Alfa Laval AQUA Blue E2 C-type

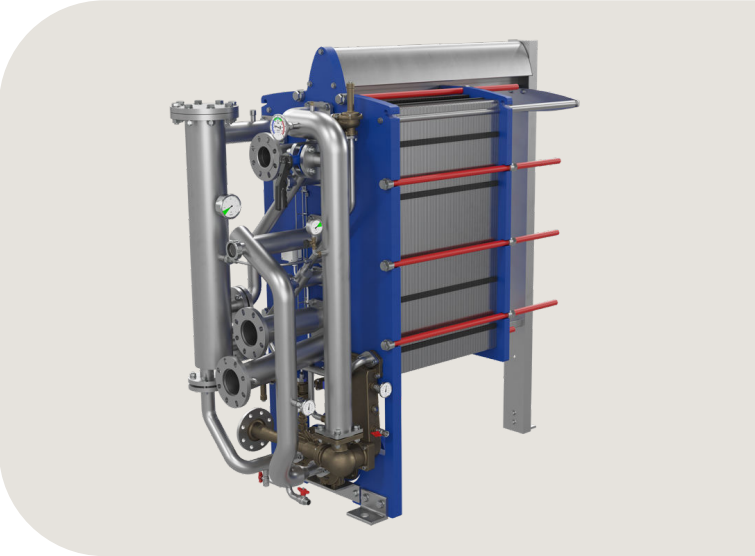
Two Stage Fresh Water Generator

Introduction

Alfa Laval provides a range of solutions for converting seawater into fresh water. The AQUA Blue E2 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 E2 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 E2 C-type is based on a unique 3-in-1 plate technology in two stages. This enables desalination in a single plate pack without an outer shell. Two times evaporation, separation and condensation all occur within the titanium plate pack with glue free gaskets.



Application

The AQUA Blue E2 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

- High thermal and electrical efficiency
- Low hot water and seawater flow
- Simple and compact installation
- Easy operation and maintenance
- High quality fresh water/distillate

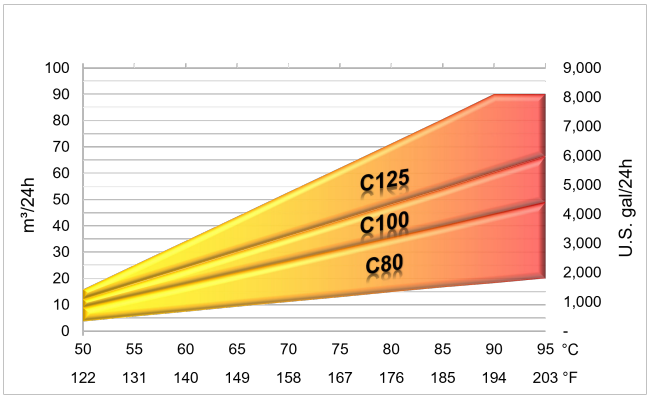
Standard design

The AQUA Blue E2 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 E2 C-type series covers a capacity range of 18–90 m^3/24h (4,755–23,776 U.S. gal/24h), depending on the heating medium and cooling water temperatures. An AQUA Blue E2 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)

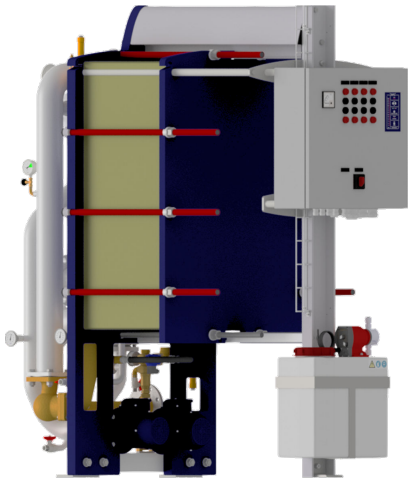


Options

Using numerous predesigned standard options, Alfa Laval can tailor-make almost any freshwater generation solution with the AQUA Blue E2 C-type. Some of the options can be seen below, but there are others as well.

