Alfa Laval AQUA Blue Mini E1

Single-stage freshwater generator

Introduction

Alfa Laval provides a range of solutions for converting seawater into fresh water. The AQUA Blue Mini E1 is a thermal vacuum distillation unit that converts seawater into high-quality fresh water by means of an evaporation process where it utilizes waste heat or steam. The process and control system ensure fresh water with salinity levels below 2 ppm.

AQUA Blue Mini E1 is designed for start-and-forget operation in periodically unmanned machine rooms and other automated operations. It is suitable for installation on ships and rigs, as well as in remote onshore locations.

The process used by the AQUA Blue Mini E1 is based on a unique 3-in-1 plate technology that enables desalination in a single plate pack without an outer shell. Evaporation, separation and condensation all occur within the titanium plate pack with glue free gaskets.

Application

The AQUA Blue Mini E1 can be used in numerous applications where high quality fresh water is needed. It is mainly installed in the engine cooling circuit onboard ships, offshore platforms or power stations, but can utilize any heat source.

Benefits

- Small footprint
- Low electrical consumption
- Easy operation and maintenance
- High quality fresh water
- Easy to fit and upgrade
- Non-glued gaskets — easy to replace

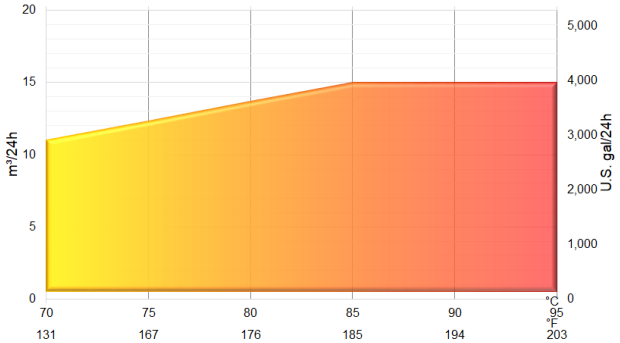
Standard design

The AQUA Blue Mini E1 freshwater generator consists of

- Titanium plate pack suspended within a frame
- Condenser cooling, ejector and feed water system
- Hot water system
- Freshwater system containing a freshwater pump and a control sensor that ensures a stable outgoing flow of high quality fresh water
- Control panel with motor starters and salinometer
- Ejector water pump with electric motor
- Feed water treatment equipment
- Cleaning In Place (CIP) connections

Capacity range

The AQUA Blue Mini E1 series covers a capacity range up to 5–15 m^3/24h (1,320–3,963 U.S. gal/24h), depending on the heating medium and cooling water temperatures. An AQUA Blue Mini E1 freshwater generator can be dimensioned to suit any jacket water temperature of 50–95°C (122–203°F) at cooling water/liquid temperatures of 0–40°C (32–104°F)



Options

Using numerous predesigned standard options, Alfa Laval can tailor-make almost any freshwater generation solution with the AQUA Blue Mini E1. Some of the options can be seen below, but there are others as well.

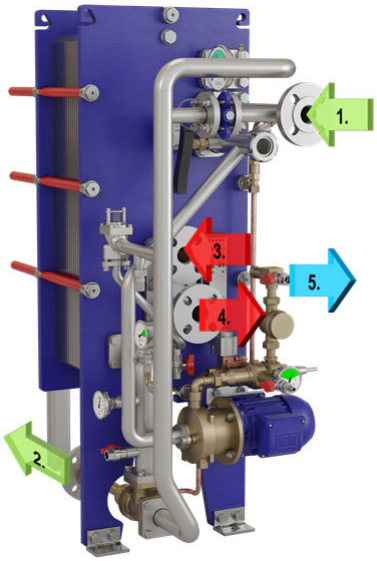
Optional design

- Fresh water outlet system with bypass
- Root valves for pressure gauges
- Manometer set for ejector and hot water pumps
- Counter flanges
- Plate pack protection sheet
- Distance indicators on stay bolts

Accessories

- Hot water pump
- Hot water loop for utilizing an additional heat source in combination with hot/jacket water
- Cleaning In Place (CIP) unit
- Spare part kits
- UV sterilizer units
- Rehardening/pH adjustment filter
- Chlorination units
- Dechlorination filters
- Silver ion water sterilizer
- Extra freshwater quality control and dump module

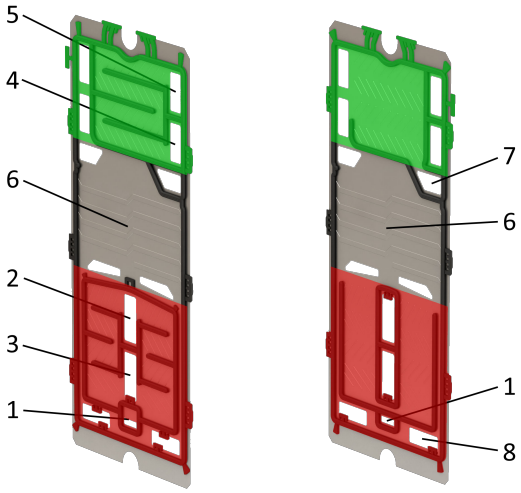
Working principle



1. Sea/cooling water inlet	3. Heating medium inlet	5. Distillate outlet
2. Brine/cooling water outlet	4. Heating medium outlet	

