



Aqua Whisper DX Compact 450-1800

Owner's Manual

Initial Release - 1 December 2008



FOR 2008 MODELS

SRC Aqua Whisper DX 450-1	SRC Aqua Whisper DX 900-2
SRC Aqua Whisper DX 700-1	SRC Aqua Whisper DX 1400-2
SRC Aqua Whisper DX 900-1	SRC Aqua Whisper DX 1800-2



Aqua Whisper DX Compact 450-1800

Owner's Manual

PREFACE

Thank you for your purchase of a Sea Recovery Coral Sea Slimline Reverse Osmosis Desalination System. This manual contains instructions for the installation, operation, maintenance, and repair of the Sea Recovery Desalination System. This information is provided to ensure extended life and safe operation of your Sea Recovery system.

Please read this manual thoroughly before installation or operation, and keep it for future reference. A better understanding of the system ensures optimum performance and longer service life.

Sea Recovery's Reverse Osmosis Desalination Systems are designed and engineered to function as a complete working unit. Generally speaking, the performance of each component within the System is dependent on the component prior to it and governs the performance of all components after it. Proper performance of the system is thus dependent upon proper operation of every single component within the system.

The intent of this manual is to allow the operator to become familiar with each component within the Sea Recovery system. By understanding the function, importance, and normal operation of each component within each subsystem of the unit, the operator can readily diagnose minor problems, which if detected early are usually easily corrected. However, if left unattended, a problem in one component eventually affects the rest of the system and leads to further repairs.

The manual is divided into sections that address different subject matter. Each section should be reviewed before operating the Reverse Osmosis Desalination system.

The major documented cause of failures and problems are from the use of third party, non Sea Recovery, parts, from improper installation, and from improper operation:

The use of third party, non Sea Recovery, consumable, spares, and assemblies will damage the Sea Recovery system and/or specific components within the system. Do not use parts, components from any source other than Sea Recovery. Use of third party, non Sea Recovery, components will void any and all warranty of the system and/or void the effected component within the system.

Sea Recovery maintains inventory for immediate shipment and our Service Dealers throughout the world maintain stock of Sea Recovery parts. Always insist on Sea Recovery supplied parts

for your system in order to avoid failures, eliminate problems, and maintain your Sea Recovery Warranty.

Follow the Installation and Operation Instructions in this manual. From time to time, Sea Recovery may make programming changes to the Control Logic.

Other physical production changes may also be made from time to time and are tracked by Sea Recovery through the System Serial Number.

Troubleshooting and repair method results can vary depending on the information that is displayed at the SYSTEM INFORMATION screen.

When requesting assistance from Sea Recovery or Sea Recovery's service dealers, always:

PROVIDE ALL INFORMATION DISPLAYED AT THE SYSTEM INFORMATION SCREEN.

- **SERIAL NUMBER** helps us to determine the latest physical version and configuration of your system which is necessary to ensure that we provide you with the correct information or parts.
- **TYPE** tells us the production capacity of your system which gives us a bench mark in diagnosing product water flow and pressure concerns.
- **TIME RUNNING** assists us in diagnosing abnormalities that can occur at given operational time intervals such as required pump maintenance, or R.O. membrane element condition.
- **VERSION** allows us to determine the specific sequential operation of the system based on the version of the programmed control logic.

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Section 1 - INTRODUCTION

1 INTRODUCTION

1.1 PURPOSE

This manual is intended for Sea Recovery's system technicians, technical support, and training personnel. This manual contains technical information and instructions for the installation, operation, maintenance, and troubleshooting of the Sea Recovery Desalination System.

1.2 SAFETY IN GENERAL

Anyone responsible for the installation, operation, and maintenance of the Sea Recovery Desalination System must read this manual thoroughly and comply with the instructions, guidelines, and safety requirements at all times.

1.3 USING THIS MANUAL

Reading this manual in its entirety will help users to become familiar with each component within the system. By understanding the function, importance, and normal operation of each component, users can readily operate and diagnose problems.

Aside from this section, this manual is divided into nine majors sections.

- System Description
- Pre-installation Notes
- Electrical Information
- Installation Requirements
- Commissioning
- Operation
- Maintenance and Repair
- Troubleshooting
- Exploded Parts View

Each section should be reviewed in the order provided before performing any system operations.

1.4 TERM USED

The term System refers to Aqua Whisper System in general and will be used throughout this manual.

1.5 REFERENCES

All references in this manual refers to other section within this manual unless specifically defined.

1.6 SAFETY NOTES

Safety issues that require users attention are highlight through out this manual as follows.



WARNING: A Warning note provides critical information users must comply with in order to prevent the possibility of injuries and/or death.



CAUTION: A Caution note provides important information users must know to prevent the possibility of damaging the device or equipment.



NOTE: A Note provides additional information users should know to properly and safely operate the equipment.

1.7 GRAPHICS

Graphics used are for reference and illustration purposes only, and may not represent the actual part or arrangement of parts in a customized system.

1.8 GLOSSARY

Following terms are helpful in becoming familiar with the Sea Recovery RO System.

BOUNDARY LAYER / CONCENTRATION POLARIZATION

When water permeates through the membrane, nearly all the salt is left behind in the brine channel. In any dynamic hydraulic system, the fluid adjacent to the wall of the vessel is moving relatively slow. Even though the main body of the stream is turbulent, a thin film adjacent to the wall (membrane) is laminar. This thin film is called the boundary layer.

At the boundary layer the salts are saturated and can readily adhere to and pack into the R.O. membrane element surface if the Feed Water Flow is insufficient. For this reason it is important to maintain sufficient Feed Water flow, to prevent Concentration Polarization, through the R.O. membrane element.

BRINE VELOCITY

The brine flow over the membrane surface is very important to both product water quality and quantity. At low flows, concentration polarization occurs, causing the water quality to decline.

In addition to inferior product water quality, low brine flows can increase the precipitation of sparingly soluble salts which will foul the R.O. membrane element surface (concentration polarization). If this occurs, the product water flux (production) will decline.

The Feed Pump integrated design provide a relatively smooth and continual flow of Feed Water across and through the R.O. membrane element.

COMPACTION

Some densification of the membrane structure may take place while operating at elevated pressures, above 1000 PSI. The change is known as compaction and is accompanied by a reduction in the water permeation rate.

When the R.O. membrane element is subjected to elevated pressures beyond 1000 PSI the Product Water Channel becomes squeezed which results in restriction and in turn product water recovery reduction.

OSMOTIC PRESSURE

The transfer of the water from one side of the membrane to the other will continue until the head (pressure) is great enough to prevent any net transfer of the solvent (water) to the more concentrated (feed water) solution.

At equilibrium, the quantity of water passing in either direction is equal, and the head pressure is then defined as the "Osmotic Pressure" of the solution having that particular concentration of dissolved solids.

PRESSURE

The operating pressure has a direct affect on product water quality and quantity. Both factors will increase as the system pressure increases (higher quantity and higher quality within design limits).

The system must be operated at the lowest pressure required to achieve the designed product water flow rate. This parameter also minimizes compaction, which proceeds at a faster rate at higher pressures as well as at higher temperatures.

The System self adjusts its operating pressure to maintain a precise amount of Product Water Flow. However in so doing, at low temperatures and or high salinity feed water conditions the system will operate at higher than normal pressure in maintaining the specified amount of product water flow. This is normal, to be expected, and is due to the design characteristics of the system.

SPIRAL-WOUND MEMBRANE

The spiral-wound membrane consists of multiple membrane envelopes each formed by enclosing a channelized product water carrying material between two large flat membrane sheets. The membrane envelope is sealed on three edges with a special adhesive and attached with the adhesive to a small diameter pipe.

A polypropylene screen is used to form the feed water channel between the membrane envelopes. A wrap is applied to the membrane element to maintain the cylindrical configuration. The center tube is also the permeate (product water) collecting channel. Several elements may be connected in series within a single or multiple pressure vessels).

WATER TEMPERATURE EFFECT

The product water flow through the membrane is significantly affected by the water temperature. At any given pressure this flow increases with increasing water temperature and is reduced at lower temperatures. The System over comes this factor by self adjusting the operating pressure to maintain a precise amount of Product Water Flow.

Aqua Whisper DX Compact 450-1800

Section 2 - SYSTEM DESCRIPTION

2 SYSTEM DESCRIPTION

Since 1981, Sea Recovery Corporation has been producing water desalination systems for various applications to customers all around the world. Since then Sea Recovery has become one of the top leaders in advanced water desalination systems for leisure marine applications.



2.1 MODELS

Aqua Whisper Compact series are available in six models.

- SRC Aqua Whisper 450-1
- SRC Aqua Whisper 700-1
- SRC Aqua Whisper 900-1
- SRC Aqua Whisper 900-2
- SRC Aqua Whisper 1400-2
- SRC Aqua Whisper 1800-2

2.2 SPECIFICATIONS

Refer to [Page 2-2](#) for System Specification details.

2.3 COMPLIANCE

Sea Recovery's Reverse Osmosis Desalination Systems are Type Accepted by the American Bureau of Shipping, ABS.

Sea Recovery's Reverse Osmosis Desalination Systems comply with FCC § 15.105

Sea Recovery's Reverse Osmosis Desalination Systems have been independently tested and determined to be in compliance with European CE (Conformité Européenne).

Refer to [Page 2-5](#) for compliance certificates.

2.4 WARRANTY

Sea Recovery guarantees its product, components, and replacement parts and recommends customers to use only Sea Recovery parts. The majority of RO system problems derive from premature failure of unauthorized third party replacement parts.

Using unauthorized third party components will lead to higher operating costs and maintenance costs and labor. Most importantly, using unauthorized parts will void Sea Recovery Warranty.

Refer to [Page 2-11](#) for Limited Warranty.

2.5 REGISTRATION

Sea Recovery recommends all customers to register their System immediately after delivery to ensure and guarantee product technical support and warranty.

2.6 PACKING LIST

For visual packing list and optional accessories refer to [Page 2-13](#).

2.7 COMPONENT DIMENSIONS

Refer to [Page 2-15](#) for system and component dimensions.

2.8 DAILY SYSTEM READING

Refer to [Page 2-17](#) for daily system reading log sheet.

2.9 CHEMICAL SAFETY

Refer to [Page 2-18](#) for chemical safety and first aid recommendations.

2.10 TEMPERATURE & PRESSURE EFFECTS

Refer to [Page 2-20](#) for temperature and pressure effects on RO membrane performance.

SYSTEM SPECIFICATIONS:**PERFORMANCE:**

PRODUCT WATER PRODUCED PER HOUR AND PER DAY OF OPERATION:

(+/-15% at 850 psig / 56 BAR, 77°F / 25°C & 35,000 PPM TDS Feed Water Salinity)

Model Number	per 1 hour of operation:		per 24 hours of operation:	
	U.S. Gallons / Liters		U.S. Gallons / Liters	
SRC Aqua Whisper 450-1	19	71	450	1703
SRC Aqua Whisper 700-1	29	110	700	2650
SRC Aqua Whisper 900-1	38	142	900	3407
SRC Aqua Whisper 900-2	38	142	900	3407
SRC Aqua Whisper 1400-2	58	221	1400	5300
SRC Aqua Whisper 1800-2	75	284	1800	6814

SALT REJECTION (CHLORIDE ION): 99.4%

PRODUCT WATER TEMPERATURE: Ambient to feed water temperature

SPECIFICATIONS:

SALINITY MONITORING: Automatic computer controlled electronic monitoring. The salinity monitoring components of the system give a continuous readout in micromhos per cubic centimeter, are temperature compensated and of a fail-safe design.

SALINITY RANGE OF FEED WATER:

Seawater up to 50,000 PPM TDS (NaCl) (typical seawater salinity is 35,000 PPM)

TEMPERATURE RANGE: Max. 122°F / 50°C, Min. 33°F / .5°C

SYSTEM FEED WATER:

	Alternating Current 50 Hz	Alternating Current 60 Hz
Feed Water Flow Per Hour:	225 U.S. Gallons / 852 Liters	270 U.S. Gallons / 1,022 Liters

REVERSE OSMOSIS MEMBRANE:

TYPE: Specifically selected High Rejection / High Yield aromatic tri-polyamide, thin film composite, spiral wound, single pass reverse osmosis membrane element.

CHLORINE TOLERANCE: 0.1 PPM.

pH RANGE: 3-11 (typical seawater pH is 8)

SYSTEM PRESSURE:

FEED WATER: Minimum 6 psi / .42 Kg/cm ² / 41.4 kPa	Maximum 40 psi / 2.8 Kg/cm ² / 275.8 kPa
OPERATION: Seawater @ 35,000 PPM & 77° F / 25° C:	Nominal 800 psi / / 56.25 Kg/cm ² / 5516 kPa

EXTERNAL INSTALLATION WATER CONNECTIONS:

Pipe sizes to be supplied by the installer for connection of the Sea Recovery supplied components

Aqua Whisper

Feed Inlet:	3/4 in. (19 mm) MNPT Male National Pipe Thread U.S. Standard
Brine Discharge	3/4 in. (19 mm) MNPT Male National Pipe Thread U.S. Standard
Product	1/2 in. (12.7 mm) FNPT Female National Pipe Thread U.S. Standard

WEIGHT:

MODEL	Compact Style
Aqua Whisper 450-1	153 lbs / 69 kg
Aqua Whisper 700-1	156 lbs / 71 kg
Aqua Whisper 900-1	158 lbs / 72 kg
Aqua Whisper 900-2	165 lbs / 75 kg
Aqua Whisper 1400-2	171 lbs / 76 kg
Aqua Whisper 1800-2	176 lbs / 80 kg

ELECTRICAL MOTOR SPECIFICATIONS:

(H.P. = Horse Power; RPM = Revolutions Per Minute; FLA = Full Load Amperes; LRA = Locked Rotor Amperes @ Start Up)

ALTERNATING CURRENT SYSTEMS:

Single Phase Alternating Current:

		High Pressure Pump Motor				Booster Pump Motor			
VAC	Hz	H.P	RPM	FLA	LRA	H.P	RPM	FLA	LRA
110	50	3	2850	23	89	.5	2850	7.4	20
220	50	3	2850	11.5	44	.5	2850	3.7	10
115	60	3	3450	25.4	86	.5	3450	9.4	20
230	60	3	3450	12.7	43	.5	3450	4.7	10

Three Phase Alternating Current:

		High Pressure Pump Motor				Booster Pump Motor			
VAC	Hz	H.P	RPM	FLA	LRA	H.P	RPM	FLA	LRA
220	50	2.5	2850	7.9	24.9	.5	2850	2.5	8.2
380	50	2.5	2850	4.6	14.4	.5	2850	1.5	4.7
230	60	3	3450	7.6	23.8	.5	3450	2.4	7.9
460	60	3	3450	3.8	11.9	.5	3450	1.2	3.9

RECOMMENDED CIRCUIT BREAKER SUPPLYING POWER TO SYSTEM AMPERAGE RATING:

Operating		Recommended
AC Voltage	Phase	Circuit Breaker
110 - 115 VAC	Single	50 Ampere
220 - 230 VAC	Single	25 Ampere
220 VAC	Three	15 Ampere
380 VAC	Three	10 Ampere
460 VAC	Three	10 Ampere

RECOMMENDED POWER WIRE SIZE TO AQUA WHISPER SYSTEM:

Operating	Phase	Maximum	Recommended Minimum Wire Size for Length of run		
Voltage		Load			
			10 Ft / 3 meter	25 Ft / 8 meter	50 Ft / 15 meter
110-115 VAC	Single	34.8 Ampere	10 AWG / 6 mm ²	8 AWG / 10 mm ²	8 AWG / 10 mm ²
220-230 VAC	Single	17.4 Ampere	12 AWG / 4 mm ²	12 AWG / 4 mm ²	12 AWG / 4 mm ²
220-230 VAC	Three	10.4 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²
380 VAC	Three	6.1 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²
460 VAC	Three	5 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²

RECOMMENDED POWER WIRE SIZE TO AQUA WHISPER BOOSTER PUMP:

Operating	Phase	Maximum	Recommended Minimum Wire Size for Length of run		
Voltage		Load			
			10 Ft / 3 meter	25 Ft / 8 meter	50 Ft / 15 meter
110-115 VAC	Single	9.4 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²
220-230 VAC	Single	4.7 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²
220-230 VAC	Three	2.5 Ampere	16 AWG / 1.5 mm ²	16 AWG / 1.5 mm ²	16 AWG / 1.5 mm ²
380 VAC	Three	1.5 Ampere	16 AWG / 1.5 mm ²	16 AWG / 1.5 mm ²	16 AWG / 1.5 mm ²
460 VAC	Three	1.2 Ampere	16 AWG / 1.5 mm ²	16 AWG / 1.5 mm ²	16 AWG / 1.5 mm ²

RECOMMENDED POWER WIRE SIZE TO AQUA WHISPER HIGH PRESSURE PUMP:

Operating	Phase	Maximum	Recommended Minimum Wire Size for Length of run		
Voltage		Load			
			10 Ft / 3 meter	25 Ft / 8 meter	50 Ft / 15 meter
110-115 VAC	Single	25.5 Ampere	12 AWG / 4 mm ²	10 AWG / 6 mm ²	10 AWG / 6 mm ²
220-230 VAC	Single	12.7 Ampere	14 AWG / 2.5 mm ²	12 AWG / 4 mm ²	12 AWG / 4 mm ²
220-230 VAC	Three	7.9 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²
380 VAC	Three	4.6 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²
460 VAC	Three	3.8 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²

COMPLIANCE CERTIFICATES



CERTIFICATE NUMBER

06-HS159834E-PDA

DATE

17 May 2006

ABS TECHNICAL OFFICE

Houston SED - Ship Systems

Description

CERTIFICATE OF Design Assessment

This is to Certify that a representative of this Bureau did, at the request of
Sea Recovery Corporation

assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate. It will remain valid as noted below or until the Rules or specifications used in the assessment are revised (whichever occurs first).

PRODUCT: Reverse Osmosis Desalinator
MODEL: Aqua Matic
ABS RULE: 2006 Steel Vessel Rules 1-1-4/7.7, 4-B-2/5.7
OTHER STANDARD: None.

AMERICAN BUREAU OF SHIPPING


Hans P. Haendler

Engineering Type Approval Co-ordinator

80009

NOTE: This certificate evidences compliance with one or more of the Rules, Rules, Standards or other criteria of American Bureau of Shipping or a statutory, industrial or manufacturer's standard and is issued solely for the use of the Bureau, its committees, its plants or other authorized entities. Any significant changes to the aforementioned product without ABS approval will result in this certificate becoming null and void. This certificate is governed by the terms and conditions on the reverse side hereof.

TX 0505-58006
(TR 100)

American Bureau of Shipping

Sea Recovery's Reverse Osmosis Desalination Systems are Type Accepted by the American Bureau of Shipping, ABS.



American Bureau of Shipping.

Safety, Service, Solutions

These three goals define the activities of ABS. They are the bedrock upon which the American Bureau of Shipping's commitment to set standards of excellence as one of the world's leading ship classification societies is founded.

From its inception in 1862, setting safety standards for the marine industry has been the core commitment of ABS. This is achieved through the establishment and application of technical standards, known as Rules, for the design, construction and operational maintenance of ships and other marine structures. Classification is a process that certifies adherence to these Rules.

The core competencies of this worldwide network of ABS professionals lie in the fields of survey, engineering and auditing. Backing these field representatives is an unequivocal commitment to research and development.

The ABS Type Approval Program

The ABS Type Approval program has existed in some form since 1983. Today it is formalized in the Rules. Two basic processes and certificates establish the validity of a product and all other certificates that may be issued in the program. The format imitates the format of the European Marine Equipment Directive (MED).

- Satisfactory evaluation of a product to a set of Rules or standards is recorded in the issue of a "Product Design Assessment (PDA)" certificate. The process is the same as would be followed for an ABS Design Review Letter. It imitates the Module B category of the MED.
- Satisfactory evaluation of the manufacturing (Works) facility to confirm their ability to consistently manufacture the product in accordance with the PDA is recorded in the issue of a "Manufacturing Assessment (MA)" certificate. This was previously known in ABS as the MMEC program. This imitates the modules D and E of the MED.

The IACS Ad-Hoc Committee for the Certification of Materials and Components have consensus that Type Approval requires; 1) an evaluation of the product including prototype tests (if necessary), 2) a witness of the manufacture of the product (type test), and 3) an assessment of the manufacturer's ability to consistently manufacture the product in accordance with the approved specifications. There are a multitude of derivations of this process; following is an abbreviated outline of the basic certificates:

A Type Approved Product has satisfied the processes of:

1. An Engineer's evaluation of a design to determine conformance with specifications. The manufacturer should submit sufficient information to allow ABS to determine if the product meets specification. This results in a Product Design Assessment Certificate (PDA).
2. Witnessing manufacture and testing of a type of the product to determine compliance with the specification
3. A Surveyor's evaluation of the manufacturing arrangements to confirm that the product can be consistently produced in accordance with the specification. This results in the issue of a Manufacturing Assessment Certificate

Statement of Compliance

Presented to
Sea Recovery Corporation

The following model was tested and found to be fully compliant
with FCC/CISPR 22/85 Class A (ANSI C63.4 1992),
EN55011 Class A Group 1 (1991) & EN50082-2 (1995)

Water Desalinator, AW Series

Tested at CKC Laboratories, Inc. on September 28-29, 1998
Report Number: **FA98-126 & CE98-254**



DAR Registration No. DAT-P-051/95-00

Tracy Phillips
Tracy Phillips
Documentation Control Supervisor

Dennis Ward

Dennis Ward
Director of Laboratories

FCC

Sea Recovery’s Reverse Osmosis Desalination Systems comply with FCC § 15.105

United States Federal Communications Commission Compliance

FCC § 15.105

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Description

Declaration Of Conformity



CONFORMITY DECLARATION

Manufacturer's Name: Sea Recovery Corp.
Manufacturer's Address: 19610 South Rancho Way
Rancho Dominguez, Ca.
90220 U.S.A.

SEA RECOVERY CORP. Declares that the:

Product Series: Aqua Series and
High Sea Series of
Reverse Osmosis Desalinators

Model Names: Aqua Matic, Aqua Whisper,
Aqua Mini, Ultra Whisper,
Coral Sea, Tasman Sea,
and North Sea

Conforms to the following Standard(s): EN 55011A and EN 50082-2

SUPPLEMENTARY INFORMATION:

"The product complies with the requirements of the EMC Directive 89/336/EEC."



Official Seal

CHRIS ROLLINS
VP Director of Quality Assurance, SRC
Manufacturer's Contact



Sea
Recovery®

REVERSE OSMOSIS DESALINATORS

Sea Recovery Corporation, Rancho Dominguez, California U.S.A. © 2005

European Conformité Européne (CE)

Sea Recovery's Reverse Osmosis Desalination Systems have been independently tested and determined to be in compliance with European CE (Conformité Européne)

Description

The CE Mark ('Trade Passport to Europe') is a visible declaration by the manufacturer (or his representative, importer, etc.) that the equipment which is marked complies with all the requirements of all the applicable directives. This mark allows manufacturers and exporters to circulate products freely within the 15 European Union (EU) members. Having ensured that the equipment does indeed meet all these requirements (including all the administrative requirements involved in being able to demonstrate compliance), the CE Mark may then be affixed and the product released.

The letters, "CE", indicate that the manufacturer has undertaken all assessment procedures required for the product. The CE mark indicates conformity to the legal requirements of the EU Directives.

The "CE" mark is now mandatory for regulated products sold in the European Union.

Sea Recovery Aqua Whisper DX 450 - 1800 LIMITED WARRANTY

Sea Recovery warrants that the Sea Recovery Desalination System performs according to specifications for a period of twelve (12) months from the date of shipment. Sea Recovery's liability under this warranty is limited to repair or replacement of the Aqua Whisper Desalination System at Sea Recovery's discretion. Under no circumstances is Sea Recovery liable for consequential damages arising out of or in any way connected with the failure of the system to perform as set forth herein. This limited warranty is in lieu of all other expressed or implied warranties, including those of merchantability and fitness for a particular purpose.

Warranty Period starts from the date of original shipment by Sea Recovery, or with proof of purchase from the date of sale to the original retail purchaser:

1. System and accessories: 1 (one) year
2. Repairs made by Sea Recovery after the original warranty period has expired: 3 (three) months

Normal reoccurring user maintenance listed below is not covered by this or any Sea Recovery limited warranty:

1. Sea Strainer Element
2. Cartridge Filter Elements
3. Fuses
4. Centrifugal Pump Seal Assemblies
5. Instrument Calibration

This or any Sea Recovery limited warranty does not cover installation components not supplied by Sea Recovery. Improper installation resulting in the Sea Recovery System or component failure or decline in performance is not covered by this or any Sea Recovery limited warranty.

The Sea Recovery Reverse Osmosis Membrane Element is guaranteed to be cleanable for a minimum of one year from date of shipment, providing cleaning periods are adhered to, and fouling is acid soluble metal hydroxides and calcium carbonates or alkaline soluble organic, inorganic substances and microbiological slimes. The Sea Recovery R.O. Membrane Element is not guaranteed against iron fouling (rust), chemical or petroleum products attack, extreme temperatures [over 120° F (49° C) under 32° F (0° C)], drying out, or extreme pressures [over 1000 psig (69 bar)].

In the event of a defect, a malfunction, or failure specifically covered by this warranty and during the warranty period, Sea Recovery will repair or replace, at its option, the product or component therein which upon examination by Sea Recovery appears to be defective.

To obtain warranty service, the defective product or part must be returned to an authorized Sea Recovery Service Center or direct to Sea Recovery. An updated listing of Sea Recovery Factory Service Centers can be found on the Sea Recovery web site at <http://www.searecovery.com>. The purchaser must pay any transportation or labor expenses incurred in removing and returning the product to the service center or to Sea Recovery.

The limited warranty does not extend to any system or system component which has been subjected to alteration, misuse, neglect, accident, improper installation, inadequate or improper repair or maintenance or subject to use in violation of instructions furnished by Sea Recovery, nor does the warranty extend to components on which the serial number has been removed, defaced, or changed.

Sea Recovery reserves the right to make changes or improvements in its product, during subsequent production, without incurring the obligation to incorporate such changes or improvements on previously manufactured equipment.

The implied warranties, which the law imposes on the sale of this product, are expressly LIMITED in duration to the time period above. Sea Recovery shall not be liable for damages, consequential or otherwise, resulting from the installation, use, and/or operation of this product or from the breach of this LIMITED WARRANTY.

CAUTION: Use of non Sea Recovery supplied parts and accessories, including but not limited to, maintenance parts, pre-filter elements, cleaning and storage chemical, spare parts, replacement parts, system components, installation components and/or system accessories, shall void all warranty expressed or implied.

Sea Recovery Corp.
PO Box 5288
Carson, CA 90745-5288
sales@searecovery.com

www.searecovery.com

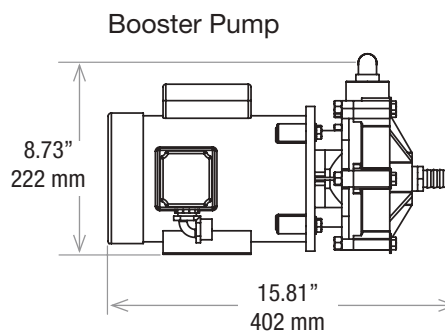
Some of the damages that may not be covered by the warranty include:

- a) Use of non-authorized or misuse of authorized chemicals for storage will void any warranty.
- b) Rust fouling of the R.O. Membrane Element is not covered under warranty.
- c) Damage to the System caused by a blocked brine discharge or product line will not be covered by warranty.
- d) High temperature will cause up to 40% flux loss (loss of production) of the R.O. membrane element(s). This damage is irreversible to the R.O. membrane element and not covered by warranty.
- e) Freezing temperatures will cause mechanical damage to the System and R.O. membrane element due to the expansion of water as it freezes. This damage is irreversible and not covered by any warranty.
- f) Damage caused by excessive vibration will not be covered under warranty.

PACKING LIST

UNCRATING:

1. DO NOT DISCARD ANY PACKAGING UNTIL YOU HAVE FOUND AND IDENTIFIED ALL PARTS!
2. Remove the system from the shipping carton.
3. Some of the components are loose or separately packaged in the shipping container.



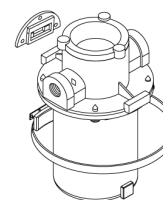
Installation Kit B0019300001

ITEM	PART NO	DESCRIPTION	QTY	UM
1	061100043000	WASHER FLAT OS 1/4"SS	12.00	EACH
2	061172143016	SC HEX "A" 1/4 X 1 SS	12.00	EACH
3	05181432AA	HOSE CLAMP 1/2"	4.00	EACH
4	05181434AA	HOSE CLAMP 3/4" SS	14.00	EACH
5	061170628016	SC PHIL PAN "A" 10 X 1 SS	5.00	EACH
6	061080028000	WASHER FLAT #10 SS	5.00	EACH
7	B651930001	OWNERS MANUAL AQWC-DX	1.00	EACH
8	B645800001	MCC-1 ALKALINE CLEANER	1.00	EACH
9	B645800002	MCC-2 ACID CLEANER	1.00	EACH
10	0328066666	HOSE CLEAR BRAID 3/4"	50.00	FEET
11	0312121969	TUBE 1/4 BLACK	20.00	FEET
12	0101013783	ELB90 3/4 FPT X 3/4 FPT PVC	1.00	EACH
13	0101653783	ADAP 3/4 MPT X 3/4 BARB PVC	1.00	EACH
14	0421051239	SEA STRAINER-3/4 BRONZE	1.00	EACH
15	0101073783	ELB90 3/4 MPT X 3/4 BARB PVC	2.00	EACH
16	0101422583	TEE 1/2 FT X 1/2 FT X 1/2 FT P	1.00	EACH
17	0101292383	RB 1/2 MT X 1/4 FT PVC	1.00	EACH
18	0101652683	ADAP 1/2 MPT X 3/4 BARB PVC	2.00	EACH
19	0204020869	ELB90 1/4 TUBE X 1/4 MPT PLAST	1.00	EACH
20	0101652583	ADAP 1/2 MPT X 1/2 BARB PVC	1.00	EACH
21	0328065066	HOSE CLEAR BRAID 1/2"	50.00	FEET
22	0101012583	ELB90 1/2 FPT X 1/2 FPT PVC	1.00	EACH

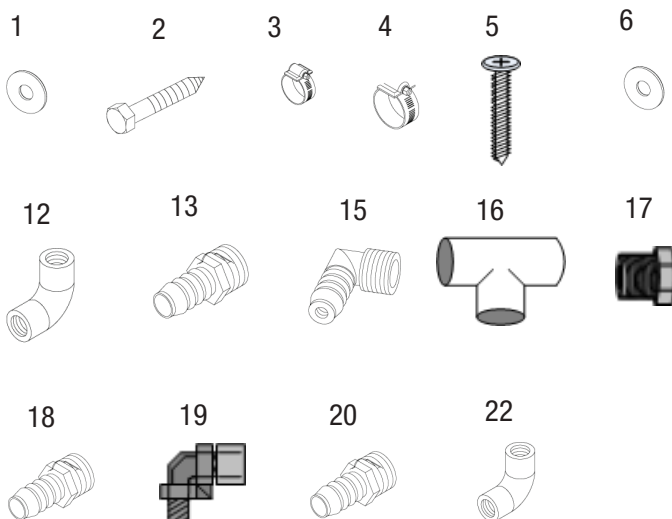
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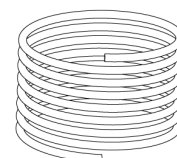
14



SEA STRAINER BRONZE



10

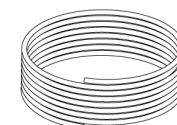
HOSE CLEAR BRAID 3/4" I.D.
QTY: 50 FEET (15.24 METERS)

11



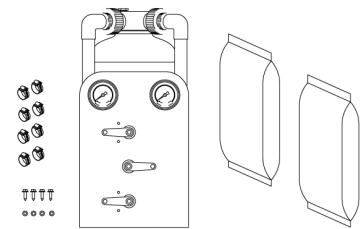
TUBE 1/4 BLACK 20 FT.