Optional design

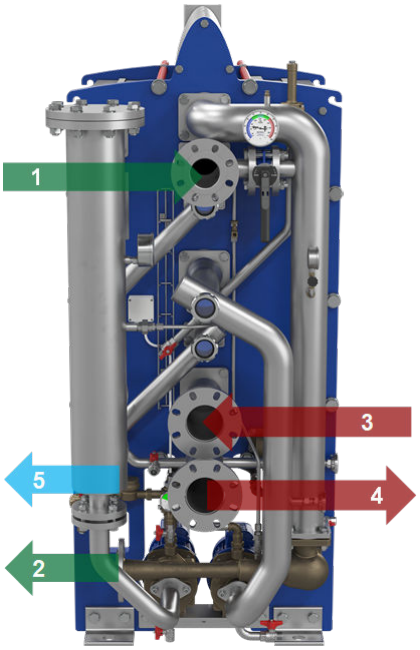
- Fresh water outlet system with bypass
- Built-on control panel
- Built-on feed water treatment equipment
- Root valves for pressure gauges
- Manometer set for ejector and hot water pumps
- Filling line for anti-scale dosing unit
- Counter flanges
- Plate pack protection sheets
- Distance indicators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

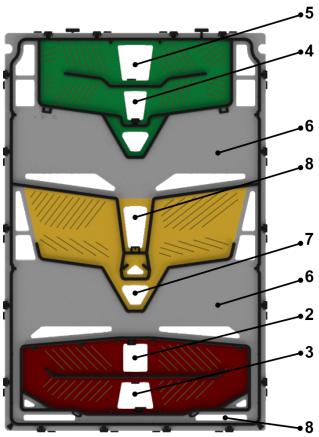
Working principle



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

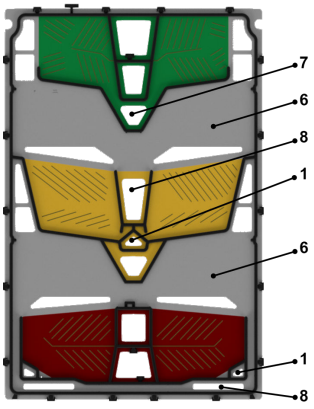
The AQUA Blue E2 C-type is heated by hot water, which enters the lower evaporator, where it heats and evaporates a portion of the feedwater. The steam is condensed in the middle section, where the energy is reused to heat and partly evaporate feedwater. The feedwater is seawater, which is preheated by 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



Green: Cooling
Yellow: Condensation
Red: Heating
Grey: Separation

Process plate



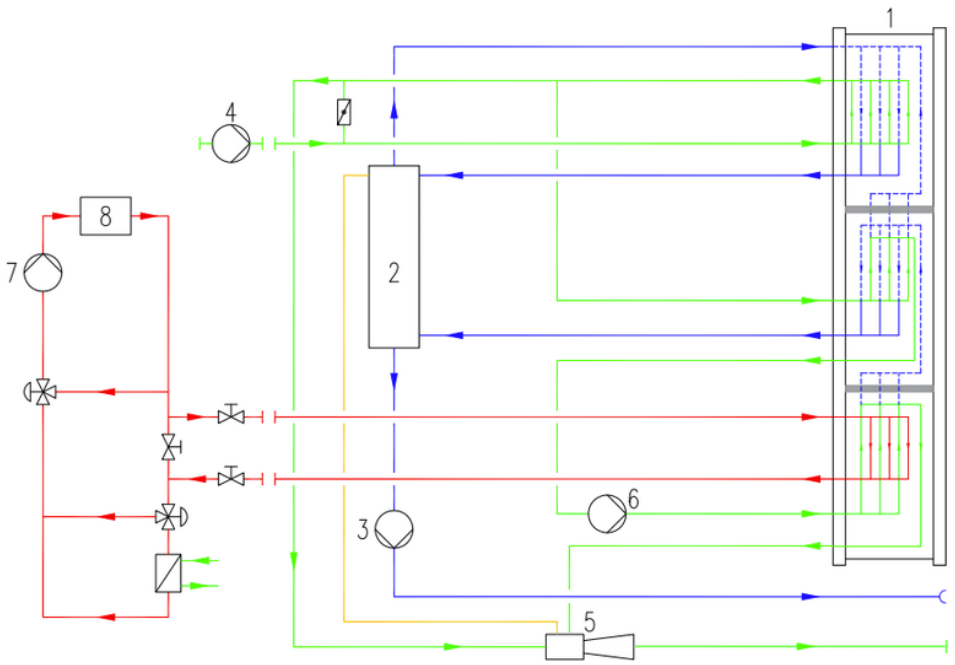
Green: Condensation
Yellow: Evaporation
Red: Evaporation
Grey: Separation

1. Seawater feed
2. Heating medium in
3. Heating medium out
4. Seawater cooling in
5. Seawater cooling out
6. Evaporated steam
7. Distillate out
8. Brine out

