Alfa Laval AQUA Blue E1 C-type

Single Stage Fresh Water Generator

Introduction

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

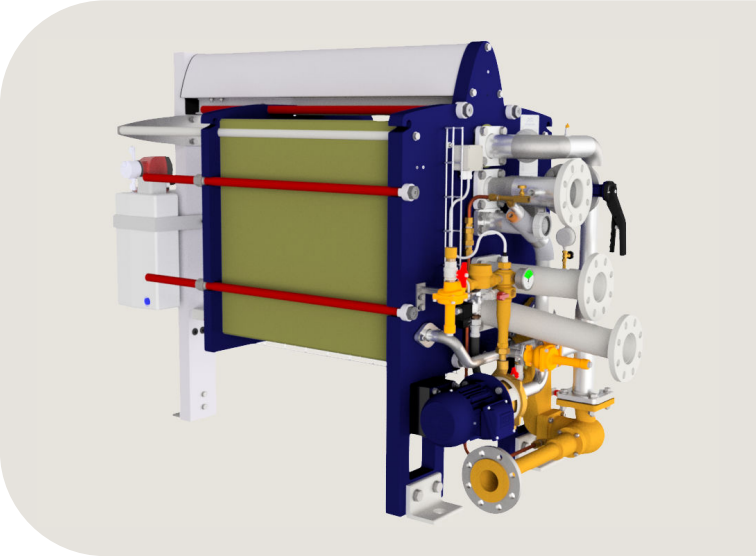
Benefits

- Glue free gaskets
- Simple and compact installation
- Easy operation and maintenance
- High quality fresh water
- Easy to fit and upgrade

Standard design

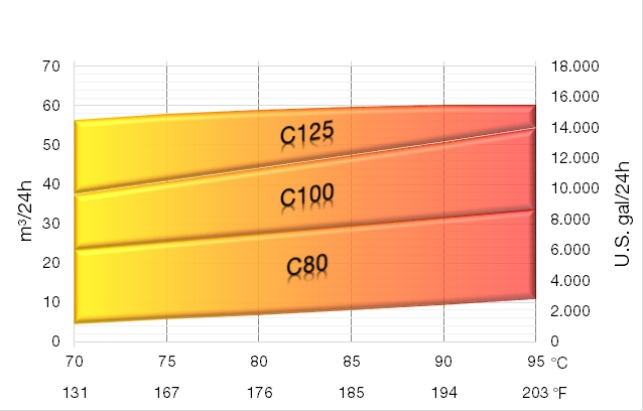
The AQUA Blue E1 C-type freshwater generator consists of

- Titanium plate pack suspended within a frame
- Condenser cooling, ejector and feed water system
- Hot water system
- Freshwater system with a pump and a control sensor that ensures a stable production of high quality fresh water
- Steam injection system for steam or hot water operation (if specified)
- Control panel with motor starters and salinometer
- Ejector pump with electric motor
- Feed water treatment equipment
- Cleaning In Place (CIP) connections



Capacity range

The AQUA Blue E1 C-type series covers a capacity range of 2–60 m^3/24h (528–15850 U.S. gal/24h), depending on the heating medium and cooling water temperatures. An AQUA Blue E1 C-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)

