IDE Technologies | Your Water Partners

MAXH$_2$O
Pulse Flow Reverse Osmosis (PFRO™)

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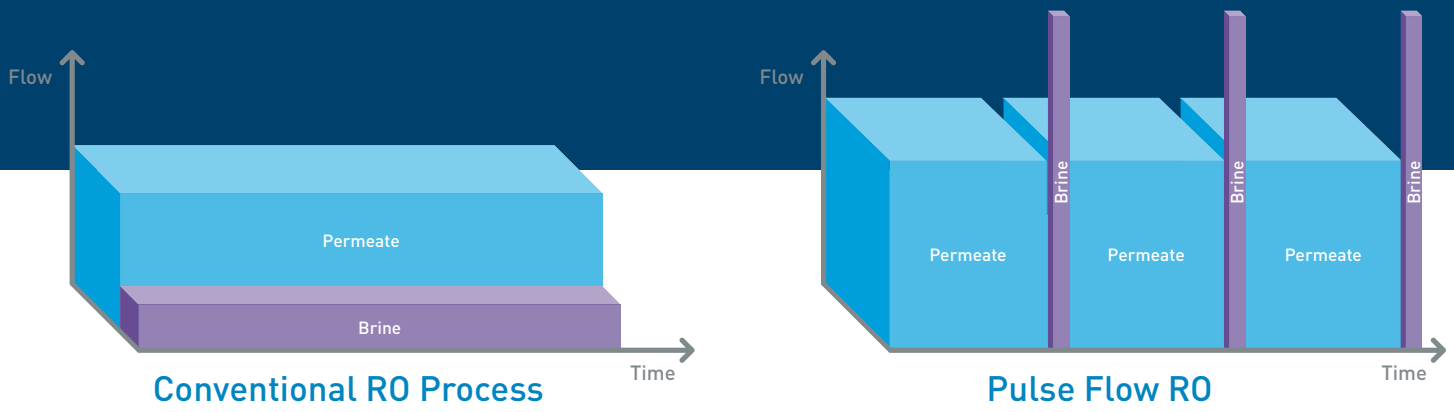
Smart Brine Minimization and Industrial Effluent Treatment

MAXH$_2$O PFRO is an advanced and more efficient version of conventional reverse osmosis (RO). Unlike traditional RO, which operates in a continuous brine discharge mode, PFRO discharges brine in short, forceful surges. This "pulse flow" creates high shearing velocity, keeping membranes clean while allowing for higher recovery in a single-stage operation. The rapid, frequent changes in osmotic and gauge pressure prevent biofouling, eliminating the need for chloramine dosing.

The diagram below shows the difference in permeate and brine flow regimes between conventional RO (left) and PFRO (right). PFRO operates in two cycles: production and flush. During the production cycle, the pressure vessels continuously receive feed flow and produce permeate.

