



PIONEERING AND ADVANCING **MEMBRANE TECHNOLOGY**



[PENTAIR.COM](https://www.pentair.com)

OUR HISTORY

Since its inception in 1966, Pentair has been known for venturing into new industries and finding operational efficiencies. In the course of half a century, Pentair developed from a U.S. balloon company into a global water company. The need for water touches nearly everything we do. No matter who we are or where we live, we are all connected by our dependence on reliable access to safe and clean water.



Tubular membrane

Pentair delivers a comprehensive range of smart and sustainable water solutions to homes, businesses and industries around the world. Our global knowledge and service network has a great track record of solving real water problems with industry-leading technology and proven solutions. We help secure access to the right water quality by delivering the right solution and application expertise, anywhere and anytime.

X-Flow is rooted in research at the University of Twente in the Netherlands. In the early 1980s, a method was developed to produce hollow-fiber membranes of exceptional quality and robustness.

In **1993** citizens of Milwaukee suffered from a large Cryptosporidium contaminated water outbreak. Due to this outbreak, legislation on drinking water supply was more emphasized and tightened. This was the reason membrane technology retrieved more attention than before.

In **1997**, X-Flow became part of the Clean Process Technologies (CPT) division of Norit. Norit plays an active role in the fields of activated carbon, with activated carbon and membrane technologies holding significant

importance in both drinking water production and wastewater treatment processes.

When Pentair acquired X-Flow in **2011**, it had already been a membrane technology pioneer for decades. In 2011, with the acquisition of X-Flow, Pentair became one of the world's leading UF membrane manufacturer. Today X-Flow membranes are applied all over the globe, in drinking water plants, in water recycling and reuse, and in a wide range of industrial applications.

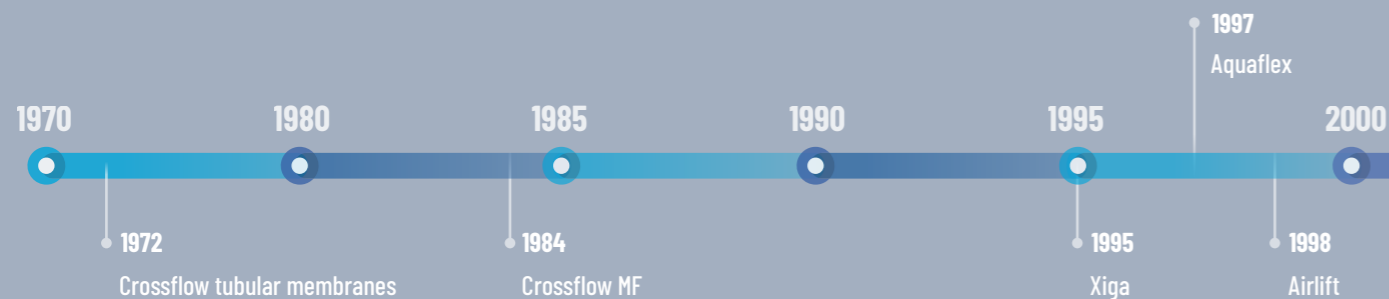
Today is about continuous improvement and innovation. As one of the leading manufacturers of membrane, modules and advanced filtration systems, we are one of the global forerunners in competitive membrane technology.



X-FLOW AT A GLANCE

X-Flow delivers membrane technology and application know-how to OEMs, contractors and end-users. As one of the leading pioneers and developers of membrane-based filtration concepts, we believe membranes will be essential in the purification processes of the future.

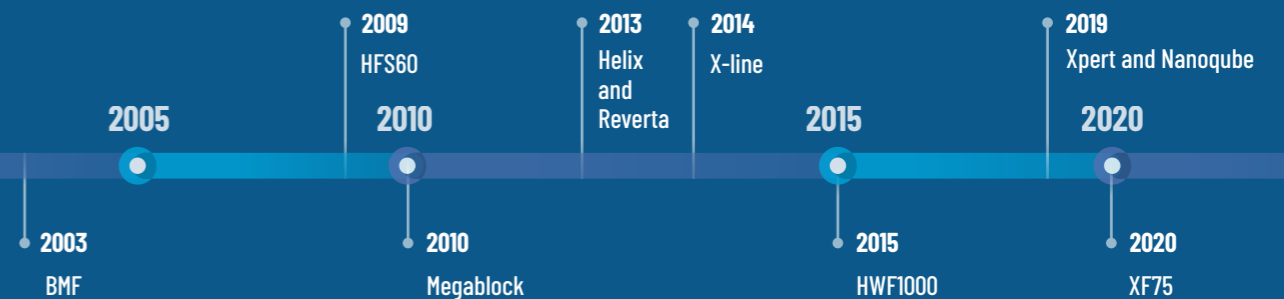
The introduction of our groundbreaking technologies through the years



APPLICATIONS

Membranes are at the heart of many critical filtration solutions. Pentair X-Flow technologies are used around the world in a wide range of markets and industries.

