EMSF
DESALINATION
EQUIPMENT

Fonte Pura-Princeston ~ seawater treatment

We make perfect drinking water nature-friendly way

INNOVATIVE, NEXT GENERATION TECHNOLOGY FOR DESALINATION EQUIPMENT - EMSF

EMSF is innovative technology for production of very clean, drinkable water using vacuum distillation, which:

- **allows for production of baby-suitable water and cleans the water to a value lower than 1 ppm** (parts per million). That is one millionth of dissolved substances. Meanwhile, when using a traditional method such as reverse osmosis (RO), it is difficult to keep the output value at even 300 ppm (and this happens only with the use of brand-new filters and a well-configured device).
- reduces pressure inside the device, leading to a marked decrease in the water‘s boiling point; thus, **decreasing energy consumption and the cost of water produced.**

EMSF = Environmental Multi-Stage Flash

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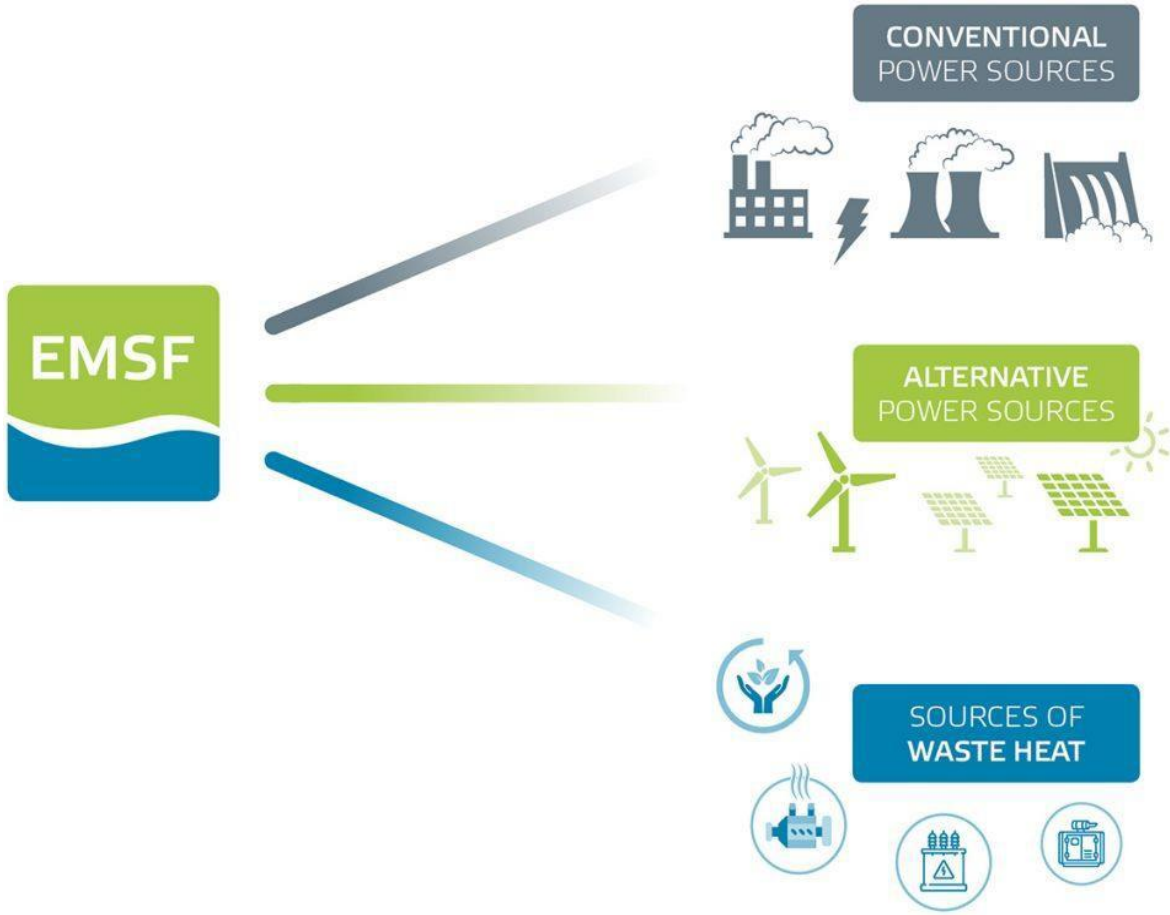
- EMSF is able to utilize for desalination process conventional (thermic, nuclear, hydro) as well as alternative (solar, wind, etc.) sources of power.
- The biggest advantage is the possible usage of waste heat which allows to produce **high-quality drinking water for close to ZERO running cost.**