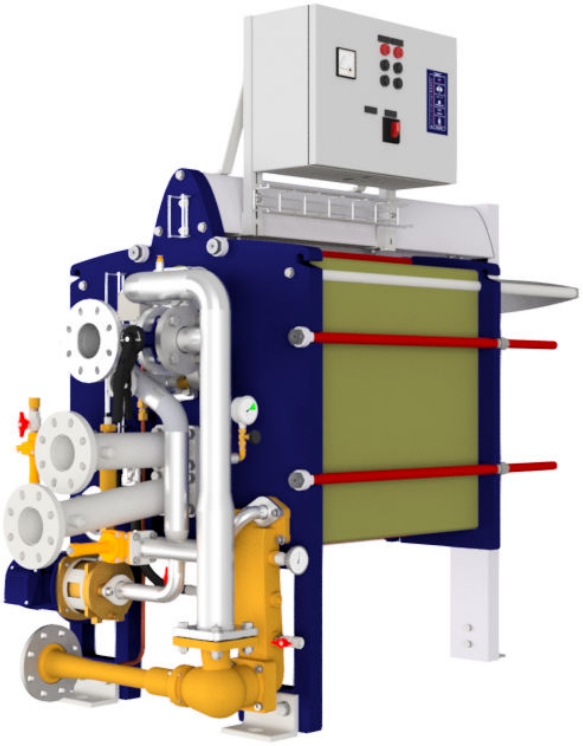


Options

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

Optional design

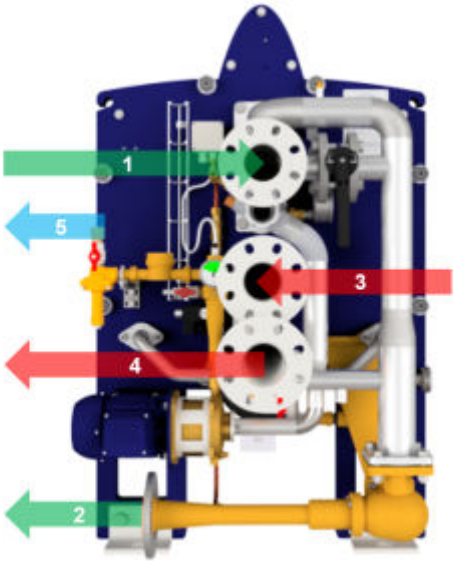
- Fresh water outlet system with bypass
- Built-on control panel
- Built-on feed water treatment equipment
- Root valves for pressure gauges
- Manometer set for ejector and hot water pumps
- Filling line for anti-scale dosing unit
- Counter flanges
- Plate pack protection sheet
- Distance indicators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

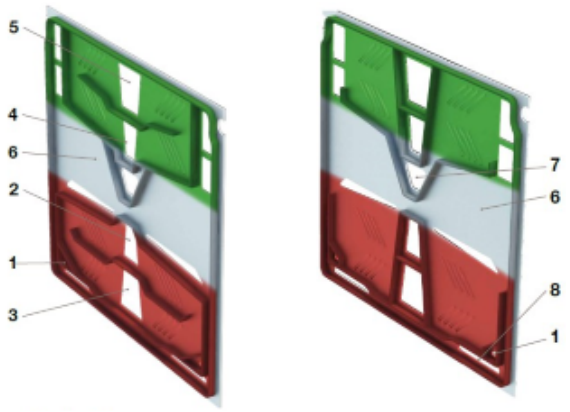
Working principle



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

The AQUA Blue E1 C-type 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**

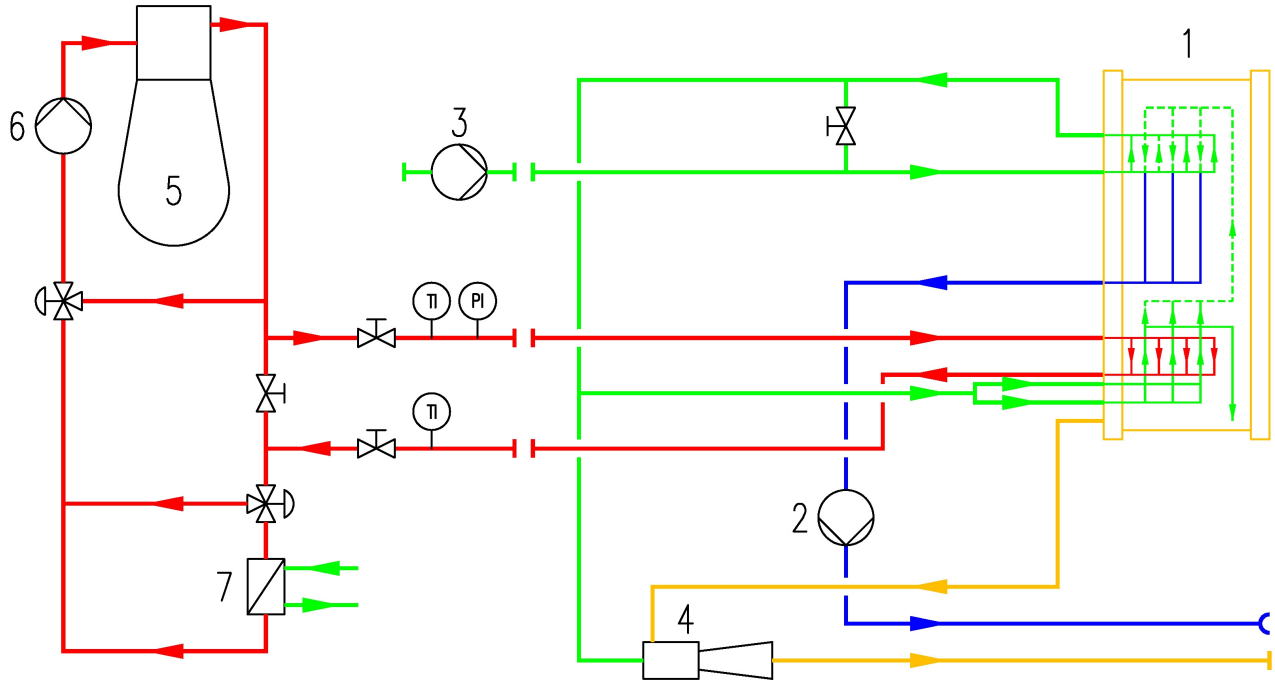


Condensation (Green)	Separation (Grey)	Evaporation (Red)
1. Seawater feed	4. Seawater cooling in	7. Fresh water out
2. Heating medium in	5. Seawater cooling out	8. Brine out
3. Heating medium out	6. Evaporated steam	

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.