- 1 Pre-treatment seawater**
 - Pre-treatment RO
 - Pre-treatment desalination
 - Colloidal silica removal
- 2 Drinking water**
 - Pre-treatment RO
 - Pre-treatment desalination
 - Color & organics removal
- 3 Industrial wastewater**
 - Membrane bioreactor (MBR)
 - Anaerobic MBR
 - Effluent polishing
 - Produced water
- 4 Municipal wastewater**
 - Leachate treatment
 - Membrane bioreactor (MBR)
 - Effluent polishing
- 5 Beverages**
 - Beer
 - Wine
 - Juice
 - Soft drinks
 - Dairy-based protein separation
 - Plant-based protein separation



TECHNICAL SUPPORT WITH X-FLOW MEMBRANE+

Membrane+ approach provides technological support to OEMs and contractors in every project phase. This expert assistance, especially when provided from an early stage onward, makes the difference in terms of quality, safety, efficiency and reliability.

Excellent performance starts with choosing the right concept and design for a particular membrane application. Once up and running, the system has to keep working well. This challenge is often underrated in many industries.

We support our partners not only with superior membrane elements, but also with engineering know-how, monitoring tools and automation solutions. We help with all the connecting parts and the design and construction of complete skid-based systems.

Membrane+ is our approach to helping customers solve any specific project-related issue. Our engineers are committed to provide all the practical support required in every project phase from conceptual design to piloting, start-up and beyond.



Xiga Solution in Roetgen, Germany



X-Flow uniquely combines high-quality membranes with exceptional implementation know-how. Our specialized engineers contribute to the realization and excellent operation of your filtration systems.

Membrane+ offers you multiple advantages and clear benefits:

- + Mitigates engineering and implementation risks
- + Ensures cost optimization during the plant design phase
- + Avoids design errors and changes in the execution phase
- + Ensures first-time-right project delivery
- + Ensures a smooth takeover by your customer

"TOGETHER WE
MAXIMIZE YOUR
RESULTS WITH
MEMBRANE+!"



01 Development phase

Through Pentair University, X-Flow offers advanced education in membrane technology and engineering.

Short and intensive training sessions also help to get the basic parameters right and avoid costly errors which can impact short-term and long-term plant performance.

Pentair provides pilot plants and piloting assistance, allowing you to test applications in real-life circumstances anywhere, validate design choices and establish KPIs. Pilot performance optimization is a continuous process of (data) exchange between engineers.

02 Design phase

Our process design engineers help your bid evaluations run smoothly.

Pentair will fine-tune all project parameters and verify the technical and commercial feasibility of your full-scale membrane plant. Our engineers can also join you in meetings with your customers.



03 Execution phase

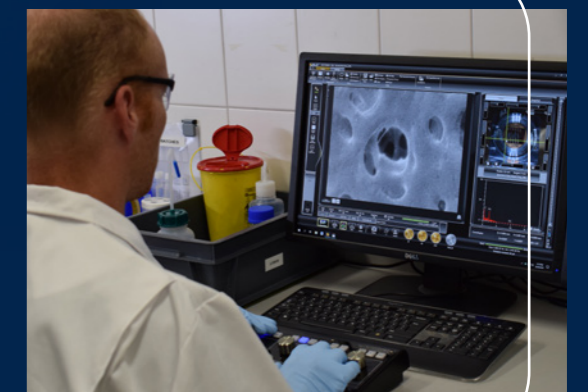
Our process engineers build the backbone of your membrane filtration system.

Our engineers finalize the basic design, produce drawings and documentations and review the drafts of the P&IDs, system layout, software protocols, and commissioning manual. Our commissioning engineers verify performance data and fully support you during commissioning for a successful start-up.

04 Operation phase

X-Flow offers after-sales support that keeps plants in optimal condition.

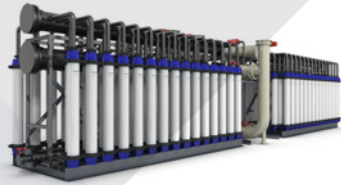
Our service engineers offer extensive operational support by continuously analyzing membrane performance in order to optimize your system and advise on further performance improvements, for example by reducing chemicals consumption and operating costs. With our MemScan, we assess the membranes' remaining operational life to avoid undue downtime and help with a replacement plan.



SOLUTIONS

X-Flow Membrane Elements are known for their versatility, durability, and consistent performance, even when subjected to the most challenging demands. We offer comprehensive water and wastewater treatment solutions to meet the diverse needs.

