ENERCON GmbH · Desalination Dept. · Dreekamp 5 · D-26605 Aurich
Phone +49 4941 9794 620 · Fax +49 4941 9794 629
E-mail: desalination@enercon.de · www.enercon.de

ENERCON
ENERGY FOR THE WORLD

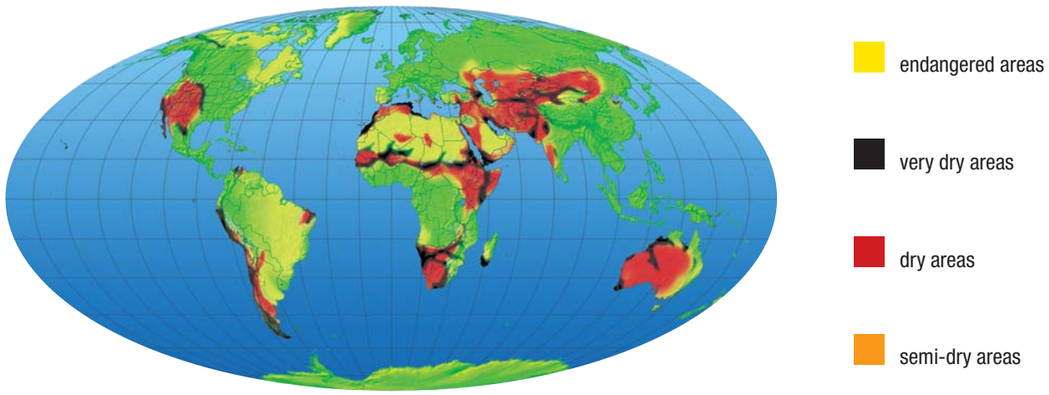
ENERCON DESALINATION SYSTEMS

- Sustainable solutions for drinking water production -

ENERCON
ENERGY FOR THE WORLD

WATER, THE ELIXIR OF LIFE

One of today's main problems is providing sufficient drinking water for the world's growing population. About three billion people have no direct access to clean potable water. Water is not only fundamental for human life, but is also essential for social development and prosperity. Global water shortage is already a source of great social tension and ecological problems.



THE ENERCON COMPANY

As drinking water becomes ever more precious, seawater desalination and water purification are becoming more important. Even in regions where drinking water supplies are now adequate, it won't be long before new solutions are needed to secure them.

As the leading manufacturer of wind power turbines, ENERCON sees a major challenge to accelerate supply using regenerative solutions. Hence, besides the development, manufacture and optimisation of wind power plants, ENERCON's product portfolio includes research into and implementation of drinking water production systems.

ENERCON has been active in drinking water production since the mid-1990s. The modular and energy-efficient desalination systems developed by ENERCON have reached series maturity and represent a sustainable concept for the world's drinking water and energy supply.