21

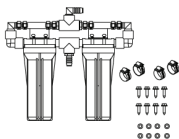
HOSE CLEAR BRAID 1/2" I.D.
QTY: 50 FEET (15.24 METERS)

OPTIONAL ACCESSORIES

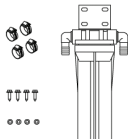
Description



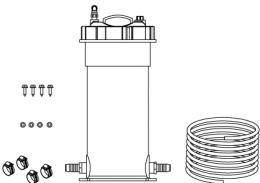
MULTI-MEDIA FILTER ASSY P/N B071080002
MEDIA SAND A100 QTY: 25 LBS
MEDIA GARNET 8-12 QTY: 17 LBS
HOSE CLAMP 3/4" SS QTY: 8
SC HEX "A" 1/4" x 1" SS QTY: 4
WASHER FLAT OS 1/4" SS QTY: 4



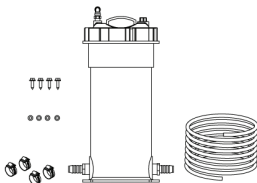
DUAL PLANKTON FILTER P/N B008800002
HOSE CLAMP 3/4" SS QTY: 4
SC HEX "A" 1/4" x 1" SS QTY: 8
SC HEX "A" 1/4" x 1" SS QTY: 8



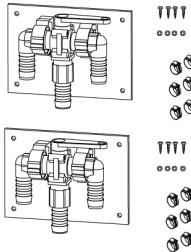
PLANKTON FILTER SINGLE P/N B008800001
HOSE CLAMP 3/4" SS QTY: 8
SC HEX "A" 1/4" x 1" SS QTY: 4
WASHER FLAT OS 1/4" SS QTY: 4



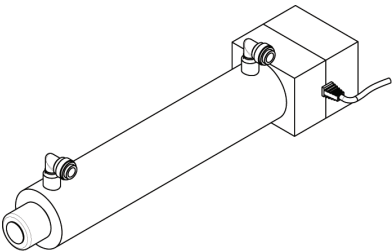
COMMERCIAL PREFILTER P/N B109120001
ADAP 3/4" MNPT x 3/4" BARB QTY: 2
HOSE CLAMP 3/4" SS QTY: 4
SC HEX "A" 1/4" x 1" SS QTY: 4
WASHER FLAT OS 1/4" SS QTY: 4
TUBE 1/4" OD BLACK NYLON QTY: 15 FT



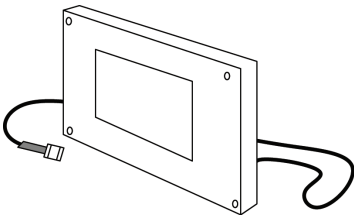
OIL/WATER SEPERATOR P/N B111120001
ADAP 3/4" MNPT x 3/4" BARB QTY: 2
HOSE CLAMP 3/4" SS QTY: 4
SC HEX "A" 1/4" x 1" SS QTY: 4
WASHER FLAT OS 1/4" SS QTY: 4
TUBE 1/4" OD BLACK NYLON QTY: 15 FT



CLEANING & RINSE VALVE KIT P/N B591080001
HOSE CLAMP 3/4" SS QTY: 12
SC PHIL PAN "A" #10 X 1 SS QTY: 8
WASHER FLAT OS #10 NYLON QTY: 8



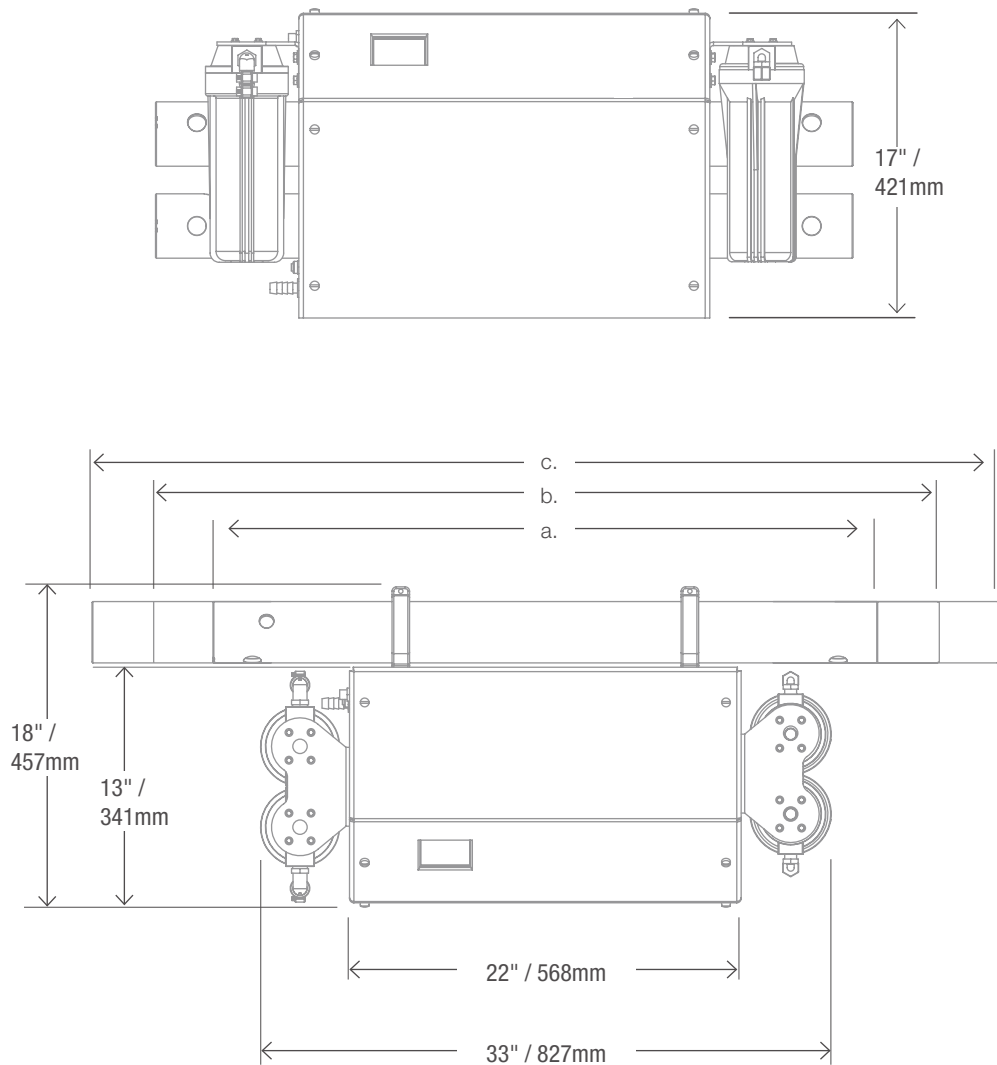
UV Light SP Series



Remote Panel
B610140005

COMPACT UNIT DIMENSIONS

Description



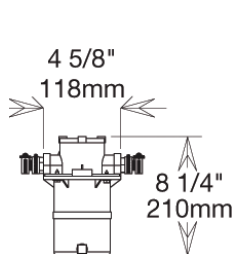
a. 27 15/16" (710mm): Aqua Whisper DX 450-1 & 900-2

b. 37 15/16" (964mm): Aqua Whisper DX 700-1 & 1400-2

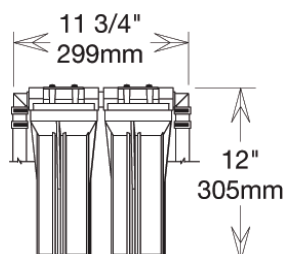
c. 46 15/16" (1192mm): Aqua Whisper DX 900-1 & 1800-2

COMPONENT DIMENSIONS

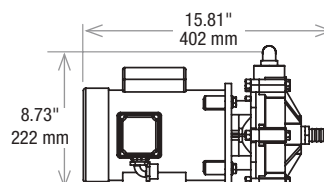
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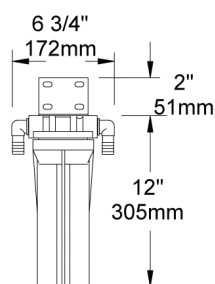
Sea Strainer



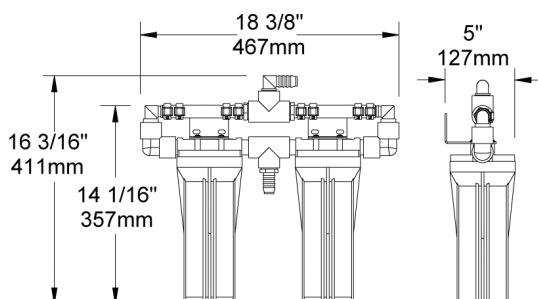
Dual Pre-filter &
Dual Post-filter



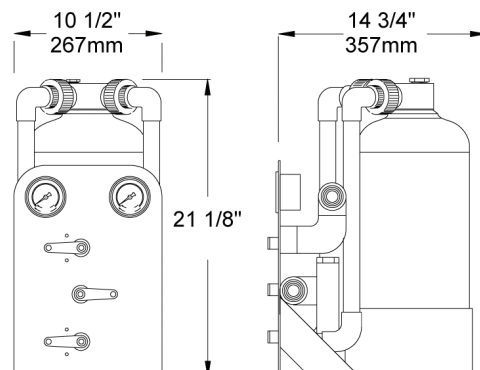
Booster Pump



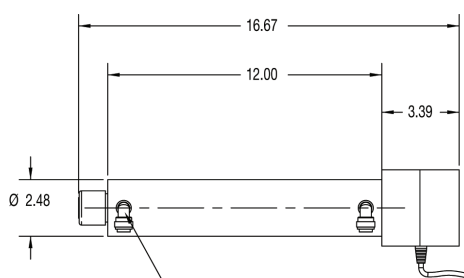
SINGLE
PLANKTON FILTER



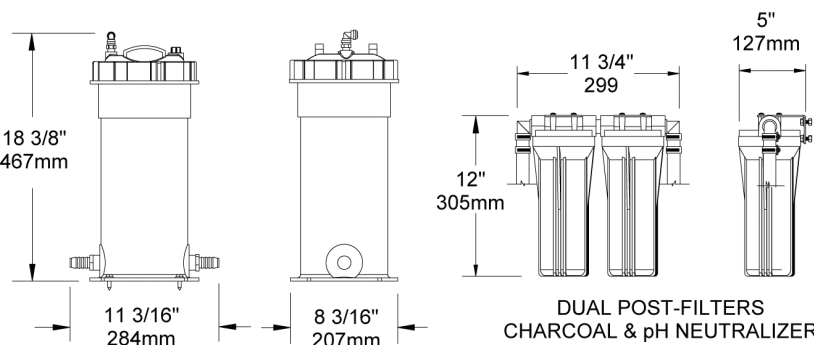
DUAL PLANKTON FILTER



MULTI-MEDIA FILTER

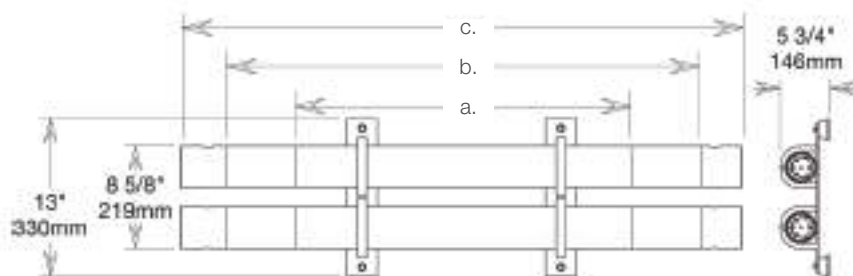


UV Light SP Series



COMMERCIAL FILTER / OWS

DUAL POST-FILTERS
CHARCOAL & pH NEUTRALIZER



Double R.O. Membrane Vessel Assembly

- a. 27 15/16" (710mm): 450-1 & 900-2
- b. 37 15/16" (964mm): 700-1 & 1400-2
- c. 46 15/16" (1192mm): 900-1 & 1800-2

DAILY PERFORMANCE SHEET**Sea Recovery Aqua Whisper****DAILY READINGS**

At the time of commissioning the NEW system, record the following information after one hour of continuous proper operation of the system.

Retain this form in this Owner's Manual for the owner and operator's future reference. This information is valuable to the servicing technicians in providing technical support to the owner and future operators of the Aqua Whisper. Provide this information to service technicians when requesting technical assistance.

Date Installed: _____ Date Commissioned: _____

Model Information:

System Serial Number: _____

Style: ____ Compact ____ Vertical ____ Modular

R.O. Membrane/Vessel Assy Quantity: ____ 1 (one) ____ 2 (two)

System Capacity: ____ 450 GPD ____ 700 GPD ____ 900 GPD ____ 1400 GPD ____ 1800 GPD

Who Installed the System:

Company _____

Street Address _____

City, State _____

Country, postal code _____ Telephone _____

Name of Installer _____

Who Commissioned the System:

Company _____

Street Address _____

City, State _____

Country, postal code _____ Telephone _____

Name of Installer _____

System Power: _____ Volts AC _____ Hz _____ Phase

Feed Water Temperature: _____ Fahrenheit or _____ Celsius

Hour Meter Reading: _____ Hours

PRESSURE READINGS:

Low Pressure Transducer #1 _____ psi or _____ kPa

Pressure Differential Pressure _____ psi or _____ kPa

Low Pressure Transducer #2 _____ psi or _____ kPa

High Pressure Transducer _____ psi or _____ kPa

WATER FLOW METER READINGS:

Flow Meter Product Water: _____ US Gallons Per Hour or _____ Liters Per Hour

Flow Meter Brine Discharge: _____ US Gallons Per Minute or _____ Liters Per Minute

WATER QUALITY:

Feed Water Salinity: _____ ppm or Location of use: _____

Product Water Salinity: _____ ppm

Problems, Unusual Occurrences, or Unusual Noises: _____

CHEMICAL SAFETY AND FIRST AID**Sea Recovery SRC SC Storage Chemical**

WARNING! CONTAINS SODIUM METABISULFITE. HARMFUL IF SWALLOWED, AVOID BREATHING DUST & FUMES. CAUSES IRRITATION TO EYES & MUCOUS MEMBRANES. DO NOT TAKE INTERNALLY. KEEP AWAY FROM FOOD.

FIRST AID: IF SWALLOWED, CALL A PHYSICIAN, GIVE TAP WATER & INDUCE VOMITING. IN CASE OF CONTACT IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES & GET IMMEDIATE MEDICAL ATTENTION. THOROUGHLY WASH AFFECTED SKIN AFTER HANDLING PRODUCT.

MEDICAL PERSONNEL FAMILIAR WITH Sea Recovery "SRC SC", SYSTEM & MEMBRANE STORAGE CHEMICAL, ARE AVAILABLE 24 HOURS A DAY, 7 DAYS A WEEK, U.S.A. TOLL FREE MEDICAL EMERGENCY NUMBER: 1-800-228-5635.

FOR INDUSTRIAL USE ONLY.

Use with adequate ventilation. Prevent breathing dust & prevent contact with eyes. Thoroughly wash contacted parts after handling. Do not allow powder to become wetted with small amounts of water. Adding small amounts of water to power may liberate irritating sulfur dioxide gas. Add powder to above specified amount of water only. Do not mix with other chemicals or cleaners. If spilled, sweep up as much as possible then flush with water to drain.

KEEP OUT OF REACH OF CHILDREN

NET CONTENTS 1.5 POUNDS (.68 Kg)

Sea Recovery SRC MCC-1 Membrane Cleaning Chemical

WARNING: CONTAINS SODIUM METASILICATE. HARMFUL IF SWALLOWED. MAY CAUSE BURNS. AVOID CONTACT WITH EYES. AVOID PROLONGED CONTACT WITH SKIN. DO NOT TAKE INTERNALLY. KEEP AWAY FROM FOOD.

FIRST AID: IF SWALLOWED, CALL A PHYSICIAN, DO NOT INDUCE VOMITING, GIVE ONE GLASS OF TAP WATER OR MILK. IN CASE OF CONTACT IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES & GET IMMEDIATE MEDICAL ATTENTION. THOROUGHLY WASH AFFECTED SKIN AFTER HANDLING PRODUCT. CONTACT A PHYSICIAN IF IRRITATION PERSISTS.

MEDICAL PERSONNEL FAMILIAR WITH Sea Recovery "SRC MCC1", R.O. MEMBRANE ELEMENT ALKALINE DETERGENT CLEANING CHEMICAL, ARE AVAILABLE 24 HOURS A DAY, 7 DAYS A WEEK, U.S.A. TOLL FREE MEDICAL EMERGENCY NUMBER: 1-800-228-5635.

FOR INDUSTRIAL USE ONLY.

Use with adequate ventilation. Prevent breathing dust and prevent contact with eyes. Thoroughly wash contacted parts after handling. Do not allow powder to become wetted with small amounts of water. Add powder to above specified amount of water only. Do not mix with other chemicals or cleaners. If spilled, sweep up as much as possible then flush with water to drain.

KEEP OUT OF REACH OF CHILDREN

NET CONTENTS 1.5 POUNDS (.68 Kg)

Sea Recovery SRC MCC-2 Membrane Cleaning Chemical

DANGER: CONTAINS SULFAMIC ACID. CAUSES BURNS, EYE & SKIN IRRITATION. HARMFUL IF SWALLOWED. AVOID BREATHING DUST. DO NOT TAKE INTERNALLY. KEEP AWAY FROM FOOD.

FIRST AID: IF SWALLOWED, CALL A PHYSICIAN, DO NOT INDUCE VOMITING, GIVE ONE GLASS OF TAP WATER OR MILK. IN CASE OF CONTACT IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES & GET IMMEDIATE MEDICAL ATTENTION. THOROUGHLY WASH AFFECTED SKIN AFTER HANDLING PRODUCT. CONTACT A PHYSICIAN IF IRRITATION PERSISTS.

MEDICAL PERSONNEL FAMILIAR WITH Sea Recovery "SRC MCC2", R.O. MEMBRANE ELEMENT ACID CLEANING CHEMICAL, ARE AVAILABLE 24 HOURS A DAY, 7 DAYS A WEEK, U.S.A. TOLL FREE MEDICAL EMERGENCY NUMBER: 1-800-228-5635.

FOR INDUSTRIAL USE ONLY.

DO NOT MIX WITH CHLORINATED SOLUTIONS OR COMPOUNDS. Use with adequate ventilation. Prevent breathing dust & prevent contact with eyes. Thoroughly wash contacted parts after handling. Do not allow powder to become wetted with small amounts of water. Add powder to above specified amount of water only. Do not mix with other chemicals or cleaners. If spilled, sweep up as much as possible then flush with water to drain.

KEEP OUT OF REACH OF CHILDREN

NET CONTENTS 1.5 POUNDS (.68 Kg)

Sea Recovery SRC MCC-3 Membrane Cleaning Chemical

WARNING: CONTAINS SODIUM METABISULFITE. HARMFUL IF SWALLOWED. AVOID BREATHING DUST AND FUMES. CAUSES IRRITATION TO EYES AND MUCOUS MEMBRANES. DO NOT TAKE INTERNALLY. KEEP AWAY FROM FOOD.

FIRST AID: IF SWALLOWED, CALL A PHYSICIAN, GIVE TAP WATER AND INDUCE VOMITING. IN CASE OF CONTACT IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES & GET IMMEDIATE MEDICAL ATTENTION. THOROUGHLY WASH AFFECTED SKIN AFTER HANDLING PRODUCT. CONTACT A PHYSICIAN IF IRRITATION PERSISTS.

MEDICAL PERSONNEL FAMILIAR WITH Sea Recovery "SRC MCC3", R.O. MEMBRANE ELEMENT RUST REMOVER CLEANING CHEMICAL, ARE AVAILABLE 24 HOURS A DAY, 7 DAYS A WEEK, U.S.A. TOLL FREE MEDICAL EMERGENCY NUMBER: 1-800-228-5635.

FOR INDUSTRIAL USE ONLY.

Use with adequate ventilation. Prevent breathing dust & prevent contact with eyes. Thoroughly wash contacted parts after handling. Do not allow powder to become wetted with small amounts of water. Adding small amounts of water to powder may liberate irritating sulfur dioxide gas. Add powder to above specified amount of water only. Do not mix with other chemicals or cleaners. If spilled, sweep up as much as possible then flush with water to drain.

KEEP OUT OF REACH OF CHILDREN

NET CONTENTS 1.5 POUNDS (.68 Kg)

TEMPERATURE AND PRESSURE EFFECTS

Sea Recovery® TEMPERATURE EFFECT COMPARISON CHART

(At 820 psi & 35,000 ppm feedwater TDS conditions)

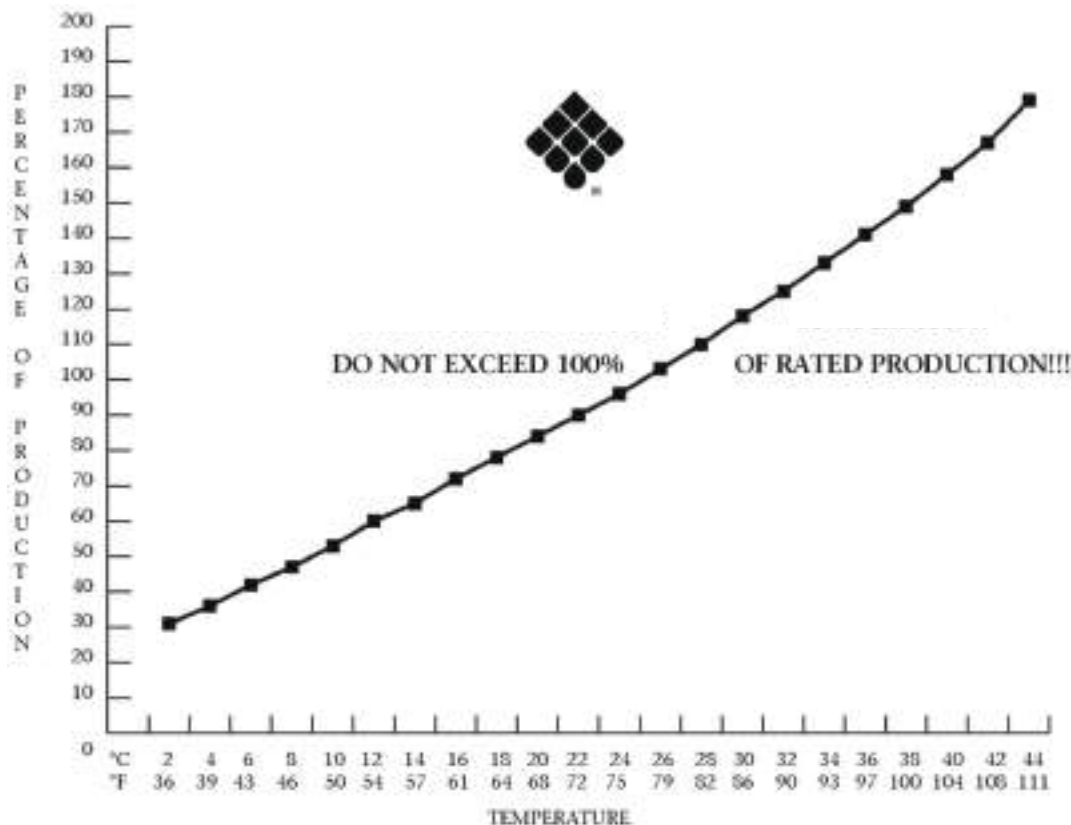
The Temperature Effect Chart on this page illustrates the loss or gain of productivity across the R.O. Membrane.

To determine what normal (in spec.) flow of the system is at 77° F (25° C), follow these directions:

1. Determine feed temperature.
2. Locate the corresponding temperature on the chart.
3. Follow the corresponding temperature in a vertical line up to the plotted production line.
4. From this temperature point at the production line, move left horizontally to the plotted productivity percent.
5. Calculate the system's present productivity in U.S. gallons per day by multiplying the gallon per hour product water flow meter reading by 24.
6. Divide the figure reached in step 5 above, present gallon per day productivity, by the plotted productivity percentage from step 4 above. The answer will be equivalent to the membranes present productivity at specification test parameters, 820 psi & 77° F (25° C).

Example:

1. With the system operating at 820 psi (57 bar).
2. The present feed temperature is 61° F (16° C).
3. Plotted productivity is therefore 72% of normal.
4. The system is a 14,530 gallon per day model and it is presently producing 9,000 gallons per day.
5. 9,000 per day divided by .72 equals 12,500 gallons per day calculated productivity. The system is rated at 14,530 gallons per day \pm 15% (12,350 to 16,709 gallons per day). Therefore the system is within specifications at 12,500 gallons per day actual productivity at 61° F (16° C), 820 psi (57 bar), and 35,000 ppm feed.

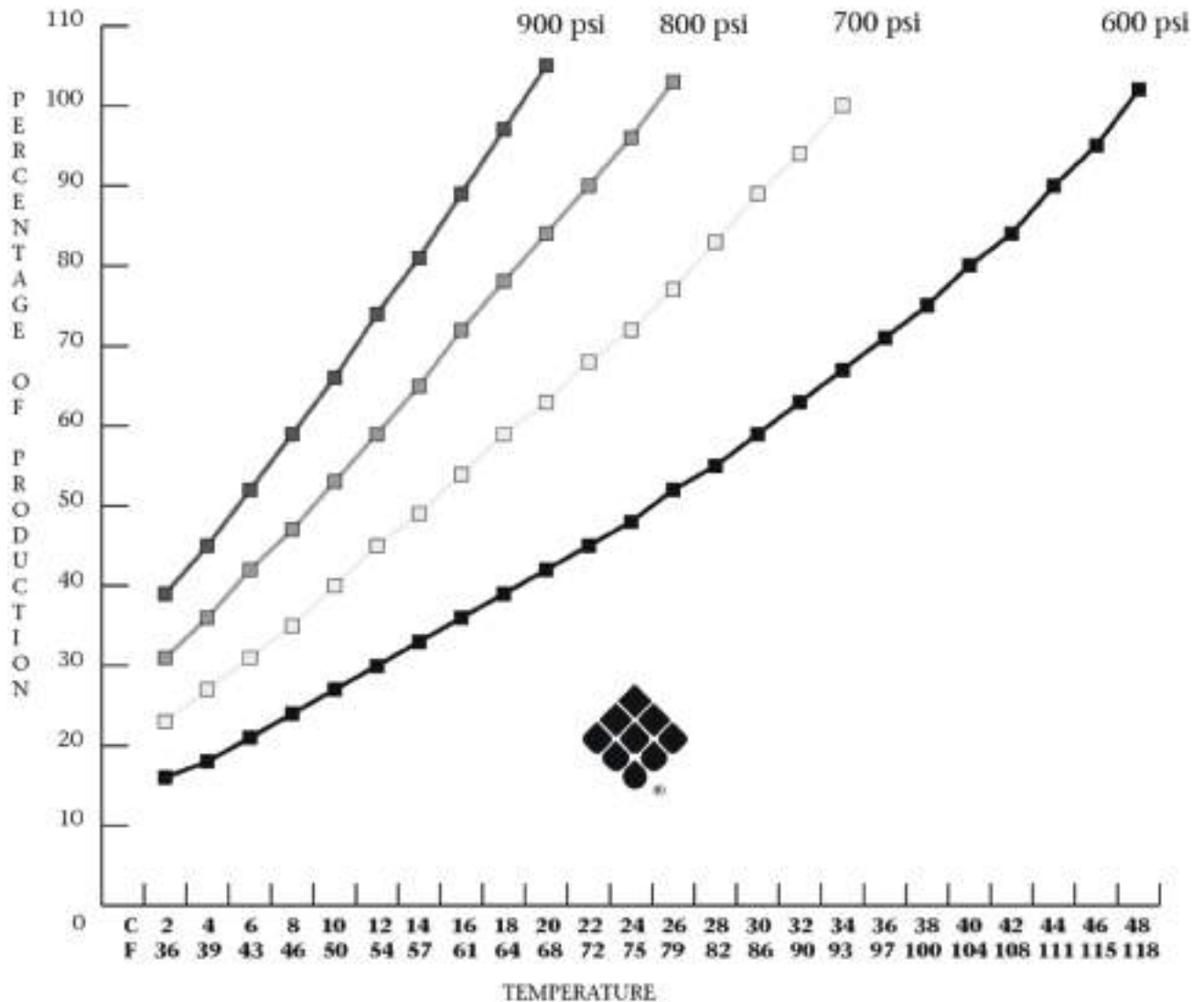


Sea Recovery® TEMPERATURE EFFECT COMPARISON CHART

(Do not use this chart for brackish water systems and applications)

As the seawater temperature increases, the Sea Recovery system pressure must be adjusted so that the system achieves no greater than 100% of rated product water flow. Product water flow greater than 100% of rated capacity causes premature fouling of the R.O. Membrane Element. This leads to more frequent required cleaning and voids all warranties of the SRC R.O. Membrane Elements.

Description

DO NOT EXCEED 100% OF RATED PRODUCTION!!!

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Description

Aqua Whisper DX Compact 450-1800

Section 3 - PRE-INSTALLATION NOTES

3 PRE-INSTALLATION NOTES

3.1 PRECAUTIONS

STORAGE PRIOR TO UNCRATING

1. Adhere to crate markings:
 - DO NOT store in direct sunlight;
 - DO NOT store above 120° F (50° C);
 - DO NOT freeze;
 - DO NOT store longer than 4 months without flushing with storage chemical;
 - STORE ONLY on base with ARROWS UP.
 - KEEP THE R.O. MEMBRANE ELEMENT WET AT ALL TIMES.
2. Refer to Section 3.10 for further cautions of the R.O. Membrane Element.

REVERSE OSMOSIS MEMBRANE ELEMENT SUSCEPTIBILITY TO CHEMICAL ATTACK



CAUTION: Do Not expose the Sea Recovery System to intake Feed Water containing the following chemical:

Hydrogen peroxide	chloramines-T
Chlorine dioxide	chlorine
Bromine	phenolic disinfectants
chloramines	N-chloroisocyanurates
hypochlorite	iodine
Bromide	petroleum products

Any chemical, not approved in writing by Sea Recovery.

USE OF NON-AUTHORIZED OR MISUSE OF AUTHORIZED CHEMICALS VOIDS SYSTEM WARRANTY

Do not connect any water line to the System that may contain any of the above chemicals. Example: Do not connect the inlet of the System to the ship's potable water system if the ship's system contains chlorinated or brominated water. These chemicals destroy the copolymer components within the RO system. These oxidants and others also damage the RO Membrane Element. The Sea Recovery Optional Fresh Water Flush Accessory removes chlorine and bromine from the ship's potable water system.

DO NOT PERFORM INSTALLATION UNLESS:

1. The System Feed Water Sea Cock Valve is closed.
2. The system main electrical disconnect switch is switched "OFF", LOCKED, and TAGGED.

3. A Volt / Ohm Meter will be necessary.



WARNING: ELECTRICAL SHOCK

HAZARD. The installation procedures expose the installer to High Voltage and electrical shock hazard. Only attempt installation if you are a qualified electrician and only if surrounding conditions are safe.

QUALIFICATIONS

Technicians must have technical knowledge and ability in the following fields:

- a) Electrical, Electronic, Electric Motors and Circuits
- b) Electromechanical and Mechanical Systems
- c) Hydraulic and Liquid Pressure and Flow Systems
- d) Piping and Plumbing Systems
- e) Water Suction and Pressure Lines
- f) Thru-Hull Fitting below and above water level



WARNING: Do not attempt Installation, Commissioning, Troubleshooting, or Repair if you are not proficient in the above fields of expertise.

3.2 SPECIAL CONSIDERATIONS

INSTALLATION CAUTIONS

Do not over tighten PVC fittings. If threaded pipe fittings leak after installation, remove the fitting, clean the mating threads, apply 3 to 4 wraps of Teflon tape to the male threads, apply liquid Teflon pipe sealer sparingly, and thread the parts back together. PVC fittings should only be hand tight without the use of a wrench.

The Sea Cock Valve, Inline Pressure Gauge, Sea Strainer, Rinse Clean Inlet Valve, and Booster Pump should be installed below water level. This will aid the Booster Pump in priming.

Always allow hoses and tubes to enter and exit straight from the connection for a minimum of one inch prior to a bend. If stress is placed on the fitting due to a tight bend the fitting will leak and may break.

Avoid skin and eye contact with the membrane packaging solution. In case of skin contact, rinse the skin thoroughly with water. In case of eye contact, flush repeatedly with water and notify a physician immediately.

R.O. Membrane Elements are stored in “sodium bisulfite”. NEVER mount liquid holding component above any electrical or electronic device. Extensive damage to the electronic device will result if liquid enters device during maintenance and or component failure.

CONNECTION LINE CAUTIONS

All connection lines should be as short and straight as possible using minimum fittings.

The connection lines must not be “kinked”.

ACCESSIBILITY CAUTIONS

This is a simple rule: Install the system and its supporting components in an accessible manner.

The Electrical Control Touch Panel must be accessible for operation and monitoring of the system.

ELECTRICAL POWER REQUIREMENTS

Refer to System Specifications on Page 2-2 and the Electrical information on Section 4 for electrical power requirements. Ensure that the power source is sufficiently sized to provide the correct voltage and cycles during Start Up and Operation.

3.3 DISTANCE BETWEEN COMPONENTS

50 feet (15 meters) of 3/4 in. (19 mm) I.D. clear braided hose is supplied for connecting the Suction Line, Low Pressure Line, and Brine Discharge Line.

