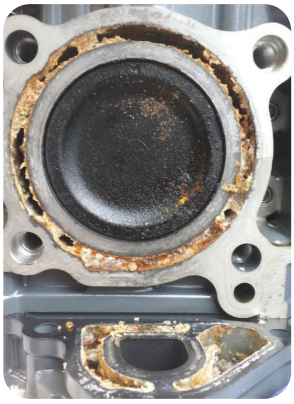
DEFINING THE PROBLEM

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



1. **CORROSION** - Many metals and softer alloys used in marine systems such as steel, aluminum, zinc, and copper will deteriorate quickly due to electrolysis with constant exposure to electrolyte (water). Corrosion is significantly exacerbated when the water is more conductive due to the presence of certain elements, such as sodium (salt).
2. **MINERAL SCALE** - When a system that uses raw water for cooling is turned off (and the flow of raw coolant water ceases), any seawater that is trapped inside the heat exchangers will absorb the remaining heat that is still inside the system. As the temperature rises inside the heat exchanger(s), dissolved minerals in seawater precipitate out and adhere to the walls of the heat exchangers as hard deposits. This buildup progressively impedes raw water flow through heat exchangers, which can degrade heat transfers, causing higher operation temperatures and reduced performance in the system.
3. **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.

Corrosion and Biofouling are consequences of the following:

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

Mineral Scale is typically a consequence of the following:

- Operating water composition
- System run cycles

The simplest method for maintaining a raw water network is the freshwater flush after every run cycle, but delivering on this task is burdensome.

THE DEFINITION OF A "CORRECT" FRESHWATER FLUSH

There are three criteria that must be factored in when performing ANY Freshwater Flush:

1. It must be executed immediately at the termination of ANY run cycle where the system will be allowed to cool to ambient temperatures
2. It must be long enough in duration to replace/dilute raw water 75-100% (total dissolved solids reduced to ≤1500 PPM)
3. It must displace raw water within the network, leaving only freshwater solution inside the heat exchangers and critical components during periods of inactivity

There are many methods (kits) available to reduce the hassle of the "manual" FWF process with automated or streamlined methods, but most 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
- Water resources & management
- Time & labor investment

PHIBER SYSTEMS

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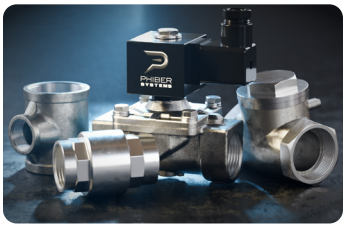
PRESSURIZED HYDRO INJECTION for BRINE EVACUATION & REMEDIATION (PHIBER)

The PHIBER freshwater flush system offers an automatic, hands-free, and environmentally friendly solution for the "preservative maintenance" of raw water networks. It maximizes performance while minimizing physical maintenance and imposes the lowest cost burden compared to any other method.

PHIBER Systems guarantee a safe and correct Freshwater Flush at the end of every operation cycle. It is an engineered system that is SCIENTIFICALLY PROVEN TO BE THE MOST EFFECTIVE METHOD to mitigate biofouling, mineral scale, and corrosion.

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

Control Module: This is the system's 'brain'. 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 optimal or scheduled intervals for maximum effectiveness. It also tracks and records the flushing maintenance processes for record-keeping and demonstrable compliance with regulations.



Freshwater Flush Manifold: This proprietary configuration revolutionizes how traditional raw water networks operate. It connects between a vessel's fresh water and raw water plumbing systems, allowing fresh water to be used for routine flushing maintenance of the raw water network. Its unique design guarantees the integrity of both networks and ensures that a flow of water is always available inside the raw water network, safeguarding the mechanical systems and heat exchangers under any conditions. The Manifold consists of 4 specially-designed components:

- Primary FWF Gate
- Swing Check
- Spring Check
- Balancing Tee

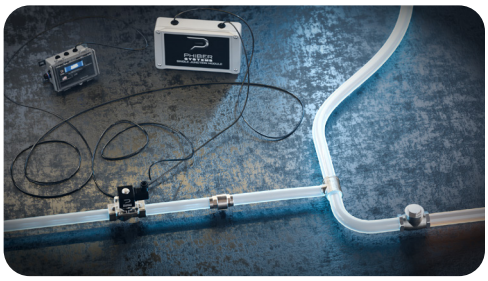
A PHIBER Control Module is universally installed into every application, whereas variations in the FWF Manifold configuration are possible, dependent on the application and installation.

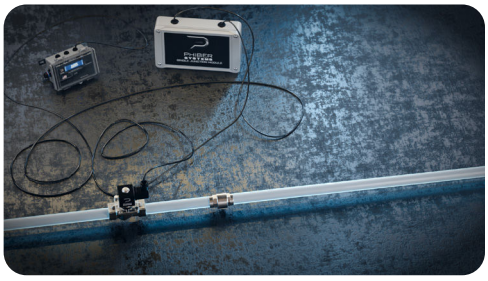
THE FWF MANIFOLDS

The proprietary FWF Manifolds are available in two configurations:

1. **The Inboard Manifold** – for introducing a FWF into complex raw water networks that must be flushed while they are active and the raw water pump is operating, preserving (pickling) the circuit with fresh water upon shutdown. The strategic orientation of the Inboard Manifold supports gyro-stabilization systems, propulsion engines, and generators where raw water flows through multiple conduits and typically exits via a wet (exhaust) network.

2. **The Overboard Manifold** - for introducing a FWF into simple raw water networks that can be flushed while they are inactive, such as on outboard engines, watermakers, and other systems where FWF water can be injected directly to the raw water network and evacuated via gravity native overboard discharge.





All PHIBER components for the FWF Manifold are constructed using the highest quality 316 Stainless Steel. This allows universal installation into any alloys used in marine systems.

PROFESSIONAL INSTALLATION IS RECOMMENDED

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