FRESHWATER MAINTENANCE FOR **INBOARD & OUTBOARD ENGINES**

PHIBER® SYSTEMS

PHIBER Systems provide "preservative maintenance" for raw water networks using ***science & technology***. The **automated push-button system** modernizes the freshwater maintenance process to 21st Century standards of convenience and performance.

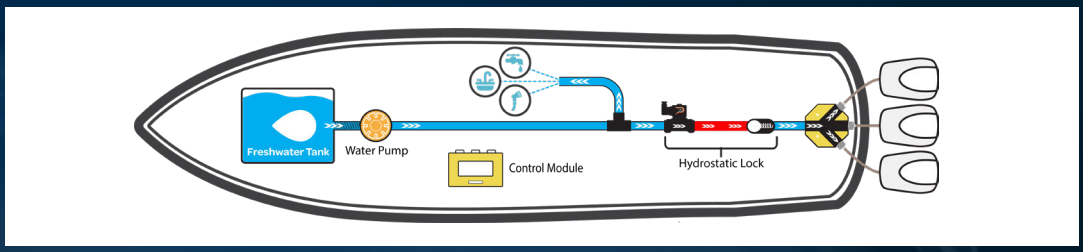
The PHIBER System comprises two main components that operate in concert:



Control Module: The 'Brain' behind the maintenance cycles, and is universally installed into every PHIBER FWF System. The Module's programming is tailored to a vessel's specific requirements and system functions, ensuring that a safe and proper freshwater flush occurs at the optimal time, interval, and duration for maximum effectiveness. It protects the engine while also tracking and recording the maintenance cycle data for demonstrable compliance with OEM standards.



Hydrostatic Lock: The Lock is installed between a vessel's fresh water and the engine's raw water system, allowing fresh water to be used for routine flushing maintenance of the engines' cooling networks. Its unique design guarantees the integrity of both seawater and freshwater networks, under any condition.



PHIBER FWF Manifolds revolutionize how traditional raw water networks operate, and have a flexible architecture that streamlines installation and minimizes the physical "footprint".

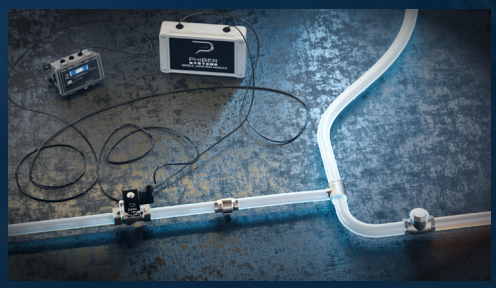
THE INNOVATIVE DESIGN OF **"PUSH-BUTTON" FRESHWATER MAINTENANCE**

PHIBER Freshwater Maintenance Systems have a unique flexible architecture that can be configured to provide a safe and effectlve flush for nearly ANY application, including inboard engines (wet and dry exhaust), vessel gyroscopic stabilization systems, desalination systems, and more.

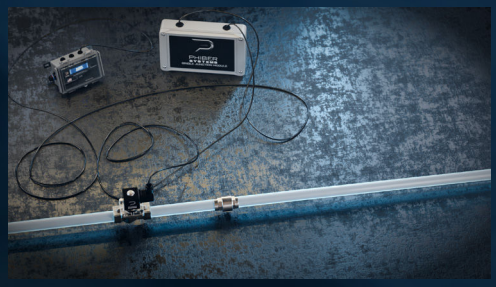
The System is comprised of Kits which are custom-tailored and programmed for a specific application, providing a precision freshwater maintenance cycle (timing, duration, and flow).

A properly configured PHIBER System does not require any manual assistance such as opening or closing valves to perform a flush. The FWF Manifold uses only physics to operate, so when the Control Module engages and a flow of fresh water is introduced into the Manifold, it automatically directs and adjusts flow rates in accordance with the needs of the raw water network.

Seawater has (on average) about 35,000 "parts-per-million" (PPM) of dissolved solids (salt, minerals, etc) in it. Once seawater has been purged and the PPM of dissolved solids drops to less than 1000, the FWF is technically complete and the full benefit of fresh water flushing is realized.



The Inboard Manifold for **"Wet"** Systems



The Overboard Manifold for **"Dry"** Systems

PHIBER® SYSTEMS

Ready to protect your investment on the water? Visit our website today to find a dealer near you.

US Patents Pending

www.PHIBERSystems.com

DEFINING THE PROBLEM

There are three primary consequences of using raw seawater in cooling networks:



CORROSION

Mechanical systems incorporate many types of materials in their construction, including metals and alloys which are dissimilar in nature. For example, modern marine diesel engines can incorporate iron, carbon steel, titanium, aluminum, zinc, copper and other metallic components that are all connected together to form the engine.

Raw water systems will often push seawater through a network comprised of a combination of these metals. Because seawater water is heavy in electrolytes (especially dissolved ions such as Sodium Chloride (NaCl), galvanic corrosion and surface degradation occurs any time the metallic surfaces are left to soak in seawater



MINERAL SCALE

When a seawater cooling system (raw water network) is turned off and the flow of raw coolant water ceases, any seawater inside the heat exchangers will absorb the remaining heat that is still trapped in the engine. As the seawater temperature rises inside the heat exchanger(s), dissolved minerals trapped in the seawater precipitate out and adhere to the heat exchanger surfaces as hard scale deposits.

Every time the engines are cycled, this buildup of scale progresses, and begins to impede raw water flow through heat exchangers, degrading the ability of the heat exchangers to remove heat from the engine. This results in higher engine operation temperatures and reduced performance.



BIOLOGICAL FOULING (BIOFOULING)

Seawater has a high concentration of biological organisms and minerals; therefore, raw water networks are highly susceptible to biofouling and particulate/scale buildup on surfaces within cooling networks. Biological growth is unavoidable given the flow of nutrient and oxygen-rich water into the cooling network, and as the buildup of biofouling progresses, and begins to impede raw water flow through heat exchangers.

Lower GPM flow degrades the ability of the heat exchangers to remove heat from the engine, causing higher operation temperatures and reduced performance.

Corrosion and Biofouling are consequences of the following:

- Operating conditions
- Exposure duration
- Temperature
- Salinity
- Biology
- Alloys

Mineral Scale is typically a consequence of the following:

- Operating waters (fresh/salt)
- Cumulative system run-cycles
- Total Dissolved Solids (TDS)
- Residual Engine Heat

THE DEFINITION OF A “CORRECT” FRESHWATER FLUSH

The simplest method for maintaining any raw water network is the freshwater flush, but delivering on this task is burdensome. There are three criteria that must be factored in when performing ANY Freshwater Flush:

1. **Executed immediately at the termination of operation cycles**
2. **Sufficient duration to reduce Total Dissolved Solids (TDS) in seawater to ≤1000 PPM**
3. **Pickles “wet” heat exchangers and critical components with fresh water during periods of inactivity**

There are many methods available to reduce the hassle of the “manual” FWF process using quick-connects or flush sequencers for multi-engine configurations, but these merely shift the time and labor burdens toward “less time” or “less labor”, and do not address the most common challenge of performing a proper FWF…

The LOGISTICS:

- **Access to a hose within the critical time window**
- **Water resources & management**
- **Time & labor investment**