50 feet (15 meters) of 1/2 in. (12.7mm) I.D. clear braided hose is supplied for connecting the Product Water Line.

20 feet (6 meters) 1/4 in. (6.35 mm) OD nylon tubing is supplied with applicable components for connecting Pressure Pick Up points for the Low Pressure Transducers.

3.5 COMPONENTS SUPPLIED BY INSTALLER



CAUTION: All fittings, valves, and piping installed prior to, within, and after the Sea Recovery system must not contain iron. The resulting failure of the R.O. Membrane Element is attributed to improper installation, is the liability of the installer.

1. Water Connections to be supplied by the installer:

Feed Inlet at the Sea Cock Valve:	3/4 in. (19 mm) MNPT (Male National Pipe Thread U.S. Standard)
Brine Discharge at the Thru Hull Discharge fitting:	3/4 in. (19 mm) MNPT (Male National Pipe Thread U.S. Standard)
Product at the Product Water Connector:	1/2 in. (12.7 mm) FNPT (Female National Pipe Thread U.S. Standard)
Pressurized Fresh Water at the Cleaning Bucket:	3/8 in. (9.5 mm) FNPT (Female National Pipe Thread U.S. Standard)

2. Inlet Thru Hull Fitting with Forward Facing Scoop. The inlet Thru Hull Fitting must be minimum 3/4 in. (19 mm) and dedicated to only the Sea Recovery system. It is important that the installer utilizes a forward facing scoop so that the system receives a positive flow of water as the boat is under way. The fitting must be installed on the boats hull in a position that provides continual feed water flow without air to the system.



CAUTION: A flush inlet thru-hull fitting will cause a vacuum as the boat is under way, and this will cause loss of feed water flow and cavitation of the Booster Pump and High Pressure Pump resulting in continual system shut down.



CAUTION: The Sea Recovery System must receive an uninterrupted supply of feed water without air.



CAUTION: The Sea Recovery System must not be tied into another existing auxiliary water line already supplying another accessory on the boat.



CAUTION: If the Sea Recovery System is connected to a Sea Chest or Stand Up Pipe, do not plumb the Sea Recovery System feed line to the “top” of the Sea Chest or Stand Up Pipe. Plumb the Sea Recovery System to the “bottom” of such feed water arrangements to ensure a continual air free supply of feed water to the system.

3. Inlet Sea Cock Valve Quarter turn ball valve minimum 3/4 in. (19 mm) size, with a 3/4 in. (19 mm) MNPT connection for mating to the supplied 3/4 in. (19 mm) FNPT Inlet Connection fitting.
4. Brine Discharge Thru Hull Fitting minimum 3/4 in. (19 mm) size with a 3/4 in. (19 mm) MNPT connection for mating to the supplied 3/4 in. (19 mm) FNPT Brine Discharge Connector fitting. The Brine Discharge Thru Hull Fitting must be installed above water level.

Do not install any valve in the Brine Discharge line. A blockage or closed valve will cause damage to the System.

5. Connection of the Sea Recovery Product Water Line to the boat's UNPRESSURIZED Potable Water Storage Tank requires a 1/2 in. (12.7 mm) FNPT connection for mating to the supplied 1/2 in. (12.7 mm) MNPT Product Water Connector fitting. In order to avoid problems such as reverse flow (osmosis) from the tank to the system and chlorination attack of the R.O. Membrane Element, the fitting must terminate above the maximum water level.

No valves should be installed in this line. A blockage or closed valve in the Product Water Line will cause extensive damage to the System and R.O. Membrane Element.

6. Connection of the Sea Recovery Fresh Water Flush subassembly to the boat's PRESSURIZED Potable Water Line requires a 3/4 in. (19 mm) FNPT connection for mating to the 3/4 in. (19 mm) MNPT fitting supplied with the Fresh Water Flush sub assembly.
7. Circuit Breaker with appropriate Amperage Rating. Refer to Section 4 for details.
8. Properly sized Power Cables. Refer to Section 4 for details.
9. An electrical power source capable of delivering the required constant voltage and cycles during start up and operation of the System. Refer to Section 4 for details.

3.6 PIPING AND INTERCONNECT DIAGRAMS

Different Piping and Interconnect Diagrams are illustrated in this section. These illustrations include Standard and Optional Accessory configurations.

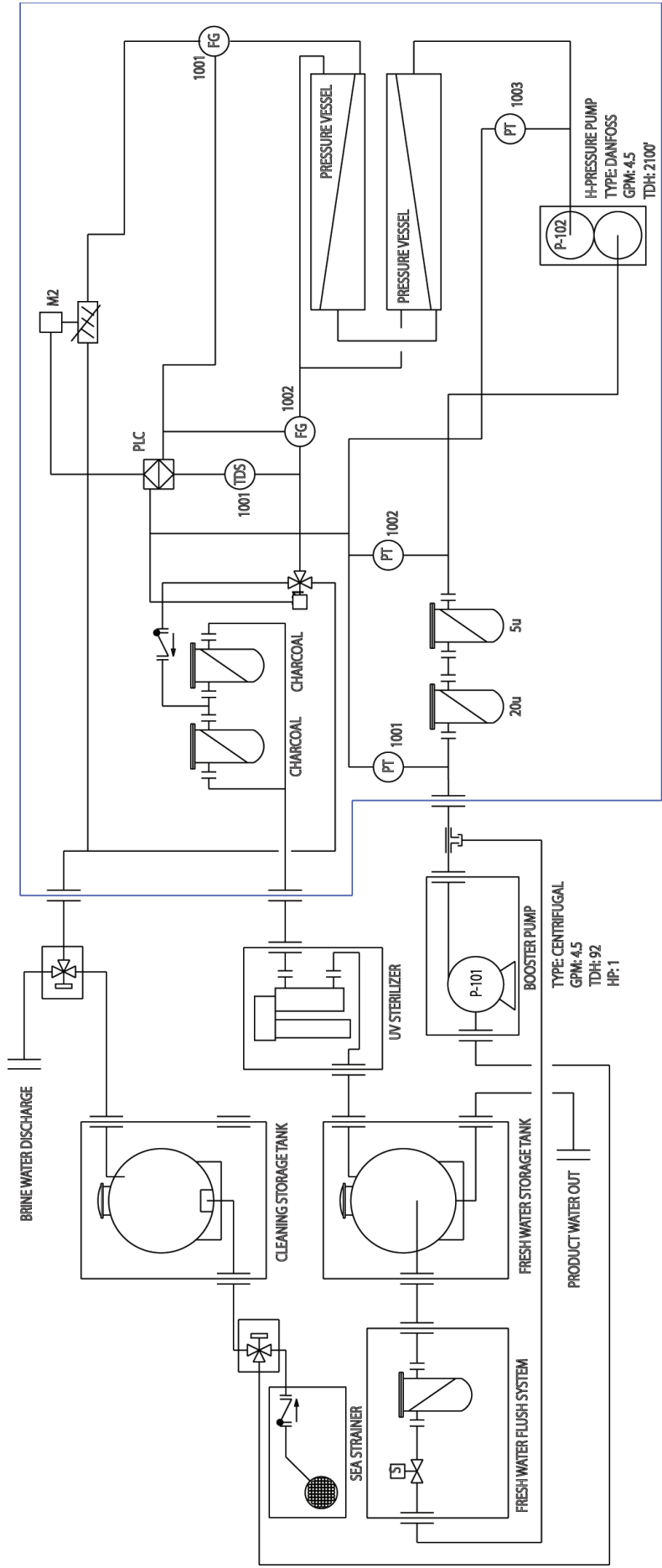
Determine the Prefiltration and Post Filtration components that were supplied with the system being installed. Locate the appropriate diagram from the following pages. Interconnect the components as per the appropriate diagram.

Note: Symbol Used in this Section.

** Indicates items supplied by owner/installer

*** Indicates optional equipment.

Note: Refer to the bigger drawing foldout at the end of this manual.

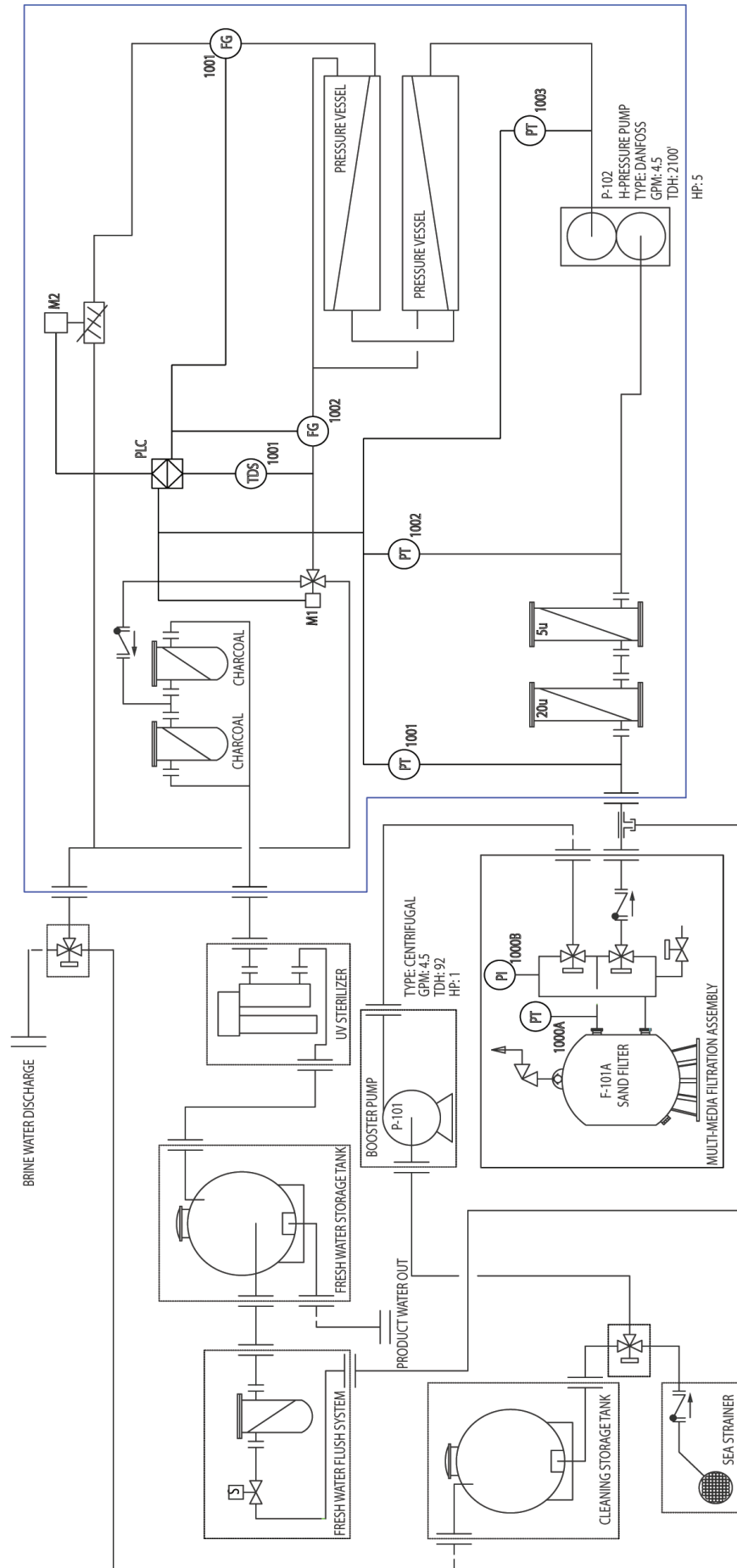


Note: Illustration shows the optional HP Pump.

- PT-Pressure Transducer
- PI-Pressure Indicator
- M-Meter
- FG-Flow Gauge
- TDS-TDS Meter
- P-Pump
- PLC-Program Logic Controller

System P&ID-Commercial Prefilters

Note: Refer to the bigger drawing foldout at the end of this manual.

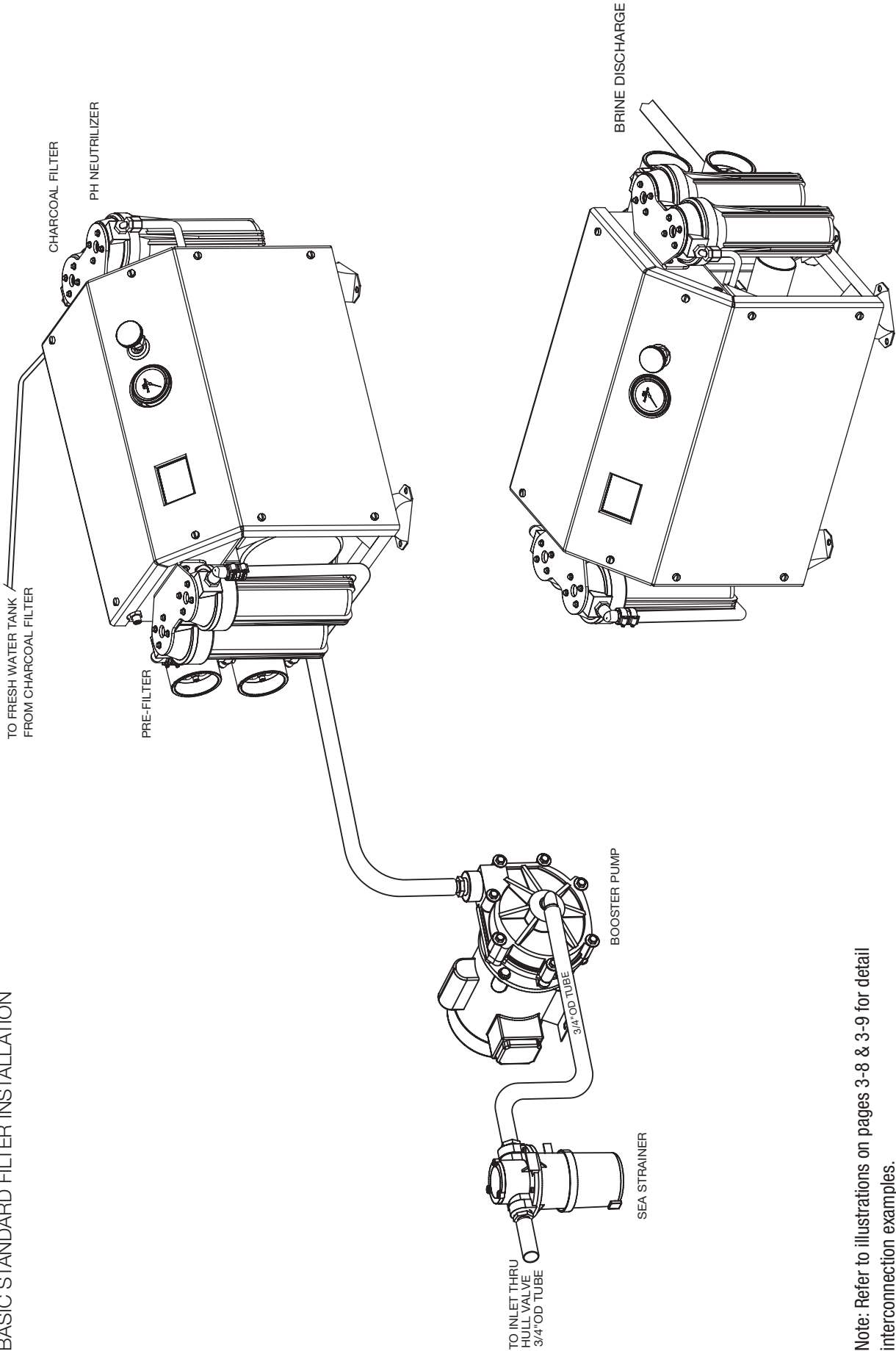


Note: Illustration shows the optional HP Pump.

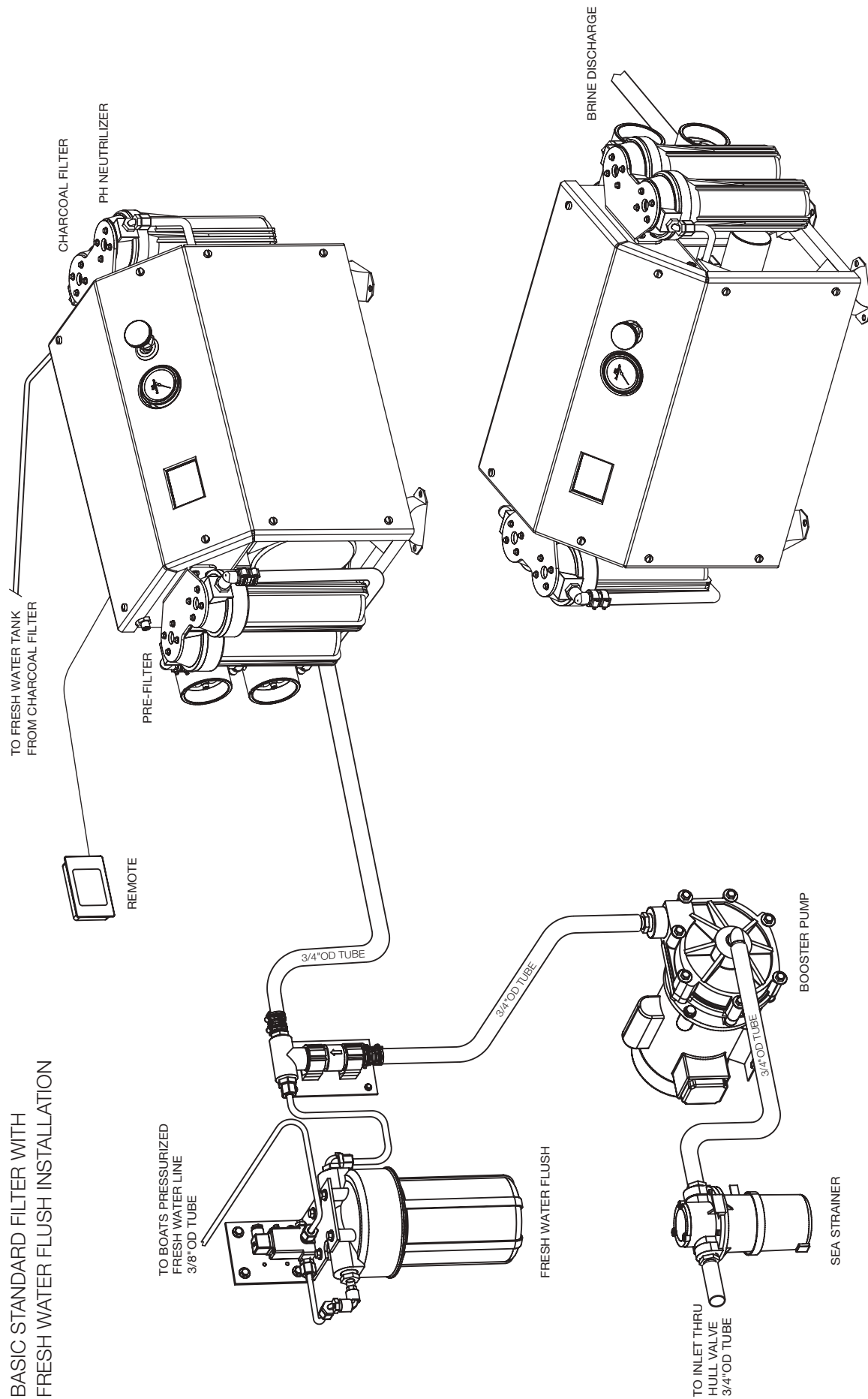
PT-Pressure Transducer
 PI-Pressure Indicator
 M-Meter
 FG-Flow Gauge
 TDS-TDS Meter
 P-Pump
 PLC-Program Logic Controller

Pre-installation

BASIC STANDARD FILTER INSTALLATION



Note: Refer to illustrations on pages 3-8 & 3-9 for detail interconnection examples.

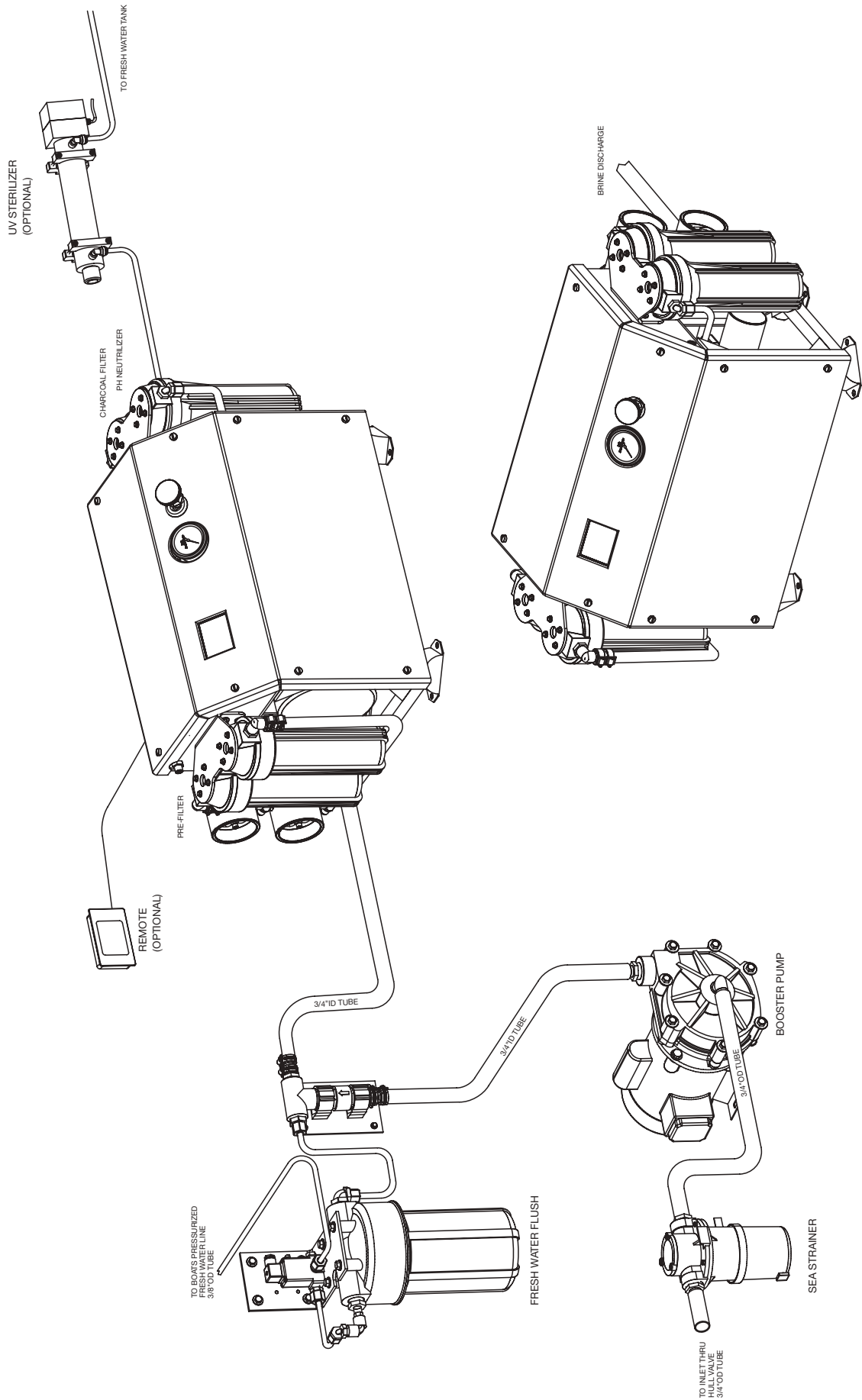


Note: Refer to illustrations on pages 3-8 & 3-9 for detail interconnection examples.

Installation Matrix

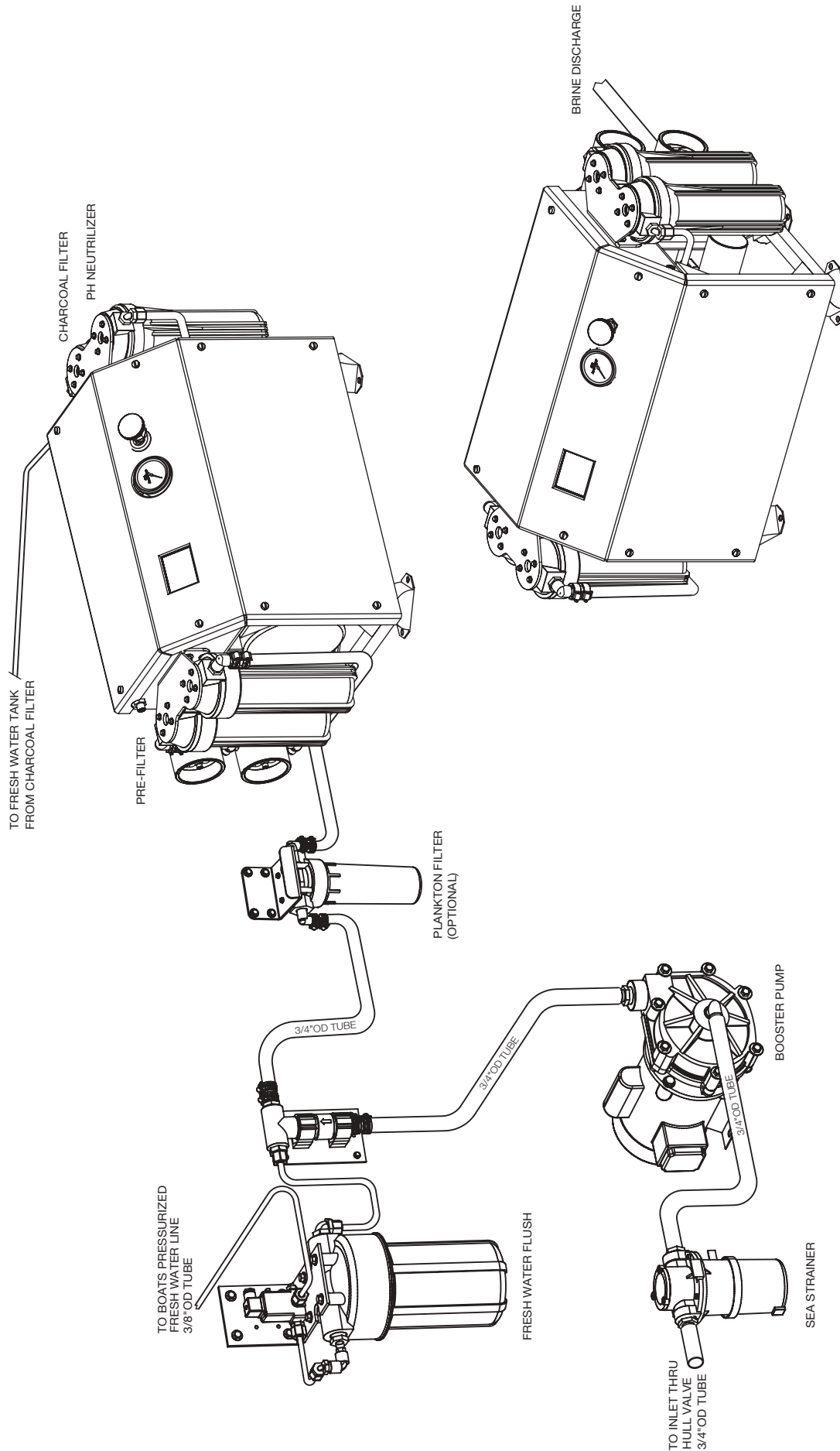
Pre-installation

STANDARD FILTERS WITH UV STERILIZER AND
FRESH WATER FLUSH INSTALLATION



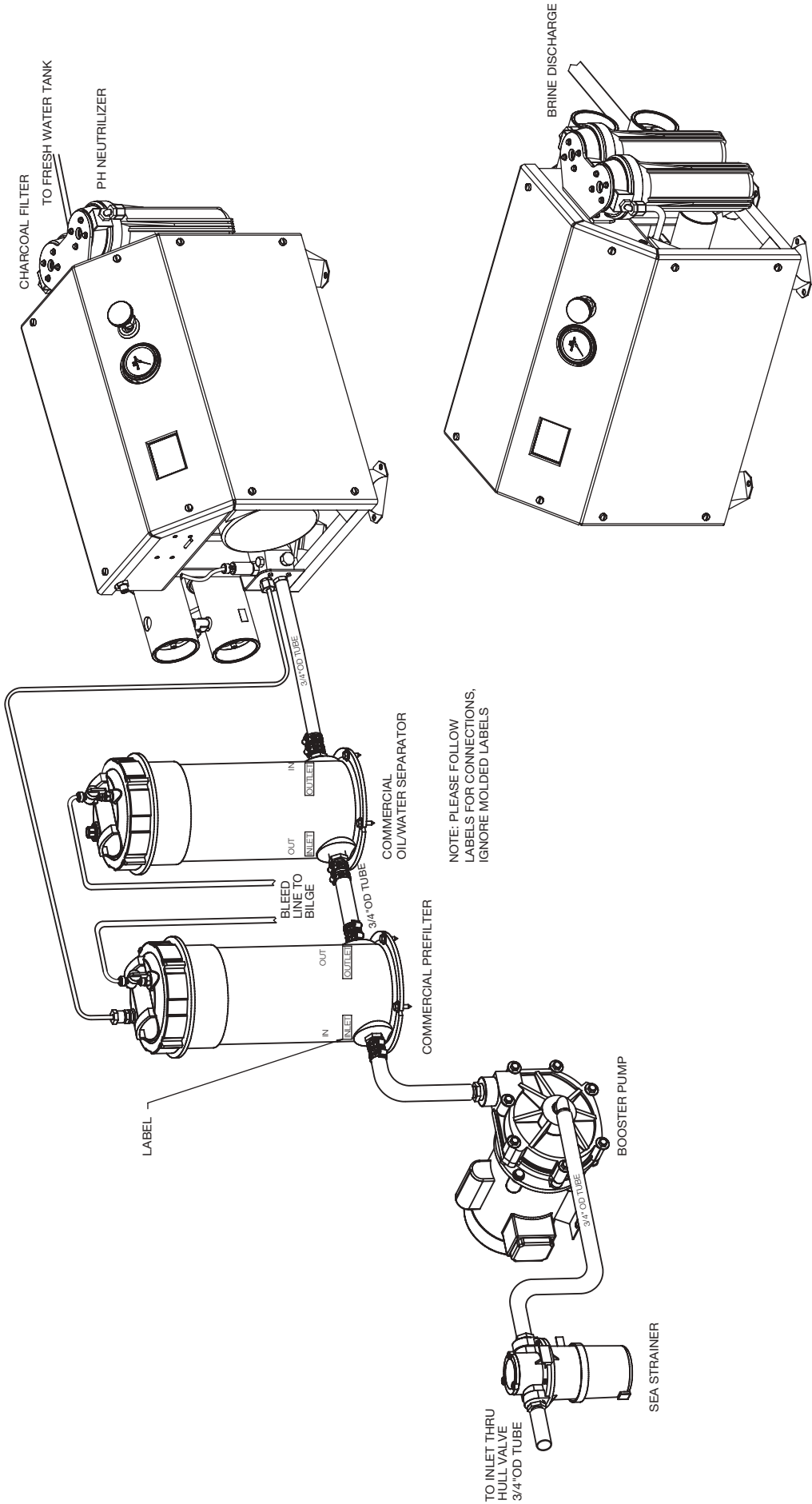
Note: Refer to illustrations on pages 3-8 & 3-9 for detail interconnection examples.

