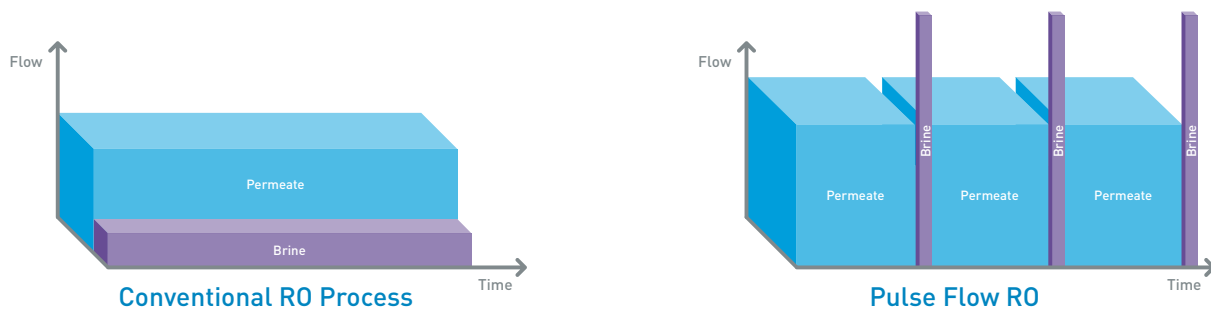


MAXH₂O Pulse Flow RO Technology

Smart brine minimization and industrial effluent treatment

? How it Works

MAXH₂O Pulse Flow RO (PFRO) is an innovative and improved version of the conventional RO desalination process. Instead of a continuous brine discharge mode in which conventional RO operates, PFRO discharges brine in a pulse flow regime, by short, forceful surges. This surge provides high shearing velocity, keeps the membrane clean and enables higher recovery in a single-stage operation. The frequently and rapidly changing osmotic and gauge pressure prevents the formation of biofouling, and eliminates the need in chloramine dosing.



The diagram above presents the permeate and brine flow regime in conventional RO (left) and PFRO (right). PFRO operates in two cycles: production and flush. The pressure vessels continuously receive feed flow from the high-pressure pump and continuously produce permeate.

✓ Advantages

MAXH₂O-PFRO converts at least 50% of the brine from conventional BWRO into product

- ✓ The PFRO process allows higher concentration of RO brine, increasing product by 50% and diminishing rejected brine by 50%. Final brine can reach levels of 3.5 Langelier Saturation Index (LSI), and 2500 Calcium Carbonate Precipitation Potential (CCPP).
- ✓ PFRO takes benefit from the kinetics of scaling formation, or “induction time”, which is the time required for a supersaturated aqueous solution to precipitate sparingly soluble salts. In LSI 3.5 solutions - induction time is about 10 minutes, whereas in conventional RO, where the solution’s concentration does not change over time, “induction time” is in fact endless.
- ✓ In PFRO, feed flow is concentrated from under-saturated to supersaturated within the production cycle, which is significantly shorter than the induction time of these sparingly soluble salts, and takes merely less than a minute. The supersaturated brine is then discharged from the RO membranes before the end of induction time.
- ✓ PFRO allows operation with notably higher recoveries by taking advantage of its short production cycle, compared to Batch and Semi-Batch RO.

Wastewater RO applications - Operating on the secondary effluent of a municipal wastewater plant

- PFRO operates with an average flux of 28 LMH, which is 50% higher than the standard 18 LMH
- Specific flux is 0.12 GFD/PSI, which is about 25% higher than most normally-operating wastewater reuse facilities, with a similar recovery rate of 0.09-0.1 GFD/PSI
- This indicates that PFRO is 25% more energy-efficient than the standard conventional RO process
- The PFRO unit operates at 86% recovery in a single RO stage. No chloramine is dosed, which means no NDMA components are developed in the process
- The chloramine-free operation generates permeate with a UVT value of about 100%, thereby saving 30-40% on CAPEX and OPEX in the final UV/AOP stage

MAXH₂O-PFRO Key Features

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

Applications

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



Why choose MAXH₂O-PFRO?

Economical – Producing more product from the same feed flow

Efficient - Diminishing brine discharge

Environmentally friendly – Converting wastewater to direct potable use without NDMA

