Sea Recovery

Aqua Whisper Pro 450-1800
Owner's Manual

SRC Aqua Whisper Pro Compact 450
SRC Aqua Whisper Pro Compact 700
SRC Aqua Whisper Pro Compact 900
SRC Aqua Whisper Pro Compact 1400
SRC Aqua Whisper Pro Compact 1800
SRC Aqua Whisper Modular 450
SRC Aqua Whisper Modular 700
SRC Aqua Whisper Modular 900
SRC Aqua Whisper Modular 1400
SRC Aqua Whisper Modular 1800

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Aqua Whisper Pro

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Contents

Chapter 1

Introduction

Parts Warning

The major documented cause of failures and problems are from the use of third-party, non- Sea Recovery parts; improper installation; and improper operation. **Do not use parts, components from any source other than Parker!** The use of third-party, non- Parker parts is *strongly discouraged* and will result in the followingconsequences:

- The use of third-party, non- Parker components, spares and assemblies will damage the ParkerSystem and/or specific components within the System.
- The use of third-party, non- Parker components, spares and assemblies will void any and all warranty ofthe System and/or void the affected component within the System.

Important: Parker maintains inventory for immediate shipment and our Service Dealers throughoutthe world maintain stock of Parker parts. Always insist on Parker supplied parts in order toavoid failures, eliminate problems, and maintain your warranty.

Cleaning

The Aqua Whisper Pro RO Desalination System is guaranteed to be cleanable for a minimum of one (1) 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 Parker RO 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, Parker will repair or replace, at its option, the product or component therein which upon examination by Parker appears to be defective.

Product Changes

Parker 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.

Obtaining Warranty Service

To obtain warranty service, the defective product or part must be returned to an authorized Parker Service Center or direct to Parker. An updated listing of Parker Factory Service Centers can be found on the Parker web site. The purchaser must pay any transportation or labor expenses incurred in removing and returning the product to the service center or to Parker.

Registration

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

Temperature and Pressure Effects

PARKER TEMPERATURE EFFECT COMPARISON CHART

(At 820 psi and 35,000 ppm feed water TDS conditions)

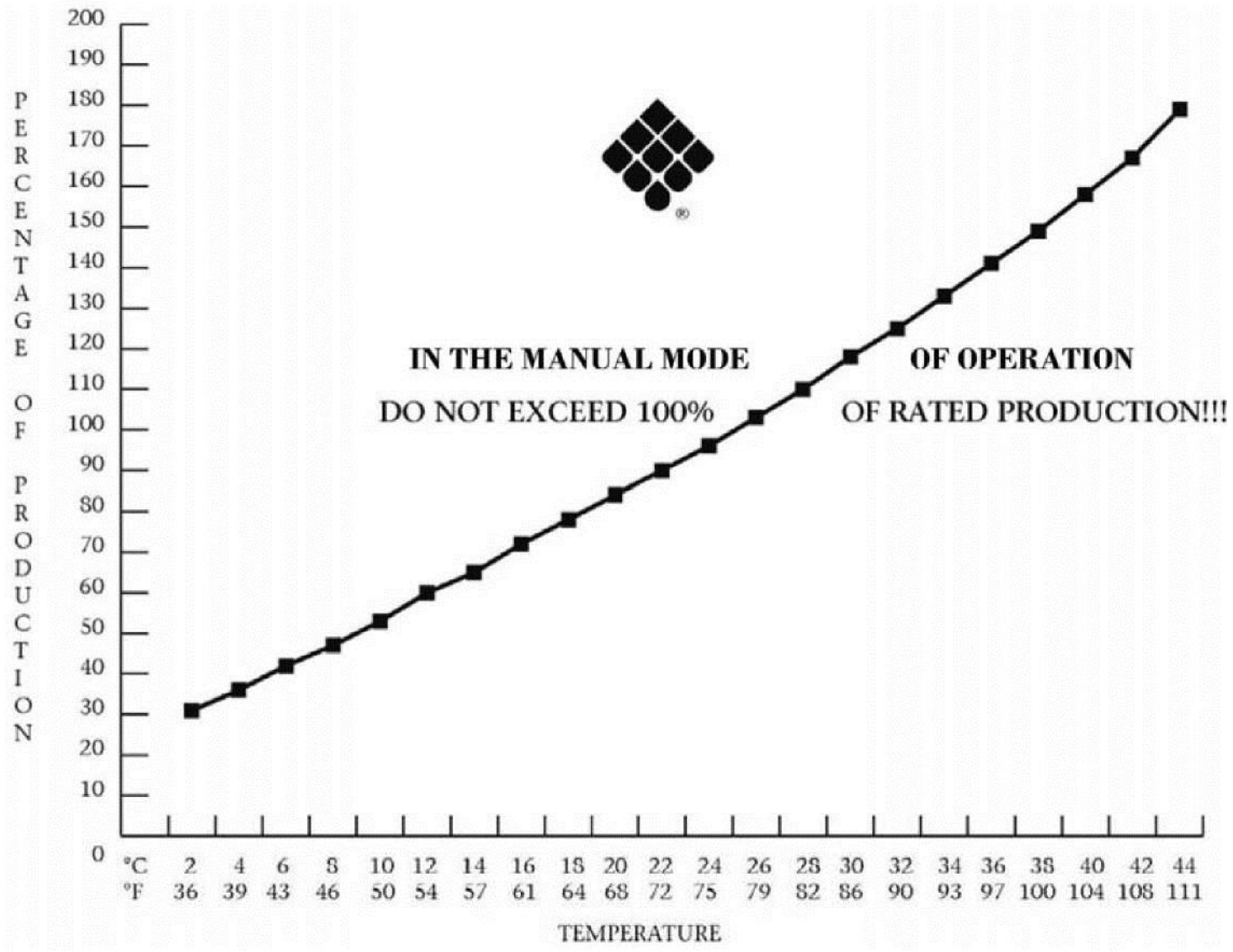
The Temperature Effect Chart on this page illustrates the loss or gain of productivity across the RO Membrane Element. To determine what the normal (in spec.) flow of the system is at 77º F (25º C), follow these directions:

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 membrane's present productivity at specification test parameters, 820 psi and 77ºF (25ºC).

Example:

1. With the system operating at 820 psi (57 bar).
2. The present feed temperature is 61º F (16º 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.

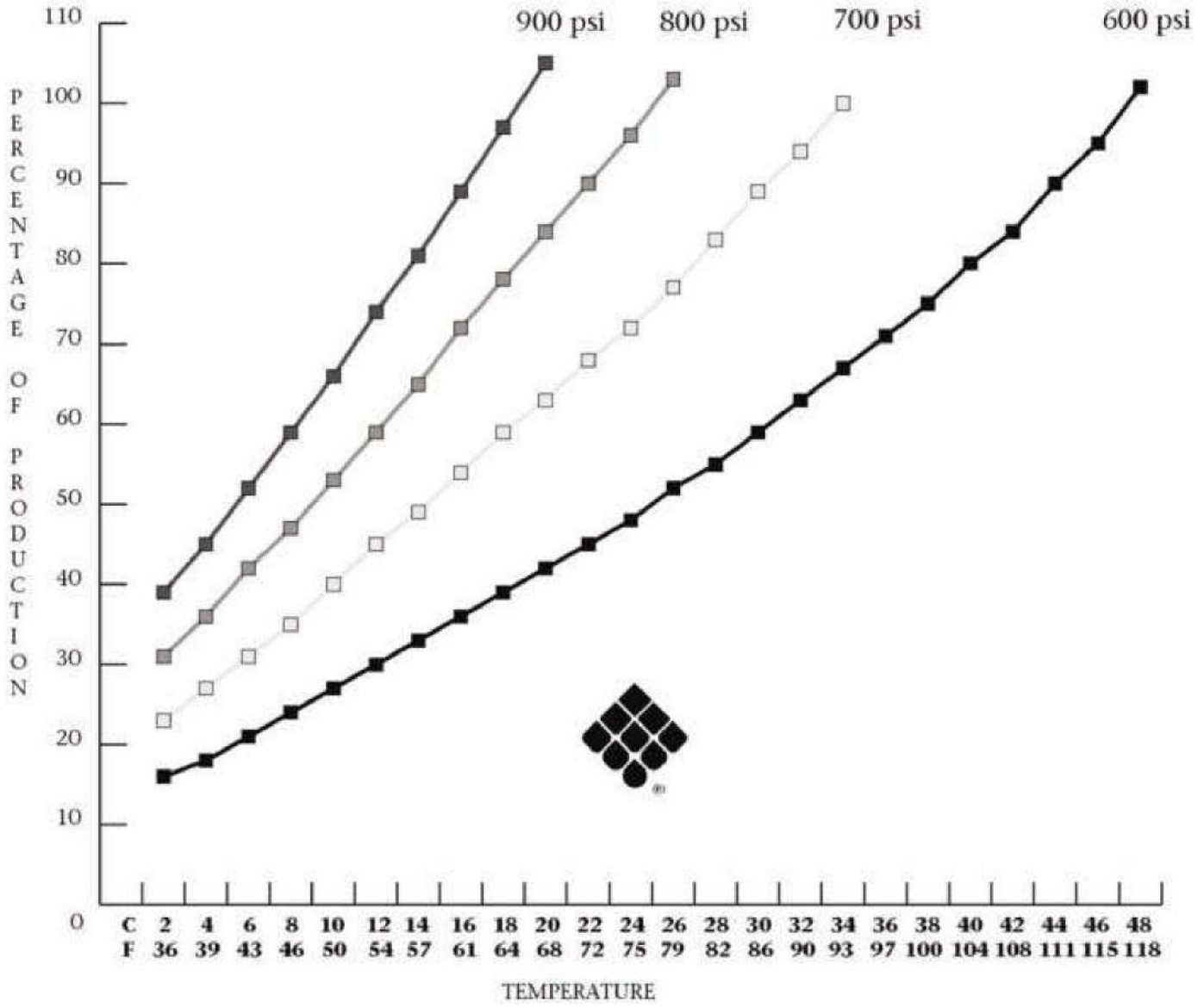
5. 9,000 per day divided by .72 equals 12,500 gallons per day calculated productivity. The system is rated at 14,530 gallons per day ± 15% (12,350 to 16,709 gallons per day). Therefore, the system is within specifications at 12,500 gallons per day actual productivity at 61° F (16° C), 820 psi (57 bar), and 35,000 ppm feed.



Note: Do not use the following chart for brackish water systems and applications

As the sea water temperature gets higher, the pressure must be adjusted so that the System does not exceed 100% of its rated product water flow. Product water flow that is greater than 100% of rated capacity causes premature fouling of the RO Membrane Element, which *voids the RO Membrane Element warranty*. This leads to more frequent required cleaning and voids all warranties of the RO Membrane Element. **DO NOT EXCEED 100% OF RATED PRODUCTION!!!**

DO NOT EXCEED 100% OF RATED PRODUCTION!!!



Safety

Parties responsible for the installation, operation, and maintenance of the Aqua Whisper Pro RO Desalination System must read this manual thoroughly and comply with the instructions and safety requirements at all times.

Disposal

If System disposal is necessary, you must comply with all federal and state environmental regulations.

Compliance

- Parker's Reverse Osmosis Desalination Systems are Type Accepted by the American Bureau of Shipping,ABS.
- Parker's Reverse Osmosis Desalination Systems comply with FCC § 15.105
- Parker's Reverse Osmosis Desalination Systems have been independently tested and determined to being compliance with European CE (Conformité Européne).

Please refer to Appendix for copies of compliance certificates.

Chemical Warnings

Parker 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 Parker “SC”, SYSTEM & MEMBRANE STORAGECHEMICAL, ARE AVAILABLE 24 HOURS A DAY, 7 DAYS A WEEK, U.S.A. TOLL FREE MEDICAL EMERGENCYNUMBER: 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. 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)

Parker 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 Parker “MCC1”, R.O. MEMBRANE ELEMENT ALKALINEDETERGENT CLEANING CHEMICAL, ARE AVAILABLE 24 HOURS A DAY, 7 DAYS A WEEK, U.S.A. TOLLFREE 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. 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)

Parker 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 Parker “MCC2”, R.O. MEMBRANE ELEMENT ACIDCLEANING CHEMICAL, ARE AVAILABLE 24 HOURS A DAY, 7 DAYS A WEEK, U.S.A. TOLL FREE MEDICALEMERGENCY 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)

Parker 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 Parker “MCC3”, R.O. MEMBRANE ELEMENT RUSTREMOVER CLEANING CHEMICAL, ARE AVAILABLE 24 HOURS A DAY, 7 DAYS A WEEK, U.S.A. TOLL FREEMEDICAL 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)

Patent Information

Certain aspects of the Aqua Whisper Pro RO Desalination System are protected by U.S. and International Patent Laws.

Chapter 2

Specifications

System Specifications

PERFORMANCE

PRODUCT WATER PRODUCED PER HOUR AND PER DAY OF OPERATION:

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

Model Number	per 1 hour of operation: (U.S. Gallons/Liters)	per 24 hours of operation: (U.S. Gallons/Liters)
SRC Aqua Whisper Pro 450-1	19 / 71	450 / 1703
SRC Aqua Whisper Pro 900-2	38 / 142	900 / 3407
SRC Aqua Whisper Pro 700-1	29 / 110	700 / 2650
SRC Aqua Whisper Pro 1400-2	58 / 211	1400 / 5300
SRC Aqua Whisper Pro 900-1	38 / 142	900 / 3407
SRC Aqua Whisper Pro 1800-2	75 / 284	1800 / 6814

SALT REJECTION (CHLORIDE ION): Minimum 99.2 %, Average 99.4%

PRODUCT WATER TEMPERATURE: Ambient to feed water temperature

SALINITY MONITORING: Automatic computer controlled electronic monitoring. Temperature compensated with the Water Quality Indicator. 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:

Model Number	Power Source Cycles	Feed Water Flow / Minute
SRC AWPC 450-1 & 900-2	50Hz	3.5 U.S. Gallons / 13.2 liters
SRC AWPM 450-1 & 900-2	50Hz	3.5 U.S. Gallons / 13.2 liters
SRC AWPC 700-1 & 1400-2	50Hz	3.5 U.S. Gallons / 13.2 liters
SRC AWPM 700-1 & 1400-2	50Hz	3.5 U.S. Gallons / 13.2 liters
SRC AWPC 900-1 & 1800-2	50Hz	3.5 U.S. Gallons / 13.2 liters
SRC AWPM 900-1 & 1800-2	50Hz	3.5 U.S. Gallons / 13.2 liters
SRC AWPC 450-1 & 900-2	60Hz	3.0 U.S. Gallons / 11.4 liters
SRC AWPM 450-1 & 900-2	60Hz	3.0 U.S. Gallons / 11.4 liters

Model Number	Power Source Cycles	Feed Water Flow / Minute
SRC AWPC 700-1 & 1400-2	60Hz	4.2 U.S. Gallons / 15.9 liters
SRC AWPM 700-1 & 1400-2	60Hz	4.2 U.S. Gallons / 15.9 liters
SRC AWPC 900-1 & 1800-2	60Hz	4.2 U.S. Gallons / 15.9 liters
SRC AWPM 900-1 & 1800-2	60Hz	4.2 U.S. Gallons / 15.9 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/cm2, 41 kPa	Maximum 40 psi, 2.8 kg/cm2, 275.8 kPa
OPERATION: Seawater @ 35,000 PPM and 77°F / 25°C	Nominal 800 psi, 56.25 kg/cm2, 5515 kPa

DIMENSIONS and WEIGHT

MODEL	WEIGHT	LENGTH	WIDTH	HEIGHT
SRC AWPC 450-1	147 lb / 67 kg	33 in	22.25 in	15.25 in
SRC AWPM 450-1	113 lb / 51 kg	22 in	16 in	14.75 in
SRC AWPC 900-2	159 lb / 72 kg	33 in	22.25 in	15.25 in
SRC AWPM 900-2	125 lb / 57 kg	22 in	16 in	14.75 in
SRC AWPC 700-1	150 lb / 68 kg	33 in	22.25 in	15.25 in
SRC AWPM 700-2	116 lb / 53 kg	22 in	16 in	14.75 in
SRC AWPC 1400-2	165 lb / 75 kg	33 in	22.25 in	15.25 in
SRC AWPM 1400-2	131 lb / 59 kg	22 in	16 in	14.75 in
SRC AWPC 900-1	152 lb / 69 kg	33 in	22.25 in	15.25 in
SRC AWPM 900-1	118 lb / 54 kg	22 in	16 in	14.75 in
SRC AWPC 1800-2	170 lb / 77 kg	33 in	22.25 in	15.25 in
SRC AWPM 1800-2	136 lb / 62 kg	22 in	16 in	14.75 in

EXTERNAL INSTALLATION WATER CONNECTIONS

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

Feed Inlet	3/4 MNPT - Male National Pipe Thread U.S. Standard
Brine Discharge	1/2 MNPT - Male National Pipe Thread U.S. Standard
Product	3/8 FNPT - Female National Pipe Thread U.S. Standard

Electrical Motor Specifications

Abbreviations:

- HP = Horse Power
- RPM = Revolutions Per Minute
- FLA = Full Load Amperes
- LRA = Locked Rotor Amperes at startup

Caution:

Sea Recovery Desalination Systems are designed to be as electrically efficient as possible. RPM supplied to and pressure created by the High Pressure Pump governs the amount of energy required by the High Pressure Pump's Electric Motor. In order to maintain a sufficient flow of feed water into the RO Membrane Element, Sea Recovery utilizes several different High Pressure Pumps with different displacement characteristics. The different High Pressure Pumps, in turn, have varying power requirements.

As such, several different Electric Motors are used in Sea Recovery systems. In order to maintain maximum operational versatility, the Aqua Whisper Pro RO Desalination System utilizes dual Cycle (Hz) Electric Motors capable of operating from both 50 Hz and 60 Hz. In a Boat application, use caution when switching from your auxiliary AC on board generator to shore power. In many cases, due to insufficient wiring or long distances from the power source to the end of the dock, shore power from a Marina may be insufficient to operate your System. Low voltage to the System causes damage to the electric motor. Damage caused to the System due to low voltage is not covered by Warranty.

HIGH PRESSURE PUMP MOTOR AND BOOSTER PUMP

Table 1: 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	2	1425	21	89	0.5	2850	9.4	89
220	50	2	1425	10.5	44	0.5	2850	4.7	44
115	60	2.5	1725	21.2	86	0.5	3450	7.4	86
230	60	2.5	1725	10.6	43	0.5	3450	3.7	43

Table 2: 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	3	1425	8	89	0.5	2850	2.5	89
380	50	3	1425	4.6	44	0.5	2850	1.5	44
230	60	3	1725	8.2	86	0.5	3450	2.4	86
460	60	3	1725	4.1	43	0.5	3450	1.2	43

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SRC AWPM 900-2	125 lb / 57 kg	22 in	16 in	14.75 in
SRC AWPC 700-1	150 lb / 68 kg	33 in	22.25 in	15.25 in
SRC AWPM 700-2	116 lb / 53 kg	22 in	16 in	14.75 in
SRC AWPC 1400-2	165 lb / 75 kg	33 in	22.25 in	15.25 in
SRC AWPM 1400-2	131 lb / 59 kg	22 in	16 in	14.75 in
SRC AWPC 900-1	152 lb / 69 kg	33 in	22.25 in	15.25 in
SRC AWPM 900-1	118 lb / 54 kg	22 in	16 in	14.75 in
SRC AWPC 1800-2	170 lb / 77 kg	33 in	22.25 in	15.25 in
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220	50	2	1425	10.5	44	0.5	2850	4.7	44
115	60	2.5	1725	21.2	86	0.5	3450	7.4	86
230	60	2.5	1725	10.6	43	0.5	3450	3.7	43

Table 2: 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	3	1425	8	89	0.5	2850	2.5	89
380	50	3	1425	4.6	44	0.5	2850	1.5	44
230	60	3	1725	8.2	86	0.5	3450	2.4	86
460	60	3	1725	4.1	43	0.5	3450	1.2	43

Recommended Power Wire Size to System

RECOMMENDED CIRCUIT BREAKER

Operating Voltage (VAC)	Phase	Recommended Circuit Breaker (Ampere)
110-115	1	50
220-230	1	25
220	3	15
380	3	10
460	3	10

RECOMMENDED MINIMUM WIRE SIZE FOR RUN LENGTH

			Recommended Minimum Wire Size for Run Length		
Operating Voltage (VAC)	**Phase**	**Max Load (Amperes)**	**10 ft / 3 m**	**25 ft / 8 m**	**50 ft / 15 m**
110-115	Single	34.8	10 AWG / 6 mm2	8 AWG / 10 mm2	8 AWG / 10 mm2
220-230	Single	17.4	12 AWG / 4 mm2	12 AWG / 4 mm2	12 AWG / 4 mm2
220-230	Three	10.4	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2
380	Three	6.1	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2
460	Three	5	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2

Recommended Power Wire Size to Pumps

RECOMMENDED POWER WIRE SIZE TO BOOSTER PUMP

			Recommended Minimum Wire Size for Run Length		
Operating Voltage (VAC)	**Phase**	**Max Load (Amperes)**	**10 ft / 3 m**	**25 ft / 8 m**	**50 ft / 15 m**
110-115	Single	9.4	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2
220-230	Single	4.7	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2
220-230	Three	2.5	16 AWG / 2.5 mm2	16 AWG / 2.5 mm2	16 AWG / 2.5 mm2
380	Three	1.5	16 AWG / 2.5 mm2	16 AWG / 2.5 mm2	16 AWG / 2.5 mm2
460	Three	1.2	16 AWG / 2.5 mm2	16 AWG / 2.5 mm2	16 AWG / 2.5 mm2

RECOMMENDED POWER WIRE SIZE TO HIGH PRESSURE PUMP

			Recommended Minimum Wire Size for Run Length		
Operating Voltage (VAC)	**Phase**	**Max Load (Amperes)**	**10 ft / 3 m**	**25 ft / 8 m**	**50 ft / 15 m**
110-115	Single	25.5	10 AWG / 6 mm2	10 AWG / 10 mm2	10 AWG / 10 mm2
220-230	Single	12.7	12 AWG / 4 mm2	12 AWG / 4 mm2	12 AWG / 4 mm2
220-230	Three	8.5	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2
380	Three	4.6	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2
460	Three	4.1	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2	14 AWG / 2.5 mm2

Chapter 3

System and Components Description

All components supplied by Sea Recovery, both standard and optional, are described in this chapter, along with items that the installer must provide.

ALL STANDARD COMPONENTS AND ALL OPTIONAL ACCESSORIES.

** Denotes items supplied by installer

*** Denotes optional equipment

Packing List

When uncrating, do not discard any packaging until you have found and identified all parts! Some components are loose, or separately packaged in the shipping container.

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. The descriptions in this chapter are listed according to the ID numbers each component is given in the System Piping and Interconnect Diagram illustrated on the following page.

Throughout this manual, components are followed by a number in brackets (i.e., “Sea Strainer [3]”). **This number refers to the component’s location in the fold-out diagram at the end of this manual.**

** Denotes items supplied by installer

*** Denotes optional equipment.

1. Inlet Thru Hull **	28. High Pressure Gauge
2. Sea Cock Valve **	29. Back Pressure Regulator
3. Inlet Connection	30. Flow Meter - Brine Discharge
4. Inline Pressure Gauge ***	31. Discharge T-Connection
5. Sea Strainer	32. Brine Discharge Thru-Hull Connector
6. Inline Pressure Gauge ***	33. Multi Media Filter Waste Tee ***
7. Booster Pump	34. Thru Hull Discharge Fitting
8. Inline Pressure Gauge ***	35. T-Connector Product Water
9. Plankton Filter ***	36. Salinity Probe
10. Multi-Media Filter ***	37. Flow Meter - Product Water
11. Inline Pressure Gauge ***	38. 3-way Diversion Valve
12. Commercial Prefilter	39. Charcoal Filter
13. 25 Micron 10” Prefilter	40. pH Neutralizer ***
14. 5 Micron 10” prefilter	41. U.V. Sterilizer ***
15. Inline Pressure Gauge ***	42. Product Water Tank Connector
16. Oil Water Separator	43. Potable Water Storage Tank **
17. Inline Pressure Gauge	44. Fresh Water Pressure Pump **
18. T-Connector Pressure Pick-up	45. Air Entrainment Tank (Accumulator) **
19. Low Pressure Manifold	46. Auto Fresh Water Flush Solenoid Valve ***
20. Low Pressure Transducer	47. Auto Fresh Water Flush Check Valve ***
21. High Pressure Pump & Motor	48. Auto Fresh Water Flush Charcoal Filter ***
22. High Pressure Hose	49. Auto Fresh Water Flush Check Valve ***
23. Membrane & Vessel #1	50. Rinse Clean Inlet Valve ***
24. Membrane & Vessel #2	51. Rinse/Clean Outlet Valve ***
25. High Pressure Hose	52. Rinse/Clean Container or Bucket **
26. High Pressure Manifold	53. Electrical Control Box
27. High Pressure Transducer	54. System Touch Pad
	55. Remote Control Touch Pad ***
	56. Soft Start ***

Prefiltration Subsystem

This section of the system 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 pre-filtration protects the RO 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 flat 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 feed water pump and high pressure pump resulting in continual system shut down due to low feed water flow and pressure. 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.

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, this will cause the system to continually shut down due to loss of feed water. 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 nylon body filter housing or optional bronze body containing a cleanable monel fine mesh filter screen. The Sea Strainer filters out large particulate matter and suspended particles that would otherwise prematurely foul the cartridge Prefilter Element.
4. Booster Pump supplies a positive pressure to the Pre-filters and through to the High Pressure Pump. The Booster Pump has a performance curve of 70 Ft Head (30 PSI) at 1.0 GPM. The resulting pressure at the High Pressure Pump depends on the final installation configuration.
5. 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.
6. Pre-Filter This filter removes suspended solids 5 Microns and larger to protect the RO Membrane Element from fouling.

Caution: 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 premature fouling of the RO Membrane Element.

Caution: Do not use “string wound” or “fiber” prefilter elements. These types of 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. This will cause frequent shut downs of the system and very frequent changing which will result in very high cost of maintenance.

7. Low Pressure Gauge displays the Inlet Pressure to the High Pressure Pump. The gauge assists the operator in diagnosing the Sea Strainer, Booster Pump, Plankton Filter Element, and Pre Filter Element condition.
8. Low Pressure Switch shuts the system off automatically when a plugged filter element or other condition causes a low flow situation. This protects the High Pressure Pump, the RO Membrane Element, and the Booster Pump from damage.

Pressurization Subsystem

Proper pressure and proper flow across the RO Membrane Element are two basic requirements of Reverse Osmosis.

1. High Pressure Pump Motor is directly coupled to the High Pressure Pump.
2. High Pressure Pump is a marine quality, positive displacement, ceramic plunger pump with a 316 stainless steel manifold.
3. High Pressure Hose, HP Pump Outlet to MVA Inlet, transfers pressurized sea water from the High Pressure Pump to the inlet of the RO Membrane Element.
4. RO Membrane Element and Vessel. The RO Membrane Element allows potable water molecules to pass through while rejecting the salt ions. Only a small percentage of the Seawater Feed becomes fresh Product Water. The remainder carries the rejected salt ions out of the RO Membrane Element in a concentrated brine stream.

Brine Discharge Subsystem

This section of the System carries the Brine Discharge exiting from the RO Membrane Element.

1. High Pressure Hose, MVA Outlet to inlet of manifold, transfers pressurized Brine Discharge Water from the Membrane Vessel Assembly to the Control Manifold Assembly.
2. High Pressure Gauge displays the RO Membrane Element Vessel outlet pressure.
3. High Pressure Switch automatically turns the system off in case of over-pressurization during operation.
4. Back Pressure Regulator by turning the valve adjustment handle clockwise and counterclockwise, pressure is increased and decreased accordingly. This increases and decreases the production of the RO Membrane Element.
5. Thru Hull Discharge Fitting ** should be installed above water level for discharge of the Brine Discharge Water from the system.

Product Water Subsystem

This section of the system 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, as well as sterilize biological matter, which may have passed through the RO Membrane Element.

1. 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.
2. Flow Meter, Product Water measures the rate of Product Water flow, in gallons and liters per hour. It measures from the RO Membrane Element toward the Product Water Post Filtration Components.
3. 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 “Un-potable”, 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 un-potable Product Water to discharge.
4. Charcoal Filter *** is designed to remove foul odors from the Product Water. Sulfurous odor (rotten eggs) is caused when decaying biological matter in the feed water section. Fresh water flushing of the system helps to minimize this.
5. Ultra Violet Sterilizer*** destroys at least 99.9% of any virus, bacteria, and other micro-organisms which may pass through the RO Membrane Element. The UV sterilizer is recommended if the Product Water Storage Tank is not otherwise treated by means such as chlorination.
6. pH Neutralizer Filter*** The product water from the system will be slightly acidic. The pH Neutralizer Filter neutralizes the pH of the product water.
7. Potable Water Storage Tank** may be any container suitable for storing Potable Water, i.e. existing water storage tank.

Fresh Water Flush Subsystem

Consists of supplied valves and required tank or container for the cleaning, rinsing, or storage of the RO Membrane Element system.

1. Fresh Water Flush System*** (including charcoal filter and solenoid valve) automatically flushes the system with fresh water. This process is automatic at each shut down of the system and repeats automatically every 7 days. Fresh Water Flushing replaces the seawater in the system with less corrosive fresh water, and this also reduces the biological decay as well as biological growth that naturally occur if the feed water (sea water) is not flushed from the system with fresh water.
2. Fresh Water Flush Check Valve Assembly *** included with the Fresh Water Flush Optional Assembly, isolates the Fresh Water Flush system which prevents seawater from flowing in the reverse direction through the Charcoal Filter.
3. Inlet Rinse Clean Valve *** (optional) used in conjunction with the Discharge Rinse Clean Valve [31] 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 [25] is not installed.

4. Discharge Rinse Clean Valve *** (optional) used in conjunction with the Inlet Rinse Clean Valve [30] simplifies the storage and cleaning procedures by allowing the operator to turn a valve rather than disconnect a hose.

Electronic Subsystem

This subsystem 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. Salinity Controller The controller monitors the salt content of the product water and signals the 3-Way Product Diversion Valve when Potable Water is being produced. The 3-Way Product Diversion Valve, Motors, Remote Control, and UV Sterilizer are each governed by this controller. This enclosure houses the high-voltage components of the system. It serves as the connection point for all the electrical systems such as the motors, switches, valves, and the controller.
2. Remote Controller *** (optional) allows for remote monitoring and/or controlling of the system.

Chapter 4

System Installation Precautions and Information

Special Considerations

1. Length of Connection Lines:
   - All connection lines should be as short and straight as possible using minimum fittings.

     Increased length causes line-loss in the Feed Water line.

     Increased length causes excessive pressure build up in the Brine Discharge line.

     Increased length causes excessive pressure build up in the Product Water line.
   - The connection lines must not be “kinked”.

     Kinks in the Feed Water line cause cavitation and continual System shut down.

     Kinks in the Brine Discharge line cause excessive pressure build up and damage.

     kinks in the Product Water line cause excessive pressure build up and damage.
2. Accessibility
   - This is a simple rule: Install the system and it’s supporting components in an accessible manner. The Aqua Mini system requires regular operator maintenance such as filter element changing. As with any Electro Mechanical system utilized in the Marine environment the Aqua Mini system will require repair from time to time. Hidden or out of reach items may become forgotten, not maintained, and cause damage to other system components.
   - The Electrical Control Panel Touch Pad and the Back Pressure Regulator must be accessible for starting, stopping, and adjusting pressure of the system.

Storage Prior to Uncrating

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

Uncrating

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

Installation Cautions

1. 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 and thread the parts back together. PVC fittings should only be hand tightened.
2. The Inlet Connection [1], Sea Strainer [3], Inlet 3-way Clean/Rinse Valve [30], and Booster Pump [4] should be below water level. This will aid the Booster Pump in priming.
3. Always allow hoses and tubes to enter and exit straight from the connection for a minimum of one inch prior to a bend
4. 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. RO Membrane Element is stored in sodium bisulfite.
5. NEVER mount any liquid holding component of the System above an electrical or electronic circuit or device. Extensive damage to the electrical or electronic device or circuit will result if water spills from the System during maintenance and or component failure.

Reverse Osmosis Membrane Element Susceptibility to Chemical Attack

Caution: Do Not expose the Aqua Whisper Pro RO Desalination System to intake Feed Water containing:

Hydrogen peroxide	chloramines	chloramines-T	N-chlorioisocyanurates
Chlorine dioxide	hypochlorite	chlorine	iodine
Bromine	Bromide	phenolic disinfectants	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 listed chemicals. Example: Do not connect the inlet of the System to the ship's potable water system if the system contains chlorinated or brominated water. These chemicals destroy the copolymer components within the 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.

Distance Between Components

1. 20 feet (6 meters) of 1/2" (12.7 mm) ID inlet suction hose is supplied for connecting:

Outlet of	to	Inlet of
Sea Cock Valve [2]		Sea Strainer [3]
Sea Strainer [3]		Inlet 3-Way Clean/Rinse Valve [30]
Inlet 3-way Clean/Rinse Valve [30]		Rinse/Clean bucket or container
Inlet 3-way Clean/Rinse Valve [30]		Booster Pump [4]
Booster Pump [4]		Plankton Filter [5]
Plankton Filter [5]		Fresh Water Flush Check Valve [26]
Fresh Water Flush Check Valve [26]		Prefilter [6]
Prefilter [6]		High Pressure Pump [11]

2. 20 feet (6 meters) of 3/8" O.D. (9.5 mm) nylon tube is supplied for connecting:

Outlet of	to	Inlet of
System Brine Discharge		3-way Clean/Rinse Valve [31]
Discharge 3-way Clean/Rinse Valve [31]		Rinse/Clean Bucket or container
Discharge 3-way Clean/Rinse Valve [31]		Thru Hull Discharge fitting [18]

3. 30 feet (9.14 meters) of 1/4” (6.35 mm) OD nylon tubing is supplied for connecting:

Outlet of	to	Inlet of
Potable Product Water from System		Charcoal Filter [22]
Charcoal Filter [22]		U.V. Sterilizer [23]
U.V. Sterilizer [23]		pH Neutralizing Filter
pH Neutralizing Filter		Boats Potable Water Storage Tank [24]

High Pressure Pump Preparation

1. Remove the shipping tape from the High Pressure Pump Oil Fill Cap to expose the Oil Fill Cap air breather hole.
2. Ensure that the pump oil level is even with or higher than the center of the pump sight glass. Damage to the High Pressure Pump will occur if the wrong oil is used in its crankcase. Use only Sea Recovery supplied pump oil.