STANDARD FILTERS WITH UV STERILIZER, FRESH WATER FLUSH, AND PLANKTON FILTER OPTION INSTALLATION



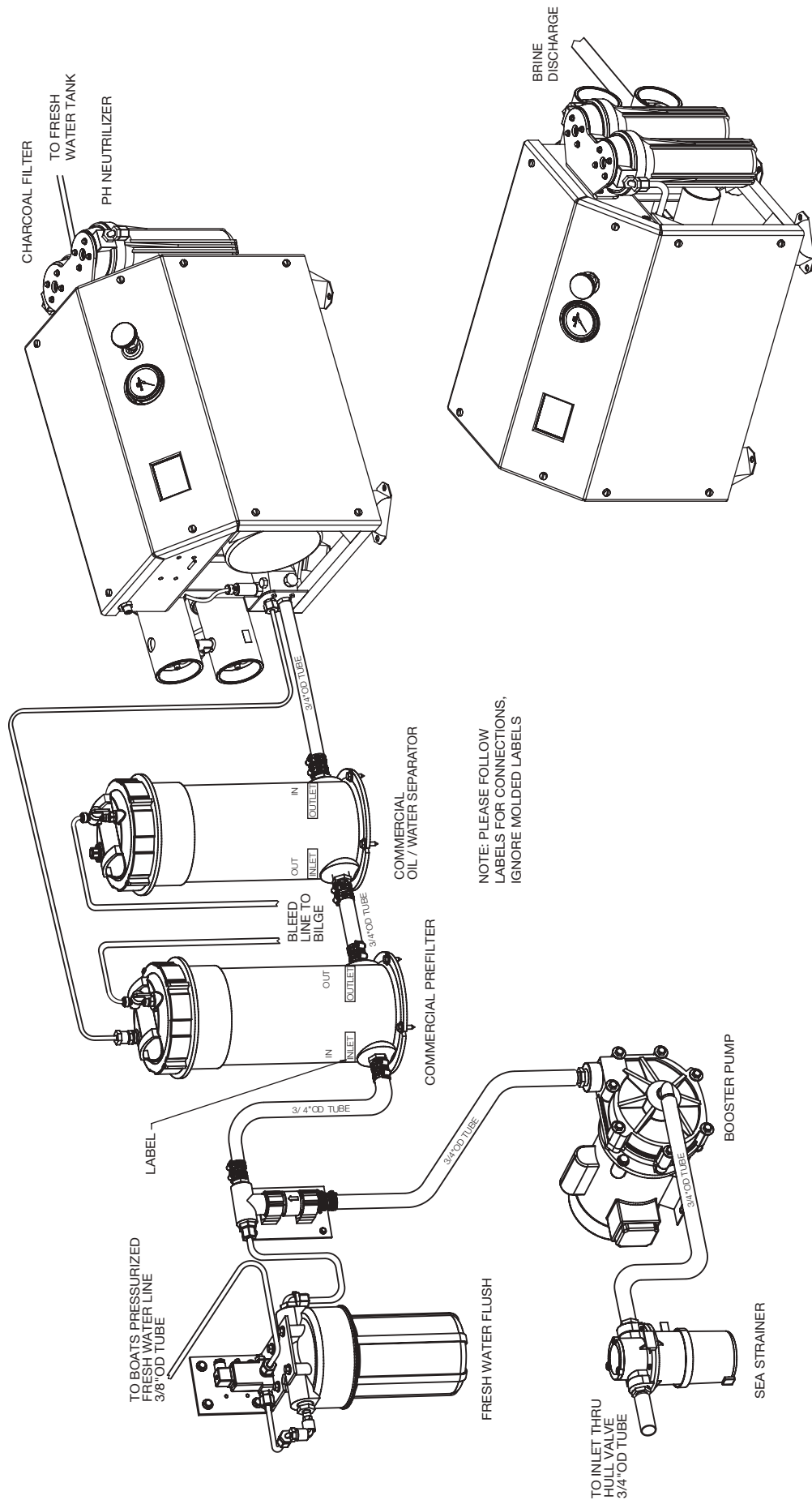
Note: Refer to illustrations on pages 3-8 & 3-9 for detail interconnection examples.

COMMERCIAL PRE-FILTERS AND OIL / WATER SEPARATOR INSTALLATION



Note: Refer to illustrations on pages 3-8 & 3-9 for detail interconnection examples.

COMMERCIAL PRE-FILTERS AND OIL / WATER SEPARATOR WITH FRESH WATER FLUSH INSTALLATION

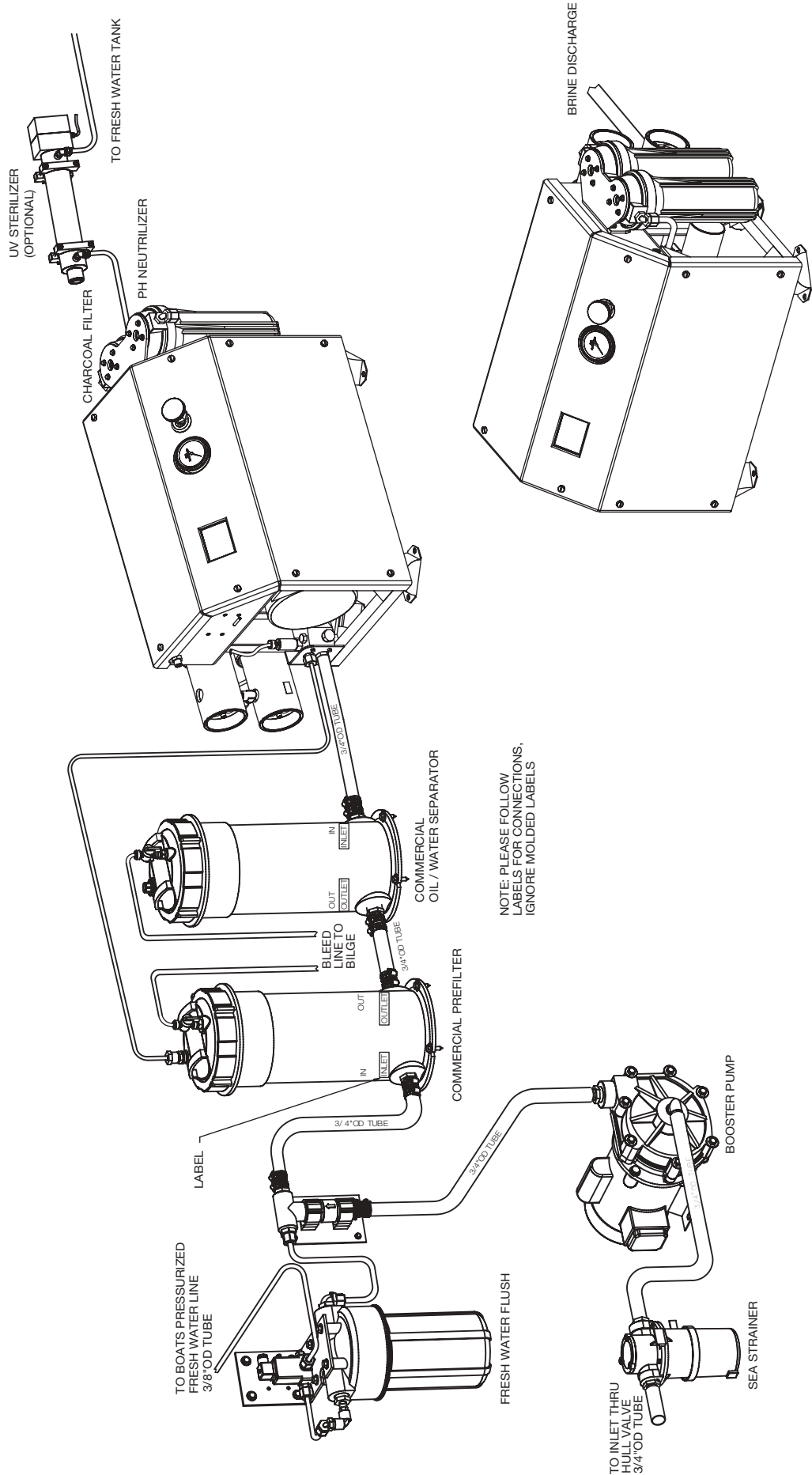


Note: Refer to illustrations on pages 3-8 & 3-9 for detail interconnection examples.

Installation Matrix

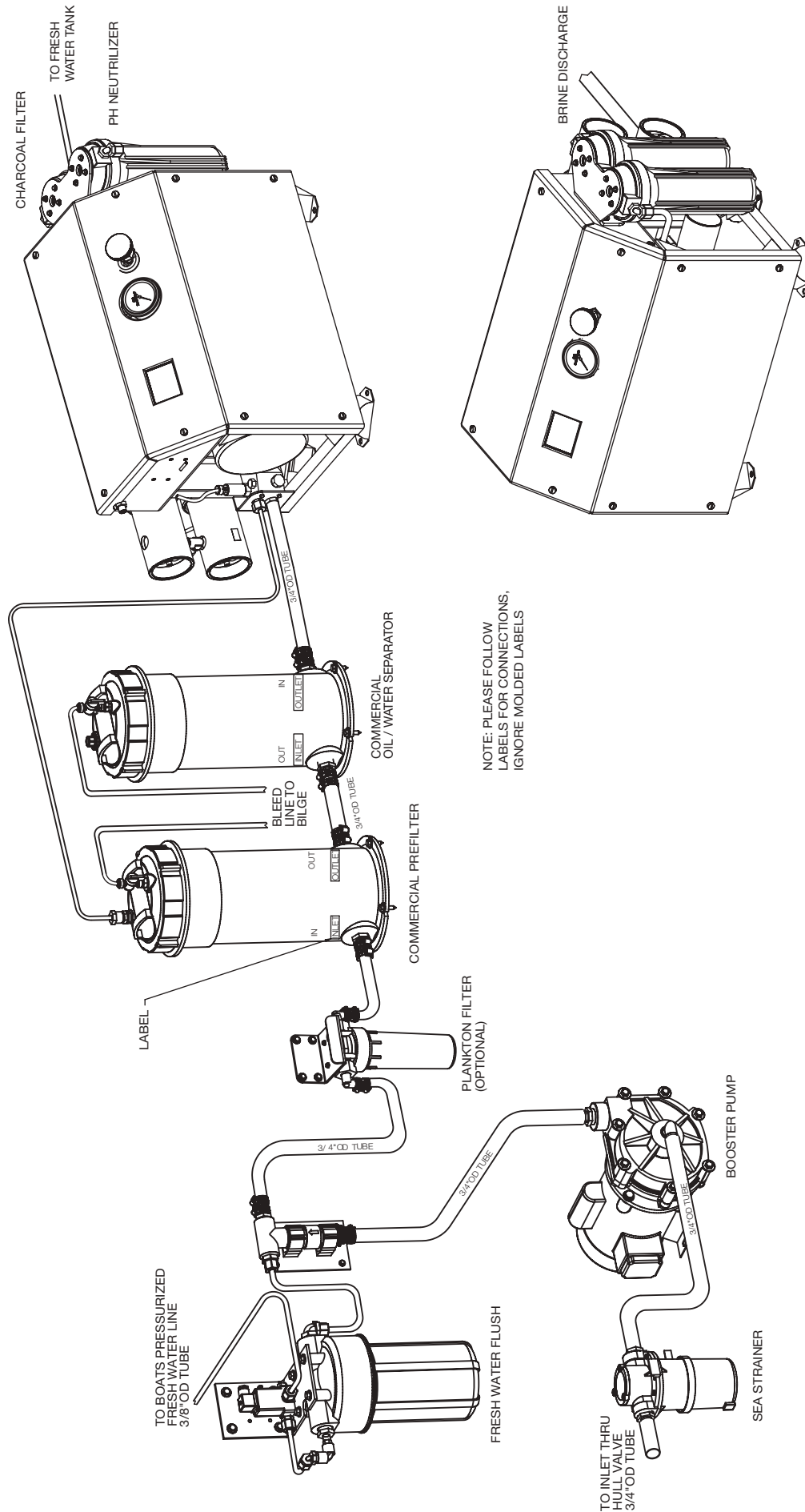
Pre-installation

COMMERCIAL PRE-FILTERS AND OIL / WATER SEPARATOR WITH
FRESH WATER FLUSH AND UV STERILIZER INSTALLATION



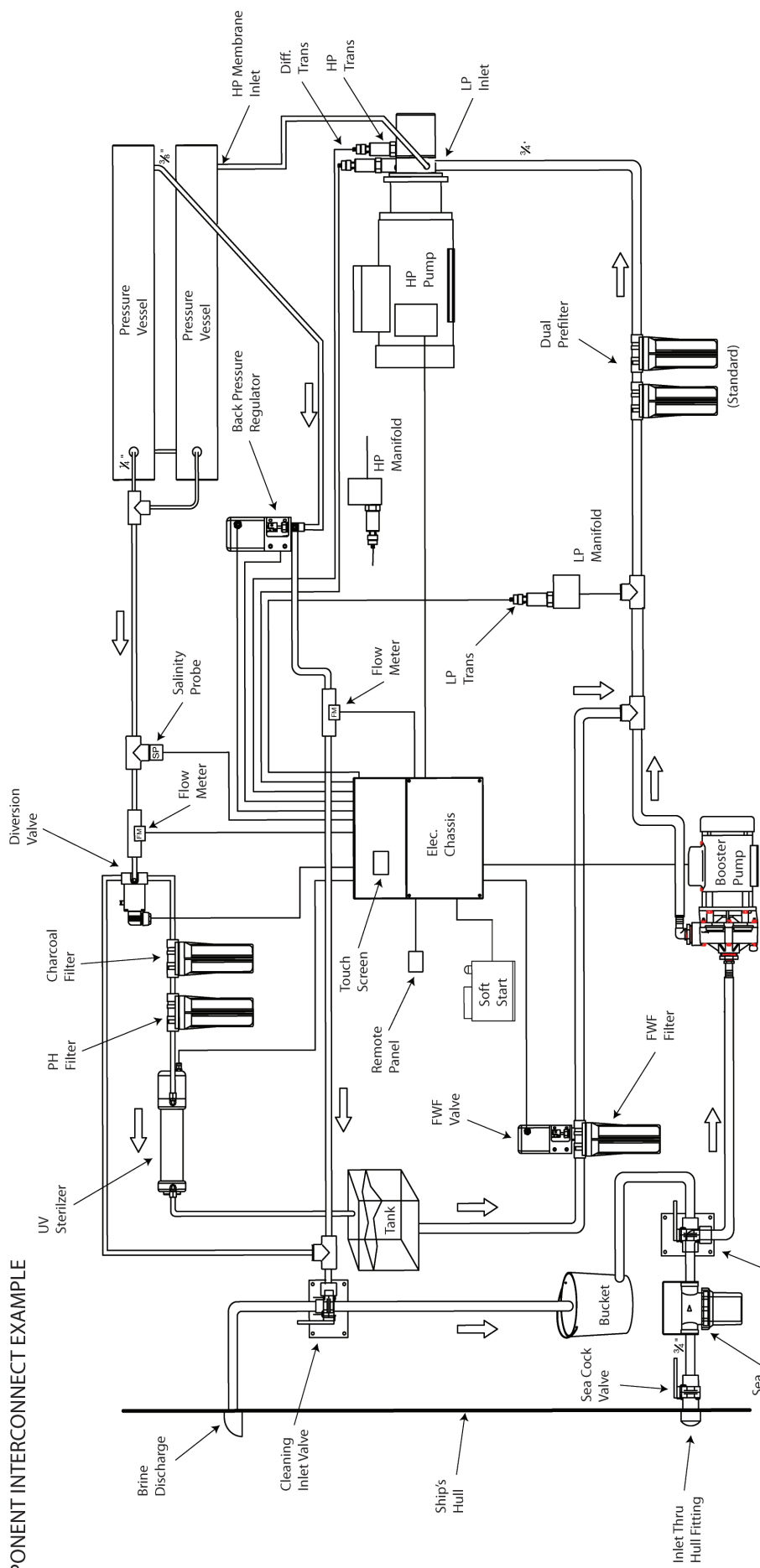
Note: Refer to illustrations on pages 3-8 & 3-9 for detail interconnection examples.

COMMERCIAL PRE-FILTERS AND OIL / WATER SEPARATOR WITH FRESH WATER FLUSH, UV STERILIZER, AND PLANKTON FILTER INSTALLATION



Note: Refer to illustrations on pages 3-8 & 3-9 for detail interconnection examples.

AQUA SERIES
COMPONENT INTERCONNECT EXAMPLE



Note 1: The HP & Diff. Pressure Transducer connection depends on the HP Pump used.
Note 2: This illustration may not show all the components used on a system.

Pressure Interconnect Example

Brine Discharge

Cleaning Inlet Valve

Ship's Hull

Inlet Thru Hull Fitting

Sea Strainer

Sea Cock Valve

Bucket

Cleaning Outlet Valve

FWF Filter

FWF Valve

Soft Start

Remote Panel

Touch Screen

Elec. Chassis

Flow Meter

Salinity Probe

Diversion Valve

Charcoal Filter

PH Filter

UV Sterilizer

Back Pressure Regulator

HP Membrane Inlet

Diff. Trans

HP Trans

HP Pump

LP Inlet

LP Manifold

LP Trans

Comm Prefilter

Oil-Water Sep

Booster Pump

Note 1: The HP & Diff. Pressure Transducer connection depends on the HP Pump used.

Note 2: This illustration may not show all the components used on a system.

Note 1: The HP & Diff. Pressure Transducer connection depends on the HP Pump used.

Note 2: This illustration may not show all the components used on a system.

3.7 EXPLANATION OF PRESSURE TRANSDUCERS

Standard Transducers:

The Illustration below shows the Standard Pressure Transducers included with each System.

- a. Low Pressure Transducer #1 measures the pressure into the Prefiltration. This is the pressure exiting from the Booster Pump.

The Pressure Manifold for Low Pressure Transducer #1 is located inside the System Frame.

- b. Low Pressure Transducer #2 measures the pressure exiting the last Prefilter. This is the pressure entering the High Pressure Pump.

The difference of pressure registered by Low Pressure Transducer #1 and Low Pressure Transducer #2 equates to the amount of line loss, or pressure loss, across the prefiltration.

As the Prefiltration elements become fouled the pressure registered by Low Pressure Transducer #1 increases and the pressure registered by Low Pressure Transducer #2 decreases.

The Low Pressure Transducer #2 is located on the HP pump inside the System Frame.

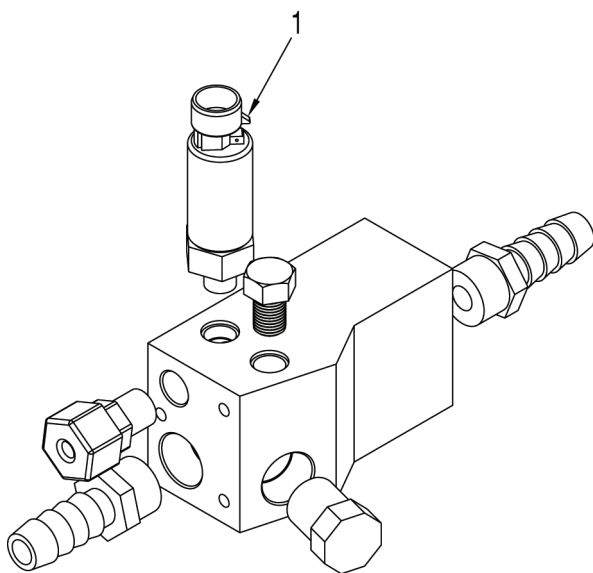
- c. High Pressure Transducer #3 measures the pressure exiting the HP Pump. This is the pressure entering the RO Membrane Vessel.

The Optional Differential Pressure Transducer #4 (not shown) measures the pressure between two Prefiltration components. The difference of the pressure into and out of a Prefiltration component is the “differential” across that given Prefilter.

When the System is equipped with two (2) or more prefiltration components, such as a Commercial Prefilter and Oil/Water Separator it is helpful to know the pressure across each of them. Knowing the pressure across each filter allows the operator to easily diagnose which of the filters is dirty and requires changing.

The Differential Pressure Transducer will pay for itself in a very short period of time through less time spent troubleshooting dirty filter elements.

Pick Up T for Differential Pressure Transducer is always plumbed in the Feed Line at the appropriate location by the Installer and connected to the Differential Pressure Transducer with a 1/4 in. (6.35 mm) OD Tube by the Installer.



3.8 RO MEMBRANE ELEMENT NOTES



CAUTION: Some systems are shipped WITHOUT the Reverse Osmosis Membrane Element. This is to accommodate Boat Builders that will install the System well in advance of commissioning the boat and the System.

DOES THIS SYSTEM HAVE R.O. MEMBRANE(S) INSTALLED OR NOT?

If not, is it your intention to install the R.O. membrane(s) at this time, or do you wish to install them at a later date when the boat is commissioned?

If the R.O. membrane element has been installed, there will be a R.O. Membrane Element Serial Number tag, illustrated below, attached to the High Pressure Vessel(s). Find this Serial Number tag to ensure that the R.O. membrane element(s) has been installed.

Sea Recovery		Rancho Dominguez, California 90220 U.S.A. Tel: 1-310-637-3400 Fax: 1-310-637-3430 Email: srcsales@searecovery.com	
SERIAL NO: FLOW: DATE:		087945021505 BRINE INLET END October 15, 2005	

If the R.O. membrane element Serial Number tag is missing or does not contain a serial number and date then the R.O. membranes are not installed. If the R.O. membrane elements are not installed and you wish to install them at this time contact Sea Recovery and supply us with your original Purchase Order Number, Sea Recovery's Invoice Number, and this System's Serial Number.



WARNING: If the Reverse Osmosis Membrane Element is not to be installed at this time, ensure that you leave a visible note at the system controller and at the front of the control panel informing the end user that:

The Reverse Osmosis Membrane elements are not installed; contact the factory for the R.O. Membrane elements; DO NOT operate this system without the R.O. Membrane Elements installed.

*****EXTENSIVE DAMAGE WILL OCCUR IF THE SYSTEM IS OPERATED WITHOUT THE R.O. MEMBRANE ELEMENTS INSTALLED.*****

Damage to the caused by the operation of the system without the R.O. Membrane Elements installed is not covered by the Sea Recovery warranty; is the liability of the installer if the installer did not notify the end user; or is the liability of the end user; if the installer notified the end user that the R.O. Membranes were not installed and to not operate the system without the R.O. Membrane elements installed.

Note: Symbol Used in this Section.

** Indicates items supplied by owner/installer

*** Indicates optional equipment.

3.9 COMPONENT DESCRIPTIONS

All components supplied by Sea Recovery, both standard and optional, are described in this section along with items required or desired by the installer. The location, operation, and purpose of each major component are briefly explained in this section.

Use of third party, Non Sea Recovery, components will lead to premature failure, added operating and maintenance costs, and increased labor. Using 3rd party, Non Sea Recovery, components will void any and all Sea Recovery Warranty. We only wish to help you enjoy the luxury of owning a Sea Recovery R.O. System. Treat it properly by using only Sea Recovery supplied parts, consumable, and accessories.

PREFILTRATION SECTION:

The Prefiltration Section filters and delivers the feed water into the system. The raw feed water is filtered to remove suspended solids larger than 5 Micron size (5/1,000,000 of a meter). The prefiltration protects the High Pressure Pump from premature wear and the Reverse Osmosis Membrane Element from premature fouling.

1. Inlet Thru Hull Fitting with Forward Facing Scoop

** is the point at which the feed water enters the system. It is important that the installer utilizes a forward facing scoop so that the system receives a positive flow of water as the boat is under way.



CAUTION: A flush inlet thru-hull fitting will cause a vacuum as the boat is under way, and will cause loss of feed water flow, cavitation of the feed pump and high pressure pump resulting in continual system shut down.



CAUTION: If the thru-hull fitting is placed in a position on the underside of the hull that allows air to continually enter the thru-hull fitting, it will cause the system to continually shut down due to loss of feed water.



NOTE: The resulting failure of the system to remain in operation is attributed to improper installation, is the liability of the installer, and is not covered by the Sea Recovery warranty.

2. Sea Cock Valve ** is used in a ship installation for safety reasons to close the feed water line during repair, maintenance, and disuse of the system.
3. Sea Strainer has a clear bowl with bronze body filter housing containing a cleanable monel filter screen. The Sea Strainer filters out large particulate matter and suspended particles that would otherwise damage the Booster Pump and prematurely foul the cartridge Prefilter Element.
4. Booster Pump supplies a positive pressure to the Pre-filters and onward to the High Pressure Pump. The Booster Pump has a performance curve of 85 Ft Head 35 PSI (2.41 BAR) @ 60 Hz with a feed water flow of 4.5 GPM (17 LPM).
The resulting pressure at the High Pressure Pump depends on the final installation configuration and condition of Prefiltration elements.
5. Low Pressure Transducer #1 Booster Pump Outlet/ 1st Prefilter Inlet for line pressure pick up from the outlet of the Booster Pump to the 1st Prefiltration component.
6. Plankton Filter *** This optional filter assembly contains a cleanable ultra fine monel mesh screen. The mesh screen removes suspended solids or biological growth such as plankton. It also provides longer life to the Pre-filter Elements and in turn provides lower system maintenance costs. The Plankton Filter is available as a single housing or dual housing.

7. Multi Media Filter *** This optional filter assembly contains a back-washable bed of sand and gravel. The sand traps suspended solids larger than 30 micron which provides longer life to the pleated cartridge prefilter elements minimizing maintenance intervals, maintenance labor, and filter element cost.



WARNING: PREFILTER ELEMENT- Do not use third party prefilter elements, use only Sea Recovery prefilter elements. Third party prefilter elements do not properly fit and the seams fall apart. They also allow by-pass resulting in extensive and very costly damage to the High Pressure Pump as well as premature fouling of the R.O. Membrane Element(s).

8. Commercial Prefilter takes the place of the Dual Prefilter. The 5 micron Commercial Prefilter cartridge element contains 37.5 sq. ft. (3.5 square meters) of filtering surface area. This oversize cartridge gives much longer filter element life greatly extending the time interval between required maintenance and reduces maintenance labor and prefilter element replacement cost.



CAUTION: PREFILTER ELEMENT- Do not use "string wound" or "fiber" prefilter elements. String wound and fiber filter elements are designed for the Photographic Film Developing Industry. When used in sea water, they will plug up rapidly in 1/10th or less the time of a Sea Recovery supplied prefilter cartridge element. This will cause frequent shut downs of the system and very frequent changing which will result in very high cost of maintenance, and user frustration.

19. Dual Pre-Filter removes suspended solids in two stages. The feed water passes first through a 20 micron cartridge then a 5 micron cartridge. By stepping the filtration, both prefilter elements gain longer life and require less maintenance labor and prefilter element replacement cost.
10. T-Connector Pressure Differential Pick-up *** is included with Pressure Differential Transducer #4 for line differential pressure pick up between optional prefiltration components to the Low

Differential Pressure Transducer. Depending on Prefiltration configuration this T-Connector may not be necessary as illustrated on Page 3-7 and 3-8. Depending on the System style and prefiltration configuration, one of the two Pressure Pick-Up Tee styles may be used.

11. Pressure Differential Transducer #4 *** (optional) for line differential pressure across prefiltration components. Allows the operator to determine which prefiltration component requires servicing.



WARNING OIL WATER SEPARATOR

ELEMENT: Use only Sea Recovery supplied filter elements. Third party oil water separator elements do not properly fit and the seams fall apart. They also allow by-pass resulting in extensive and very costly damage to the High Pressure Pump as well as premature fouling of the R.O. Membrane Element(s).

12. Oil/Water Separator Filter removes oil present in the feed water.



CAUTION: Oil permanently destroys the R.O. Membrane element. It is recommended that the user avoid operating the Sea Recovery R.O. System in oil polluted waters if the Oil/Water Separator Filter is not installed.

13. Low Pressure Transducer #2 measures line pressure after all prefiltration and prior to the inlet of the High Pressure Pump.
14. Low Pressure Transducer Manifold supports the Low Pressure and Differential Pressure Transducers.
15. Low Pressure Gauge register the Booster Pump outlet pressure prior to the prefiltration components.

PRESSURIZATION SECTION:

The Pressurization Section provides the necessary pressure to force the product water through the R.O. Membrane Element.

1. Standard: High Pressure pump is a marine quality stainless steel manifold, positive displacement ceramic plunger pump, operates with minimal noise and vibration. This pump is exclusive and unique to the SRC systems.

Optional: High Pressure Pump and Motor Assembly is a Radial Axial Positive Displacement Plunger Pump made of high grade Duplex material specifically designed for sea water Reverse Osmosis applications. The Pump is self lubricated and does not require oil. The Pump is connected to the attached electric motor with a flex coupler and safety bell housing.

2. High Pressure Hose, HP Pump Outlet to R.O. Membrane and Vessel Assembly Inlet, transfers pressurized sea water from the High Pressure Pump to the inlet of the R.O. Membrane Element.
3. R.O. Membrane Element and Vessel #1 The Membrane Element allows potable water molecules to pass through while rejecting the salt ions. Only 7% to 28%, depending on specific model, of the Seawater Feed becomes fresh Product Water. The remainder carries the rejected salt ions out of the R.O. Membrane Element in a concentrated brine stream. The R.O. System may have one or two R.O. Membrane Element and Vessel in series depending on the specific model and system capacity.
4. R.O. Membrane Element and Vessel #2 is connected in series with the first R.O. Membrane Element and Vessel. The Sea Recovery R.O. System will have either one or two R.O. Membrane Element and Vessel depending on the model. The 2nd R.O. Membrane Element and Vessel may be added at any time to a system with only one. Adding the 2nd R.O. Membrane Element and Vessel will double the System's production.
5. High Pressure Hose R.O. Membrane Vessel Assembly Outlet to High Pressure Manifold Inlet.
6. High Pressure Transducer measures the System Operating Pressure from the Outlet of the High Pressure Pump through the R.O. Membrane and Vessels.
7. Back Pressure Regulator controls the operating pressure applied to the R.O. Membrane Element(s). The operator rotates the handle to increase or decrease system operating pressure to gain specified performance.
8. High Pressure Gauge registers the System Operating Pressure applied to the R.O. Membrane Element(s).
9. High Pressure Manifold connects the High

Pressure Hose, High Pressure Transducer, High Pressure Gauge, and Back Pressure Regulator.

BRINE DISCHARGE SECTION:

The Brine Discharge Section carries the Brine Discharge water, exiting from the R.O. Membrane Element, back to the feed source.

1. Brine Discharge Flow Meter measures the brine water rate of flow from the R.O. Membrane Element in gallons or liters per hour. By adding the amount of Product Water flow to the Brine Discharge Flow the operator is able to determine the total Feed Water Flow.
2. Brine Discharge T-Connector collects the brine discharge water and unpotable product water.
3. Brine Discharge Connector attaches to the over board thru-hull fitting for connecting the brine discharge hose.
4. Multi Media Filter Waste "T" *** is included with the Multi Media Filter. This waste T is installed in line at the Brine Discharge fitting to allow discharge of the waste from the Multi Media Filter during the back wash and rinse operations, and the brine discharge water from the system.
5. Thru Hull Brine Discharge Fitting ** should be installed above water level for discharge of the Brine Discharge Water from the system.

PRODUCT WATER SECTION:

The Product Water Section gives a visual indication of the clarity, quantity, and quality of the product water. Post Filtration is the final step in Product Water quality control. The Post Filtration Subsystem is designed to limit unpleasant odor and taste, adjust the pH to neutral, and sterilize biological matter which may have passed through the R.O. Membrane Element.

1. Product Water T-Connector combines the product water from the two individual R.O. Membrane Elements.
2. Temperature Compensated Salinity Probe electronically determines whether the salinity content of the Product Water is acceptable. This Salinity Probe is temperature compensated and provides an accurate measurement of Product Water quality.
3. Flow Meter, Product Water electronically measures the rate of Product Water flow, in gallons or liters per hour.

4. 3-Way Product Water Diversion Valve, Electric Solenoid Actuated. The Controller energizes this valve to the "Potable" position when the system produces water which meets the low salinity requirement. If the Product Water being produced is "Unpotable", or high in salinity, then no signal is sent to the valve, and it thus remains in the normal open position. The "fail safe" normal open position diverts the unpotable Product Water to discharge.
5. Charcoal Filter removes foul odors from the Product Water. Sulfurous odor (rotten egg smell) is caused when biological matter dies and decays in the feed water section. Fresh water flushing of the system helps to minimize this odor.
6. pH Neutralizer Filter The pH value of pure water is pH7 which is regarded as neutral. pH values from 0-7 indicate acidity and pH values from 7-14 indicate alkalinity. The product water from an R.O. System will be slightly acidic because most of the naturally occurring high pH calcium carbonate has been removed. The product water from an R.O. System will also be very soft for the same reason. The product water pH will be approximately 6.5 pH. The pH Neutralizer Filter dissolves calcium carbonate back into the product water bringing the pH level to neutral at approximately pH 7.
7. Ultra Violet Sterilizer *** sterilizes at least 99.9% of any virus, bacteria, and other micro-organisms which may pass through the R.O. membrane element. The UV sterilizer is recommended if the Product Water Storage Tank is not otherwise treated by means such as chlorination.
8. Product Water Connector attaches to the Potable Water unpressurized tank for connection of the Product Water hose.

FRESH WATER SYSTEM

The Fresh Water System represents the boat or home's fresh water pressurized system. Pressurized fresh water is required to supply the System Fresh Water Flush.

1. Potable Water Storage Tank** may be any container suitable for storing Potable Water, i.e. existing water storage tank on a boat or cistern for a home.
2. Fresh Water Pressure Pump** delivers fresh water throughout the boat, or home. In order to provide the required flow of water to the System during the Fresh Water Flush cycle, this pump must

deliver up to 1 U.S. Gallons (3.8 Liters) Per Minute at 25 to 60 PSI (172 to 414 kPa)

3. Air Entrainment Tank** (accumulator) is sometimes installed into the boat or home's fresh water line to eliminate pulsations from and reduce demand on the Fresh Water Pressure Pump. This tank stores pressurized fresh water for delivery to the boat or home's fresh water piping.

