



# Flowserve FLEX™ Isobaric Energy Recovery Device

Next-generation compact pressure exchanger for reverse osmosis plants



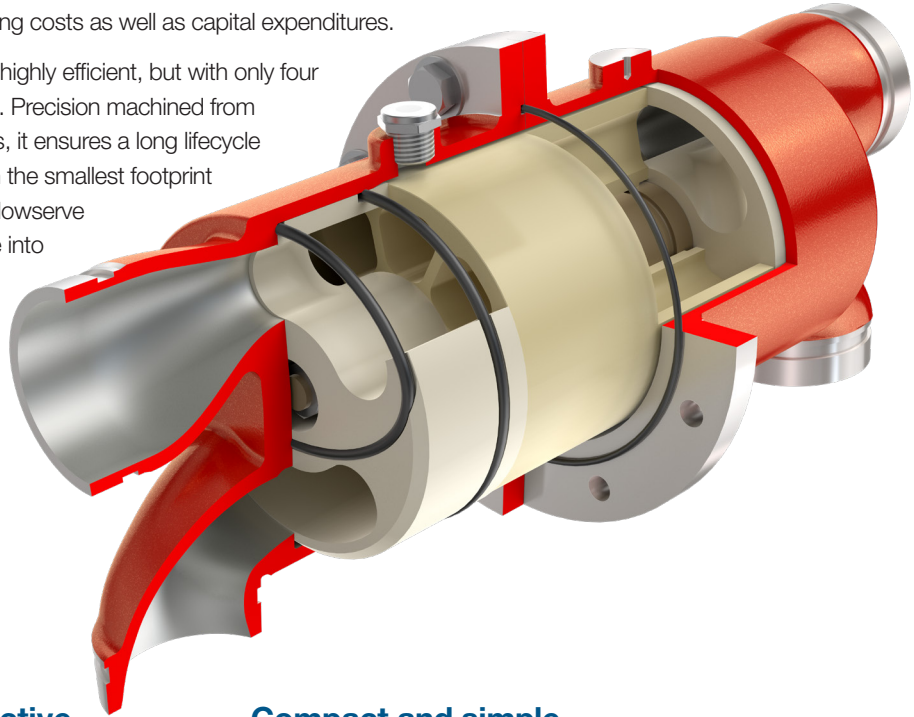
*Experience In Motion*

## Recover more energy. Recover more savings.

Energy is the primary cost driver in any reverse osmosis (RO) desalination process. That's why Flowserve designed the Flowserve FLEX™ pressure exchanger, an isobaric energy recovery device, to be the most efficient and compact device of its type. Capable of recovering more than 98% of hydraulic energy and boasting the highest unit capacity available in the market, it drives down the cost of desalination by substantially reducing operating costs as well as capital expenditures.

The FLEX energy recovery device is not only highly efficient, but with only four major components, it's also incredibly simple. Precision machined from highly corrosion- and wear-resistant materials, it ensures a long lifecycle with no maintenance or downtime. And, with the smallest footprint of any isobaric energy recovery device, the Flowserve FLEX is simple and cost-effective to integrate into new installations or retrofit existing plants.

The FLEX pressure exchanger is the latest addition to a portfolio of energy recovery equipment engineered for the desalination industry by the experienced team at Flowserve.



### Highly efficient and cost-effective

**Best-in-class hydraulic efficiency** — The Flowserve FLEX pressure exchanger recovers more than 98% of the hydraulic energy of the brine stream, substantially reducing overall plant operating costs. It also enables high-pressure pump capacity to be reduced by as much as 60%, leading to significant capital savings.

**Industry-leading mixing rate** — Mixing is a key performance indicator for isobaric devices. The Flowserve FLEX energy recovery device has an extremely low mixing rate, resulting in lower membrane feed salinity. The upside is lower high-pressure pump and ERD booster pump power consumption.

**Minimal lubrication** — The axle-guided rotor design significantly reduces lubrication flow requirements compared to other pressure exchangers, contributing to the unit's industry-leading efficiency.

**Quiet operation** — Internal passageways have been optimized using finite element analysis (FEA) to minimize vibration and noise. As a result, typical operating noise levels are below 85 dB.

### Compact and simple

**Simple design** — With only four major internal parts, the simple design of the FLEX energy recovery device ensures high reliability and uptime with low operating and maintenance costs. A sight glass allows for easy visual inspection and manual speed measurements.

