Model	Capacity		Heat consumption		Number of		Dimensions		
					modules	stages	Length	Height	Width
	m³/day	US gal/day	GJ/m³	Mcal/m³	-	-	mm	mm	mm
SA04	42	11 000	1,44	343	1	4	2 200	1 650	1 650
SA08	56	14 800	0,72	172	2	8	4 000		
SA12	63	16 700	0,48	114	3	12	5 800		
SA16	68	17 800	0,36	86	4	16	7 600		
SA20	70	18 600	0,29	69	5	20	9 400		
SA24	72	19 100	0,24	57	6	24	11 200		
SC04	64	16 900	1,43	341	1	4	2 200	1 650	2 100
SC08	86	22 600	0,71	170	2	8	4 000		
SC12	97	25 500	0,48	114	3	12	5 800		
SC16	103	27 200	0,36	85	4	16	7 600		
SC20	107	28 300	0,29	68	5	20	9 400		
SC24	110	29 100	0,24	57	6	24	11 200		
SE04	89	23 500	1,44	343	1	4	3 400	2 400	1 900
SE08	119	31 500	0,72	172	2	8	6 200		
SE12	135	35 600	0,48	114	3	12	9 000		
SE16	144	38 000	0,36	86	4	16	11 800		
SE20	150	39 600	0,29	69	5	20	14 600		
SE24	154	40 800	0,24	57	6	24	17 400		
SH04	132	34 800	1,43	341	1	4	3 400	2 400	2 350
SH08	176	46 500	0,71	170	2	8	6 200		
SH12	199	52 500	0,48	114	3	12	9 000		
SH16	212	56 000	0,36	85	4	16	11 800		
SH20	221	58 300	0,29	68	5	20	14 600		
SH24	227	60 000	0,24	57	6	24	17 400		
SJ04	171	45 100	1,44	343	1	4	4 300	2 500	2 100
SJ08	229	60 400	0,72	172	2	8	7 800		
SJ12	259	68 400	0,48	114	3	12	11 300		
SJ16	276	72 900	0,36	86	4	16	14 800		
SJ20	288	76 000	0,29	69	5	20	18 300		
SJ24	296	78 200	0,24	57	6	24	21 800		
SL04	245	64 700	1,43	341	1	4	4 300	2 500	2 550
SL08	328	86 500	0,71	170	2	8	7 800		
SL12	370	97 800	0,48	114	3	12	11 300		
SL16	395	104 200	0,36	85	4	16	14 800		
SL20	411	108 500	0,29	68	5	20	18 300		
SL24	423	111 700	0,24	57	6	24	21 800		
SN04	553	145 900	1,43	341	1	4	5 900	3 200	2 850
SN08	738	195 000	0,71	170	2	8	10 600		
SN12	835	220 500	0,48	114	3	12	15 300		
SN16	889	234 900	0,36	85	4	16	20 000		
SN20	926	244 700	0,29	68	5	20	24 700		
SN24	953	251 700	0,24	57	6	24	29 400		
SP04	838	221 400	1,44	343	1	4	5 900	3 200	3 700
SP08	1 122	296 400	0,72	172	2	8	10 600		
SP12	1 270	335 500	0,48	114	3	12	15 300		
SP16	1 354	357 600	0,36	86	4	16	20 000		
SP20	1 411	372 700	0,29	69	5	20	24 700		
SP24	1 452	383 600	0,24	57	6	24	29 400		

CAPACITY TABLE - Figures are valid with temperature of sea water 30 °C (86 °F) and temperature of hot water 100 °C (212 °F)

