



Peace of mind



Efficient



Competitive



Easy

www.ballast-water-treatment.com

BIO  **SEA**

BIO-UV environmental UV treatment solutions



Ballast Water



REUSE



Drinking water



Grey waters



Legionella



Pools & Spas



BIO-SEA by BIO-UV, the UV water treatment European leader

With almost 20 years of experience in ultraviolet light (UV-C) water treatment equipment, BIO-UV designs, manufactures and markets the most comprehensive range of UV water treatment systems in Europe, adapted to a large number of applications : automatic chlorine-free treatment for residential pools and spas, disinfection and dechloramination in collective swimming pools and spas, purification of fresh or salt water in aquariums, domestic and urban water purification, production of drinking water in isolated areas using photovoltaic energy, treatment of waste water which is reused or not as the case may be, disinfection of water from industrial processes and ultra-pure water, treatment of legionella, **treatment of ballast water: BIO-SEA.**

From the outset, the company has been offering its customers equipment that meets the highest quality standards.

We design and produce all our systems in our own facility in Lunel, France. That enables us to respond to the special needs of our customers, and design and build the quality into our products by mastering the many disciplines that ensure that quality.

Relying on state-of-the-art CFD design and machine tools, we produce our systems from a whole integrated process that goes along from conception to manufacture and market throughout the world.

More than 65% of the group's sales are made in export markets.

The directors' experience in the medical, water treatment and engineering equipment fields and the use of the best and most recent UV-C transmission technologies enables BIO-UV to supply the most effective and most innovative water treatment processes, meeting the requirements of its customers.

BIO-SEA is part of the BIO-UV Group.

The **ballast water treatment system BIO-SEA** combines mechanical filtration and high UV dose disinfection, without any chemical treatment, made with high marine quality components.

BIO-SEA systems are **IMO and USCG type approved.**

BIO-SEA has equipped many vessels, with reliable, innovative, modular and cost efficient solutions. BIO-SEA is able to provide, thanks to its worldwide certified Partners, systems for new building projects and turnkey solutions for retrofits projects, from **onboard study till onboard installation** (at quay, dry-dock or on voyage).

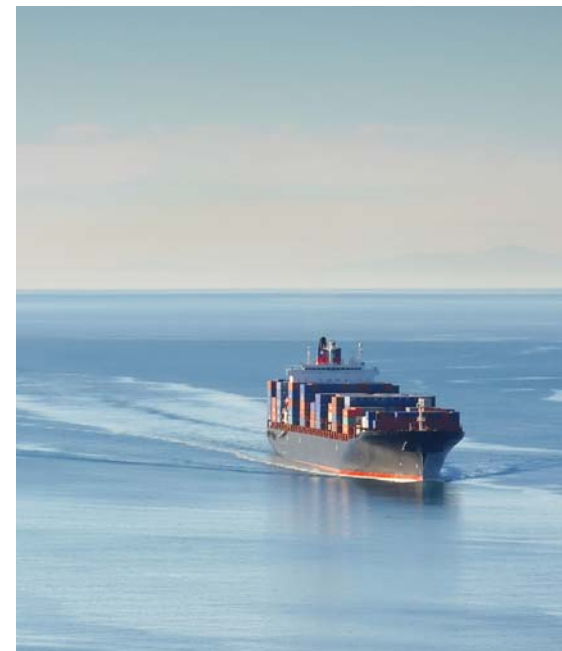


Peace of mind

Efficient

BIO-SEA systems can treat all types of waters: marine, brackish and fresh water even at low transmittance

- Well proven technology
- High UV dose
- Not impacted by water temperature, nor by salinity
- Tested in the best reknown laboratories
- Flexible solution adapted to New Built and retrofit
- Taylor-made solution
- Automatic treatment solution
- Safe: no explosive gas, no induced corrosion, chemical free
- First Class marine components
- Low maintenance
- 100% of our systems are tested in our factory before any installation



BIO-SEA systems have been tested a lot more than what regulations require : *BIO-SEA range is certified with the shortest holding time on the market !*

- **Official IMO and USCG testing on 5 ships from 60 to 2000 m³/h** on a great variety of ports and onboard significant ships around the world (Asia, Australia, Americas and Europe)
- Many land-based tests results have been highly superior to the discharge requirements (performed by DHI, NIVA, GO CONSULT, GOLDEN BEAR...)
- Thanks to its strong UV dose and high available power (max 22 kW/reactor), our system will allow, even at low transmittance and in all water qualities, a treatment in compliance with **IMO and USCG regulations**
- **BIO-SEA systems are matching both the tighter environmental requirements (0° to 55° - 95% relative humidity - IP 54) and the Classification Societies regulatory framework**

BIO-SEA range is certified with the shortest holding time on the market !