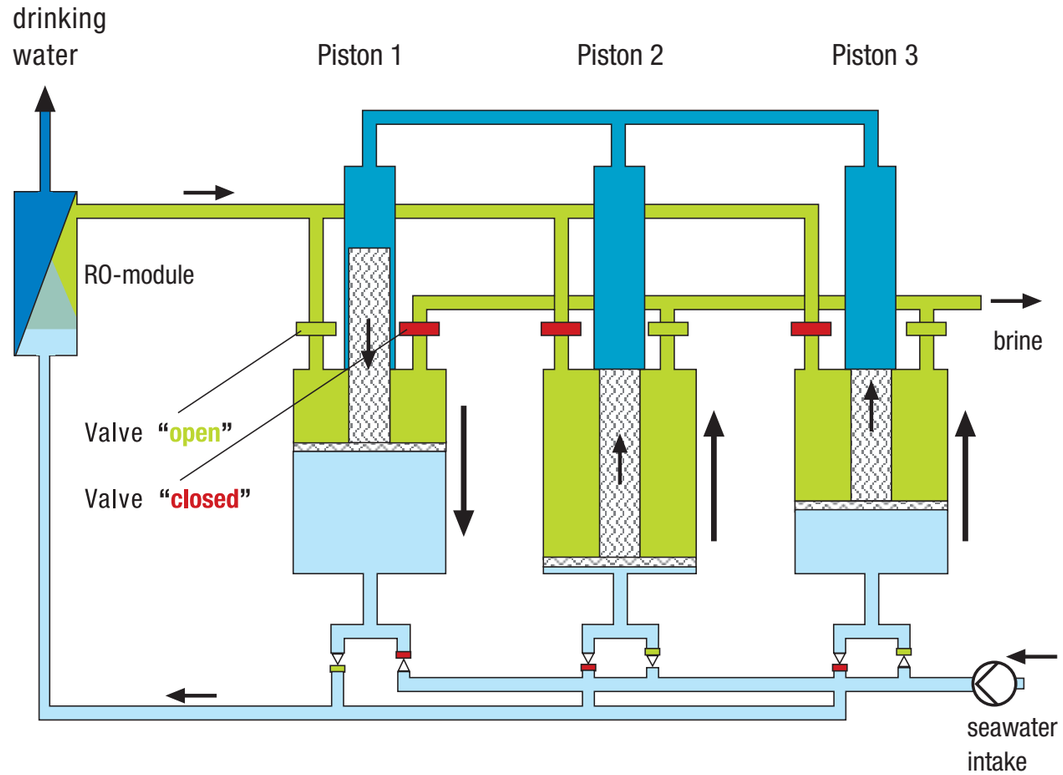
ENERCON'S SEAWATER DESALINATION SYSTEM

ENERCON'S ENERGY RECOVERY SYSTEM

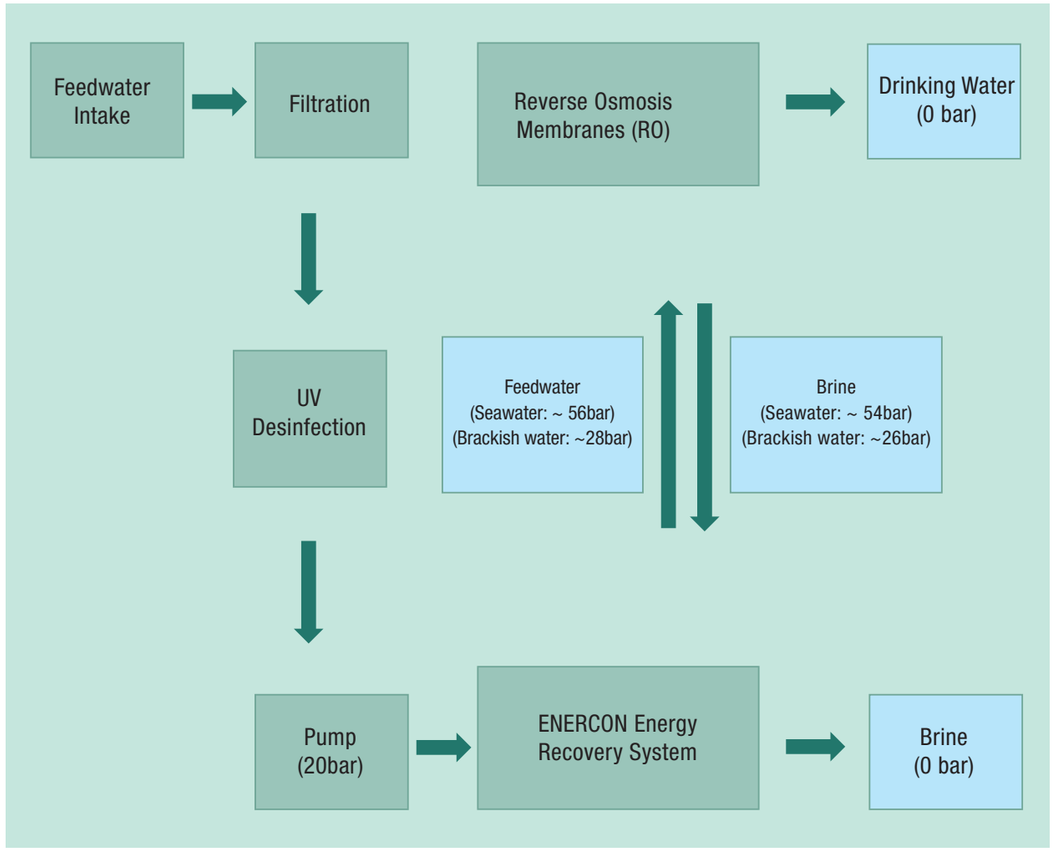
ENERCON's seawater and brackish water desalination systems are based on the principle of reverse osmosis (RO). In this process pressurised seawater flows over a membrane. The structure of the membrane retains the dissolved salts – water is able to permeate. The result is pure drinking water.

After passing the membrane, a three-piston system recycles the energy of the remaining seawater pressure with virtually no loss.

Thus desalination and energy recovery occur in a continuous complementary process, forming a cycle.



BASIC FUNCTIONALITY OF ENERCON'S SEAWATER DESALINATION PLANT

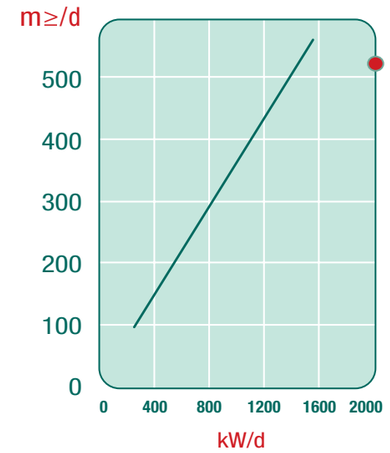


The feedwater flows through filters and an UV-disinfection system to the ENERCON Energy Recovery System. The pump pressure of 20bar is transferred to ~ 56bar/seawater or ~28bar/brackish water and flows to the RO-membranes. At the RO-membranes, feedwater separates into drinking water and brine. Drinking water leaves the system and brine, still under pressure, flows back to the energy recovery system to support the process.