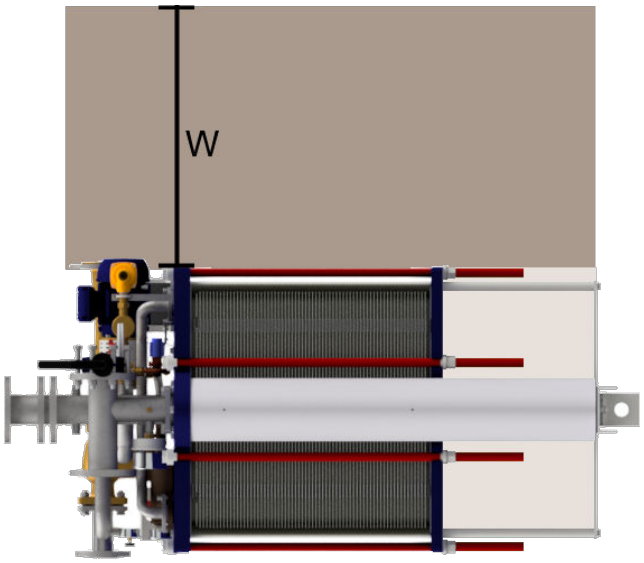
Installation

AQUA Blue E1 C-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. 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 installed separately and connected to its own seawater intake. The fresh water produced is pumped into the storage tank by a built-in freshwater pump. A control panel, which incorporates motor starters and a salinometer, supplies electrical power to the ejector pump and freshwater pump, as well as control voltage to the salinometer and dump valve.



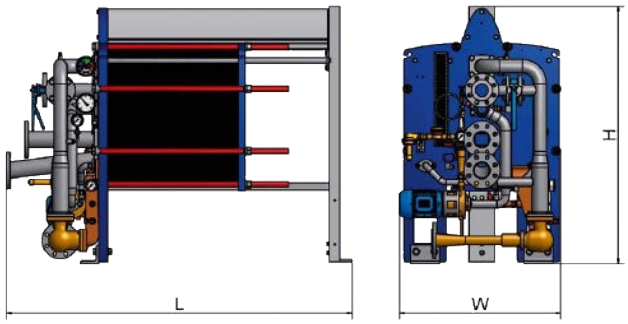
1. Freshwater generator	3. Ejector pump	5. Engine	7. Central cooler
2. Freshwater pump	4. Brine/air ejector	6. Jacket water pump	

Not only does the AQUA Blue E1 C-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.



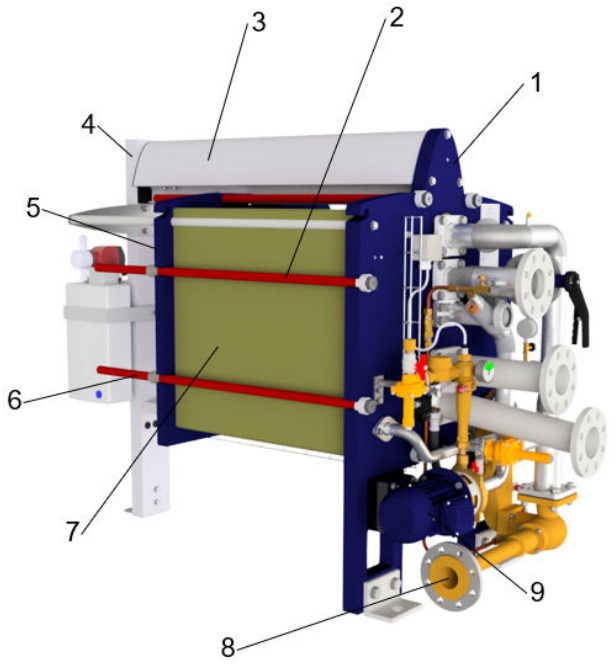
Recommended service area
W: 600 mm (23.62 in)

Dimensions



AQUA Blue E1 C-type		C80	C100	C125
Length (L)	mm	1092–1692	1692–1892	1892–2292
	in	43.0–66.6	66.6–74.5	74.5–90.2
Width (W)	mm	876	876–911	911
	in	34.49	34.49–35.87	35.87
Height (H)	mm	1395	1395	1395
	in	54.92	54.92	54.92
Weight (empty)	kg	699–931	892–1038	971–1171
	lbs	1541–2053	1967–2288	2141–2582

Material data



1. Frame plate	C3 painted steel
2. Tightening bolts	Galvanized steel
3. Carrying bar	Aluminium
4. Support column	Aluminium
5. Pressure plate	C3 painted steel
6. Protection tube	MDPE
7. Utility and process plates	Titanium
8. Ejector	
Housing	Bronze
Diffuser	Bronze
Nozzles one	Duplex steel
Nozzle two	Bronze
9. 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	Bronze
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 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

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