BIO-SEA® by BIO-UV is the first only system developed and manufactured in France for treatment of ballast water in compliance with IMO D-2 discharge standard and USCG Regulation.

The system first cleans ballast water using a screen filter, in order to reduce the amount of total suspended particles, organic or not, present in the sea water. The filter size will be dependent on the system size according to the ballast pump flow rate.

Then UV stage of the treatment takes place in a reactor without any addition of chemicals nor creation of active substances. It inactivates the microorganisms present in the water (bacteria, phytoplankton, zooplankton).

When ballasting, both operations of filtration and UV disinfection are carried out: the objective is to limit the loading of suspended solids and living microorganisms in the ballast tanks.

When deballasting, only the operation of UV disinfection is completed. This allows re-treating the water that stayed in the ship’s ballast tank during the journey, in order to eliminate the possible biological recontamination, to ensure compliance with the IMO standards.

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

**BENEFITS**

- Well proven technology
- High UV dose
- Tested in low UV transmittance
- Not impacted by water temperature, neither by salinity
- Modular: flexible, scalable to any flow rate
- Easy to install, operate and maintain
- Automatic operation, easy-to-use interface
- Automatic regulation of power consumption depending on water quality
- Safe: no explosive gases, no induced corrosion, chemical free
- First Class marine components
- Cost efficient solution

BIO-SEA® 400 m³/h retrofit installation example
1ST STEP: MECHANICAL FILTRATION
- 40µm screen in order to retain suspended solids and zooplankton
- Size to scale depending on the flow rate to treat
- Automatic backwash, monitored by a pressure switch
- No disruption of the filtration process during the cleaning cycle, and no significant variation of the treated flow rate
- Additional suction pump to allow a complete cleaning even if the vessel service pressure is low
- Vertical or horizontal configurations available
- 2 models of filter are available, one standard, and one compact option

2ND STEP: UV DISINFECTION
- Titanium reactor equipped with a single polychromatic, medium pressure, high intensity UV lamp
- A high-quality quartz sleeve protecting the UV lamp
- Optimized design by CFD (Computational Fluid Dynamic), taking into account the seawater quality (UV transmittance) and fluid speeds on the quartz sleeves, in order to facilitate cleaning and maintenance
- Lamp driven by electronic transformer allowing precise management of the UV lamp in order to optimize its regulation, reduce the power consumption and prolong its life
- Monitoring through UV sensor (intensity)
- Modular design, facilitating the installation of UV reactors in parallel and a better adjustment to the flow that has to be treated

MONITORING AND CONTROL
- Automated operation and monitoring through sensors and PLC: UV sensor, temperature sensor, flow meter, differential pressure switch, automatic valves)
- Automatic and/or manual operations for ballasting, deballasting, and cleaning
- Touch screen interface for easy friendly use and understanding
- Recording of operations, alarms, and measured UV intensity (10,000 records of each) covering 24 months
- Operator and Administrator Modes
- Bus communication for remote control and integration to vessel automation system and command control

BIO-SEA® RANGE

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment Capacity</td>
<td>from 30 to 2000 m³/h +</td>
</tr>
<tr>
<td>Power Supply</td>
<td>380 – 440V; 50-60 Hz; 3-phase</td>
</tr>
<tr>
<td>Average Power Consumption per UV reactor</td>
<td>14 kW</td>
</tr>
<tr>
<td>Environmental Operating Conditions</td>
<td>T°= 0°C - 55°C; H% = 95</td>
</tr>
<tr>
<td>Global Head Loss</td>
<td>&lt; 0,7 bar</td>
</tr>
<tr>
<td>Min Operating Pressure</td>
<td>1 bar</td>
</tr>
<tr>
<td>Max Operating Pressure</td>
<td>10 bars</td>
</tr>
</tbody>
</table>

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STANDARD OPTION

COMPACT OPTION

850 avenue Louis Médard • 34403 LUNEL Cedex • FRANCE
Tel : +33 (0) 4 99 133 911 • Fax : +33 (0) 4 99 133 919
bio-sea@bio-uv.com
www.ballast-water-treatment.com

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