Easy aS

Plug & Play

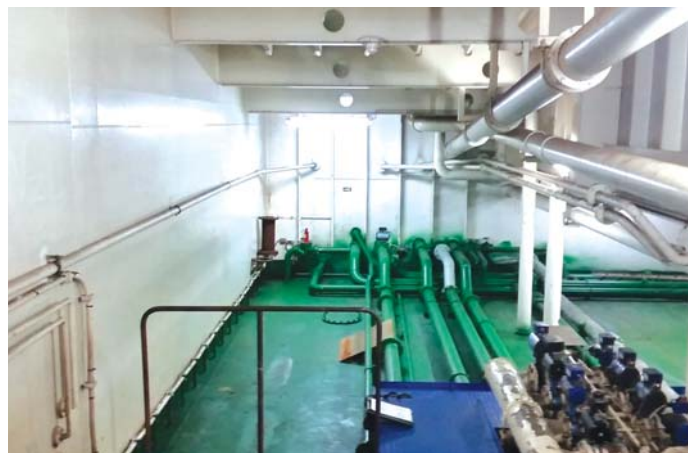
Easy to install

Modularity

- Our design allows a flexible integration and installation onboard ships whatever the available space
- Our solutions are available from loose components to a full skid version, fulfilling all technical requirements for an optimum integration, making **BIO-SEA** the most adapted solution for retrofit purpose
- Thanks to the most compact unit dedicated to small flowrate ballast pump, our **BIO-SEA** solution, even in very tiny space, will perfectly fit
- A set of clear and detailed manuals are provided in order to ease the work of engineering offices and shipyards
- Full access to our 2D and 3D library on our secured Cloud, as well as a technical assistance during ship integration phase

Case study

> Before installation



> After installation



Easy to use

Intuitive operations

- All treatment operations are fully automatic with no manual intervention thanks to several sensors (UV intensity, temperature, flowrate...)
- The **BIO-SEA** system, thanks to different available communication protocols (dry contacts, RS 485, auxiliary touch screen) can be fully integrated to all ship automation systems whatever brand or version

Easy to maintain

Thanks to the maintenance mode integrated to our systems, the operational teams will take advantage of an automated tracking while operating maintenance.

Low maintenance thanks to:

- First class marine materials: titanium, bronze aluminum and copper aluminium...
- Our water treatment engineering experience, our devices have been reliably designed
- No wiper is needed thus avoiding any scratch on the quartz sleeve in harsh environment (sand, salt, suspended particles...)
- **BIO-SEA Clean Option** provides an automatic quartz cleaning solution which avoids any manual manipulation and optimizes the system performance

Our single UV medium pressure lamp reactor reduces the maintenance time, the risk of breaking UV lamps and quartz sleeve, and reduces the quantity of spare parts required onboard.



Competitive

BIO-SEA systems are made with high quality raw materials and components from reliable and recognized suppliers all around the world.

- We are providing the system with the longest lifetime on the market
- We guarantee the availability of spare parts and/or features for all your ship's lifetime
- We help you keep your ship on operational condition, guaranteeing the highest system availability rate

