



Pall Corporation

Pall Aria™ Integrated MF/RO Systems

for Cost-Effective Treatment of Sea and Brackish Waters

Filtration. Separation. Solution.™

Pall Aria™ Integrated MF/RO Systems for Cost-Effective Treatment of Sea and Brackish Waters

Water scarcity resulting from manmade and natural influences such as growing populations, expanding industrial usage, climate change and drought, is a challenge faced by water producers and users worldwide. While sea and brackish waters may be abundantly available, traditional thermal distillation technologies for desalination can be cost-prohibitive due to high energy consumption. High-pressure reverse osmosis (RO) and nanofiltration membrane systems have been used for many years to remove dissolved substances from water, with mixed success. The pretreatment typically used with these processes—conventional (sand) filters with coagulation, followed by cartridge filters—has often proven to be ineffective and expensive long-term. On the other hand, when microfiltration is used to pre-treat the water, spiral wound RO membrane systems are a reliable and cost-effective alternative that has become the technology of choice for many desalination applications.

In addition to choosing the most effective technology, water producers are concerned with maximizing production volume by ensuring ongoing operation of the desalination system. If the system comprises components from several suppliers, the troubleshooting process can take much longer. When the components of the desalination system are sourced through a single supplier, the responsibility is clear, and service and support are simplified.



An Integrated Desalination Solution from Pall, the Global Leader in Filtration and Separations

To meet the need to produce pure water from brackish and sea water, Pall Corporation is offering complete, packaged, spiral-wound RO and nanofiltration systems, fully integrated with its proven microfiltration membrane technology for pretreatment. As the global leader in filtration solutions, Pall has been a trusted supplier to municipalities, industries and government for over 60 years. Pall's water processing team applies its expertise in process design, membrane science, system engineering, and manufacturing to deliver truly optimized desalination systems.

Major MF and RO Components

Two major components comprise the Pall Aria Integrated MF/RO System: the Pall Aria microfiltration membrane system for pretreatment, and an RO membrane system to complete the desalination process. Both systems are constructed from standard "building blocks"—prefabricated skids of valve and module racks.

- **The Pall Aria microfiltration membrane system—** removes suspended solids from sea or brackish source water during the pretreatment process. Pall Aria microfiltration membranes are the most robust in the industry, with the longest warranty. In fact, a Pall customer in California with more than 700 modules experienced fiber breakage of only 1 in 3,073,400 over a 40-month period.* More than 300 filtration systems using the membrane technology incorporated in Pall's systems have been sold worldwide.
- **A reverse osmosis membrane system—** captures dissolved salts and other impurities from pretreated water with spiral wound RO technology, the industry standard for RO systems. Spiral wound RO modules capitalize on an extremely high ratio of filter area to hold-up volume. With feedwater that is optimally pre-treated, these modules allow the greatest output of de-salted water with the lowest energy use.

Recover Energy From Your Desalination Process

After analyzing the energy requirements and costs for your specific desalination process, Pall will recommend and implement a state-of-the-art device to recover energy from the pressured brine stream. By recycling this energy to power the pumps on the RO system, your cost of water production will be reduced.

* Based on the CalWater, Bakersfield, CA installation.

Reduce Your Risk and Long-Term Costs

In addition to the energy conservation benefits of our MF/RO solution, Pall provides you with the following cost-saving, efficiency, and risk-reduction advantages.

- **Smaller footprint—** Membrane systems have a smaller footprint and lower long-term costs than conventional filtration technologies. The pre-engineered design and assembly of the integrated MF/RO system enables you to reduce space requirements, thereby reducing facility costs.
- **Lower energy cost compared to distillation—** Compared to thermal distillation processes, membrane desalination generally requires less energy.
- **Lower overall cost of water production—** Pall sales and process engineers are available to provide estimates for capital and operating costs to enable you to derive and evaluate the overall cost of water using a Pall Aria Integrated MF/RO System. We're convinced that our system will realize cost savings over systems supplied by others who are not filtration experts. Our experienced engineers design and package systems that optimize operations and maintenance.
- **Longer lifespan of the RO membranes—** By pretreating sea and brackish water with microfiltration membranes, Pall's integrated system exposes the RO membranes to a lower volume of particulate matter. This protective capability reduces the number of membrane cleanings, increases efficiency, and prolongs the life and value of the RO system.
- **Redundant components maximize uptime—** The MF and RO system design can include redundant modules, enabling the integrated system to maximize uptime for critical water delivery applications.
- **Lower chemical use—** There are no pre-treatment chemicals to mix, feed, and adjust when feedwater conditions change.
- **Long-term reliable operation—** By developing a desalination process that is tailored to your feed water characteristics and treatment needs, Pall will ensure the long-term, reliable operation of your MF/RO system. Further, your system can be matched with a customized service plan.
- **Single point of responsibility—** With a single supplier for your desalination system, potential problems will be addressed more rapidly, thereby reducing the potential risk of downtime and reduced production.

