PureBox™ HPW

Containerized High Purity Water Treatment System

The RODI Systems PureBox™ HPW water purification systems are built inside intermodal dry cargo shipping containers that have been specifically modified for water treatment applications. This results in a fully self-contained, fully functional water purification system that can be delivered to a site and put into operation with a minimum of site preparation. The PureBox™ HPW is one of several versions of the PureBox™ product and is designed to produce high purity water for industrial applications. The PureBox™ HPW is suitable for:

- **Boiler Feed Water**
- **Combustion Turbine Power Augmentation (Wet Compression)**
- **Manufacturing (Such as Glass Production, Electronics Fabrication, and Metal Finishing)**
- **Hydrogen Generation from Electroyzers**
- **Any Process Requiring High Purity Water**

Benefits

The PureBox™ HPW purification systems offer a number of benefits that makes them an excellent choice for your water purification application.

Portability — The systems are completely self-contained in intermodal shipping containers. Simply unload the container, make piping and electrical connections, and commission the system.

Flexibility — As your water treatment needs change, PureBox™ systems may be added or changed easily.

Quality — PureBox™ is designed and built by RODI Systems Corp., a leader in the construction of portable water treatment systems.

Dependability — RODI's portable systems are serving as dependable sources of purified water around the world.

Low Cost — The PureBox™ HPW cost of ownership is one of the lowest in the industry due to its high energy efficiency and low cost of operation.

Chemical Safety — The PureBox™ HPW is designed to use a minimum amount of hazardous chemicals and produce no chemical waste.

General Features

The PureBox™ HPW incorporates features that make it a cost-effective way to produce high purity water from a wide variety of sources including fresh water, brackish water, or even seawater.

Our Namesake — The PureBox™ HPW features technologies that are RODI's namesake, reverse osmosis (RO) and deionization (DI). For decades, the combination of these technologies has proven to be the most cost-effective means for producing high purity water.

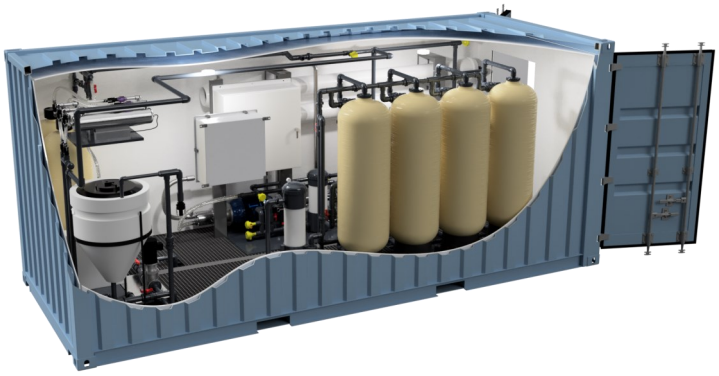
Core Technologies — RODI's water purification systems feature modern technologies that improve on the RO/DI standard. High performance pretreatment is used to protect the downstream processes. Two-pass reverse osmosis (RO) is used to remove the majority of dissolved solids. Final polishing is performed by continuous electrodeionization (CEDI) which eliminates the need for hazardous ion exchange regeneration chemicals. Additional treatment steps such as degassing and UV may be added to the treatment system depending upon the purity requirements and feed water quality. A modern electronic control system ensures safe and efficient operation of the system, even while unattended. System performance may be monitored remotely via cloud service.

Technical Support and Training — All of RODI's PureBox™ systems are supported by a well-trained and highly experienced group of technical and administrative professionals. Whether by remote monitoring, email, telephone, or an on-site visit, RODI's staff is dedicated to supporting each and every product manufactured by RODI Systems.

PureBox™ HPW Specifications

The RODI Systems PureBox™ HPW water purification systems incorporate a number of specifications which make them a high quality choice for your water purification application.

Container — The system is totally self-contained inside a modified ISO dry cargo shipping container. Only new "One Trip" containers are used for our systems. This means the container has only been exposed to one ocean voyage before being modified for use in housing the treatment system.



Construction — All of the PureBox™ systems are constructed of new, industrial quality materials. Piping, vessels, and other system components are supported inside the container with fiberglass structural members.

Piping — All low pressure piping is Schedule 80 PVC or other non-metallic materials. High pressure piping utilizes stainless steel alloys. High purity piping is stainless steel or virgin polypropylene. Welded joints are used wherever possible and threaded joints are avoided as much as possible to prevent leaks. All valves and fittings are of industrial quality.

Pressure Vessels — Membrane pressure vessels are filament wound using fiberglass roving and sealed with an epoxy resin. This results in a corrosion-proof vessel that will last for years with little or no maintenance. Vessel suppliers include Protec and Codeline.