FLEXIBILITY IN POWER SUPPLY

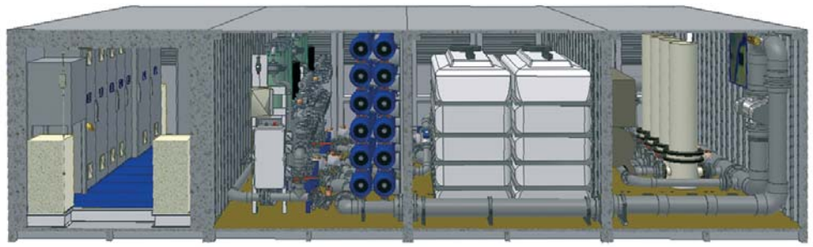
ENERCON plants have no fixed operating point. The water production can range between max. 12.5% and 100% of the nominal capacity by adjusting the piston speed according to demand. This has two main advantages: Firstly, operation is possible with a fluctuating energy supply, and secondly, output can be adjusted flexibly to water demand without shutting down the plant.

Only about 25% of the energy in the reverse osmosis process is used to produce drinking water, so without a recovery method, about 75% would go to waste. ENERCON's energy recovery system comprises a low-pressure pump (max. 20 bar) and a three-piston system, which raises the pressure up to 70 bar and simultaneously re-uses the remaining energy. There is no need for a second (high-pressure) pump. So this system consumes very little power and works extremely energy efficient.



MODULAR CONTAINER DESIGN

ENERCON's seawater desalination plant is modular, comprising various containers. Each 20-foot container contains a separate part of the plant. This design enables easy worldwide transport and set-up logistics and also guarantees optimal protection of the plant from climatic influences.



1. Power and control container
2. Desalination/RO container
3. Water storage container
4. Pretreatment container

CHARACTERISTICS OF ENERCON'S SEAWATER DESALINATION SYSTEM

- Very low energy consumption: The ENERCON recovery system saves 30% energy
- No need for chemicals: Physical control processes eliminate the need for chemicals
- Energy-efficient output adjustment: Without reducing efficiency, water production can be adjusted to demand and energy availability within a range of 12.5 % to 100%
- Based on the power and output variability, ENERCON seawater desalination plants can also be applied in weak power grid areas or as stand-alone systems
- Fully automatic operation, including re-start after a power failure, cleansing cycles, control depending on energy and feedwater availability
- Low operating costs; due to very low power consumption per m^3 of drinking water produced
- Low noise emission
- Remote plant monitoring with ENERCON's SCADA system: Monitoring regardless of location enables online viewing of all operating data. The data can be generated in tabulated or graphic form, statistical assessments can be calculated, etc.
- No 24 hour personnel necessary
- Combination with renewable energy systems, such as wind turbines

APPLICATIONS

DIRECT CONNECTION OF ENERCON'S SEAWATER DESALINATION PLANT TO THE PUBLIC GRID

Connecting the ENERCON seawater desalination plant directly to a stable grid poses no problem. The sea water is extracted from the open sea with a suction pipe or through a well and fed to the plant.

ENERCON'S SEAWATER DESALINATION PLANT IN COMBINATION WITH AN ENERCON WIND ENERGY CONVERTER AND LINKED TO THE PUBLIC GRID

The seawater desalination plant's primary power supply is generated by an ENERCON wind turbine. Costal locations present excellent conditions for wind power, especially on islands. During strong winds, the surplus energy can be fed directly into the public grid. When there is insufficient wind the desalination plant can be powered from the grid.

ENERCON'S SEAWATER DESALINATION PLANT AS A STAND-ALONE GRID SYSTEM

ENERCON has developed a stand-alone grid system to guarantee a continuous, stable supply of energy and water to consumers in remote areas far away from the public grid. The seawater desalination plant's primary power supply is generated by an ENERCON wind energy converter. In combination with other system components, such as a synchronous machine, flywheel, battery and diesel generator, the system supplies and stores energy and water precisely according to demand. ENERCON's energy management system ensures ideal utilisation of the wind and water supply, while guaranteeing exceptionally high quality of the island grid.

DIFFERENT OPTIONS

TYPE	TYPE OF WATER	CAPACITY IN m^3/DAY	NUMBER OF RO UNITS	NUMBER OF 20'' CONTAINERS	PUMPS PER RO UNIT
EDS SW 300	Seawater	175 - 350	1	4	1
EDS SW 600	Seawater	175 - 700	2	4	1
EDS SW 900	Seawater	175 - 1050	3	5	1
EDS SW 1200	Seawater	175 - 1400	4	5	1
EDS BW 600	Brackish	350 - 700	1	4	1
EDS BW 1200	Brackish	350 - 1400	2	4	1
EDS BW 1800	Brackish	350 - 2100	3	5	1
EDS BW 2400	Brackish	350 - 2800	4	5	1