**Highest unit capacity and low installation costs** — The FLEX boasts the highest unit capacity of any pressure exchanger. Fewer units are needed to achieve the total flow capacity of the plant and the plant footprint can be smaller. Moreover, smaller and less complicated headers along with fewer couplings help to simplify installation and keep associated costs low.

**Compact and easy to retrofit** — The Flowserve FLEX is the most compact and lightweight pressure exchanger available, which makes it easier to handle and a simple drop-in replacement for existing isobaric energy recovery devices.

**IoT enabled** — Each FLEX unit can be equipped with sensors that enable monitoring of RPM and vibration from a remote control room.



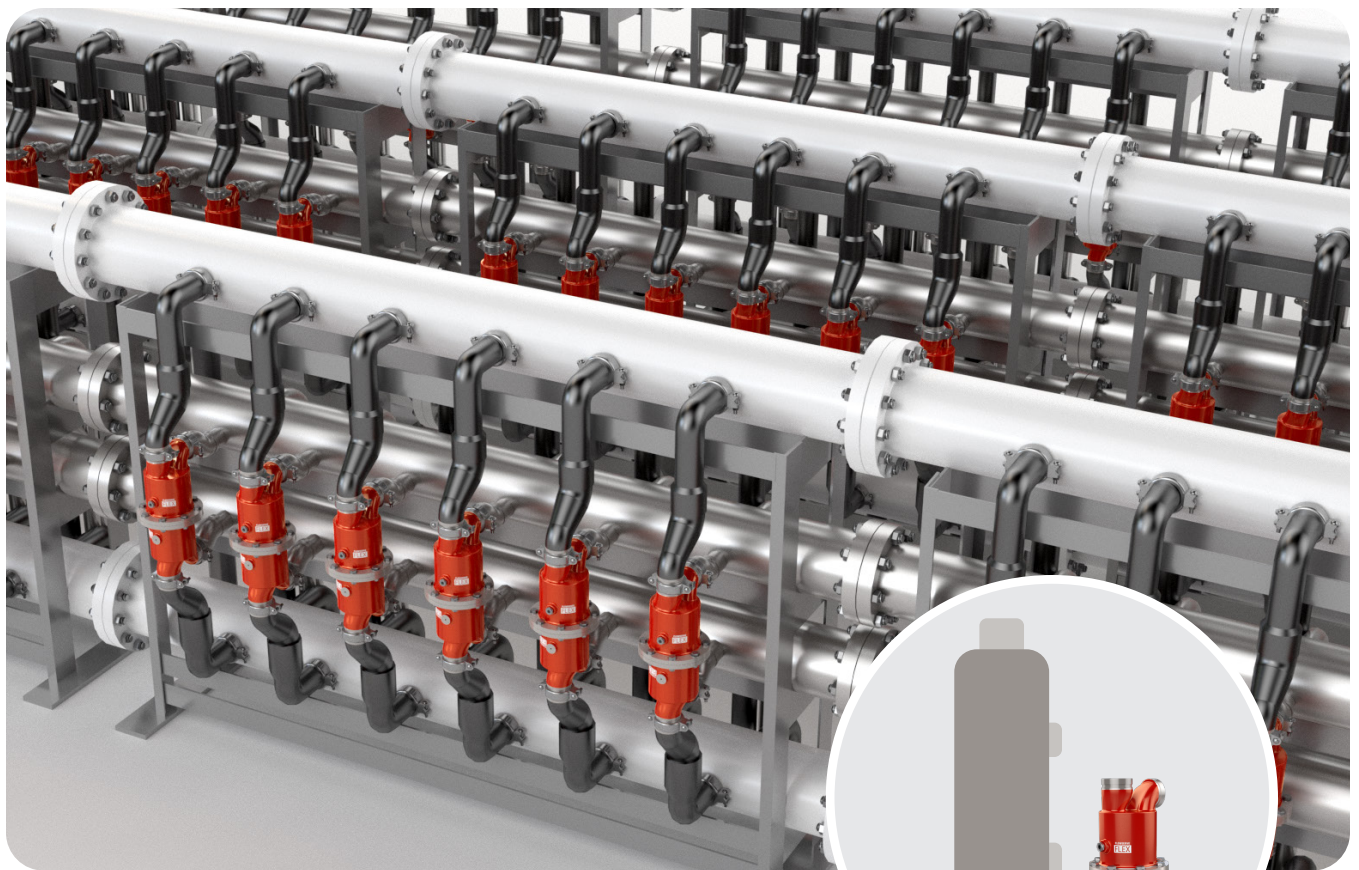
## Superior specifications

Parameter by unit	Model	
	FLEX 6300	FLEX 8600
Dimensions	245 x 533 mm (9.6 x 21.0 in.)	300 x 762 mm (11.8 x 30.0 in.)
Weight	29 kg (64 lb)	71 kg (156 lb)
Capacity	Up to 68 m <sup>3</sup> /h (300 gpm)	up to 135 m <sup>3</sup> /h (600 gpm)
Pressure	up to 83 bar (1,200 psi)	up to 83 bar (1,200 psi)
Temperatures	up to 49°C (120°F)	

For operating requirements outside the above standard design range, please contact Flowserve.

## Advanced materials of construction

Component	Material
Axle	Pure aluminum oxide ceramic
Rotor	Pure aluminum oxide ceramic
End covers	Pure aluminum oxide ceramic
