

Article | Desalination

Creating a **Sustainable Future** with **Seawater**

Over the past decade, the use of Sea Water Reverse Osmosis (SWRO) for desalination has taken off. With proven efficiency rates up to 92% and energy savings of up to 65% compared to traditional solutions, the opportunities of SWRO technologies deserve further exploration.

92%

efficiency rates
compared to
traditional
centrifugal pumps

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Growing demand for **desalination**

Despite the fact that more than 70 % of the globe is covered by water, only 1% of the water is drinkable. According to the UN, water scarcity is one of the major challenges facing the world today and tomorrow.

The call for solutions to water scarcity is urgent, and reverse osmosis is seen as one of the most effective solutions to solve the challenge. The process, which turns seawater into fresh water, is simple and more efficient than other desalination methods.

Facts about water scarcity

- Worldwide consumption of drinking water doubles every 20 years
- More than one billion people suffer from lack of fresh water
- 300 million people in 150 countries rely wholly or partly on seawater desalination for drinking water

1%

of the world's
water is drinkable

Reducing the energy cost of **reverse osmosis**

The process of pumping large amounts of seawater through desalination membranes is highly energy intensive. In recent years, however, the increasing focus on climate change and energy efficiency has brought new pumping solutions to the forefront, notably the use of positive displacement pumps with energy recovery devices and AC drives.

For the past ten years, the number of SWRO plants using positive displacement pumps with energy recovery and AC drive has grown significantly. The systems have proven to outperform the traditional centrifugal pumps on most operational parameters, returning efficiency rates up to 92 % and energy savings up to 65 %.

Up to
65%
energy savings

The power of **modularity**

The trend towards modularity in mid-size and large SWRO plants fuels the uptake of parallel-coupled trains of positive displacement pumps with energy recovery and AC drive.

The flexible set-up with multiple pumps running in parallel provides a number of advantages. For instance, the capacity of the system can be adjusted continuously according to the need for water at any given time to save energy. If one of the pumps is out for maintenance, the remaining pumps automatically take over the full operation allowing 24/7/365 production.

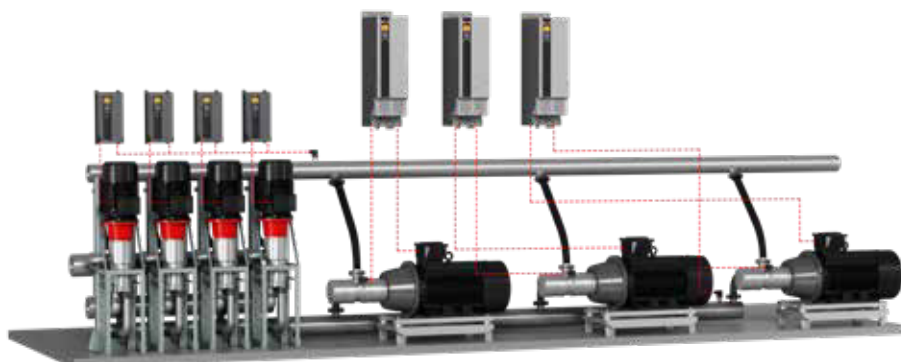
Besides, the flow on a single pump can be adjusted without affecting the other pumps. This means that the AC drive can be sized for one pump only, while the rest of the pumps run directly online.

The simple configuration with parallel-coupled positive displacement pumps saves money on the AC drive and returns significant energy savings during operation.

By combining high-pressure pumps, AC drives, energy recovery devices and pressure transmitters, Danfoss offers desalination solutions that return 65% energy savings compared to plants operating centrifugal pumps without energy recovery and AC drive.

The benefits of using several parallel-coupled pump trains

- High uptime and uninterrupted operation, even when one or more of the pumps are out for maintenance
- One small, redundant pump is cheaper than one, large redundant pump
- Simple and energy efficient flow control



Desalination plant

Four core technologies from Danfoss that work together to improve SWRO efficiency:

- APP pumps, designed for SWRO, offer the highest efficiency rates in the industry.
- iSave 3-in-1 Energy Recovery Device is optimized for SWRO and returns substantial energy savings.
- VLT AQUA Drive FC 202 drives and controls all types of pumps and comes equipped with cascade controller.
- DST P40I pressure sensor designed to meet the requirements of corrosive industrial environments.



Danfoss – your partner in pump solutions for SWRO

Danfoss is committed to supporting the desalination industry with energy efficient solutions for desalination. Based on decades of experience in developing components for critical applications like for instance the axial pump technology, we use our extensive know-how of seawater reverse osmosis to lead the industry towards even better desalination methods.

Danfoss combines four core technologies to provide superior and cost-efficient desalination solutions: High-pressure pumps, energy recovery devices, AC drives and pressure and fluid control sensors. These combine into highly efficient and lasting water purification solutions.

Our product range for SWRO applications provide the following benefits:

- Efficiency rates of up to 92%
- Energy savings of up to 65% compared to centrifugal pumps without energy recovery and AC drive
- One-stop-shop for pumps, energy recovery, drives and sensors
- Minimal service, long service intervals and ultra-low maintenance costs
- Simple and reliable operation
- Small footprint and light weight components



Danfoss engineers advanced technologies that enable us to build a better, smarter and more efficient tomorrow. In the world's growing cities, we enable the supply of fresh food and optimal comfort in our homes and offices, while meeting the need for energy-efficient infrastructure, connected systems and integrated renewable energy. Our solutions are used in areas such as refrigeration, air conditioning, heating, motor control and mobile machinery. Our innovative engineering dates back to 1933 and today Danfoss holds market-leading positions, employing 27,000 and serving customers in more than 100 countries. We are privately held by the founding family. Read more about us at www.danfoss.com.