



...and not a drop you can't drink.



SALES AND SERVICE THROUGHOUT THE WORLD

Reverse osmosis
water production systems

From well-traveled shipping lanes to deep offshore waters; from arctic brine to steamy harbors and remote operations—AquaGlobal's® water production systems significantly cut the cost of providing potable water.

AquaGlobal's® water production technology is an integrated package of field-proven components that can pre-filter, pre-treat, and desalinate virtually every water condition a ship, offshore rig, or work station will ever encounter. It is a fully automatic reverse osmosis system that is more compact, more efficient, more dependable, more reliable, and more serviceable than all others.

AquaGlobal® is an MMC International Associated Company, with worldwide sales and service facilities supported by over 40 years of experience and a philosophy that commits it to the production of only the finest marine and industrial equipment.

A complete water production system in a single compact package

AquaGlobal water production systems combine pretreatment, prefiltration, and reverse osmosis in a single package plant **specifically designed for heavy duty marine, offshore, and remote applications.**

The entire system is encased in a noise-reducing steel cabinet equipped with hinged doors for easy access to the interior. Inside the cabinet, the system's modular components are securely mounted to an epoxy-coated, corrosion-resistant steel frame.

To ensure efficient performance and long system life, AquaGlobal uses only the finest quality components. Two of these are: pretested spiral-wound reverse osmosis (RO) membranes, and an exceedingly efficient positive displacement pump.

AquaGlobal systems are designed to operate simply. All systems have a plexiglass-protected control panel, which includes all temperature, pressure, and flow gauges along with an annunciator panel. However, the most unique concept employed in this control station is its ability to be pre-programmed for daily back flushing and cleaning of the filtration system. This allows for operator-free machine maintenance.

Applications

The AquaGlobal unit is the ideal water production plant for offshore oil rigs, commercial seagoing vessels, and other remote locations with on-site crews.

In marine applications, the system is used onboard any size commercial vessel, work boats, and pleasure craft to provide pure, potable water for drinking, cooking, and sanitary use. On fishing vessels, AquaGlobal's water production plant is an economical source of water for ice-making for onboard storage of catch, packaging and processing.

Other potable water applications include:

- Electronics industry.
- Chemical and petrochemical industries.
- Food processing — The RO system can be used to concentrate cheese by-products, maple syrup, juice, beer, coffee, milk, etc.
- Plating industry.
- Land use — factories, hospitals, hotels, shoreline condominiums, vacation homes, schools.

AquaGlobal is in the process of designing an add-on Reverse Osmosis module that can polish potable water into boiler, medical, and pharmaceutical-quality water. This more polished water has less than 10 ppm of total dissolved solids (TDS).

Advantages of the AquaGlobal® system

AquaGlobal is a better choice than evaporators or other RO systems for new installations and retrofits. Here's why:

AquaGlobal® vs. Evaporators

• **Lower operating costs.** The cost of processing 1,000 gallons (3.72 tons) of water is approx. \$7.50 with the AquaGlobal system vs. up to \$25 for many evaporators. And when you're using thousands of gallons a day, AquaGlobal's cost-efficiency multiplies into big savings — and a rapid return on your investment.

• **More energy-efficient.** The AquaGlobal system consumes only 1/10 to 1/8 the energy of an evaporator. Evaporators use a tremendous amount of energy and heat to achieve phase conversion. High energy consumption increases operating costs.

• **Weights less.** The RO unit is more compact than most evaporators. Which means the AquaGlobal system weighs less and requires less space.