FRESH WATER FLUSH SECTION

The Fresh Water Flush Section includes a Carbon Filter and an Automatic Motor Actuated Ball Valve that automatically flushes the system with fresh water. This process is automatic at each shut down of the system and repeats automatically every preset number of days. Fresh Water Flushing replaces the seawater in the system with less corrosive fresh water, and this also reduces the biological growth and subsequent decay that naturally occur if the sea water is not flushed from the system with fresh water.

1. Fresh Water Flush 2-way solenoid valve ***automatically actuates at system shut down and every preset number of days there after to flush the system with fresh water.
2. Fresh Water Flush Check Valve *** prevents feed water from entering the fresh water line.
3. Fresh Water Flush Charcoal Filter *** removes chlorine, if present, in the fresh water prior to flowing through the R.O. Membrane Element.
4. Fresh Water Flush Check Valve *** routes the fresh water through the system.
5. Cleaning Bucket ** can be any non ferrous container capable of holding at least 10 U.S. Gallons (37.8 Liters) of water. This container is used during the R.O. Membrane Element cleaning, storing, or winterizing process.
6. Rinse Clean Inlet Valve *** These Optional Valves are mounted separately on singular individual plates or together on a double plate.

The Rinse Clean Inlet Valve is used in conjunction with the Rinse Clean Outlet Valve simplifies the storage and cleaning procedures by allowing the operator to turn a valve rather than disconnect a hose. Also used for a manual fresh water flush if the Automatic Fresh Water Flush System is not installed. The Rinse Clean Valves are available on single valve mounting plates or on double valve mounting plate.

7. Rinse Clean Outlet Valve *** used in conjunction with and identical to the Rinse Clean Inlet Valve simplifies the storage and cleaning procedures by allowing the operator to turn a valve rather than disconnect a hose.

ELECTRONIC SECTION

The Electronic Section measures water quality, controls the direction of Product Water flow, Starts and Stops the pumps, and contains the central electrical connection point of the system. It also ensures only potable Product Water passes into the Product Water Storage Tank.

1. System Touch Panel is where all system functions are accessed by touching the user friendly intuitive screen and where all operating conditions are monitored.
2. Electrical Control Box contains all electrical and electronic components that control the system.
3. Remote Control Touch Panel *** allows for remote control, operation, and monitoring of the system.
4. Soft Start *** The soft start, used only in AC Single Phase systems, reduces the initial startup amperes required to start the High Pressure Pump Motor and in turn allows a smaller sized KW generator to start the system. Starting amperage is reduced by 40% with the Soft Start installed.

Not Numbered:

- Fresh Water Tank Low Level Switch ** owner/ installer supplied provides an optional feature to the System Control Logic that works in conjunction with the Automatic Fresh Water Flush option.

When installed and connected to the Main Printed Circuit Board, the Fresh Water Tank Low Level Switch must be connected as a N.O. (Normally Open) 1PST (One Pole Single Throw) switch.

When the Fresh Water Tank is empty the switch is Open. As water rises a few inches in the tank the switch Closes. This informs the System Control Logic that there is sufficient Fresh Water to perform the Automatic Fresh Water Flush Cycle.

- Fresh Water Tank High Level Switch ** owner/ installer supplied provides an optional feature to the System Control Logic that allows the System to shut off automatically when the Fresh Water Tank is full, when the System is operated in the Automatic mode. Additionally, the System will not start in the

Automatic mode when the Fresh Water Tank High Level Switch signals the System Control Logic that the Fresh Water Tank is full.

When installed and connected to the Main Printed Circuit Board, the Fresh Water Tank High Level Switch must be connected as a N.C. (Normally Closed) 1PST (One Pole Single Throw) switch.

When the Fresh Water Tank is several inches below the full mark the switch is Closed. As water rises and reaches the top of the full mark the switch Opens. This informs the System Control Logic that the Fresh Water Tank is full.

If operation of the System is desired when the Fresh Water Tank Switch signals the System Control Logic that the Fresh Water Tank is full then the System may be operated in the Manual mode.

Aqua Whisper DX Compact 450-1800

Section 4 - ELECTRICAL INFORMATION

4 ELECTRICAL INFORMATION

4.1 ELECTRICAL REQUIREMENTS AND INFORMATION

Following are general electrical requirements and information for Aqua Whisper DX Compact models.



CAUTION: DO NOT PERFORM INSTALLATION UNLESS:

1. The System Feed Water Sea Cock Valve is closed.
2. The system main electrical disconnect switch is switched "OFF", LOCKED, and TAGGED.



WARNING: ELECTRICAL SHOCK HAZARD. A Volt / Ohm Meter will be necessary. The following installation procedures expose the installer to High Voltage and electrical shock hazard. Only attempt this if you are a qualified electrician and only if surrounding conditions are safe.



CAUTION: Always allow slack in electrical cables. Allow the cable to enter or leave from the strain relief in a straight manner for several inches to ensure proper connection, to relieve stress to the cable and fitting, and to allow ease of detachment and reattachment for maintenance or replacement. If electrical cables are pulled tight causing them to bend at the strain relief, they will pull out of the strain relief causing a dangerous electrical shock condition, the wire may break, and the strain relief will lose its water-tight integrity.

A. AMPERAGE NOTES

The Electric Motors within the Aqua Whisper systems start in series with time delay between each motor starting after the Touch Screen "Start" Switch is pressed. First, the Booster Pump starts, then the main High Pressure Pump Electric Motor starts. Alternatively, the Booster Pump and High Pressure Pump may be started manually by accessing the manual operation mode from the Touch Screen.

During start up, the current of the Booster Pump Electric Motor surges to "Locked Rotor" amperage for a fraction

of a second after which the current drops to normal running load. Then the High Pressure Pump Electric Motor starts and surges to "locked Rotor" amperage for a fraction of a second after which the current drops to normal running load.

Therefore, the maximum surge current equals the Booster Pump Electric Motor normal running amperage plus the High Pressure Pump Electric Motor starting amperage. Normal operational amperage equals the normal operating amperage of the Booster Pump Electric Motor plus the normal operating amperage of the High Pressure Pump Electric Motor.

B. POWER SOURCE REQUIREMENTS

Check line voltage and frequency to ensure that it agrees with system nameplate. Grounding and circuit protection should be done in accordance with National Electrical Code. See connection diagram on nameplate of motor or refer to the diagrams within this manual.

Voltage AC Systems	HZ (AC)	Min. HZ	Max. HZ	Min. Voltage	Max. Voltage
120 VAC	60 HZ	58 Hz	62 Hz	108 VAC	132 VAC
230 VAC	60 HZ	58 Hz	62 Hz	207 VAC	253 VAC
100 VAC	50 HZ	48 Hz	52 Hz	90 VAC	110 VAC
220 VAC	50 HZ	48 Hz	52 Hz	198 VAC	242 VAC

C. MOTOR ROTATION

Refer to Booster Pump and High Pressure Pump markings to determine proper rotation.

Three Phase Systems: Ensure proper rotation by jogging each motor from the manual operation mode.

4.2 ELECTRICAL MOTOR SPECIFICATIONS

(H.P. = Horse Power; RPM = Revolutions Per Minute; FLA = Full Load Amperes;
LRA = Locked Rotor Amperes @ Start Up)

ALTERNATING CURRENT SYSTEMS:

Single Phase Alternating Current:

		High Pressure Pump Motor				Booster Pump Motor			
VAC	Hz	H.P	RPM	FLA	LRA	H.P	RPM	FLA	LRA
110	50	3	2850	23	89	0.5	2850	7.4	20
220	50	3	2850	11.5	44	0.5	2850	3.7	10
115	60	3	3450	25.4	86	0.5	3450	9.4	20
230	60	3	3450	12.7	43	0.5	3450	4.7	10

Three Phase Alternating Current:

		High Pressure Pump Motor				Booster Pump Motor			
VAC	Hz	H.P	RPM	FLA	LRA	H.P	RPM	FLA	LRA
220	50	2.5	2850	7.9	24.9	0.5	2850	2.5	8.2
380	50	2.5	2850	4.6	14.4	0.5	2850	1.5	4.7
230	60	3	3450	7.6	23.8	0.5	3450	2.4	7.9
460	60	3	3450	3.8	11.9	0.5	3450	1.2	3.9

4.3 RECOMMENDED CIRCUIT BREAKER

Recommended circuit breaker supplying power to system amperage rating:

Operating		Recommended
AC Voltage	Phase	Circuit Breaker
110 - 115 VAC	Single	50 Ampere
220 - 230 VAC	Single	25 Ampere
220 VAC	Three	15 Ampere
380 VAC	Three	10 Ampere
460 VAC	Three	10 Ampere

4.4 RECOMMENDED POWER WIRE SIZE

Recommended power wire size to Aqua Whisper system and pump motors:

RECOMMENDED POWER WIRE SIZE TO AQUA WHISPER SYSTEM:

Operating		Maximum	Recommended Minimum Wire Size for Length of run		
Voltage	Phase	Load	10 Ft / 3 meter	25 Ft / 8 meter	50 Ft / 15 meter
110-115 VAC	Single	34.8 Ampere	10 AWG / 6 mm ²	8 AWG / 10 mm ²	8 AWG / 10 mm ²
220-230 VAC	Single	17.4 Ampere	12 AWG / 4 mm ²	12 AWG / 4 mm ²	12 AWG / 4 mm ²
220-230 VAC	Three	10.4 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²
380 VAC	Three	6.1 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²
460 VAC	Three	5 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²

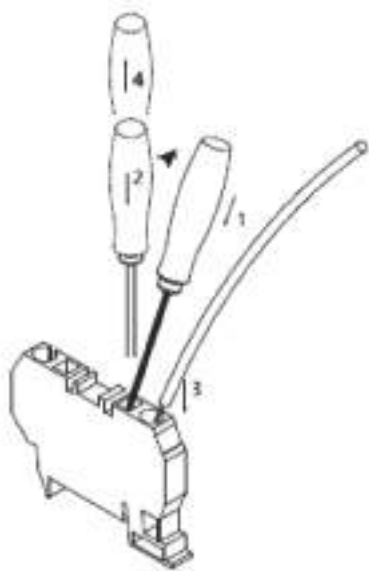
RECOMMENDED POWER WIRE SIZE TO AQUA WHISPER BOOSTER PUMP:

Operating		Maximum	Recommended Minimum Wire Size for Length of run		
Voltage	Phase	Load	10 Ft / 3 meter	25 Ft / 8 meter	50 Ft / 15 meter
110-115 VAC	Single	9.4 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²
220-230 VAC	Single	4.7 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²
220-230 VAC	Three	2.5 Ampere	16 AWG / 1.5 mm ²	16 AWG / 1.5 mm ²	16 AWG / 1.5 mm ²
380 VAC	Three	1.5 Ampere	16 AWG / 1.5 mm ²	16 AWG / 1.5 mm ²	16 AWG / 1.5 mm ²
460 VAC	Three	1.2 Ampere	16 AWG / 1.5 mm ²	16 AWG / 1.5 mm ²	16 AWG / 1.5 mm ²

RECOMMENDED POWER WIRE SIZE TO AQUA WHISPER HIGH PRESSURE PUMP:

Operating		Maximum	Recommended Minimum Wire Size for Length of run		
Voltage	Phase	Load	10 Ft / 3 meter	25 Ft / 8 meter	50 Ft / 15 meter
110-115 VAC	Single	25.5 Ampere	12 AWG / 4 mm ²	10 AWG / 6 mm ²	10 AWG / 6 mm ²
220-230 VAC	Single	12.7 Ampere	14 AWG / 2.5 mm ²	12 AWG / 4 mm ²	12 AWG / 4 mm ²
220-230 VAC	Three	7.9 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²
380 VAC	Three	4.6 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²
460 VAC	Three	3.8 Ampere	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²	14 AWG / 2.5 mm ²

4.5 WIRE INSERTION TO TERMINAL STRIPS



4.6 WIRE SIZE REFERENCES

Wire Size Cross Reference American Wire Gauge (AWG) vs. Metric Wire Sizes

AWG	Diameter	Square	Diameter	Square
	Inch	Inch (In2)	Millimeters	Millimeters (mm2)
0	0.46	0.1661	11.684	107.1649
0	0.4096	0.1317	10.4038	84.9683
0	0.3648	0.1045	9.2659	67.398
0	0.3249	0.0829	8.2525	53.4609
1	0.2893	0.0657	7.3482	42.3871
2	0.2576	0.0521	6.543	33.6069
3	0.2294	0.0413	5.8268	26.6516
4	0.2043	0.0328	5.1892	21.1385
6	0.162	0.0206	4.1148	13.2913
8	0.1285	0.013	3.2639	8.3626
10	0.1019	0.0082	2.5883	5.2588
12	0.0808	0.0051	2.0523	3.3064
14	0.0641	0.0032	1.6281	2.0809
16	0.0508	0.002	1.2903	1.307
18	0.0403	0.0013	1.0236	0.8225
20	0.032	0.0008	0.8128	0.5186
22	0.0254	0.0005	0.6452	0.3267

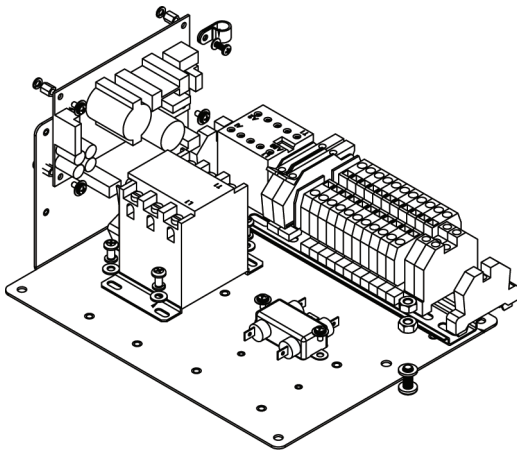
American Wire Gauge			Metric Wire Gauge		Metric Wire
AWG	dia inch	sq. inch	dia mm	sq mm	Size mm2
0	0.46	0.1661	11.684	107.1649	100
0	0.4096	0.1317	10.4038	84.9683	85
0	0.3648	0.1045	9.2659	67.398	65
0	0.3249	0.0829	8.2525	53.4609	50
1	0.2893	0.0657	7.3482	42.3871	40
2	0.2576	0.0521	6.543	33.6069	32
3	0.2294	0.0413	5.8268	26.6516	32
4	0.2043	0.0328	5.1892	21.1385	19
6	0.162	0.0206	4.1148	13.2913	13
8	0.1285	0.013	3.2639	8.3626	8
10	0.1019	0.0082	2.5883	5.2588	5
12	0.0808	0.0051	2.0523	3.3064	3
14	0.0641	0.0032	1.6281	2.0809	2
16	0.0508	0.002	1.2903	1.307	1
18	0.0403	0.0013	1.0236	0.8225	0.8
20	0.032	0.0008	0.8128	0.5186	0.5
22	0.0254	0.0005	0.6452	0.3267	0.35

4.7 COMPACT MODEL ELECTRICAL INFORMATION

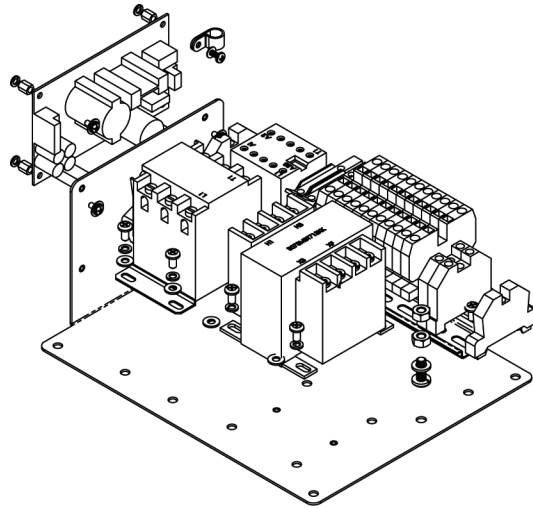


WARNING: ELECTRICAL SHOCK HAZARD. A Volt / Ohm Meter will be necessary. The following installation procedures expose the installer to High Voltage and electrical shock hazard. Only attempt this if you are a qualified electrician and only if surrounding conditions are safe.

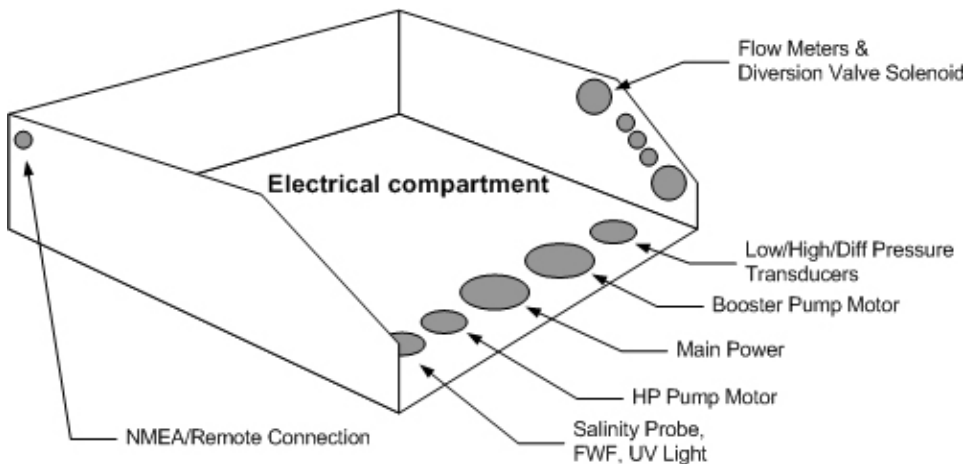
Electrical Chassis-Single Phase



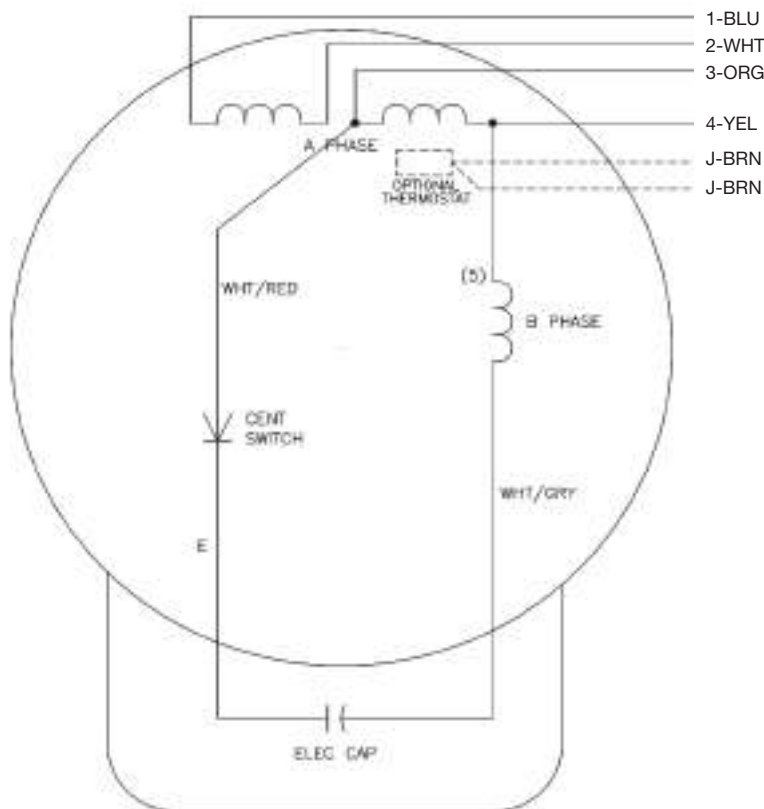
Electrical Chassis-Three Phase



Strain Reliefs



Electrical Motor Wiring-Single Phase



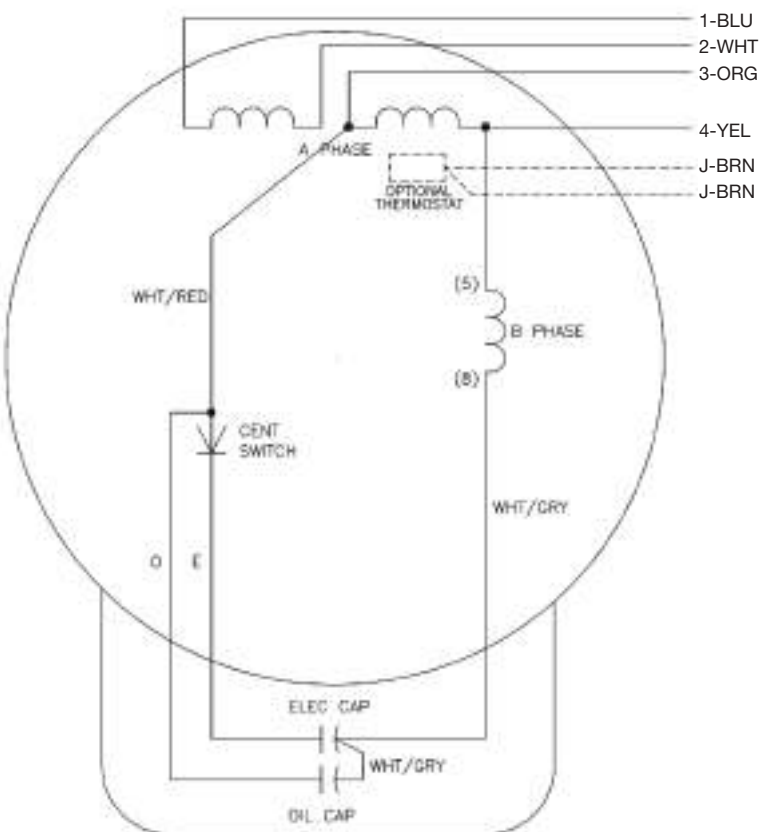
VOLTAGE	LINE A	LINE B	JOIN
220 - 230 VAC	1	4	2, 3
110 - 115 VAC	1, 3	2, 4	--

NOTES

1. CONNECTIONS ARE SHOWN FOR CCW ROTATION FACING END OPPOSITE SHAFT EXTENSION (STD). FOR CW ROTATION, INTERCHANGE 5 AND 8 INTERNALLY.
2. OPTIONAL THERMOSTAT IS PROVIDED WHEN SPECIFIED.
3. MULTIPLE CAPACITORS ARE CONNECTED IN PARALLEL UNLESS OTHERWISE SPECIFIED.
4. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

Sea Recovery
BOOSTER PUMP
ELECTRIC MOTOR
WINDINGS DIAGRAM CD0093
SINGLE PHASE
50/60 Hz
110-115 VAC // 220 - 230 VAC
RPM@50 Hz 2850 - @ 60 Hz 3450

Electrical



VOLTAGE	LINE A	LINE B	JOIN
220 - 230 VAC	1	4	2, 3
110 - 115 VAC	1, 3	2, 4	--

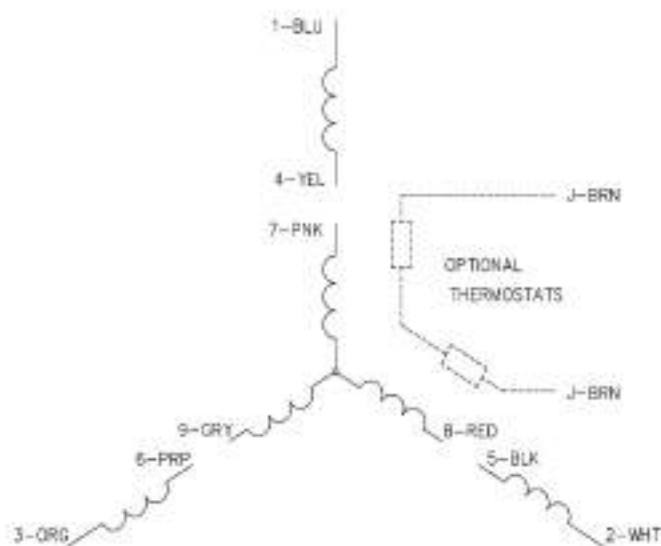
NOTES

1. CONNECTIONS ARE SHOWN FOR CCW ROTATION FACING END OPPOSITE SHAFT EXTENSION (STD). FOR CW ROTATION, INTERCHANGE 5 AND 8 INTERNALLY.
2. OPTIONAL THERMOSTAT IS PROVIDED WHEN SPECIFIED.
3. MULTIPLE CAPACITORS ARE CONNECTED IN PARALLEL UNLESS OTHERWISE SPECIFIED.
4. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

Sea Recovery
HIGH PRESSURE PUMP
ELECTRIC MOTOR
WINDINGS DIAGRAM CD0093
SINGLE PHASE
50/60 Hz
110-115 VAC // 220 - 230 VAC
RPM@50 Hz 2850 - @ 60 Hz 3450

Electrical Motor Wiring-Three Phase

ELECTRIC MOTOR WINDING / WIRING DIAGRAMS THREE PHASE, 50/60 Hz, 220 - 230 VAC // 380 - 460 VAC



NOTES:

1. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
2. OPTIONAL THERMOSTATS ARE PROVIDED WHEN SPECIFIED.
3. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY BE A MULTIPLE OF THOSE SHOWN ABOVE.
4. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

220 - 230 VAC
LOW VOLTAGE
(2Y)



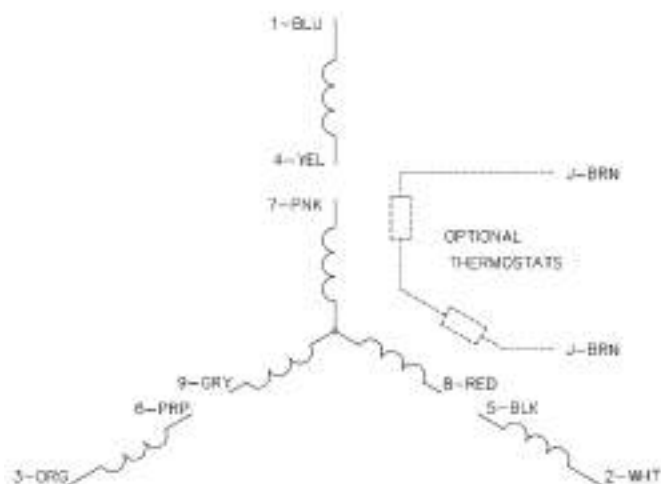
LINE LEADS
220 - 230 VAC

380 - 460 VAC
HIGH VOLTAGE
(1Y)



LINE LEADS
380 - 460 VAC

See Recovery
BOOSTER PUMP
ELECTRIC MOTOR
WINDINGS DIAGRAM CD0005
THREE PHASE
50/60 Hz
220 - 230 VAC // 380 - 460 VAC
RPM @ 50 Hz 2850 - @ 60 Hz 3450



NOTES:

1. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
2. OPTIONAL THERMOSTATS ARE PROVIDED WHEN SPECIFIED.
3. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY BE A MULTIPLE OF THOSE SHOWN ABOVE.
4. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

220 - 230 VAC
LOW VOLTAGE
(2Y)



LINE LEADS
220 - 230 VAC

380 - 460 VAC
HIGH VOLTAGE
(1Y)



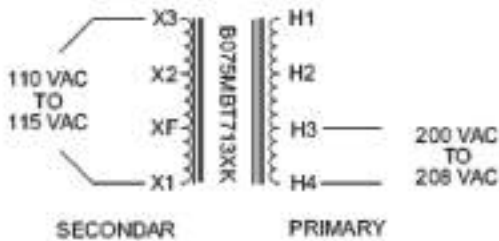
LINE LEADS
380 - 460 VAC

See Recovery
HIGH PRESSURE PUMP
ELECTRIC MOTOR
WINDING DIAGRAM CD0005
THREE PHASE
50/60 Hz
220 - 230 VAC // 380 - 460 VAC
RPM @ 50 Hz 2850 - @ 60 Hz 3450

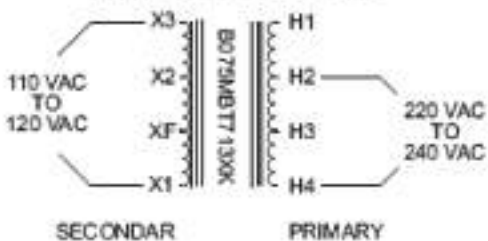
Three Phase Transformer Wiring

Three Phase Power Supplied to the Aqua Matic System
Step Down Transformer Primary and Secondary
(inside the System Control Box)
Wiring and Voltages

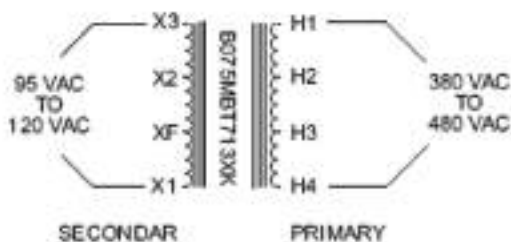
Three Phase Aqua Matic System Voltage
from 200 VAC to 208 VAC



Three Phase Aqua Matic System Voltage
from 220 VAC to 240 VAC



Three Phase Aqua Matic System Voltage
from 380 VAC to 480 VAC



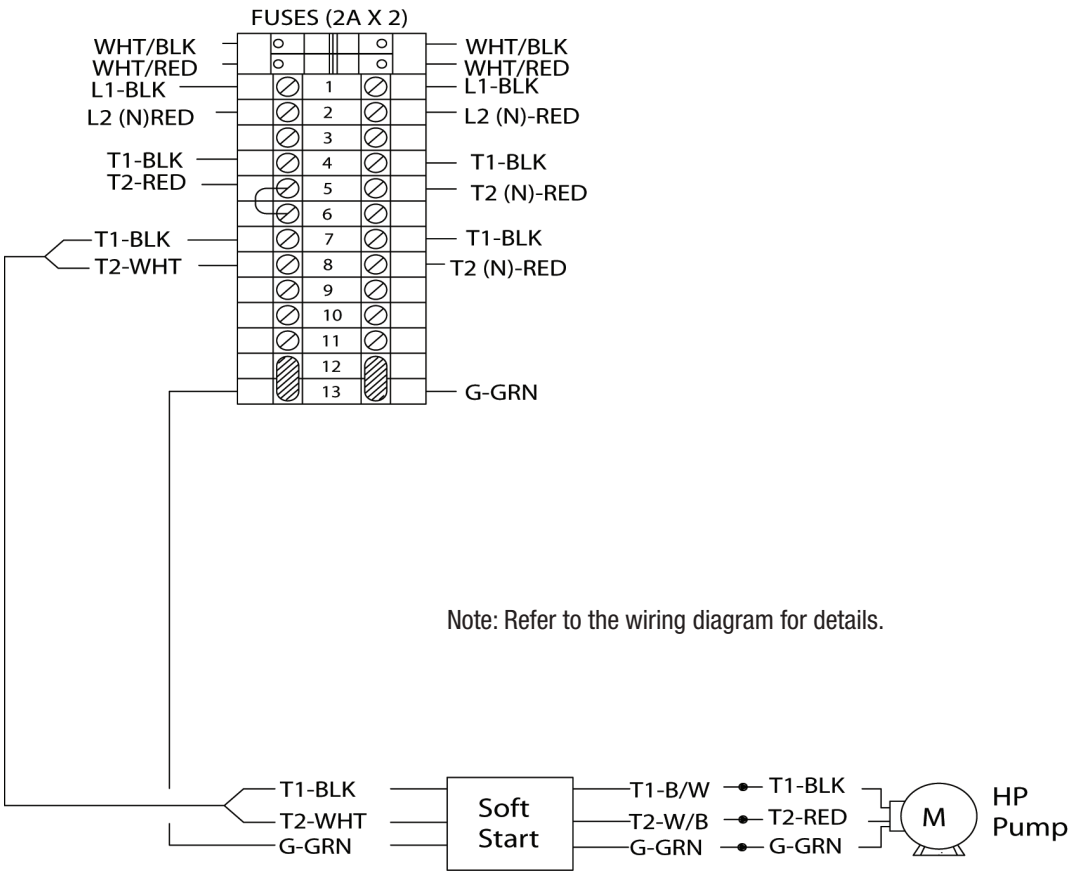
4.8 COMPACT MODEL WIRING DIAGRAMS



WARNING: ELECTRICAL SHOCK HAZARD. A Volt / Ohm Meter will be necessary. The following installation procedures expose the installer to High Voltage and electrical shock hazard. Only attempt this if you are a qualified electrician and only if surrounding conditions are safe.