Tools Required for Installation

Not all installations are typical, therefore, it is recommended to have a full set of Mechanic’s and Electrician’s tools available. No special system tools are required for installation. A separate TDS Meter, available from Sea Recovery will assist in confirming system product water quality. A volt/ohm meter (VOM) is required for system installation and commissioning to ensure proper electrical power and connection.

Components Supplied by Installer or Owner

Caution: All fittings, valving, and piping installed prior to, within, and after the Aqua Whisper Pro RO Desalination System must not contain iron. They must be non-ferrous material (not containing iron). Iron fittings or piping will cause rust fouling and failure of the RO Membrane Element. The resulting failure of the RO Membrane Element is attributed to improper installation, is the liability of the installer, and is not covered by the Sea Recovery warranty.

1. Water Connections to be supplied by the Installer

Feed Inlet	3/4” MNPT - Male National Pipe Thread Standard
Brine Discharge	1/2” MNPT - Male National Pipe Thread Standard
Product	3/8” FNPT - Female National Pipe Thread Standard

2. Inlet Thru Fitting with Forward Facing Scoop [1].

The inlet Thru Hull Fitting must be dedicated to only the Aqua Whisper Pro RO Desalination 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 boat's 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 due to low feed water flow and low pressure. 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.

Caution: The Aqua Whisper Pro RO Desalination System must receive an uninterrupted supply of feed water without air. 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, this will cause the system to continually shut down due to loss of feed

water. 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.

Caution: The Aqua Whisper Pro RO Desalination System must not be tied into another existing auxiliary water line already supplying another accessory on the boat. Using one Thru Hull fitting for other equipment will cause the Aqua Mini system to draw air or cavitate leading to continual system shut down. 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.

Caution: If the Aqua Whisper Pro RO Desalination System is connected to a Sea Chest or Stand Up Pipe, do not plumb system's feed line to the “top” of the Sea Chest or Stand Up Pipe. If plumbed into the top of these feed water arrangements, the system will experience continual shut down due to air inducement into the system. Plumb the Aqua Whisper Pro RO Desalination 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 [2]

Use a quarter turn ball valve min. 1/2” size, with a 1/2” MNPT connection for mating to the supplied 1/2” FNPT fitting.

4. Brine Discharge Thru Hull Fitting [18]

Use a minimum 1/2” size with a 1/2” MNPT connection for mating to the supplied 1/2” FNPT fitting. The Brine Discharge Thru Hull Fitting should be installed above water level. No valves should be installed in this line. If a closed valve was the cause of damage and failed the system, it will not be covered by the Sea Recovery Warranty.

5. Connection to the boat’s Potable Water Storage Tank [24]

Requires a 1/4” FNPT connection for mating to the supplied 1/4” MNPT fitting. In order to avoid problems such as reverse flow (osmosis) from the tank to the system and chlorination attack of the RO Membrane Element, the fitting must terminate above the maximum water level. No valves should be installed in this line. If a closed valve was the cause of damage and failed the system, it will not be covered by the Sea Recovery Warranty.

Refer to Electrical Specifications at the beginning of this booklet.

System and Component Mounting

The following steps discuss the installation of the Aqua Whisper Pro RO Desalination System (models 450-1, 700-1, 900-1, 900-2, 1400-2 and 1800-2). The prior illustrations show the system installed in the port-aft section of a boat as an example. It is understood that this location or configuration may not always be possible, and there are a variety of locations the system may be mounted. The components in the illustrations are spaced far apart only to allow illustration of the hose and tube connections between components.

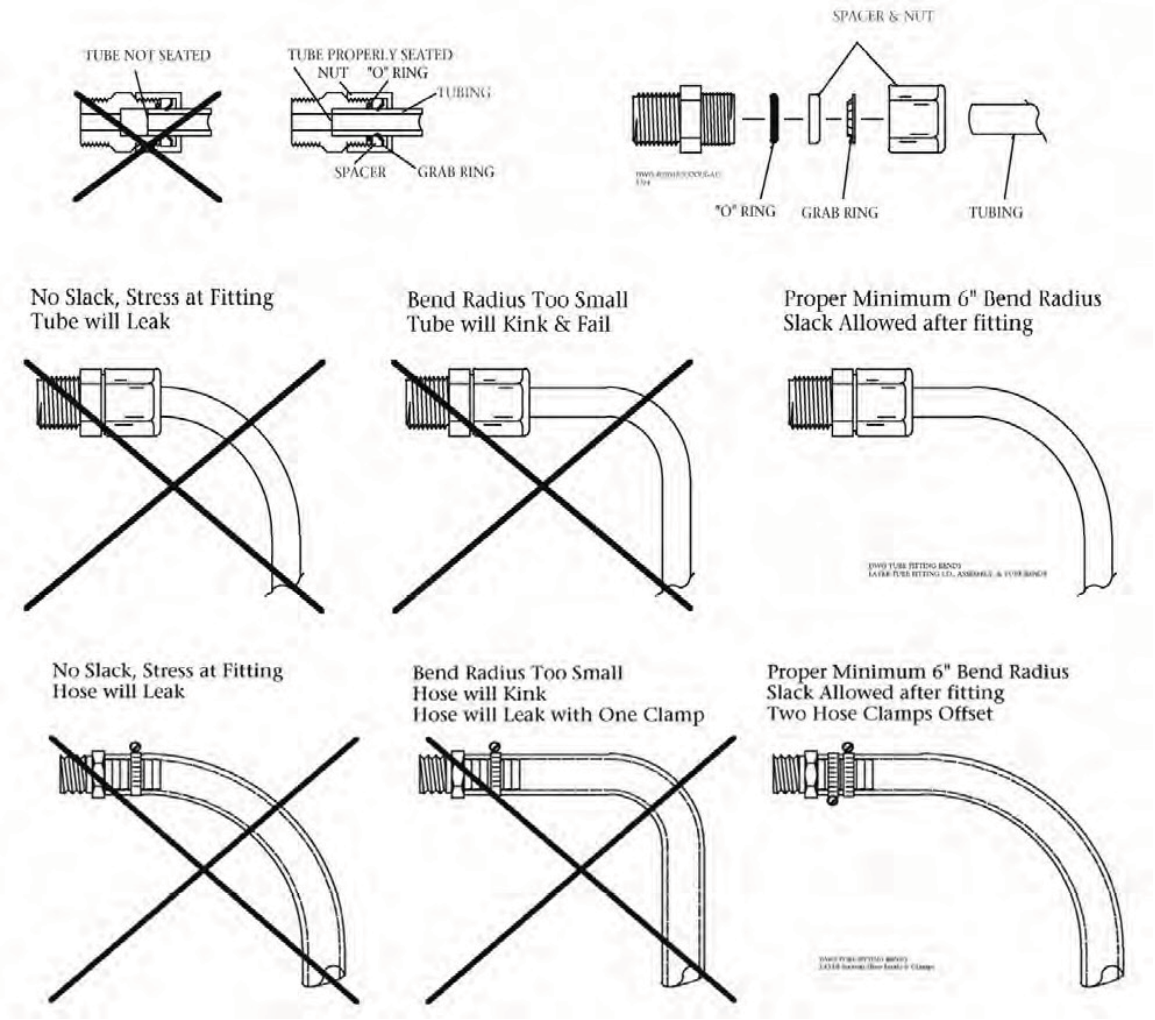
The mounting surfaces must be flat in order to avoid warping of brackets and frames. Use appropriate shims on uneven surfaces to ensure that mounting of the system components does not cause bending or warping.

1. The Optional Sea Strainer is mounted below water level between the Inlet Sea Cock Valve and Booster Pump. Allow at least 4 inches (10 cm) of clearance below the bowl to access the mesh screen for cleaning or replacement.
2. The Optional Fresh Water Flush Filter Canister is mounted to a Vertical Bulkhead. Allow at least 4 inches (10 cm) of clearance below the bowl for element replacement.
3. Mount the Fresh Water Flush Check Valve Assembly vertically in close proximity to the Booster Pump, Fresh Water Flush Filter Canister and the Pre-Filter.
4. The Booster Pump is mounted to a flat surface using the four (4) supplied #10 x 1 1/4” long 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 Booster Pump close to the Inlet Thru Hull / Sea Cock Valve and the Sea Strainer (if purchased). If the booster pump is mounted vertically, mount the motor up and pump head down. Do not mount the pump head above the motor else motor damage will occur if the pump or its fittings should develop a leak.

5. The Optional Plankton Filter is mounted inline between the Booster Pump and the Pre Filter. Allow at least 4 inches (10 cm) of clearance below the bowl for element replacement.
6. The Pre-filter is mounted to a bulkhead using the four (4) supplied #10 Type "A" 1" long screws. Allow minimum 4 inches (10 cm) below the bowl for filter element removal. Feed water may spill during filter element replacing; therefore, **DO NOT** mount the prefilter above any electrical or electronic component
7. The Optional Charcoal Filter is mounted to a vertical bulkhead using the four (4) supplied #10 x 1" long Type "A" screws.
8. The system is mounted to a flat surface using the four (4) supplied 1/4" x 1" Type "A" screws.
9. Mount the UV Sterilizer (not shown) to a bulkhead directly after the Charcoal Filter. The UV should be mounted vertically to displace air from the sterilizing chamber, with the electrical fitting on the top. The UV should be plumbed with the inlet on the bottom and the outlet on top. Horizontal mounting is acceptable with outlet port on top (pointed up) to displace air.
10. Attach the supplied Sea Cock Inlet Fitting Assembly, 1/2" FNPT elbow with attached 1/2" hose barb to the boats Sea Cock 1/4 turn ball valve.
11. Attach the supplied Brine Discharge Outlet Fitting Assembly, 1/2" FNPT elbow with attached 3/8" Tube Fitting, to the boat's over-board Discharge Fitting.
12. Attach the supplied Product Water Tank Connector, 1/4" MNPT x 1/4" Tube Fitting, to the 1/4" FNPT tap at the Potable Water Tank.

Plumbing Connections

Caution: Always allow slack in water lines. 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 re-attachment during maintenance or repair. If water lines are pulled tight (causing them to bend at the fitting), they will leak, take in air, fail prematurely, and/or break the attached fitting.

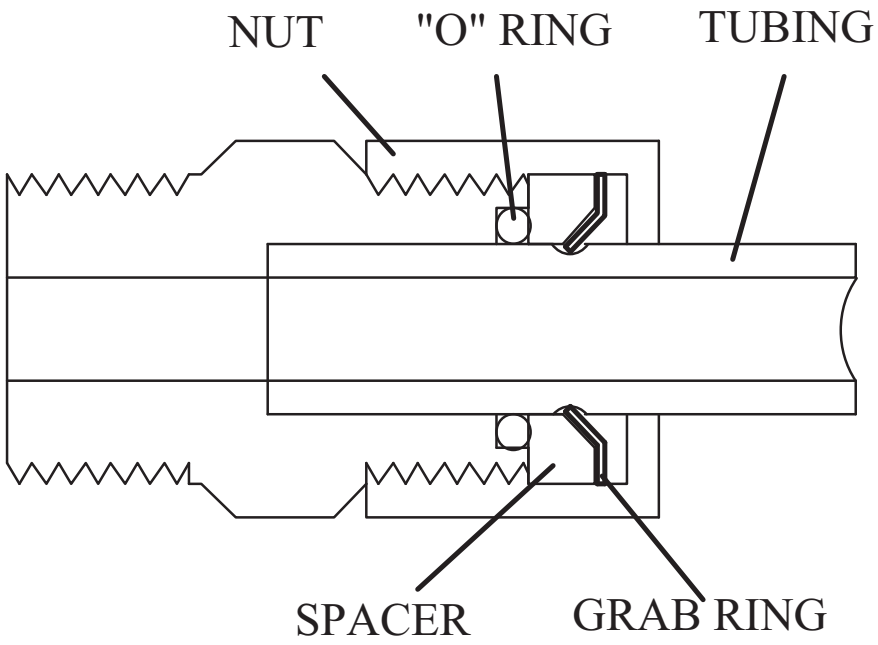


Connect all inlet feed lines with the supplied 20 feet (6 meters) of 1/2" (12.7 mm) I.D. Inlet Suction Hose:

Outlet of	to	Inlet of
Sea Cock Valve [2]		Sea Strainer [3]
Sea Strainer [3]		Inlet 3-Way Clean/Rinse Valve [30]
Inlet 3-way Clean/Rinse Valve [30]		Rinse/Clean bucket or container
Inlet 3-way Clean/Rinse Valve [30]		Booster Pump [4]
Booster Pump [4]		Plankton Filter [5]
Plankton Filter [5]		Fresh Water Flush Check Valve [26]
Fresh Water Flush Check Valve [26]		Prefilter [6]
Prefilter [6]		High Pressure Pump [11]

Tube Fitting Connections Assembly

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



4. Connect Brine Discharge line with the supplied 20 feet (6 meters) of 3/8" (9.5 mm) O.D. Brine Discharge Tubing.

Outlet of	to	Inlet of
System Brine Discharge		Discharge 3-way Clean/Rinse Valve [31]
Discharge 3-way Clean/Rinse Valve [31]		Rinse/Clean Bucket or container
Discharge 3-way Clean/Rinse Valve [31]		Thru Hull Discharge fitting [18]

5. Connect Product Water line with the supplied 30 feet (9.14 meters) of 1/4" (6.35 mm) O.D. nylon tubing:

Outlet of	to	Inlet of
Potable Product Water from System		Charcoal Filter [22]
Charcoal Filter [22]		U.V. Sterilizer [23]
U.V. Sterilizer [23]		pH Neutralizing Filter
pH Neutralizing Filter		Boats Potable Water Storage Tank [24]

UV Light Installation

The SP Series UV unit is shipped with the UV lamp, quartz sleeve, fittings, and O-rings, which must 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 50psig (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 1/4" wide PTFE tape 2 to 3 turns counter-clockwise around the male threads of the 1/4" 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 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 four screws holding the ballast box cover and remove the cover.
3. Remove the rubber boot and pull out the 4-point lamp connector.
4. Remove the compression nuts.
5. Insert the close-end of the quartz sleeve into the cylinder through the ballast box pass-thru.
6. Allow 1/2” 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 Steps 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 UV unit is leak-free, the quartz sleeve installation is complete and the UV lamp can 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

1. Release the pressure in the UV treatment chamber before breaking the compression nut seals.
2. Disconnect all power to the UV unit before servicing.
3. Do not allow the inlet water temperature to drop below 35ºF (2ºC).
4. Do not allow the flow rate to exceed 2 GPM.
5. Do not cycle the UV unit more than 3 “ON/OFF” cycles in a 24-hour period.
6. Ensure all plumbing connections are tightly sealed before applying pressure.
7. Before connecting the return tube, flush the unit to rinse out any debris left from the installation process.

Danger: UV LIGHT EXPOSURE CAN SEVERELY BURN AND DAMAGE EYES AND SKIN.

Danger: 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 35ºF to 100ºF. If the inlet water temperature exceeds 100ºF (38ºC), 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.

System Commissioning

Initial Start-up Procedure of a New Aqua Whisper Pro RO Desalination System (models 450-1, 700-1, 900-1, 900-2, 1400-2 and 1800-2)

The Commissioning instructions must be carried out for initial start-up of a NEW system. Failure to follow these instructions exactly leads to system failure and causes damage to the components. Read this section and other appropriate sections of the manual in order to gain familiarity with the requirements of the system and functions of each component.

For installation diagrams, please refer to the fold-outs at the end of this manual.

System Initial Start-up Procedures

1. Ensure that the installation has been properly performed per the instructions in this section.
2. Ensure that the shipping tape from the High Pressure Pump Oil Fill Cap has been removed to expose the Oil Fill Cap air breather hole.
3. Ensure that the pump oil level is even with or higher than the center of the pump sight glass. Damage to the High Pressure Pump will occur if the wrong oil is used in its crankcase or if the oil level is not at minimum required level. Use only Sea Recovery supplied pump oil. The supplied Pump Oil is special hydraulic oil, which contains anti rust and wear inhibitors essential to the high-pressure pump crankcase section.
4. Ensure that the tube shipping plug has been removed from the Potable Water outlet port of the Water Control Manifold and that 1/4” product water tube is connected.
5. RO Membrane Element:

   Caution: Some systems are shipped WITHOUT the RO Membrane Element. This is to accommodate, for example, Boat Builders that install the system well in advance of commissioning the boat and the Aqua Whisper Pro RO Desalination System.

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

   If the 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.

   DO NOT attempt to operate the system without a RO Membrane Element installed in the system otherwise extensive damage will result.

6. Check each tube connection to the system to ensure that the installer has properly connected and routed each tube. Improper routing and line blockage will cause damage to the system. ***Do not rely on the installer's word; check it yourself.***
7. Ensure sure that the Electrical Power Source, boat's circuit breaker to the system, is switched "OFF."
8. Open the front panel of the Main Power Enclosure and check all electrical and electronic connections for proper wiring and attachment. Refer to wiring diagrams.
9. Close the Main Power Enclosure front panel.
10. Ensure that the manual By-Pass lever on the Diversion Valve [21] is positioned outward (away from the coil body).
11. Open any auxiliary valve within the incoming Feed Line, Outgoing Brine Discharge Line and Outgoing Product Water Line.

    Caution: If an auxiliary valve is installed in these lines, it will damage the Aqua Whisper Pro RO Desalination System if left closed during starting and/or operation.

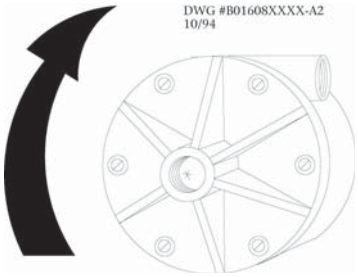
12. Open the Back Pressure Regulator Valve [17] FULLY OPEN by turning counter clockwise.

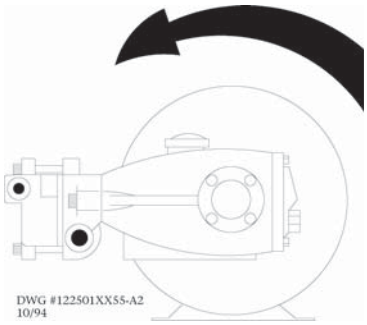
    Caution: The Back Pressure Regulator Valve [17] must be fully open when starting the Aqua Whisper Pro RO Desalination System. If this valve is left closed, it will cause damage to the system.

13. Switch the Electrical Power Source, boat's circuit breaker to the system "ON."
14. High Pressure Electric Motor Rotational Check:

    Ask an assistant to view the fan section of the Booster Pump Motor [4] and High Pressure Pump Motor[10] while you "Jog" the system.

    Press the "Booster Pump" switch, and then immediately press the "Stop" switch. Ensure that the Booster Pump Electric Motor is turned in the proper rotation as indicated by an arrow on the front of the pump. If the motor is turned in the wrong direction, refer to the wiring diagrams to correct. To change rotation in DC systems, reverse polarity to the respective electric motor.





Press the "Start" switch, and then immediately press the "Stop" switch. Ensure that the High Pressure Pump Electric Motor is turned in the proper rotation. If the motor is turned in the wrong direction, refer to the wiring diagrams to correct. To change rotation in DC systems, reverse polarity to the respective electric motor.

15. To start the system, press the “Start” Switch or press the “Booster Pump” Switch and then the “Start” switch. If the system automatically shuts off after several seconds of operation, it may be due to a system fault. Look at the Touch Pad to confirm whether a fault has occurred. If the “High/Low Pressure” Fault Lamp is illuminated, ensure that the System Feed Line is primed and that there is no air in the Feed Water Line. Press the "Fault Reset" button on the Touch Pad and restart the system. Initial New System Commissioning will require priming of the Feed Water through the prefiltration section in order to build sufficient feed water pressure to maintain operation.
16. After 5 minutes of running un-pressurized, slowly adjust the Back Pressure Regulator Valve [17] by turning clockwise to increase the pressure to the proper setting (example: Approximately 850 psi for 35,000 ppm seawater @ 77°F).

    WHILE ADJUSTING THE BACK PRESSURE REGULATOR TO OPERATING PRESSURE, OBSERVE THE PRODUCT WATER FLOW METER.

Model	Product Water Flow (Gallons/Hour)
450-1	18
700-1	29
900-1 and 900-2	37
1400-2	58
1800-2	75

    DO NOT EXCEED 900 PSI ON HIGH PRESSURE GAUGE.

17. If any abnormality develops, stop the system and correct the problem.
18. 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 at which time it is directed to the "potable" (good water) position and into the Post Filtration components onward to the boat’s Storage Tank [24]. At the same time, the Water Quality LED on the Touch Pad changes from red to green.
19. Check for:

    • A constant feed water flow.
    • A consistent system pressure.
    • Leaks in the system.
    • Abnormal noises or other occurrences.

Chapter 5

System Operation

System Operation Notes

The fresh water production of the Aqua Whisper Pro RO Desalination System models depends on six factors:

- Feed Water Temperature
- Feed Water Salinity
- Feed Water Flow Rate
- Operating Pressure
- Characteristics of the individual RO Membrane Element
- Condition of the individual RO Membrane Element

Feed water temperature and salinity vary depending upon location of operation. Feed water flow is fixed on the Aqua Whisper Pro RO Desalination System at 3.5 gallon per minute (13.2 liters per minute) by design. The only operator adjustment that remains is the operating pressure, which is adjusted at startup by the operator. Two parameters are controlled by this single operator adjustment: Operating Pressure and resulting Product Water Flow.

The Operating Pressure is adjusted upward until the Aqua Whisper Pro RO Desalination System produces the following:

Model	Product Water (Gallons per hr / liters per hour)
450-1	18.7 / 71
700-1	29 / 110.8
900-1 and 900-2	37.5 / 142.5
1400-2	58.3 / 221.67
1800-2	75 / 285

Caution:

The maximum Operating Pressure allowed is 900 psi. Do not exceed 900 psi even if the system does not produce the specified amount of product water. The system automatically shuts down if the maximum Operating Pressure exceeds 950 psi. External factors, such as Feed Water Temperature, Feed Water Salinity, or condition of the RO Membrane Element may cause the system to produce less than specified even though the Operating Pressure is at 900 psi.

Operation Cautions

- Open all valves on the piping or hoses leading to and from the system.
- Check the Oil level in the High Pressure Pump.
- Check for any abnormalities such as leaks, damaged hoses, wires, etc.

Startup Procedure

1. Open the Cock Valve [2] fully.

2. Switch the electrical power to the system on at the circuit breaker. The “POWER” lamp on the system Touch Pad will illuminate.
3. Ensure that the back-pressure regulator valve [17] is fully open (counterclockwise). This is not required and is commonly skipped on systems equipped with a Remote Control. Performing this step reduces wear and tear on the mechanical and electrical components.
4. Press the “Start” switch. This initiates the automatic start sequence. The automatic start sequence begins with the booster pump starting immediately and the high-pressure pump following after a brief delay.

   or

   Press the “Booster Pump” switch then press “Start” switch. Pressing the booster pump switch starts just the booster pump. It continues running by itself until the start switch is pressed.

High/Low Pressure Fault Lamp Explanation

Low Pressure fault: When the inlet pressure to the high-pressure pump falls below 6 psi, the “High/Low Pressure” lamp blinks. If the condition is not corrected, the system shuts down after 20 seconds. The Low Pressure switch monitors this condition caused by a dirty pre-filter, a closed Inlet Sea Cock Valve, or restriction at the Inlet Thru-Hull fitting or in the inlet feed line.

High Pressure fault: The High Pressure switch stops the system if pressure exceeds 950 psi.

1. After the cause of the fault condition has been corrected, press “Fault Reset” and repeat the steps in *Startup Procedure* on page 39.
2. Slowly adjust the backpressure regulator [17] until the system produces the specified product water gallon per hour flow at the Product Flow meter (DO NOT exceed 900 psi).

   See “Temperature Effects Chart” and “Salinity Effects Chart” for expected pressure settings and production.

   Colder Water: At sea water temperatures below 77°F, the Aqua Whisper Pro RO Desalination System must operate at a higher pressure to produce the specified amount of fresh water. As water temperature drops, the individual H2O molecules are less active and higher pressure is required to drive them through the membrane surface. Another result of lower temperature feed water is that the fresh water produced has a lower salt content. Do not operate with feed water below 33°F / 1°C because the product water will freeze and cause mechanical failure and rupture of components within the system.

   Warmer Water: At water temperatures above 77°F, the Aqua Whisper Pro RO Desalination System operates at a lower pressure to produce the specified amount of fresh water. As water temperature rises, the individual H2O molecules are more active and pass through the RO Membrane Element with less pressure. Higher temperatures also allow more salt to make its way into the fresh water. Do not operate with feed water that exceeds 122°F / 50°C. High temperatures will cause structural damage to the RO Membrane Element.
3. If any abnormality develops, stop the system and correct the problem.
4. Check for unusual noises or other occurrences.

Controller Operations

Start/Stop button

1. Powers on and sets the system in its initial state.
2. When the system is producing water and the START/STOP button is pushed, the system stops all pumps and diverts water into the sea.
3. Resets all faults.

Note that this button performs its designated action, regardless of whether or not you are browsing a menu.

Cycle button

This button allows the operator to cycle through the process and configuration parameters.

• Press the CYCLE button once to view to view the Display Menu.
• Press and hold CYCLE for 5 seconds to view the Configuration Menu.

Display Menu

This menu monitors measured values (e.g. pressure, flow and salinity); system states (e.g. FWF, running, FWP); and timers. Press the CYCLE button once to view this menu and CYCLE again to scroll through the menu items.

Every time CYCLE is pressed, the next item is shown. If you release, and do not push the CYCLE button for more than 5 seconds, you will return to the main screen.

1. Pre-Filter Press – Inlet pressure in Bar or PSI (pre-filter inlet)
2. HP Inlet Press – Inlet pressure in Bar or PSI (high pressure pump inlet)
3. Membrane Press – Membrane pressure in Bar or PSI
4. Product Flow – Product water flow in l/min or GPM
5. Brine Flow – Brine flow in l/min or GPM
6. Water Quality – Salinity (water status) in ppm
7. Total Hours – High pressure pump/ETD hour meter (counted in seconds but shown in whole hours)
8. Tank Full – Yes or no
9. Tank Empty – Yes or no
10. Booster Relay - Booster pump on or off
11. FWF Relay – Fresh Water Flush on or off
12. HP Relay – High pressure pump on or off
13. DV Relay – Diversion valve on or off
14. UV Relay – Ultraviolet on or off
15. Supply Voltage – volts (used only for diagnostics)
16. Version – software version

Configuration (Change) Menu

This menu shows a list of configuration parameters that can be changed by the operator. Press the CYCLE button and hold for 5 seconds to view this menu and CYCLE again to scroll through the menu items. Every time CYCLE is pressed, the next item is shown. Holding the CYCLE button for more than 5 seconds selects the displayed menu item. Note that this menu does not allow the operator to monitor the state of these configuration parameters. Please use the Configuration (Read) Menu to do so.

1. Unit – units (metric or US)
2. Low Pressure 1 Inst – S1 Lo pressure sensor installed (yes or no)
3. Low Press 2 Inst – S2 Lo pressure sensor installed (yes or no)
4. Prod Flow Inst – Product flow meter installed (yes or no)
5. Brine Flow Inst – Brine flow meter installed (yes or no)
6. Tank Full Inst – Tank level full sensor installed (yes or no)
7. Tank Empty Inst – Tank level empty sensor installed (yes or no)
8. FWF Delay – High pressure pump stop to FWF delay (HH:mm:ss)
9. Time to AutoShut – Auto shutdown after X hours in state FWP (HH:mm:ss)
10. AutoShut Time – Auto shutdown after time (yes or no)
11. AutoShut Tank – Auto shutdown on tank full (yes or no)
12. FWF Duration – FWF duration time (HH:mm:ss)
13. FWF Interval – FWF interval time (HH:mm:ss)
14. PassiveUVoff – Time from leaving fresh water production to turning UV off (HH:mm:ss)
15. UV off delay – Time from UV on to diversion valve to tank (HH:mm:ss)
16. AutoStart Tank – Autostart on tank empty (yes or no)
17. BP Delay – Time from feed pump to high pressure pump/ETD (HH:mm:ss)
18. Salinity Level – Salinity error level (ppm)
19. Min Pressure – minimum pressure (Bar or PSI)
20. Min Pressure Time – Min pressure measure time (HH:mm:ss)
21. Max Pressure – Maximum pressure (Bar or PSI)
22. Sol. Valve Time – Solenoid valve time (seconds)

Configuration (Read) Menu

This menu monitors a selected list of configuration parameters, which may be of interest to the operator (e.g. units are metric or US, FWF time interval, etc.). This menu is appended to the Display Menu.

1. Unit – units (metric or US)
2. Low Pressure 1 Inst – S1 Lo pressure sensor installed (yes or no)
3. Low Press 2 Inst – S2 Lo pressure sensor installed (yes or no)
4. Prod Flow Inst – Product flow meter installed (yes or no)
5. Brine Flow Inst – Brine flow meter installed (yes or no)
6. Tank Full Inst – Tank level full sensor installed (yes or no)
7. Tank Empty Inst – Tank level empty sensor installed (yes or no)
8. Time to AutoShut – Auto shutdown after X hours in state FWP (HH:mm:ss)
9. AutoShut Time – Auto shutdown after time (yes or no)
10. AutoShut Tank – Auto shutdown on tank full (yes or no)
11. FWF Duration – FWF duration time (HH:mm:ss)
12. FWF Interval – FWF interval time (HH:mm:ss)
13. AutoStart Tank – Autostart on tank empty (yes or no)
14. Salinity Level – Salinity error level (ppm)
15. Min Pressure – minimum pressure (Bar or PSI)
16. Max Pressure – Maximum pressure (Bar or PSI)
17. Sol. Valve Time – Solenoid valve time (seconds)

Fresh Water Flush button

This button initiates the Fresh Water Flush (FWF) cycle. The cycle can be interrupted by pressing it again to stop operation. Note that this button starts the FWF cycle, regardless of whether or not you are browsing a menu.

Booster Pump button

Start the booster pump. Press the Start/Stop button to stop operation. Note that this button starts the booster pump, regardless of whether or not you are browsing a menu.

Chapter 6

System Storage and Cleaning

RO Membrane Element Handling and System Storage Cautions

1. **TEMPERATURE:** Never store the RO Membrane Element or Membrane/Vessel Assembly in direct sunlight. Never expose the RO Membrane Element or Membrane/Vessel Assembly to storage temperatures above 120°F / 50°C or below 32°F / 0°C. High temperatures cause up to 40% loss of production from the RO Membrane Element. This damage is irreversible. Freezing temperatures cause mechanical damage to the system and irreversible damage to the RO Membrane Element.
2. **DRYING OUT:** Never allow the RO 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 RO 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 RO Membrane Element must remain wet at all times.
3. **BIOLOGICAL FOULING:** Protect the RO 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.
4. **CHEMICAL FOULING:** Never expose the RO Membrane Element to chemicals other than those supplied by Sea Recovery. Use caution when operating the system in harbors that may be polluted with chemicals, oil, or fuel. Chemicals may damage the RO Membrane Element beyond repair.
5. **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 RO Membrane Element from up to 40% 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 as explained later in this chapter.
6. **NEW SYSTEM STORAGE:** If you are storing the system for longer than 3 months, do not install the membrane. Install the membrane prior to actual use. If storage of the new system is longer than 3 months, the system must be rinsed with fresh water and stored with fresh storage solution every 3 months, otherwise biological fouling and/or drying out damages the RO Membrane Element.

Illustrated below is the Aqua Whisper Pro water flow in a Once Through Configuration without the Inlet Rinse / Clean Valve [50] or the Outlet Rinse / Clean Valve [51]. Disconnection of the suction hose is required. This configuration is used to rinse the system with fresh water and also to discharge the contents of the cleaning solution bucket.