OPEX

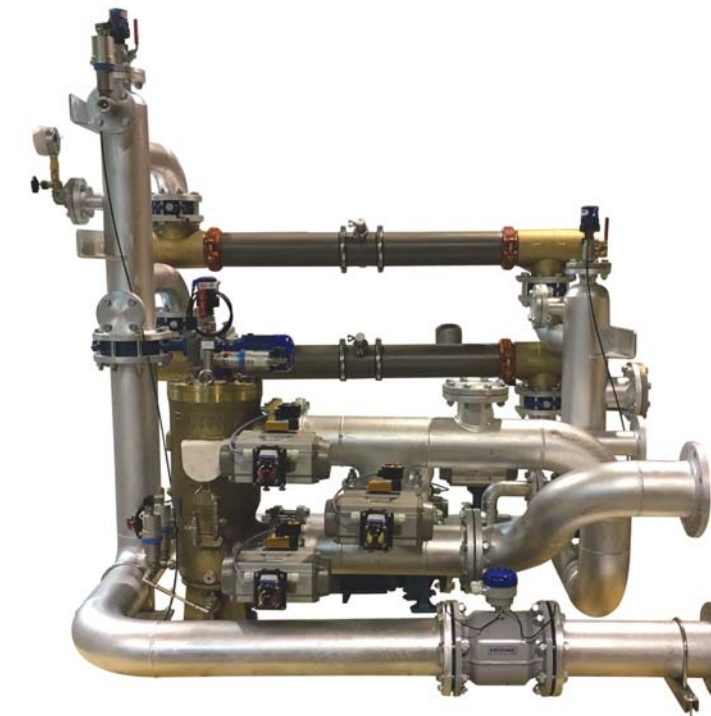
Low cost & low time for the crew = low opex

- We design our systems by aiming at reducing moving parts (and also onboard spare parts), which results in a lower maintenance rate
- Very few parts have to be changed in preventive maintenance

Optimized energy consumption:

Thanks to our UV sensors, the power is automatically adjusted (6 to 22kW/reactor) on each UV lamp in order to optimize energy consumption

BIO-SEA solutions : the optimum price/quality/efficiency ratio



Technology

BIO-SEA is a treatment system specifically designed for inactivation and elimination of organisms contained in ballast water, in order to comply with the **IMO D-2 standard and USCG regulations** for discharge of such water by vessels during their operations. The system first cleans ballast water using a screen filter, then the UV stage of the treatment takes place in a reactor without any additional chemical product nor creation of active substances. It inactivates the micro-organisms present in the water.

Filtration

Mechanical Filtration

- The objective of the filtration is to retain the suspended particles, organic or not, present in the sea water at uptake, with a 20µm screen. The filtrate is flushed out of the filter, thanks to automatic backwash, and the filtered organisms are sent back to the local water
- In standard configuration, based on our operational expertise, we include to all installations configurations a dedicated backwash pump that boosts the backwash flow, reducing clogging risk
- The backwash cycle of the filter screen does not disrupt the filtration process, allowing no significant variation of the treated flow rate



UV Reactor

Without any addition of active substance, nor creation of by-product, the UV-C light inactivates the microorganisms present in the water (bacteria, phytoplankton, zooplankton).

Designed by CFD (Computational Fluid Dynamic), the UV reactor used in the **BIO-SEA** system is a tubular- type reactor equipped with a single medium pressure UV lamp placed in a central position.

This design has been optimized considering the quality of seawater to be treated, especially its UV transmittance.

The characteristics of the **BIO-SEA** UV reactors are:

- Reactor equipped with a single medium pressure UV lamp, polychromatic, high intensity
- Protection of the UV lamp in a quartz sleeve of high purity
- Lamp driven by electronic ballast, allowing precise management of the UV lamp in order to optimize its dimming, reduce the power consumption and prolong its life
- Monitoring through UV sensor (UV intensity) on each reactor
- Modular design that facilitates the installation of UV reactors in parallel, and a better adjustment to the flow that has to be treated