Housing	ASTM B367, Grade C3 titanium



Above: Example rendering of Flowserve FLEX trains in a retrofit installation

Inset: The Flowserve FLEX pressure exchanger (inset right) is notably smaller than other energy recovery devices with comparable flow (inset left), so plant footprints can be minimized.



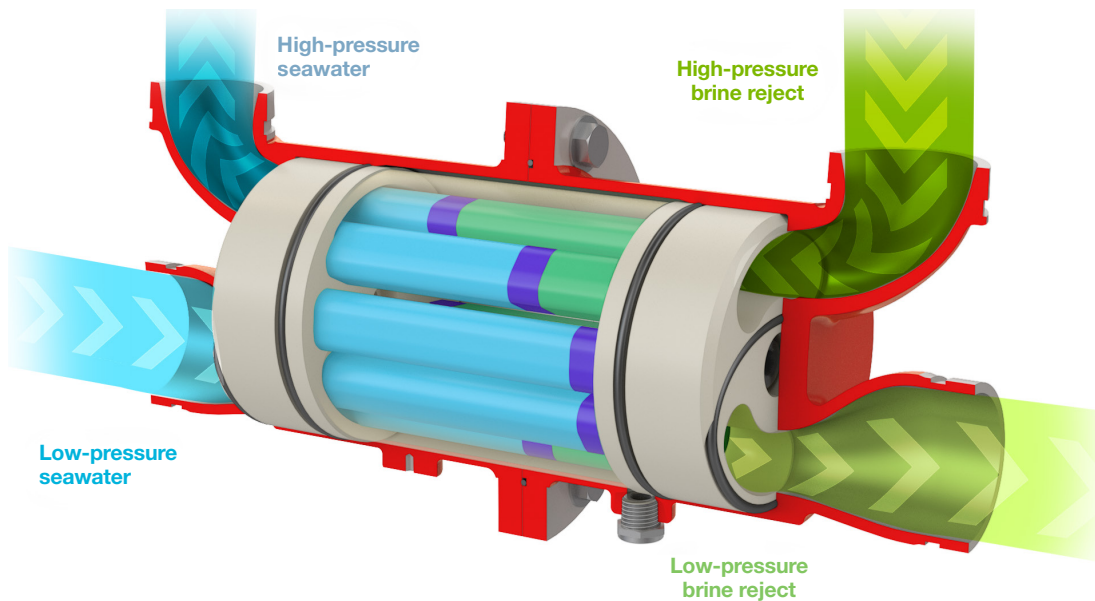
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## Simple and reliable operation – continuously

Hydraulic energy from the high-pressure brine reject stream is transferred by the Flowserve FLEX pressure exchanger to the seawater membrane feed.

Low-pressure seawater flows into the FLEX energy recovery device, filling a duct within the rotor and causing it to rotate. (No external drive is needed.) Simultaneously, high-pressure brine reject from the membranes enters the same duct from the opposite side. As the ceramic rotor spins, the low-pressure seawater is exposed momentarily to the high-pressure brine reject stream, at which point hydraulic energy is transferred from the brine to the seawater.

As the rotor continues to spin, the now high-pressure seawater and low-pressure brine reject are discharged out of their respective sides. This process repeats itself up to 900 rotations per minute – 24 hours a day, seven days a week, 365 days a year.



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