



Medium-sized SWRO plants Just got 20% more efficient

500-20,000 m³/day

Higher efficiency for SWRO applications

- Single or parallel trains
- For train sizes 500-3,000 m³/day

20%

Additional energy savings

- Compared to centrifugal high-pressure pumps
- Better total cost of ownership than either centrifugal or plunger pumps
- Most energy-efficient pump/ERD package on the market



Medium-sized plants are too small for centrifugal pumps, too big for plunger pumps

Let APP pumps start saving money for your next medium-sized SWRO plant

Will your next SWRO plant produce between 500 and 20,000 m³/day? And do you plan to join the growing trend of configuring parallel trains rather than a one-train system? Then you need to discover the unrivalled efficiency of Danfoss APP pumps. Only Danfoss gives you such low energy costs per m³ of produced water for trains between 500-3,000 m³/day.

If you're looking for the market's most efficient pumps for medium-sized SWRO plants, then take another look at Danfoss APP pumps. With their low maintenance, compact size and weight, Danfoss APP pumps have long been the alternative to plunger pumps for smaller plants.

Now, we're bridging the gap between large centrifugal pumps and small plunger pumps for medium-sized plants – and doing it more efficiently than any other pump. Our unique axial piston technology makes it work. And our new APP 43 pump, with output all the way up to 43 m³/h, makes the same savings available for even larger plants.

With output up to 43 m³/h, our new APP 43 helps more medium-sized SWRO plants achieve unsurpassed energy efficiency.



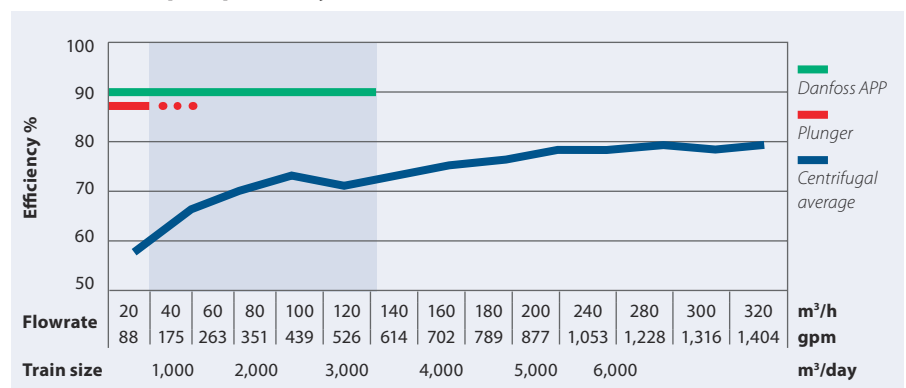
APP pumps outperform centrifugal pumps and save energy

Plunger pumps work for small systems, but are too big – and too expensive – as soon as train sizes climb above 500 m³/day.

Centrifugal pumps work for very large plants, but are relatively inefficient at permeate flows below 3,000 m³/day.

With more than 20% better efficiency, Danfoss axial piston pumps are the ideal choice wherever permeate flow ranges between 500 – 3,000 m³/day. Add multiple trains for energy-efficient plants up to 20,000 m³ and higher.

If you produce between 500-20,000 m³/day, Danfoss APP pumps have you covered*



The market's lowest price per m³ of permeate flow for medium-sized trains*

Train/plant size m ³ /day	500	1,000	1,500	2,000	3,000
Train/plant size [MGD]	[3.2]	[6.3]	[9.5]	[12.6]	[18.9]
Saving kWh	202,575	302,950	459,900	585,460	544,215
Saving EUR [0.10 EUR/kWh]	20,258	30,295	45,990	58,546	54,422
Saving USD [0.10 USD/kWh]	20,258	30,295	45,990	58,546	54,422

* Typical energy savings using APP pumps versus centrifugal pump. Efficiencies and savings are calculated by comparing average centrifugal pumps to Danfoss APP pumps at 60 bar.

Turbocharged ERDs are 30% less efficient at lower flow rates

Isobaric ERD is the right choice for medium-sized plants

Traditional turbocharged ERDs just can't keep efficiency up when flow rates go down. So if you want your medium-sized plant to save up to 60% on energy bills, make sure your ERD is isobaric.

Typical energy saving per year using the iSave versus a turbocharger *

Train/plant size m ³ /day	500	1,000	1,500	2,000	3,000
Train/plant size [MGD]	[3.2]	[6.3]	[9.5]	[12.6]	[18.9]
Saving kWh	68,000	105,000	204,000	197,000	287,000
Saving EUR [0.10 EUR/kWh]	6,800	10,500	20,400	19,700	28,700
Saving USD [0.10 USD/kWh]	6,800	10,500	20,400	19,700	28,700

More efficient than turbochargers: The Danfoss iSave isobaric ERD saves medium-sized plants energy and money every day.

** including the Danfoss high-pressure APP pump and a high-pressure centrifugal pump used for the turbocharger*

The Danfoss iSave: All of the advantages of isobaric ERD in just a fraction of the footprint.

More and more OEMs are choosing isobaric ERD to save energy on their medium-sized trains. But they also want to cut down on installation costs and improve reliability.

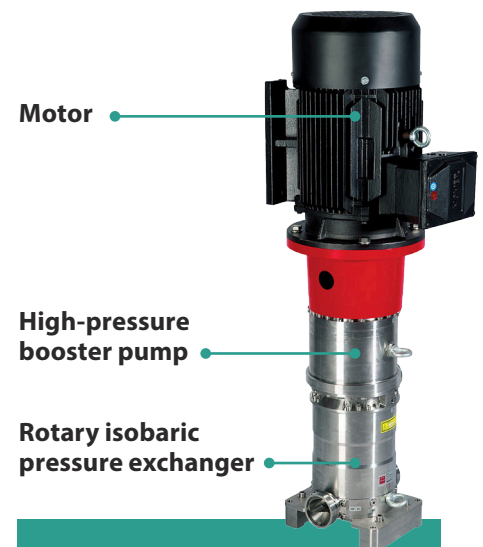
That's why the Danfoss iSave integrates a pressure exchanger, positive displacement booster pump and motor – all in one innovative design.

