

Titan PX-1200 Energy Recovery device — test results from the Inima Los Cabos, Mexico, seawater RO facility

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ABSTRACT

The Energy Recovery, Inc. (ERI®) PX Pressure Exchanger® energy recovery device recovers hydraulic energy from the high-pressure reject stream from a reverse osmosis (RO) system and transfers it to low-pressure feedwater. Pressurized feedwater from the PX device is sent to the membrane feed, merging with a stream of pressurized water from a high-pressure pump. This significantly reduces the duty of the high-pressure pump. The PX device operates at extremely high efficiency — up to 98% — and itself consumes no electrical power. Therefore, the overall energy consumption of a seawater RO process is cut in half or less compared to a system operating with no energy recovery or by 15 to 30% compared to a system operating with state-of-the-art centrifugal energy recovery devices. In addition, PX technology gives the operator the flexibility to vary the RO system recovery rate to maximize process productivity and energy efficiency over a wide range of feed conditions. The first PX device sold commercially in 1997 — the PX-40 — was the product of at least 10 years of development effort. It was made with ceramic components, a material with extremely high strength, high durability and immunity to corrosion that has remained the material of choice for this application. The next generation PX device — the PX-220 — has been operating in the field since 2002 with improved performance and reliability. With a unit capacity of 50 m³/h or 220 gpm, it is deployed in arrays to serve the largest seawater RO trains in operation. PX technology has become the most popular positive-displacement energy recovery method in RO. ERI has continued aggressive research and development of PX technology to achieve higher-capacity, better-performing devices. In October 2007, ERI announced the successful development of the Titan PX-1200™. This device was designed to operate at flow rates up to 273 m³/h or 1,200 gpm. A prototype device will be in operation in the Inima seawater RO facility in Los Cabos, Mexico, starting in October 2008. The authors present design considerations and performance results from the facility for the Titan device. These are compared to the performance of arrays of PX-220 devices also in operation in the facility.

Keywords: Seawater reverse osmosis (SWRO); Energy recovery; Pressure exchanger

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