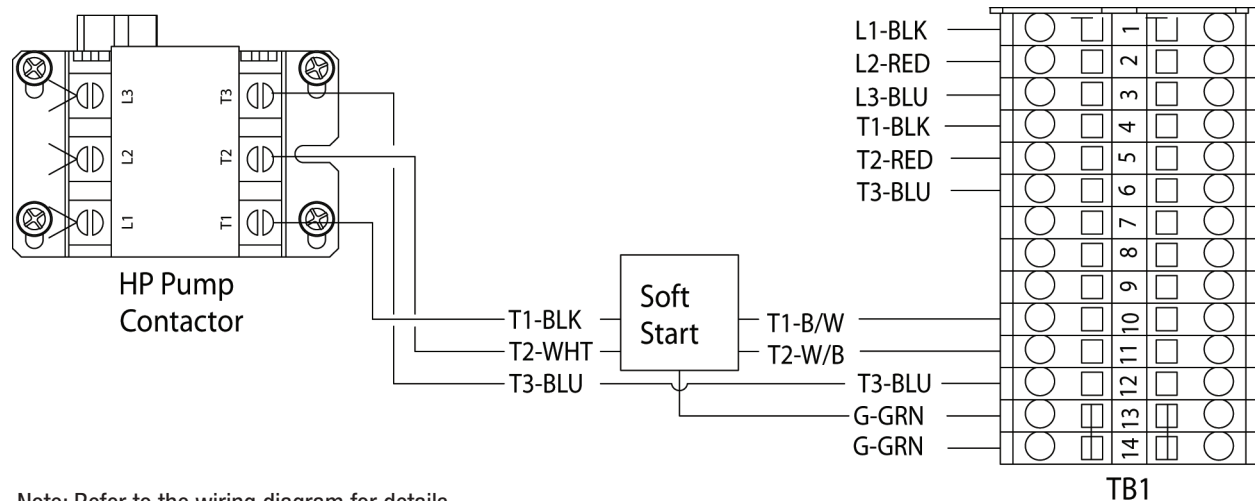
Soft Start Wiring Diagram B596800006

Single Phase Wiring Connections:



If the Motor Soft Start is not already installed, follow these instructions to install it:

- 1. Disconnect the power source from the System.
- 2. Open the System or Controller Enclosure cover to access the Electrical Chassis.
- 3. Connect Motor Soft Start wiring as shown above.

3 Phase Wiring Connections:

Note: Refer to the wiring diagram for details.

If the Motor Soft Start is not already installed, follow these instructions to install it:

1. Disconnect the power source from the System.
2. Open the System or Controller Enclosure cover to access the Electrical Chassis.
3. Connect Motor Soft Start wiring as shown above.

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Electrical

Aqua Whisper DX Compact 450-1800

Section 5 - INSTALLATION REQUIREMENTS

5 INSTALLATION REQUIREMENTS

LAND INSTALLATION NOTE: REFER TO SECTION 5.7 REGARDING FEED WATER INSTRUCTIONS FOR LAND INSTALLATIONS. REFER TO THE REST OF THIS SECTION FOR INSTALLATION.

All mounting surfaces must be flat in order to avoid warping of brackets and frames. Any damage caused by attaching the system or its components to an uneven surface is attributed to improper installation, is the liability of the installer, and is not covered by the Sea Recovery warranty. Grind flat or use appropriate shims on uneven surfaces to ensure that mounting of the system components does not cause bending or warping.

Refer to the System P&ID in Section 3.

5.1 SYSTEM FRAME

PLACEMENT AND SECURING THE MAIN SYSTEM FRAME

The System Frame must be placed in a location that allows access for operation and maintenance. Allow sufficient room for filter bowl removal. Allow access to the right side of the frame for electrical wire attachment. Ensure that the Touch Pad is reachable and readable.

The System Frame is mounted in place with 4 supplied rubber isolation mounts. Four threaded bolts and four sheet metal screws are provided for attachment. Set the System Frame in place onto a flat surface and mark the mounting holes.

Move the System Frame out of the way and drill the appropriate hole depending on which hardware will be used. Place the System Frame over the drilled holes and attach the rubber isolation grommet under the frame at each of the 4 mounting holes. Place the mating rubber isolation grommet over the top of the frame hole and attach with the appropriate supplied washers, and bolts or screws.

5.2 COMPONENTS

COMPONENT MOUNTING

Do not connect the water lines or electrical lines to the components until each of the components are in place and secure. After all components are in place and secure visually inspect the layout to ensure that the plumbing hoses and tubes will connect kink free, in short and straight segments, and will avoid heat and abrasions from surrounding surfaces.

1. Attach the supplied Inlet Connection to the Sea Cock Valve and rotate it towards the location of the Sea Strainer Inlet.

2. Allow sufficient space between the Inlet Connection and Sea Strainer for the Inline Vacuum/Pressure Gauge, if used.
3. The Sea Strainer is mounted to a flat vertical surface, below water level, between the Inlet Sea Cock Valve or the Inline Vacuum/Pressure Gauge and Rinse Clean Inlet Valve or the Inline Vacuum/Pressure Gauge or Booster Pump. Allow clearance above the bowl to access the mesh screen for cleaning or replacement.
4. The optional Rinse Clean Inlet Valve with attached Rinse Clean Outlet Valve is mounted below water level between the outlet of the Sea Strainer and the Rinse/Clean Bucket or Container and the Inline Vacuum/Pressure Gauge or Booster Pump. Allow access for the operator to reach and turn the valve handles.
5. Allow sufficient space between the Sea Strainer or Inlet Rinse/Clean Valve and Booster Pump for the Inline Vacuum/Pressure Gauge, if used.
6. The Automatic Fresh Water Flush Solenoid Valve is mounted on the Fresh Water Filter Assembly, below water level, after the Booster Pump. Mount the Automatic Fresh Water Flush Check Valve vertical with the arrow pointing UP. Mounting the valve horizontal or with arrow pointing down may cause it to not properly function.
7. The Booster Pump is mounted to a flat horizontal surface using the 4 supplied 1/4x1 SS Type "A" screws. The Booster Pump is mounted below water level to assist priming, and in an accessible location to allow access for maintenance. Mount the Booster Pump in an accessible location for Seal maintenance. Keep the Booster Pump close to the Inlet Thru Hull Sea Cock Valve, Sea Strainer, and Rinse Clean Inlet Valve. If the Booster Pump is mounted Vertical place the Pump Head at the bottom and the electric motor at the top. If the pump head is above the electric motor salt water damage to the electric motor will occur when the pump seal weeps or leaks.
8. Allow sufficient space after the Booster Pump Outlet for the Inline Vacuum/Pressure Gauge, if used. If the Multi Media Filter is installed this Inline Vacuum/Pressure Gauge is not required as the Multi Media Filter includes inlet and outlet pressure gauges.

9. The optional Plankton Filter (single or double housing version) is mounted to a flat vertical surface using the supplied screws. Allow minimum 4 in. (10 cm) below the bowl, and allow accessibility to the Plankton Filter for mesh screen removal and maintenance. Mount either the Plankton Filter or Multi Media Filter (Installing both is redundant and will lead to line pressure loss) in close proximity to the outlet of the Booster Pump.

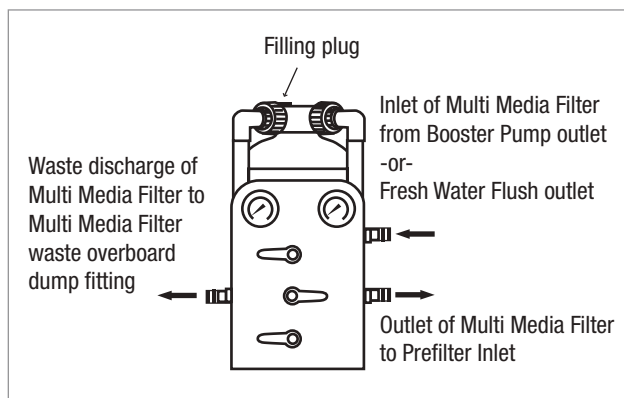


Figure 5a: Multi Media Filter

10. The optional Multi Media Filter is mounted to a flat horizontal surface using the supplied screws. Maintain an orientation and accessibility that allows the operator to view the pressure gauges, and adjust the valves mounted to the Multi Media Filter. Mount the Multi Media Filter in close proximity to the outlet of the Booster Pump.

Connect the inlet to the Booster Pump or Fresh Water Flush outlet. Connect the outlet to the Prefilter inlet. Connect the Multi Media Filter's waste discharge fitting to the overboard dump waste fitting. Connect the waste outlet to the Multi Media Filter's over board dump waste fitting.

Before use, you must place the supplied media, small gravel and fine sand, into the Multi Media Filter. Unscrew the Multi Media fill plug, located on top of the Multi Media Filter lid. Using a funnel, pour in approximately 15 lbs. (7 kg) of small gravel (1/8"x1/4"), then pour in approximately 26 lbs. (12 kg) of #20 silica sand. The silica sand must always go on top of the gravel. Clean the fill plug female threads of all debris and replace lid with a wrench, lightly tightened.



NOTE: The Multi Media Filter must be back washed prior to use to avoid prefilter and RO Membrane Element fouling. (Refer to Commissioning, Section 6)

11. Allow sufficient space after the Plankton Filter Outlet for the Inline Vacuum/Pressure Gauge, if used. If the Multi Media Filter is installed this Inline Vacuum/Pressure Gauge is not required.
12. Prefilter. The 10 in. (25.4 cm) Dual Prefilters and the Commercial Prefilter serve the same function. Use either the 10 in. (25.4 cm) Dual Prefilters or the Commercial Prefilter. Do not use both. Using both is redundant and will lead to line pressure loss.

The Dual Prefilters are mounted to the Aqua Whisper Compact System frame. Remote mounting is permissible to a flat vertical surface. If remote mounted, allow minimum 4 in. (10 cm) below the bowl, and allow accessibility to the Filters for element removal and maintenance.

or (either install the Dual Prefilters or Commercial Prefilter. Installing both will lead to line pressure loss).

The optional Commercial Prefilter replaces the 10 in. (25.4 cm) Dual Prefilters. The Commercial Prefilter is mounted to a flat horizontal surface using the supplied screws. Maintain an orientation and accessibility that allows the operator access to remove the filter element for maintenance. Allow minimum 12 in. (30.5 cm) above the top of the housing for filter element removal. Mount the Commercial Prefilter in close proximity to the outlet of the Booster Pump and the System frame. The commercial prefilter is plumbed as per the raised arrow and Inlet and Outlet letters molded into the filter housing. The correct water flow enters the outer surface of the filter element and migrates to the center core.

Refer to PAGE 5-4, figure 5b.

13. Allow sufficient space after the Commercial Prefilter for the Inline Vacuum/Pressure Gauge, if used.
14. The no-charge optional Oil / Water Separator is mounted to a flat horizontal surface using the supplied screws. Maintain an orientation and accessibility that allows the operator access to remove the filter element for maintenance. Allow minimum 12 in. (30.5 cm) above the top of the housing for filter element removal. Mount the Oil / Water Separator in close proximity to the outlet of the Booster Pump and the System frame.



WARNING NOTE: The Oil / Water Separator utilizes the same filter housing as the Commercial Prefilter. However, the Oil / Water Separator is plumbed opposite of (backwards from) the Commercial Prefilter. This filter housing has a raised arrow molded into the housing indicating flow and the inlet and outlet ports are also marked with raised lettering Inlet and Outlet molded into the housing. For the Oil / Water Separator these markings are INCORRECT. The Oil / Water Separator's correct water flow enters the center core of the filter element and migrates to the outer surface of the filter element (opposite that of the Commercial prefilter).

Prior to shipping Sea Recovery has placed Inlet and Outlet labels (stickers) indicating the correct plumbing. Follow the stickers, not the molded arrow and lettering.

Refer to PAGE 5-4, figure 5b.

15. Pressure Differential Transducer. The optional Pressure Differential Transducer threads into the center port of the Low Pressure Transducer Manifold.



CAUTION: Take care to NOT cross the fine female threads in the manifold.

Thread in clockwise finger tight. Using a wrench tighten an additional 45 degrees.

DO NOT OVER TIGHTEN.

OVER TIGHTENING WILL STRIP THE MANIFOLD FEMALE THREADS.

Using the supplied 1/4 in. (6.35 mm) O.D. tubing connect the center Pressure Differential Transducer Tube Fitting to the T-Connector Pressure Pick-Up or to the Pressure Pick Up port of the respective Prefiltration component. Refer to the various Piping and Interconnect Diagrams Illustrated in this Section 3.

16. Ultra Violet Sterilizer Installation. The Ultra Violet Sterilizer will be mounted, by the factory, to the System Frame if ordered with the Aqua Whisper System.

If the UV Sterilizer was not installed at the factory refer to Section 5.8 for installation.

16. The Fresh Water Flush Carbon Filter, with attached Fresh Water Flush 2-Way Solenoid Valve and Fresh Water Flush Check Valve is mounted to a flat vertical surface in an accessible location for filter element changing. Choose a location between the Automatic Fresh Water Flush Check Valve and a pressurized line from the boat's fresh water pressure system.



CAUTION: In order to provide the required flow of water to the Aqua Whisper System during the Fresh Water Flush cycle, the Boat or Home's fresh water pressure system must deliver minimum 1 U.S. Gallons (3.8 Liters) Per Minute at minimum 25 PSI and maximum 60 PSI (minimum 172 kPa and maximum 414 kPa).

TUBING AND HOSE PRECAUTIONS

TUBE FITTING CONNECTIONS ASSEMBLY

- a. Cut tube end square and clean.
- b. Loosen nut on fitting three turns.
- c. Insert tube into fitting until it bottoms.
- d. Loosen nut completely and remove tube with attached parts from body.
- e. Check to ensure that the O-Ring is seated onto the tube under the spacer (and not pinched into the body).
- f. Insert tube with attached parts into the body and tighten nut finger tight.

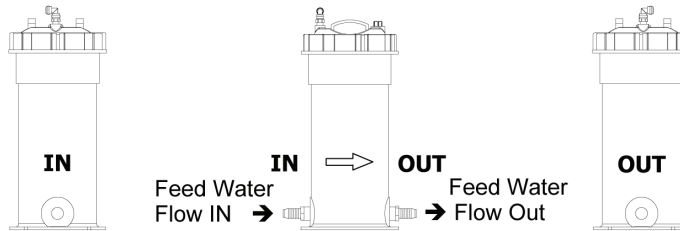


CAUTION: Always allow slack in all tube and hose lines. Never cause the tube or hose to immediately bend from the fitting. Allow the line to enter or leave from the fitting in a straight manner for several inches to ensure proper connection, to relieve stress to the fitting and tube or hose, and to allow ease of detachment and reattachment during maintenance or repair.

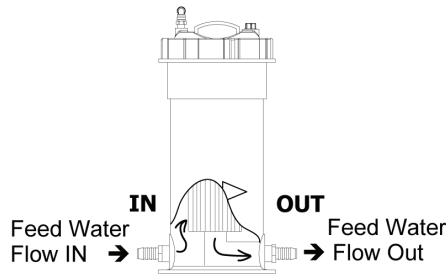


Figure 5b: Follow the labeling - NOT the molded arrows and lettering

COMMERCIAL PREFILTER CONNECTION AND WATER FLOW

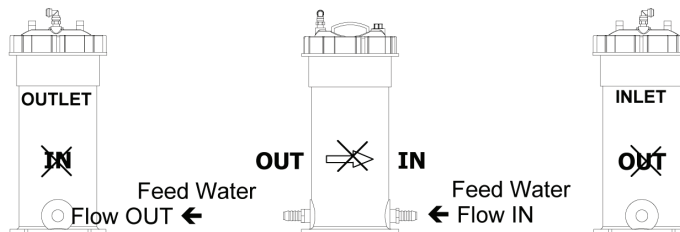


Commercial Prefilter is plumbed
as per the raised arrows and markings IN and OUT

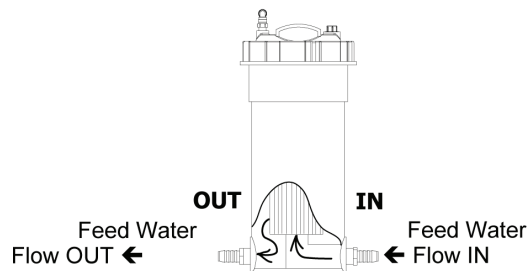


Feed Water Flow through the Commercial Prefilter Element
is from the OUTSIDE of the Element to the INSIDE CENTER of the Element

OIL/WATER SEPARATOR CONNECTION AND WATER FLOW



Oil/Water Separator utilizes the same housing as the Commercial Prefilter, however it is plumbed
OPPOSITE of the Commercial Prefilter and OPPOSITE of the raised arrows and markings IN and OUT
Separate Labels are placed on the Oil/Water Separator indicating correct INLET and OUTLET



Feed Water Flow through the Oil/Water Separator Element
is from the INSIDE CENTER of the Element to the OUTSIDE of the element

If water lines are pulled tight causing them to bend at the fitting they will leak, allow air to enter, fail prematurely, and or break the fitting that they are attached to.

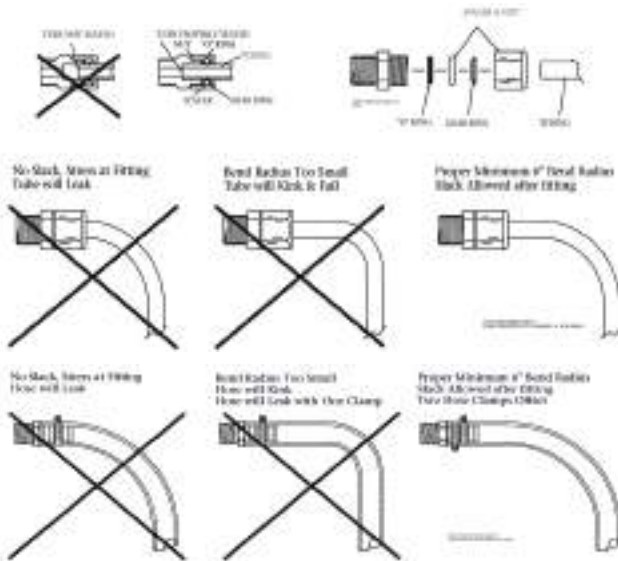


Figure 5c - Always allow slack in all tube and hose lines.

5.3 INTERCONNECTING COMPONENTS

INTERCONNECTING COMPONENTS WITH SUPPLIED HOSE

(Refer to page 5-6 for Component Interconnect Chart)

- Using the supplied 3/4 in. (19 mm) I.D. clear braided hose connect the Suction Line components, Low Pressure line components, and Brine Discharge Line components:

Secure each connection with the supplied hose clamps. Ensure all Suction Hose connections use two hose clamps rotated 180 degrees with the screw heads facing the same direction. Remove any flash on the Hose Barb fittings using fine sandpaper.

If your System is not supplied with a mentioned optional component then skip it and connect to the next supplied component.

- With the supplied 1/2 in. (12.7 mm) I.D. clear braided hose connect the Feed Water Line components and secure each connection with the supplied hose clamps, placing 1 hose clamp onto each hose barb fitting.
- 1/4 in. (6.35 mm) OD nylon tubing is supplied with applicable components for connecting Pressure Pick Up points to the Low Pressure Transducers. Use or non use of the 1/4 in. (6.35 mm) OD nylon tubing is dependent upon Prefiltration Options installed.

- If remote mounting the RO Membrane and Pressure Vessel Assembly ensure all High Pressure Hoses have sufficient slack and are not pulled tight into a sharp or immediate bend.

5.4 WATER TANK

CUSTOMER SUPPLIED FRESH WATER TANK, HIGH AND LOW LEVEL SWITCHES, AND ALARM

Not Numbered on the Piping and Interconnect Diagram. Installed inside the Fresh Water Tank.

These two tank level switches are not necessary for operation of the System. They do add additional features to the Automatic mode of the System. The choice of make, model, and style are left up to the Installer or Owner. They must meet the electrical requirement and operation as explained below.

The customer may also connect an external alarm to the System which will alert the operator that the system has shut down.

Fresh Water Tank Low Level Switch ** owner/installer supplied provides an optional feature to the System Control Logic that works in conjunction with the Automatic Fresh Water Flush option.

When installed and connected to the Main Printed Circuit Board, the Fresh Water Tank Low Level Switch must be connected as a N.O. (Normally Open) 1PST (One Pole Single Throw) switch.

When the Fresh Water Tank is empty the switch is Open. As water rises a few inches in the tank the switch Closes. This informs the System Control Logic that there is sufficient Fresh Water to perform the Automatic Fresh Water Flush Cycle.

Fresh Water Tank High Level Switch ** owner/installer supplied provides an optional feature to the System Control Logic that allows the System to shut off automatically when the Fresh Water Tank is full, when the System is operated in the Automatic mode. Additionally, the System will not start in the Automatic mode when the Fresh Water Tank High Level Switch signals the System Control Logic that the Fresh Water Tank is full.

When installed and connected to the Main Printed Circuit Board, the Fresh Water Tank High Level Switch must be connected as a N.C. (Normally Closed) 1PST (One Pole Single Throw) switch.

When the Fresh Water Tank is several inches below the full mark the switch is Closed. As water rises and

Component Interconnect Chart

Outlet of	To Inlet of
Inlet Connection	Sea Strainer
Sea Strainer	Rinse Clean Inlet Valve left or right port
Rinse Clean Inlet Valve unused left or right port	Rinse/Clean container
Rinse Clean Inlet Valve center port	Booster Pump
Booster Pump	Prefiltration Options
Prefilter Option	LP Manifold
Brine Discharge Tee	Rinse Clean Discharge Valve
Rinse Clean Discharge Valve	Cleaning Bucket
Rinse Clean Discharge Valve	Brine Discharge Connector
Multi Media Filter Waste Line (if used)	Multi Media Filter Discharge Fitting separate Thru-Hull or Tee at Brine Discharge Connector
pH Neutralizing Filter	Ultra Violet Sterilizer
Ultra Violet Sterilizer	Potable Water Storage Tank or Cistern

reaches the top of the full mark the switch Opens. This informs the System Control Logic that the Fresh Water Tank is full, the System will shut down if operating in the Automatic mode, and the System will not start in the Automatic mode.

If operation of the System is desired when the Fresh Water Tank Switch signals the System Control Logic that the Fresh Water Tank is full then the System may be operated in the Manual mode.

Alarm ** owner/installer supplied provides an optional feature to the System Control Logic that audibly or visually signals the operator that the System has stopped operating.

The output of this alarm circuit from the Main Printed Circuit Board is 12 VDC with MAXIMUM allowable current consumption of 1 (one) Ampere.

This alarm will signal if a fault occurs. It will not signal with a normal shut down that was not associated with a fault.

5.5 REMOTE TOUCH SCREEN

PLACEMENT AND SECURING THE REMOTE TOUCH SCREEN ENCLOSURE ASSEMBLY.

The Remote Touch Screen Enclosure Assembly is supplied with a 80 ft. (24.4 m) long NMEA 200 cable for connection to the Main Control Panel.

Place and install the Remote Touch Screen Enclosure in a location that is:

1. Away from water lines and hoses
2. Away from locations subject to water spray
3. In an accessible and viewable location
4. Within 80 ft. (24.4 m) of the Main Control Panel

5.6 ELECTRICAL CONNECTIONS

Refer to the electrical diagram in Section 4.



CAUTION: The Reverse Osmosis Membrane Element(s) must be kept wet else severe loss of production will occur. Refer to Section 7 for further information and instructions.

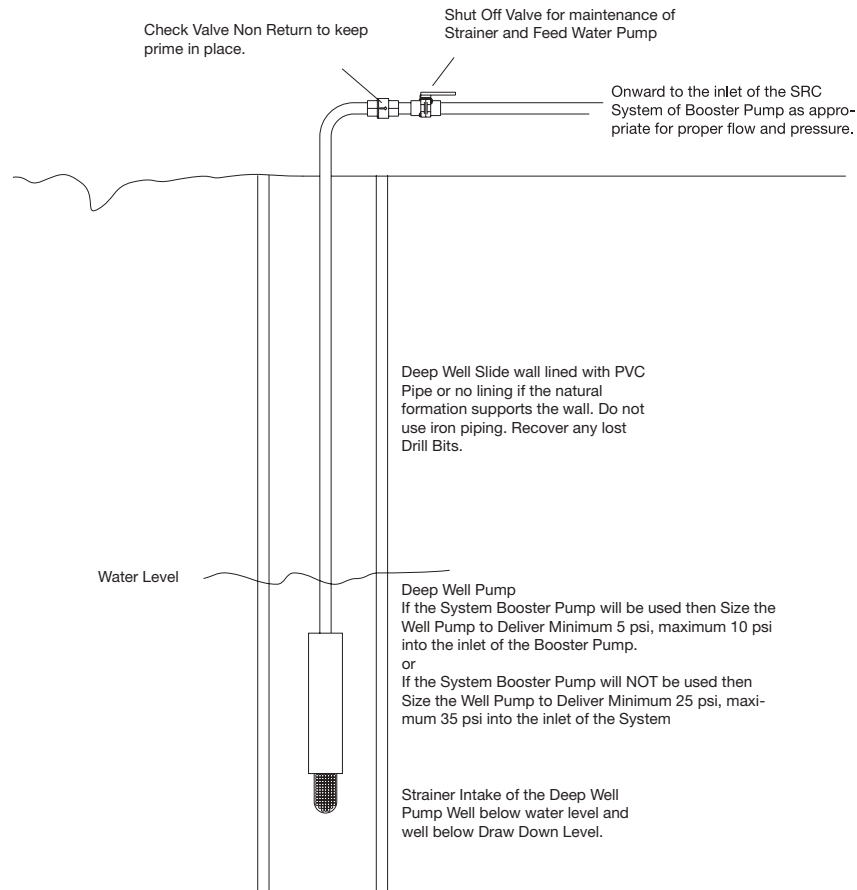
5.7 LAND FEED WATER PICK-UP

LAND INSTALLATION FEED WATER PICK-UP INFORMATION

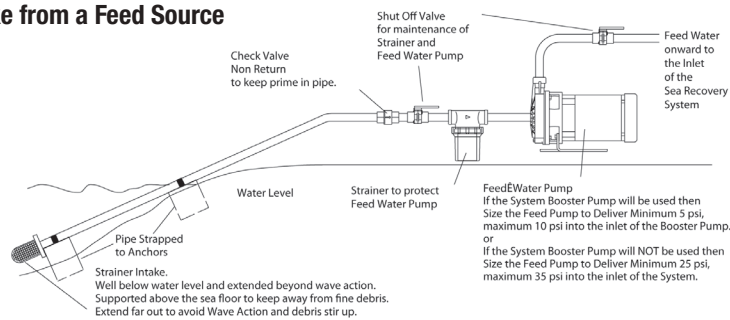
Refer to the illustrations on the next page.

Example of Water intake from a Deep Well

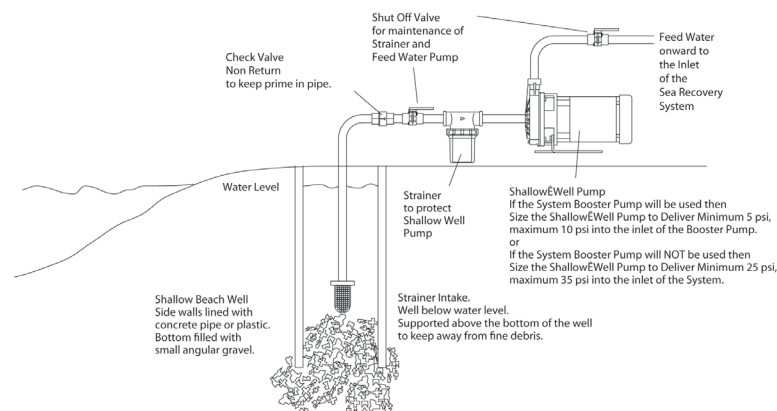
Example of Feed Water Intake from a Deep Well for a Land Installation



Example of Water intake from a Feed Source



Example of Feed Water Intake from a Shallow Beach Well for a Land Installation.



5.8 UV STERILIZER INSTALLATION

The SP Series UV unit is shipped with the UV lamp, quartz sleeve, fittings, and O-rings and need to be assembled before the UV unit can be used.

1. Install the UV unit in a sheltered, well ventilated area.
2. Install the UV unit as close as possible to the point-of-use to avoid potential contamination discharge from pipes, fittings, etc.
3. The UV unit should be mounted on stable support to avoid straining or warping. Allow sufficient clearance around the unit for servicing.
4. Verify the location is free from vibration.
5. All UV units are rated for maximum operating pressure at 50 psig (8.24 bar).
6. The UV unit must be properly grounded for safe and proper operation. Failure to properly ground the UV unit automatically voids all unit warranty.
7. Line voltage must be within 10.56V to 16.50V. Voltage outside the range will compromise the performance of the UV unit.

Plumbing Requirements

All piping, tubes and hoses leading to the UV unit connection points must be leak-free before the UV unit can be installed.

NOTE! The UV unit may be installed horizontally or vertically. For vertical installation, make sure the inlet port is positioned at the bottom.

Installation Procedure

NOTE! Do not assemble or install damaged parts. Quartz sleeve and UV lamp are fragile and must be handled with care.

Install Fittings

Perform this procedure to prepare the UV unit for installation.

1. Inspect each port and fitting to ensure threads are free of dirt, burrs, and excessive nicks. If threads are badly nicked, replace the fitting.

2. Wrap ¼ inch (6.35 mm) wide PTFE tape 2 to 3 turns counter-clockwise around the male threads of the ¼ inch (6.35 mm) fitting.
DO NOT wrap tape around the first thread.
3. Screw the fitting into cylinder ports to finger tight position to achieve desired alignment.
4. Do not back-off fitting. Do not over-tighten fitting. Over-tightening could strip the fitting threads and cause a leak.

Install Quartz Sleeve

Perform this procedure only when water piping for UV unit is in place and ready for service.

1. Visually inspect quartz sleeve for cracks and damages.
2. Remove the ballast box cover. Remove the four screws holding the ballast box cover then remove the cover.
3. Remove the rubber boot. Pull out the 4-point lamp connector.
4. Remove the compression nuts.



5. Insert the quartz sleeve. Place the closed-end of the quartz sleeve into the cylinder through the ballast box pass-thru.



6. Leave a ½ in. (12.7 mm) of the quartz sleeve to expose on the viewport pass-thru.



7. Lubricate the tips of the quartz sleeve with clean water and insert new O-ring. Ensure the O-ring has all-round contact with the cylinder pass-thru.
8. Tighten the compression nut while making sure the nut does not contact the quartz sleeve. Adjust O-ring position as necessary. The compression nut should be snug and tight, not over-torque.
9. Repeat Step 7 and 8 on the ballast box compression nut.

Connect Plumbing

Tube or hose ends must be cut squared and clean; must have no rough edges. The quick fit elbow fitting has a C-clamp that will lock the tube in place once inserted.

1. Insert the supply pipe into one cylinder port and label the port "Inlet".
2. Insert the temporary pipe into the other cylinder port to direct water into a container.



3. Slowly fill the cylinder with water and flush cylinder for 1 minute.



4. Remove temporary pipe and insert the return pipe into the cylinder port and label the port "Outlet".
5. Slowly pressurize the UV unit by filling the cylinder with water while checking for leaks.
6. If leaks are found on the compression nuts, depressurize the unit and slightly tighten the leaking compression nut.
7. Retest until a leak-free installation is verified.
8. Once the UV unit is leak-free, the quartz sleeve installation is complete. The UV lamp can now be installed.



NOTE! To remove tube from fitting, first remove the C-clamp then push fitting sleeve down. Once the fitting sleeve is down, pull the tube out of the fitting.



Install Ultraviolet Lamp

Perform this procedure only after the quartz sleeve installation and leak-tests are completed successfully

1. Connect the UV lamp to the 4-point receptacle. If the lamp is not installed properly, lamp breakage will occur.



2. Insert lamp into quartz sleeve through compression nut pass-thru.



3. Install rubber boot over compression nut.



4. Connect unit power cable to power source.
5. Tighten the 4 screws to secure ballast box cover.
6. Turn ON the power to the unit.
7. Verify UV lamp operation from the viewport.
8. Allow one minute for the UV lamp to warm up prior to flowing water through the UV unit.



CAUTION! Use the viewport to verify the proper operation of the UV lamp.



CAUTION! Rapid successive cycling of the power to the ballast can cause premature failure of the unit.



CAUTION! Prior to energizing the lamp, make sure there is no water leaking from the quartz sleeve compression nuts.

Mounting the Unit

Once the UV unit is assembled and tested successfully, it can be mounted onto its permanent operational location. The unit must be mounted in a manner that will prevent excessive vibration and warping which will damage the quartz sleeve.

Operational Guidelines

- a) Release the pressure in the UV treatment chamber before breaking the compression nut seals.
- b) Disconnect all power to the UV unit before servicing.
- c) Do not allow the inlet water temperature to drop below 35°F (2°C).
- d) Do not allow the flow rate to exceed 2 GPM (7.5 LPM).
- e) Do not cycle the UV unit more than 3 "ON/OFF" cycles in a 24-hour period.
- f) Ensure all plumbing connections are tightly sealed before applying pressure.
- g) Before connecting the return tube, flush the unit to rinse out any debris left from the installation process.