The AQUA Blue Mini E1 is heated by hot water, which enters the evaporator section, where it heats and evaporates a portion of the feedwater. The steam is condensed in the condenser. The feedwater is seawater, which is preheated by cooling the condenser. This cooling flow is also used as ejector motive flow. The evaporation occurs around 35-65 °C (113–149 °F) in a vacuum of 75-99%, which is maintained by the brine/air ejector.

Utility plate **Process plate**

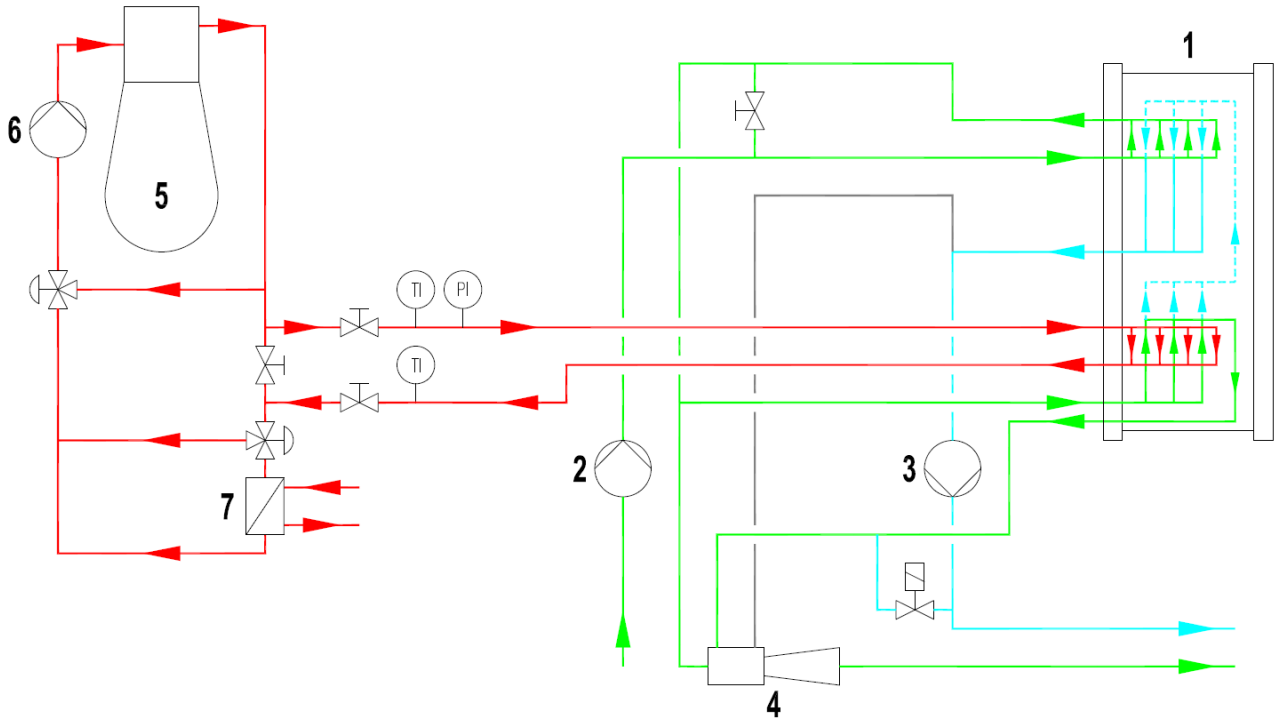


Condensation (Green)	Separation (Grey)	Evaporation (Red)
1. Seawater feed	4. Seawater cooling in	7. Fresh water out
2. Heating medium in	5. Seawater cooling out	8. Brine out
3. Heating medium out	6. Evaporated vapour	

The steam passes the separator section of the plate pack, where any droplets of entrained seawater hit the plate corrugations and fall back into the brine sump. Only clean steam reaches the condenser and is condensed into distillate, which is pumped out by the distillate pump.