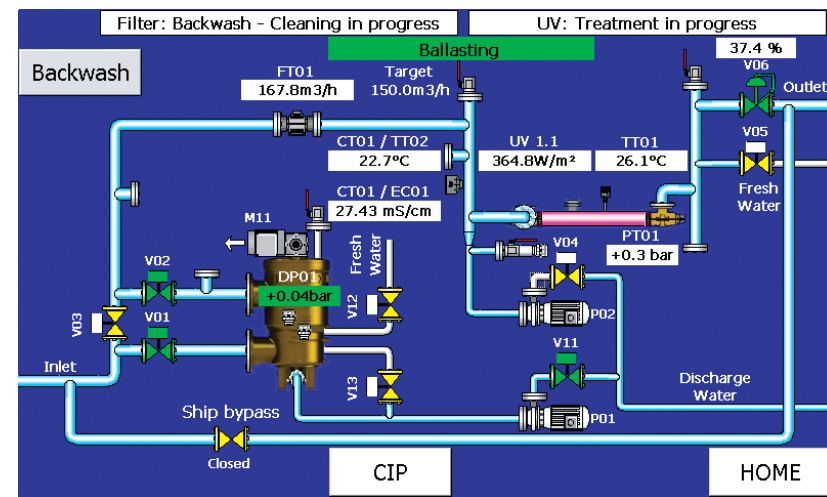


Technology

Monitoring and control

The entire operation of the **BIO-SEA** system is automated (opening and closing of valves, filter cleaning, UV intensity regulation, events recording, etc).

- Automated operation and monitoring through sensors and PLC: UV sensor (W/m^2), temperature sensor ($^{\circ}C$), flow meter (m^3/h), differential pressure transmitters (bars), (automatic valves and on **BIO-SEA** conductivity meter and flow regulating valves)
- Automatic and/or manual operation for ballasting, deballasting, stripping and cleaning
- Touch screen interface for friendly use and understanding
- Recording of operations, alarms, and measured UV intensity covering 24 months
- Operator and Administrator Modes



How it works

Process description

The **BIO-SEA** treatment system should be operated at each ballasting and deballasting operation.

- During **ballasting**, both operations of filtration and UV disinfection are carried out: the objective is to restrain the load of suspended solids and living microorganisms in the ballast tanks

The filtrate is flushed out of the filter, thanks to automatic cleaning, and the filtered organisms are sent back to the local water

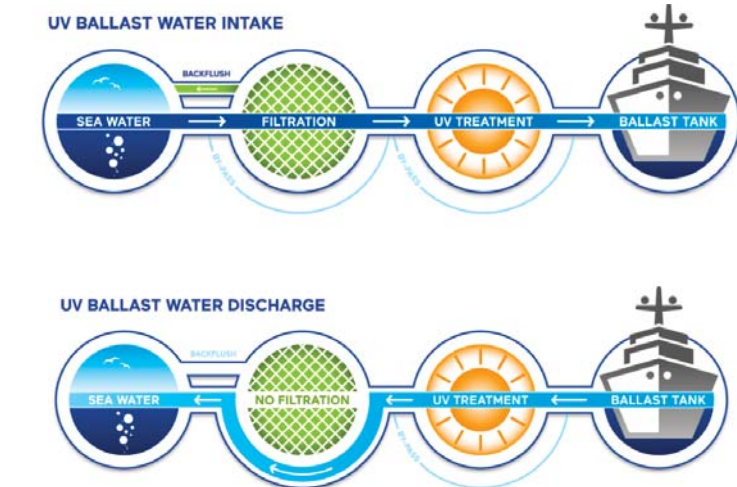
- During **deballasting** only UV disinfection is completed (the filter is by-passed).

This allows retreating the water, after retention and/or mix with other treated water volumes in the ship's ballast tanks during voyage, in order to eliminate any possible biological recontamination, and **to ensure compliance with the IMO D-2 and USCG standards for discharge of ballast water**

At the end of each operation, a cleaning cycle is triggered in order to flush and refill the complete system with fresh water

Remark: Deballasting by gravity can be possible under certain conditions.

Management of stripping operation is possible through our dedicated "stripping" mode available on our system.



Our solutions

Solutions



A complete range from 10 to 2000 m³/h

The BIO-SEA range is simple to install and use. It is adaptable, compact, competitive, economical, automatic and guaranteed chemical free.

2 BIO-SEA ranges are available :

- From **10 m³/h to 90 m³/h**, the most compact unit on the market, no additional external power cabinet, especially dedicated to **Yacht, Offshore vessel, Dredger vessel, fishery vessel...**
- From **55 m³/h to 2000 m³/h**, the most flexible unit on the market, especially dedicated to **Container vessel, general cargo vessel, RORO/ROPAX, passengers vessels...**

Our solutions are available from loose components to a full skid version, matching all technical requirements for an optimum integration, making **BIO SEA** the most adapted solution for new building and retrofit purpose installations.