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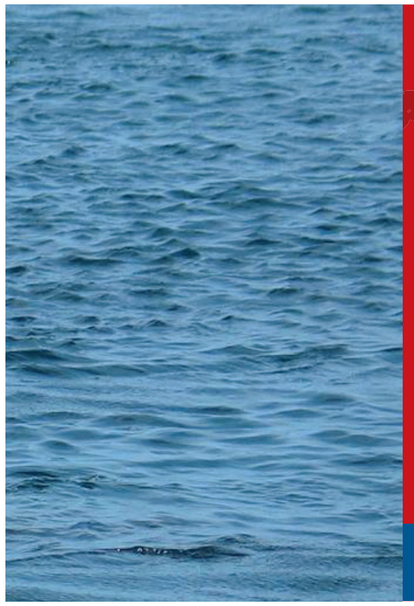
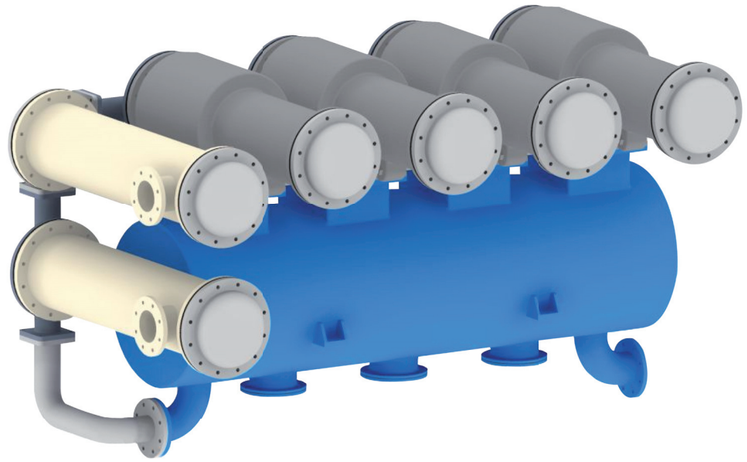
DESALINATION SYSTEMS



MULTI-STAGE FLASH (MSF) FRESH WATER GENERATOR

- for on-shore application

PBS POWER EQUIPMENT, s.r.o. design and manufacture multi-stage flash (MSF) distillation units with brine recirculation which are employed for producing fresh water from sea water. These units are used for on-shore installations for producing process and potable water. Units are heated by hot water, steam, waste heat or solar power.



PBS POWER EQUIPMENT

Description of the unit and process

MSF desalination units are produced as modular systems. The last two stages of the unit are cooling stages. The sea water flows through the tubes of a last two condensers. The recirculation stream flows from the n-2 stage to the first stage whereby it is heated gradually by the vapor condensing. After leaving the first stage condenser the sea water flows through the brine heater where the heat input to the plant causes a further temperature increase. The sea water leaves the brine heater at the brine top temperature (BTT = approx. 80 °C). Up to this point, the pressure of the sea water is above to atmospheric pressure and therefore below boiling pressure. The sea water is then directed into the first stage of the unit which is at pressure below boiling pressure. In order to return to a state of equilibrium, part of the sea water flashes off such 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 last stage, with stage to stage pressure and temperature differential being the key to the repeated flashing. The flashed vapor is drawn to the condenser where it is condensed and collected as distillate. The distillate is drawn through from the first stage to the last stage condenser where it is discharged by the distillate pump. A part of brine (approx. 2/3) from the last stage is mixed with raw sea water and then it is pumped by recirculation pump into distillation system again. The second part of brine (approx. 1/3) is discharged by the brine pump. The non-condensable gases released in the various stages are discharged by the vacuum pump. The fresh water is continuously measured. If the salinity exceeds the adjustable limit the distillate is automatically dumped into the recirculation brine.