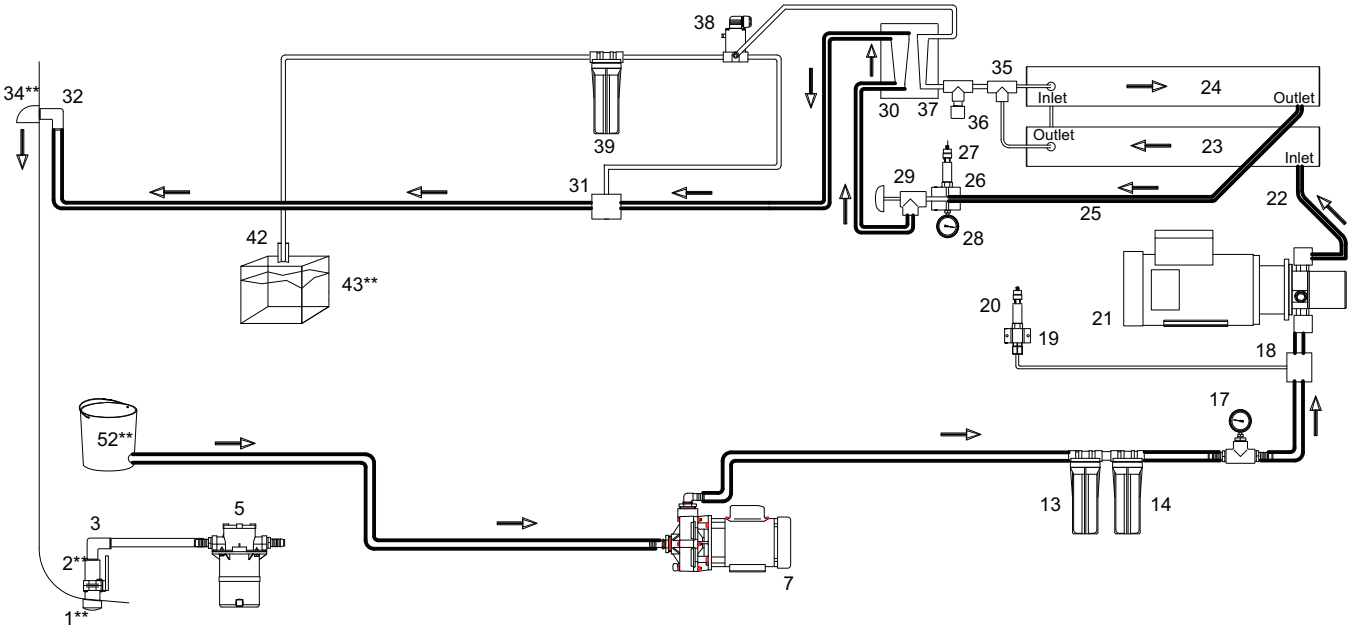


Figure 1: Aqua Whisper Pro RO Desalination System Illustrated in a Once Through Configuration for Flushing the System with Fresh Water and for Discharging Cleaning or Storage Chemical (without Inlet Rinse / Clean Valve or the Outlet Rinse / Clean Valve)

Illustrated below is the Aqua Whisper Pro RO Desalination System water flow in a Closed Loop Configuration without the Inlet Rinse / Clean Valve [50] or the Outlet Rinse / Clean Valve [51]. Disconnection of the suction hose and discharge hose is required. This configuration is used to circulate storage chemical, winterizing chemical, fresh water or RO Membrane cleaning chemical through the system.

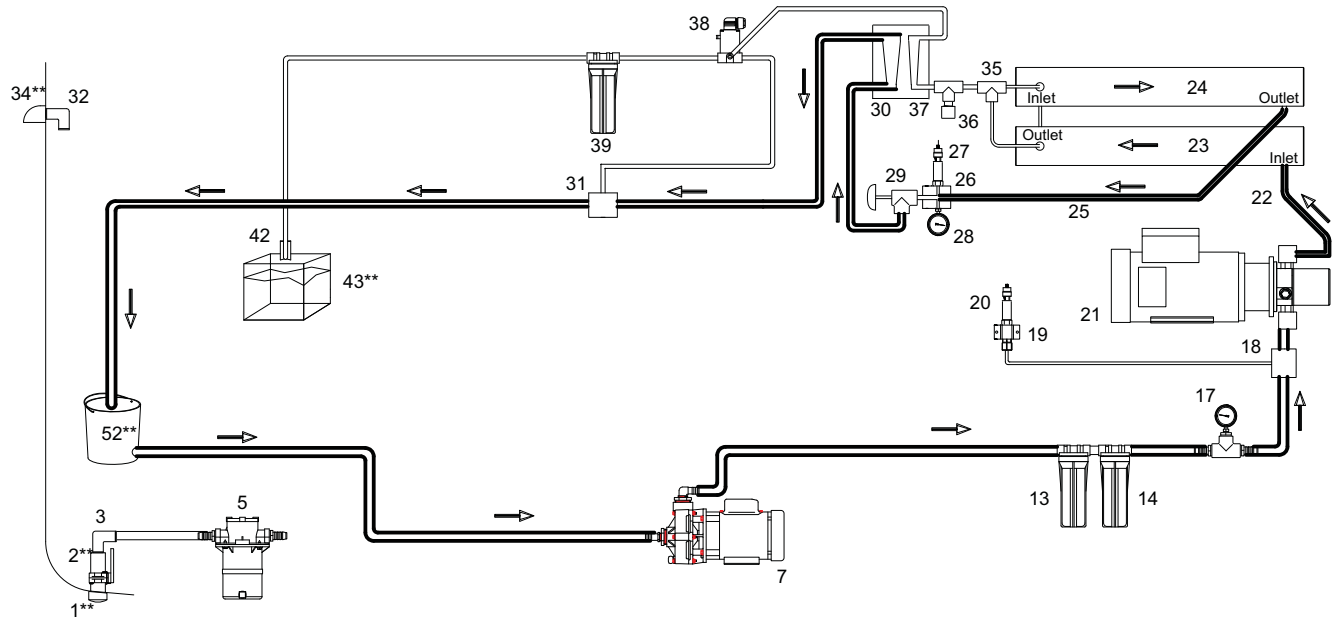


Figure 2: Aqua Whisper Pro RO Desalination System Illustrated in a Closed Loop Configuration for RO Membrane Cleaning, Rinse Water Circulation or Storage Solution Circulation (without Inlet Rinse / Clean Valve or the Outlet Rinse / Clean Valve)

Illustrated below is the Aqua Whisper Pro RO Desalination System water flow in a Once Through Configuration utilizing the Inlet Rinse / Clean Valve [50] and the Outlet Rinse / Clean Valve [51]. This configuration is used to rinse the system with fresh water and also to discharge the contents of the cleaning solution bucket.

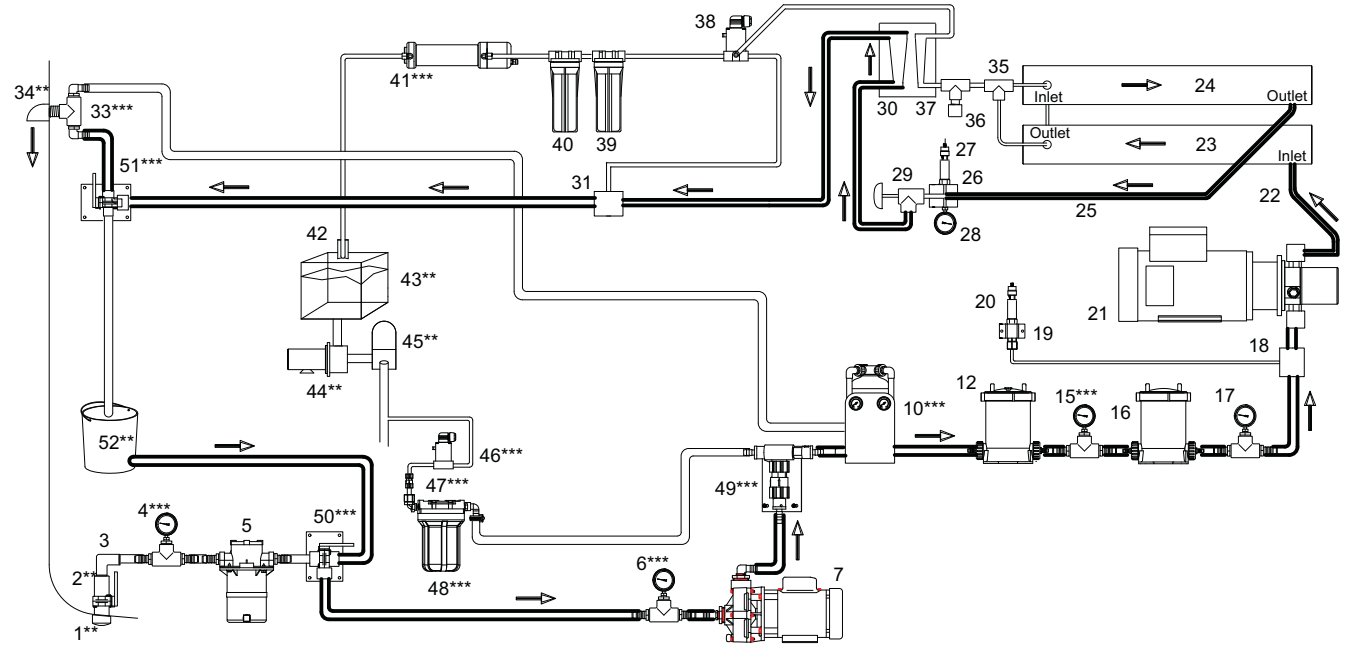


Figure 3: Aqua Whisper Pro RO Desalination System Illustrated in a Once Through Configuration for Flushing the System with Fresh Water and for discharging Cleaning or Storage Chemical (with Inlet Rinse / Clean Valve or the Outlet Rinse / Clean Valve)

Illustrated below is the Aqua Whisper Pro RO Desalination System water flow in a Closed Loop Configuration utilizing the Inlet Rinse / Clean Valve [50] and the Outlet Rinse / Clean Valve [51]. This configuration is used to circulate storage chemical, winterizing chemical, fresh water or RO Membrane cleaning chemical through the system.

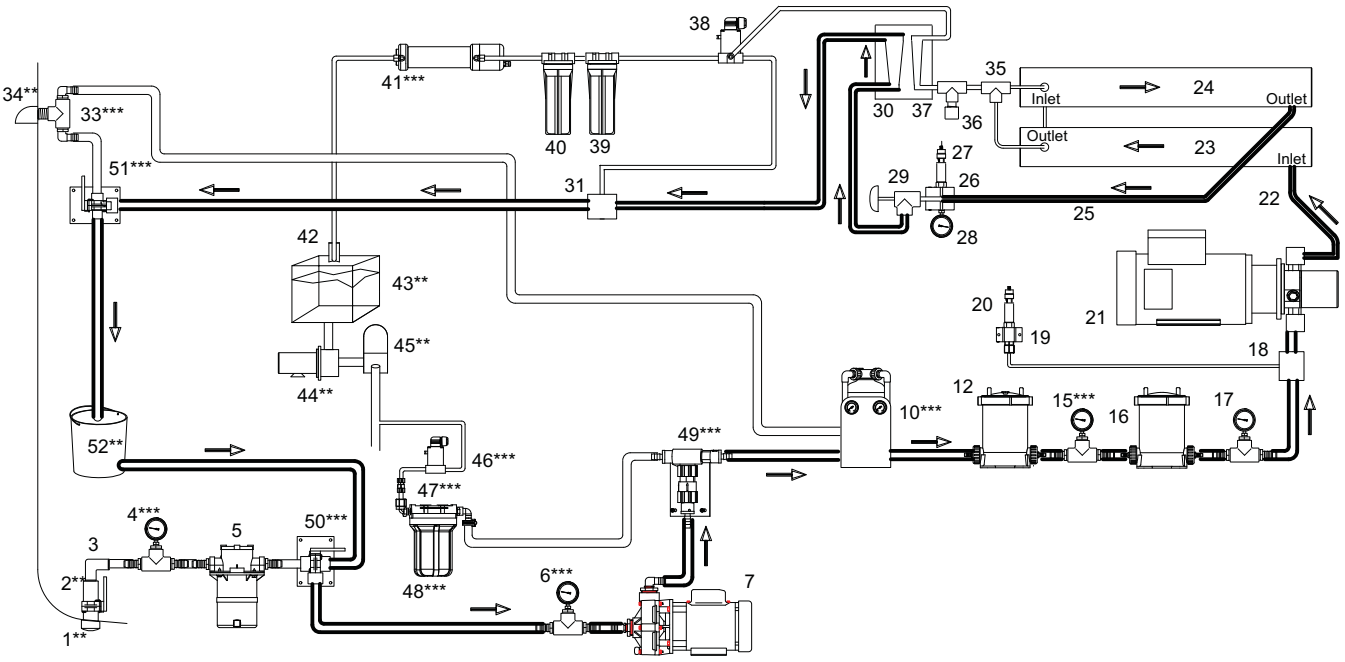


Figure 4: Aqua Whisper Pro RO Desalination System Illustrated in a Closed Loop Configuration for RO Membrane Cleaning, Rinse Water Circulation or Storage Solution Circulation (with Inlet Rinse / Clean Valve or the Outlet Rinse / Clean Valve)

Illustrated below is a simplified flow diagram with water flow in a Once Through Configuration utilizing the Inlet Rinse / Clean Valve [50] and the Outlet Rinse / Clean Valve [51]. This configuration is used to rinse the system with fresh water, as well as to discharge the contents of the cleaning solution bucket.

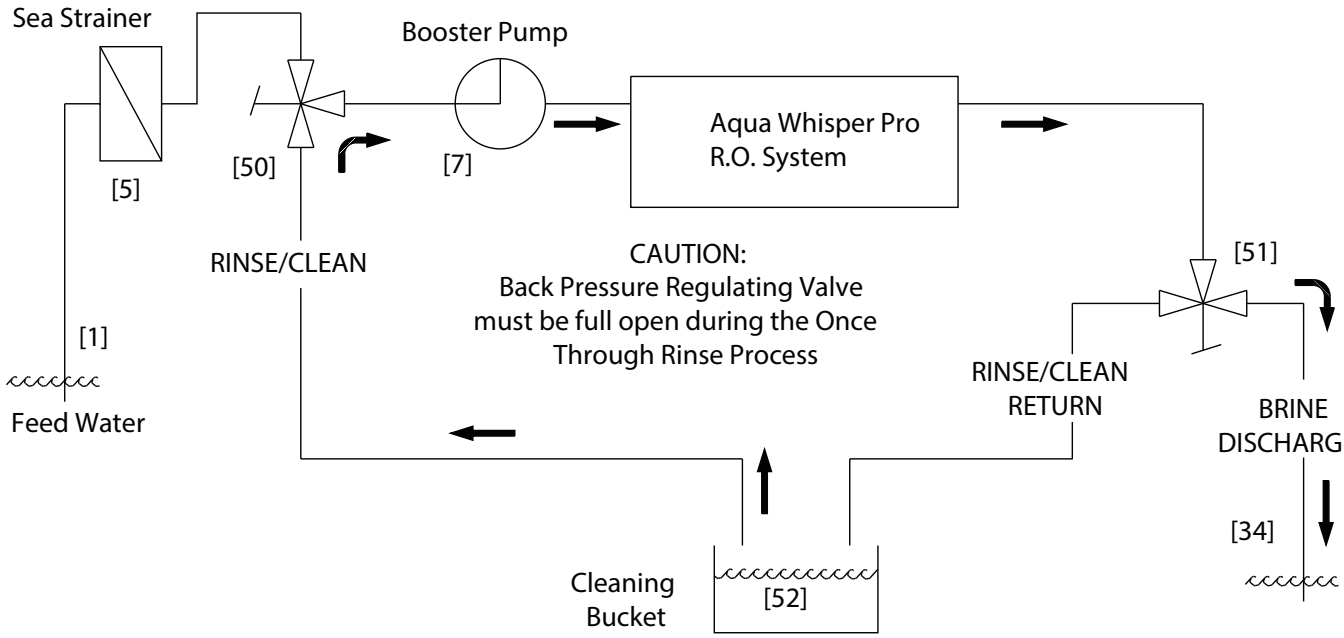


Figure 5: Simplified Aqua Whisper Pro RO Desalination System Once Through Rinse

Illustrated below is a simplified flow diagram with water flow in a Closed Loop Configuration utilizing the Inlet Rinse / Clean Valve [50] and the Outlet Rinse / Clean Valve [51]. This configuration is used to circulate storage chemical, winterizing chemical, fresh water or RO Membrane cleaning chemical through the system.

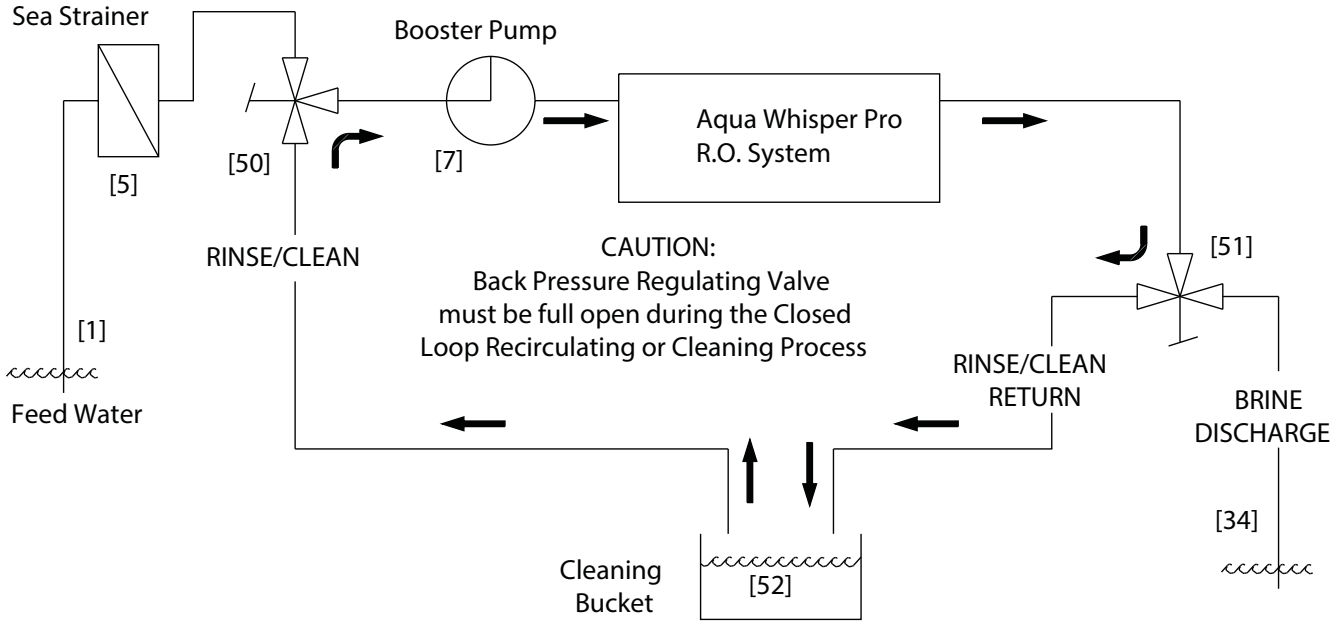


Figure 6: Simplified Aqua Whisper Pro RO Desalination System Recirculating Loop

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 RO Membrane Element is a Fresh Water Rinse of the entire system (product water from the system). This prolongs the system life by minimizing electrolysis and retarding biological growth.

If the system is equipped with an automatic Fresh Water Flush Accessory then it is not necessary to read this section. The Automatic Fresh Water Flush accessory rinses the system every 7 days automatically. 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. Deactivate the Automatic Fresh Water Flush cycle by pressing the “Stop” switch twice (2 times).

Note:

When the instructions state "configure for Once Through Rinse," proceed as follows:

1. Configure the Suction line for a Once Through Configuration. Disconnect the outlet line from the Sea Strainer [3] and place it in the container or bucket. Or if the system is equipped with an Optional Inlet Clean/Rinse 3-way ball valve [30] between the Sea Strainer [3] and Booster Pump [4], then position this valve to draw from the bucket.
2. Configure the Brine Discharge line for a Once Through Configuration. Connect the Brine Discharge Line from the system to the Thru-Hull over board discharge fitting [18], normal connection for normal operation. Or if the system is equipped with an Optional Discharge Clean/Rinse 3-way ball valve [31] between the System and the Thru-Hull over board discharge fitting [18], then position this valve to discharge through the Thru-Hull fitting, normal connection for normal operation

MANUAL FRESH WATER RINSE PROCEDURE: Follow the directions below if the system is not equipped with an Automatic Fresh Water Flush accessory. This procedure displaces the system feed water with fresh water and allows a short-term shutdown for up to four weeks. Five gallons (19 liters) of fresh product or potable water is required for the fresh water rinse.

1. Close the Cock Valve [2].
2. Fill a 5-gallon container with clean, fresh water.
3. Configure the system for a **Once-Through Rinse**.
4. Fully open the Back Pressure Regulating Valve [17] counter clockwise.
5. Press the “Start” switch. The fresh water rinses the system and discharges out to waste [18].
6. Apply 200 psi of pressure to the system by turning the Back Pressure Regulator [17] clockwise. This allows the system to produce a minimal amount of product water, which ensures that the product water line remains wet.
7. Just prior to depleting the rinse water from the bucket, fully open the Back Pressure Regulator Valve [17] counter clockwise and stop the system.

   IN NON FREEZING TEMPERATURES, THE SYSTEM MAYBE LEFT UNATTENDED FOR SEVERAL WEEKS. HOWEVER, IF THE SYSTEM WILL BE EXPOSED TO FREEZING TEMPERATURES, CONTINUE WITH THE FOLLOWING PROCEDURES:

8. Again, fill a 5-gallon container with clean, fresh water. Add twenty percent (1 gallon / 4 liters) food grade glycerin (propylene glycol) to the Storage Chemical Solution. This prevents the water in the system from freezing.
9. Configure the system for a **Once Through Rinse**.
10. Fully open the Back Pressure Regulating Valve [17] counter clockwise.
11. Press the “Start” switch. The fresh water rinses the system and discharges out to waste [18].
12. Just prior to depleting the rinse water from the bucket, fully open the Back Pressure Regulator Valve [17] counter clockwise and stop the system. Deactivate the Automatic Fresh Water Flush Cycle by pressing the “Stop” switch twice (2 times).
13. Reconfigure the system for normal operation by reconnecting the Sea Strainer [3] outlet line, or reposition the Inlet Rinse/Clean 3-way ball valve [30] to normal operation position. The system is now exposed to fresh rinse water and may be left unattended for up to four weeks.
14. Remove product water from the Post Filtration Section.

a) Open the Charcoal Filter Bowl and drain the product water from it.
b) Disconnect the bottom tube fitting from the Ultra Violet Sterilizer and drain the product water from it.
c) Open the pH Neutralizer Filter Bowl and drain the product water from it.
d) Disconnect or Close the valve from the fresh water tank to the Automatic Fresh Water Flush and drain the Fresh Water Flush Charcoal Filter bowl.

The Manual Fresh Water Rinse Procedure should be repeated every four weeks if the system is not in use and if the system does not have the optional Automatic Fresh Water Flush.

Long Term Shutdown

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. This chemical inhibits bacterial growth while maintaining the high flux and salt rejection of the RO Membrane Element. The Long Term Shutdown procedure requires 10 gallons (38 liters) of potable water. Follow the directions listed below.

WINTERIZING AND FREEZING TEMPERATURE STORAGE NOTE: If the system is exposed to freezing temperatures, add 20% (1 gallon / 4 liters) food grade glycerin (propylene glycol) to the Storage Chemical Solution. This prevents the water in the system from freezing.

Note:

When the instructions state "configure for Once Through Rinse," proceed as follows:

1. Configure the Suction line for a Once Through Configuration. Disconnect the outlet line from the Sea Strainer [3] and place it in the container or bucket. Or if the system is equipped with an Optional Inlet Clean/Rinse 3-way ball valve [30] between the Sea Strainer [3] and Booster Pump [4], then position this valve to draw from the bucket.
2. Configure the Brine Discharge line for a Once Through Configuration. Connect the Brine Discharge Line from the system to the Thru-Hull over board discharge fitting [18], normal connection for normal operation. Or if the system is equipped with an Optional Discharge Clean/Rinse 3-way ball valve [31] between the System and the Thru-Hull over board discharge fitting [18], then position this valve to discharge through the Thru-Hull fitting, normal connection for normal operation

Note:

When the instructions state "configure for Closed Loop Configuration," proceed as follows:

1. Configure the Suction line for a Closed Loop Configuration. Disconnect the outlet line from the Sea Strainer [3] and place it in the container or bucket. Or if the system is equipped with an Optional Inlet Clean/Rinse 3-way ball valve [30] between the Sea Strainer [3] and Booster Pump [4], then position this valve to draw from the bucket.
2. Configure the Brine Discharge line for a Closed Loop Configuration. Disconnect the Brine Discharge Line from the Thru-Hull over board discharge fitting [18] and place it in the container or bucket. Or if the system is equipped with an Optional Discharge Clean/Rinse 3-way ball valve [31] between the system and the Thru-Hull over board discharge fitting [18], then position this valve to return to the container or bucket.

1. Close the Cock Valve [2].
2. Replace the Pre-filtration Cartridges [6] with new Sea Recovery Pre-filtration Elements.
3. Fill a clean 5-gallon container with non-chlorinated product water.
4. Configure the system for a **Once Through Rinse**.
5. Fully open the Back Pressure Regulating Valve [17] counter clockwise.
6. Press the “Start” switch. The fresh water rinses the system and discharges out to waste [18].
7. Apply 200 psi of pressure to the system by turning the Back Pressure Regulator [17] clockwise. This allows the system to produce a minimal amount of product water, which ensures that the product water line remains wet.
8. Just prior to depleting the rinse water from the bucket, fully open the Back Pressure Regulator Valve [17] counter clockwise and stop the system (press stop button twice to abort Fresh Water Flush Cycle).

9. Fully open the Back Pressure Regulating Valve [17] counter clockwise.
10. Fill the 5-gallon bucket with product water. Add 4 ounces (1/6th bottle) of Storage Chemical to the water in the plastic bucket. **DO NOT ADD ANY OTHER CHEMICAL.**
11. Mix and thoroughly dissolve the solution in the container.
12. If the system will be exposed to freezing temperatures, add 1 gallon (4 liters) food grade glycerin (propylene glycol) to the 5 gallons of Storage Solution. This prevents the water in the system from freezing. **DO NOT ADD ANY OTHER CHEMICAL.**
13. Configure the system for a **Closed Loop Configuration**.
14. Operate the system by pressing the "Start" Switch. The Storage Chemical Solution flows from the container through the system and back into the container in a Closed Loop configuration. **Do not pressurize the system; leave the Back Pressure Regulator [17] fully open.**
15. After approximately 10 minutes of circulation, stop the system (Press stop button twice to abort Fresh Water Flush Cycle).
16. Configure the system for a **Once Through Rinse**.
17. Start the system, which discharges the Storage Chemical Mixture through the Brine Discharge Thru Hull Fitting [18].
18. Stop the system just before depleting the Storage Chemical Solution from the tank. Press the Stop switch twice to abort the Automatic Fresh Water Flush cycle.
19. Reconfigure the system for normal operation by reconnecting the Sea Strainer [3] outlet line for normal operation. Or if the system is equipped with a Inlet Clean/Rinse 3-way ball valve [30] then position this valve to the normal operating position towards the Sea Strainer.
20. **WINTERIZING AND FREEZING TEMPERATURE STORAGE NOTE:** If the system is exposed to freezing temperatures, remove product water from the Post Filtration Section.
    a) Open the Charcoal Filter Bowl and drain the product water from it.
    b) Disconnect the bottom tube fitting from the Ultra Violet Sterilizer and drain the product water from it.
    c) Open the pH Neutralizer Filter Bowl and drain the product water from it.
    d) Disconnect or Close the valve from the fresh water tank to the Automatic Fresh Water Flush and drain the Fresh Water Flush Charcoal Filter bowl.

The system may now be left unattended for up to 3 to 6 months. With ideal conditions including a relatively new RO Membrane Element, a clean system prior to storage, cool temperatures, and no leakage of storage chemical within the system, it provides protection for up to 6 months. Adverse conditions may provide less protection. Evaluate these factors before determining the proper interval between repeated rinsing and storage periods.

RO Membrane Element Cleaning Procedures

Do not arbitrarily clean the RO Membrane Element in a NEW system. If a New system experiences low production or high salinity then it should be operated for up to 48 hours continuously to clear and saturate the RO Membrane Element and product water channel. If a new system still experiences low production and or high salinity after 48 hours of continual operation, then contact the factory.

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 RO Membrane Element may requires cleaning.

If production rate has dropped dramatically since the last time the system was used, this may be due to drying out of the RO 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 RO 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 RO Membrane Element. Suspended solids fouling results from silt, coral dust, river or inland waterway debris, or other small solid matter.

RO Membrane Element Cleaning Water and Chemical Requirements

1. The system must be rinsed with fresh water before any cleaning procedure.
2. The process of rinsing and cleaning the RO Membrane Element requires 20 gallons / 76 liters of fresh non-chlorinated product water.
3. The Reverse Osmosis cleaning compounds are designed to clean in a closed loop configuration moderate fouling from theRO Membrane Element. If the RO Membrane Element is excessively fouled and in-field cleaning is not successful, the RO 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.
4. SRC MCC-1, Membrane Cleaning Compound "# 1" is an alkaline cleaner designed to clean biological fouling and slight oil fouling from the RO Membrane Element. Biological fouling is usually the first cause of the RO 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 RO 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 RO 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 RO Membrane Element fouling then that fouling is likely biological fouling. If the system has in excess of 1000 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 RO 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 Membrane Elements may not be recoverable as rust not only fouls the membrane element but also damages the membrane surface.

Caution:

DO NOT MIX DIFFERENT CLEANING CHEMICALS TOGETHER. DO NOT USE DIFFERENT CLEANING CHEMICALS TOGETHER AT THE SAME TIME. MIX THE CLEANING CHEMICALS SEPARATELY AND USE THEM SEPARATELY.

RO Membrane Element Cleaning Instructions

Product Water Required, in Gallons, for Cleaning of the RO Membrane Element:

Chemical	Rinse water required	Cleaning water required	Second Rinse water required	Final Rinse water required	Total water required
CC-1	5	5	5	5	20
CC-2	5	5	5	5	20
CC-3	5	5	5	5	20

1. Close the Cock Valve [2].
2. Replace the Pre-filtration Cartridge with a new Pre-filtration Element.
3. Configure the system for a **Once Through Rinse**.
4. Fill the 5-gallon container full with non-chlorinated product water. The bucket must contain enough product water to rinse the system until all of the feed water is displaced.
5. Open the Back Pressure Regulating Valve [17] fully open counterclockwise.
6. Operate the system by pressing the "Start" switch. The rinse water rinses the entire system and discharges out to waste.
7. Just prior to depleting the rinse water from the 5-gallon container, stop the system.
8. Fill the 5-gallon container with product water. NOTE: FOR OPTIMUM CLEANING RESULTS, USE WATER BETWEEN 90°F-110°F / 32°C –43°C. DO NOT EXCEED 120°F / 50°C.
9. Add 6 oz (1/4 bottle) of the SRC MCC-1, MCC-2, or MCC-3 Cleaning Chemical to the water in the plastic bucket. USE ONLY ONE CHEMICAL AT A TIME.

10. Mix and thoroughly dissolve the solution in the container.
11. The ratio for the Membrane Cleaning Chemical (MCC) is one bottle per 20 gallons of product water.
12. Configure the system for a **Closed Loop Configuration**.
13. Press the “Start” switch to begin circulating the Cleaning Chemical solution from the container through the system and back into the container. Do not pressurize the system; leave the Back Pressure Regulator Valve [17] fully open.
14. After approximately 60 minutes of circulation, stop the system (Press the stop button twice to abort the Fresh Water Flush Cycle). For best cleaning results (if time permits), allow the cleaning solution to sit in the system for 4 to 6 hours and then reticulate the solution for an additional 20 minutes. This will allow the solution to soak, dislodge, and dissolve fouling.
15. Empty the 5-gallon container by reconfiguring the system for a **Once Through Rinse**.
16. Press the “Start” switch to discharge the solution out the Brine Discharge Thru Hull Fitting [18].
17. Just prior to depleting the Cleaning Chemical solution from the container, stop the system (press the stop button twice to abort the Fresh Water Flush Cycle).
18. Fill the 5-gallon container full with non-chlorinated product water.
19. Again, configure the system for a **Closed Loop Configuration**.
20. Press the “Start” switch to circulate the water from the container through the system and back into the container. Continue rinsing for 20 minutes.
21. After 20 minutes, stop the system by pressing the “Stop” switch (press the "Stop" button twice to abort the Fresh Water Flush Cycle).
22. Empty the 5-gallon container by again reconnecting the Brine Discharge line to the normal position as described in Step 15.
23. Press the “Start” switch to discharge the rinse water out the Brine Discharge Thru Hull Fitting [18].
24. Just prior to depleting the rinse water from the 5-gallon container, stop the system (press the "Stop" button twice to abort the Fresh Water Flush Cycle).
25. Fill the 5-gallon container with non-chlorinated product water.
26. Start the system to begin final rinsing of the system and discharging out the Brine Discharge Thru Hull Fitting to waste.
27. Just prior to depleting the Final Rinse Water from the container, stop the system (Press the stop button twice to abort the Fresh Water Flush Cycle). The system is now ready for additional cleaning, storage, or use.
28. If further membrane cleaning is necessary, repeat Steps 8 through 27 for each additional cleaning.
29. If cleaning is completed and the system is to be stored:
    a) Press the “stop” switch once to place the Fresh Water Flush in the stand-by mode
    b) Reconnect the system’s Suction and Discharge Lines to normal operating position.
    c) Leave the Inlet Seacock Valve in the closed position.
30. If cleaning is complete and the system will be operated again within a short period of time:
    a) Reconnect the system’s Suction and Discharge Lines to normal operating position.

Chapter 7

Troubleshooting

System Shuts Down During Operation

1. NUMBER ONE REPORTED PROBLEM IS “THE SYSTEM DOESN’T WORK!”

We can’t help with this one unless you give us more information, or allow us to ask an unlimited number of questions.

2. NUMBER TWO REPORTED PROBLEM IS "System Shuts Down By Itself" with "ERROR ID 2" or "ERROR ID 3" (High/Low Pressure Fault)

1. To clear the electronics Press Start/Stop Button
2. While observing Low and High Pressure Gauges Start System:

   a. **ERROR ID 2**: If High Pressure Sensor increases beyond 950 PSI and System shuts down, then Press Start/Stop Button and check the Brine Discharge Section as well as the Product Line Section:

   • No kinks or blockages in the Brine Discharge Line
   • No kinks or blockages in the Product Water Line

   b. **ERROR ID 3:** If Low Pressure sensor decreases to near or below 4 PSI, check the inlet line and associated components prior to the High Pressure Pump Inlet:

   • Cock Valve must be fully open
   • Check for air suction leaks at all components and fittings prior to the Feed Pump
   • Sea Strainer Mesh Screen clean manufacturing or installation debris and check for air suction leaks
   • Prefilter Element clean manufacturing or installation debris
   • Plankton Filter Element clean manufacturing or installation debris
   • No kinks or blockages in the inlet line and check for air suction leaks
   • Ensure that the Feed Pump is operational and delivering flow and pressure
   • Inlet Thru-Hull Fitting clean manufacturing or installation debris and check for air suction leaks
     • Caulking compound within the opening
     • Shipping cover or tape below the hull in the water
     • Casting slag on the “fingers” below the hull in the water or within the orifice
     • Plastic bag or other debris in the water below the hull in the water

3. Have patience with this one, and please read this carefully: Debris may plug up the Prefilter Element causing the system to shut down. After shut down, that same debris may settle off of the prefilter element and down into the prefilter housing bowl. Re-starting of the system may initially give normal readings. However, after a short period of time, the debris will stir up and once again clog the prefilter element causing the system to shut down due to low pressure.