WARNING! UV LIGHT EXPOSURE CAN SEVERELY BURN AND DAMAGE EYES AND SKIN.



WARNING! DO NOT look at the blue UV light. DO NOT operate the UV lamp outside of the UV treatment chamber.



CAUTION! The unit operates on high voltage and must be serviced by qualified personnel only.



CAUTION! Standard flow rate are based on water temperature 35°F to 100°F (2°C to 38°C) . If the inlet water temperature exceeds 100°F (38°C), please contact your local CSR.



CAUTION! Cycling more than 3 cycles will reduce the end-of-life (EOL) output and/or cause premature lamp failure.

Aqua Whisper DX Compact 450-1800

Section 6 - COMMISSIONING

6 COMMISSIONING

COMMISSIONING NOTES

These Commissioning instructions must be carried out for initial start-up of a NEW system.

Failure to follow these instructions will lead to system failure and cause damage to components.

6.1 CHECK INSTALLATION

Ensure that the installation has been properly performed. Do not rely on the installer's word, do not assume the System has been installed correctly.

WARNING: Damage caused to the system due to operation of an improperly installed system is the liability of the installer and the operator.

Check each water connection to the system to ensure that the installer has properly connected and properly routed each tube. Improper routing and any blockage in any line causes damage to the system. Improperly connected or loose connected lines resulting in leaks causing damage is the liability of the installer and the operator, and is not covered by the Sea Recovery warranty.

Do not assume and do not rely on the installer's word; check it yourself.

Make sure that the Electrical Power Source, boat's circuit breaker to the system, is switched "OFF".

Open the unit cover and check all electrical and electronic connections for proper wiring and attachment.

After checking all wiring for correct and tight connection, close the cover.

Switch the Electrical Power Source, boat's circuit breaker to the system, to the "ON" position.

6.2 CHECK RO MEMBRANE

Check to ensure that the Reverse Osmosis Membrane Elements are installed within the Pressure Vessels.



CAUTION: Some systems are shipped WITHOUT the Reverse Osmosis Membrane Element. This is to accommodate Boat Builders that install the system well in advance of commissioning the System.

If the Reverse Osmosis Membrane Element has been installed, there will be a Reverse Osmosis Membrane Element Serial Number tag, attached to the High Pressure Vessel.

If the R.O. Membrane Element Serial Number tag is missing or does not contain a serial number and date, then immediately contact the company that sold the system to you, the installer, or Sea Recovery.



WARNING! DO NOT attempt to operate the system without a Reverse Osmosis Membrane Element installed in the system otherwise extensive damage will result.



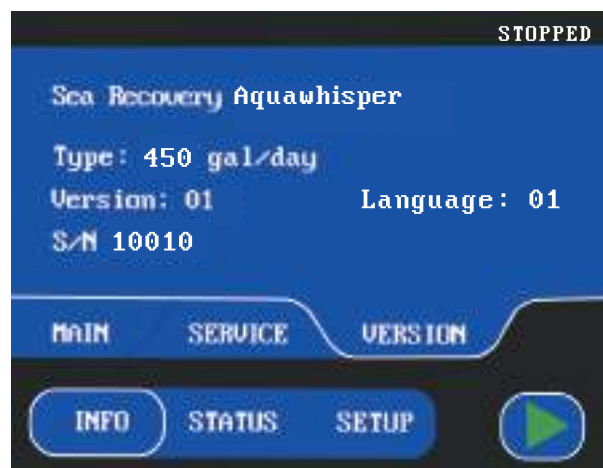
WARNING! Damage caused to the system due to operation of the System without an R.O. Membrane Element correctly installed is the liability of the installer and the operator.

6.3 SETUP CONTROLLER

The controller is set by Sea Recovery prior to shipping based on the features and optional equipment that shipped with the System at the time of ordering.

Addition of the Fresh Water Flush to the System after it has shipped from Sea Recovery will require new set up of the computer logic.

Addition of, removal of, or changes in the length of the R.O. Membrane / Pressure Vessel Assembly will require control logic setup. Refer to the NMEA Configuration Guide.



A. FEATURES PROGRAMMABLE BY OPERATOR

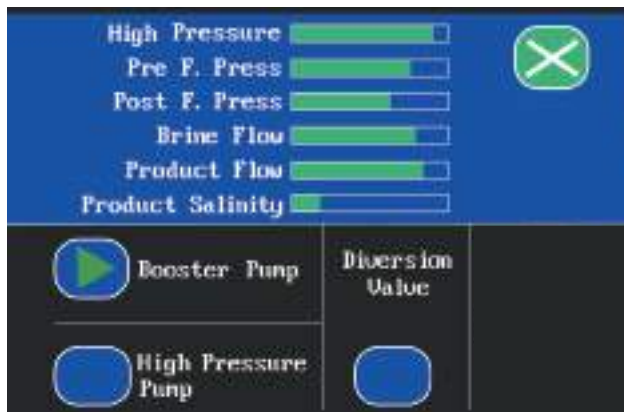
The following is an explanation of features in the main controller that are programmable by the operator. It is required that each feature be set properly in order to gain maximum performance of the System.

Only preinstalled features will be displayed on this screen.

1. MANUAL MODE



Enable user to control the Booster Pump, HP Pump, Diversion Valve and Pressure.



- a. **BOOSTER PUMP**
Manually start and stop the Booster Pump.
- b. **HIGH PRESSURE PUMP**
Manually start and stop the HP Pump when the Booster Pump is running.
- c. **DIVERSION VALVE SET POINT**
Manually energize the 3-Way Product Water Diversion Valve when the specified product water quality level has been reached, in PPM (Parts Per Million). The factory setting is 500 PPM TDS (five hundred Parts Per Million Total Dissolved Solids expressed as NaCl [sodium chloride - salt]).

2. **DISPLAY**
Changes the color contrast of the touch screen for better viewing.
3. **ACCEPTED SALINITY LEVEL**
Changes the accepted salinity level by adjusting the PPM level.
4. **BACK WASH TIME**
Changes the interval for automatic FWF by adjusting the number of days.
5. **LANGUAGE**
Changes the current language used on the controller by selecting new language option.
6. **UNIT**
Toggles the measurement standards between U.S. Standards and Metric Standards

Pressure: U.S. Standard = PSI (Pounds Per square Inch); Metric Standard = kPa (kilo Pasquel)

Flow: U.S. Standard = GPM (Gallons Per Minute) or GPH (Gallons Per Hour); Metric Standard = LPM (Liters Per Minute) or LPH (Liters Per Hour).

6.4 CHECK SYSTEM MANUALLY

Refer to the P&ID in Section 3.

1. Ensure that the manual By-Pass lever on the 3-Way Product Water Diversion Valve is positioned outward (away from the coil body).
2. Open any auxiliary valve within the incoming Feed Line, Outgoing Brine Discharge Line, and Outgoing Product Water Line.



WARNING: If any auxiliary valve is installed in these lines, it will damage the System if left closed during starting and/or operation of the system. The resulting damage is the liability of the operator.

3. Position Rinse Clean Inlet Valve to normal operation towards the Sea Restrainer.
4. Position Rinse Clean Outlet Valve to normal operation towards the Thru Hull Discharge Fitting.
5. Unwound the Back Pressure Regulator to fully open position (counter clockwise).
6. Check all filter housings to ensure that they contain the proper filter element:
 - a) Sea Strainer check for monel screen

- b) Plankton Filter if installed check for monel fine mesh screen filter element
- c) Multi Media Filter if installed check for media (#20 silica sand).
- d) Dual Prefilter or Commercial Prefilter check for pleated cartridge filter elements
- e) Oil/water Separator check for Oil/water Separator filter element
- f) R.O. Membrane(s) check for Sea Recovery Serial Number and Date on the label attached to each pressure vessel.
- g) Charcoal Filter check for charcoal filter element
- h) pH Neutralizer check for pH Neutralizer cartridge
- i) Fresh Water Flush Carbon Filter check for Carbon element.

7. Function Tests of Electric Components:

PRIOR TO ASSUMING THAT AN ELECTRICAL COMPONENT IS BROKEN OR NON FUNCTIONAL PERFORM A FUNCTION TEST TO DETERMINE IF IT IS OPERABLE OR NOT.

Function Tests should be performed manually as part of the commissioning procedure.

- Booster Pump Electric Motor
- High Pressure Pump Electric Motor
- Diversion Valve energize solenoid
- Fresh Water Flush Valve energize solenoid
- UV Sterilizer Ballast and Lamp
- a) Electric Motor Rotational Check:
Ask an assistant to view the fan section of the Booster Pump Motor and High Pressure Pump Motor.while you “Jog” each of these electric motors. Rotation is clockwise when viewing the back of the electric motor (fan), counter clock wise when viewing the front of the pump.
- b) Check the function of the following:
DIVERSION VALVE: 3-Way Product Diversion Valve Solenoid will energize momentarily. The valve should click when repositioning.
FWF VALVE: Fresh Water Flush Solenoid Valve will actuate to the Fresh Water Flush position. Pressing the switch a second time will cause the Fresh Water Flush Solenoid Valve to revert

to the Normal Feed position. The valve should click when repositioning.

UV STERILIZER: UV Sterilizer will flicker when energized. Check for illumination from the UV Sterilizer viewport. Do not look directly onto light.

- c) Correct any abnormalities.

8. Prime the System.

In order to save time and make the initial start easy, when starting the System for the first time, the feed water lines and each component in the prefiltration section should be filled with either feed water or fresh water. This will prime the feed water section including the Booster Pump so that it will be able to pick up and continue delivering feed water.

6.5 OPERATION NOTES

BEFORE starting the System in semi-auto mode be prepared for the following sequence. After the System has been started the following will occur:



CAUTION: The operator must verify the back pressure regulator valve knob is in fully open position before starting the System.

1. The System starts monitoring the Tank Low Level sensor, pressures, and water flow.
2. The System starts the booster pump.
3. When the inlet pressure of the high pressure pump is within valid range for 20 seconds, the System starts the high pressure pump.
4. The operator verifies that the low pressure gauge reading is within 35 psi (2.4 bar) normal operating range.
5. The operator increases operating pressure by adjusting the back pressure regulator valve knob in a clockwise direction.
6. When the product water flow reaches the configured production rate, the System starts monitoring the product water salinity.
7. While monitoring the product water flow reading on the control panel, the operator then adjusts the back pressure regulator knob in small steps for the product water to flow at the configured production rate.

If the system pressure exceeds 975 psi, an alarm will sound and system safety will be activated and shut down the System.

8. When the sensor indicates that the product water tank is not full the System starts a 5-minute countdown.
9. When the salinity of the product water is below the set up salinity level for 5 seconds, the 3-way Product Water Diversion Valve is energized sending the product water to the potable water outlet, the UV sterilizer will energize if this option is installed. This may take up to 30 minutes.
10. Feed Pressure, Feed Flow, Operating Pressure, Brine Flow, Product Flow, and Product Salinity are all being monitored and the values of these readings cause the System Control Logic to perform various tasks to maintain proper functioning of the System.
11. When the Tank High Level sensor indicates that the water tank is full, the System will stop all operations.
 - a) Operator must adjust the Back Pressure Regulator to 0 psig (0 bar).
 - b) The 3-Way Product Water Diversion Valve will revert to unpotable water.
 - c) The UV Sterilizer will stop.
 - d) The High Pressure Pump will stop.
 - e) The Booster Pump will stop.
 - f) If the System does not include the Automatic Fresh Water Flush option this ends the stop sequence.
or
 - g) If the System includes the Automatic Fresh Water Flush option, the Automatic Fresh Water Flush Valve will energize and after 7 to 15 minutes the Fresh Water Flush Valve will de-energize and the Stop sequence is complete.
12. The System will go to a Fresh Water Flush Stand-by mode and count down until the next automatic Fresh Water Flush Cycle. The Fresh Water Flush Cycle will automatically initiate every preset number of days until canceled or power is disconnected from the System.

MULTI MEDIA FILTER BACKWASH AND RINSE:

If the System is equipped with a Multi Media Filter it must be back washed and rinsed. New gravel and sand contain fines that must be backwashed from the multi media filter prior to operating the System.

1. Open the Inlet Sea Cock Valve.
2. Position the Rinse Clean Inlet Valve, to the normal operating position towards the Sea Strainer.
3. Position the Rinse Clean Outlet Valve, to the normal operating position towards the Multi Media Filter Brine Discharge Thru-Hull Fitting.
4. Position the Multi Media Filter valves to Backwash.
5. Set the controller into the Manual mode of operation, and operate only the Booster Pump.
6. After 10 minutes of back washing, stop the Booster Pump.
7. Position the Multi Media Filter Valves to Rinse.
8. In the Manual mode of operation, operate only the Booster Pump.
9. After 5 minutes of Rinsing, stop the Booster Pump.
10. Position the Multi Media Filter Valves to Normal Operation.

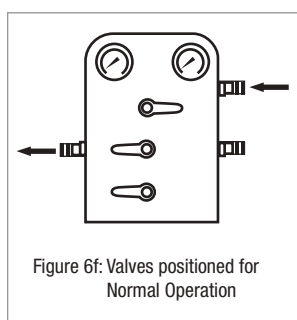
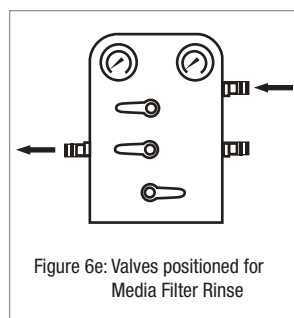
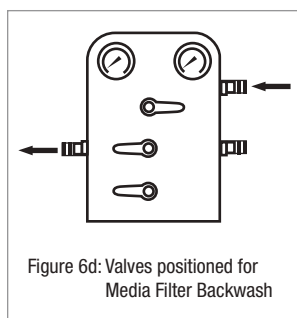
6.6 INITIAL STARTUP

6.6.1. POSITION SYSTEM VALVES

VALVE	POSITION
Inlet Sea Cock Valve	FULL OPEN
Rinse Clean Inlet Valve	FROM SEA STRAINER TO FRESH WATER FLUSH VALVE
Rinse Clean Outlet Valve	FROM BRINE DISCHARGE OF SYSTEM TO THRU HULL DISCHARGE FITTING
Multi Media Filter Valves	NORMAL OPERATION
Back Pressure Regulator	FULL OPEN
ANY auxiliary valve in the Feed Line, Brine Discharge Line, or Product Water Line	FULL OPEN



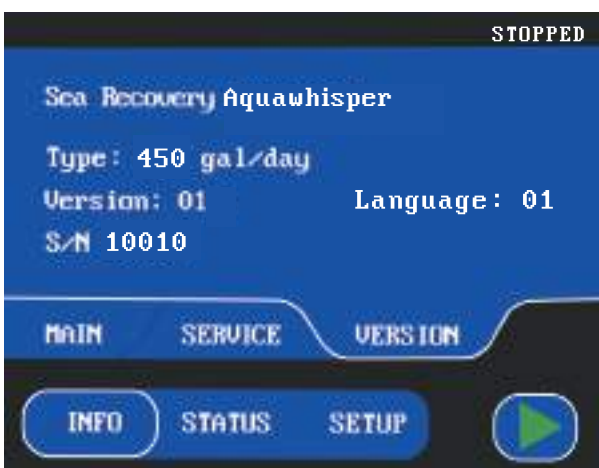
WARNING: If any auxiliary valve is installed in these lines, it will damage the System if left closed during starting and/or operation of the system. The resulting damage to the system is attributed to improper installation, is the liability of the operator, and is not covered by the Sea Recovery warranty.



6.6.2 APPLY POWER TO THE SYSTEM

- a) Switch the Electrical Power Source, boat or home's circuit breaker to the system "ON".
- b) All Operating Screens WILL NOT include the Automatic Fresh Water Flush components if the Fresh Water Flush Option is not installed and the control logic has been informed that the Fresh Water Flush Option is not installed.
- c) After the control logic has initiated itself, the default screen will appear indicating that the System is ready to Start.

Fig. 6a: Default screen



6.6.3 START THE SYSTEM

A. SEMI-AUTOMATIC MODE

The Semi-Automatic Mode is recommended for users and owners. These instructions are recommended when the System is configured with a Tank High Level sensor.

1. Verify the back pressure regulator valve knob is in full open position.
2. Press the Start button on the Main Control Panel or Remote Control Panel.
 - a) The System starts monitoring the Tank level, system pressures, and system water flow.
 - b) The System starts the booster pump.
 - c) When the inlet pressure of the high pressure pump is within 35 psi (2.4 bar) for 20 seconds, the System starts the high pressure pump.
3. Verify that the low pressure gauge reading is within 35 psi (2.4 bar), normal operating range.
4. Slowly increase operating pressure by adjusting the back pressure regulator valve knob in a clockwise direction until the product water flow reach the System production rate.
 - a) If the high pressure exceeds 975 psi (67.2 bar), an alarm will sound and shut down the System.
 - b) When the production flow rate is reached, the System will start monitoring the product water salinity.

Although the system is producing "Product Water", the Product Water may not be "Potable" for up to 30 minutes. The salinity of the Product Water diminishes gradually, until it reaches the acceptable level or lower.

PRODUCT SALINITY (RED) simply means that the dissolved solids in the Product Water have not yet decreased to acceptable level.

PRODUCT SALINITY (GREEN) simply means that the dissolved solids in the Product Water have reached the acceptable level and the Diversion Valve can be activated.

- c). If the tank is not full and the salinity of the product water drops below the preset salinity level, the U.V. sterilizer will energize if installed.
- d) If the salinity of the product water is below the preset salinity level for 5 seconds the

- 3-way Diversion Valve will energize sending the product water to the potable water outlet.
- e) Feed Pressure, Feed Flow, Operating Pressure, Brine Flow, Product Flow, and Product Salinity will be monitored and the System Control Logic will perform various tasks to maintain proper functioning of the System.
- f). When the tank is full, the System will stop all operations.
- 5. Check for:
 - a) A constant feed water flow.
 - b) A consistent system pressure.
 - c) Leaks in the system.
 - d) Abnormal noises or other occurrences.
- 6. If any abnormality develops, a warning/error screen will display.
 - a) Stop the System. correct the problem then repeat Step 1-5.
- 7. Proceed to Log System Readings.

B. MANUAL MODE

The Manual Mode is intended for SRC technicians for setup and configuration purposes.



NOTE: The Remote Touch Screen will be blocked during operation in the Manual Mode.



CAUTION: When the System is operated in the MANUAL Mode Safety features will still be controlled by the System Logic, however AUTOMATED features will not be controlled by the System Logic and must be controlled by the operator.

1. Verify the back pressure regulator valve knob is in fully open position.
2. From the default screen, touch the SETUP tab.
3. On the next screen, touch the Acceptable Salinity Level button.
4. On the Salinity Level screen, adjust to desired level (200 to 1000 PPM) then touch the SETUP button.
5. On the next screen, touch the Manual Mode button.

6. On the next screen, touch the Booster Pump START button then wait 5 seconds for booster pump to stabilize.
7. Touch the HP Pump START button.
8. Slowly increase operating pressure by adjusting the back pressure regulator valve knob in a clockwise direction until the product water flow reaches the System production rate.
 - a) If the high pressure exceeds 975 psi (67 bar), an alarm will sound and shut down the System. Manually adjust the back pressure regulator to 0 psi (0 bar).
 - b) When production rate is reached, the System will start monitoring the product water salinity. Although the system is producing "Product Water", the Product Water may not be "Potable" for up to 30 minutes. The salinity of the Product Water diminishes gradually, until it reaches the acceptable level or lower.

PRODUCT SALINITY (RED) simply means that the dissolved solids in the Product Water have not yet decreased to acceptable level.

PRODUCT SALINITY (GREEN) simply means that the dissolved solids in the Product Water have reached the acceptable level and the Diversion Valve can be activated.

9. Activate the Diversion valve when Salinity meter turns Green.
 - a). If the tank is not full and the salinity of the product water drops below the preset salinity level, the U.V. sterilizer will energize if installed.
 - b) Feed Pressure, Feed Flow, Operating Pressure, Brine Flow, Product Flow, and Product Salinity will be monitored and the System Control Logic will perform various tasks to maintain proper functioning of the System.
 - c). When the tank is full, the System will stop all operations.
10. Check for:
 - a) A constant feed water flow.
 - b) A consistent system pressure.
 - c) Leaks in the system.
 - d) Abnormal noises or other occurrences.

11. If any abnormality develops, touch the STOP button on the Touch Screen. A warning screen will display.
 - a) Correct the problem then repeat Step 1-10.
12. Proceed to Log System Readings.

6.6.4 LOG SYSTEM READINGS

1. Record the System initial performance readings. Use the New System Initial Readings form on Page 6-8.
2. Proceed to Shutdown.

6.6.5 SHUTDOWN THE SYSTEM

A. SEMI-AUTOMATIC MODE

1. Rotate the Back Pressure Regulator counter-clockwise to decrease operating pressure to 0 psi (0 bar).
2. From the default screen, touch the STOP button.
 - a) The 3-Way Product Water Diversion Valve will revert to unpotable water.
 - b) The UV Sterilizer will stop.
 - c) The High Pressure Pump will stop.
 - d) The Booster Pump will stop.
 - e) If the System does not include the Automatic Fresh Water Flush option, the Stop sequence is complete, or
 - f) If the System includes the Automatic Fresh Water Flush option, the Automatic Fresh Water Flush Valve will energize and after 7 to 15 minutes the Fresh Water Flush Valve will de-energize and the Stop sequence is complete. The System will go to a Fresh Water Flush Stand-by mode until the next automatic Fresh Water Flush Cycle. The Fresh Water Flush Cycle will automatically initiate every preset number of days until canceled or power is disconnected from the System.

B. MANUAL MODE

1. Rotate the Back Pressure Regulator counter-clockwise to decrease operating pressure to 0 psi (0 bar).
2. From the Manual Mode screen, touch the Diversion Valve button to de-activate the 3-way valve and de-energize the UV Sterilizer.

3. Touch the HP Pump STOP button.
4. Touch the Booster Pump STOP button.

If installed, the Automated Fresh Water Flush will NOT activate automatically. In order to perform a manual Fresh Water Flush follow the directions in Section 7.3:



BOAT SAFETY WARNING: The Inlet Thru-Hull Sea Cock Valve is in the Open position. It is recommended for the safety of the boat to close the Sea Cock Valve when ever the System is not in use. This will protect the boat from water flooding should a hose or component fail.



AUTOMATIC OPERATION WARNING: If the Automatic Fresh Water Flush option is installed and if the System Control Logic has been set to perform Automatic Fresh Water Flushing, the Touch Screen will show the operator when this automatic cycle will be performed.

6.7 WARNINGS AND CAUTIONS

NEW SYSTEMS

A new System may take up to 30 minutes to purge the R.O. Membrane Element of the storage chemical and produce Potable Water. Even after the storage chemical is purged, although the system is producing "Product Water", the Product Water may not be "Potable" for up to 30 minutes. The salinity of the Product Water diminishes gradually, until it reaches the factory setting. When the Product Water is Potable and is diverted by the 3-way Product Water Diversion Valve [28] to the "Potable" (good water) position and into the Post Filtration components onward to the Ship's Storage Tank. At this point the UV Sterilizer will also illuminate.

RO MEMBRANE ELEMENT WARNING:



WARNING: Prior to stopping the system, review and adhere to the following warnings and respective actions.



WARNING: The R.O. Membrane Elements must be kept wet at all times.



WARNING: The System must be protected from biological fouling if it will not be operated within the next 2 weeks.

FREEZING TEMPERATURE WARNING

The System must be protected from freezing if it will be exposed to temperatures below 32° Fahrenheit (0° Celsius). Freezing temperatures (below 32° Fahrenheit or 0° Celsius) will cause extensive damage to the System as the water expands within the System during the freezing process. Resulting damage to the System caused by freezing temperatures is the liability of the operator.

DO NOT subject the System to temperatures below 32° Fahrenheit (0° Celsius) unless the System has been rinsed with a solution of product water with twenty percent food grade glycerin (propylene glycol).

LONG TERM STORAGE CAUTION

If the System will not be operated for an extended period of time, 3 months or longer, a Long Term Storage Procedure will be required.

If the Automatic Fresh Water Flush option is not installed or selected in the System Control Logic, pressing Stop will place the System into the Semi-automatic Shut Down mode. The operator will reduce the system pressure, the 3-Way Diversion Solenoid Valve will de-energize, the UV Sterilizer will de-energize, the High Pressure Pump will stop, and the Booster Pump will stop.

If the Automatic Fresh Water Flush option is installed, after the sequence listed above; the Fresh Water Flush Solenoid Valve will energize for 7 to 15 minutes, allowing fresh water from the boat's fresh water system to enter the System and flush it with fresh water.

After the Fresh Water Flush cycle has finished the Fresh Water Flush Solenoid Valve will de-energize and the System will go into a stand by mode. At the end of the preset number of days the Fresh Water Flush cycle will repeat.

This automatic cycle will stop if the power has been interrupted or if CANCEL has been Touched

R.O. MEMBRANE ELEMENT PROTECTION CAUTION:**SHORT STORAGE**

If the System is not equipped with the Automatic Fresh Water Flush option perform a manual fresh water flush. Refer to the Short Term Storage Procedure in Section 7.

LONG TERM STORAGE

If the System will not be operated for an extended period of time, 3 months or longer, refer to the Long Term Storage Procedure in Section 7.

Sea Recovery Aqua Whisper

NEW SYSTEM INITIAL READINGS

At the time of commissioning the NEW system, record the following information after one hour of continuous proper operation of the system.

Retain this form in this Owner's Manual for the owner and operator's future reference. This information is valuable to the servicing technicians in providing technical support to the owner and future operators of the Aqua Whisper. Provide this information to service technicians when requesting technical assistance.

Date Installed: _____ Date Commissioned: _____

Model Information:

System Serial Number: _____

Style: ____ Compact ____ Vertical ____ Modular

R.O. Membrane/Vessel Assy Quantity: ____ 1 (one) ____ 2 (two)

System Capacity: ____ 450 GPD ____ 700 GPD ____ 900 GPD ____ 1400 GPD ____ 1800 GPD

Who Installed the System:

Company _____

Street Address _____

City, State _____

Country, postal code _____ Telephone _____

Name of Installer _____

Who Commissioned the System:

Company _____

Street Address _____

City, State _____

Country, postal code _____ Telephone _____

Name of Installer _____

System Power: _____ Volts AC _____ Hz _____ Phase

Feed Water Temperature: _____ Fahrenheit or _____ Celsius

Hour Meter Reading: _____ Hours

PRESSURE READINGS:

Low Pressure Transducer #1 _____ psi or _____ kPa

Pressure Differential Pressure _____ psi or _____ kPa

Low Pressure Transducer #2 _____ psi or _____ kPa

High Pressure Transducer _____ psi or _____ kPa

WATER FLOW METER READINGS:

Flow Meter Product Water: _____ US Gallons Per Hour or _____ Liters Per Hour

Flow Meter Brine Discharge: _____ US Gallons Per Minute or _____ Liters Per Minute

WATER QUALITY:

Feed Water Salinity: _____ ppm or Location of use: _____

Product Water Salinity: _____ ppm

Problems, Unusual Occurrences, or Unusual Noises: _____

Aqua Whisper DX Compact 450-1800

Section 7 - OPERATION

7 OPERATION



NOTE - Automated operational

sequence: During operation, touching STOP button at any time immediately stops all functions of the System. The STOP button is also used for emergencies..

SEMI-AUTOMATIC SEQUENCE

Be prepared for the following automatic sequence. After the System has been started the following will occur:

1. Booster Pump electric motor will start and a screen will indicate that it has started.
2. Low Pressure Transducers will signal the System Control Logic which will look for adequate feed water pressure from the Booster Pump.
3. After a 20 seconds delay timer, the High Pressure Pump electric motor will start and a screen will indicate that it has started.
4. Feed Water Flow Meter will signal the System Control Logic which will look for adequate feed water flow through the System.
5. Gradually close the Back Pressure Regulator by rotating clockwise to build up operating pressure until specified product water flow rate is accomplished.
6. Product Water Flow Meter will register product water flow, as operating pressure exceeds the osmotic pressure of the feed water. Product Water Flow will take priority to inform the control logic to increase or decrease operating pressure in order to maintain the product water flow specification.
7. The 3-Way Product Water Diversion Valve will energize sending the Product Water to the Post Filtration section and the UV Sterilizer will energize if installed. This may take up to 30 minutes.
8. Feed Pressure, Feed Flow, Operating Pressure, Brine Flow, Product Flow, and Product Salinity are all being monitored and the values of these readings cause the System Control Logic to perform various tasks to maintain proper functioning of the System.
9. The System may be manually stopped, or it may be programmed to stop at a given time or given volume of Product Water production.
10. If the STOP is touched the System will immediately stop all functions.
 - a). Manually rotate the Back Pressure Regulator counter-clockwise to full open position.
11. When the System is signaled to perform a non-emergency stop:
 - a) The 3-Way Product Water Diversion Valve will revert to unpotable water.
 - b) The UV Sterilizer will stop.
 - c) The High Pressure Pump will stop.
 - d) The Booster Pump will stop.
 - e) Manually rotate the Back Pressure Regulator counter-clockwise to full open position.
 - f) If the System does not include the Automatic Fresh Water Flush option this ends the stop sequence.

OR

 - g) If the System includes the Automatic Fresh Water Flush the Automatic Fresh Water Flush Valve will energize to Fresh Water.

After 7 to 15 minutes the Fresh Water Flush Valve will de-energize and the Stop sequence is complete.



NOTE: The Back Pressure Regulator Valve should be manually opened all the way to prevent flow restriction during Fresh Water Flush.

12. The System will go to a Fresh Water Flush Stand-by mode and count down until the next automatic Fresh Water Flush Cycle. The Fresh Water Flush Cycle will automatically initiate every set number of days until canceled or power is disconnected from the System.

SYSTEM WARNINGS

PRIOR TO OPERATION AND DURING NON-OPERATION OF THE SYSTEM, REVIEW AND ADHERE TO THE FOLLOWING WARNINGS AND RESPECTIVE ACTIONS.



WARNING: The R.O. Membrane Elements must be kept wet at all times.



WARNING: The System must be protected from biological fouling if it will not be operated within the next 2 weeks.

FREEZING TEMPERATURE WARNING:

The System must be protected from freezing if it will be exposed to temperatures below 32° Fahrenheit (0° Celsius). Freezing temperatures, below 32° Fahrenheit (0° Celsius), will cause extensive damage to the System as the water expands within the System during the freezing process. Resulting damage to the System caused by freezing temperatures is attributed to improper operator care and protection, is the liability of the operator, and is not covered by the Sea Recovery warranty.

DO NOT subject the System to temperatures below 32° Fahrenheit (0° Celsius) unless the System has been rinsed with a solution of product water with 20% food grade glycerin (propylene glycol) as described in Section 7.4.

LONG TERM STORAGE CAUTION:

If the System will not be operated for an extended period of time, 3 months or longer, a Long Term Storage Procedure must be performed.

If the Automatic Fresh Water Flush option is not installed and is not selected in the System Control Logic, pressing Stop will place the System into the Automatic Shut Down mode. The pressure will be reduced, the High Pressure Pump will stop, and the Booster Pump will stop.

If the Automatic Fresh Water Flush option is installed, after the Booster Pump stops the Fresh Water Flush Valve will energize for 7 to 15 minutes allowing fresh water to flush the System.

SHORT TERM STORAGE:

If the Automatic Fresh Water Flush option is installed, after the System has stopped operating, the Fresh Water Flush Solenoid Valve will energize and flush the System with fresh water for 7 to 15 minutes.

WARNING: There must be sufficient Fresh Water in the Potable Water Storage Tank and the Pressure System (Pressure Pump and Air Entrainment Tank) if used must be pressurized to minimum 25 PSI (172 BAR). The Fresh Water System Piping must be capable of delivering minimum 1 U.S. Gallons (3.8 Liters) Per Minute at 25 PSI (172kPa) during the Fresh Water Flush cycle.

After the Fresh Water Flush cycle has finished the Fresh Water Flush Solenoid Valve will de-energize and the System will go into a stand by mode and repeat after

preset number of days. This Automated Fresh Water Flush cycle will protect the System and R.O. membrane element for short term shut downs.

This automatic cycle will stop if the power has been interrupted or if CANCEL has been Touched

R.O. MEMBRANE ELEMENT PROTECTION CAUTION:

SHORT STORAGE: If the System is not equipped with the Automatic Fresh Water Flush option, perform a manual fresh water flush. Refer to Section 7.3 for Short Term Storage Procedures.

LONG TERM STORAGE: If the System will not be operated for an extended period of time, 3 months or longer, refer to Section 7.4 for Long Term Storage Procedures.

