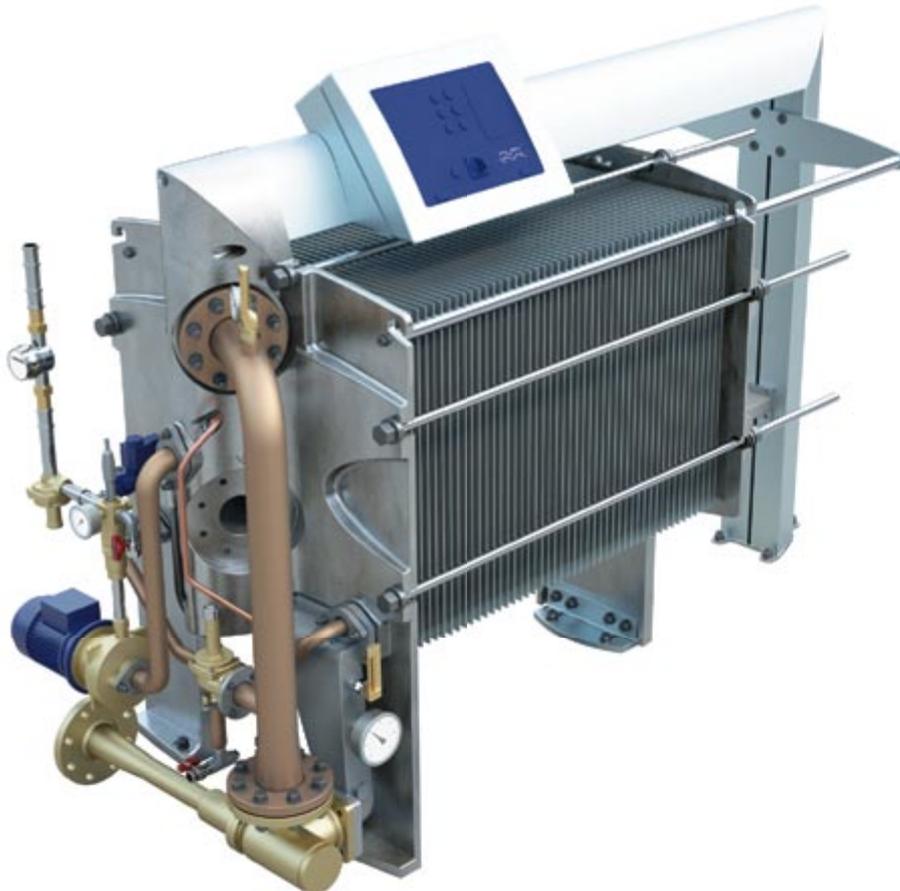




# AQUA

## Titanium-plate freshwater generator



### The AQUA freshwater generator

The AQUA freshwater generator is a major advance based on proven Alfa Laval expertise. AQUA's optimized process cuts seawater needs in half, which minimizes pipework and allows the installation of smaller seawater pumps. This in turn reduces installation costs, fuel consumption and CO<sub>2</sub> emissions.

AQUA makes use of 3-in-1 plate technology, which enables desalination in a single plate pack with one type of titanium plate. Since the plate pack also contains the process vacuum, AQUA has no outer shell and is smaller than other freshwater generators. The plate pack slides open for easy access to the interior without an additional service area.

The use of corrosion- and erosion-resistant titanium, combined with an optimized process that inhibits natural scaling, ensures that AQUA needs little maintenance. The system has

been fully tested both on and off shore, and is designed to last the lifetime of the ship.

### Application

AQUA uses vacuum distillation to convert seawater into high-quality fresh water for domestic and process utilization. By providing a constant supply of low-salinity water and continuously controlling the water quality, it eliminates the need for bunker water.

AQUA is designed for automatic operation in periodically unmanned engine rooms and other automated operations. It is suitable for installation on ships and rigs, as well as in remote onshore locations.

Jacket water, steam injection or a Hot Water Loop can all be used as heating media.

## Features and benefits

- *Half the seawater flow.*

AQUA requires only half the seawater needed by other freshwater generators, which means smaller seawater pumps can be used. Optimized distribution prevents dry spots and inhibits the natural scaling process.

- *Lower costs and emissions.*

The reduction in seawater pumping needs has a corresponding effect on the consumption of electrical energy. Less fuel has to be burned, which reduces both operating costs and CO<sub>2</sub> emissions.

- *3-in-1 plate technology.*

AQUA incorporates the evaporation, separation and condensation processes into a single type of titanium plate. Desalination is handled within a single plate pack that also contains the process vacuum. No outer shell is necessary.