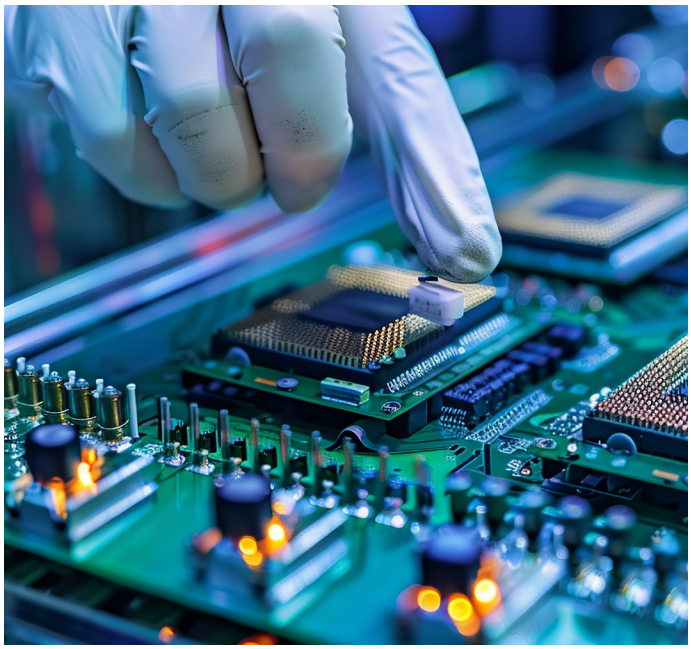


- Final brine can reach levels of 3.5 Langelier Saturation Index (LSI), and 2500 Calcium Carbonate Precipitation Potential (CCPP).
- PFRO utilizes the kinetics of scaling formation (or “induction time”), enabling higher recovery in a much shorter production cycle compared to conventional RO.
- PFRO achieves higher recovery rates by shortening the production cycle, making it more efficient than batch and semi-batch RO systems.

Success Stories:

Cherokee Metropolitan District Wastewater Treatment Plant

In Colorado Springs, Cherokee's regional water reclamation facility faced challenges in expanding its capacity to meet lower TDS permit levels and allow for indirect potable reuse. Our innovative PFROTM technology and design enabled the facility to achieve a water recovery rate of 90-95%, successfully managing brine volume discharge and addressing additional water chemistry challenges.



Wastewater Treatment for a Semiconductor Manufacturer

IDE implemented our MAXH_2O Pulse Flow RO (PFROTM) system for a semiconductor manufacturer in Israel, treating wastewater for reuse in the facility's cooling system. The system processes brine and effluent from cooling tower blowdown and brine RO units, enhancing water recovery and reducing reliance on external water sources. The PFRO unit's recovery rate stands at 54% and will ultimately increase to 88%.

Central Coast Blue - Advanced Water Purification Demo Facility

Pismo Beach, California, USA

The Central Coast Blue Coalition in California initiated a water purification demonstration facility in Pismo Beach to combat water scarcity. IDE provided a PFRO skid that produced 30 GPM of high-quality permeate with 85% recovery. The system delivered a stable performance, high RO flux, and consistent differential pressure, achieving all operational goals without the need for chloramine.

About IDE

IDE Technologies is a world leader in water treatment solutions, specializing in the development, design, construction, delivery, and operation of some of the most advanced industrial and municipal water treatment, water reuse, and desalination facilities.

With over 60 years of experience and a global footprint, IDE leverages cutting-edge technologies to deliver sustainable, efficient, and environmentally friendly water treatment solutions to public, municipal, and industrial customers. Our landmark projects, including the world's largest and most energy-efficient seawater desalination plants, provide clean water to millions worldwide, helping major industries, municipalities, and governments address critical water challenges.

IDE has received multiple prestigious awards from organizations such as MIT and GWI, recognizing our innovation and leadership in the water treatment industry.

Wastewater RO Applications

Treating Secondary Effluent from Municipal Wastewater Plants

- **PFRO operates at an average flux of 16.5GFD**, 50% higher than the standard 10.6 GFD.
- **Specific flux is 0.12 GFD/PSI**, approximately 25% higher than typical wastewater reuse facilities, with a similar recovery rate of 0.09-0.1 GFD/PSI.
- This results in **25% greater energy efficiency** compared to conventional RO processes.
- The PFRO unit achieves **86% recovery in a single RO stage**, with no chloramine dosing, eliminating NDMA formation.
- **Chloramine-free operation** produces permeate with a UVT value close to 100%, reducing CAPEX and OPEX in the final UV/AOP stage by 30-40%.

MAX H2O PFRO Key Features:

- High recovery operation without scaling
- Lower power consumption
- Reduced CAPEX and OPEX
- No biofouling
- Simplified single-stage operation

Applications:

- Brine minimization for existing BWRO
- Reducing recovery load on existing BWRO
- Wastewater RO with higher flux and recovery
- Industrial effluent treatment

Why Choose MAX H2O PFRO?

- **Economical:** Produces more product from the same feed flow.
- **Efficient:** Reduces brine discharge.
- **Environmentally Friendly:** Converts wastewater to direct potable use without NDMA.

We Are Your Water Partner

IDE Water Technologies

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Let’s talk about your next water project