   Another cause may be a plastic bag or other debris attached to the thru-hull inlet fitting that finds its way over the thru-hull inlet then drops away when the system shuts down.

   Still another cause may be an air suction leak at or prior to the Booster Pump (suction line at or prior to the Inlet of the Booster Pump). Within up to 10 minutes of operation, if the Low Pressure Gauge gradually decreases to near or below 6 PSI, check the inlet line and associated components prior to the High Pressure Pump Inlet:

   • Sea Strainer Mesh Screen clean all debris and check for air suction leak

- Prefilter Elements replace
- Plankton Filter Element clean debris from screen
- Inlet Thru-Hull Fitting for debris, underneath the boat, and check for air suction leaks.
- Cock Valve must be full open and check for air suction leaks
- No kinks or blockages in the inlet line and check for air suction leaks from each fitting.
- Ensure that the Booster Pump is operational and delivering flow and pressure

4. If system shuts down due to low or high pressure prematurely, then either the Low Pressure Switch or the High Pressure Switch may require adjustment or replacement. Refer to High and Low Pressure Switch Troubleshooting as well as High and Low Pressure Gauge Troubleshooting.

2. System Shuts Down By Itself

Voltage may have been interrupted causing the system to shut down. Check Voltage at the system inside the Control Panel. The system must receive adequate voltage at start up and during operation in order for it to operate normally.

- 12 VDC Systems shut down by design when the voltage falls below 11 VDC
- 24 VDC Systems shut down by design when the voltage falls below 22 VDC
- AC systems shut down by design when the voltage falls below 10% of the set voltage
- **ERROR ID 4** - DC systems shut down by design when the voltage falls below 10.5VDC

Check power cable wire size from the power source to the system to ensure that it is not undersized and causing voltage drop to the system. Check power cable wire connections from the power source to the system to ensure that they are tight.

3. System Shuts Down By Itself and does not Start when the "Start" switch is pressed

Check power source circuit breaker.

- If the breaker has tripped and if this is a continual problem, check circuit breaker amperage rating to ensure that the proper circuit breaker has been installed.
- Occasionally a circuit breaker can be “weak” or defective causing premature trip.
- Have a qualified electrician check the circuit breaker with a full rated load to test its integrity.
- Check Power Wire Size to ensure that it is proper for the amperage rating of the system. Undersize wire will cause voltage drop and increased current.

4. System Shuts Down when the Operating pressure is less than 950 PSI

Inspect the pressure gauge orifice inside the High Pressure Gauge port and dislodge debris within the orifice by cleaning or opening the hole with a small drill bit 1/32 inch (1 mm) diameter. Replace Gauge if necessary.

Product Water Flow and Product Water Quality

The system is operating at 850 psi and is not producing specified product water flow

1. **Feed Water salinity is greater than 35,000 PPM:** Higher salinity Feed Water Requires higher Pressure to make rated flow. Refer to Salinity Effects chart in this manual to identify expected pressure for Higher Salinity Feed Waters. Do not exceed 900 psi operating pressure.
2. **System Feed Water temperature is lower than 77ºF / 25ºC:** Lower temperature feed water requires higher operating pressure to make rated flow. Refer to Temperature Effects chart in this manual to identify expected pressure for lower temperature Feed Waters. Do not exceed 900 psi operating pressure.
3. **NEW System Initial Commissioning:** The RO Membrane Element may have dried out between the time of installation and the time of commissioning. Contact the factory if this time period is uncertain. If this may be the situation, then operate system pressurized for 48 hours continuous to saturate and hydrate the RO Membrane Element. Only do this if it is known that the system was shipped months prior to installation and commissioning was performed months after installation, or if it is known that theRO Membrane Element has dried out.
4. **RO Membrane Element has been in use for a period of time and is fouled from use:** If RO Membrane Element has been stored improperly without proper flushing and/or storage solution or if it has simply slowly degraded over time and use, then the membrane may be fouled and cleaning may restore performance. If not, membrane should be replaced.

5. **Membrane has chemical fouling:** If RO Membrane Element has been performing normally and the drop in production was sudden over one or two times of use it may be chemically fouled by petroleum or other pollutants.
6. **Membrane has dried out:** If it is known that the RO Membrane Element has dried out operate system pressurized for 48 hours continuous to saturate and hydrate the RO Membrane Element.
7. **RO Membrane Element has been exposed to temperatures in excess of 140°F / 60°C:** Replace RO Membrane Element.
8. **There may be a restriction in the product water line:** Ensure that any valve in the product water line is fully open. Note: It is preferred and recommended that there are no valves in the Product Water Line. Ensure that any valve in the product water line is tight, a loose or easily turning valve handle will move and reposition itself due to the movement and pounding of the boat.

System produces more than rated product water flow when operating from full seawater salinity of 35,000 ppm or higher and the operating pressure is 400 PSI or lower and the Product Water Quality Lamp is illuminated "red."

1. A mechanical failure exists in the RO Membrane Element and/or High Pressure Vessel.
2. Cracked or broken RO Membrane Element product water tube which is caused by a blockage in the Product Water Line during operation
3. Cracked End Plug in the High Pressure Vessel allowing seawater to mix with Product Water which is caused by over tightening of tapered pipe fittings into the End Plug
4. Damaged or worn Product Water O-ring in the High Pressure Vessel End Plug
5. Lamination failure within the RO Membrane Element which is caused by a blockage in the Product Water Line and/or air entrapment in the High Pressure Vessel is normally associated with mounting the High Pressure Vessels vertically rather than horizontally.

ERROR ID 1: System produces expected rated product water flow with normal operating pressure after compensating for Feed Water Salinity and Temperature and the Product Water salinity is above 100ppm for more than 10 consecutive seconds

1. It is helpful to use a portable TDS meter to determine if the problem is with the RO Membrane Element or with the Salinity Probe and Electronic monitoring system.
2. Damaged or worn Product Water O-ring at one of the End Plugs within the High Pressure Vessel is allowing Feed Water to mix with Product Water. This would usually result in higher than normal Product Water Flow. However, a small nick in the O-ring may allow enough Feed Water to mix with the Product Water to cause the condition without resulting in a noticeable increase in Product Water Flow.
3. Crack in one of the End Plugs within the High Pressure Vessel is allowing Feed Water to mix with Product Water. This would usually also result in higher than normal Product Water Flow. However, a small crack may allow enough Feed Water to mix with the Product Water to cause the condition without resulting in a noticeable increase in Product Water Flow.
4. RO Membrane Element is fouled due to normal use and requires cleaning.
5. Salinity Probe has debris on the probe causing the system to read poor water quality. Clean the Salinity Probe with a toothbrush.
6. Salinity Monitor out of calibration. Test the actual Salinity of the product water using a portable TDS meter. The system switches from potable water to un-potable water at 800 PPM TDS. If the salinity of the Product Water is less than 800 PPM TDS then calibrate the Salinity Monitor.

The Water Quality is less than 1000ppm, but the water has a definite salt taste.

1. Blockage or pressure in excess of 55 psi is present in the brine discharge line.
   - A blocked brine discharge line causes brine water to mix with product at the Diversion Valve. Flow through the flow meter will be normal because the flow meter is prior to the 3-way product water diversion valve.
   - Ensure that the brine discharge line is free from kinks and that any valves installed in the brine discharge line are fully open.
2. 3-way Product Water Diversion Valve requires mechanical adjustment or cleaning. Tube Connector fittings have been over tightened into the valve body causing the adjustment screws to move resulting in seawater bypass into the product water. Adjust the valve per the instructions in Section 6 of this manual.
3. Salinity Probe has debris on the probe causing the system to read good water quality. Clean the Salinity Probe with a toothbrush.

Product Water is leaking from the Product Tubing when the Water Quality is less than 1000ppm.
Blockage or pressure in excess of 55 psi is present in the product outlet line from the system.

- Check all components and check for kinks or closed valves at and after the point of leakage.
- Charcoal Filter element is fouled, replace element
- pH Neutralizer element is fouled, replace element.
- 3-way Product Water Diversion Valve is blocked or inner ports are out of adjustment, adjust inner ports.

There is a Sulfurous odor (rotten eggs) in the product tank.

1. Dirty Pre-Filtration Element.
   - Dirty Pre-Filtration Elements allow biological matter to decay. When this biological matter decomposes, sulfur gas is released as a byproduct.
   - Check and replace as necessary Prefiltration and Post Filtration Elements.
2. Charcoal Filter Element requires replacement. Change the Charcoal Filter Element every 3 months.
3. Product Tank is dirty or has biological growth in it. Clean and Chlorinate product tank.

The UV sterilizer is flickering or does not light. (Ultra Violet light will damage skin and eyes. Do not look directly at the UV lamp!)

1. UV lamp is weak due to length of time in use, in excess of 1,000 hours. Replace the UV lamp.
2. The UV ballast is very sensitive to voltage changes. Ensure that the voltage supplied to the UV sterilizer is within 11.5 VDC to 13 VDC.

3-way Product Water Diversion Valve Abnormalities

When the system is producing “unpotable” water and the Water Quality lamp is illuminated “red” the 3-way Product Water Diversion Valve coil will not receive voltage from the controller. This allows the 3-way Product Water Diversion Valve to divert the “unpotable” water to the Brine Discharge.

When the system is producing “potable” water and the Water Quality lamp is illuminated “green”, the 3-way Product Water Diversion Valve coil will receive 12 VDC from the controller. This allows the 3-way Product Water Diversion Valve to divert the “potable” water to the post filtration section and on to the boat’s potable water storage tank.

The Water Quality is less than 1000ppm, however, the Diversion Valve does not divert potable water to the post filtration section and on to the boat’s potable water storage tank.
The Diversion Valve is not energizing, and the valve’s coil is cool to the touch after several minutes of operation with the Water Quality is less than 1000ppm.

- The 3-way Product Water Diversion Valve may have a defective solenoid coil.
- There may be a loose wire connection at the Control Printed Circuit Board or the solenoid’s din connector.
- The Control Printed Circuit Board may not be delivering 12 VDC to the solenoid.

The 3-way Diversion Valve is receiving 12 VDC when the Water Quality less than 1000ppm safe water and the valve’s solenoid coil is not defective, the valve’s solenoid coil is warm or hot to the touch, however the Diversion Valve does not divert potable water to the post filtration section and on to the boat’s potable water storage tank.
The Diversion Valve internal ports may have been moved by over tightening of the black tube fittings causing blockage internally and require adjustment. Remove Diversion Valve from the system and adjust ports.

High Pressure Pump Abnormalities

High Pressure Pump flow is normal when the system operating pressure is below 100 PSI, but the flow drops or becomes erratic and pulsates as pressure is applied.

- Warn High Pressure Seals from normal use require replacement.
- Worn High Pressure Pump valves, valve seats, valve springs and/or valve seat "O" rings are broken or warn due to normal use and are allowing internal by-passing. Repair the pump with a Valve and Seal Kit.

Pump is noisier than usual and pulsations are observed in hoses and gauges.

- Worn or broken Valve, Valve Spring, or Valve Seat. Repair the pump with a Valve and Seal Kit.
- Pump is cavitating and not receiving sufficient feed water at its inlet due to blockage prior to the pump's inlet port. Clear the blockage in the feed water line.

High Pressure Pump Leaks Oil.

Determine source of leak and replace appropriate associated seal.

High Pressure Pump leaks water between manifold and Drive End.

- Worn Inlet Packings due to normal use.
- Worn Inlet Packings due to operation under a vacuum condition.
- Worn Inlet Packings because pump has been operated dry, without inlet feed water.
- Repair the pump with a Seal Kit.

If the High Pressure Pump electric motor fails to operate, follow these steps to isolate the problem.

1. Ensure that the system is receiving proper power from the power source.
2. Press "Start" switch to activate the motor. It will take approximately 10 seconds before the High Pressure Pump Motor starts. Do not press any other switch.
3. Measure the AC voltage between terminals 4 and 5 (AC Systems) or 3 and 4 (DC systems) on the main terminal strip.
4. If the voltage measured in the step 3 above matches the system voltage, then problems may be in the power cable attached to the motor or the motor internal wiring or windings.
5. If low or no voltage is present in step 3 above, then check for proper operation of the High Pressure Pump Contactor. To deactivate the contactor, press the "Stop" switch twice. To activate the contactor again, press the "Start" switch.
6. If the contactor is mechanically operating, but no voltage is present at the motor terminal (step 3 above), then the High Pressure Pump Motor contactor may be at fault.
7. If the contactor does not operate mechanically, then measure the DC voltage between A1 and A2 terminals on the High Pressure Pump Motor contactor coil. It should read 12V DC when activated.
8. If the contactor coil is receiving 12V DC but inoperative then the contactor's coil may be bad. Replace the contactor.
9. If 12V DC is not present when the High Pressure Pump is activated, trace the orange and orange/black wires to the main circuit board and measure the DC voltage at the terminals. It should read 12V when activated.

Booster Pump Abnormalities

If the Booster Pump electric motor fails to operate, follow these steps to isolate the problem.

1. Ensure that the system is receiving proper power from the power source.
2. Press "Booster Pump" switch to activate the motor. Do not press any other switch.
3. Measure the AC voltage between Terminals 1 and 2 on the main terminal strip in the controller.
4. If the voltage measured in the step 3 above matches the system voltage, then problems may be in the power cable attached to the motor or the motor internal wiring or windings.
5. If low or no voltage is present in step 3 above, then check for proper operation of the Booster Pump Contactor. To deactivate the contactor, press the "Stop" switch twice. To activate the contactor again, press the "Booster Pump" switch.
6. If the contactor is mechanically operating, but no voltage is present at the motor terminal (step 3 above), then the Booster Pump Motor contactor may be at fault.
7. If the contactor does not operate mechanically, then measure the DC voltage between A1 and A2 terminals on the Booster Pump Motor contactor coil. It should read 12V DC when activated.
8. If the contactor coil is receiving 12V DC but inoperative then the contactor's coil may be bad. Replace the contactor.
9. If 12V DC is not present when the Booster Pump is activated, trace the yellow and yellow/black wires to the Control Printed Circuit Board and measure the DC voltage at the terminals. It should read 12V when activated.

Electrical and Electronic Circuit Abnormalities

The Start Switch is pressed, but the system does not attempt to start.

1. System is in Fresh Water Flush Mode. Press Stop to exit Fresh Water Flush Mode. Press Start to operate the system.
2. The LCD on the Touch Pad is not illuminated.
   - Reset the system circuit breaker.
   - There is no main Power to the system from the Power Source, investigate, and correct.
3. Blown Fuse in controller. Check and Replace fuse if blown.
4. Improper wiring. Ensure that system is wired correctly and that there are no loose wire connections.
5. Inadequate power source to the system.
   - Ensure that the voltage does not drop below the industry standard of 10% of the full operating voltage set for the system. If the voltage drops below this standard during the system startup, the system will not start. High current is necessary to “excite” the electric motors. At the time of attempting to start the electric motors, they will consume high current. This may cause the voltage from the Power Source to drop dramatically for a fraction of a second which can be enough to cause the electronic circuit to shut off.
   - For DC systems it is instantaneous, and you will not hear or see this occur. DC systems ensure that the battery bank is fully charged and ensure that the wire size feeding the system is sufficient in diameter to carry the current without losing voltage. AC systems will usually result in the Generator loading down and the Generator RPM slowing down.
   - Provide adequate power to the system.
6. Defective Start Switch on Touch Pad.
   - Test with Substitute Touch Pad.
   - Replace Touch Pad if one or more lamps or switches are found to be inoperable.

The Stop Switch is pressed, but the system does not stop.

1. Microprocessor has locked up. Turn main power off to the system at the power source circuit breaker for a minimum of 30 seconds to reset the microprocessor.
2. Defective Stop Switch on Touch Pad.
   - Test with Substitute Touch Pad.
   - Replace Touch Pad if one or more lamps or switches are found to be inoperable.
3. Water damage to printed circuit board.
   - Inspect Printed Circuit board for presence of water or corrosion from water.
   - If board had water spilled on it remove board from system, flush with distilled water, and thoroughly dry with hair dryer. Place board in low humidity area for minimum 24 hours. Shake the board to ensure that no water is left on the board. Reinstall and attempt to operate the system. If there is any sign of corrosion from water damage, replace it.

Fuse in the controller blows at startup.

1. Power source
   - There is either low voltage or high voltage into the system, below or above 10% of system set voltage.
   - Correct the improper power at the Power Source feeding the system.
2. Defective Component that relies on the fuse for power.
   - Check the 3-Way Diversion Valve, Printed Circuit board, Fresh Water Flush, UV Sterilizer (If installed), or the Touchpad.
   - Repair or replace Defective Component.

Product Water 3-way Diversion Valve does not switch to “safe water,” potable water.

1. First see "3-WAY PRODUCT WATER DIVERSION VALVE ABNORMALITIES."
2. The Water Quality greater than 1000ppm the 3-way Product Water Diversion Valve is not energized, it is sending the Product Water to Brine Discharge over board. Using a hand held TDS Meter check the salinity of the Product Water. If the Salinity of the Product Water is greater than 800 PPM TDS then the Salinity controller is reading properly and diverting the “unpotable water” Product Water by not energizing the 3-way Diversion Valve. This is normal and the problem lies in the RO Membrane Element. See "PRODUCT WATER FLOW AND PRODUCT WATER QUALITY."
3. The Water Quality, however the 3-way Product Water Diversion Valve is not energized, it is sending the Product Water to Brine Discharge over board.

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

- With the system in operation and The Water Quality less than 1000ppm , remove the Controller Enclosure front panel to expose the inside of the controller box components.
- With the system in operation and The Water Quality less than 1000ppm, measure the voltage at the terminals labeled 3-Way Product Water Diversion Valve. The voltage should be 12 VDC.
- If no voltage is present replace the Control Printed Circuit Board.
- If 12 VDC is present, see "PRODUCT WATER FLOW AND PRODUCT WATER QUALITY."

Product Water salinity is confirmed (verified with a hand held TDS meter) to be less than 800 PPM TDS, however the Water Quality LED is illuminated RED “unpotable water.”

Salinity Control requires calibration. See Salinity Level Calibration instructions.

Maintenance and Repair

Are you mechanically inclined?

Troubleshooting and subsequent correction or repair will require understanding of:

- Electrical Circuits
- Electronic Circuits
- Electric Motors
- Hydraulic Systems
- Liquid Pressures and Flows
- Electro Mechanical Systems
- Mechanical knowledge and skills

Do not attempt troubleshooting and/or subsequent correction or repair if you are not familiar with or are not proficient in the above fields of expertise.

USE CAUTION WHEN TROUBLESHOOTING. DO NOT PERFORM MAINTENANCE UNLESS:

1. The system Feed Water Sea Cock Valve [2] is closed.
2. The system main electrical disconnect switch is switched "OFF", LOCKED, and TAGGED
3. The "EXPLODED PARTS VIEWS" of this manual is available.

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

Weekly Quick Check

The following steps ensure that potential problems are resolved preventing major repairs:

1. Inspect all fasteners for tightness including brackets, screws, nuts, and bolts. Pay special attention to the High Pressure Pump [11] and Electric Motor [10] since they are subject to increased vibration.
2. Ensure that Sea Strainer [3] and Plankton Filter [5], if either are installed, are clean and do not restrict flow.
3. Check the level of the High Pressure Pump [11] crankcase oil. The minimum oil level is the center of the sight glass, located at the side of the High Pressure Pump; the maximum oil level is at the top of the sight glass window. Use only Sea Recovery High Pressure Pump oil. **DO NOT USE MOTOR OR OTHER HYDRAULIC OIL.**
4. Clean any salt water or salt deposits from the system with a wet rag.
5. Check for fluid leaks; either oil from the High Pressure Pump or water from anywhere in the system.
6. Check all tubing and high-pressure hoses for wear and friction against abrasive surfaces. The hoses should not contact heated or abrasive surfaces.
7. Check Inlet Pressure to the High Pressure Pump. If pressure is below 10 psi after 5 minutes of operation, replace Pre-Filter element.

Operator Maintenance Intervals

The frequency of required maintenance is dependent on the regularity of usage, the condition of the intake water (the location of use), the length of time the system is exposed to water, the total running time and, in some cases, the manner in which the system is installed or operated. Because of these factors, it is virtually impossible to comprise an exact timetable for required maintenance. The following maintenance timetable is an estimate of the time intervals at which maintenance may be required on the various systems components. This is based upon factual data compiled from Sea Recovery installations around the world. However, this schedule must be adjusted to each individual system depending upon the variables listed.

COMPONENT	MAINTENANCE REQUIRED	TIME INTERVAL CONTINUOUS	TIME INTERVAL INTERMITTENT DUTY
Sea Strainer	Inspect and Clean Screen and Housing	weekly	100 hours
Plankton Filter	Inspect and clean	weekly	100 hours
Pre-filter	Replace element	Low Pressure <6 psi	Low Pressure <6 psi
Flow Meter	Clean Inside of the clear tube	As required when dirty	
High Pressure	Change oil	First 50 Hours New Pump Break In Period	
Pump		500 hours	Annually
	Replace Seal Kit	2000 hrs / as required	2000 hrs
	Replace Valve Kit	2000 hrs / as required	2000 hrs
RO Membrane Element	Clean Element	When production or salt rejection decreases by 10%	
Salinity Probe	Clean Probes	Annually	Annually
Charcoal Filter	Replace Element	3 months	3 months
UV Sterilizer	Clean quartz sleeve	2000 Hours	2000 Hours
Fresh Water Flush	Replace Element	3 months	3 months

Other _____

Other _____

Other _____

Other _____

Other _____

Chapter 8

Electrical

Electrical Requirements and Information

Amperage Notes: After the Touch Pad “Start” Switch is pressed, the Electric Motors within the Aqua Whisper Pro RO Desalination System starts in series with time delay between each motor. First, the Booster Pump starts, then the main High Pressure Pump Electric Motor starts. Alternatively, the Booster Pump may be started manually by pressing the “Booster Pump” Switch.

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.

For wiring diagrams, please refer to the fold-outs at the end of this manual.

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.

AC SYSTEMS - SINGLE PHASE

VOLTAGE	HZ (AC)	MIN VOLTAGE	MAX VOLTAGE	MIN HZ	MAX HZ
120 VAC	60 HZ	108 VAC	132 VAC	58 Hz	62 Hz
230 VAC	60 HZ	207 VAC	253 VAC	58 Hz	62 Hz
220 VAC	50 HZ	198 VAC	242 VAC	48 Hz	52 Hz

AC SYSTEMS - THREE PHASE

VOLTAGE	HZ (AC)	MIN VOLTAGE	MAX VOLTAGE	MIN HZ	MAX HZ
208 VAC	60 HZ	187 VAC	228 VAC	58 Hz	62 Hz
230 VAC	60 HZ	207 VAC	253 VAC	58 Hz	62 Hz
460 VAC	60 HZ	414 VAC	506 VAC	58 Hz	62 Hz
220 VAC	50 HZ	198 VAC	242 VAC	48 Hz	52 Hz
380 VAC	50 HZ	342 VAC	418 VAC	48 HZ	52 HZ

Electrical Connections

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 re-attachment 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.

1. Remove the front cover from the system controller to access the Main Terminal Strip and Printed Circuit Board.
2. **Main Power:** Insert main power cable through strain. Connect main power cable leads to the system.
3. **Booster Pump:** Insert Booster Pump power cable through strain relief. Connect Booster Pump power cable leads to the system.
4. **Fresh Water Flush Solenoid Valve:** Remove strain relief hold plug from the side of the control box and attach the Fresh Water Flush Solenoid Valve strain relief supplied with the Fresh Water Flush Accessory. Insert power cable through the strain relief. Connect Fresh Water Flush Solenoid Valve power cable leads to the system.
5. **UV Sterilizer:** Remove strain relief hold plug from the side of the control box and attach the UV Sterilizer strain relief supplied with the UV Sterilizer Accessory. Insert power cable through strain relief. Connect UV Sterilizer power cable leads to the system.
6. **Remote Control:** Remove strain relief hold plug from the side of the control box and attach the Remote Control strain relief supplied with the Remote Control Accessory. Insert power cable through strain. Connect Remote Control power cable leads to the system.

For wiring diagrams, please refer to the fold-outs at the end of this manual.

Motor Rotation

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

AC Systems: Refer to Booster Pump Electric Motor nameplate and High Pressure Pump Electric Motor nameplate for wiring connections and rotation notations.

Recommended Wire Sizes

Caution: DO NOT USE ROMEX TYPE SOLID CORE WIRE. SOLID CORE WIRE CAN EASILY BREAK AND WILL NOT FIT OR SEAL INTO THE SUPPLIED STRAIN RELIEFS. USE ROUND JACKETED STRANDED WIRE PREFERABLY WITH AN OUTER JACKET DESIGNATION OF SJO OR SIMILAR COMPATIBLE WITH MARINE USE AND AN OILY ENVIRONMENT. FOR DC OPERATION FINE STRAND WIRE, SIMILAR TO BATTERY CABLE, IS PREFERRED FOR MINIMAL RESISTANCE AND MINIMAL VOLTAGE DROP.

American Wire Gauge		Metric Wire Gauge	Metric Wire		
AWG	dia inch	sq. inch	dia mm	sq mm	Size mm
0000	0.4600	0.1661	11.6840	107.1649	100
000	0.4096	0.1317	10.4038	84.9683	85
00	0.3648	0.1045	9.2659	67.3980	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	6.5430	33.6069	32
3	0.2294	0.0413	5.8268	26.6516	32
4	0.2043	0.0328	5.1892	21.1385	19
6	0.1620	0.0206	4.1148	13.2913	13
8	0.1285	0.0130	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	0.0020	1.2903	1.3070	1
18	0.0403	0.0013	1.0236	0.8225	0.8
20	0.0320	0.0008	0.8128	0.5186	0.5
22	0.0254	0.0005	0.6452	0.3267	0.35

Chapter 9

Maintenance and Repair

Individual Component Maintenance and Repair

1. Inlet Thru Fitting [1]: Non Sea Recovery component. Keep the Inlet Thru Hull Fitting free and clear of debris and marine growth. If the Inlet Thru Hull Fitting is clogged, this results in a low feed pressure condition, which causes the system to shut off.
2. Cock Valve [2]: Non Sea Recovery component. The packings and connections of the Inlet Sea Cock Valve must be tight and must properly seal. Clean the valve cavity of debris or replace the seal and seat or the entire valve, as required. This section is under a vacuum condition while operating the system. Loose fittings or worn seal will allow air to enter the Sea Recovery system causing continual shut down due to subsequent low feed water pressure.
3. Sea Strainer [3]: Keep the mesh screen free and clear of debris. When the mesh screen is clogged, it results in a low-pressure condition causing system shut off. This section is under a vacuum condition while operating the system. If the Sea Strainer's bowl is loose or if the O-ring seal is worn or not properly seated, air will enter the system causing continual shut down due to subsequent low feed water pressure.

   To clean the Sea Strainer:

   • Remove the bowl by turning it counter-clockwise.
   • Remove the Mesh Screen from the bowl.
   • Remove the flat sealing gasket carefully from the bowl. The gaskets are fragile, so handle with care.
   • Wipe the sealing gasket with a damp cloth. Lubricate it sparingly with Parker "O" ring lubricant.
   • Place the seal back onto the bowl. Seat the mesh screen back into the bowl.
   • Screw the lid on clockwise. Hand-tighten only enough to seal water in and air out.

UV Light Maintenance

Follow the preventative maintenance procedures to maximize the efficiency, reliable, and longevity of the UV unit.

Safety Requirements

Danger: All personnel must review and comply with the following mandatory safety requirements. Operators must observe Safety Requirements at all times! Failure to comply can cause injuries and/or damages to the UV unit.

1. Never look directly at the blue UV lamp when it's "ON." Never operate the UV lamp outside the stainless steel cabinet. UV light exposure can severely burn and damage eyes and skin.
2. Properly ground the UV unit. Failure to properly ground the UV unit can cause severe electrical shock hazard.
3. Provide watertight piping and compression nut seals. Failure to provide watertight seals can cause damage to electrical components or cause electrical shock hazard.
4. Disconnect power before servicing the UV unit. The UV lamp and electrical components operate with high voltage electrical power. Do not attempt to service the UV unit without first disconnecting the power source. Shut off the source of power at the main panel breaker and use appropriate tag-out or lock-out procedures to prevent accidental power-up.
5. Only qualified service personnel should perform services to the UV unit.
6. Remove pressure before servicing the UV unit.

7. Never operate the UV unit for more than 30 minutes without water flow. Elevated water temperature can damage the UV unit.
8. Do not exceed 3 “Start/Stop” cycles per 24-hour period. Exceeding 3 cycles will subjected the lamp filament to excessive thermal stress leading to premature failure of the UV lamp.

Unit Maintenance

The exterior surfaces of the UV unit should be kept clean and dry. In most cases it may be necessary to clean the exterior of the unit once a month. Use soft cloth and soapy water, or any commercial stainless steel cleaner. Interior of the ballast box should be inspected for debris. Any debris should be removed using vacuum.

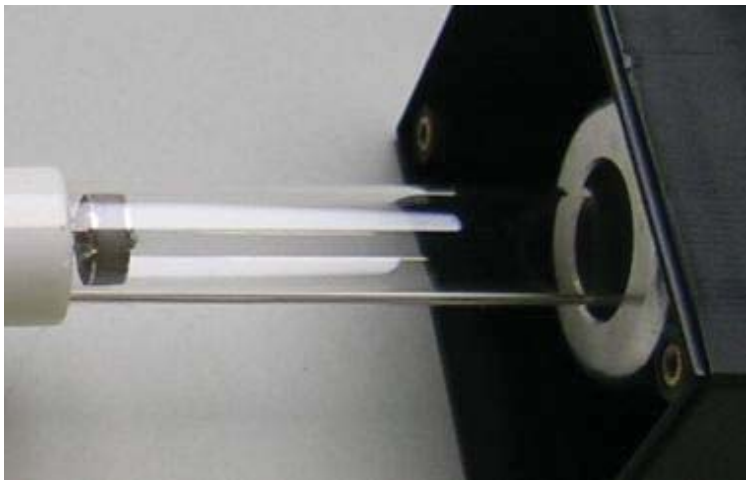
Quartz Sleeve

Debris and other matter in the water will settle onto the quartz sleeve and eventually block the UV rays from penetrating the water. It is necessary to determine a cleaning schedule for the quartz sleeve. The frequency will depend on the specific type of water being processed and the duty cycle of the unit. Inspect the quartz sleeve 30 days after initial installation to assess the amount of contamination collected over the 30-day period. Use the finding to determine a reasonable schedule and frequency for periodic cleaning. Clean-In-Place (CIP) cleaning is sometimes effective in removing debris from the quartz sleeve. Conduct a CIP cleaning test to determine its effectiveness. If CIP cleaning is not effective, then a manual cleaning or replacement is required.

When the quartz sleeve is due for cleaning, use the following procedures.

1. Turn off the water source to the UV unit.
2. Disconnect the power source to the UV unit.
3. Drain the UV treatment chamber.
4. Remove the ballast box cover.

5. Remove rubber boot and carefully pull out the UV lamp through the compression nut pass-thru.



6. Use a channel lock to remove the compression nuts.
7. Remove the Quartz Sleeve carefully.

8. Wash the Quartz Sleeve with mild soapy water and rinse in clean hot water.

If dirt remains after rinsing, the quartz sleeve should be replaced. Contact your local CSR to order a replacement.

Note: Failure to perform quartz sleeve maintenance may reduce the efficiency of the UV light to adequately treat water in the treatment chamber.

Checking for Leaks

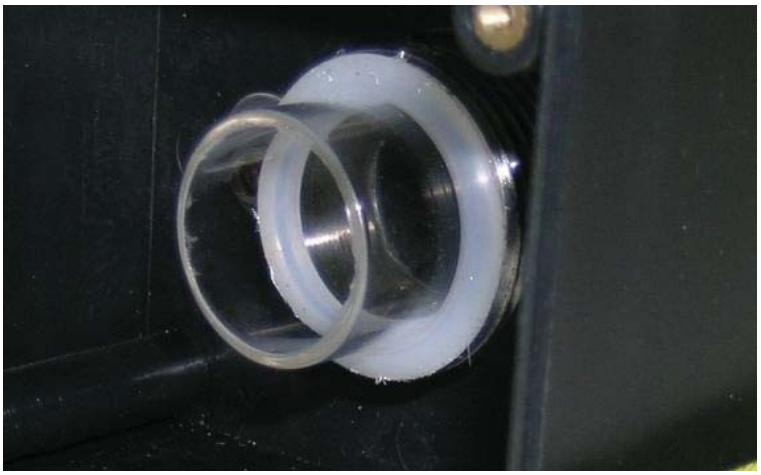
Visually inspect the UV unit exterior for signs of leakage. The cause of any leakage must be located and repaired. If a leakage is detected, perform the following.

