

Alfa Laval AQUA Blue E1 S-type

Single-stage freshwater generator

Introduction

Alfa Laval provides a range of solutions for converting seawater into fresh water. The AQUA Blue E1 S-type 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 E1 S-type 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 E1 S-type 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 E1 S-type 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

- Low electrical consumption
- Glue free gaskets
- Flexible and compact installation
- Easy operation and maintenance
- High quality fresh water
- Easy to fit and upgrade

Standard design

The AQUA Blue E1 S-type freshwater generator package consists of

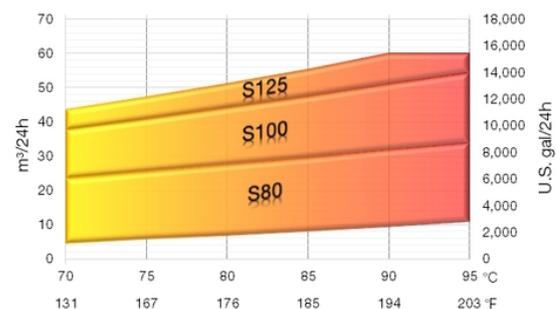
- Titanium plate pack suspended within a frame
- Condenser cooling water system
- Ejector/feed water system
- Hot water system
- Freshwater system containing a freshwater pump and a control sensor that ensures a stable outgoing flow of high quality fresh water
- Steam injection system for steam or hot water operation (if specified)



- Control panel with motor starters and salinometer
- Ejector/Feed water pump with electric motor
- Feed water treatment equipment
- Cleaning In Place (CIP) connections

Capacity range

The AQUA Blue E1 S-type series covers a capacity range of 5–60 m³/24h (1320–15850 U.S. gal/24h), depending on the heating medium and cooling water temperatures. An AQUA Blue E1 S-type 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 E1 S-type. Some of the options can be seen below, but there are others as well.

Optional design

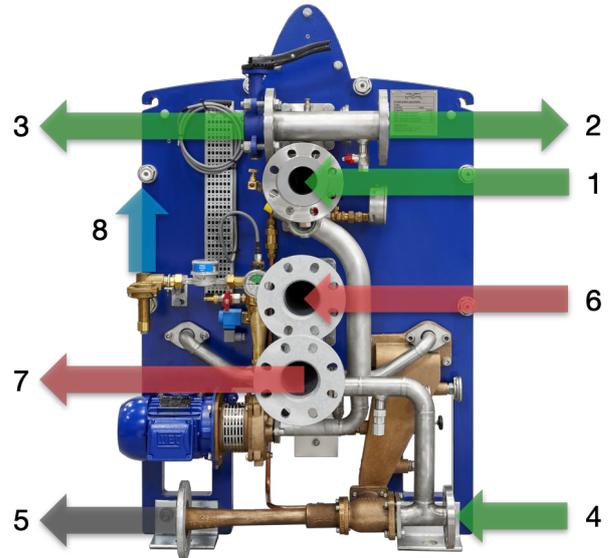
- Ejector/feed water pipe
- Fresh water outlet system with bypass
- Built-on control panel
- Built-on feed water treatment equipment
- Root valves for pressure gauges
- Manometer set for ejector/feed and hot water pumps
- Filling line for anti-scale dosing unit
- Counter flanges
- Plate pack protection 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 for AQUA Blue
- 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

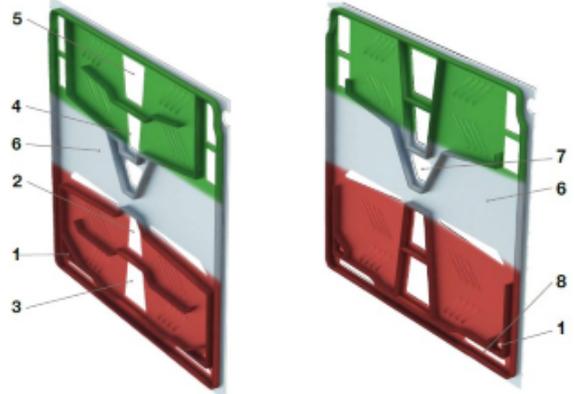


- | | | |
|------------------------------|-----------------------------|--------------------------|
| 1. Sea/cooling water inlet | 4. Ejector/feed water inlet | 7. Heating medium outlet |
| 2. Ejector/feed water outlet | 5. Brine outlet | 8. Distillate outlet |
| 3. Sea/cooling water inlet | 6. Heating medium inlet | |

The AQUA Blue E1 S-type has the option of taking ejector and feed water from the condenser outlet or from an alternative source. Feed water enters the evaporator section of the plate pack, where it heats and evaporates a portion of the feedwater. The evaporation occurs around 45-65 °C (113-149 °F) in a vacuum of 75-99%, which is maintained by the brine/air ejector.

