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Modified operation of a small scale energy recovery device for seawater reverse osmosis

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ABSTRACT

The Clark pump reciprocating pressure intensifier is a well established mechanism for highly efficient brine stream energy recovery in small scale seawater reverse osmosis (SWRO) desalination systems. This article describes operation of a modified Clark pump in which the roles of the two pairs of chambers are reversed and the general arrangement of the complete RO system is substantially altered. In particular, the low-pressure motorised pump that feeds into the standard Clark pump is replaced by a high-pressure motorised pump that sits in parallel with it. A conceptual comparison of the original and modified arrangements is presented, followed by a discussion of the practical modifications made to a standard Clark pump in order to test the concept. The initial tests were successful and results indicating specific energies in the range 3.5–4.5 kWh/m^3 are presented.

Keywords: Clark pump; Energy recovery; Reverse osmosis (RO)

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