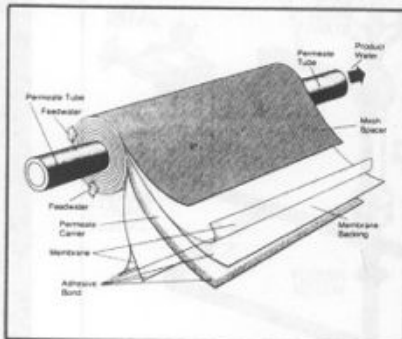
**ONLY
NATURE
MAKES IT
CHEAPER**



SALES AND SERVICE THROUGHOUT THE WORLD

AquaGlobal® vs. other RO systems

The AquaGlobal unit features a **low recovery rate** (12%-24%), conservative capacity rating, and system pressure and flow rates designed for minimal membrane compaction. **Built-in pretreatment, prefiltration, and automatic maintenance** also contribute to longer membrane life and result in more efficient use of the pump, motor, and membranes. AquaGlobal's thin-film spiral-wound RO membranes (which can tolerate some chlorine contamination) are **less susceptible to plugging** and easier to clean than other types of membranes.



Most RO systems do not offer anti-scaling chemical treatment due to its danger. In the past, highly toxic chemicals such as sulfuric acid or sodium hexametaphosphate were offered to reduce calcium carbonate scaling. However, due to the danger involved with these chemicals, most other RO manufacturers ignore the situation and offer no antiscalant. AquaGlobal has discovered a solution to this problem; the solution is to use a single chemical antiscalant, (in addition to an inlet water flocculant feed) which is safe, non-toxic, and EPA approved. The antiscalant and flocculant are automatically dispensed within the unit.

The AquaGlobal unit is also equipped with an **automatic backwash**; most other RO units are not. Automatic backwash of the prefiltration components eliminates the possibility of equipment failure that can occur if the operator forgets to backwash manually.

Other advantages of the AquaGlobal system are highlighted in the "Water Purification Comparison Chart." **No other system offers all of these features as standard equipment.**

WATER PURIFICATION COMPARISON CHART (NA = Not Applicable)

Feature	AquaGlobal	Other Reverse Osmosis Systems	Evaporators
*1. Cost of producing potable water (\$/ton)	approx. \$2.00	higher	\$7.00 - \$8.00
2. Energy consumption	low	higher	6-10 times as high as RO system
3. Equipment configuration	small, compact package plant or modular design	large units, separate components	large with significant maintenance
4. Weight	low	higher	highest
5. Built-in chemical pretreatment	yes	no	no
6. Built-in, safe, nontoxic antiscalant	yes	some	no
7. Built-in prefiltration	yes (4 stages)	some	no
8. Maintenance	negligible	higher (manual)	highest
9. Unattended operation	yes	no	no
10. Automatic backwash/blowdown	yes	some (option only)	NA
11. Membrane life	over 2 years	less	NA
12. Operation continues if a membrane fails	yes (at reduced capacity)	no	NA
13. Overall system reliability	high	low	high
14. Chlorine-resistant construction	yes	some	NA

*Based on the cost of crude oil Feb., 1983.



How the system works

(Note: Text will be keyed into a numbered process flow diagram. Arrows in the diagram will indicate the direction and sequence of the fluid flow.)

1. Basket Strainer. Feedwater enters the system through a basket strainer that removes algae, seaweed, and other particles larger than 1/8-inch in diameter.

2. Solids Separator. An in-line cyclone separator removes 98% of solids larger than 74 microns in diameter including sand, silt, and grit. The separator has no moving parts and no filters. Solids are collected and discharged automatically; no backwashing is required.

3. Polyelectrolyte Flocculant is added to the feedwater in the separator. The flocculant conditions raw water to achieve greater filtration efficiency by coagulation of suspended solids.

4. The Antiscalant Compound is added to the water as it leaves the separator. This chemical prevents scale formation in membranes and pipes and is non-toxic and EPA approved.

5. Sand Filter. The water flows through 500 pounds (225 kgs.) of 20-grain white silica sand. The sand filter removes solids down to 15-20 microns in diameter, and is backwashed automatically to increase filter life and reduce maintenance.

