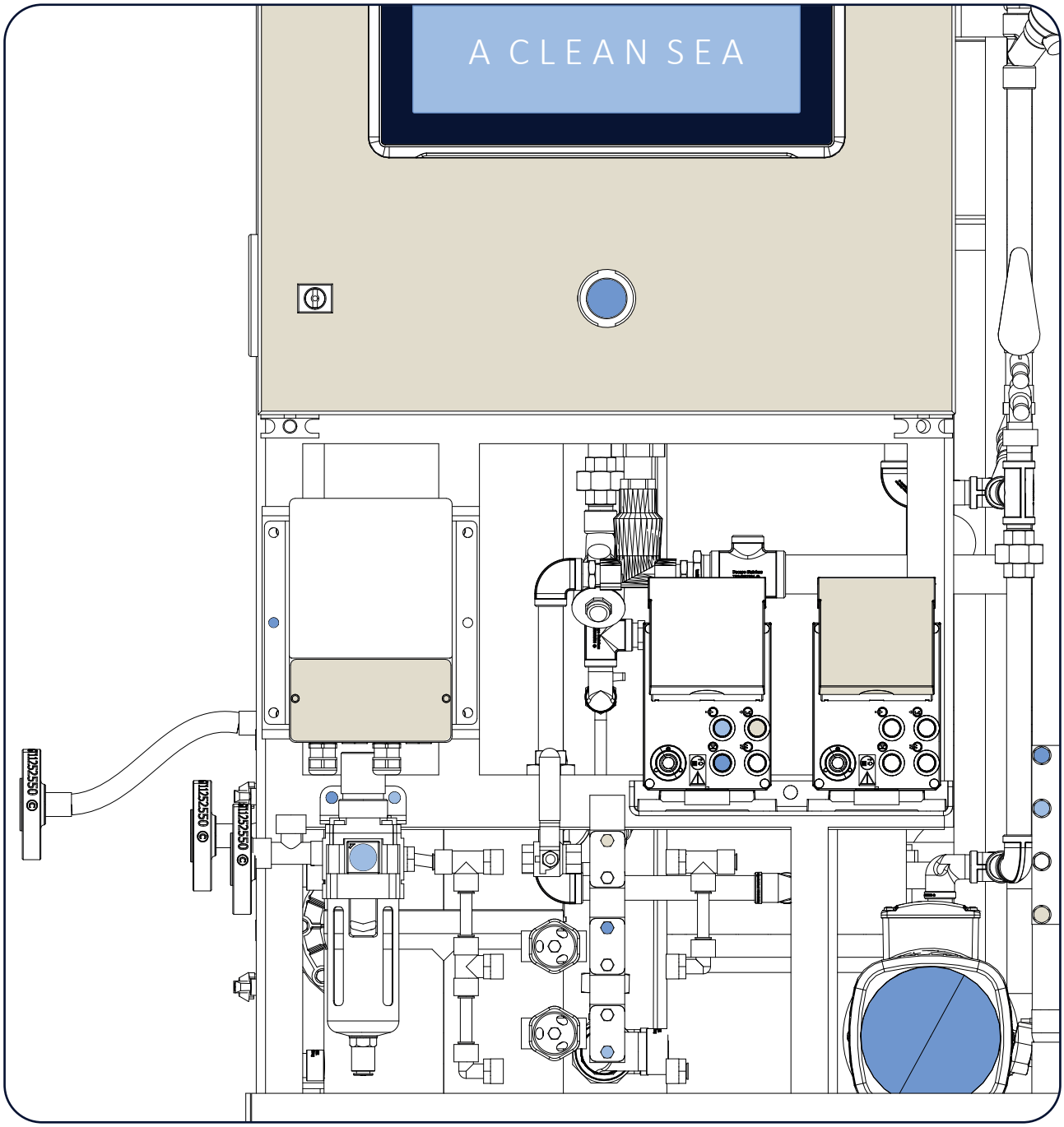
MARINFLOC®
A CLEAN SEA

TECHNICAL SPECIFICATION

Marinfloc CD unit

Bilge Water Separator



Introduction

The CD unit, trusted by over 700 vessels worldwide, is a state-of-the-art dissolved air flotation and flocculation system available in capacities ranging from 0.25 to 5.0 m³/h. It consistently treats bilge water to levels below 5 ppm. Equipped with an intuitive HMI screen, it empowers the crew with the right tools to tackle all variations of bilge water. Operators can easily adjust the dosage to meet varying bilge water compositions. Designed specifically for onboard conditions, not only does the CD unit comply with MARPOL requirement MEPC.107(49), but it also boasts the lowest OPEX in the market.

Primary advantages

- Utilizes flocculation technology, eliminating the need for cartridge filters and centrifuges.
- Adaptable to treat the specific composition of a ship's bilge water.
- Type-approved to 5 ppm.
- Easy to install, easy to retrofit.
- Designed for low energy consumption, contributing to reduced carbon footprints.
- Touchscreen control cabinet available for smart functions and online connectivity.
- Offers a low operational cost, ensuring value for money.

