

IDAIRA SANCHEZ

MANAGER OF THE ARUCAS-MOYA SEAWATER DESALINATION PLANT
IN GRAN CANARIA, CANARY ISLANDS, SPAIN

“Seven Danfoss MPE 70 isobaric energy recovery devices have been installed in one of the treatment lines of the Arucas-Moya seawater desalination plant”

Operated by ACCIONA since it was commissioned in 1995, the Arucas-Moya seawater desalination plant is a state-of-the-art facility. In addition to having a nominal production capacity of 15,000 m³/d, capable of meeting the water needs and demands of the area, it is equipped with the latest technology available in terms of energy recovery: the Danfoss MPE 70 isobaric energy recovery devices (ERD), the world's first active isobaric ERDs designed for medium and large SWRO plants.

 ÁGUEDA GARCÍA DE DURANGO

Idaira Sánchez, industrial engineer and plant manager at the Arucas-Moya desalination plant since 2021, tells us in this interview about the particularities of the plant, the characteristics of the Danfoss energy recovery device and the advantages of having it installed.

First of all, we would like to know about your career path up to the position you currently hold.

I have been an industrial engineer since 2013 and my career in the water sector began in ACCIONA in 2018. Since then, I have worked in different areas and departments, until, in June 2021, I started working in my current position as plant manager of the Arucas-Moya desalination plant, operated by ACCIONA.

Please tell us about the particularities of the Arucas-Moya plant.

The Arucas-Moya desalination plant has been in operation since 1995. It is owned by the Gran Canaria Island Water Board and has been operated by ACCIONA since it was commissioned.

It is located in the municipality of Arucas, specifically in El Puertillo, Bañaderos. It provides drinking water to the population of Arucas, Moya and a small nucleus of Firgas, a total of approximately 45,400 people.

It is designed with two osmosis racks that produce 7,500 m³/day each, so it has a nominal production of 15,000 m³/day, with a salinity of 500 µS/cm. The specific consumption of the facility is 3.84 kWh/m³.





Seawater is collected for the facility using six coastal intake wells and a tank. The first filtration stage consists of four sand filters and the second has four 5 µm cartridge filters; there is no chemical dosing in the pretreatment. In addition, there are two high-pressure units plus a reserve unit: 2 (TBB-ERIs) + 1 (TBB-MPE 70).

We also have several models of isobaric energy recovery devices. On the one hand, we have a set of ten passive isobaric ERDs, ERIs PX-220, for each line. And, in the high-pressure backup group, seven Danfoss MPE 70 active isobaric ERDs have been installed in one of the lines.

It has 1,262 membrane units (high rejection and low energy) and has a remineralization system based on the injection of carbon dioxide and calcium hydroxide, which makes it possible to adapt the Langelier index to the requirements of Spanish legislation on water quality criteria for human consumption (Royal Decree 140/2003).

The plant has several Danfoss energy recovery devices installed in parallel. How many of these units are installed in the rack, and how long have they been in operation?

There are seven units of the MPE 70 isobaric ERDs installed in parallel for an osmosis rack, with a nominal production of 7,500 m³/day.

They have been in continuous operation since January 2022.

Improvements are currently being made in desalination plants thanks to

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the digitalisation and optimisation of equipment operations. How does the new Danfoss active ERD fit with these new trends?

In a device like this, where each of the elements can be adjusted to a specific operational point, its operation can be optimised by applying digital techniques and tools, thanks to the features of the MPE 70 ERD: the start-up is simple and controlled; the speed of operation, also controlled in each of the devices with its 2.2 kW electric motor; the ease of operation with balanced flows; and the salinity balance in all the units.

What do you think about the possibility of being able to monitor each ERD individually?

Monitoring the MPE 70 devices provides us with real-time and digitised information on the status and operation of each ERD independently, which is very useful not only to control and supervise the process, but also to be able to anticipate any potential anomalies.

Concerning technical details, what is the maximum capacity of the new ERD rack, and what are the mixing levels of this equipment?



The maximum high-pressure output flow rate of each ERD is 70 m³/h. Therefore, having seven units, the maximum capacity of the MPE 70 rack is 490 m³/h.

The salinity increase in the membrane with a 40% conversion factor should be 3% according to the manufacturer, and we have verified that the maximum mixing limits specified are met.

By being able to control the speed of the ERDs and being able to operate with overflushing without any risks, what improvements in mixing have been observed compared to normal operation?



The desalination plant has two osmosis racks that produce 7,500 m³/day, so it has a nominal water production of 15,000 m³/day



We have found that by increasing overflushing to 5%, mixing over the device has been reduced to about 1.9%.

In terms of reliability and safety, do you think that being able to control the rotation speed at all times brings an extra benefit to the ERDs?

Yes, since, by controlling the rotor speed, there is no risk of overspinning in the MPEs, thus avoiding serious damage to the pressure exchanger.

In addition, it allows us to control the flow rate of each MPE depending on its position in the train, so that the ERD rack is as balanced as possible.

Finally, how has Danfoss's support been during the commissioning and operation of the equipment?

The support has been very good, both during the development phase and during the commissioning of the equipment.

There has always been good communication between ACCIONA and Danfoss, and they have always been able to adapt to the way of working and the particularities of the plant.

Danfoss has supported us to solve any doubts and problems that have arisen during the operation of the plant. In short, they have taken into account the needs and the points of view of those of us who work in the facility every day.

MPE 70:

The first active isobaric ERD for medium and large SWRO plants

The Danfoss MPE 70 is the first active energy recovery device designed for medium and large SWRO plants.

The integration of a low-voltage motor allows unprecedented control to facilitate smarter automation, prevents rotor stops due to biofouling and provides greater flexibility during plant maintenance.

Its smart design also keeps mixing levels consistently low, year after year, to reduce membrane feed salinity and help plants achieve very low energy consumption.

Key features:

- ★ Full control of each equipment unit.
- ★ Controls and reduces mixing over time.
- ★ Gets the most out of overflushing.
- ★ Improved OPEX throughout the plant's lifetime.
- ★ Smart operation compatible with automation.
- ★ Continuous operation even with biofouling.
- ★ Optimised design for energy recovery.
- ★ Robust design from a world leader in innovation.