Water treatment



Aquaflow Helps address challenging surface water, groundwater, seawater, and wastewater treatment requirements. It offers unmatched flexibility in operation: dead-end flow, circulation with feed-and-bleed and AirFlush is possible to improve performance and maximize output.

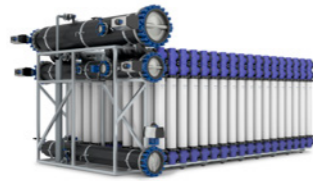


Aquaflow High Solids (HS) Eliminates the need for conventional pretreatment requirements of traditional ultrafiltration (UF) systems. Reduce the overall footprint and total cost of ownership by one-step direct high solids filtration.



Xiga Helps ensure a minimum membrane footprint for surface water, groundwater, seawater, and wastewater treatment requirements compared to other ultrafiltration systems. Eliminate the intermediate break tank by reducing the capital investment that makes an ideal configuration for large desalination projects.

X-line Provides a pre-engineered solution for surface water, groundwater, seawater, and wastewater treatment requirements with higher scalability and flexibility. The solution reduces investment cost and assembly time with integrated OptiFlow caps in addition to a high flow-to-footprint ratio compared to any vertical ultrafiltration system.



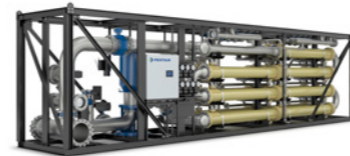
HFNano Pure and clean water from surface water without the use of chemicals! Install Pentair X-Flow HFNano Solution with the Pentair X-Flow HFW1000 membrane elements, it leverages the strengths of hollow fiber technology and nanofiltration (NF) membranes into a sustainable membrane filtration solution. The X-Flow innovative HFW1000 hollow-fiber NF membrane element is chlorine resistant and backwashable, which helps address the challenges of spiral-wound NF membranes. The X-Flow HFNano Solution eliminates the need for coagulants to remove dissolved organics from difficult surface water sources.



Nanoqube A pre-engineered fully functional unit, specifically designed to help meet the drinking water requirements of small communities and facilities. Utilize the uniquely designed Pentair X-Flow Hollow Fiber HFW1000 Hydrophilic Nanofiltration Membrane Elements. Typical applications are small capacity drinking water production from highly colored, surface water or treatment and reuse of wastewater.

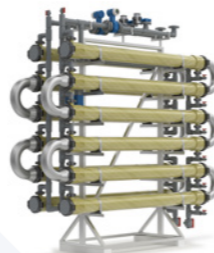


Wastewater treatment



Crossflow UF Operates in the crossflow membrane filtration principle using the Pentair X-Flow 5.2 or 8 mm Compact Membrane Elements. Benefiting from the Pentair X-Flow Flux Enhancement Helix Technology, it prevents cake formation on the membrane layer by producing higher permeate flows at lower crossflow velocities and saves energy compared to the traditional crossflow membrane filtration systems.

Crossflow MBR Crossflow UF also applies the Pentair X-Flow 5.2 or 8 mm Compact Membrane Elements and benefits from the Pentair X-Flow Flux Enhancement Helix Technology. Crossflow MBR offers the great combination with the bioreactor. A sidestream membrane bioreactor system assures simple operation with effective cleaning of the membranes and easy maintenance. Pollutants in the wastewater are biodegraded at high concentration of biomass. These are separated by the efficient crossflow operation of the side stream tubular membrane section.



Airlift Cost-effective membrane bioreactor (MBR) solution for municipal and industrial wastewater treatment applications. Synergize the crossflow filtration principle at low velocities enhanced with the Airlift process to create sufficient turbulence to solve cake layer build-up and operate at high flux rates. Be assured of effective cleaning of the membranes, low power consumption and easy maintenance with Pentair X-Flow sidestream membrane bioreactor solutions. The X-Flow Airlift Solution requires a small footprint and lowers the total cost of ownership compared to the submerged MBR systems.



Airlift MGB Revolutionizes the construction of the MBR system with pre-engineered

assembly components that reduce the total construction time and a minimum membrane footprint. It provides a simple, reliable mounting of membrane elements to the segments and easy connections to the bioreactor. Be assured of effective cleaning of the membranes and easy maintenance with Pentair X-Flow sidestream membrane bioreactor solutions.

Reverta Adapts the combination of crossflow filtration principle with Feed Flow Reversal operation. By reversing the feed flow, it ensures no accumulation of debris at the membrane elements' feed. Installed with the Pentair X-Flow Compact Membrane Element's Flux Enhancement Helix Technology, it prevents cake formation on the membrane layer while producing higher permeate flows at lower crossflow velocities. Pentair X-Flow sidestream membrane bioreactor solutions ensure effective cleaning of the membranes and easy maintenance.