6. Cartridge Filters. High-surface-area, end-sealed cartridges arranged in parallel act as the final polishing filter.

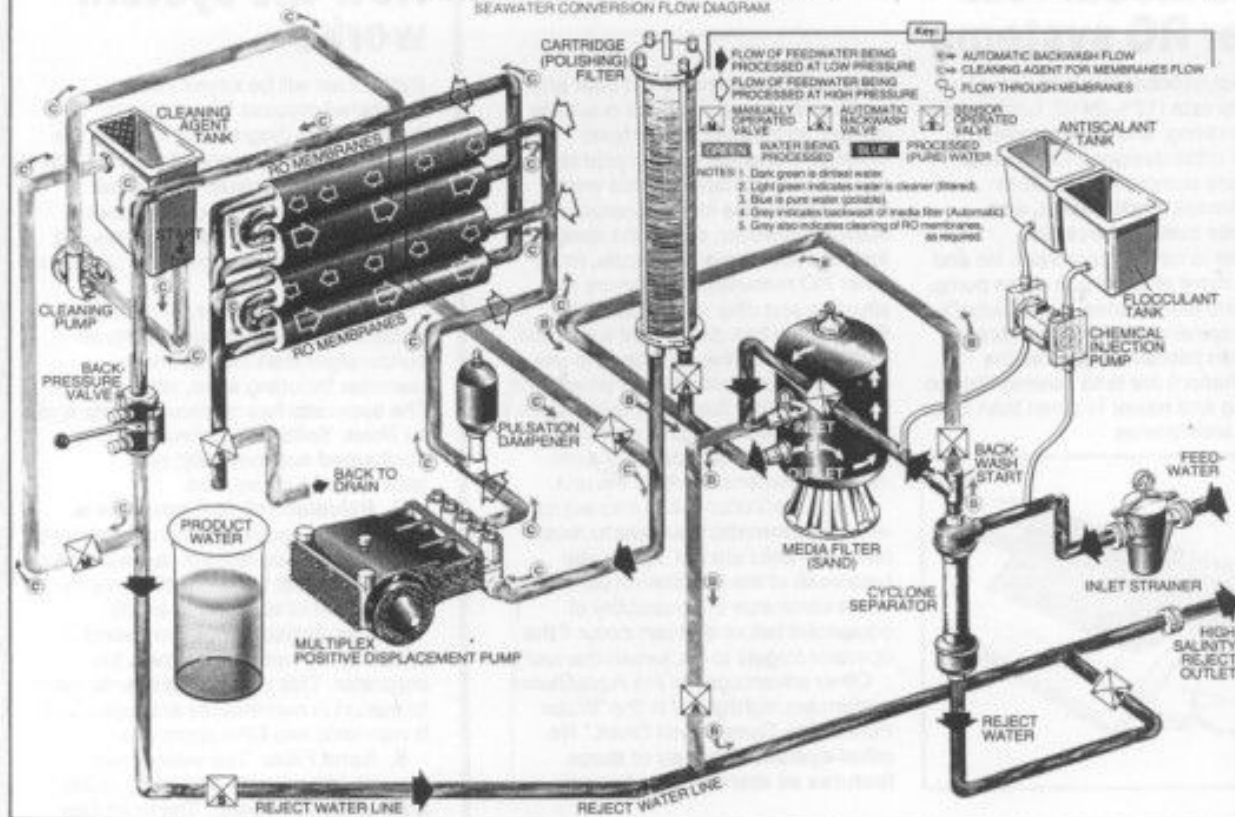
7. High-Pressure Pump pressurizes feedwater to the 800-1000 psi required for the reverse osmosis process.

8. Reverse Osmosis Membranes. In the AquaGlobal AGI-5000S system shown, four RO membranes in series and parallel remove a minimum of 98.6% of the total dissolved solids (TDS) so that the product water contains less than 600 ppm TDS. This meets EPA and World Health Organization standards for potable water.