- *Simple, compact installation.*

With no outer shell and no additional service area, AQUA has a minimal weight and footprint. Assembly can be handled on site and installation is simplified by the ability to use smaller seawater pumps and pipes. Since AQUA is not sensitive to roll and pitch, it can also be installed in any direction.

- *Easy operation and maintenance.*

AQUA offers start-and-forget operation, which saves time for the crew. Maintenance intervals are long and the plate pack slides open for easy access to the interior.

- *Proven technology.*

AQUA has been thoroughly tested in full scale, both in Alfa Laval's thermal laboratory and onboard vessels at sea. Roll and pitch tests have been performed to ensure that AQUA can be installed in any direction.

- *Long product lifetime.*

High-grade materials that resist corrosion and erosion, including titanium for the plates and other wetted parts, ensure that AQUA will last as long as the ship.

- *Low-salinity water.*

The fresh water supplied by AQUA has a lower content of salt and other dissolved solids than that supplied by other freshwater generators. It can be used directly by the steam boilers.

- *Continuous quality control.*

AQUA's salinometer-equipped control system continuously monitors the quality of the outgoing fresh water.

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## Basic equipment

The AQUA freshwater generator consists of a single plate pack containing a flexible number of titanium process plates. These plates are suspended within a frame, which comprises a carrying bar, frame plate and pressure plate. Evaporation, separation and condensation all occur within the same plate pack.

Among the plate pack features are gaskets with rubber flaps that indicate correct plate assembly, as well as distance pipes that ensure proper plate alignment and correct tightening.

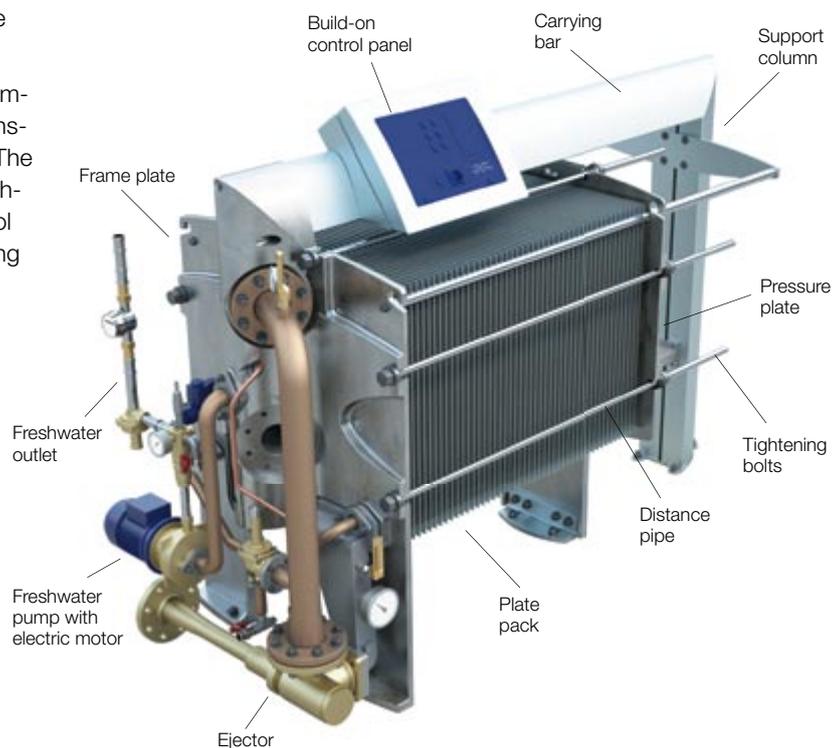
Connected to the plate pack is a combined system for feed water, condenser cooling water and ejector water. The freshwater system consists of a freshwater pump and a freshwater control sensor that ensures a stable outgoing flow.

## Additional equipment

- Combined cooling and ejector water pump with electric motor
- Control panel with motor starters and salinometer
- Anti-scale chemical dosing unit for feed water

## Optional equipment

- Steam heating system with direct steam injection
- Equipment for steam boosting and hot water loop system
- Extended control panel with motor starters and salinometer
- Freshwater pH adjustment equipment
- Freshwater disinfection equipment
- Connections according to DIN, JIS and ANSI standards
- Cleaning-in-Place (CIP) unit