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- The technological design enables use of **waste heat** from all sorts of technological equipment: diesel generators, transformer stations, engine rooms, engines, heat exchangers, incinerators, etc.; allowing for the cheapest water production possible, while not producing additional CO^2.

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- Connection of an EMSF unit to a waste heat source (diesel generator)
- Besides waste heat, solar energy with the use of solar collectors and panels can also be utilised.

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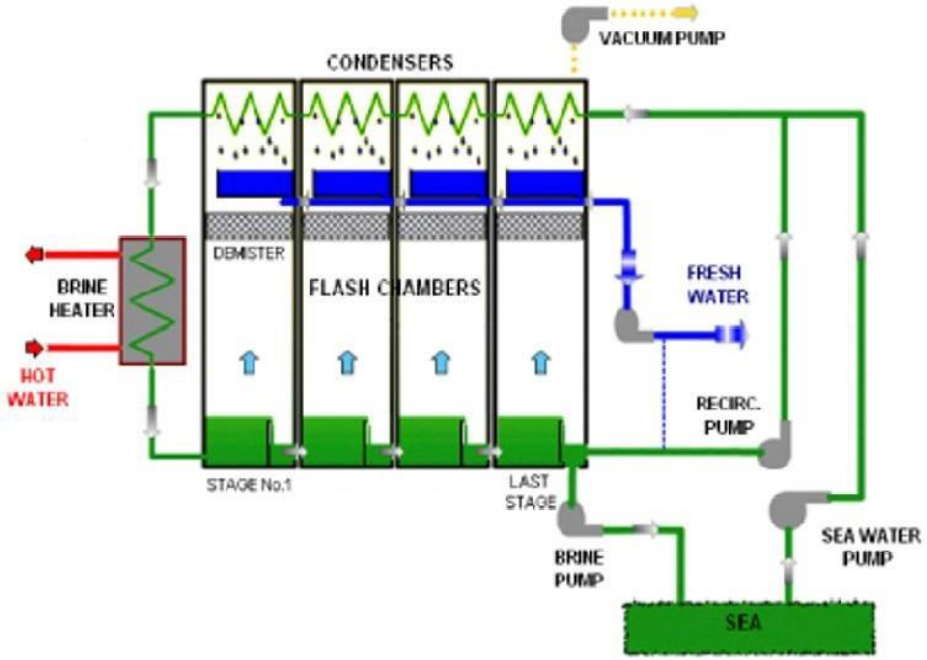
- As with all thorough water cleaning devices, it is advisable to have the water re-mineralized if it is meant for drinking.

- The technology can also be regulated in order to achieve the desired level of mineral preservation from the original (input) water. This further distinguishes it from other traditional technologies.

- Other uses include the addition of fertilizers and trace elements to clean (output) water designated for agricultural irrigation.

DESCRIPTION OF THE UNIT AND PROCESS



The recirculation stream flows from the n-2 stage to the first stage where it is heated gradually by the condensation vapor.

After leaving the first-stage condenser, water flows through the brine heater, where the heat input to the unit causes a further temperature increase.

The well water leaves the brine heater at the brine top temperature (BTT – approx. 80 °C). Up to this point, the pressure of the well water is above atmospheric pressure and therefore below boiling pressure.

The well water is then directed into the first stage of the unit, which is at a pressure below the boiling pressure. In order to return to a state of equilibrium, part of the well water is flashed off such that the saturation temperature corresponds to the pressure in the stage. The distillation process operates from low vacuum in the first stage to high vacuum in the last stage, with stage-to-stage pressure and temperature differentials being the key to the repeated flashing.

The flashed vapor is drawn into the condenser where it is condensed and collected as a distillate. The distillate is drawn through from the first stage to the last stage condenser, where it is discharged by the distillate pump.