9. Product Water is diverted to a storage tank via the product water outlet flange.

10. Effluent Feedwater is returned to its source via the reject water outlet flange.

AGI 5000S REVERSE OSMOSIS WATER PRODUCTION SYSTEM
SEAWATER CONVERSION FLOW DIAGRAM



Technical specifications

Typical system design parameters

[5000 gpd (19 M³/day) system as an example]

Type:	Single pass seawater
Model No.:	AGI 5000S
Rated Capacity:	5000 gpd (19 M ³ /day)
Design Operating Temperature:	77°F (25°C)
Operating Temperature Range:	32°F (0°C) – 100°F (38°C)
Design Feedwater Flow:	28 gpm (106 lpm) [50 gpm (1189 lpm) on backwash]
Design Feedwater Pressure:	45 psi (3 kg/cm ²)
Feedwater Pressure Range:	40–55 psi (2.75–3.75 kg/cm ²)
Design Operating Pressure:	800–1000 psi (54–68 kg/cm ²)
Maximum Operating Pressure:	1000 psi (68 kg/cm ²)
Power Consumption:	15 kw
Feedwater Total Dissolved Solids:	35,000 ppm

Note: Other systems are available in capacities ranging from 600 gpd (2.25 M³/day) to 80,000 gallons per day (300 M³/day).

Typical performance

The AquaGlobal Reverse Osmosis Seawater Desalinator, when operated within its design parameters, will reduce the total dissolved solids (TDS) by the values given below $\pm 10\%$.

Feedwater Ionic Composition:	PPM:	Product Water PPM:
Chloride (CL)	19,350	271
Sodium (NA +)	10,600	148
Sulfate (SO ₄)	2,710	38
Magnesium (MG +)	1,300	18
Calcium (CA +)	405	6
Potassium (K +)	385	5
Carbonate and Bicarbonate	122	2
Other dissolved solids	128	2
Total dissolved solids	35,000	490

Typical control system

The electrical control system is operated from a single 220/380/440; 50/60 HZ, 3 phase power supply connected to the system(s) fused disconnect switch. The high pressure pump is operated on 220/380/440 volts 3 phase. The cleaning pump, solenoid control valves, and Total Dissolved Solids

Monitor are 120 VAC, single phase. The annunciator and shutdown system are 24 VAC/VDC. Internal step-down transformers are provided.

The system control panel is of welded steel construction in accordance with NEMA 12 requirements. All operator controls are located on the front panel, where complete system operating status can be observed through a clear plexiglass window.

The system can be remotely controlled by positioning the 3-position switch in the automatic mode and wiring from the terminals provided to the device remotely located, such as a product water storage tank.

NOTE: Compatible electric controls available to your specs.

Safety circuits

Power to the high pressure pump will be interrupted and an alarm activated (which has provision for connection of a remote alarm) in the event the pre-set limits of the following safety devices are exceeded:

1. Low air pressure
2. Low suction pressure
3. High discharge pressure
4. High or low feedwater temperature
5. High product water pressure
6. Media filter high differential pressure

7. Cartridge filter high differential pressure
8. Pump crankcase high or low oil level
9. Low level antiscalant tank
10. Low level flocculant tank

An indicator light is provided for each of the above shutdowns. The system must be reset and the fault corrected before the system can be restarted.

An alarm will be activated and product water diverted to reject, should the product water TDS exceed the predetermined set point of the TDS monitor.





AGI 5000S WATER PRODUCTION PLANT



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TYPICAL SYSTEM OVERALL DIMENSIONS

[5000 gpd (19 M³/day)
system as an example]

Length: 97½" (247.7 cm)

Width: 49½" (125.7 cm)

Height: 61½" (156.2 cm)

WEIGHT

Dry: 2,600 lbs. (1179 kgs.)

Wet: 3,550 lbs. (1610 kgs.)

CUSTOMER INTERFACE REQUIREMENTS

Electrical:

440 Volts, 60 Hertz or 380 Volts, 50 Hertz
3 Phase 30 Amps

Air Supply:

50 psi min., 150 psi max. (3.4 kg/cm²,
min., 10.2 kg/cm² max.)