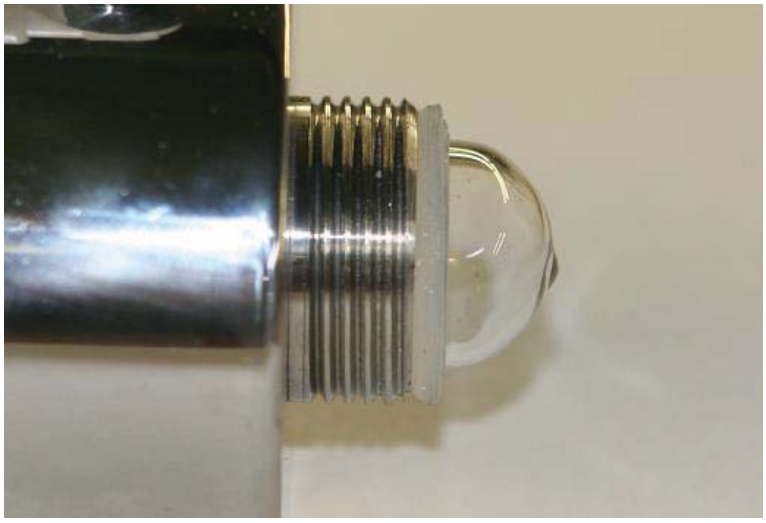
1. Shut off all electrical power. Shut off the source of power at the main panel breaker and use appropriate tag-out procedures to prevent accidental power-up.
2. Depressurize the UV unit.
3. Remove ballast box cover and remove the rubber boot.
4. Locate which end of the quartz sleeve is leaking.

Repairing Leaks

If both ends of the quartz sleeve are leaking, perform the following on both ends:

1. Use a channel lock to loosen and remove the compression nut.
2. Remove the quartz sleeve O-ring without pulling the quartz sleeve out.





3. Lubricate the quartz sleeve tip with clean water and place new O-ring. Ensure the O-ring has all-round contact with the cylinder pass-thru.
4. Replace and tighten the compression nut.
5. Refill the treatment chamber and verify a leak-free condition.

Measuring Performance

Every UV unit must be tested periodically to verify its efficiency. Regardless of the intended application or any optional equipment provided with the UV unit, the most accurate procedure is the Post-UV Analysis. The Post-UV Test must be performed in accordance with standard testing methods.

Verifying Lamp Operation

The UV lamp is “ON” when the blue light is emitting thru the viewport.

Obtaining Water Samples

The vast majority of unsatisfactory Post-UV Test results are directly related to improper sample-taking techniques. Although several commercial sample collection apparatuses are available, the proper manufacturer’s sample procedures must be followed.

Note: Sea Recovery recommends a valve with a discharge orifice not to exceed 1/4" (6mm).

Sampling Procedure

For this procedure, use sterile sample bottles obtained from a reliable laboratory that have been autoclaved and kept in plastic bags.

1. Use a temporary tube to direct water from UV unit to container or drainage.
2. Pressurize the UV unit and flush unit with sample valve fully opened for 3.5 minutes. After flushing for 3.5 minutes, reduce valve opening to 50% and flush for 3 minutes.
3. Open the sample bottle and keep the inside of the cap facing down.
4. Fill the sample bottle and avoid breathing directly into the bottle or touching the inside of the bottle, cap or neck.
5. Immediately cover and secure the cap after filling the sample bottle.
6. Label the sample bottle and place in a clean plastic bag.
7. Take sample bottle to laboratory for plating as soon as possible.

Note: Sample processing must begin within 3 hours after sample collection and must comply with accepted standard methods.

Periodic Maintenance Table

The table below represents the recommended Periodic Maintenance (PM) for the SP Series UV Unit.

Table 3: Periodic Maintenance Table

Description	Initial	Daily	Monthly	Annual	Other
Quartz Sleeve Cleaning	x				
Quartz Sleeve Replacement*	x				
Operating Condition	x				
Unit Cleaning	x		x		
Leak Inspection	x	x	x		
UV Lamp Inspection	x	x	x		
UV Lamp Replacement-SP-1				x	4,400 hrs
UV Lamp Replacement-SP-2				x	8,000 hrs

*Quartz Sleeve replacement will occur more frequently for systems operating with continuous high flow rate or low water quality water, and less frequently for systems operating with low flow rate or high water quality.

Quartz Sleeve Cleaning

1. Remove the four screws on the ballast box and remove lid.
2. Remove the rubber boot and carefully pull lamp out of the quartz sleeve.
3. Unscrew and remove the two compression nuts (ballast box and view port).
4. Remove the O-ring on the view port side only.
5. With care pull the quartz sleeve out from the ballast box side.
6. Clean the quartz tube with water and a bottlebrush without moving the O-ring. Dry with a soft cloth. Handle the quartz sleeve carefully.

Quartz Sleeve Reassembly

1. Replace old O-rings with new O-rings.
2. Insert the quartz sleeve (close-end first) through the ballast box passthru until O-ring contact passthru. Screw on the ballast box compression nut. Insert view port O-ring and screw on view port compression nut..
3. Attach a new UV Lamp into the plug.
4. Slide the lamp into the Quartz Sleeve and install rubber boot over the compression nut.
5. Replace the three 1/4-20 cap head screws.

Ultraviolet Sterilizer [23]

The UV Sterilizer lamp emits a low frequency form of light. This light degrades and loses intensity and the ability to sterilize biological matter over approximately 4,000 hours of use. Therefore, the lamp may remain lit, but requires replacement every 4000-8000 hours.

Caution: System power must be turned off before beginning sterilizer maintenance. UV light is harmful to eyes and skin.

Lamp Replacement:

1. Remove the four screws on the ballast box and remove lid.
2. Remove the rubber boot and carefully pull lamp out of the quartz sleeve.
3. Replace the lamp. During lamp replacement, clean the quartz sleeve as well. The quartz sleeve should be crystal clear. If it is discolored, it must be cleaned or replaced.

Charcoal Filter [22]

A sulfurous (rotten eggs) odor from the product water requires replacement of the Charcoal Element. Otherwise, the Charcoal Element should be replaced every 3 to 4 months. It is not cleanable.

To replace the Charcoal Filter Element:

1. Unscrew the bowl counter clockwise.
2. Remove the Charcoal Filter Element from the bowl.
3. Remove the O-Ring from the top of the bowl and take care to not damage it.
4. Replace the Charcoal Filter Element with a new Sea Recovery element.
5. Wipe the O-Ring with a damp cloth.
6. Lubricate the O-Ring lightly using a sparingly amount of O-Ring lubricant.
7. Place the O-Ring back onto the bowl.
8. Insert the new, Sea Recovery Charcoal Filter Element into the bowl.
9. Screw the bowl on clockwise.
10. Hand snug to seal the O-Ring, do not use a wrench or other tool to tighten, do not over tighten. Over tightening may damage the threads in the bowl or housing and over tightening will cause removal to be difficult.

3-way Product Water Diversion Solenoid Valve [21]

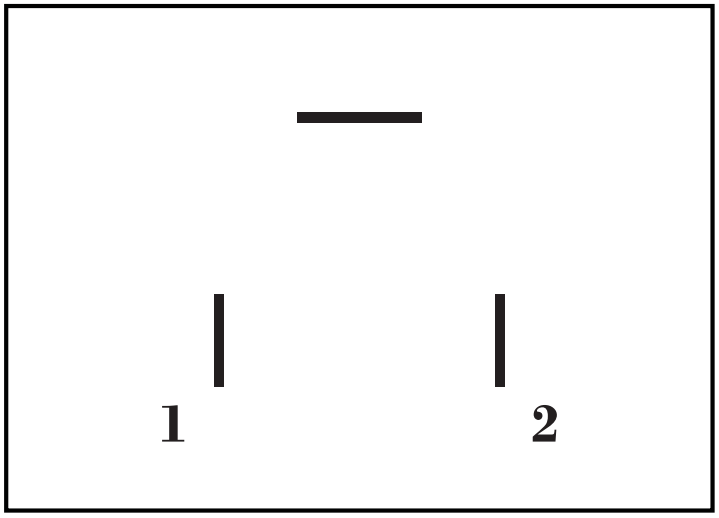
Over tightening of the tube fittings into the valve's body can cause the Diversion Valve internal ports to move out of proper position resulting in internal blockage or bypassing.

1. Remove Diversion Valve from the system and adjust ports.
2. Position the manual over ride button OUTWARD to normal position by first pushing the button inward and rotating it counter clockwise allowing it to spring outward away from the coil body.
3. With your mouth, blow into port "P," air should expel from port "B" which is the "normally open" or "bad water" port.
4. If it is extremely difficult to expel air from port "B" or if no air expels from port "B," then port "B" requires adjustment.
5. Again, blow into port "P" while plugging port "B" with a finger tip. No air should expel from port "A."
6. If air expels from port "A," then port "A" requires adjustment.
7. Position the manual override button INWARD to manual override position by pushing the button inward and rotating it clockwise allowing it to lock inward close to the coil body.
8. With your mouth, blow into port "P," air should expel from port "A" which is the "normally closed" or "good water" port.
9. If it is extremely difficult to expel air from port "A" or if no air expels from port "A," then port "A" requires adjustment.
10. Again blow into port "P" while plugging port "A" with a fingertip. No air should expel from port "B."
11. If air expels from port "B," then port "B" requires adjustment.

Solenoid Valve Coil Check

The 3-way Product Diversion Valve Solenoid operates from 12 VDC. To check the condition of the Diversion Valve solenoid coil follow the instructions below.

1. While System is operating and while the Water Quality less than 1000ppm, remove the din connector from the valve's coil. Using a voltmeter set to DC, check the voltage at the din connector terminals.
2. If 12 VDC is present at the din connector terminals then the control circuit is operating normally, but the 3-way Diversion Valve Coil may be defective. Check the solenoid coil continuity.
3. Using an Ohm meter measure the continuity of the solenoid coil as shown below. Measure the DC resistance between pins 1 and 2. Proper resistance reading is approximately 12 to 15 W .



4. If an open circuit exists, or if the resistance is much greater than or less than 12 to 15 W, then replace the solenoid coil or the entire valve.
5. If 12 VDC is not present at the din connector terminals, then the cable connections may be loose, the cable may be broken, or the control circuit may be defective. Check these components.
6. Check for 12 VDC at the connection points of the Diversion Valve Solenoid Coil on the Control Printed Circuit Board terminals.
7. If 12 VDC is present while system is operating and the Water Quality less than 1000ppm, then the Diversion Valve cable is loose at one of the connections or the cable is defective.
8. If there is no voltage present while system is operating and while the “safe water” lamp on the Touch Pad is illuminated green, then troubleshoot the Control Printed Circuit Board.

Flow Meter [20]

Since the flow meter body is clear and allows light penetration, it supports biological growth. To clean the flow meter body, remove the top access fitting, the guide rod, float and O-Ring bumpers, and tube stops. Clean the interior of the tube using a bottlebrush, soft rag, cotton swab or other soft item. Reassemble the unit.

High Pressure Pump Electric Motor

Troubleshoot electric motor failure to ensure that any abnormality from the power, wiring, wiring connections, contactor, or control circuit are not at fault or at cause. If the electric motor has failed, it will require replacement. Depending upon failure, replacement may be more cost effective than repair. If failure of the motor is due to external source, not the motor itself, then correct the cause; otherwise, the replacement or repaired motor will fail again.

Failures of the electric motor may be:

- Bearing failure: Bearings are field replaceable.
- Winding failure: Generally caused by low or high power, below or above the specified voltage requirements of the system, and feeding the motor. Not economically repairable.
- Internal centrifugal switch. Generally mechanical failure of the switch. Field replaceable.
- Capacitor failure: Generally caused by low power feeding the motor. Also caused by rapidly repeating starting and stopping of the motor. Capacitors are field replaceable.

Back Pressure Regulator [17]

If the Back Pressure Regulator valve leaks from the valve stem, lightly tighten the packing gland nut located below the valve stem. Should adjustment fail to stop the leak, replace the stem and internal packing or replace the entire valve.

High Pressure Gauge [15]

If the pressure gauge fails to register, the orifice may be corroded with debris. Use a thin wire or small diameter (1/64” or 0.4 mm) drill bit to dislodge any debris trapped within the pressure port orifice. If clearing the orifice does not bring the gauge to normal operation, then replace the gauge.

High Pressure Pump [11] Servicing

Failure Signs and Possible Causes

1. Abnormally High Pulsations at the High Pressure Gauge are caused by
   - Worn or broken Valve
   - Worn or broken Valve Spring
   - Worn or broken Valve Seat
   - Debris in Valve Chamber
2. Water Leak between the High Pressure Pump Manifold and Rear Section caused by.
   - Worn Low Pressure Seals
   - Low Pressure Seals damaged due to running dry.
3. Flow drops dramatically when attempting to pressurize and/or unable to build pressure. This is caused by:
   - Worn High Pressure Seals
   - High Pressure Seals damaged due to running dry
   - Broken Valve
   - Broken Valve Spring
   - Debris in Valve Chamber

Disassembly of the Discharge Valve Assemblies

Tools required:

- 3/8” Drive Ratchet; 6 mm Hex Socket
- O-Ring Pick
- Two slotted screwdrivers
- Torque Wrench
- Needle Nose Pliers

Only one valve kit is required to repair all of the valves in one pump. The Valve Kit includes new valve O-Rings, valve seats, valves, and springs.

1. Disconnect all plumbing.
2. Remove the six socket head screws from the manifold. Remove the outer screws first, then the inner screw.
3. Using a soft mallet, tap the back side of the Discharge Manifold from alternate sides to maintain alignment and avoid damage to the plungers
4. Grasp the Discharge Manifold from the underside and gradually lift manifold while you pull away from the Crankcase.
5. The Adapter/Spacers may stay with either the Discharge or Inlet Manifold. By inserting two opposing screwdrivers between Spacer and manifold, you can easily remove them from the Discharge Manifold. If they stay in the Inlet Manifold, gently work them up and down as you pull away from the Inlet Manifold.
6. The Valve Assemblies are in the Discharge Manifold ports and will fall out when manifold is turned over.

Disassembly of the Seal Assembly

Tools Required: 3/8” Drive Ratchet; 6mm Hex Socket; Packing Extractor; and Colette.

1. Remove the Inlet Valve Assembly from the exposed plunger rod ends, including Cotter pin, Nut, Washer, Spring, Spacer and Inlet Valve.
2. Grasp the Inlet Manifold from the front and underside and pull to remove from Plunger Rods.
3. Carefully examine backside of Low Pressure Seal before removing from manifold as it will be damaged during removal. If worn, insert screwdriver into I.D. of seal and pry out. Exercise caution to avoid damage to the Inlet Manifold.
4. Press ceramic Plunger with thumb or soft tool from backside of Inlet Manifold. (The High Pressure Seal may stay with the plungers or remain in the Inlet Manifold. If on the plungers, slide off by hand. If in the manifold, use reverse pliers to remove.)
5. Remove Seal Retainers from Crankcase by grasping tab with pliers and pulling out.
6. Examine Crankcase Oil Seal to determine if Crankcase servicing is needed.
7. Examine Ceramic Plunger, Low Pressure Seals, V-Packings for scoring, cracks, and wear and replace if needed.

Reassembly of Seal Assembly

1. Examine Seal Retainers and replace if worn or damaged. Install on Plunger Rod and press into Crankcase with tab out.
2. Place Inlet Manifold on work surface with Crankcase Side up.
3. Lubricate new Low Pressure Seals and press into position with garter spring down. Ensure the seal is seated squarely on the shoulder on the inlet manifold chamber.
4. Place the inlet Manifold on work surface with Crankcase side down (Larger ID ports up).
5. Carefully examine the Plungers for scoring or cracks and replace if worn.
6. Lubricate Ceramic Plungers and new High Pressure Seals. Press the plunger into the seal and position seal in middle of plunger. **NOTE:** Place the deeper recessed end of the plunger into the seal from the metal backside.
7. Insert the Plungers into the manifold ports. Press into position using the larger I.D. end of Discharge Valve Spacer. Examine the O-Ring and Back-up-ring under the Sleeve for cuts or wear and replace. Examine the Barrier Slinger for wear and replace as needed. Install the Barrier Slinger with the concave side facing away from the Crankcase. Lubricate the Plunger Rod O-Ring to avoid cutting during installation. Install the Back-up-ring first then the O-Ring into the groove on the Plunger Rod. Install the Sleeve with the tapered end facing out. Gently press towards the Plunger Rod shoulder until flush with the Barrier Slinger.
8. Carefully install Inlet Manifold over Plunger Rod ends and slowly press into Crankcase.
9. Examine Inlet Valve and replace if worn. Inlet valves cannot be reversed if worn. The SS Inlet Valves may be lapped if not badly worn. Install the SS Inlet Valves with square edges towards the plungers (round edges towards the discharge). Install the Nylon Inlet Valve with ridged side towards the discharge.
10. Examine Spacers for wear and replace as needed. Install Spacer on each Plunger Rod with smaller O.D. towards inlet valve.
11. Examine Springs for damage or fatigue and replace as needed. Place on Plunger Rods.
12. Install Washers next with concave side towards Inlet Manifold.
13. Install Nuts and torque to 55 in. lbs. / 4 ft. lbs. / 4 Nm.
14. Always install new Cotter pins and turn ends to secure in position.

Reassembly of the Discharge Valve Assembly

1. Examine Adapter Spacer O-Rings and replace if worn. Lubricate and install O-Rings and Back-up-Rings on both front and rear of the Adapter Spacer.
2. Examine the Valve Retainers for scale build up or war and install into each Discharge Manifold port with tab down into the manifold chamber.
3. Replace worn or damaged springs and place into Retainers.
4. Examine Valve and Seats for pitting, grooves, or wear and replace as needed.
5. Place Valves over springs with concave side down.
6. Place Valve Seats on Valves with concave side down.
7. Lubricate O.D. of Adapter/Spacer and insert smaller I.D. into Discharge Manifold ports. Snap into position. Exercise caution not to cut or pinch O-Rings.

8. Carefully guide Discharge Manifold with Spacers over Plunger Rod ends and press into Inlet Manifold.
9. Replace Socket Head Screws and torque to 115 in. lbs. / 9.4 ft. lbs. / 13 Nm
10. If oil was not changed, be sure oil it is at the proper level on the sight gauge.
11. Torque sequence for tightening the manifold:

3	1	5
X	X	X
X	X	X
6	2	4

Reverse Osmosis Membrane Element Replacement

Note:

- The RO Membrane Element is accessible with the Vessel still attached to the frame.
- Replace all Brine and Product Water O-Rings attached to the End Plugs within the High Pressure Vessel Assembly each time the RO Membrane Element is removed or replaced. Ensure these O-Rings are on hand prior to repair.
- Membranes are only installed and removed from the INLET end of the High Pressure Vessel.

Tools Required:

- 5/16” Allen wrench
- Regular pliers
- Needle-Nose Pliers

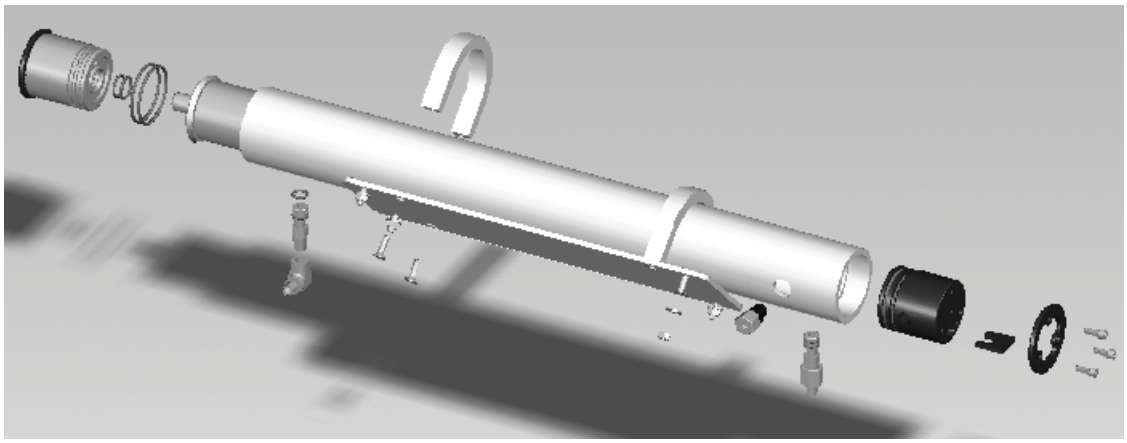
1. Disconnect the High Pressure Hose from each end of the High Pressure Vessel Assembly.
2. Using a 5/16” Allen wrench, remove the 3 each Socket Head Cap Screws from the three-piece Segment Rings located at each end of the Pressure Vessel.
3. Push inward on the End Plug and Remove the three-piece segment ring from one end, repeat for the other end.
4. Remove the Port Retainer from each end.
5. Remove the from each end.
6. Remove the product water tube from the respective end.
7. Insert all three of the Socket Head Cap Screws back into the End Plug. These screws are used as a grip to remove the End Plug.
8. Grasp one or more of the Socket Head Cap Screws with a pair of pliers and pull slowly outward to remove the End Plug. There is some resistance due to the two Brine O-Rings exerting friction against the Vessel wall. With the End Plug removed from the High Pressure Vessel, the RO Membrane Element is visible.
9. Remove and discard the brine O-rings from each of the End Plugs.
10. Remove and discard the Product Water O-rings from each of the End Plugs.
11. Clean the end plugs with a cloth and inspect each for any sign of wear, cracks, or damage.
12. Sparingly, lightly, lubricate 4 (four) NEW Brine O-Rings and 4 (four) new Product Water O-Rings for the Aqua Whisper Pro RO Desalination System.
13. Place the NEW Product Water O-Rings into the product port inner O-Ring groove in each of the End Plugs.
14. Place the NEW Brine O-Rings onto the outer Brine O-Ring grooves of each of the End Plugs.

Caution: At each end of the RO Membrane Element is a Product Water Tube approximately 1/2” diameter by 1” long. The outside diameter surface of this product water tube is a sealing surface, which isolates the Product Water from the Feed Water. The surface of the Product Water Tube must be scratch free. Never use pliers or other grabbing tools on the Product Water Tube. Do not drop the RO Membrane Element onto a hard surface as the Product Water Tube may be damaged.

15. With your fingers, grasp the Product Water Tube attached to the RO Membrane Element from the INLET end of the Pressure Vessel and pull outward. If resistance is met, cup the INLET end of the High Pressure Vessel with one hand and shake downward to dislodge the RO Membrane Element.
16. Run a rag through the High Pressure Vessel to remove any biological film or debris from the High Pressure Vessel.

    A new Sea Recovery RO Membrane Element comes complete with a “U” cup Brine Seal at one end of the Element. This Brine Seal must be positioned at the INLET end of the Pressure Vessel.

INLET End	OUTLET End
Feed Water Entry End	Brine Discharge End
RO Membrane Element Brine Seal End	No brine seal on this end



Install a new RO Membrane Element with attached "U" cup Brine Seal into the Pressure Vessel. Place the end of the RO Membrane Element that DOES NOT have the Brine Seal attached into the INLET end of the Pressure Vessel and slide it into the Pressure Vessel. (Insert the downstream end (the end without a brine seal) of the RO Membrane Element into the upstream inlet end of the High Pressure Vessel.)

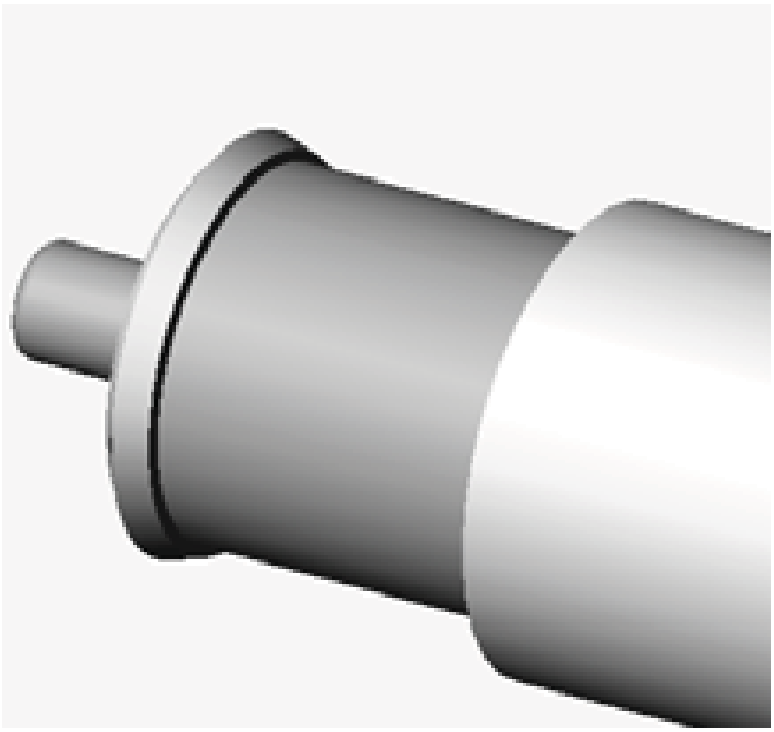


Figure 7: Inlet end of Pressure Vessel Brine Seal End of RO Membrane Element

17. Slide the RO Membrane Element into the High Pressure Vessel, past the brine seal, until the RO Membrane Element product water tube is 4 inches past the end lip of the High Pressure Vessel.
18. Insert the End Plug with new attached O-Rings into the High Pressure Vessel while aligning the High Pressure Port and Product Water Port to the respective holes in the High Pressure Vessel. Continue pushing inward on the End Plug until its exposed end travels just past the Segment Ring Groove in the Pressure Vessel. Ensure that the Ports of the End Plug are aligned with the Port Holes of the High Pressure Vessel.
19. Insert the High Pressure Port Fitting with attached O-Rings into the High Pressure Port.
20. Replace the Port Retainer.
21. Insert the three-piece Segment Ring Set into the Segment Ring Groove of the High Pressure Vessel. Align the Segment Ring Set with the tapped holes in the End Plug for insertion of the three Socket Head Cap Screws. Attach the three Socket Head Cap Screws and tighten.
22. Connect the High Pressure Hoses to the respective fitting on the Pressure Vessel.

Plankton Filter [5]

Element Cleaning: Identical procedure for Pre-filter and Charcoal Elements.

1. Unscrew the bowl counter clockwise.
2. Remove the Plankton Filter Element from the bowl.
3. Remove the O-Ring from the top of the bowl. The O-Ring is fragile, so handle it with care.
4. Clean the mesh screen filter element with a bristle brush and water spray.
5. Wipe the O-Ring with a damp cloth.
6. Lubricate the O-Ring lightly using a sparingly amount of O-Ring lubricant.
7. Place the O-Ring back onto the bowl.
8. Insert the cleaned or a new plankton filter element into the bowl.
9. Screw the bowl on clockwise.
10. Hand snug to seal the O-Ring; do not use a wrench or other tool to tighten; do not over tighten. Over tightening may damage the threads in the bowl or housing and will cause removal to be difficult.

Pre-filter [6] Element Replacement

The Prefilter Pleated Cartridge Element may be cleaned with water spray once or twice. After cleaning the expected life will be reduced by half. Attempts to clean the element more than twice will result in a very short life and will damage the element rendering it useless. Change the element after the first or second cleaning. Clean or replace the element when plugged to the extent that the Low Pressure Gauge at the control panel reads 10 to 6 psi. At slightly below 6 PSI, the Low Pressure Switch shuts the system off.

Caution: Do not use third party prefilter elements; use only Sea Recovery Prefilter Elements. Third party prefilter elements on the market do not properly fit, the seams fall apart, they will allow by-pass, and will allow the R.O. Membrane Element to foul prematurely. Use of third party prefilter elements will void any and all Sea Recovery warranty to the High Pressure Pump and the RO Membrane Element.

Important: Do not use “string wound” or “fiber” prefilter elements. These types of 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 causing frequent shut down of the system and very frequent changing which will also lead to very high cost of maintenance. Use of String Wound or Fiber type elements will only lead to user frustration and very high maintenance costs. Use of third party prefilter elements will void any and all Sea Recovery warranty to the High Pressure Pump and the RO Membrane Element.

To clean or replace the Prefilter Element:

1. Unscrew the bowl counter clockwise.
2. Remove the Prefilter Pleated Cartridge Element from the bowl.
3. Remove the O-Ring from the top of the bowl. The O-Ring is fragile, so handle it with care.

4. Replace the Prefilter Pleated Cartridge Element with a new Sea Recovery element.
5. Wipe the O-Ring with a damp cloth.
6. Lubricate the O-Ring lightly using a sparingly amount of O-Ring lubricant.
7. Place the O-Ring back onto the bowl.
8. Insert the cleaned or new Sea Recovery Prefilter Pleated Cartridge Element into the bowl.
9. Screw the bowl on clockwise.
10. Hand snug to seal the O-Ring; do not use a wrench or other tool to tighten; do not over tighten. Over tightening may damage the threads in the bowl or housing and cause removal to be difficult.

Low Pressure Gauge [7]

If the pressure gauge fails to register, the orifice may be corroded with debris. Use a thin wire or small diameter (1/64” or 0.4 mm) drill bit to dislodge any debris trapped within the pressure port orifice. If clearing the orifice does not bring the gauge to normal operation, then replace the gauge.

Brine Discharge Thru Hull Fitting [1]

Non Sea Recovery component. Keep the Brine Discharge Thru Hull Fitting free and clear of debris and corrosion.

Booster Pump Disassembly

1. Disconnect Power Source to motor.
2. Disconnect electrical connections tagging wires carefully to preserve correct rotation.
3. Remove pump and motor assembly to repair area
4. Remove bolts and volute cover from pump.
5. Remove impeller locknut and impeller. Unscrew CCW.
6. Remove seal head from the shaft. Slide from the shaft.
7. Remove four motor bolts and volute bracket from motor.
8. Remove seal seat from bracket.

Booster Pump Reassembly

1. Clean seat cavity of the volute bracket thoroughly.
2. Thoroughly clean pump shaft. Assure that the shaft is not grooved and that there is no evidence of pitting or fretting. If the shaft is grooved, fretted, or worn, replace it.
3. Install the pump shaft onto the motor shaft. Ensure all debris and burrs are removed from the motor shaft.
4. Place the volute bracket on a firm surface with the seat cavity (pump end) up. Then place a small amount of Parker O-ring lube on the seat cup or o-ring seat. Place the seat in the cavity with the polished face up toward the pump end. Evenly push seat into cavity with fingers then gently tap seat into place with a wooden dowel or plastic rod (1 - 1/8” outside diameter / 28 mm). To help ensure the seat is not damaged, place the cardboard disk supplied with the seal over the seat face.
5. Place volute bracket on motor (aligning the base if applicable). Secure volute bracket with four motor bolts.
6. Pull pump shaft forward until shoulder of pump shaft contacts back of volute bracket and slightly snug one setscrew to hold shaft in place.
7. Install seal head assembly:
   a) Lubricate shaft and elastomer with Parker O-ring lube.
   b) Install rotary seal head onto pump shaft and slide toward seat until carbon face touches seal seat.
   c) Install seal spring and retainer.
   d) Thread impeller onto pump shaft ensuring that the spring retainer does not slip between the shoulder of the shaft and the hub of the impeller. Install locknut with small amount of removable loctite. Hold shaft with locking type pliers (vice grips) and tighten impeller locknut.
   e) Loosen pump shaft setscrew.

f) Install new volute cover gasket and mount volute cover. Secure with bolts and tighten evenly.

g) Slide pump shaft forward until impeller touches volute cover. Slide shaft back with a screwdriver .010 - .015” (0.254 - 0.381 mm). Tighten pump shaft setscrews. Rotate shaft by hand to ensure impeller does not rub against volute cover.

8. Return pump to installation and reconnect electrical connections.
9. Start pump momentarily to observe shaft rotation. If rotation corresponds to the rotation arrow, pump may be put into service.

Chapter 10

System Logs

Aqua Whisper Pro 450-1, 700-1, 900-1, 900-2, 1400-2 and 1800-2 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 the Owner's Manual for future reference and troubleshooting. Retain the form in this 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 theAqua Whisper Pro RO Desalination System. Provide this information to service technicians when requesting technical assistance.

Serial Number: _____

Model Number (Aqua Whisper Pro 450-1, 700-1, 900-1, 900-2, 1400-2 or 1800-2): _____

Name of Operator: _____

Date: _____

INSTALLER INFORMATION

Company_____

Street Address_____

City, State_____

Country, postal code_____

Telephone number_____

Name of Installer_____

SYSTEM

System Power: _____ Volts AC, _____ Hz or _____ Volts DC

Feed Water Temperature: _____ Fahrenheit or _____ Celsius

Hour Meter : _____ Hours

PRESSURE GAUGE

Low Pressure Gauge : _____ psi

High Pressure Gauge reading: _____ psi

WATER FLOW METER

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

WATER QUALITY

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

Product Water Salinity: _____ ppm

Unusual occurrences or noises: _____

_____

_____

_____

_____

_____

_____

Aqua Whisper Pro 450-1, 700-1, 900-1, 900-2, 1400-2 and 1800-2 System Identification Information

INSTRUCTIONS: It is important that this form is completely filled in at the time of purchase of the Aqua Whisper Pro RO Desalination System. This information will be requested by our Service Department and Parts Order Desk whenever contacting Sea Recovery for technical assistance or by the Sales Department whenever ordering parts.

SYSTEM INFORMATION: Aqua Whisper Pro RO Desalination System

Serial Number: _____

Model Number (Aqua Whisper Pro 450-1, 700-1, 900-1, 900-2, 1400-2 or 1800-2): _____

OPERATING VOLTAGE

Alternating Current: ___ 110/115 VAC or ___ 220/230 VAC

Cycles: ___50 Hz or ___ 60 Hz

Date Purchased: _____

Date Commissioned: _____ (First tested or operated)

DEALER INFORMATION

Dealer's Name: _____

Address: _____

City: _____

State: _____

Country: _____

Postal Code: _____

Dealer's Invoice Number: _____

Parker Hannifin - Water Purification
2630 E. El Presidio
Carson, CA 90810 USA
www.parker.com/watermakers

Aqua Whisper Pro 450-1, 700-1, 900-1, 900-2, 1400-2 and 1800-2 Daily Operation Log System Readings

Make copies of this blank form. At each shut down of the Aqua Whisper Pro RO Desalination System, record the following information. Retain daily logs of the system performance for future reference and troubleshooting. This information is valuable to the servicing technicians in providing technical support to the owner and future operators of the Aqua Whisper Pro RO Desalination System. Provide this information to service technicians when requesting technical assistance.