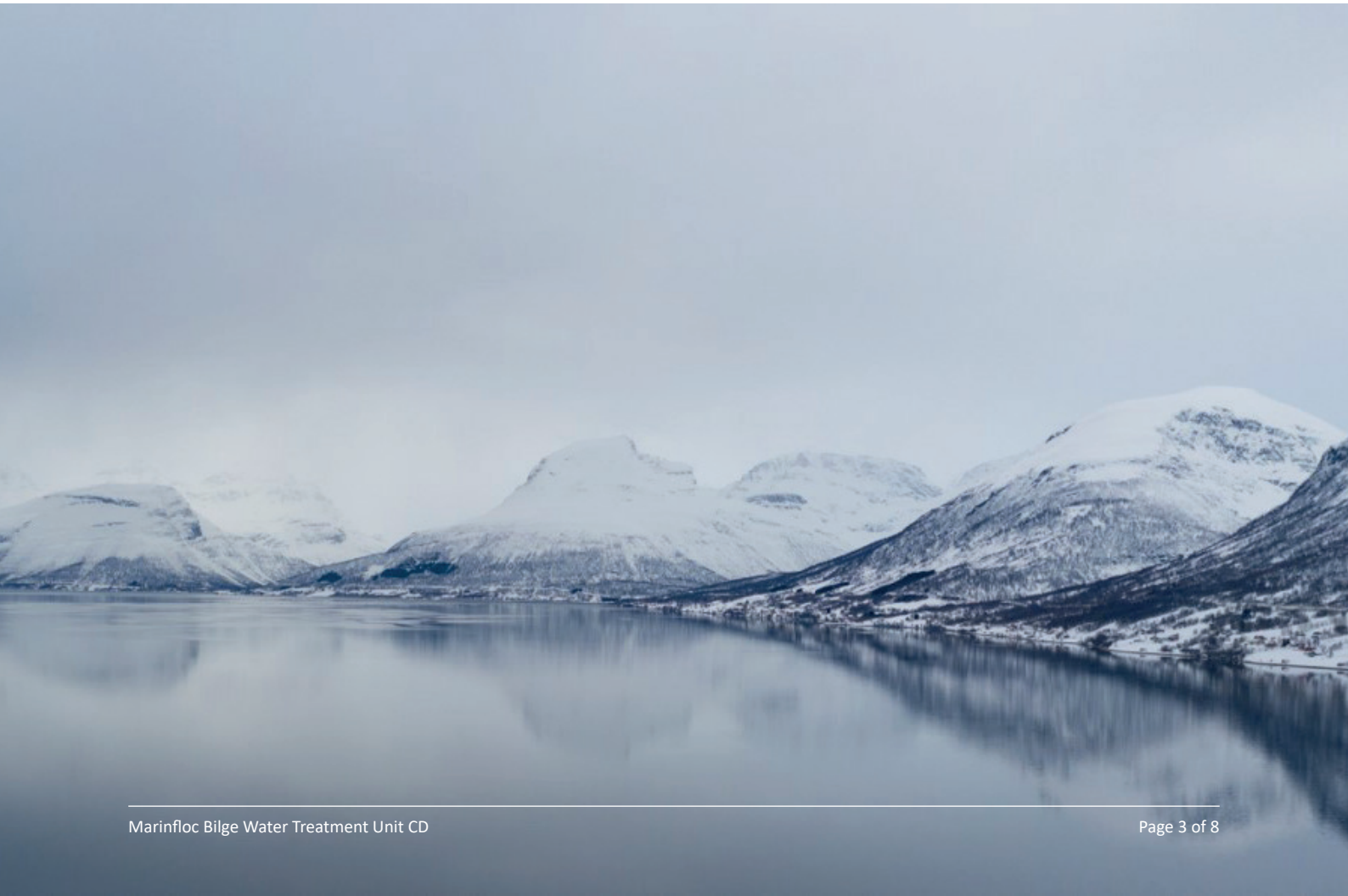
Water treatment methods

Flocculation

Flocculation is a water treatment process in which solids come together to form larger clusters, or flocs, which are then removed from the water. This process can occur naturally or with the assistance of chemical agents. It is a common method of wastewater treatment and drinking water purification. The process of flocculation is chemical in nature. It entails sequentially adding chemicals to the wastewater and allowing tiny solid particles to aggregate into a larger particle that can be separated from water. The treatment of wastewater by flocculation is done in stages. Solid particles suspended in wastewater are negatively charged. A coagulant, such as aluminum chloride, is added to the wastewater. The negatively charged solid particles suspended in the water are neutralized by the positively charged coagulant molecules. The neutralization of these particles allows them to flocculate together into a larger particle. A polymer chemical is added to the wastewater once flocs begin to form. Polymers link the flocculant from micro to macro flocculant, increasing the mass of particles clumping together. This chemical also binds the collected mass together, preventing it from dissolving even when the water is slightly agitated.

Dissolved air flotation

Dissolved air flotation (DAF) is a water treatment method that removes suspended particles such as oil or sediments from wastewaters or other liquids. The separation is accomplished by dissolving air under pressure in the water or wastewater and then releasing the air at atmospheric pressure in a flotation tank. The released air forms tiny bubbles that cling to the suspended matter, causing it to float to the surface where it can be removed. This technique is widely used in land based industrial wastewater treatment units for oil refineries, paper mills, general water treatment plants, and other industrial facilities. Water being fed to the DAF tank is dosed with a flocculant to bind the particles into bigger clusters. For the Marinfloc CD, this is achieved in stages 2 and 3.