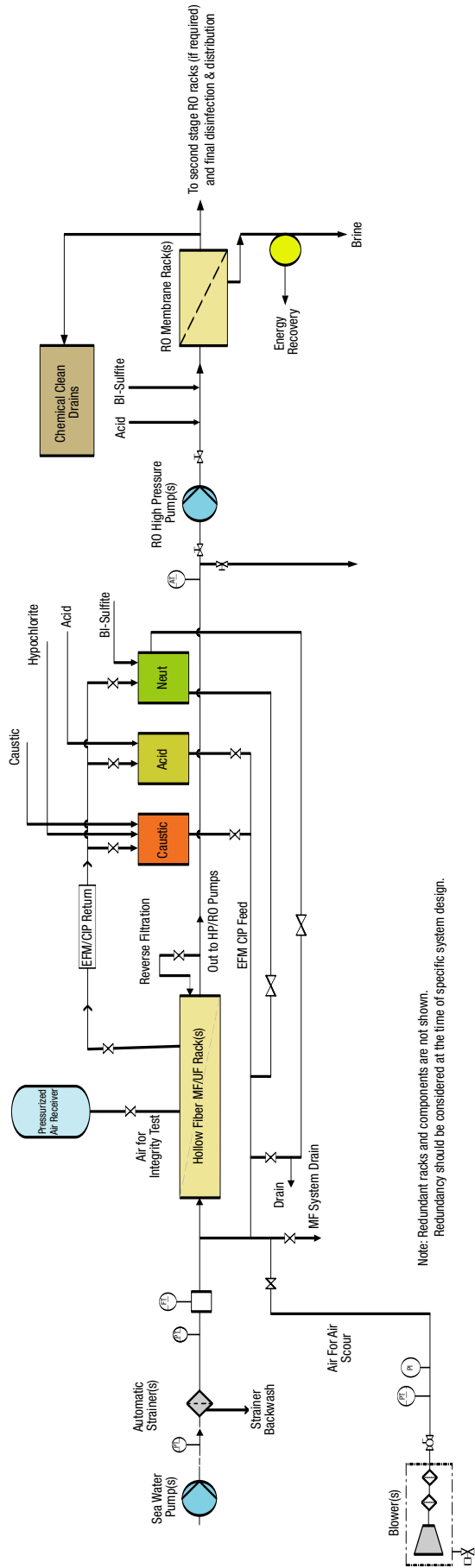


Figure 1 – Simplified process flow diagram: Pall Aria Integrated MF/RO System for desalination of sea and brackish waters.

Technical and Support Services for Long-term Reliability

To help ensure trouble-free operation of your system, Pall offers a comprehensive portfolio of technical support services. These services can help you:

- Gain technical expertise without adding head-count,
- Realize optimized system performance and product quality,
- Increase system reliability, and
- Enjoy cost-effective operation and maintenance.

Your Pall representative will help you choose one or more of the following services to support your integrated MF/RO system:

- 24/7 Service Support*
- CIP (Clean-In-Place)
- Commissioning and Start-up
- Emergency Service
- Inspection and Maintenance
- Membrane Cleaning Study
- Operation And Maintenance (O&M)
- Process Audit
- Process Consulting
- Process Monitoring Systems
- Remote Monitoring
- Spare Parts Inventory Management
- System Optimization
- Technical Support
- Training
- Water Analysis

* 24 hours per day, seven days per week.

How to Get Started

Pall's Integrated MF/RO System combines the strengths of Pall's membrane microfiltration technologies, engineering and technical expertise, along with comprehensive support for high-yield production of pure water from sea and brackish water. Please contact your local Pall representative for more information and a free analysis of your feedwater and treatment requirements.

Other Applications for the Pall Aria Integrated MF/RO System

In addition to removing salt from sea and brackish waters, Pall MF/RO fully integrated systems are suitable for the following applications:

- Removal of organic matter from groundwater and surface water.
- Removal of radioactive and other contaminant ions from water from any source.
- High purity water recycled from industrial process or municipal wastewater.




Water Processing

25 Harbor Park Drive
Port Washington, NY 11050
1.888.428.5597 toll free (only in US)
516.801.9906 phone
516.484.3216 fax
water@pall.com

Visit us on the Web at www.pall.com/water

Pall Corporation has offices and plants throughout the world in locations including: Argentina, Australia, Austria, Belgium, Brazil, Canada, China, France, Germany, India, Indonesia, Ireland, Italy, Japan, Korea, Malaysia, Mexico, the Netherlands, New Zealand, Norway, Poland, Puerto Rico, Russia, Singapore, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, United Kingdom, United States, and Venezuela. Distributors are located in all major industrial areas of the world.

© Copyright 2007 Pall Corporation. Pall, , and Pall Aria are trademarks of Pall Corporation.
® Indicates a Pall trademark registered in the USA. *Filtration. Separation. Solution.*SM is a service mark of Pall Corporation.

*Filtration. Separation. Solution.*SM

WPMFROEN