Serial Number: _____

Model Number (Aqua Whisper Pro 450-1, 700-1, 900-1, 900-2, 1400-2 or 1800-2): _____

Name of Operator: _____

Date: _____

SYSTEM

System Power: _____ Volts AC, _____ Hz or _____ Volts DC

Feed Water Temperature: _____ Fahrenheit or _____ Celsius

Hour Meter : _____ Hours

PRESSURE GAUGE

Low Pressure Gauge : _____ psi

High Pressure Gauge reading: _____ psi

WATER FLOW METER

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

WATER QUALITY

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

Product Water Salinity: _____ ppm

Unusual occurrences or noises: _____

_____

_____

_____

_____

_____

_____

_____

_____

Chapter 11

Glossary

Terms

Cascading Failure

A failure in a system of interconnected parts in which the failure of a part can trigger the failure of successive parts.

Boundary Layer

(Also known as 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 RO 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 RO 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 RO 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 RO 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 RO 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.

Chapter 12

Exploded Parts View

When Ordering

When ordering Parts or Accessories from your local Sea Recovery Dealer or from Sea Recovery direct, you can save time and ensure that you receive the correct part by providing the following information:

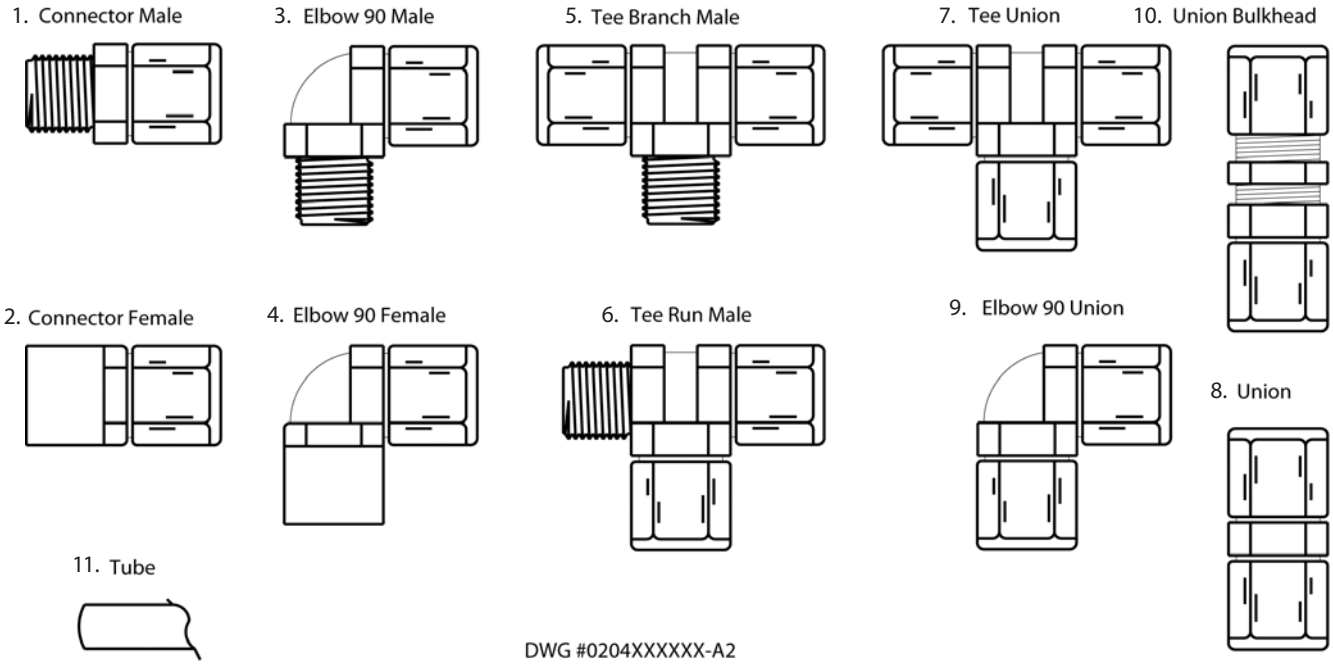
System	System Style	System Production	System Serial #
Sea Recovery	Compact / Modular	450-1 (one short 21" (53.3 cm) long RO Membrane Element)	Serial Number
Sea Recovery	Compact / Modular	700-1 (one medium 31" (78.7 cm) long RO Membrane Element)	Serial Number
Sea Recovery	Compact / Modular	900-1 (one long 40" (101.6 cm) long RO Membrane Element)	Serial Number
Sea Recovery	Compact / Modular	900-2 (two short 21" (53.3 cm)" long RO Membrane Element)	Serial Number
Sea Recovery	Compact / Modular	1400-2 (two medium 31" long RO Membrane Element)	Serial Number
Sea Recovery	Compact / Modular	1800-2 (two long 40" long RO Membrane Element)	Serial Number

Provide us with information on the part that you wish to order:

Part Number | Part Description | Quantity

Having this information will expedite your request and ensure that you receive the correct part.

Available Tubes and Fittings

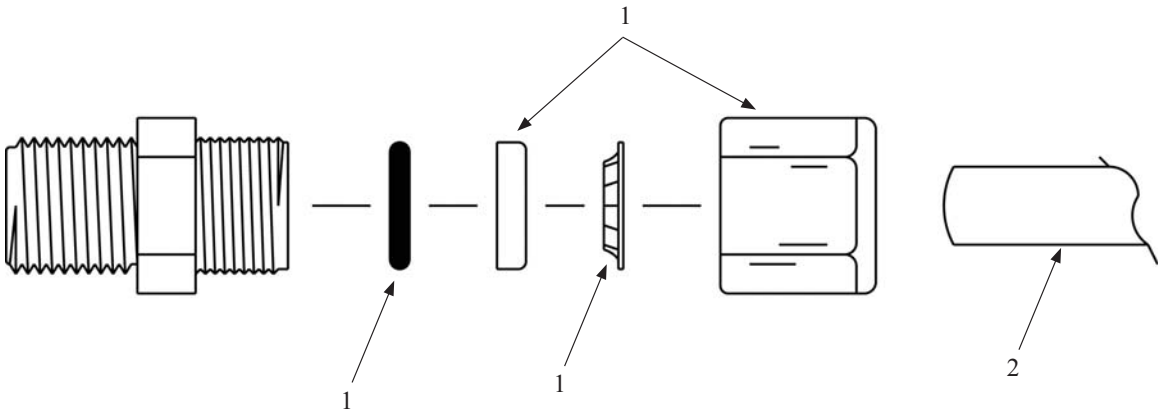


PART NO	DESCRIPTION
1. CONNECTOR MALE	
0204090669	1/4 inch tube x 1/8 inch mnpt
0204090869	1/4 inch tube x 1/4 inch mnpt
0204091669	3/8 inch tube x 1/8 inch mnpt
0204091769	3/8 inch tube x 1/4 inch mnpt
0204091869	3/8 inch tube x 3/8 inch mnpt
0204091969	3/8 inch tube x 1/2 inch mnpt
0204092069	3/8 inch tube x 3/4 inch mnpt
0204092269	1/2 inch tube x 1/8 inch mnpt
0204092369	1/2 inch tube x 1/4 inch mnpt
0204092469	1/2 inch tube x 3/8 inch mnpt
0204092569	1/2 inch tube x 1/2 inch mnpt
0204092669	1/2 inch tube x 3/4 inch mnpt
0204099069	5/8 inch tube x 1/8 inch mnpt
0204099169	5/8 inch tube x 1/4 inch mnpt
0204092869	5/8 inch tube x 3/8 inch mnpt
0204092969	5/8 inch tube x 1/2 inch mnpt
0204093169	5/8 inch tube x 3/4 inch mnpt
2. CONNECTOR FEMALE	
0204120669	1/4 inch tube x 1/8 inch fnpt
0204120869	1/4 inch tube x 1/4 inch fnpt
0204121769	3/8 inch tube x 1/4 inch fnpt
0204121869	3/8 inch tube x 3/8 inch fnpt
0204121969	3/8 inch tube x 1/2 inch fnpt

PART NO	DESCRIPTION
0204122569	1/2 inch tube x 1/2 inch fnpt
0204122669	1/2 inch tube x 3/4 inch fnpt
0204122969	5/8 inch tube x 1/2 inch fnpt
3. ELBOW 90 MALE	
0204020669	1/4 inch tube x 1/8 inch mnpt
0204020869	1/4 inch tube x 1/4 inch mnpt
0204020969	1/4 inch tube x 3/8 inch mnpt
0204021769	3/8 inch tube x 1/4 inch mnpt
0204021869	3/8 inch tube x 3/8 inch mnpt
0204021969	3/8 inch tube x 1/2 inch mnpt
0204022069	3/8 inch tube x 3/4 inch mnpt
0204022469	1/2 inch tube x 3/8 inch mnpt
0204022569	1/2 inch tube x 1/2 inch mnpt
0204022969	5/8 inch tube x 1/2 inch mnpt
4. ELBOW 90 FEMALE	
0204010669	1/4 inch tube x 1/8 inch fnpt
0204010869	1/4 inch tube x 1/4 inch fnpt
0204011769	3/8 inch tube x 1/4 inch fnpt
0204011869	3/8 inch tube x 3/8 inch fnpt
0204012469	1/2 inch tube x 3/8 inch fnpt
0204012569	1/2 inch tube x 1/2 inch fnpt
0204012969	5/8 inch tube x 1/2 inch fnpt
5. BRANCH TEE MALE	
0204150669	1/4 inch tube x 1/8 inch mnpt
0204151769	3/8 inch tube x 1/4 inch mnpt
0204152469	1/2 inch tube x 3/8 inch mnpt
0204152969	5/8 inch tube x 1/2 inch mnpt
6. RUN TEE MALE	
0204170669	1/4 inch tube x 1/8 inch mnpt
0204170869	1/4 inch tube x 1/4 inch mnpt
0204171769	3/8 inch tube x 1/4 inch mnpt
0204171869	3/8 inch tube x 3/8 inch mnpt
0204172469	1/2 inch tube x 3/8 inch mnpt
0204172569	1/2 inch tube x 1/2 inch mnpt
0204172969	5/8 inch tube x 1/2 inch mnpt
7. UNION TEE	
0204240869	1/4 inch tube
0204241869	3/8 inch tube
0204242469	1/2 inch tube x 3/8 inch tube
0204242569	1/2 inch tube
0204242869	5/8 inch tube x 3/8 inch tube
0204243069	5/8 inch tube
8. UNION	

PART NO	DESCRIPTION
0204210869	1/4 inch tube
0204211769	3/8 inch tube x 1/4 inch tube
0204211869	3/8 inch tube
0204212469	1/2 inch tube x 3/8 inch tube
0204212569	1/2 inch tube
0204212869	5/8 inch tube x 3/8 inch tube
0204212969	5/8 inch tube x 1/2 inch tube
0204213069	5/8 inch tube
9. UNION ELBOW 90	
0204220869	1/4 inch tube
0204221769	3/8 inch tube x 1/4 inch tube
0204221869	3/8 inch tube
0204222569	1/2 inch tube
0204223069	5/8 inch tube
10. UNION BULKHEAD	
0204270869	1/4 inch tube
0204271869	3/8 inch tube
0204272569	1/2 inch tube
11. TUBE	
0312122969	1/4 inch tube Black Nylon
0306152969	1/4 inch tube Blue Polypropylene
0306142969	1/4 inch tube Red Polypropylene
0312124169	3/8 inch tube Black Nylon
0306154169	3/8 inch tube Blue Polypropylene
0306144169	3/8 inch tube Red Polypropylene
0312125069	1/2 inch tube Black Nylon
0305125869	5/8 inch tube Black Polypropylene

Tube Compression Fittings Replacement Parts



ITEM	DESCRIPTION	PART NO.
FOR 1/4" O.D. TUBE		
1	NUT/SPACER/GRAB & O-RING 1/4"	0204-1/469
2	TUBE 1/4 BLACK	0312121969
FOR 3/8" O.D. TUBE		
1	NUT/SPACER/GRAB & O-RING 3/8"	0204-3/869
2	TUBE 3/8 BLACK	0312123569
FOR 1/2" O.D. TUBE		
1	NUT/SPACE/GRAB & O-RING 1/2"	0204-1/269
2	TUBE 1/2 BLACK NO SUBSTITUTE	0312124269
FOR 5/8" O.D. TUBE		
1	NUT/SPACER/GRAB & O-RING 5/8"	0204-5/869
2	TUBE 5/8 BLACK POLYPRO	0305125169

B001195001 INSTALLATION KIT AND OWNERS MANUAL

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	2	01124225DG	TEE 1/2 FPT X FPT X FPT NYL
2	1	01122923DG	RB 1/2 MT X 1/4 FT NYL
3	1	0204020869	ELB90 1/4 TUBE X 1/4 MPT PLASTIC
4	1	01120137DG	ELB90 3/4 FPT X 3/4 FPT NYL
5	1	0112653700	ADAP 3/4 MPT X 3/4 BARB NYL
6	1	01120737DG	ELB90 3/4 MPT X 3/4 BARB NYL
7	1	0204021769	ELB90 3/8 TUBE X 1/4 MPT PLAST
8	1	0204021969	ELB90 3/8 TUBE X 1/2 MPT PLAST
9	1	0204090869	CONN 1/4 TUBE X 1/4 MPT PLAST
10	1	0204091869	CONN 3/8 TUBE X 3/8 MPT PLAST
11	2	01126526DG	ADAPT 1/2 MPT X 3/4 BARB NYL
12	1	0204091769	CONN 3/8 TUBE X 1/4 MPT PLAST
13	1	0204092469	CONN 1/2 TUBE X 3/8 MPT PLAST
14	5	061080028000	WASHER FLAT #10 SS
15	5	061170628020	SC PHIL PAN "A" #10X1-1/4L SS
16	24	061172143000	SC HEX "A" 1/4X1"L SS
17	24	061100043000	WASHER FLAT OS 1/4 SS
18	16	05181434AA	HOSE CLAMP 3/4" SS
19	12 FEET	0328066666	HOSE CLEAR BRAID 3/4"
20	20 FEET	0312124269	TUBE 1/2 BLACK
21	10 FEET	0312121969	TUBE 1/4 BLACK
22	50 FEET	0312123569	TUBE 3/8 BLACK
23	1	0421056739	SEA STRAINER-3/4 BRONZE
24	1	B647800003	PUMP OIL 16 OZ
25	1	B651950001	OWNERS MANUAL AWP

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QTY: 1

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QTY: 1

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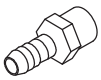
QTY: 1



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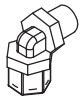

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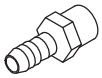

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QTY: 1

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QTY: 5

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QTY: 24

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QTY: 24

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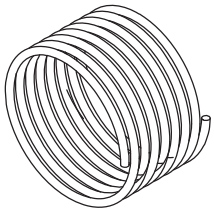
QTY: 10



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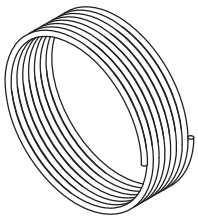

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QTY: 20 FEET

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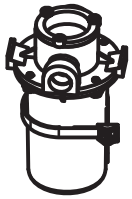
QTY: 10 FEET

22
QTY: 50 FEET



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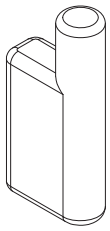

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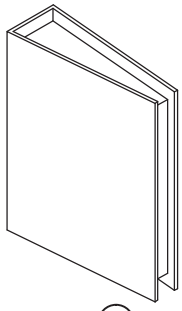


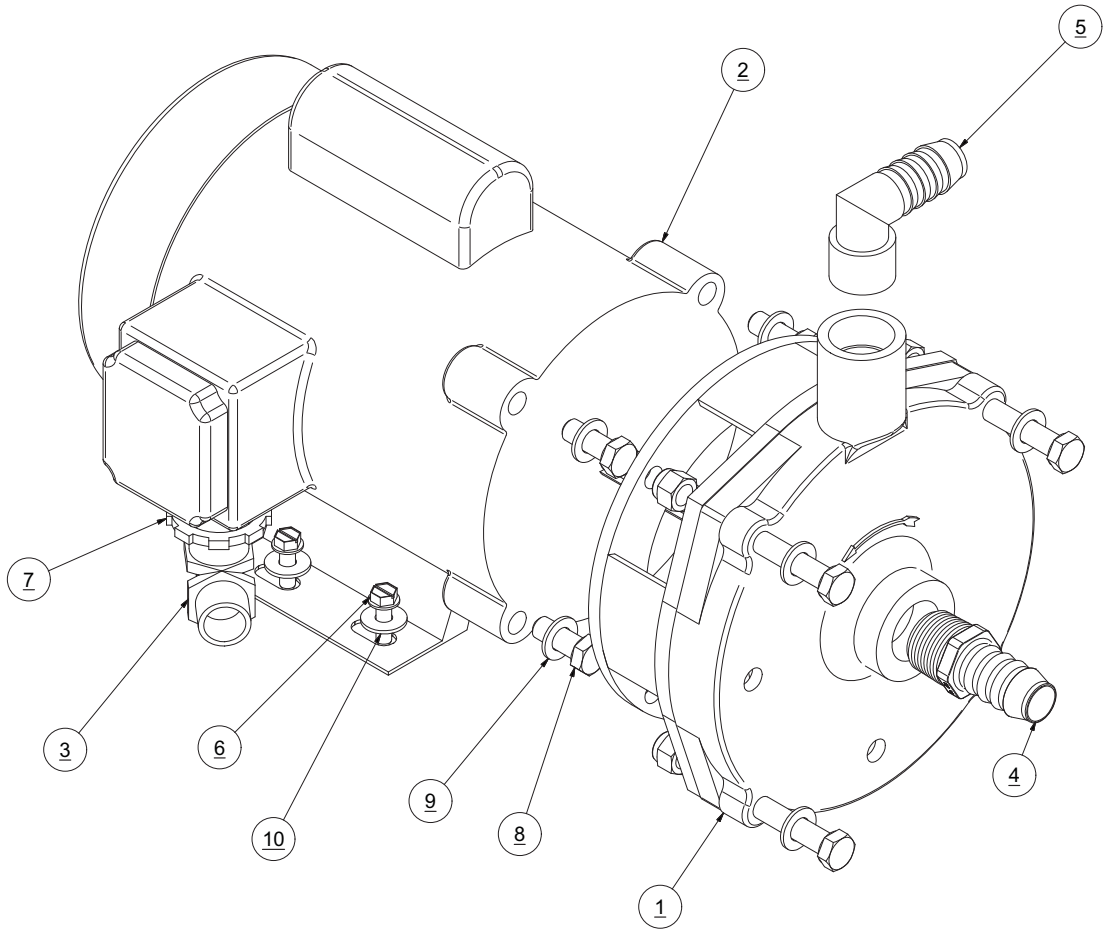
25
QTY: 1

B016080026 BOOSTER PUMP ASSY 1PH HP75

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	1205514772	BOOSTER PUMP HEAD HP75 W-4.75 IN IMPELLER
2	1	1519081110	MOTOR .50 HP 110-230-50-60-1PH
3	1	1920023632	STRAIN RELIEF 90 CG90-6250
4	1	0112653700	ADAP .75 MPT X.75 BARB NYLON
5	1	01120737DG	ELB90 .75 MPT X .75 BARB NYLON
6	4	061172143016	SCREX,HEX A,.25x1.00,SS
7	1	063200066000	NUT LOCK .50 STEEL
8	4	061142157016	SCREW,HEX HEAD,3/8-16x1",SS
9	4	061080056000	WASHER,FLAT,3/8",SS
10	4	061100043000	WASHER,FLAT,OS,1/4",SS

RECOMMENDED SPARES

PART NUMBER	DESCRIPTION
2625130172	SEAL/SEAT BOOSTER PMP HP75 AB/SS
1205514772-1	GASKET/ORING HP75 PP
29020350072	IMPELLER 5" HP75 CPVC80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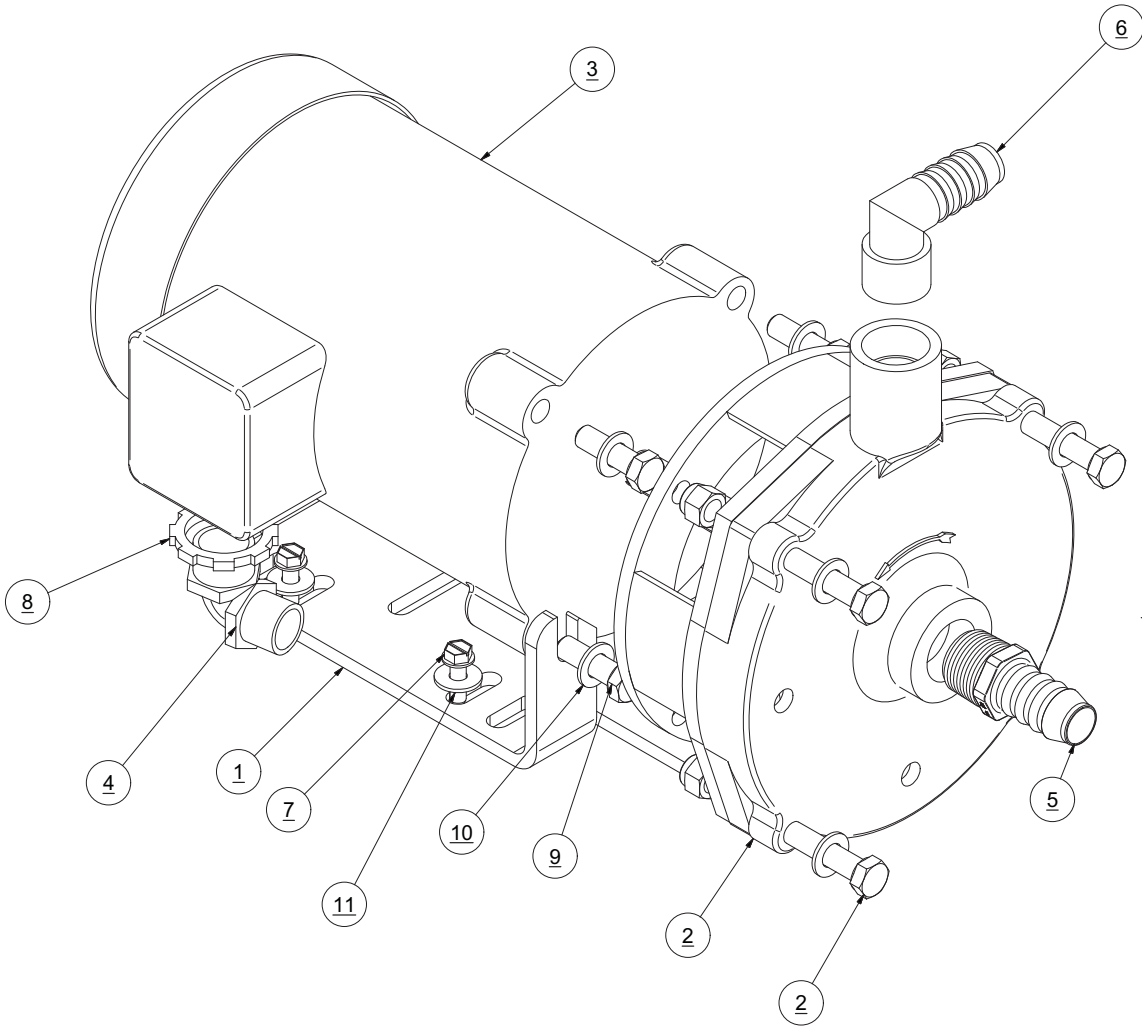
B016080027 BOOSTER PUMP ASSY 3PH HP75 W- 4.75 IN IMPELLER

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	1221514722-3	BRACKET,MTG,PUMP,BOOSTER
2	1	1205514772	BOOSTER PUMP HEAD HP75 W-4.75 IN IMPELLER
3	1	1520181110	MOTOR .50 HP 208-230-460-50-60
4	1	1920023632	STRAIN RELIEF 90 CG90-6250
5	1	0112653700	ADAP .75 MPT X.75 BARB NYLON
6	1	01120737DG	ELB90 .75 MPT X .75 BARB NYLON
7	4	061172143016	SCREX,HEX A,.25x1.00,SS
8	1	063200066000	NUT LOCK .50 STEEL
9	4	061142157020	SCREW,HEX HEAD,3/8-16x1-1/4",SS
10	4	061080056000	WASHER,FLAT,3/8",SS
11	4	061100043000	WASHER,FLAT,OS,1/4",SS

RECOMMENDED SPARES

PART NUMBER	DESCRIPTION
2625130172	SEAL/SEAT BOOSTER PMP HP75 AB/SS
1205514772-1	GASKET/ORING HP75 PP
29020350072	IMPELLER 5" HP75 CPVC80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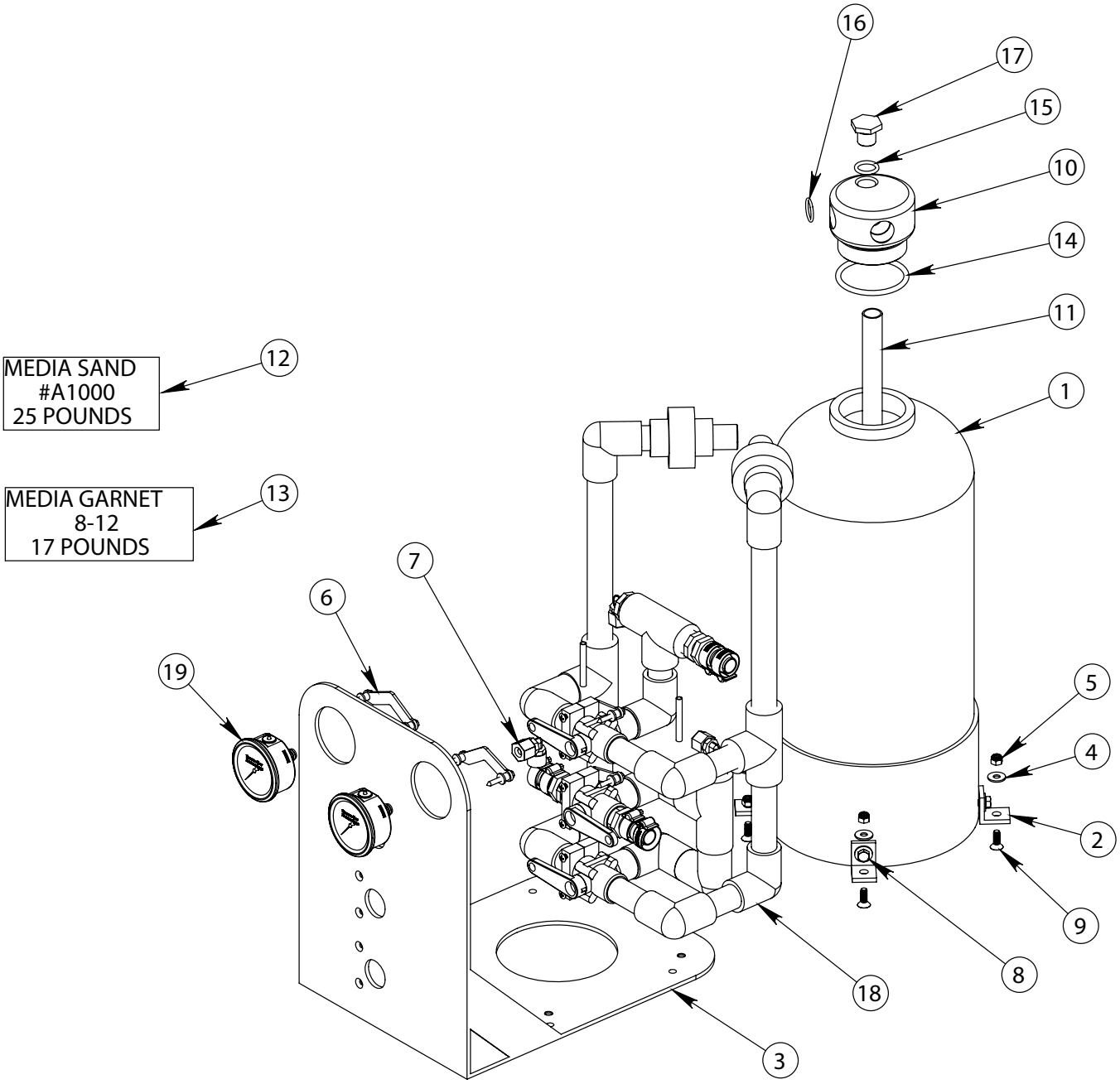
Prefiltration Subsystem

Caution: Damage caused to the Sea Recovery High Pressure Pump, RO Membrane Element or any other component from the use of third-party, non-Sea Recovery supplied filter elements is the responsibility and liability of the operator and is not covered by the Sea Recovery warranty.

Caution: Do not use “string wound” or “fiber” prefilter elements. These types of 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. This will cause frequent shut downs of the system and very frequent changing which will result in very high cost of maintenance.

B071080002 MEDIA FILTER ASSY 4 HS/AW/UW

ITEM NO.	QTY	PART NO.	DESCRIPTION
1	1	0708040468-1	MEDIA FILTER HOUSING 818 ALMOND
2	4	20200404010	BRACKET L"" MOUNTING FEET
3	1	20200325000	SKID MEDIA FILTER AS>7/97
4	16	061100043000	WASHER FLAT OS 1/4"SS
5	8	061060045000	NUT HEX 1/4-20 W/INSERT SS
6	2	05180851CC	GAUGE BRACKET CBM SS
7	2	0204010869	ELB90 1/4 TUBE X 1/4 FPT PLAST
8	4	061142145012	BOLT HEX 1/4-20 X 3/4 SS
9	4	061161845012	SC ALLEN FLAT 1/4-20 X 3/4 SS
10	1	0708040400-1	MEDIA FILTER TOP
11	1	0708040400-2	MEDIA FILTER RISER
12	25 LB.	4643020255	MEDIA SAND A1000 (100LB BAG)
13	17 LB.	4643070155	MEDIA GARNET 8-12 50# BAG
14	1	2614017300	O-RING 334 MEDIA LID 97
15	1	2614013001	O-RING 209
16	1	2614017400	O-RING 117 MEDIA TOP INLET
17	1	0708040400-3	PLUG MEDIA FILTER TOP
18	1	B075000001	MULTI MEDIA FILTER PLUMBING
19	2	10181522CC	GAUGE -30/0/70 CBM.NPT


16
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MEDIA SAND
#A1000
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MEDIA GARNET
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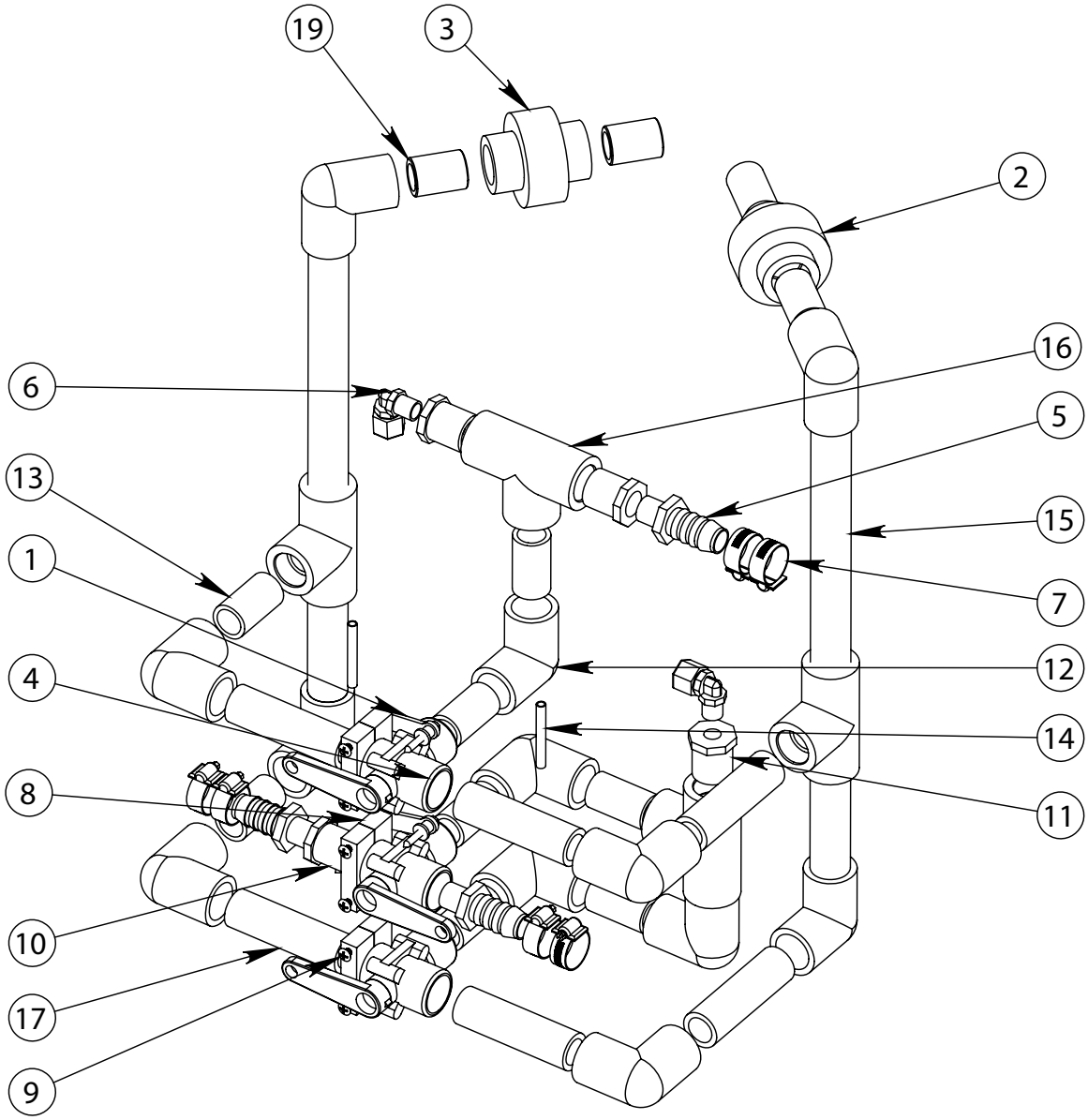
B075000001 MULTI MEDIA FILTER PLUMBING ASSY