Utility plate

Process plate



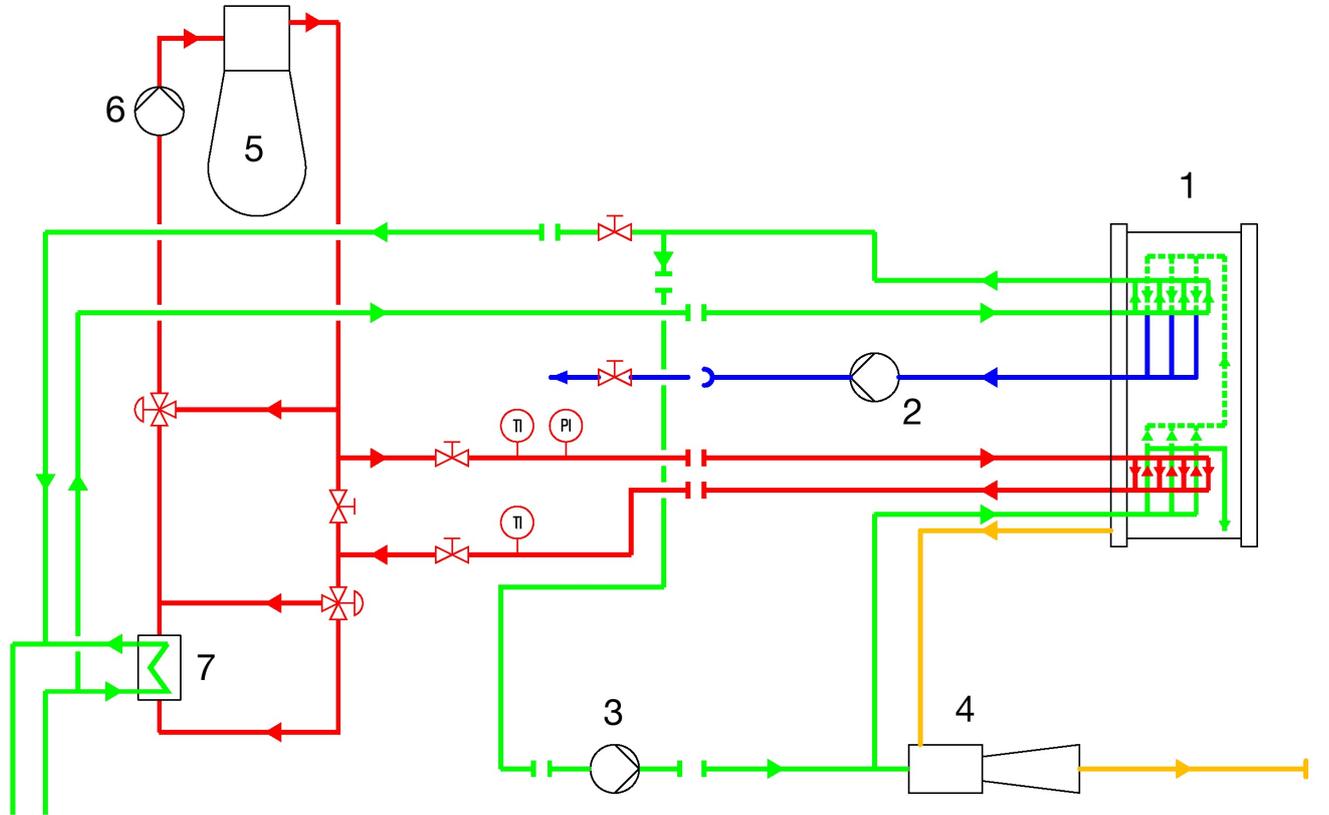
- | Condensation (Green) | Separation (Grey) | Evaporation (Red) |
|-----------------------|-------------------------|--------------------|
| 1. Seawater feed | 4. Seawater cooling in | 7. Fresh water out |
| 2. Heating medium in | 5. Seawater cooling out | 8. Brine out |
| 3. Heating medium out | 6.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

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

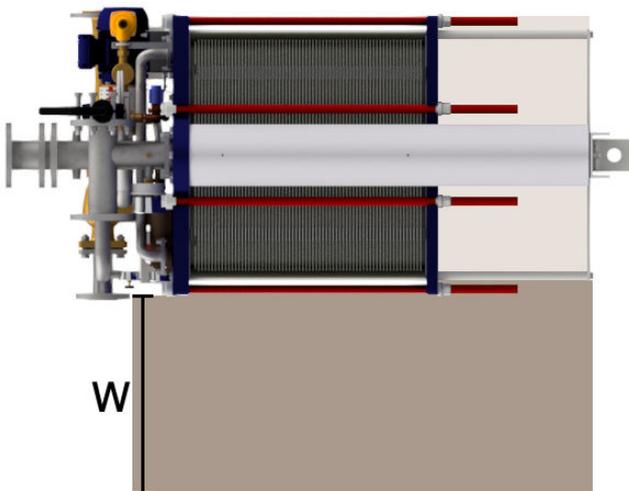
AQUA Blue E1 S-type is easily installed. Since there is limited need for service area, the installation can be highly compact. The heating medium is hot water, such as jacket water from the engine, or by steam. The condenser coolant is taken from the ship's main cooling system, to which it is also returned. An ejector/feed water pump supplies feed water for

evaporation and motive water for the combined brine/air ejector. This water can be taken from the condenser outlet or an alternative source. The fresh water produced is pumped into the storage tank. A control panel supplies electrical power to the ejector/feed pump, freshwater pump and dosing pump, and control voltage to the salinometer and dump valve.