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

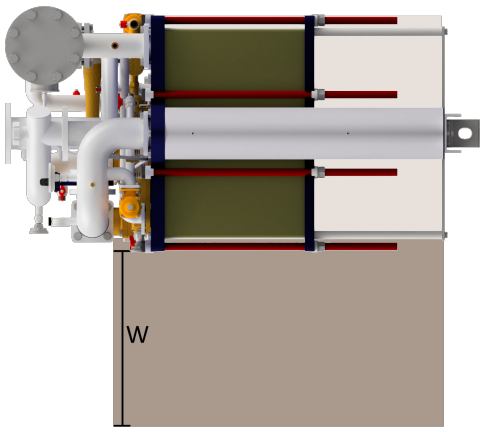
AQUA Blue E2 C-type is easily installed. Since there is limited need for service area, the installation can be highly compact. The heating medium is hot water, such as jacket water from the engine, or steam. The condenser coolant is taken from the ship's main cooling system, to which it is also returned. An ejector/brine 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/brine pump, freshwater pump and dosing pump, and control voltage to the salinometer and dump valve.



1. Freshwater generator	3. Freshwater pump	5. Brine/air ejector	7. Jacket water pump
2. Flashpot	4. Ejector pump	6. Brine pump	8. Engine

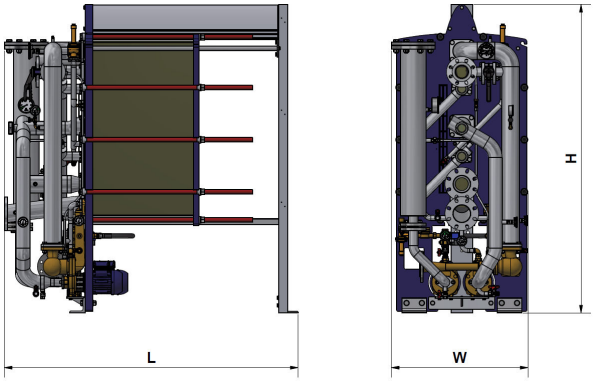
Service area

Not only does the AQUA Blue E2 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.



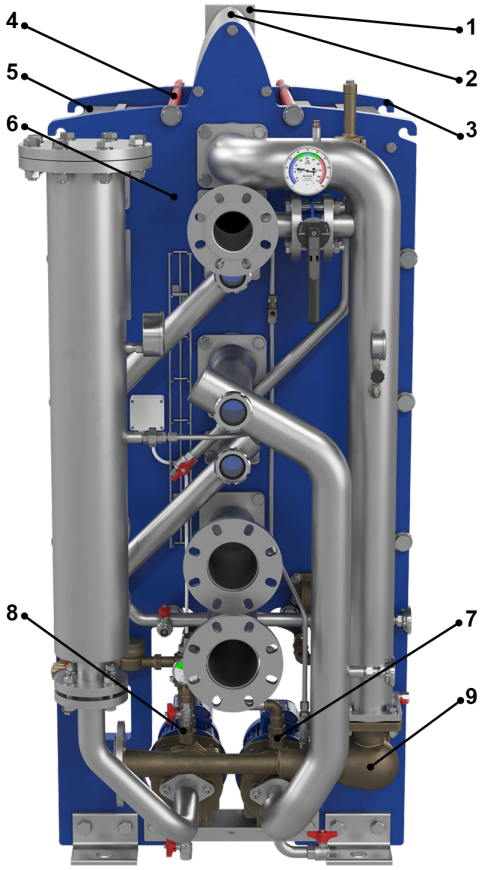
Recommended service area
W: 600 mm (23.62 in)

Dimensions



AQUA Blue E2 C-type		C80	C100	C125
Length (L)	mm	1514–1714	1914	2314
	in	59.6–67.5	75.4	91.1
Width (W)	mm	890	917	1078
	in	35.1	36.1	42.4
Height (H)	mm	2010	2010	2010
	in	79.2	79.2	79.2
Weight (empty)	kg	1288–1350	1438	1674
	lbs	2840–2976	3170	3691

Material data



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

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

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.

This document and its contents are subject to copyrights and other intellectual property rights owned by Alfa Laval AB (publ) or any of its affiliates (jointly “Alfa Laval”). No part of this document may be copied, re-produced or transmitted in any form or by any means, or for any purpose, without Alfa Laval’s prior express written permission. Information and services provided in this document are made as a benefit and service to the user, and no representations or warranties are made about the accuracy or suitability of this information and these services for any purpose. All rights are reserved.

© Alfa Laval AB

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com