- **COMPACT:** 3-in-1 design combines electric motor, rotary isobaric pressure exchanger and high-pressure booster pump.
- **EFFICIENT:** Reduces energy costs by 60% compared to SWRO plants with no ERD.
- **SIMPLE:** Fewer parts, easier installation. Eliminates the need for costly high-pressure flow meters. Reduces fittings and pipes.
- **RELIABLE:** Unlike traditional ERD solutions, the iSave integrates the booster pump to eliminate sealing issues. And with an integrated motor, overspinning and clogging due to bio-fouling are things of the past.

The Danfoss iSave. There's never been a better reason to rethink ERD for medium-sized trains.



Scan the QR and watch the video...



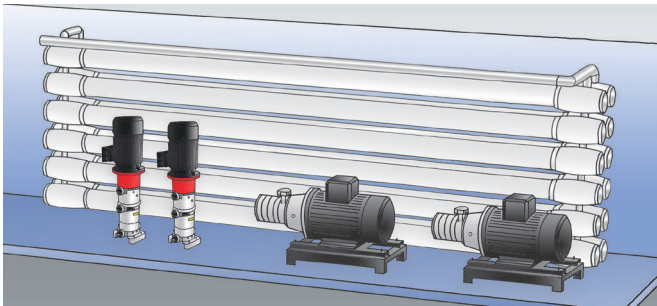
www.isave.danfoss.com

The Danfoss pump and ERD package is not only the market's most energy-efficient – it also boosts flexibility and increases uptime for modular trains

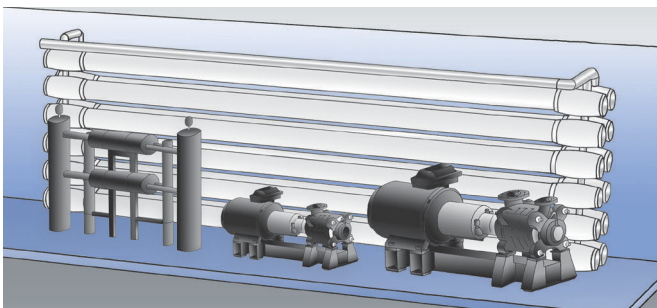
And we do it all without adding space

Danfoss APP pumps and iSave ERDs are so compact that two or more sets of them fit into the same space required by traditional solutions that use a centrifugal pump, booster pump and ERDs.

"Get all the benefits of market-leading energy efficiency. Combine them with design that is compact, simple and reliable. All from the same world-class supplier."



Danfoss makes it easy to configure trains with the market's most compact pump and ERD duo. You can install them horizontally or vertically – and with fewer parts and less maintenance (Trains built to produce 2,000 m³/day at 50% recovery rate).



Bulky centrifugal and ERD packages require separate high-pressure booster pumps. A Danfoss train configuration of the same capacity gives you all of the energy-saving advantages – and more – in the same footprint or less (Trains built to produce 2,000 m³/day at 50% recovery rate).



Containerized unit built with 2 APP 30 pumps and 2 iSave 40.
Photo: Enwa Water Treatment.

"The trend is clear: More and more OEMs are configuring mid-size SWRO plants with multiple, standardized trains to boost uptime and reduce engineering costs. Danfoss leads the way with unrivalled energy efficiency, reliability and flexibility."

More capacity for more applications

Wherever your medium-sized SWRO plant needs to produce fresh water, we help you do it efficiently

No matter where people need to produce fresh water, Danfoss APP pumps save energy day in and day out. Onshore or offshore, we're helping everywhere from resorts and seaside communities to production facilities.



The Danfoss APP pump range delivers output from 0.6 m³/h up to 43 m³/h.



Danfoss also produces a range of APP pumps designed according to API 674. The APP S 674 range is available from 0.8 m³/h to 38.4 m³/h.





To learn more about Danfoss axial piston technology and our complete range of APP pumps for SWRO, please see www.ro-solutions.com

To learn more about Danfoss iSave isobaric technology and our complete range of 3-in-1 ERD for SWRO, check out www.isave.danfoss.com

To learn more about Danfoss High Pressure Pumps and the rest of the Danfoss Group, please see www.danfoss.com



Here **today.** Here **tomorrow.**

Danfoss is a leading global player within the development and production of mechanical and electronic products and controls.

Since 1933, our extensive know-how has made modern life easier and we continue to break new ground in our core business areas.

Every day, more than 250,000 items are produced at 70 factories in 25 countries. Impressive as these figures are, we are

most proud of the way our dedicated employees apply the high-quality components in customer solutions, adding value to the end product.

Building strong partnerships is of great importance to us, because it is purely by understanding our customers' needs that we can meet the expectations of tomorrow.

The Danfoss High Pressure Pump Division brings decades of hydraulic

experience to the design and manufacture of energy-saving pumps.

The division designs and markets a broad range of high-performance pumps, including the groundbreaking APP pumps for the reverse osmosis market. Next to pumps the division also designs and markets energy recovery devices also for the reverse osmosis market.

Danfoss A/S, High Pressure Pumps

DK-6430 Nordborg · Denmark · www.ro-solutions.com · www.isave.danfoss.com

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