BIO-SEA offers maritime operators a complete range of ballast water treatment systems and a worldwide service

Technical and practical training

A strong and unique experience with strengthened skills, here is what we offer during our training sessions to help you to master our UV Ballast Water Treatment System

- Operational training thanks to our demo systems
- Unique Online Computer Based Training
- From 1 to 10 people per session, we favour interactive courses where sharing experiences is as important as transmitting a knowledge
- Dedicated crew onboard practical training
- Vessel specific training : operation, trouble shooting, maintenance



Our range

Modular version



> BIO-SEA 150



> BIO-SEA 300



> BIO-SEA 300



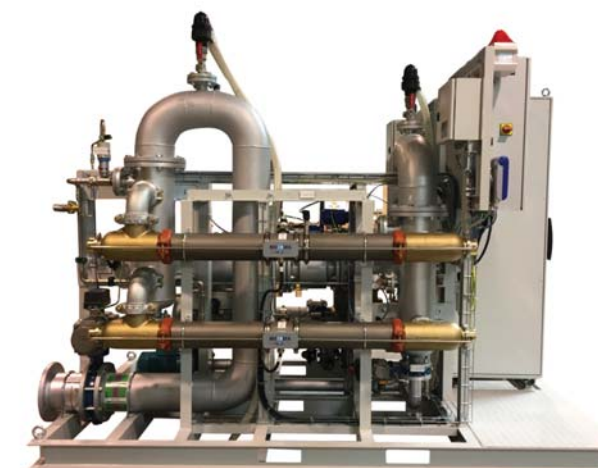
> BIO-SEA 1800

Skid version



> BIO-SEA 60

> BIO-SEA B 150



> BIO-SEA 300

> BIO-SEA 450



Partners Sales & Services partners

Turnkey Sales and Services partners

From a simple onboard visit, or a 3D laser scanning survey, to a high-level global turnkey package BIO-SEA works with a worldwide network of certified Partners.

Bring services to customers all around the world

- > Technical support through a dedicated hotline
- > Dedicated engineers with excellent skills in marine industry
- > Reliable diagnostics and customized advices
- > After sales representation and Maintenance services through certified partners
- > Mobility on all continents
- > Fast intervention and optimal services
- > Helping customers for better practice
- > Ballast Water treatment unit sustained unit on long-term basis

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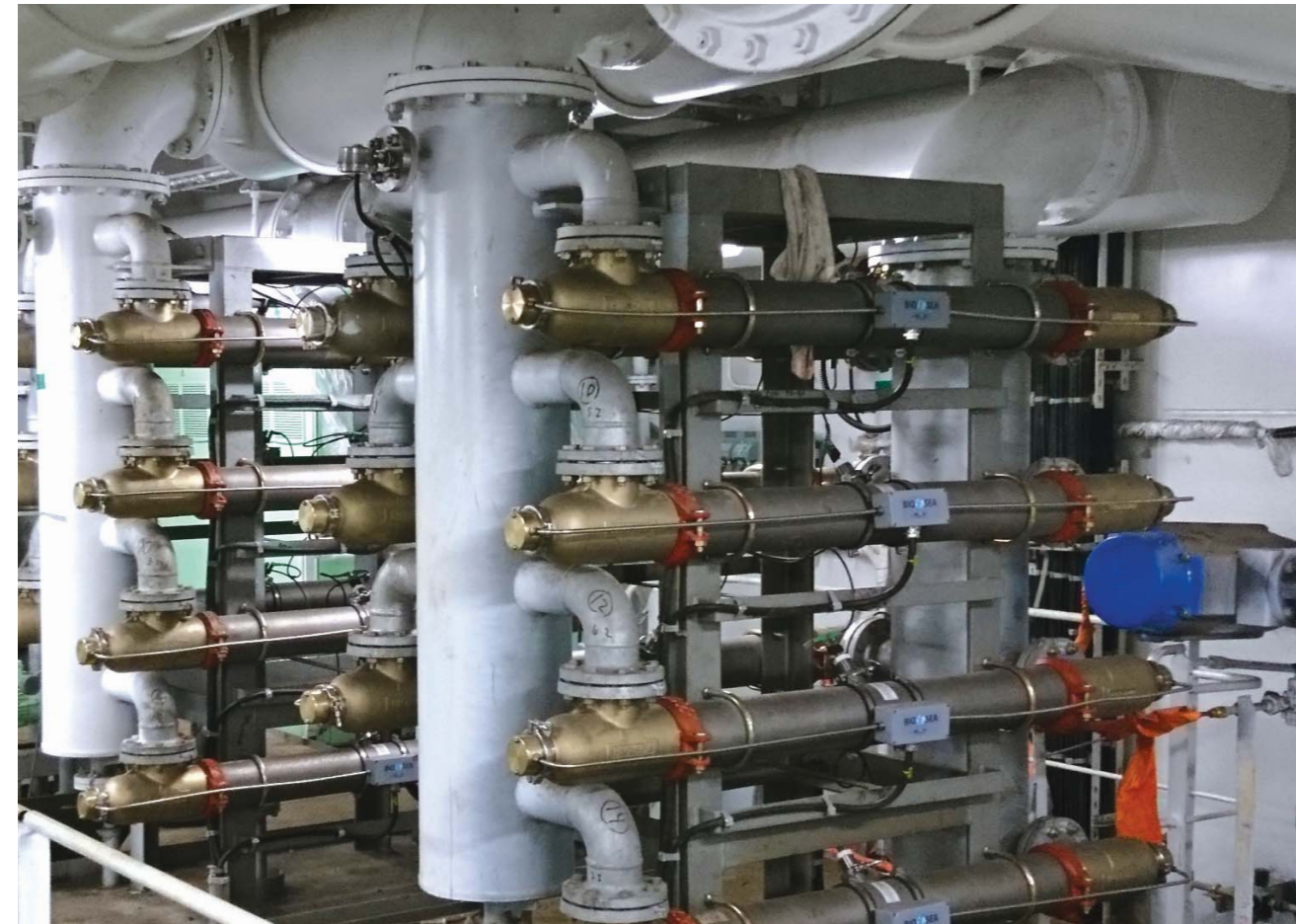
References