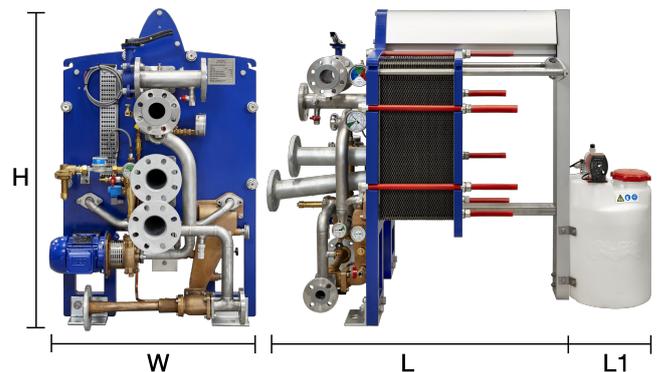
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|-------------------------|----------------------------|----------------------|-------------------|
| 1. Freshwater generator | 3. Ejector/feed water pump | 5. Engine | 7. Central cooler |
| 2. Freshwater pump | 4. Brine/air ejector | 6. Jacket water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

Not only does the AQUA Blue E1 S-type 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.



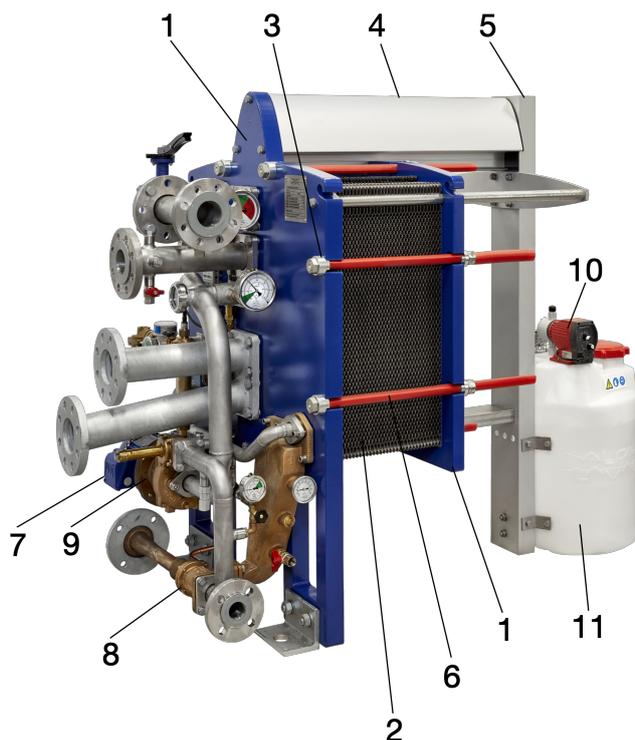
Recommended service area
W: 600 mm (23.62 in)

Dimensions



AQUA Blue E1 S-type		S80	S100	S125
Length (L)	mm	1492-1692	1692-1892	1892-2292
	in	58.7-66.6	66.6-74.5	74.5-90.2
Length 1 (L1)	mm	410	410	410
	in	16.1	16.1	16.1
Width (W)	mm	882	882-917	917
	in	34.7	34.7-36.1	36.1
Height (H)	mm	1395	1395	1395
	in	54.92	54.92	54.92
Weight (empty)	kg	787-833	869-930	942-1049
	lbs	1735-1836	1916-2050	2077-2313

Material data



1. Frame and pressure plate	C3 painted steel
2. Utility and process plates	Titanium
3. Tightening bolts	Galvanized steel
4. Carrying bar	Aluminium
5. Support column	Aluminium
6. Protection tube	MDPE
7. Motor housing	Painted cast iron
8. Ejector	
Housing	Bronze
Diffuser	Bronze
Nozzles one	Duplex steel
Nozzle two	Bronze
9. Freshwater pump	
House	Bronze
Impeller	Bronze
Shaft	Duplex steel
Ejector/feed water pump	
House	Bronze
Impeller	Aluminium bronze
Optional impeller	Stainless steel
Shaft	Stainless steel

Piping

Seawater	Duplex steel
Brine	Bronze
Distillate	Stainless steel

10. Feed water treatment pump

Dosing head and connectors	Polypropylene
Membrane	PTFE coated
Seals	EPDM
Valve balls	Ceramics

11. Dosing tank	Polyethylene
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Electrical data

Main supply voltage:

- 50 Hz : 3 x 220–240 V / 3 x 380–415 V / 3 x 600–690 V
- 60 Hz : 3 x 220 V / 3 x 440–480 V / 3 x 690 V

Control voltage:

- 50 or 60 Hz : 100 / 110 / 115 / 230 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

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