ITEM NO.	QTY	PART NO.	DESCRIPTION
1	2	05180851CC	GAUGE BRACKET CBM SS
2	1	0101693783	UNION .75 SL x .75 SL PVC
3	1	0101673783	UNION .75 FNPT x .75 FNPT PVC
4	3	14011317AR	VALVE 3-WAY BALL .75 SL
5	3	0101652683	ADAP 1/2 MPT X 3/4 BARB PVC
6	2	0204020869	ELB90 1/4 TUBE X 1/4 MPT PLAST
7	6	05181434AA	HOSE CLAMP 3/4" SS
8	3	1453131700-02	VALVE BRACKET 3/4" SL, SET
9	6	061161130028	SC PHIL OVAL 10-24 X 1 1/4 SS
10	3	0101313683	RB .75 SL x .50 FNPT PVC
11	2	0101323483	RB .75 SL x .25 FNPT PVC
12	12	0101053783	ELB90 .75 SL X .75 SL PVC
13	11	0301096600	PIPE PVC SCH 80 .75 DIA x 1.75LG
14	2	0312121969	TUBE .25 BLK SEMI-RIGID NYLON
15	2	0301096600	PIPE PVC SCH 80 3/4" PER FOOT
16	4	0101463783	TEE .75 SL x .75 SL x .75 SL PVC
17	8	0301096600	PIPE PVC SCH 80 .75 DIA x 3.625LG
18	1	0328066666	HOSE CLEAR BRAID 3/4"
19	2	01013737CL	NIPPLE .75 NPT X CLOSE PVC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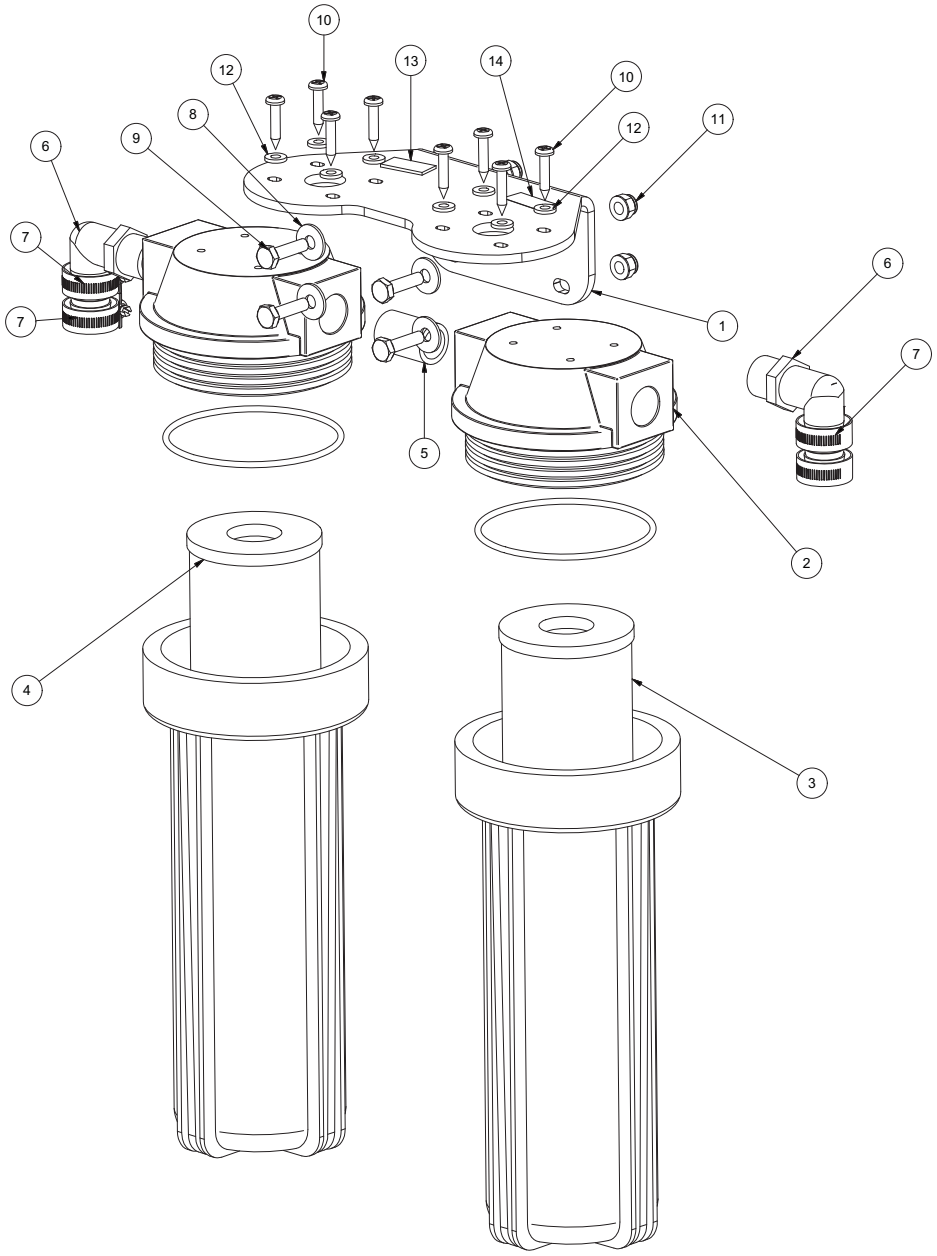
B108800001 PREFILTER ASSY AWC

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	20200402101	DUAL BRACKET PREFILTER-CHRCL-PLNKTN Rev A
2	2	0713020873	FILTER HOUSING 1/2x10"L
3	1	0801060157	ELEMENT PREFILTER 10-05
4	1	0801130257	ELEMENT PREFILTER 10-25
5	1	01013725CL	NIPPLE 0.50 NPT x CL
6	2	0112072600	ELB90 .50 MPT X .75 BARB NYLON
7	4	05181434AA	HOSE CLAMP .75 SS
8	4	061100043000	WASHER FLAT OS .25 SS
9	4	061142145016	BOLT HEX .25-20 X 1 SS
10	8	061170628016	SC PHIL PAN A #10 X 1 SS
11	4	065070045000	NUT HEX .25-20 FLANGED
12	8	065080028000	WASHER FLAT #10 NYLON
13	1	2234012360	LABEL 25 MICRON PREFILTER -1
14	1	2234012460	LABEL 5 MICRON PREFILTER -2

RECOMMENDED SPARES

PART NUMBER	DESCRIPTION
2614010473	O-RING 237 BLUE HOUSING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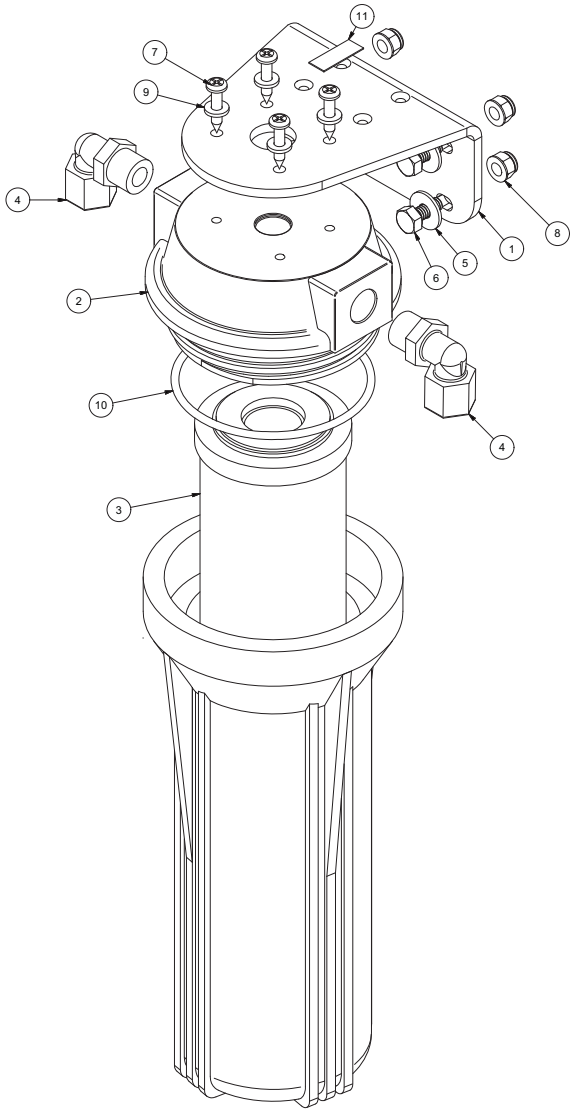
P521080001 CARBON FILTER ASSY -AS-AWC

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	20200402102	BRACKET SINGLE FILTER
2	1	0713020573	FILTER HOUSING/LID 3/8X10L
3	1	0803004773	ELEMENT CHARCOAL 10.0
4	2	0204021869	ELBOW,SS,3/8 ODx3/8 MT
5	4	061100043000	WASHER,FLAT,OS,1/4",SS
6	4	061142145010	BOLT HEX .25-20 X .625 SS
7	4	061170628016	SC PHIL PAN A #10 X 1 SS
8	4	065070045000	NUT HEX .25-20 FLANGED
9	4	065080028000	WASHER FLAT #10 NYLON
10	1	2614010473	O-RING 237 BLUE HOUSING
11	1	2234014560	LABEL CHARCOAL ELEMENT

RECOMMENDED SPARES

PART NUMBER	DESCRIPTION
2614010473	O-RING 237 BLUE HOUSING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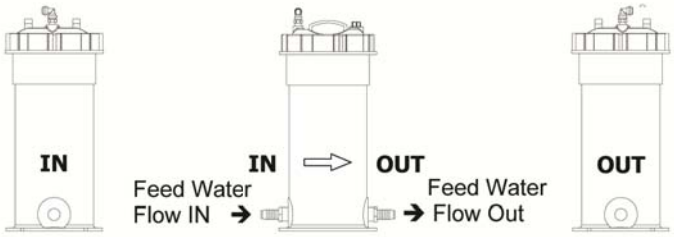
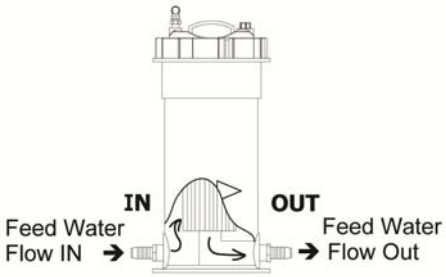
Commercial Prefilter and Oil/Water Separator Connection and Water Flow

COMMERCIAL PREFILTER CONNECTION AND WATER FLOW

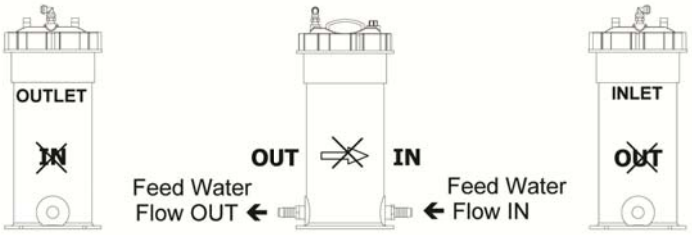


Commercial Prefilter is plumbed
as per the raised arrows and markings IN and OUT

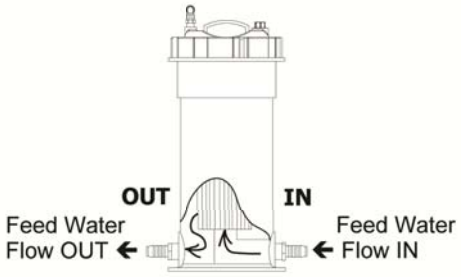


Feed Water Flow through the Commercial
Prefilter Element is from the OUTSIDE
of the Element to the INSIDE CENTER
of the Element

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



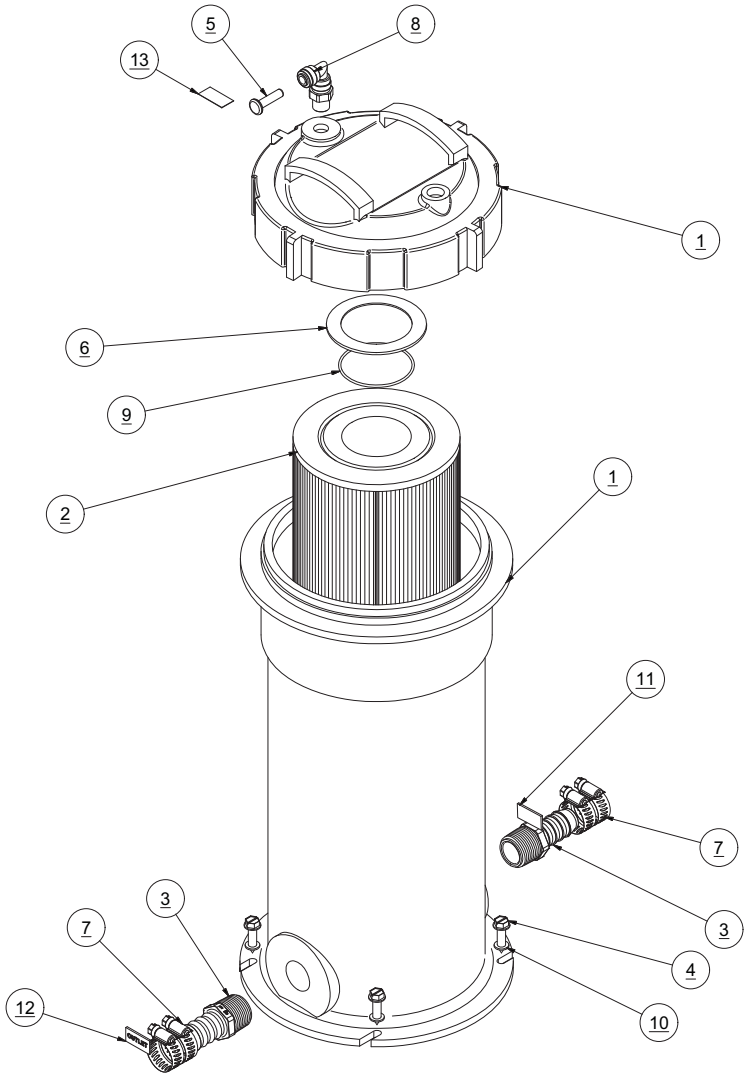
Feed Water Flow through the
Oil/Water Separator Element
is from the INSIDE CENTER
of the Element to the
OUTSIDE of the element

B109120001 COMMERCIAL PREFILTER ASSY 32.5 SQ FT SRC AQM

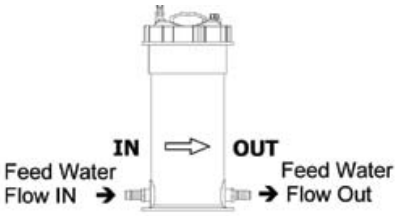
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	07620310WA	FILTER HOUSING 32.5 SQFT
2	1	0801063357	ELEMENT CPFE 5 MIC 32.5 SQFT
3	2	0112653700	ADAP .75 MPT X.75 BARB NYLON
4	4	061172143016	SCREX,HEX A,.25x1.00,SS
5	1	0204990300	PLUG .25 JQ
6	2	3901040100	ADAPTER SPACER RING, COMMERCIAL FILTERS
7	4	05181434AA	CLAMP,HOSE,SS,3/4"
8	1	0204020100	ELB90 .25 TUBE JQ x .25MNPT
9	2	2614018969	O-RONG 034 COMMERICAL PREFILTER SEAL
10	4	061080028000	WASHER FLAT #10 SS
11	1	2213017063	LABEL INLET (WHITE BACKGROUND)
12	1	2213017163	LABEL OUTLET (WHITE BACKGROUND)
13	1	2234010400	LABEL SRC COMM PREFILTER

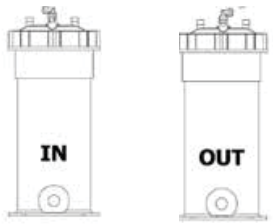
RECOMMENDED SPARES

PART NUMBER	DESCRIPTION
07620310WA-06	O-RING LID CPF / OWS 32.5 SQFT



Commercial Prefilter
Connection and Water Flow





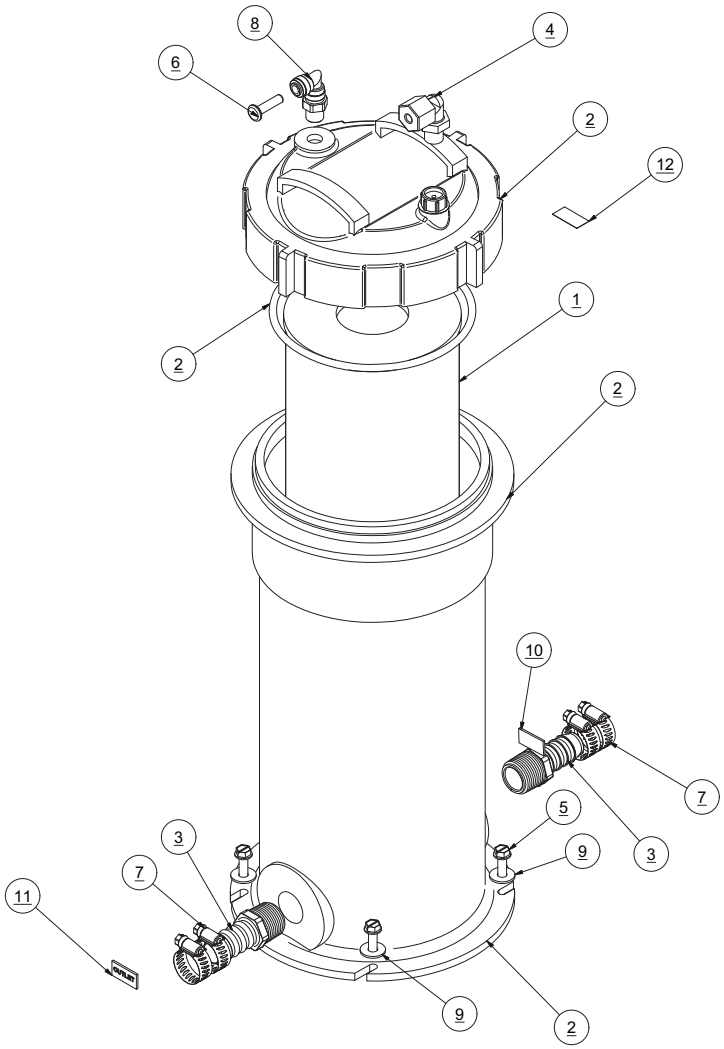
Commercial Prefilter is plumbed as per raised arrows and markings IN and OUT

B111120001 OIL WATER SEPARATOR ASSY SRC 32.5 SQ FT

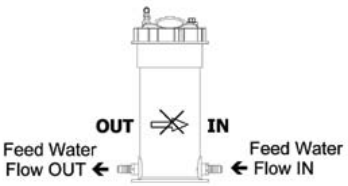
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	08020723KD	ELEMENT OWSE 32.5 SQFT
2	1	07620310WA	FILTER HOUSING 32.5 SQFT
3	2	0112653700	ADAP .75 MPT X.75 BARB NYLON
4	1	0204020869	ELBOW,PP,1/4 ODx1/4 MT
5	4	061172143016	SCREX,HEX A,.25x1.00,SS
6	1	0204990300	PLUG .25 JQ
7	4	05181434AA	CLAMP,HOSE,SS,3/4"
8	1	0204020100	ELB90 .25 TUBE JQ x .25MNPT
9	4	061100043000	WASHER,FLAT,OS,1/4",SS
10	1	2213017063	LABEL INLET (WHITE BACKGROUND)
11	1	2213017163	LABEL OUTLET (WHITE BACKGROUND)
12	1	2234010300	LABEL,OIL WATER, SEPARATOR

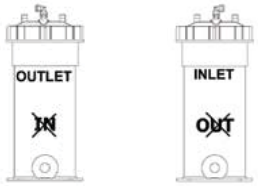
RECOMMENDED SPARES

PART NUMBER	DESCRIPTION
07620310WA-06	O-RING LID CPF / OWS 32.5 SQFT



Oil Water Separator
Connection and Water Flow





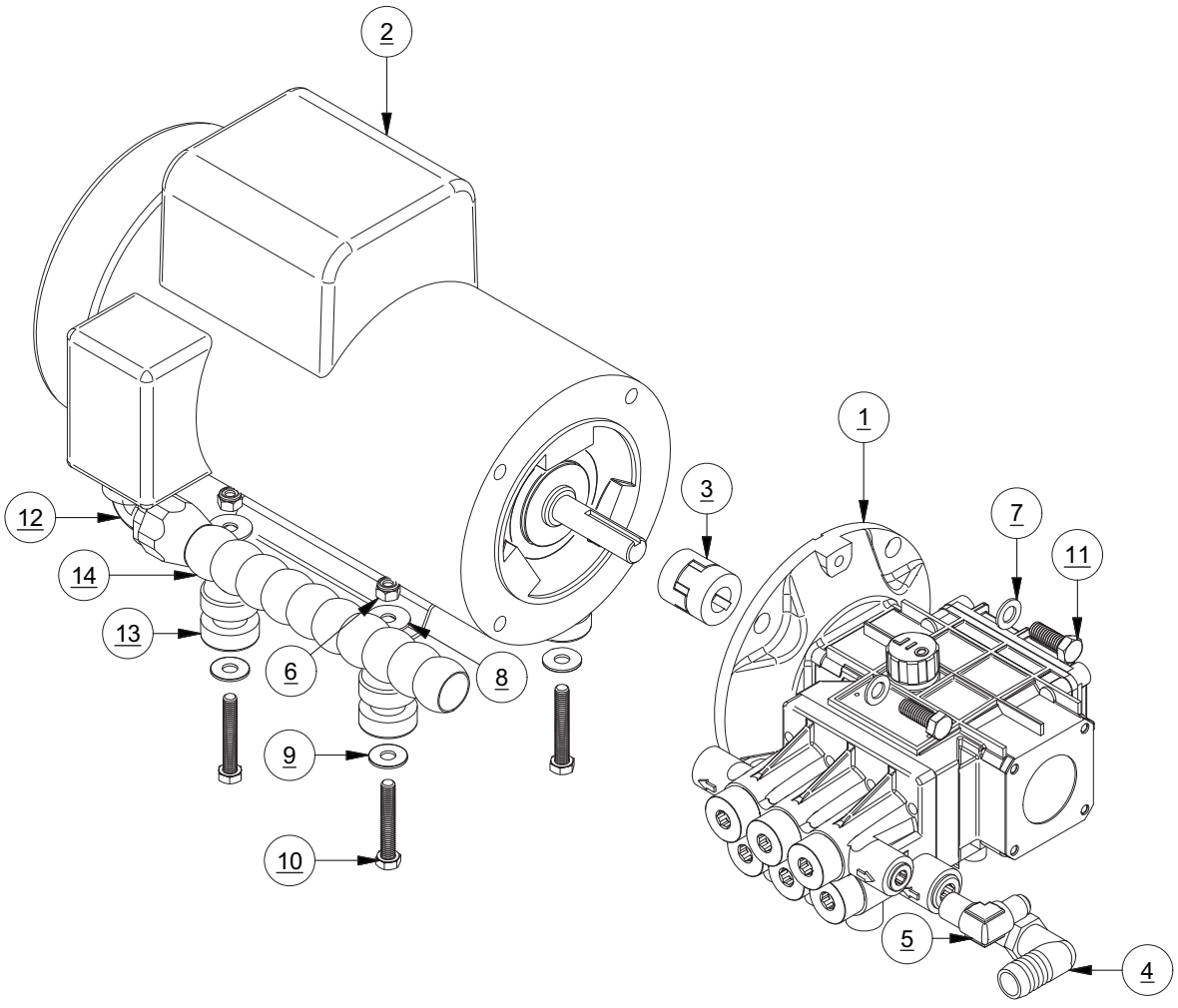
Oil Water Separator uses the same housing as the Commercial Prefilter, however it is plumbed OPPOSITE of the Commercial Prefilter. DO NOT follow the raised arrows and markings IN and OUT. Separate labels are placed indicating the correct INLET and OUTLET for the Oil Water Separator

B156930008 HP PUMP MOTOR ASSY 3HP 110-220 1PH

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	12180512CO	HP PUMP-GP 4.2 GPM SS LEFTHAND
2	1	15AH261919	MTR 2.5HP 115-230 60-1PH W-SS
3	1	12207602RW	COUPLER TX1 AQM2
4	1	0112072600	ELB90 0.50 MPT x 0.75 BARB NYLON
5	1	1317021969	ELB90 6 FLARE X .375 MPT SS
6	4	061060050000	NUT HEX .31-18 W-INSERT SS
7	4	061080056000	WASHER,FLAT,3/8",SS
8	4	061100049000	WASHER,FLAT,OS,5/16",SS
9	4	061110049000	WASHER FENDER .312 SS
10	4	061142150032	BOLT HEX .31-18 X 2.0 SS
11	4	061142157016	BOLT HEX .375-16 X 1.0 SS
12	1	1920016590	STRAIN RELIEF 90, .50 BLK W-NUT
13	4	2115031700	RUBBER MOUNT 90LB
14	1	4928402800	CONDUIT .50 FLEX BLK

RECOMMENDED SPARES

PART NUMBER	DESCRIPTION
B654080002	HP PUMP VALVE REBUILD 2.3-4.2G
B653090001	HP PUMP SEAL KIT REBUILD GEN P
B647800003	PUMP OIL 16 OZ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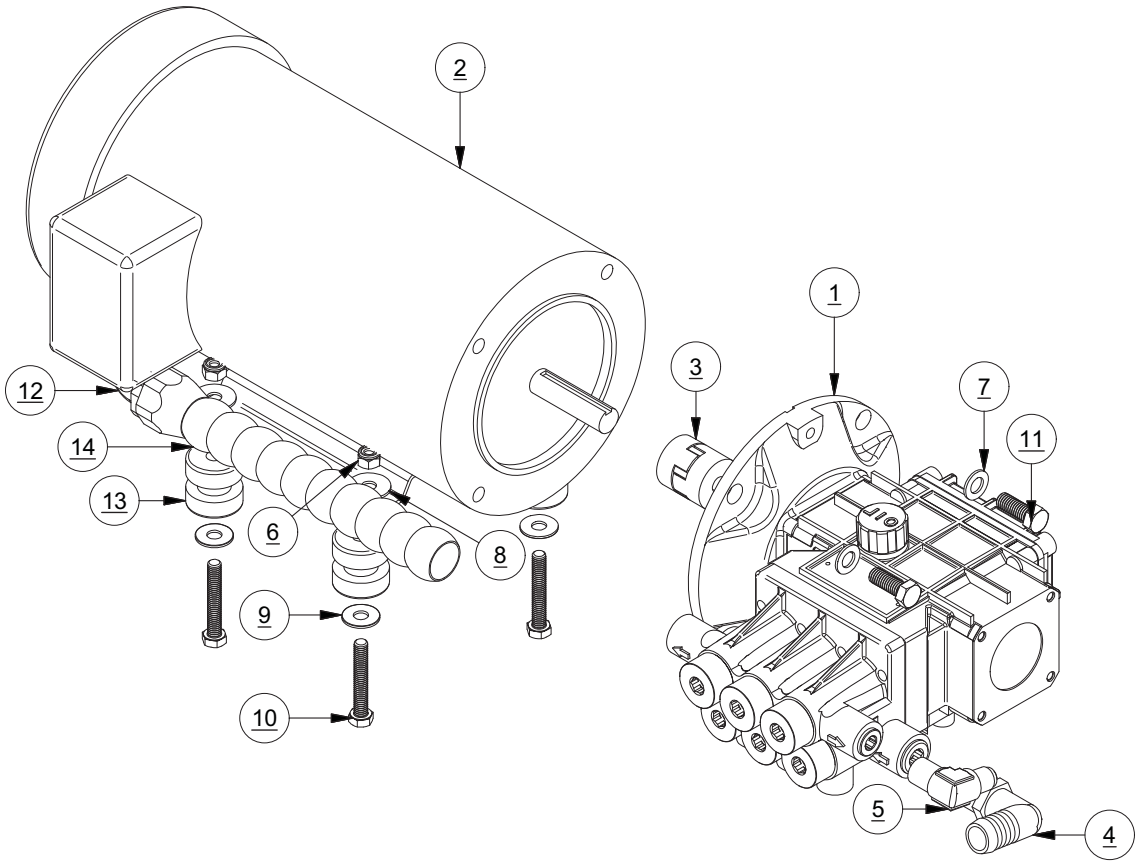
B156930004 HPP-MTR PLGR AQWCII 220-440-3PH

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	12180512CO	HP PUMP-GP 4.2 GPM SS LEFTHAND
2	1	15AE231012	MOTOR 3 HP 220-60-440-60 3PH
3	1	12207602RW	COUPLER TX1 AQM2
4	1	0112072600	ELB90 0.50 MPT x 0.75 BARB NYLON
5	1	1317021969	ELB90 6 FLARE X .375 MPT SS
6	4	061060050000	NUT HEX .31-18 W-INSERT SS
7	4	061080056000	WASHER,FLAT,3/8",SS
8	4	061100049000	WASHER,FLAT,OS,5/16",SS
9	4	061110049000	WASHER FENDER .312 SS
10	4	061142150032	BOLT HEX .31-18 X 2.0 SS
11	4	061142157016	BOLT HEX .375-16 X 1.0 SS
12	1	1920016590	STRAIN RELIEF 90, .50 BLK W-NUT
13	4	2115031700	RUBBER MOUNT 90LB
14	1	4928402800	CONDUIT .50 FLEX BLK

RECOMMENDED SPARES

PART NUMBER	DESCRIPTION
B654080002	HP PUMP VALVE REBUILD 2.3-4.2G
B653090001	HP PUMP SEAL KIT REBUILD GEN P
B647800003	PUMP OIL 16 OZ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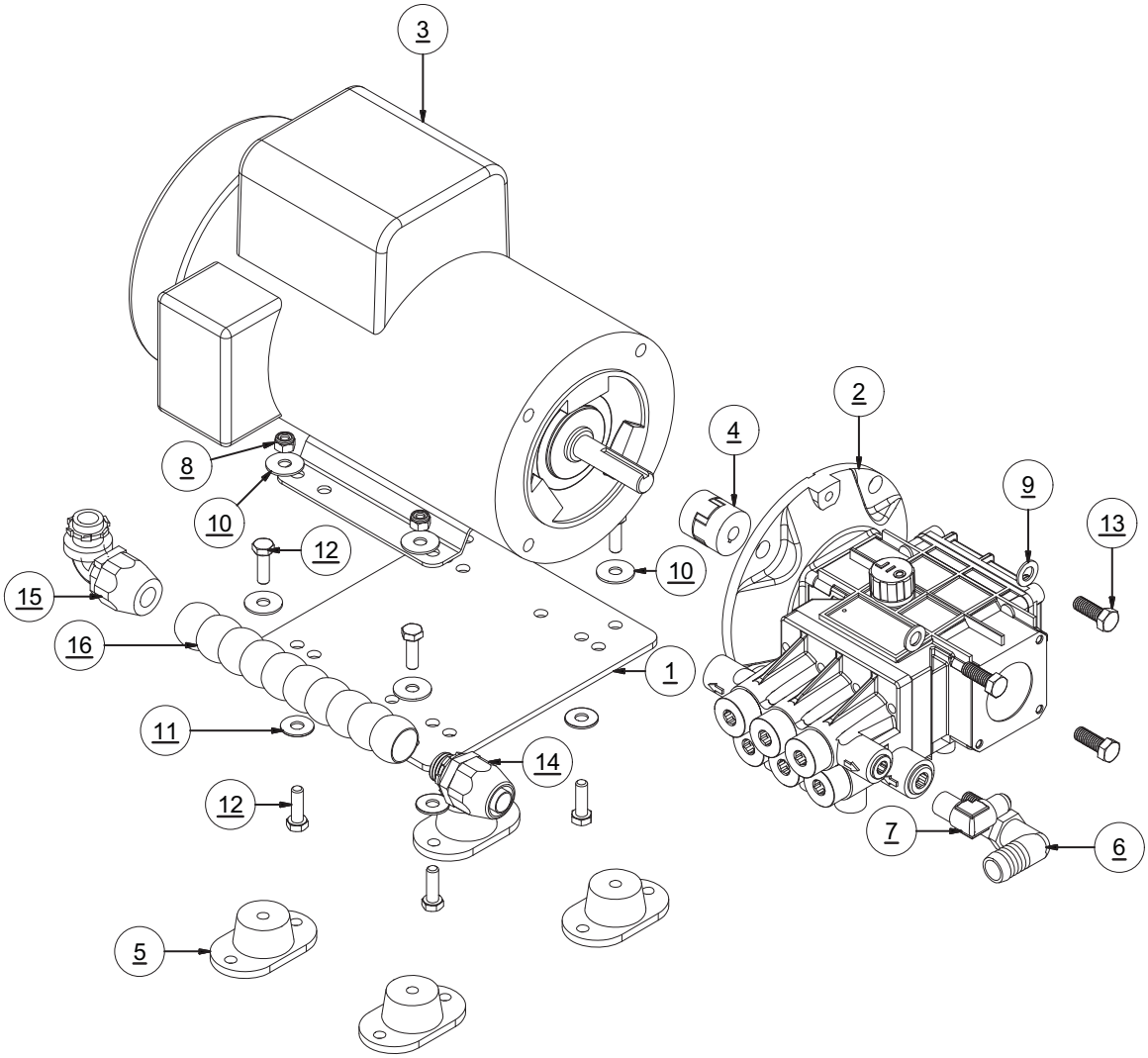
B156920003 HPP-MTR ASSY AQWMII PLNGR 110-220 -50-60-1PH