Our references

Our customers are shipyards and ship owners who have all been trusting us for years!

CMA-CGM, Louis Dreyfus Armateurs (LDA), MSC Cruises, RCCL, the French Navy, DAMEN Green Group, Venteville Radio Holland Group and many other worldwide stakeholders work with us on projects in France, the Netherlands, Germany, Spain, China, Singapore, Philippines, South Korea...

Thanks to our experience, the continuity of our company, a worldwide network of Service Stations and the variety and adaptability of our offers, our customers benefit from an effective and performing ballast water treatment.



Regulation

BIO-SEA range is compliant with IMO and USCG Regulations

IMO Ballast Water Management Convention

The direct economic impact as well as the potential long term damages to the environment and people has led to the development of international, national, and regional regulations in order to control the transport and discharge of aquatic organisms. In 2004, the IMO adopted the International Convention for the Control and Management of Ships' Ballast Water and Sediments (a.k.a. BWM Convention), which entered into force on September 8th 2017. From this date, compliance to treatment standard (D-2) is compulsory for newly built ships, whereas existing ships need to comply with Exchange standard (D-1). There is a transition period from 2019 to 2024, in order to equip existing vessels with a ballast water treatment system to answer D-2 standard requirements.

USCG Ballast Water Management Regulation in the USA

Linked to the National Invasive Species Act of 1996, the US Coast Guard (USCG) established in 2004 the rules for controlling the discharge of Living Organisms from ships' Ballast Water in US waters, through publication of 33 CFR Part 151 and 46 CFR Part 162. The Rules have been effective since June 21, 2012. Vessels should manage their ballast water through one of the authorized options : treatment by a USCG approved BWMS, use of water taken from a U.S. Public Water System, discharge to a reception facility, or no discharge. In addition, use of an Alternate Management System (AMS) is a temporary bridging strategy until the installed system receives US Coast Guard type approval.



“Come onboard with us, we can, together, bring you efficiency, simplicity, compliance and peace of mind”



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Institutional partners

BIO-SEA is a member of the GICAN, a professional group representing the French marine industry. GICAN members are involved in naval defence, maritime security, safety and environment, and commercial shipbuilding



BIO-SEA is also a member of the French Maritime Cluster, an organization which promotes the French maritime economic sector. It was set up in 2005 by the French Institute of the Sea and began work in 2006



Public financiers

This project is financed in part by the European Union funds for Regional Development in Occitanie, FR, by the Region Occitanie, FR.