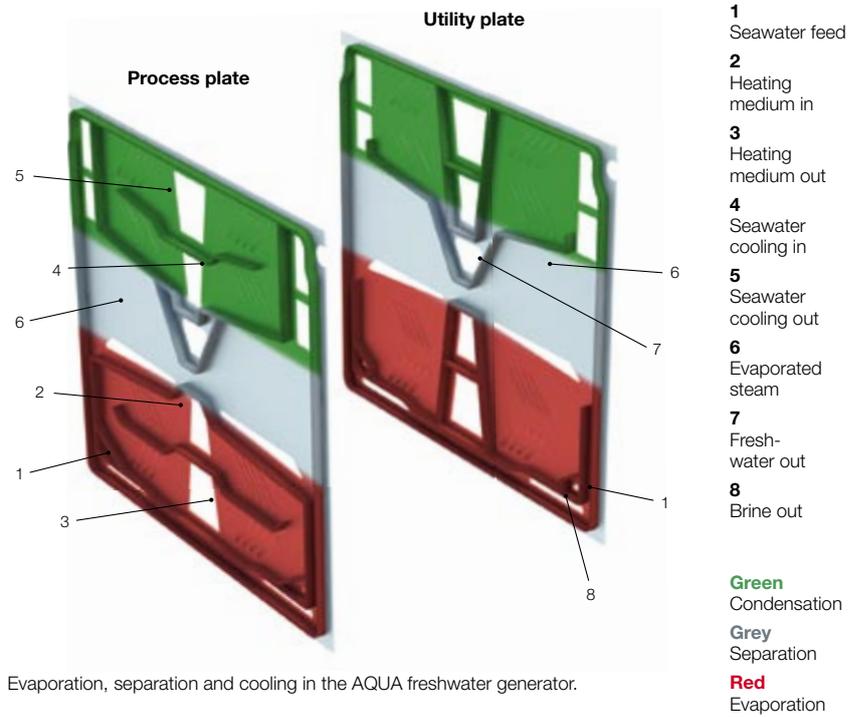


### Operating principle

AQUA's flow of feed water is taken from the flow of seawater coolant. Feed water enters the lower (evaporator) section of the plate pack, in which the plates are warmed by the heating medium. Here the water is evaporated at around 40-60°C in a vacuum of 85-95%, which is maintained by the brine/air ejector.

The vapour produced rises between the plates into the middle (separator) section of the plate pack, where any droplets of entrained seawater are removed. Gravity causes these droplets to fall back into the brine sump at the bottom of the freshwater generator.

Only clean freshwater vapour reaches the top (condenser) section of the plate pack, which is cooled by a flow of seawater. Here the vapour is condensed into fresh water, which is pumped out of the freshwater generator by the freshwater pump.



Evaporation, separation and cooling in the AQUA freshwater generator.

### Installation

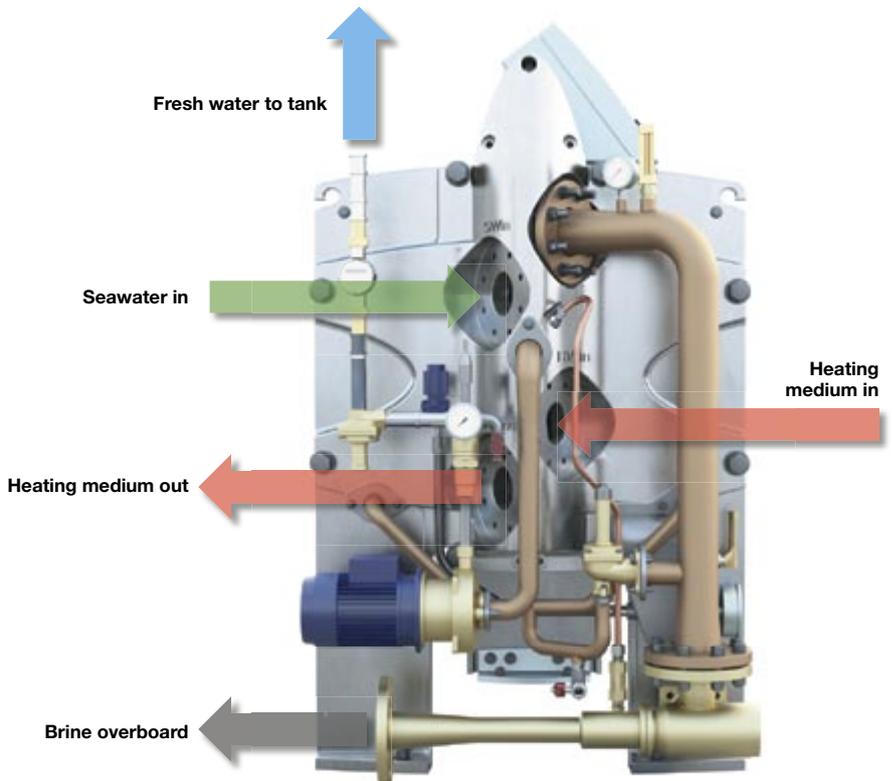
AQUA is easily installed on ships and rigs, as well as in remote onshore locations. Since there is no need for an extra service area, the installation is highly compact. All maintenance areas can be accessed from within the AQUA footprint (see green diagram).