Membrane Elements — All systems utilize spiral wound reverse osmosis membrane elements from trusted suppliers such as Hydranautics, FilmTec, and Toray. The type of membrane is carefully chosen to provide the lowest operating cost and highest product quality.

Pumps — High quality pumps are a key factor to obtain trouble-free performance from water treatment systems. The PureBox™ HPW systems utilize pumps from manufacturers such as Grundfos and Danfoss. All primary pumps are equipped with variable frequency drives (VFDs) to provide energy efficient operation.

Electrical — Each container is equipped with interior lighting. All electrical construction is done to recognized standards. Rigid or flexible PVC conduit and PVC junction boxes are used to prevent corrosion. Only NEMA 4/4X enclosures are used on systems that require large control or electrical enclosures. All electrical systems are thoroughly tested before the treatment system is shipped to the client. RODI is a UL 508A certified panel builder.

Documentation — All systems are provided with a complete set of documentation which includes component O&M manuals and wiring diagrams.

PureBox™ HPW General Specifications

Production (Gal/Day)[1]	6,500	13,000	26,000	52,000	130,000
Container Dimensions (L x W x H) (ft)	10 x 8 x 8.5	20 x 8 x 8.5	20 x 8 x 9.5	40 x 8 x 9.5	40 x 8 x 9.5 (x 2 containers)
Approximate Dry Weight (lbs)	7,000	11,000	13,000	20,000	42,000
Approximate Power Consumption (kW)[2]	3.5	5	8	13	25
Product Water Quality	As necessary for specific application, up to and including ASTM Type I (18 Meg Ohm).				

[1] Assuming a system availability of 90%.
[2] When treating typical potable quality feed water at 25°C.

PureBox™ HPW Features and Options

The RODI Systems PureBox™ HPW systems are available with a number of features and options which are valuable for high purity applications.

High Performance Pretreatment — Proper pretreatment is critical in the system design to insure that the first pass RO membrane elements do not foul excessively. The HPW system can be equipped with a number of high performance pretreatment methods to allow production of high purity water from otherwise unusable feed water sources. This includes membrane microfiltration which produces RO feed water of exceptional quality.

Raised Floor — The system container is equipped with a raised floor consisting of fiberglass grating supported six inches above the container floor. This protects the floor of the container and provides a neat and safe environment inside the container since the piping runs beneath the raised floor.

Scale Inhibitor Dosing — A chemical dosing system injects a chemical scale inhibitor into the system feed line. This chemical addition assists in the prevention of scale formation in the ROmembrane elements.

Container Modifications — The container housing the system is equipped with approximately 3 inches of solid foam insulation covered with rigid waterproof plastic. Containers are also equipped with air conditioner and steel wall inside container doors with hydraulic connections and personnel door.

Instrumentation and Controls — The advanced control system includes a color touch screen operator interface with data logging. The control system also includes a complete set of electronic sensors for conductivity, pH, flow, temperature, and pressure. A number of optional analyzers can be provided to assist the client in monitoring the quality of both inlet and outlet of the system. Optional instrumentation includes ORP, chlorine, turbidity, and silt density index. Analyzers include silica, sodium, and TOC.

Degassing or Caustic Dosing — Membrane degassing modules are used to remove carbon dioxide from the second pass RO permeate in order to reduce the ionic load on the CEDI. Alternatively, caustic dosing may be used between the first and second pass RO units to convert carbon dioxide to bicarbonate thus allowing it to be rejected in the second pass RO unit.

Membrane Clean-in-Place System — Larger systems may include an integral clean-in-place (CIP) system for routine chemical cleaning of the RO membrane elements. This eliminates the need to remove the elements for cleaning off site.

UV Treatment — The reduction of total organic carbon (TOC) may require the use of 185 nm ultraviolet light treatment before the CEDI unit. The 185 nm UV oxidizes the organic compounds thus allowing them to be removed with the CEDI.

Continuous Electrodeionization (CEDI) — Traditional ion exchange polishers use chemicals (acid and caustic) to regenerate the ion exchange resin. The unique design of CEDI modules utilizes electricity to continuously regenerate the resin. This is accomplished through the use of ion selective membrane barriers within the CEDI modules.

Remote Monitoring — This optional feature allows the system to be monitored remotely via a local area network, the cellular phone network, or satellite. Data can be accumulated via cloud service and used to analyze and predict on-going system performance.

Operator Training — Training is available at RODI's facility for those individuals responsible for operating and maintaining the PureBox™ systems. Training and technical support are also available on-site for most locations.

RODI systems

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