Options and sizes

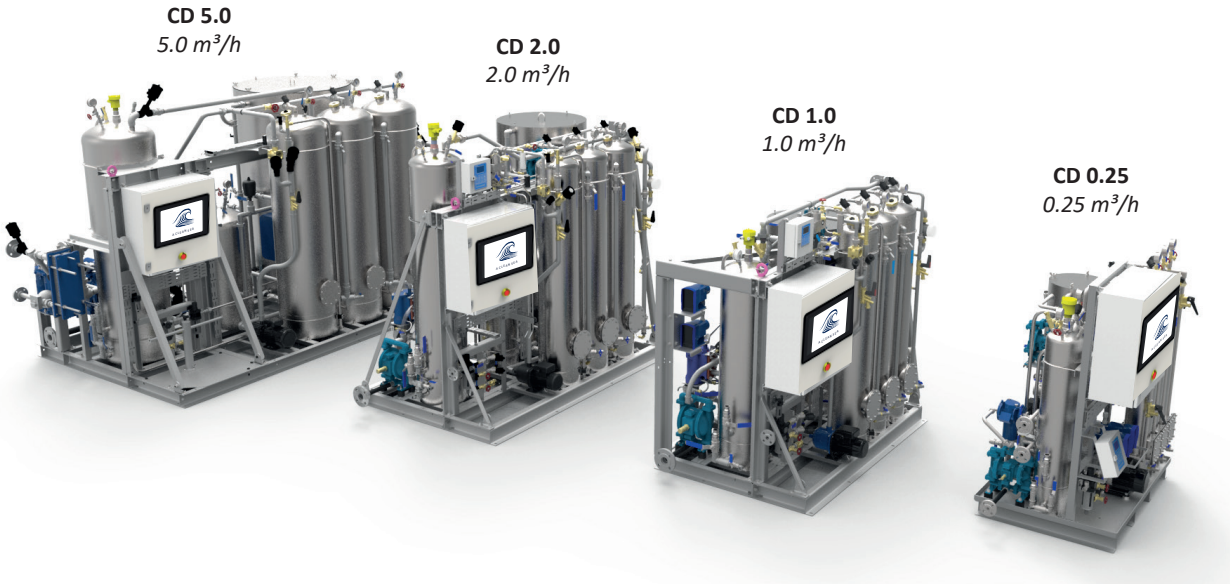
One unit or divided

The CD unit can be delivered as one unit or divided in two modules for easier retrofit installations.

Sizes

The CD unit is available in the following capacities:

- 0.25 m³/hour
- 1.0 m³/hour
- 2.0 m³/hour
- 5.0 m³/hour



Option: WhiteBox®

The Marinfloc WhiteBox® System is a fail-safe system for the overboard discharge of water. The WhiteBox® is designed so that no water with an oil content above the set limit can accidentally be pumped overboard. The oily water separator discharge pump feeds water through the WhiteBox® system. An adequate flow of water is continuously directed to the oil content meter by the differential pressure valve. The sample is measured by the oil content meter after being directed through the flow switch. The purpose of the flow switch is to secure that no bilge water can be discharged overboard without first being measured by the oil content meter. The flow through the flow meter, the oil content, the position of the three-way valve, status OCM is activated, the status of the system (on/off), the time and the ship's GPS position (optional) will be logged on the recorder and stored on an external memory card.

Operating principle

The Marinfloc system is a fully automatic bilge water cleaning system, based on flocculation. The system can handle stable chemical emulsions and was the first system approved to IMO resolution MEPC.107(49). It is also certified by U.S. Coast Guard and all major classification societies. The CD-system is type-approved in accordance with DNV 5 ppm type approval program. The drain separator's operation can be broken down into four steps:

1 Gravimetrical oil separation | 2 Aeration | 3 Flocculation & forced flotation | 4 Filtration

1. Oil separation

The feed pump (1) channels bilge water from a strainer (66) to the oil descaler (44). Utilizing gravimetrical principles, this stage effectively separates free oil from water. When oil accumulates in the top section, the oil sensor (39) activates, prompting the transfer of oil to the vessel's sludge tank.

2. Aeration

When the water level in the circulating tank reaches high level, compressed air is added to the tank to aerate the water. A pump circulates air and water to increase the surface area of the water for maximum dissolvent of air into the water. The bilge water will continuously be discharged out of the circulation tank and the feed pump will compensate accordingly.

3. Flocculation and forced flotation

Aerated water flows from the circulation tank to the flocculation tank (87). Here, the flow and dosage of flocculent chemicals are meticulously controlled. Two dosage pumps (2A, 2B), one for the flocculent chemical and the other for the Flocbooster, ensure precise chemical injection into the bilge water.
The flocculation tank, comprising three chambers, facilitates separation of floating flocks and water, with a foam layer forming on top. This foam layer is continuously drained to the sludge tank by the drain pump (9).