The heating medium is either engine jacket cooling water or a closed circuit heated by steam.

An ejector pump supplies seawater coolant for the condenser, feed water for evaporation and water for the combined brine/air ejector. This pump is separately installed 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 and freshwater pumps, as well as control voltage to the salinometer and dump valve.



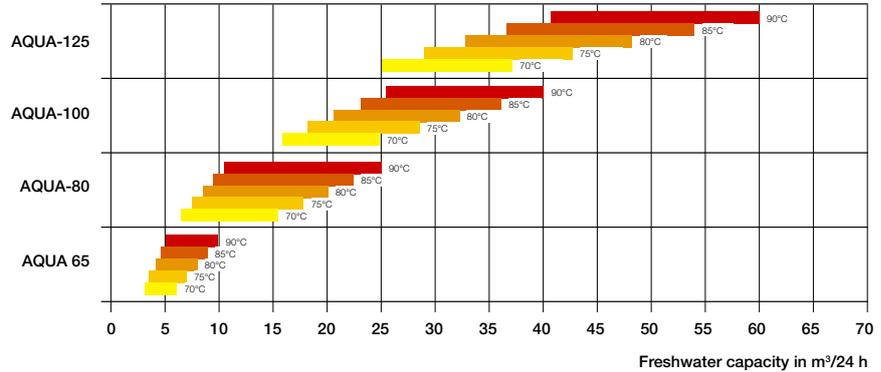
Dark green = Equipment  
Light green = Footprint

**Operations**

- AQUA is designed for easy maintenance. If Alfa Laval recommendations are followed, only a few service inspections are needed.
- Connections for Cleaning-in-Place (CIP) are available.
- Standard spare part kits are available.
- The Installation Manual provides detailed information regarding correct installation in electronic or printed format:
  - System description
  - Installation
  - Technical data and drawings
- The System Manual provides detailed information regarding operation and maintenance in electronic or printed format:
  - System description
  - Operating instructions
  - Chemical dosing of anti-scaling chemicals
  - Troubleshooting
  - Maintenance of major components
  - Spare parts drawings
  - Technical data and drawings
- Commissioning and technical services are available from all Alfa Laval offices, including installation assistance and advice on operation and maintenance.
- Training in all aspects of freshwater generation can be provided by Alfa Laval service engineers.
- Spares and maintenance can be provided by Alfa Laval Service Centres. Details are available from local Alfa Laval offices.

**Capacity range**

The AQUA series covers a capacity range from 3.1 to 60 m<sup>3</sup>/24 h, depending on the heating medium and cooling water temperatures. An AQUA freshwater generator can be dimensioned to suit any jacket water temperature from 55-95°C at any cooling water temperature.



Capacities at different heating medium temperatures and nominal flow for a minimum and maximum number of plates at 32°C seawater temperature.

**AQUA dimensions**

| Size     | L    |      | W   |      | H    |      | Weight |      |
|----------|------|------|-----|------|------|------|--------|------|
|          | mm   | in   | mm  | in   | mm   | in   | kg     | lbs  |
| AQUA-65  | 1160 | 45.7 | 850 | 33.5 | 1385 | 54.5 | 700    | 1543 |
| AQUA-80  | 1365 | 53.7 | 850 | 33.5 | 1385 | 54.5 | 760    | 1676 |
| AQUA-100 | 1765 | 69.5 | 850 | 33.5 | 1385 | 54.5 | 820    | 1808 |
| AQUA-125 | 2165 | 85.2 | 850 | 33.5 | 1385 | 54.5 | 910    | 2006 |

**Technical data**

|                     |                            |
|---------------------|----------------------------|
| Main supply voltage | 3-phase, 220 V up to 690 V |
| Control voltage     | 1-phase, 100/110/115/230 V |
| Frequency           | 50 or 60 Hz                |

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 Alfa Laval reserves the right to change specifications without prior notification.

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**How to contact Alfa Laval**

Contact details for all countries are continually updated on our web site. Please visit [www.alfalaval.com/marine](http://www.alfalaval.com/marine) to access the information direct.