SELECT YOUR IDEAL MEMBRANE FILTRATION SOLUTION



Xpert Assistant

X-Flow Xpert features the world's first conversational interface in the membrane filtration industry. This Web App guides you through helping to select the ideal Pentair X-Flow membrane filtration solution and configuration for water and wastewater treatment applications by answering a few questions.

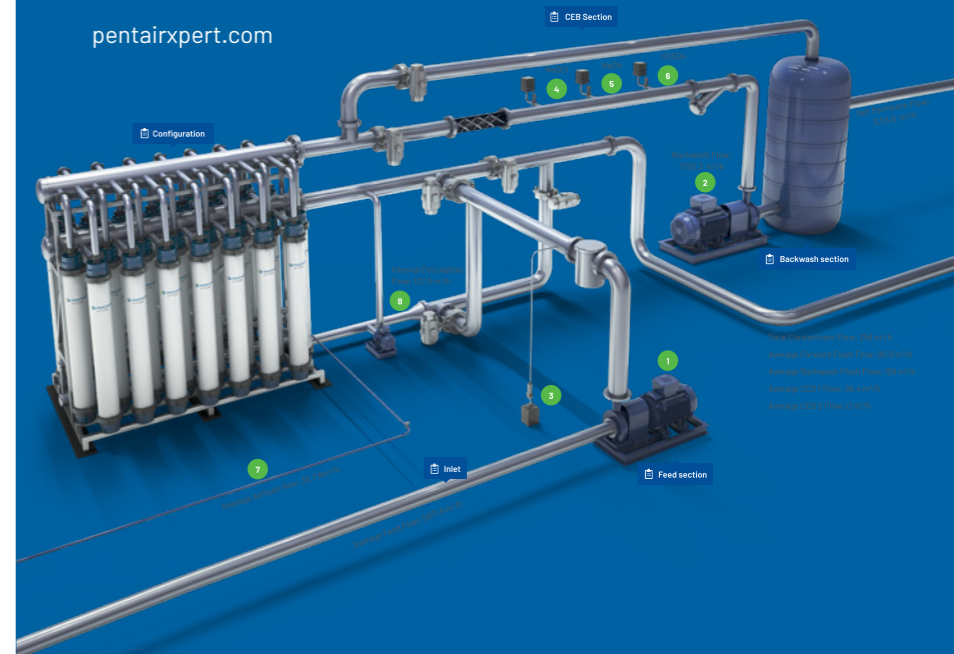
Easy designing

Design your entire filtration systems, including all ancillary equipment and all operational requirements that mobilize decades of experience of Pentair X-Flow Membrane Filtration Solutions.

Exceed expectations

Xpert Web App offers guidelines, parameter recommendations, customization options, and comprehensive information on operational settings. All of this will help enable you to exceed expectations, optimize the processes, and devise preventive maintenance routines to avoid downtime and excessive wear and tear.

pentairxpert.com



INNOVATION IS IN OUR DNA.

At Pentair X-Flow, we are passionate about developing filtration concepts and designing filtration systems that make a difference.

Research and development are the heart and soul of our company, and the success of our technologies is rooted in scientific progress and continuous innovation.

We pride ourselves on proactive support and world-class solutions, turning ideas into business opportunities by realizing the full potential of membrane technology.

XF75

membrane element maintains the same outer dimensions as its predecessors, yet boasts an exceptional area-to-size ratio and an outstanding area-to-weight ratio, making it competitive for all UF applications.

Reverta

solution applies crossflow filtration with feed flow reversal, uniquely benefiting AnMBR applications to ensure no accumulation of debris at the membrane feed.

Helix

technology provides turbulence by continuous feed water mixing and enhances flux by boosting productivity while saving energy in wastewater applications.

HF71000

membrane element uses the world's first hollow fibre membrane technology that combines NF separation with high mechanical strength and chemical resistance of PES hollow fibres.

X-line

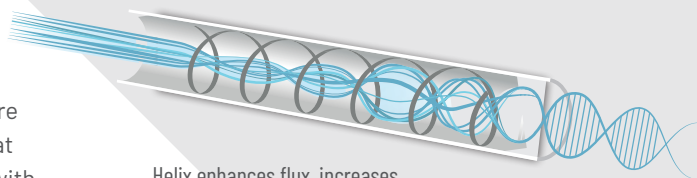
solution is a revolutionary pre-engineered solution for UF applications, providing greater scalability and flexibility with a higher flow-to-footprint.

Xpert

Web App guides in selecting the ideal membrane filtration solution, offering detailed comparisons and comprehensive knowhow to support at every project phase.



The world's first conversational interface in the membrane filtration industry.



Helix enhances flux, increases flow and saves energy.



Optimized footprint-to-flow ratio due to OptiFlow Caps as part of our X-line technology.



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