Fig.1 Prototype unit

TECHNICAL SUMMARY:

- **Capacities 20 - 1500 m³/24 hours.**
- **MSF distillers for on-shore application can utilize several kinds of energy (hot water, steam, waste heat from engines, solar power).**
- **Salinity of fresh water < 10 ppm NaCl, on request under 1 ppm.**
- **Heat consumption from 50 kWh/1m³ fresh water (in dependence on the number of modules).**

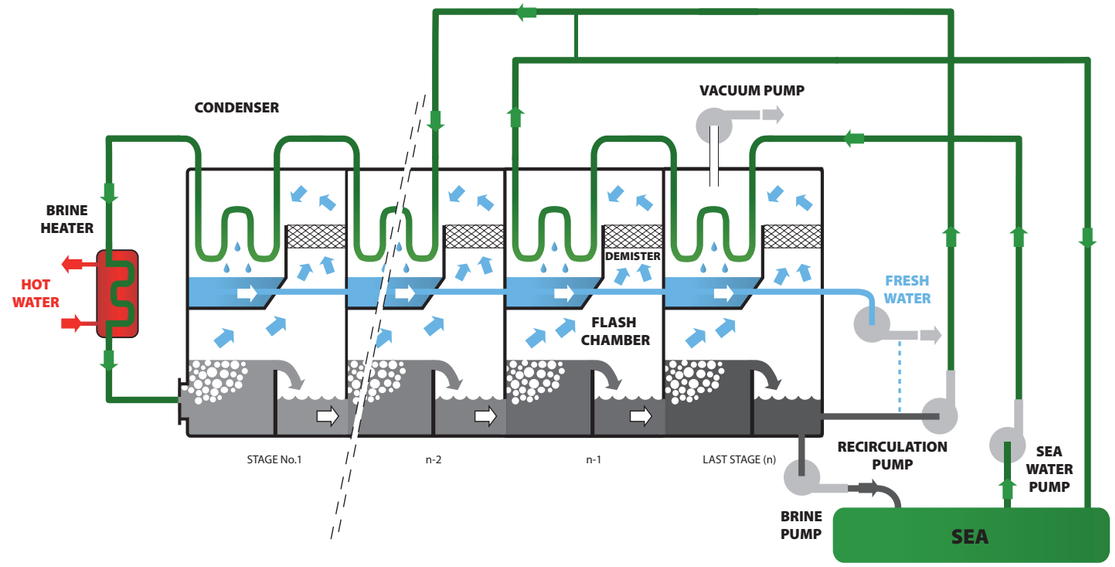
ADVATAGES:

- **Easily expandable modular design.**
- **Brine recirculation.**
- **Simple and fully automatic operation.**
- **Easy maintenance.**
- **Compact and sturdy construction.**
- **Low consumption of cooling water.**
- **Operates at a top brine temperature < 100 °C to minimize scaling and to prevent corrosion.**
- **Minimum down time (higher availability factor).**
- **Components in contact with sea water or fresh water are manufactured of corrosion resistant materials.**
- **Qualified after-sales service and support.**

BASIC FACTS:

- **Capacity increases with the number of modules (stages).**
- **Heat consumption decreases with the number of modules (stages).**

Flow diagram of a MSF distiller



Energy Saving in Co-Generation Schemes

The ability of low temperature distillation plants to make effective use of low cost, low grade heat, or, where available, even zero cost waste heat, maximizes the reduction of the energy cost component of these plants. Water production costs are consequently lower than any other sea water desalination system. Low grade heat is available through cogeneration schemes with steam turbine, diesel generator and gas turbine power plants. This is obtained through waste heat recovery from industrial cooling waters and exhaust gases, from solid waste incinerators, solar ponds and geothermal waters.

STADNDARD SCOPE OF SUPPLY:

- **Distillate pump with electric motor**
- **Recirculation pump with electric motor**
- **Brine pump with electric motor**
- **Sea water pump with electric motor**
- **Vacuum pump with electric motor**
- **Demister**
- **Control panel with motor starter, built in salinometer and common alarm**
- **Documentation including operating instruction**

ACCESSORIES:

- **Disinfection unit**
- **Set of thermometers**
- **Set of pressure gauges**
- **Vacuum meter**
- **Fresh water meter**
- **Fresh water sample cock**
- **Remote indication fresh water quantity**
- **Remote indication salinity**
- **Dosing pumps station - remineralisation of water**