4. Filtration

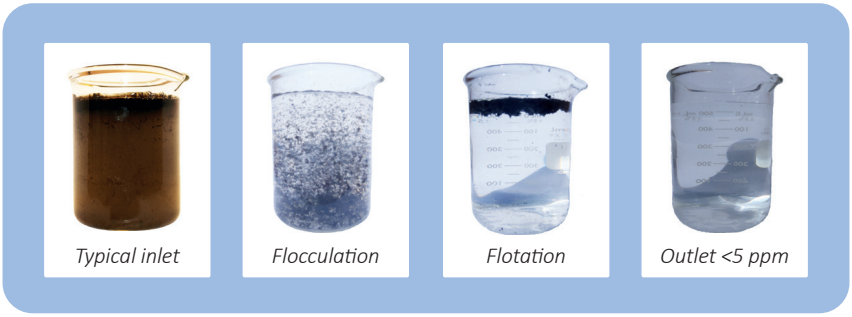
Post-flocculation, the water, potentially slightly discolored or turbid, passes through three filters to achieve an effluent quality of <15 ppm. The first filter contains an oil-absorbing mineral material, capturing any remaining oil and flocks. The subsequent filters are filled with activated carbon, removing discoloration and any residual flocks. All filters are underlaid with coarse sand to prevent clogging of the back-flush water pipe slits. These filters can be back-flushed manually or automatically using heated water. Owing to the high efficiency of the flocculation stage, the filter material has an extended lifespan and can be regenerated on-site with steam.

Oil content meter (OCM)

The oil content meter (15A) ensures compliance with environmental regulations by verifying that the water's oil content does not exceed the set limit, typically 15 or 5 ppm. The system incorporates a flow switch (96) on the sample line, which prevents discharge if the oil content meter's sample valve is closed or if there isn't sufficient flow for an accurate sample.

Temperature

The ideal process temperature is 45-55 °C. If the temperature is too low, the bilge water will not enter the flocculation tank; it will be discharged back to the bilge water holding tank until the right temperature is obtained.



Technical data

	CD 0.25	CD 1.0	CD 2.0	CD 5.0
Capacity of treated bilge water	max. 250 liters/h	max. 1 000 liters/h	max. 2 000 liters/h	max. 5 000 liters/h
Operating temperature of bilge water *	Optimal: +50 °C; Min. +40 °C; Max. +60 °C			
Operating pressure	0.25–0.40 MPa / 2.5–4.0 bar			
Test pressure	0.78 MPa / 7.8 bar			
Safety valves release	0.60 MPa / 6.0 bar			
Voltage supply	3 x 400–690V, AC, 50–60 Hz			
Electric power consumption / Fuse	1.6 kW / 10 A	2.3 kW / 10 A	2.56 kW / 10 A	4.5 kW / 10 A
IP-classification	IP 54			
General service air pressure	0.6–0.9 MPa / 6.0–9.0 bar			
General service air consumption	<2 normal liters/sec.	<5 normal liters/sec.	<9 normal liters/sec.	<23 normal liters/sec.
Technical water pressure	0.3–0.6 MPa / 3.0–6.0 bar			
Back-flushing cycle, fresh-water consumption/full cycle	approx. 60 liters	approx. 200 liters	approx. 300 liters	approx. 750 liters
Filter stages, each	20 liters/filter, EN 1.4462	65 liters/filter, EN 1.4462	100 liters/filter, EN 1.4462	250 liters/filter, EN 1.4462
Total net weight incl. filter media (dry)	430 kg	968 kg	1 475 kg	2 100 kg
Total operating weight (wet)	630 kg	1 450 kg	2 160 kg	3 960 kg
Main dimensions (WxDxH)	1200 x 800 x 1500 mm	1700 x 1100 x 1700 mm	2000 x 1250 x 2000 mm	2800 x 1800 x 2150 mm