7.1 DAILY OPERATION**7.1.1 POSITION VALVES**

VALVE	POSITION
Inlet Sea Cock Valve	FULL OPEN
Rinse Clean Inlet Valve	FROM SEA STRAINER TO FRESH WATER FLUSH VALVE
Rinse Clean Outlet Valve	FROM BRINE DISCHARGE OF SYSTEM TO THRU HULL DISCHARGE FITTING
Multi Media Filter Valves	NORMAL OPERATION
Back Pressure Regulator	FULL OPEN
ANY auxiliary valve in the Feed Line, Brine Discharge Line, or Product Water Line	FULL OPEN



WARNING: If any auxiliary valve is installed in these lines, it will damage the System if left closed during starting and/or operation of the system. The resulting damage to the system is attributed to improper installation, is the liability of the operator, and is not covered by the Sea Recovery warranty.

7.1.2 APPLY POWER TO THE SYSTEM

1. Switch the Electrical Power Source, boat or home's circuit breaker to the system "ON".

All Operating Screens WILL NOT include the Automatic Fresh Water Flush components if the Fresh Water Flush Option is not installed and the control logic has been informed that the Fresh Water Flush Option is not installed.



2. After the control logic has initiated itself, the default screen will appear indicating that the System is ready to Start

7.1.3 START THE SYSTEM

A. SEMI-AUTOMATIC MODE

The Semi-Auto Mode is highly recommended for users and owners. Follow these instructions when the System includes a Tank High Level sensor.

1. Verify the back pressure regulator valve knob is in full open position.
2. Press the Start button on the Main Control Panel or Remote Control Panel.
 - a) The System starts monitoring the Tank level, system pressures, and system water flow.
 - b) The System starts the booster pump.
 - c) When the inlet pressure of the high pressure pump is within 35 psi (2.4 bar) for 20 seconds, the System starts the high pressure pump.
3. Verify that the low pressure gauge reading is within 35 psi (2.4 bar), normal operating range.
4. Slowly increase operating pressure by adjusting the back pressure regulator valve knob in a clockwise direction until the product water flow reach the System production rate.
 - a) If the high pressure exceeds 975 psi (67.2 bar), an alarm will sound and shutdown the System. Manually adjust the back pressure regulator to 0 psi (0 bar).
 - b) When the production flow rate is reached, the System will start monitoring the product water salinity.

Although the system is producing "Product Water", the Product Water may not be "Potable" for up to 30 minutes. The salinity of the Product Water diminishes gradually, until it reaches the acceptable level or lower.

PRODUCT SALINITY (RED) simply means that the dissolved solids in the Product Water have not yet decreased to acceptable level.

PRODUCT SALINITY (GREEN) simply means that the dissolved solids in the Product Water have reached the acceptable level and the Diversion Valve can be activated.

- c). If the tank is not full and the salinity of the product water drops below the preset salinity level, the U.V. sterilizer will energize if installed.
 - d) If the salinity of the product water is below the preset salinity level for 5 seconds the 3-way Diversion Valve will energize sending the product water to the potable water outlet.
 - e) Feed Pressure, Feed Flow, Operating Pressure, Brine Flow, Product Flow, and Product Salinity will be monitored and the System Control Logic will perform various tasks to maintain proper functioning of the System.
 - f). When the tank is full, the System will stop all operations.
5. Check for:
 - a) A constant feed water flow.
 - b) A consistent system pressure.
 - c) Leaks in the system.
 - d) Abnormal noises or other occurrences.
 6. If any abnormality develops, a warning/error screen will display.
 - a) Stop the System. correct the problem then repeat Step 1-5.
 7. Proceed to Log System Readings.

B. MANUAL MODE

The Manual Mode is intended for Sea Recovery technicians for setup and configuration purposes.



CAUTION: When the System is operated in the MANUAL Mode Safety features will still be controlled by the System Logic, however AUTOMATED features must be controlled by the operator.

1. Verify the back pressure regulator valve knob is in fully open position.
2. From the default screen, touch the SETUP tab.
3. On the next screen, touch the Acceptable Salinity Level button.
4. On the Salinity Level screen, adjust to desired level (200 to 1000 PPM) then touch the SETUP button.
5. On the next screen, touch the Manual Mode button.
6. On the next screen, touch the Booster Pump

- START button then wait 5 seconds for booster pump to stabilize.
7. Touch the HP Pump START button.
 8. Slowly increase operating pressure by adjusting the back pressure regulator valve knob in a clockwise direction until the product water flow reaches the System production rate.
 - a) If the high pressure exceeds 975 psi (67 bar), an alarm will sound and shut down the System. Manually adjust the back pressure regulator to 0 psi (0 bar).
 - b) When production rate is reached, the System will start monitoring the product water salinity. Although the system is producing "Product Water", the Product Water may not be "Potable" for up to 30 minutes. The salinity of the Product Water diminishes gradually, until it reaches the acceptable level or lower.
- PRODUCT SALINITY (RED) simply means that the dissolved solids in the Product Water have not yet decreased to acceptable level.
- PRODUCT SALINITY (GREEN) simply means that the dissolved solids in the Product Water have reached the acceptable level and the Diversion Valve can be activated.
9. Activate the Diversion valve when Salinity meter turns Green.
 - a). If the tank is not full and the salinity of the product water drops below the preset salinity level, the U.V. sterilizer will energize if installed.
 - b) Feed Pressure, Feed Flow, Operating Pressure, Brine Flow, Product Flow, and Product Salinity will be monitored and the System Control Logic will perform various tasks to maintain proper functioning of the System.
 - c). When the tank is full, the System will stop all operations.
 10. Check for:
 - a) A constant feed water flow.
 - b) A consistent system pressure.
 - c) Leaks in the system.
 - d) Abnormal noises or other occurrences.
 11. If any abnormality develops, touch the STOP button on the Touch Screen. A warning screen will display.
 - a) Correct the problem then repeat Step 1-10.

12. Proceed to Log System Readings.

7.1.5 LOG SYSTEM READINGS

1. Record the System performance readings. Use the Daily System Readings form on Page 7-12.
2. Proceed to Shutdown.

7.1.6 SHUTDOWN THE SYSTEM

A. SEMI-AUTOMATIC MODE

1. Rotate the Back Pressure Regulator counter-clockwise to decrease operating pressure to 0 psi (0 bar).
2. From the default screen, touch the STOP button.
 - a) If the System does not include the Automatic Fresh Water Flush, the Stop sequence is complete;
 - OR
 - b) If the System includes the Automatic Fresh Water Flush, the Automatic Fresh Water Flush Valve will be energized. After 7 to 15 minutes the Fresh Water Flush Valve will de-energize and the Stop sequence is complete.
 - c) The System will go to a Fresh Water Flush Stand-by mode and until the next automatic Fresh Water Flush Cycle. The Fresh Water Flush Cycle will automatically initiate every preset number of days until canceled or power is disconnected from the System.

B. MANUAL MODE

1. Rotate the Back Pressure Regulator counter-clockwise to decrease operating pressure to 0 psi (0 bar).
2. From the Manual Mode screen, touch the Diversion Valve button to de-activate the 3-way valve and the UV Sterilizer.
3. Touch the HP Pump STOP button.
4. Touch the Booster Pump STOP button.
 - a) If installed, the Automated Fresh Water Flush will NOT activate automatically because operation during the Manual Mode deactivates all Automated features. In order to perform a manual Fresh Water Flush follow the directions in Section 7.3.



BOAT SAFETY WARNING: The Inlet Thru-Hull Sea Cock Valve is in the Open position. It is recommended for the safety of the boat to close the Sea Cock Valve when ever the System is not in use. This will protect the boat from water flooding should a hose or component fail.



AUTOMATIC OPERATION WARNING: If the Automatic Fresh Water Flush option is installed and if the System Control Logic has been set to perform Automatic Fresh Water Flushing, the Touch Pad will show the operator when this automatic cycle will be performed.

7.2 SYSTEM STORAGE AND CLEANING

R.O. MEMBRANE ELEMENT HANDLING & SYSTEM STORAGE CAUTIONS:

TEMPERATURE: Never store the R.O. membrane element or Membrane/Vessel Assembly in direct sunlight. Never expose the R.O. membrane element or Membrane/Vessel Assembly to storage temperatures above 120 degrees F (50 degrees C) or below 32 degrees F (0 degrees C). High temperatures cause up to 40% loss of production from the R.O. membrane element. This damage is irreversible. Freezing temperatures cause mechanical damage to the system and irreversible damage to the R.O. membrane element.

DRYING OUT: Never allow the R.O. membrane element to dry out, as 40% production loss occurs. This membrane damage may be irreversible. Some, but not all, production may be restored by saturating the R.O. membrane element in product water for several days and then operating the system using product water feed into the system for a continuous 48 hour period. The R.O. membrane element must remain wet at all times.

BIOLOGICAL FOULING: Protect the R.O. membrane element from biological fouling. Production loss occurs if the element becomes fouled by biological slimes. Some, but not all, production may be restored after cleaning.

CHEMICAL FOULING: Never expose the R.O. membrane Element to chemicals other than those supplied by SRC. Use caution when operating the system in harbors that may be polluted with chemicals, oil, or fuel. Chemicals may damage the R.O. membrane element beyond repair.



WARNING: NEVER USE THIRD PARTY CHEMICALS, ONLY USE SEA RECOVERY SUPPLIED CHEMICALS. Third party chemicals are not compatible with various materials used in the Sea Recovery System. Copolymer parts within the Sea Recovery System will be dissolved by third party chemicals. Third party chemicals will destroy the Sea Recovery R.O. membrane element. Damage to the Sea Recovery System or components within the System are not covered by the Sea Recovery Warranty.

STORAGE: The dark and moist interior of a membrane element is an excellent breeding ground for microorganisms. Simply operating the system does not protect the R.O. membrane element from production loss due to biological fouling. During short-term shutdowns, the system must be rinsed as explained in the following pages. During long-term shutdowns, the system must be rinsed as well as chemically treated.

NEW SYSTEM STORAGE: If the R.O. membrane elements are installed in the System and if the System will not be installed and commissioned within a 3 months from receipt refer to the procedures for either Short Term or Long Term storage.

Illustrations on Page 7-6 - figure 7a, show the flow of water in a Once-Through-Rinse operation and in a Closed Loop operation. These illustrations may be referred to during the Rinse, Clean, and Storage procedures.

The illustration on Page 7-7 - figure 7c demonstrates a simplified Once Through Configuration

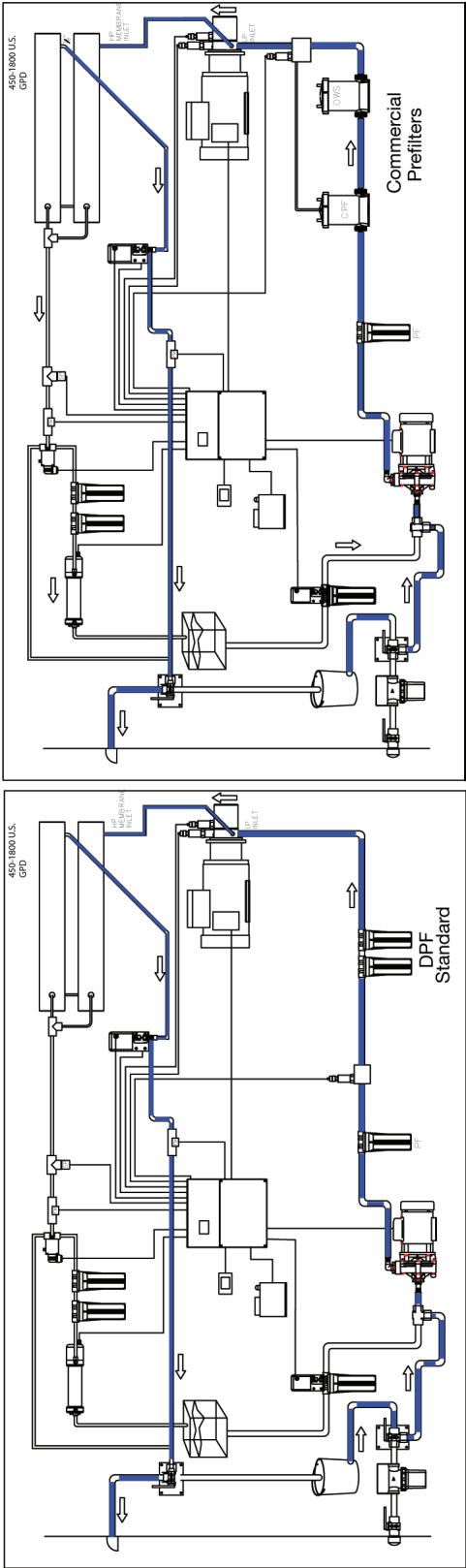
This is used to Rinse the System with Fresh Water, to Winterize the System, and also to Discharge the contents of the cleaning solution bucket.

When the instructions within this section state “configure for Once Through Rinse”, refer to page 7-6 - figure 7a and proceed as follows:

1. Configure the Suction line for a Once Through Configuration (fig. 7a). Disconnect the outlet line from the Sea Strainer and place it in the Rinse/Clean Bucket or Container. Or if the system is equipped with the optional Rinse Clean Inlet Valve then position this valve to draw from the Rinse/Clean Bucket or Container.

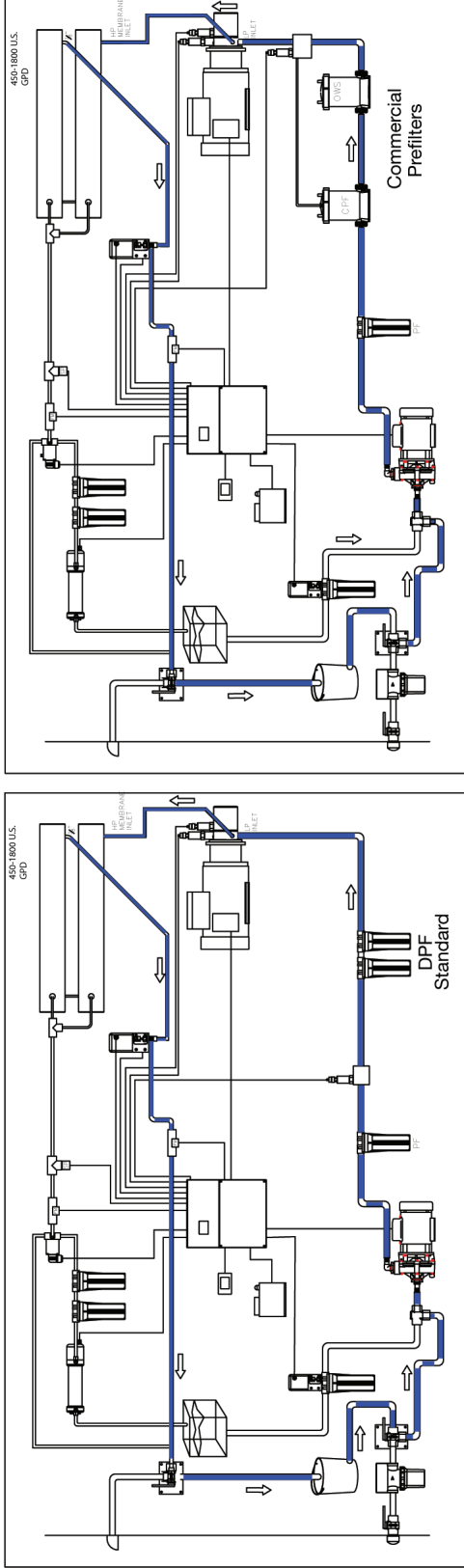
- also -

Figure 7a: ONCE THROUGH RINSE



This is used to rinse the system with fresh water, to winterize the system, and also to discharge the content of the cleaning solution bucket.

Figure 7b: RECIRCULATING CLOSE LOOP



This is used to circulate cleaning or storage solution through the system.

Note: The above illustrations show representations of components and may not show actual or all components.

Figure 7c: Simplified Aqua Whisper DX Once Through Rinse

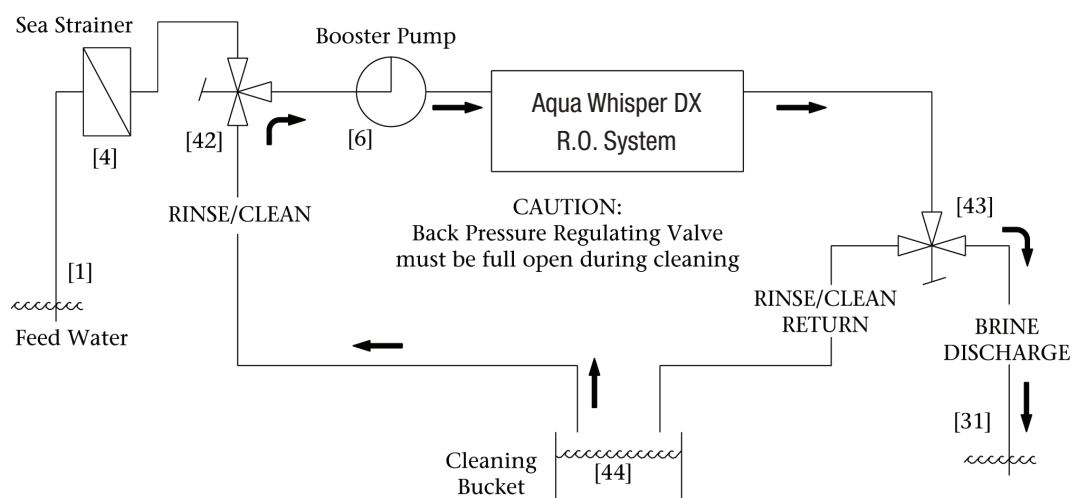
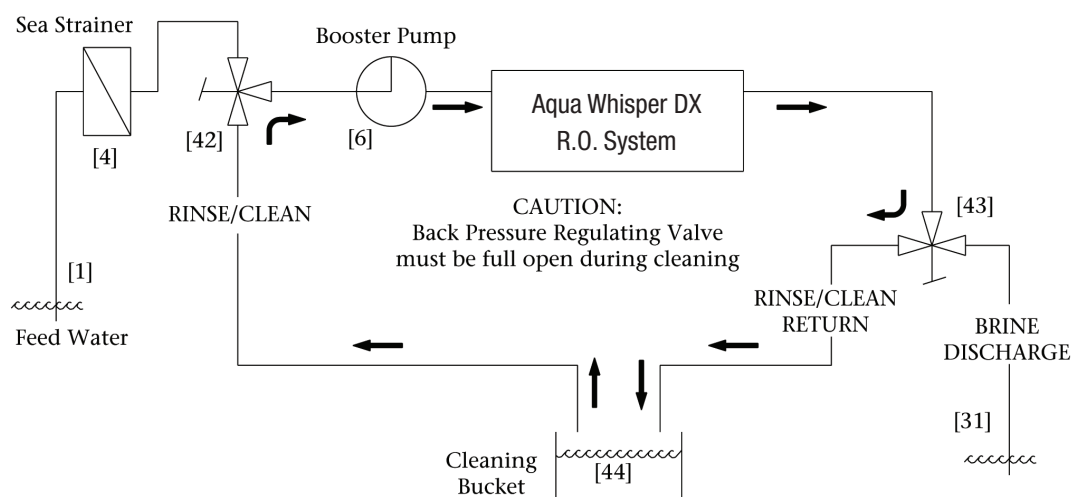


Figure 7d: Simplified Aqua Whisper DX Re-Circulating Loop



2. Configure the Brine Discharge line for a Once Through Configuration (fig. 7a). Connect the Brine Discharge Line from the system to the Thru-Hull over board discharge fitting, normal connection for normal operation. Or if the system is equipped with the optional Rinse Clean Outlet Valve then position this valve to discharge through the Thru-Hull fitting, normal connection for normal operation.

When the instructions within this section state “configure for Closed Loop” proceed as follows:

1. Configure the Suction line for a Closed Loop Configuration (fig. 7b). Disconnect the outlet line from the Sea Strainer and place it in the Rinse/Clean Bucket or Container. Or if the system is equipped with the optional Rinse Clean Inlet Valve then position this valve to draw from the Rinse/Clean Bucket or Container.

- also -

2. Configure the Brine Discharge line for a Closed Loop Configuration (fig. 7b). Disconnect the Brine Discharge Line from the Thru-Hull over board discharge fitting and place it in the Rinse/Clean Bucket or Container. Or if the system is equipped with the optional Rinse Clean Outlet Valve then position this valve to return to the Rinse/Clean Bucket or Container.

7.3 SHORT-TERM SHUTDOWN

A short-term shutdown is defined as a period of time in which the system is not utilized for up to four weeks. An effective short-term protection for the system and R.O. membrane element is a Fresh Water Rinse of the entire system with fresh water (product water from the system). This prolongs the system life by minimizing electrolysis and retarding biological growth.

WARNING: WINTERIZING AND FREEZING TEMPERATURE STORAGE
NOTE: If the system is exposed to freezing temperatures, DO NOT activate the Automatic Fresh Water Flush. Instead, perform a Manual Fresh Water Rinse below.

MANUAL FRESH WATER RINSE PROCEDURE

Follow the directions below if the system is not equipped with an Automatic Fresh Water Flush option, or if the System is to be Winterized against freezing temperatures.

This procedure displaces the system feed water with fresh water and allows a short-term shutdown for up to four weeks, and adds propylene glycol if Winterizing. Ten gallons (38 liters) of fresh product or potable water is required for the fresh water rinse, and 2 gallons (7.5 liters) food grade glycerin (propylene glycol) is required for Winterizing.

1. Close the Inlet Sea Cock Valve.
2. Fill a 10-gallon container with clean, fresh water.



WARNING: IF THE SYSTEM WILL BE EXPOSED TO FREEZING TEMPERATURES add 20% (2 gallons or 7.5 liters) food grade glycerin (propylene glycol) to 10 gallons (37.8 liters) of potable water in the Bucket. This prevents the water in the system from freezing.

3. Configure the system for a Once Through Rinse as illustrated on Page 7-6, fig.7a.
4. Start the System in the MANUAL MODE
Operation of the System will deplete the Fresh Water or Water and Propylene Glycol mixture in the bucket. Just prior to depleting the Water or mixture in the Bucket Stop the System.
5. Proceed to Section 7.5.

7.4 LONG TERM SHUTDOWN

A Long Term or Prolonged Shutdown is a period in which the system goes unused for longer than three months, depending on conditions.

For this interval, the system should first be rinsed with fresh water then stored with system and Membrane Element Storage Chemical (SRC SC). This chemical inhibits bacterial growth while maintaining the high flux and salt rejection of the R.O. membrane element.

ITEMS REQUIRED

- a) 20 gallons (75.7 liters) of potable water.
- b) Sea Recovery Storage Chemical SRC SC
- c) 2 Gallons (7.5 liters) of food grade glycerin (propylene glycol) if the System will be Winterized



NOTE: If the system is equipped with an automatic Fresh Water Flush Accessory then it is not necessary to read this

section as long as the Automatic Fresh Water Flush cycle remains active. The Automatic Fresh Water Flush option rinses the system every preset number of days automatically. However, see “Winterizing and Freezing” note below.



NOTE - WINTERIZING AND FREEZING TEMPERATURE STORAGE:

If the system is exposed to freezing temperatures, DO NOT activate the Automatic Fresh Water Flush. Instead, perform a Manual Fresh Water Rinse as described below.

Follow the directions below if the system will not be used for several months or if the system is not equipped with an Automatic Fresh Water Flush option, or if the System is to be Winterized against freezing temperatures. This procedure displaces the system feed water with Storage Chemical or Storage Chemical and propylene glycol.

LONG TERM SHUTDOWN PROCEDURE

1. Close the Inlet Sea Cock Valve.
2. Fill a 10-gallon (37.8 liters) container with clean, potable water.
3. Configure the system for a Once Through Rinse as illustrated at the TOP of Page 7-6, fig. 7a.
4. Start the System in the MANUAL MODE
Operation of the System will deplete the Fresh Water in the bucket. Just prior to depleting the Water in the Bucket Touch STOP.
5. Once again, fill a 10-gallon (37.8 liters) container with 10 gallons (37.8 liters) clean, potable water.
6. Add to the Fresh Water in the bucket or Fresh Water and Propylene glycol, 4 ounces of Sea Recovery Storage Chemical SRC SC.
7. Configure the system for a Recirculating Closed Loop configuration as illustrated on Page 7-6, fig7b.
8. Start the System in the MANUAL MODE
Operate the System in the Recirculating Closed Loop configuration for 10 minutes. After 10 minutes stop the system:
9. Proceed to Section 7.5.

7.5 WINTERIZING PROCEDURE

If the System will be exposed to freezing temperatures the Post Filtration Section of the System must be drained of all Product Water.

- a) Charcoal Filter
 - 1) Remove the Charcoal Filter bowl.
 - 2) Remove the water from the bowl.
 - 3) Replace the Charcoal Filter Element with a New Charcoal Filter Element.
 - 4) Replace the bowl back onto the lid.
- b) pH Neutralizing Filter
 - 1) Remove the pH Neutralizing bowl.
 - 2) Remove the water from the bowl.
 - 3) Replace the bowl and pH element back onto the lid.
- c) UV Sterilizer
 - 1) Disconnect the product water line from the UV Sterilizer filter and drain the product water from it.
 1. Switch the Power to the System OFF.
 2. Lock and Tag the Power Breaker to ensure that no one will accidentally operate the System and displace the Winterizing Mixture with Feed or Fresh Water.
 3. Discard the Storage Chemical in an environmentally safe manner.

7.6 R.O. MEMBRANE CLEANING

Do not arbitrarily clean the R.O. membrane in a NEW system. The R.O. membrane element in a NEW System will not be fouled with any substance that is cleanable. Low production or high salinity of the Product water from a NEW System will be attributed to factors other than fouling.

If a NEW system experiences low production this would indicate that there is a blockage in the Product Water Line, the feed water temperature is low, the operating pressure is low, or the R.O. membrane element has dried out prior to use. A NEW System experiencing low production should be operated for up to 48 hours continuously to clear and saturate the R.O. membrane element and product water channel. Correlate and compensate operating pressure, feed water temperature, and feed water salinity as charted in the Section 2.

If a NEW System still experiences low production after 48 hours of continual operation, then contact the factory. If a NEW System experiences poor quality Product Water, high in salinity, this would be attributed to a mechanical failure such as a broken or missing O-ring and will be accompanied with high production at low operating pressure. For problems with a NEW System refer to the Troubleshooting section.

The membrane element requires cleaning from time to time. Biological growth and salt accumulation eventually make replacement necessary. The frequency of required cleaning depends on the amount of production loss and salt rejection loss resulting from normal use. In order to properly assess performance changes, it is important to maintain daily log readings for comparison.

During performance comparisons, Feed Water Temp, Feed Water Salinity, and System Operating Pressure must be taken into consideration and compensated for. After compensations, a 10% decline in productivity (GPH Flow) and/or a 10% increase in salt passage indicate that the R.O. membrane element may require cleaning.

If production rate has dropped dramatically since the last time the system was used, this may be due to drying out of the R.O. membrane element and/or fouling during storage. If the system has not been used for several months and the production rate has dropped dramatically since the last time used, try operating the system for 48 or more continuous hours to saturate the Product Water Channel within the R.O. membrane element.

If production rate drops dramatically from one day to another, this may be due to chemical attack which is not cleanable. Sewage chemicals or petroleum products cause irreparable damage to the R.O. membrane element. Suspended solids fouling resulting from silt, coral dust, iron (rust), river or inland waterway debris, or other small solid matter may not be cleanable.

R.O. WATER AND CHEMICAL REQUIREMENTS

1. The system must be rinsed with fresh water before any cleaning procedure, cleaned, and then rinsed again.
2. The process of rinsing and cleaning the R.O. membrane elements with just one cleaning compound requires 30 gallons (113.5 liters) of fresh non-chlorinated product water. If a second cleaning is performed using a different cleaning compound an additional 20 gallons (75.7 liters) will be required per additional cleaning.
3. The Sea Recovery Reverse Osmosis cleaning compounds are designed to clean in a closed loop configuration moderate fouling from the R.O. membrane element. If the R.O. membrane element is excessively fouled and in-field cleaning is not successful, the R.O. membrane element may be returned to Sea Recovery or to one of Sea Recovery's many Service Dealers for professional chemical cleaning. If your membrane requires professional cleaning, please contact Sea Recovery for a Return Authorization Number, price quotation, and return instructions. Due to the complexity of and time involvement in professionally cleaning the R.O. membrane element it can be more cost effective to replace a heavily fouled R.O. membrane element. Always compare the cost of cleaning vs the cost of replacement in order to make the proper decision to clean or replace.
4. SRC MCC-1, Membrane Cleaning Compound "# 1" is an alkaline cleaner designed to clean biological fouling and slight oil fouling from the R.O. membrane element. Biological fouling is usually the first cause of the R.O. membrane element fouling. The system is constantly exposed to seawater and biological growth occurs from the first day forward. If exposed to seawater and left to sit, the R.O. membrane element becomes fouled even with no actual system use. This fouling is minimized with fresh water rinsing whenever the system is not in use.
5. SRC MCC-2, Membrane Cleaning Compound "# 2" is an acid cleaner designed to clean calcium carbonate and other mineral deposits from the R.O. membrane element. Mineral fouling is a slow process which takes place during use of the system. Therefore, if the system has relatively few hours of use yet shows signs of R.O. membrane element fouling then that fouling is likely biological fouling. If the system has several thousand hours of use then there may be some mineral fouling combined with biological fouling.
6. SRC MCC-3, Membrane Cleaning Compound "# 3" is used for iron fouling. It is not included in the SRC Membrane Cleaning Chemical kit. If the system's R.O. membrane element is fouled with rust from iron piping, then SRC CC-3 may be used for effective removal of light or moderate rust fouling. Heavily rust fouled RO membranes may not be

recoverable as rust not only fouls the Membrane Element but also damages the membrane surface.



WARNING: DO NOT mix different cleaning chemicals together. DO NOT use different cleaning chemicals together at the same time. Mix cleaning chemicals separately and use them separately. Use only Sea Recovery supplied chemicals. Never use third party, non Sea Recovery chemicals.

CLEANING PROCEDURE

Product Water Required, in U.S. Gallons for Cleaning of the R.O. membrane element:

Chemical	Rinse water required	Cleaning water required	Second rinse water required	Total water required
CC-1	10	10	10	30
CC-2		10	10	20
CC-3		10	10	20

1. Close the Inlet Sea Cock Valve.
2. If installed, position the Multi Media Filter Valves in the Multi Media Filter By-Pass position to by-pass it during the cleaning procedures See illustration on the next page for Multi Media Filter Valve positionings.
3. Replace the Pre-filtration Cartridge with a new SRC supplied Pre-filtration Element.
4. Fill a 10-gallon (37.8 liters) container with clean, fresh water.
5. Configure the system for a Once Through Rinse as illustrated on Page 7-6.
6. Start the System in the MANUAL MODE
Operation of the System will deplete the Fresh Water in the bucket. Just prior to depleting the Water in the Bucket Touch STOP.
7. Once again, fill the container with 10 gallons (37.8 liters) clean, fresh water.
8. Add to the 10 gallons (37.8 liters) of fresh water 1.5 lbs. (0.68 kg) of Sea Recovery Membrane Cleaning Compound MCC 1, MCC 2 or MCC 3. Thoroughly mix the solution until the cleaning compound has dissolved.
9. Configure the system for a Recirculating Closed Loop configuration as illustrated on Page 7-6.
10. Start the System in the MANUAL MODE
11. Operate the System in the Recirculating Closed Loop configuration for 60 minutes. After 60 minutes stop the system as follows:
12. Configure the system for a Once Through Rinse configuration as illustrated on Page 7-6.
13. Start the System in the MANUAL MODE to discharge the cleaning chemical to waste.
Operation of the System will deplete the cleaning solution in the bucket. Just prior to depleting the solution in the Bucket stop the System.
14. One final time, fill the container with 10 gallons (37.8 liters) clean, fresh water.
15. Configure the system for a Recirculating Closed Loop configuration as illustrated on Page 7-6.
16. Start the System in the MANUAL MODE
Operate the System in the Recirculating Closed Loop configuration for 10 minutes. After 10 minutes stop the system as follows:
17. Configure the system for a Once Through Rinse configuration as illustrated on Page 7-6.
18. Start the System in the MANUAL MODE to discharge the rinse water to waste.
Operation of the System will deplete the cleaning solution in the bucket. Just prior to depleting the solution in the Bucket Stop the System as follows:
The system is now ready for additional cleaning, use, or storing.
If further membrane cleaning is necessary, repeat Steps 4 to 18 above for each additional cleaning.
19. If System will be expose to freezing temperature, proceed to Section 7.5:

VALVE POSITIONING OF THE MULTI MEDIA FILTER DURING 4 SEPARATE MODES OF OPERATION

PSI Differential with
Clean Media:

5 psi @ 4.2 gp m

4 psi @ 3.5 gp m

3 psi @ 2.5 gp m