Part of the brine (approx. 2/3) from the last stage is mixed with raw well water and then pumped again by a recirculation pump into the distillation system. The second part of the brine (approx. 1/3) is discharged by the brine pump.

The non-condensable gases released during the various stages are discharged by the vacuum pump. The fresh water is continuously measured. If the salinity exceeds the acceptable limit, the distillate is automatically dumped into the recirculation brine.

THE BASIC MODEL SERIES

- Distillation units with brine recirculation.
- The device is a modular system with a standard capacity ranging **from 1 to 200m^3 of fresh water/day.**
- **Individual units can be set up and arranged as needed**. This flexibility is especially convenient for use on ships and in other confined spaces. **Conversely, the same process can be used to increase capacity.**
- The device is nearly maintenance-free: with planned shutdowns for simple cleaning being the only exception. The device‘s operating time is **350 days/year.**
- It is possible to equip the technology with remote monitoring with regular transfer of service data, i.e. the service history and error reports.
- Technological or building preparation is not needed: the EMSF unit can be delivered in a standard container.

ADVANTAGES

- Easily expandable modular design
- Fast manufacturing (ready within 2-4 months after ordering)
- Simple and fully automatic operation
- Very easy maintenance
- Compact, sturdy construction
- Low consumption of cooling water
- Operates at a top brine temperature < 100 °C to minimize scaling and to prevent corrosion
- Minimal down time (higher availability factor)
- Components the come into contact with sea water or fresh water are manufactured from corrosion-resistant materials.

Main disadvantages of Reverse Osmosis when compared with EMSF

- Acquisition cost of Reverse Osmosis (RO) is higher than EMSF and if there is a waste heat source available on site RO has also significantly higher running costs than the EMSF.
- EMSF produces 100 to 300 times cleaner water (in terms of depleted salts).
- RO is more susceptible to cleanliness of the inlet water. Besides its own filter membrane it still needs pre-filtration and also uses activated charcoal which increases the running costs of the consumables.
- RO is more limited by the salinity of the inlet water. If the salinity of raw water is increased also the pump capacity must be increased (need of installation of more powerful pumps).
- RO is limited by inlet water temperature, its functionality is guaranteed only up to water temperature + 30°C.
- RO has increased demands on time-out for filter regeneration (backflow of the filters) and the associated high consumption of purified water for self-regeneration and also for pressurized pump energy.
- RO needs a qualified operator for its own operation, regular replacement of filter membranes and can be installed only in a clean operating environment.
- RO needs chemicals (acids) for its washouts and these acids must be subsequently disposed.

Main disadvantages of Reverse Osmosis when compared with EMSF

- Fundamental difference is **quality of output water**.
- The long term use of water treated by RO for irrigation leads to **gradual soil degradation** due to the irreplaceable proportion of salt in irrigation water.
- This can be illustrated by the place on the photo, where **irreversible soil degradation** has occurred due to usage of **low-salt irrigation water**.

SUCCESSFUL APPLICATION - EMSF 20

- Installed in Egypt
- Capacity: 20 m3/day
- Salinity: 10-15 ppm
- DESIGN PARAMETRES

Tube length	[m]	1,3
Tube diameter	[mm]	19x1
Tube material	[-]	CuNi90/10
Number of tubes	[-]	10
Number of stages	[-]	4
Capacity	[m3/day]	20
Energy consump.	[kW]	313

SUMMARY OF THE TECHNOLOGY

- EMSF is an innovative, next generation technology for desalination devices.
- It is a unique method that allows for production of baby water from non-drinkable water.
- It will enable the supply of water to regions affected by high amounts of diseases and high mortality rates caused by water pollution.
- It can be used in areas with no infrastructure, using only solar energy.
- It is energetically self-sustainable, using the waste heat from other equipment.
- It does not require complicated technological and building preparations.
- It has a long service life.
- It does not require qualified personnel.
- It can be widely used in agriculture: for irrigation, thickening of liquid fertilisers, etc.
- It is effective in industrial use: i.e. when thickening or separating water from other substances.
- It is suitable for water production on ships.
- It brings immediate financial savings thanks to the use of waste heat.
- It brings additional financial savings by not needing operating materials.

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For more information, please contact us

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