9.3 m CP 960 systems, the compact system is ideal for high-capacity projects.

**MEMCOR XP SYSTEM**
Pressurised Package Plant

MEMCOR XP is a self-contained, factory-tested, prepackaged unit that treats 0.1 – 2.0 MLD (0.04 – 0.05 MGD) on one skid. The simple, compact design is easy to operate and install. This system is ideal for small communities, new developments, schools and remote systems that require minimal operator attention.

**MEMCOR CS SYSTEM**
Submerged Component System

MEMCOR CS is a robust, modular treatment system ideal for high solids applications, large capacity systems and conventional treatment plant retrofits. The open tank design permits visual inspection for easy operation and maintenance. Each cell can be sized to over 40 MLD (10 MGD). The world’s largest submerged pre-treatment system, MEMCOR CS features seawater compatible components, a high rate of recovery, fewer required ancillaries and a simplified, direct coupling design for faster maintenance and access. Using direct coupling, the intermediate feed tanks and cartridge filter are eliminated, simplifying the process and layout with reduced maintenance on frequent replacement of cartridge filters and servicing of associated infrastructure.

**MEMCOR XS SYSTEM**
Submerged Package Plant

Fully skid-mounted and self-contained, the MEMCOR XS can treat 0.6 – 2.1 MLD (0.18 – 0.57 MGD) on a single compact skid. The innovative side-door removal mechanism allows for easy service and reduces ceiling height requirements.

**MEMCOR MEMBRANES**

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MEMCOR® MEMBRANE PROCESS OVERVIEW

STEP 1 – NORMAL FILTRATION
Filtration takes place from the outer surface of the fiber to the hollow inner core or lumen. Filtered water passes through the wall of the fibers while particulates in the feed stream are retained on the outside of the fiber wall. Particles larger than 0.1 microns are retained on the outside surface of the fibers.

STEP 2 – AUTOMATED BACKWASH
Backwashing commences automatically after a set interval (usually 15-60 minutes) for a set duration of 90 seconds. The backwash cycle interval and duration are dependent upon feedwater conditions and are operator adjustable. During a backwash, both filtrate water and air are used to scour the membrane surface. Units are then drained to ensure harmful protozoa and bacteria are removed before returning to normal filtration.

STEP 3 – CHEMICAL CLEANING
Periodically, chemical cleaning is needed to dissolve or detach the accumulated particles on the membrane surface that cannot be dislodged by backwashing. MEMCOR® membranes are made of oxidant-tolerant materials, therefore, chlorine is typically used in cleaning. A low-strength acid is also used to help remove inorganics. Once the cleaning process is complete, the MEMCOR system automatically initiates a backwash to ensure all chemicals are removed before returning to normal filtration.

STEP 4 – MEMBRANE INTEGRITY TESTING
MEMCOR membranes provide a physical barrier able to achieve reliable removal of cryptosporidium, giardia and other harmful microorganisms. The key to this physical barrier is the ability to test fiber integrity using a direct integrity test, called an air hold test. This on-line, automated test uses compressed air to detect any flaw in a membrane fiber, seal or o-ring. MEMCOR membranes use an air pressure of 14 psi (96 kPA) to detect a 3-micron break, ensuring pathogen rejection.
Whether you’re in the earliest stages of a desalination project idea, or considering adding membrane pre-treatment technology to optimise your existing application, the experts at Evoqua can customise a solution to meet your needs.
A DIRECT AND POSITIVE EFFECT ON GREENHOUSE GAS REDUCTION

Compared to conventional RO pre-treatment methods like dual media filtration (DMF), membrane pre-treatment processes have a substantially lower carbon footprint. In a typical 100 MLD (26.4 MGD) Plant, DMF processes require approximately 10 tonnes of chemicals per day and 1,000 cartridge filters (40 inch) every 2 months, increasing carbon dioxide emissions dramatically through manufacturing and transportation. MEMCOR® membrane systems produce far less waste, fewer carbon dioxide emissions and require only 5 – 10% of the chemicals needed in DMF processes.

- No chemicals or coagulants required for filtration
- Only a small amount of acid and hypochlorite required for cleaning
- Compared to other methods, the MEMCOR membrane system requires no costly cartridge filters

Since MEMCOR membrane systems require no chemicals for pre-treatment, membrane backwash mixed with brine may discharge directly into the ocean. With no additional treatment or sludge handling, this system helps you achieve substantial cost savings and significant reduction in the impact on the environment.

Affordable, reliable, sustainable. MEMCOR membrane systems are the best RO pre-treatment technology on the market today and in the future, from a company dedicated to pioneering innovative technologies.