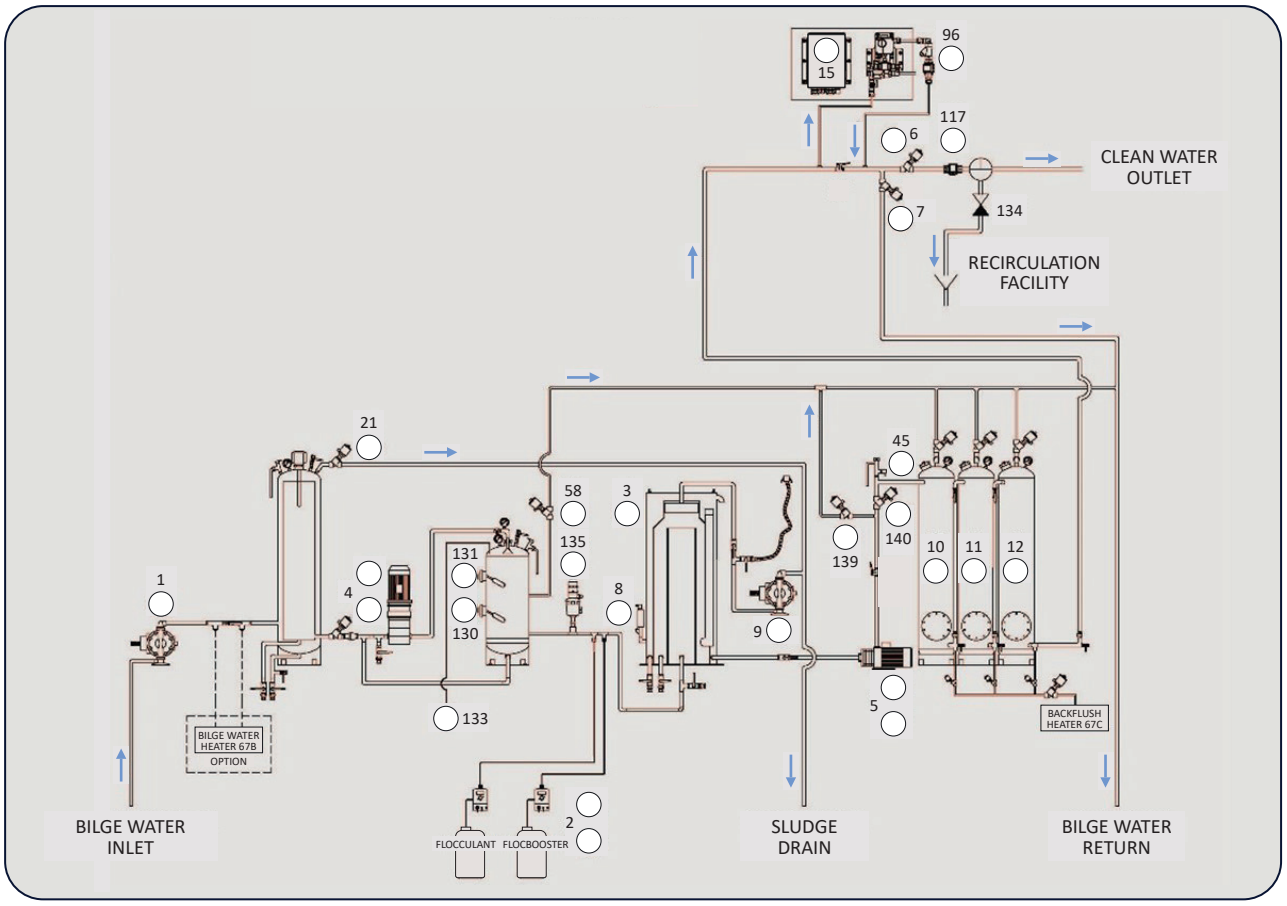
*) Disclaimer on inlet water temperature:
Bilge water must be supplied at 50–55 °C. Heating is the responsibility of the client unless otherwise agreed in our scope.

Flowchart

Pos.	Denomination
1	Feed pump
2	Dosage pumps
3	High level flocculation tank
4	Circulation pump
5	Discharge pump
6	Cleaned water outlet
7	Bilge water return
8	Low level flocculation tank

Pos.	Denomination
9	Drain pump
10	Backflush filter no. 1
11	Backflush filter no. 2
12	Backflush filter no. 3
15	Oil content meter alarm
21	Oil release
45	High filter pressure
58	Cold/hot bilge water return

Pos.	Denomination
96	Flow switch indicator
117	Excessive flow
130	Low level circulation tank
131	High level circulation tank
133	Air inlet circulation tank
135	Regulating inlet valvet
139	Recirculating valve
140	Filtering valve



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