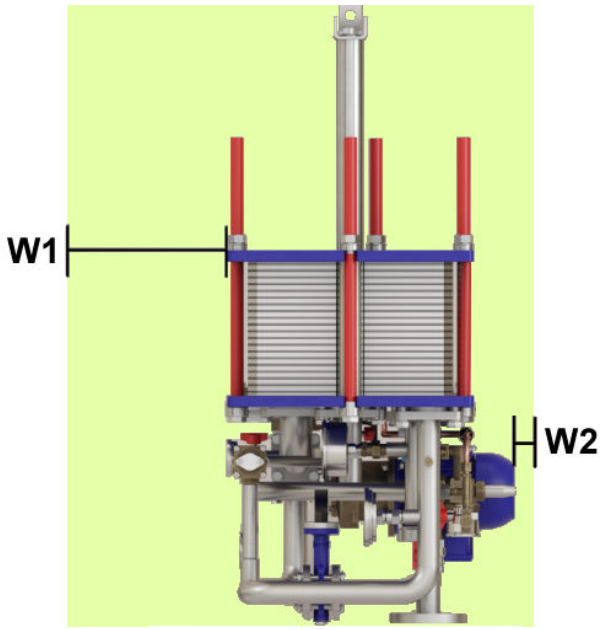
Installation

AQUA Blue Mini E1 is easily installed. Since there is limited need for service area, the installation can be highly compact. The heating medium is hot water, such as jacket water from the engine, or other heat sources. An ejector pump supplies seawater coolant for the condenser, feed water for evaporation and motive water for the combined brine/air ejector. This pump is separately installed and connected to its own seawater intake such as the ship's main cooling system or other seawater intake, to which it is also returned. The fresh water produced is pumped into the storage tank. A control panel supplies electrical power to the ejector pump, freshwater pump and dosing pump, and control voltage to the salinometer and dump valve.



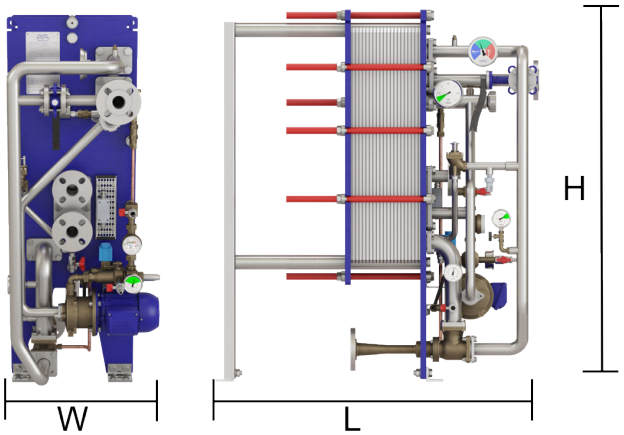
1. Freshwater generator	3. Freshwater pump	5. Engine	7. Central cooler
2. Ejector pump	4. Brine/air ejector	6. Jacket water pump	

Not only does the AQUA Blue Mini E1 have a small footprint, it also has a service area much smaller than other plate or shell- and tube freshwater generator models. There is no outer shell that requires extra space to open.



Minimum recommended service area
W1: 450 mm (17.72 in)
W2: 100 mm (3.94 in)

Dimensions



AQUA Blue Mini E1		34 — 54 plates	56 — 96 plates	98 — 118 plates
Length (L)	mm	1069	1319	1469
	in	42.1	51.9	57.8
Width (W)	mm	570	570	570
	in	22.4	22.4	22.4
Height (H)	mm	1306	1306	1306
	in	51.4	51.4	51.4
Weight (empty)	kg	335	377	399
	lbs	739	831	880

Material data

1. Frame and pressure plate	C3 painted steel
2. Utility and process plates	Titanium
3. Tightening bolts	Galvanized steel
4. Carrying bars	Carbon steel
5. Support column	Aluminium
6. Protection tube	MDPE
7. Ejector	
Housing	Bronze
Diffuser	Bronze
Nozzles one	Duplex steel
Nozzle two	Bronze
8. Freshwater pump and motor	
House	Bronze
Impeller	Bronze
Shaft	Duplex steel
Motor housing	Painted cast iron
Ejector pump and motor	
House	Bronze
Impeller	Aluminium bronze
Optional impeller	Stainless steel
Shaft	Stainless steel
Motor housing	Painted cast iron
Piping	
Seawater	Duplex steel
Brine	Duplex steel
Distillate	Stainless steel
Feed water treatment pump	
Dosing head and connectors	Polypropylene
Membrane	PTFE coated
Seals	EPDM
Valve balls	Ceramics
Dosing tank	Polyethylene

Electrical data

Main supply voltage

- 50 Hz : 3 x 380–415 V / 3 x 600–690 V
- 60 Hz : 3 x 440–460 V / 3 x 690 V

Certifications and classification

Alfa Laval freshwater generators are manufactured in accordance with following standards, rules and regulations:

- PED 2014/68 Pressure Equipment Directive
- IEC Publication No 60092, Electric installations on ships
- ISO 9001 certified Quality Management System
- ISO 14001 certified Environmental Management System
- WHO Guidelines for Drinking-water Quality, 3rd edition, 2004
- EC drinking water directive 98/83/EC 1998
- EN ISO 15748 Potable water supply on ships and marine structures
- Design acceptance by all major IACS classification society members

Service support

By choosing Alfa Laval you are choosing the perfect long-term partner for your daily operations. In addition to parts and immediate assistance, our experts deliver a full range of services – digital as well as physical – to bring customers maximum uptime and value from Alfa Laval equipment. Contact your nearest Alfa Laval office for more information and support.

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