Feedwater Supply:

28 gpm (106 lpm) - 25 psi (1.7 kg/cm²)
min., 55 psi (3.75 kg/cm²) max.

PIPING CONNECTIONS:

Feedwater Inlet:

2" 150# Flange Type 316 SS

Reject Water Outlet:

2" 150# Flange Type 316 SS

Product Water Outlet:

1" 150# Flange Type 304 SS

Air Supply Inlet: ½" FIPT Carbon Steel

System Drain: 1" FIPT Type 316 SS

NOTE: Materials for feedwater to be PVC,
fiberglass, 316 stainless steel, or internal
epoxy lined carbon steel.

GENERAL INFORMATION

All material used in the construction of this system will be new and free of defects. Equipment will be grouped and securely mounted within the system and protected by 14 gauge steel covers. Access doors are provided where necessary for inspection and servicing.

FRAMES/SKIDS:

Frames which hold membrane assemblies, valves, piping, etc. will be of all welded-steel construction. Bolt-holes, mounting holes, etc. will be drilled prior to painting. All frames will be sand blasted and epoxy coated for corrosion resistance.

PIPING:

All low pressure pipe and fittings for feedwater, product and reject water will be fabricated from PVC Schedule 80, conforming to ASTM D-1785, ASTM D-2484 or ASTM D-2467. All high pressure pipe and fittings within the system will be fabricated from type 316 stainless steel, conforming to ANSI B 36.19 and ANSI B 16.11. All pipe, fittings and hoses are approved for potable water service.

TESTING:

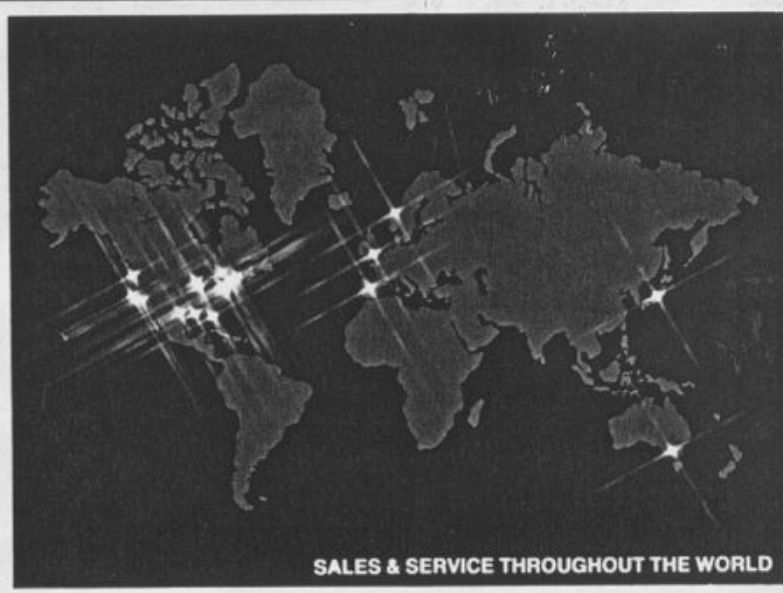
The system will be given a complete operational test using water equivalent to standard seawater. System performance data will be recorded and provided to the customer on the Quality Assurance Test Data Sheet.

INSPECTION AND PACKING:

Upon request, AquaGlobal will insure that all components are available for inspection at the factory facilities during fabrication. All components will be carefully prepared for shipment and packed in accordance with accepted standards for export shipping.

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AQUAGLOBAL® INCORPORATED



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Liquid Level Probe Alarms

AquaGlobal®: your single source

At AquaGlobal, we have the experience, resources, and technology to be the single source for *all* your potable water production needs. With over 21 locations worldwide, we can

provide the systems and services you need — where and when you need them. For more information, contact AquaGlobal today.



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