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	2020054903A	PANEL MOTOR BASE PLATE
2	1	12180512CO	HP PUMP-GP 4.2 GPM SS LEFTHAND
3	1	15AC062412	MOTOR 2.5 HP 50-60 110-220
4	1	12207602RW	COUPLER TX1 AQM2
5	4	2115030120	RUBBER MOUNT 55 AQUA SERIES
6	1	0112072600	ELB90 0.50 MPT x 0.75 BARB NYLON
7	1	1317021969	ELB90 6 FLARE X .375 MPT SS
8	4	061060050000	NUT HEX .31-18 W-INSERT SS
9	4	061080056000	WASHER,FLAT,3/8",SS
10	8	061100049000	WASHER,FLAT,OS,5/16",SS
11	4	061110049000	WASHER FENDER .312 SS
12	8	061142150016	SCREW,HEX HEAD,.31-18x1.00,SS
13	4	061142157016	BOLT HEX .375-16 X 1.0 SS
14	1	1904040600	STRAIN RELIEF .50 LIQTITE
15	1	1920016590	STRAIN RELIEF 90, .50 BLK W-NUT
16	1	4928402800	CONDUIT .50 FLEX BLK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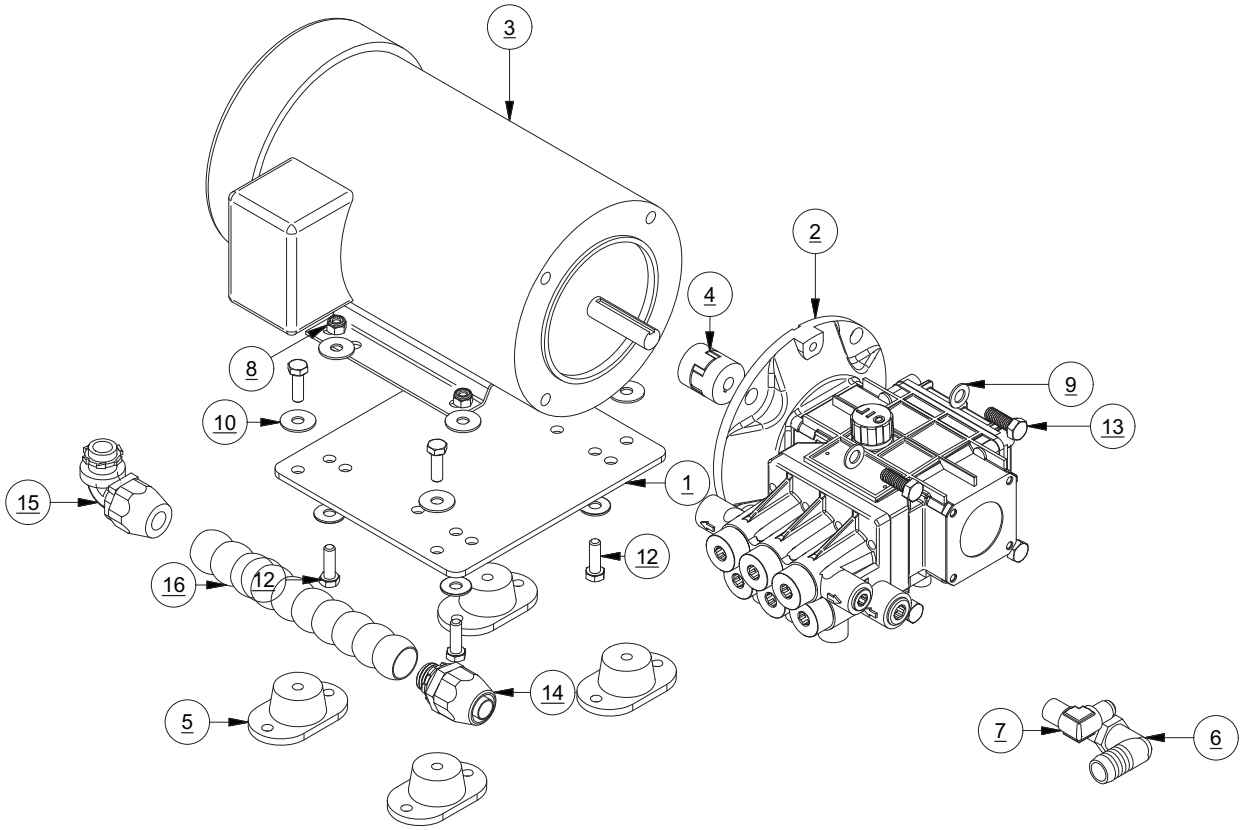
B156920007 HPP-MTR ASSY AQWMII PLNGR 220-440 VAC 60-3PH

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	2020054903A	PANEL MOTOR BASE PLATE
2	1	12180512CO	HP PUMP-GP 4.2 GPM SS LEFTHAND
3	1	15AF241012	MOTOR 3 HP 220-380, 50-3PH
4	1	12207602RW	COUPLER TX1 AQM2
5	4	2115030120	RUBBER MOUNT 55 AQUA SERIES
6	1	0112072600	ELB90 0.50 MPT x 0.75 BARB NYLON
7	1	1317021969	ELB90 6 FLARE X .375 MPT SS
8	4	061060050000	NUT HEX .31-18 W-INSERT SS
9	4	061080056000	WASHER,FLAT,3/8",SS
10	8	061100049000	WASHER,FLAT,OS,5/16",SS
11	4	061110049000	WASHER FENDER .312 SS
12	8	061142150016	SCREW,HEX HEAD,.31-18x1.00,SS
13	4	061142157016	BOLT HEX .375-16 X 1.0 SS
14	1	1904040600	STRAIN RELIEF .50 LIQTITE
15	1	1920016590	STRAIN RELIEF 90, .50 BLK W-NUT
16	1	4928402800	CONDUIT .50 FLEX BLK

RECOMMENDED SPARES

PART NUMBER	DESCRIPTION
B654080002	HP PUMP VALVE REBUILD 2.3-4.2G
B653090001	HP PUMP SEAL KIT REBUILD GEN P
B647800003	PUMP OIL 16 OZ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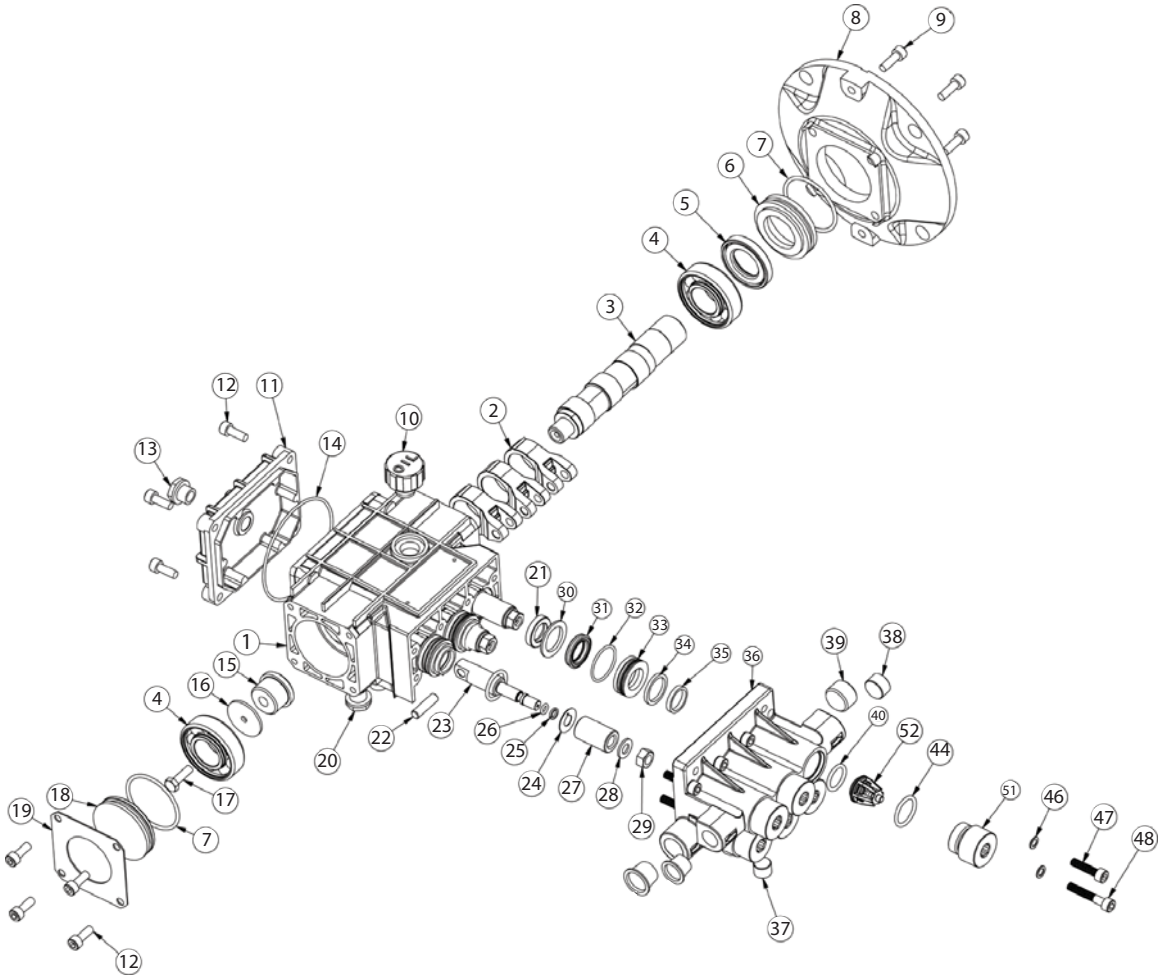
HP PUMP ASSY-12180513CO (STANDARD)

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1-52	1	12180511CO	Pump HP 3.0 GPM SS Left (complete high pressure pump)
		12180512CO	Pump HP 4.2 GPM SS Left (complete high pressure pump)
1-29	1	12180511CO-CCAL	Crank Case Stuffed HP 3.0 GPM SS Left
		12180512CO-CCAL	Crank Case Stuffed HP 4.2 GPM SS Left
30-52	1	12180511CO-WE	Manifold Stuffed HP 3.0 GPM SS
		12180512CO-WE	Manifold Stuffed HP 4.2 GPM SS
1	1	12180510CO-01	Crankcase
2	3	12180510CO-02	Connecting Rod
3	1	12180511CO-03	Crankshaft 5/8” Hollow 3.0 GPM
		12180512CO-03	Crankshaft 5/8” Hollow 4.2 GPM
4	2	12180510CO-04	Bearing
5	1	12180510CO-05	Oil Seal, Crankshaft
6	1	12180510CO-06	Retainer, Oil Sea
7	2	12180510CO-07	O-ring, Oil Seal Retainer/Side Cover
8	1	12180510CO-08	Flange, NEMA 56C Face
9	4	12180510CO-09	Screw SHCS 18mm Long
10	1	12180510CO-10	Oil Cap Vented
11	1	12180510CO-11	Rear Cover
12	8	12180510CO-12	Screw SHCS 16mm Long
13	1	12180510CO-13	Sight Glass
14	1	12180510CO-14	O-ring, Rear Cover
15	1	12180510CO-15	Bushing
16	1	12180510CO-16	Washer
17	1	12180510CO-17	Screw HHCS 20mm long
18	1	12180510CO-18	Side Cover
19	1	12180510CO-19	Side Plate
20	1	12180510CO-20	Oil Drain Plug
21	3	12180510CO-21	Oil Seal Plunger
22	3	12180510CO-22	Wrist Pin
23	3	12180510CO-23	Plunger Rod
24	3	12180510CO-24	Slinger
25	3	12180510CO-25	Anti-Extrusion Ring
26	3	12180510CO-26	O-ring Plunger
27	3	12180510CO-27	Plunger 18mm
28	3	12180510CO-28	Washer, Plunger Rod
29	3	12180510CO-29	Nut, Plunger Rod
30	3	12180510CO-30	Seal Retainer
31	3	12180510CO-31	Low Pressure Sea
32	3	12180510CO-32	O-ring Seal Case
33	3	12180510CO-33	Seal case
34	3	12180510CO-34	Square Ring, High Pressure Seal

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
35	3	12180510CO-35	Glide Ring, High Pressure Seal
36	1	12180510CO-36	Manifold
37	3	12180510CO-37	1/4 NPT Plug
38	1	12180510CO-38	3/8 NPT Plug
39	1	12180510CO-39	1/2 NPT Plug
40	6	12180510CO-40	O-ring Valve Spacer
44	6	12180510CO-44	O-ring Valve Plug
46	8	12180510CO-46	CONDUIT .50 FLEX BLK
47	4	12180510CO-47	Screw SHCSM5 x 25mm Long
48	4	12180510CO-48	Screw SHCSM5 x 35mm Long
51	6	12180513CO-51	Valve Cap
52	6	12180510CO-52	Valve Assembly 2.3 through 4.2 GPM
		B647800003	Pump Oil 16oz

REPAIR KITS:

PART NUMBER	MODEL NUMBER	ITEMS IN KIT	PER KIT
B653090001	SRC HPP Seal Kit	25, 26, 30, 31, 32, 33, 34 & 35	3
B654080002	SRC HPP Seal Kit	40, 44 & 52	6
B652090002	SRC HPP Seal Kit	25, 26, 30, 31, 32, 33, 34, 35, 40, 44 & 52	6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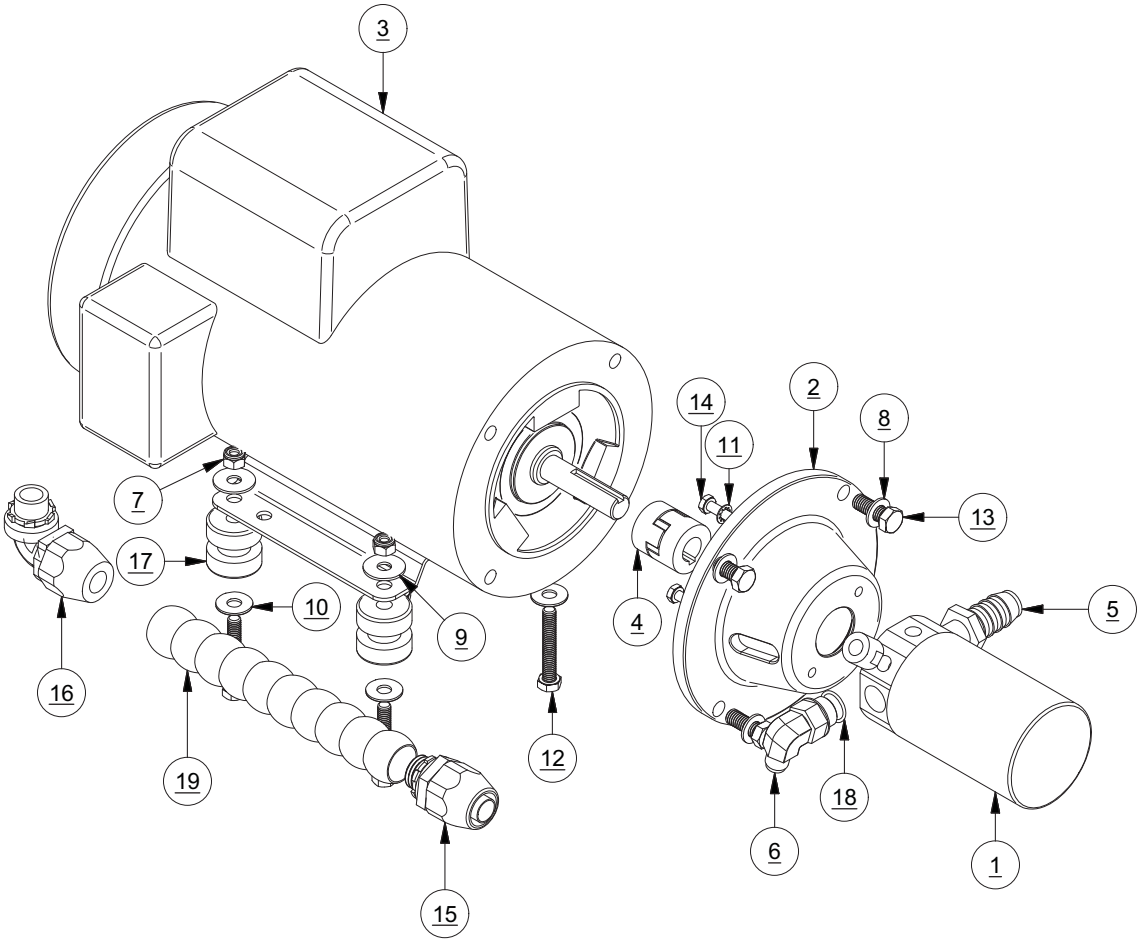
B156930001 HP PUMP-MOTOR AQWCII APP 110-220-50-60 1PH

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	12572405DS	PUMP DANFOSS TYPE 4
2	1	1220770101	1 PHASE BELL HOUSING-AQUAMATIC II
3	1	15AE261912	MOTOR 3-2.5 HP 115-230 1PH
4	1	12207602RW	COUPLER TX1 AQM2
5	1	01126526DG	ADAP 0.50 MPT x 0.75 BARB NYLON
6	1	1317021869	ELB90 -6 FLARE X MNPT SS
7	4	061060050000	NUT HEX .31-18 W-INSERT SS
8	4	061080056000	WASHER,FLAT,3/8",SS
9	4	061100049000	WASHER,FLAT,OS,5/16",SS
10	4	061110049000	WASHER FENDER .312 SS
11	2	061120091000	WASHER SPLITLOCK M6
12	4	061142150032	BOLT HEX .31-18 X 2.0 SS
13	4	061142157016	BOLT HEX .375-16 X 1.0 SS
14	2	061142191174	HEX BOLT M6X 20mm LG SS
15	1	1904040600	STRAIN RELIEF .50 LIQTITE
16	1	1920016590	STRAIN RELIEF 90, .50 BLK W-NUT
17	4	2115031700	RUBBER MOUNT 90LB
18	1	353033002A	O-RING 017
19	1	4928402800	CONDUIT .50 FLEX BLK

RECOMMENDED SPARES

PART NUMBER	DESCRIPTION
B653DF0003	SEAL KIT 4.37 V2 >06/08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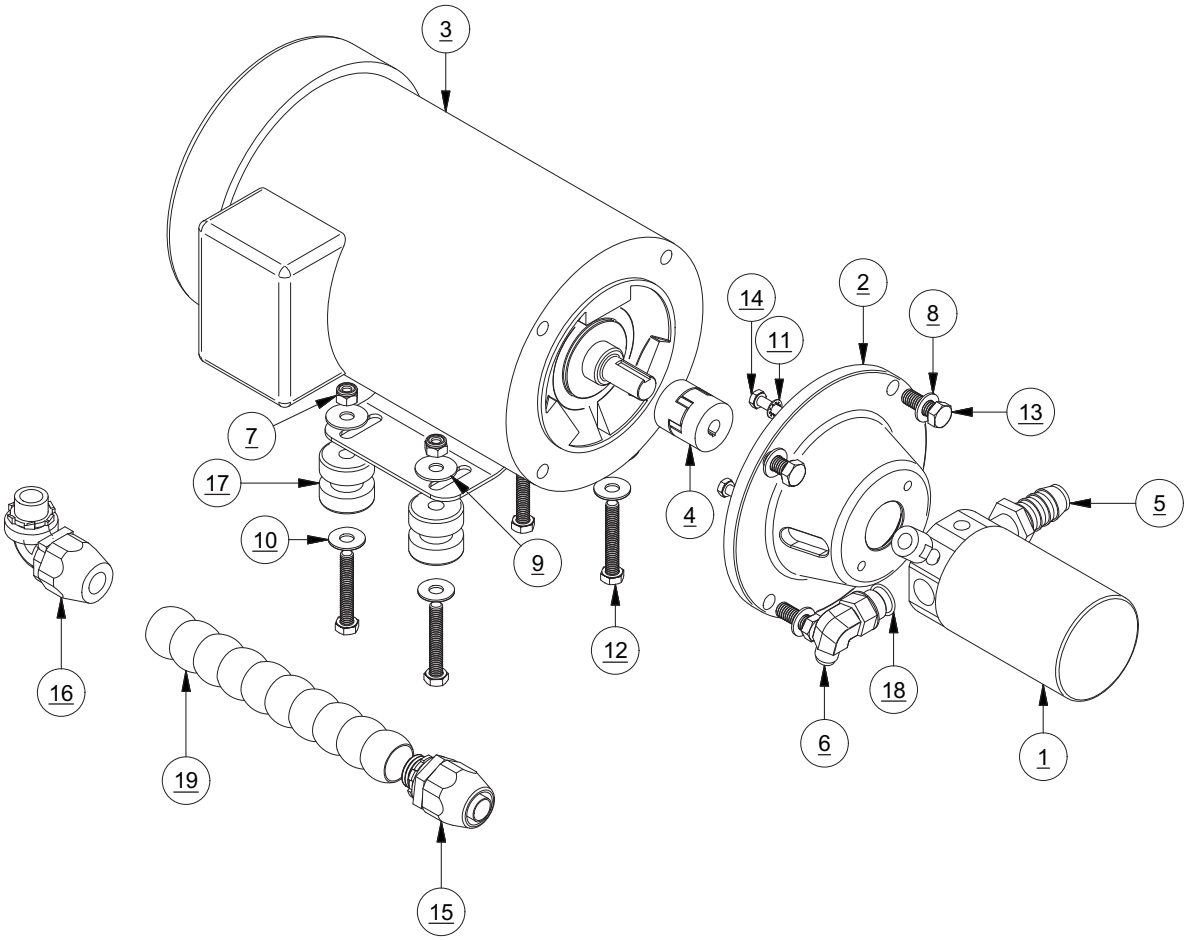
B156930002 HP PUMP-MOTOR AQWCII APP 220-440-50-60 3PH

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	12572405DS	PUMP DANFOSS TYPE 4
2	1	1220770101	1 PHASE BELL HOUSING-AQUAMATIC II
3	1	15AF271910	MOTOR 3-2.5 HP 3 PH 50-6
4	1	12207602RW	COUPLER TX1 AQM2
5	1	01126526DG	ADAP 0.50 MPT x 0.75 BARB NYLON
6	1	1317021869	ELB90 -6 FLARE X MNPT SS
7	4	061060050000	NUT HEX .31-18 W-INSERT SS
8	4	061080056000	WASHER,FLAT,3/8",SS
9	4	061100049000	WASHER,FLAT,OS,5/16",SS
10	4	061110049000	WASHER FENDER .312 SS
11	2	061120091000	WASHER SPLITLOCK M6
12	4	061142150032	BOLT HEX .31-18 X 2.0 SS
13	4	061142157016	BOLT HEX .375-16 X 1.0 SS
14	2	061142191174	HEX BOLT M6X 20mm LG SS
15	1	1904040600	STRAIN RELIEF .50 LIQTITE
16	1	1920016590	STRAIN RELIEF 90, .50 BLK W-NUT
17	4	2115031700	RUBBER MOUNT 90LB
18	1	353033002A	O-RING 017
19	1	4928402800	CONDUIT .50 FLEX BLK

RECOMMENDED SPARES

PART NUMBER	DESCRIPTION
B653DF0003	SEAL KIT 4.37 V2 >06/08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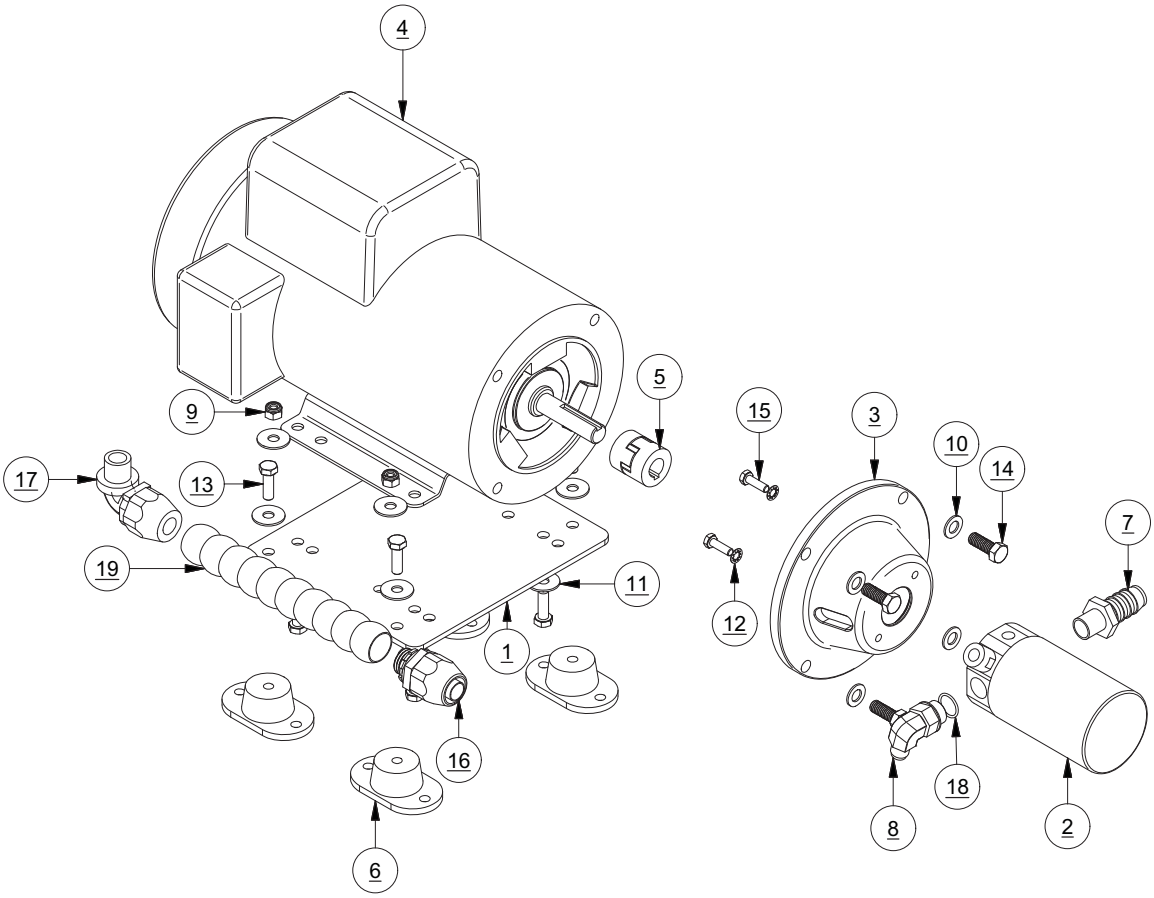
B156920001 HPP-MTR ASSY AQWMII APP 110-220 50-60-1PH

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	2020054903A	PANEL MOTOR BASE PLATE
2	1	12572405DS	PUMP DANFOSS TYPE 4
3	1	1220770101	1 PHASE BELL HOUSING-AQUAMATIC II
4	1	15AE261912	MOTOR 3-2.5 HP 115-230 1PH
5	1	12207602RW	COUPLER TX1 AQM2
6	4	2115030120	RUBBER MOUNT 55 AQUA SERIES
7	1	01126526DG	ADAP 0.50 MPT x 0.75 BARB NYLON
8	1	1317021869	ELB90 -6 FLARE X MNPT SS
9	4	061060050000	NUT HEX .31-18 W-INSERT SS
10	4	061080056000	WASHER,FLAT,3/8",SS
11	12	061100049000	WASHER,FLAT,OS,5/16",SS
12	2	061120091000	WASHER SPLITLOCK M6
13	8	061142150016	SCREW,HEX HEAD,.31-18x1.00,SS
14	4	061142157016	BOLT HEX .375-16 X 1.0 SS
15	2	061142191174	HEX BOLT M6X 20mm LG SS
16	1	1904040600	STRAIN RELIEF .50 LIQTITE
17	1	1920016590	STRAIN RELIEF 90, .50 BLK W-NUT
18	1	353033002A	O-RING 017
19	1	4928402800	CONDUIT .50 FLEX BLK

RECOMMENDED SPARES

PART NUMBER	DESCRIPTION
B653DF0003	SEAL KIT 4.37 V2 >06/08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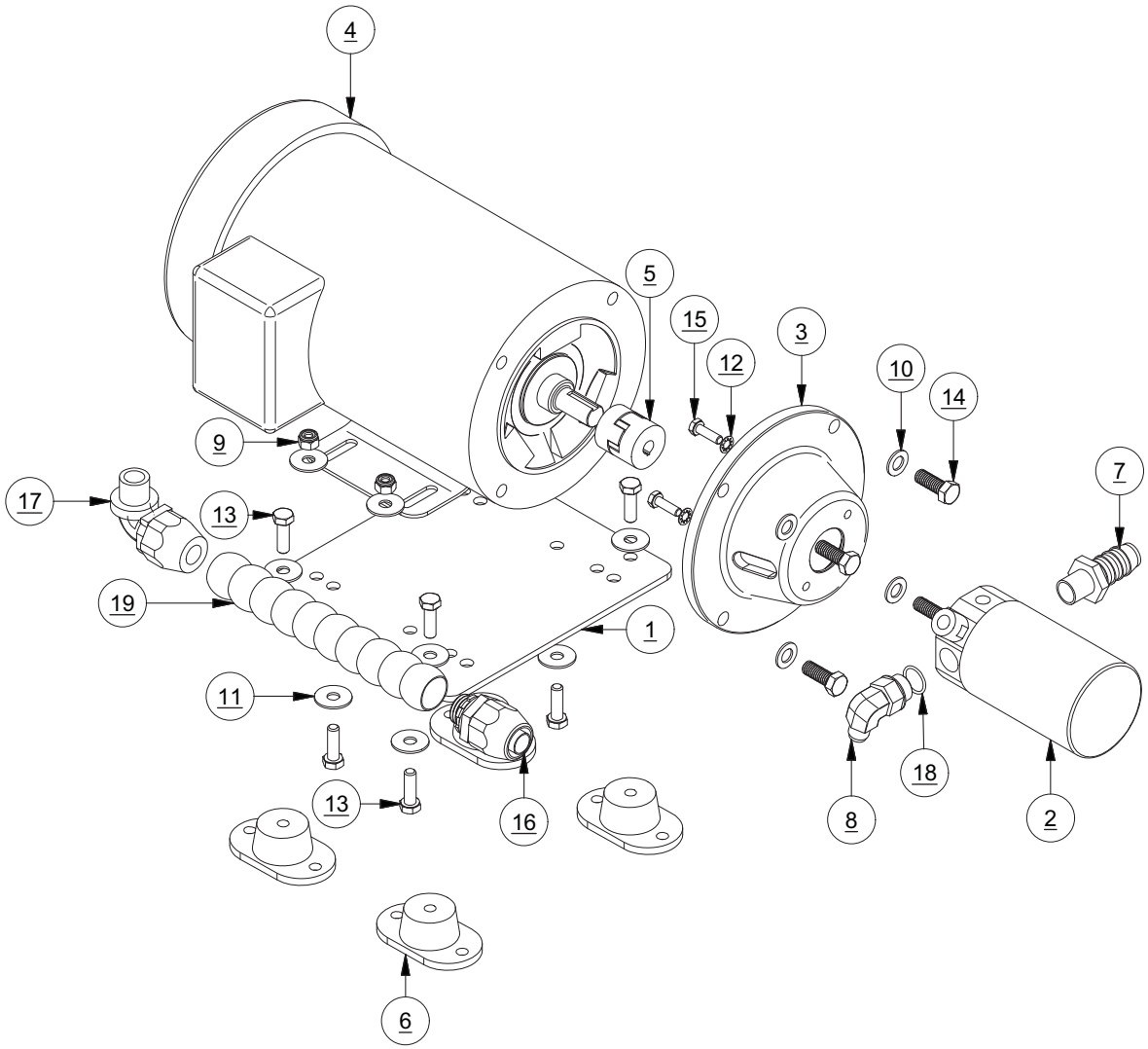
B156920002 HPP-MTR ASSY AQWMII APP 220-440 50-60-3PH

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	2020054903A	PANEL MOTOR BASE PLATE
2	1	12572405DS	PUMP DANFOSS TYPE 4
3	1	1220770101	1 PHASE BELL HOUSING-AQUAMATIC II
4	1	15AF271910	MOTOR 3-2.5 HP 3 PH 50-6
5	1	12207602RW	COUPLER TX1 AQM2
6	4	2115030120	RUBBER MOUNT 55 AQUA SERIES
7	1	01126526DG	ADAP 0.50 MPT x 0.75 BARB NYLON
8	1	1317021869	ELB90 -6 FLARE X MNPT SS
9	4	061060050000	NUT HEX .31-18 W-INSERT SS
10	4	061080056000	WASHER,FLAT,3/8",SS
11	12	061100049000	WASHER,FLAT,OS,5/16",SS
12	2	061120091000	WASHER SPLITLOCK M6
13	8	061142150016	SCREW,HEX HEAD,.31-18x1.00,SS
14	4	061142157016	BOLT HEX .375-16 X 1.0 SS
15	2	061142191174	HEX BOLT M6X 20mm LG SS
16	1	1904040600	STRAIN RELIEF .50 LIQTITE
17	1	1920016590	STRAIN RELIEF 90, .50 BLK W-NUT
18	1	353033002A	O-RING 017
19	1	4928402800	CONDUIT .50 FLEX BLK

RECOMMENDED SPARES

PART NUMBER	DESCRIPTION
B653DF0003	SEAL KIT 4.37 V2 >06/08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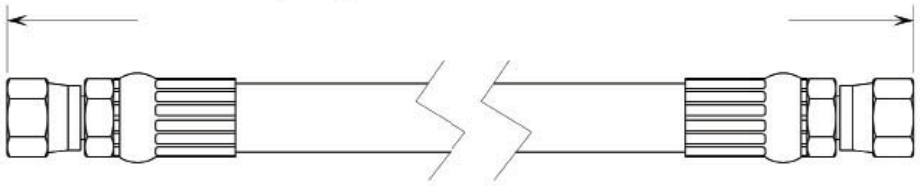
HP Hose Assembly

PART NO.	QTY	DESCRIPTION
2432160669	1	HOSE HP - 6P
1317481969	2	SWIVEL FITTING - 6 SSP

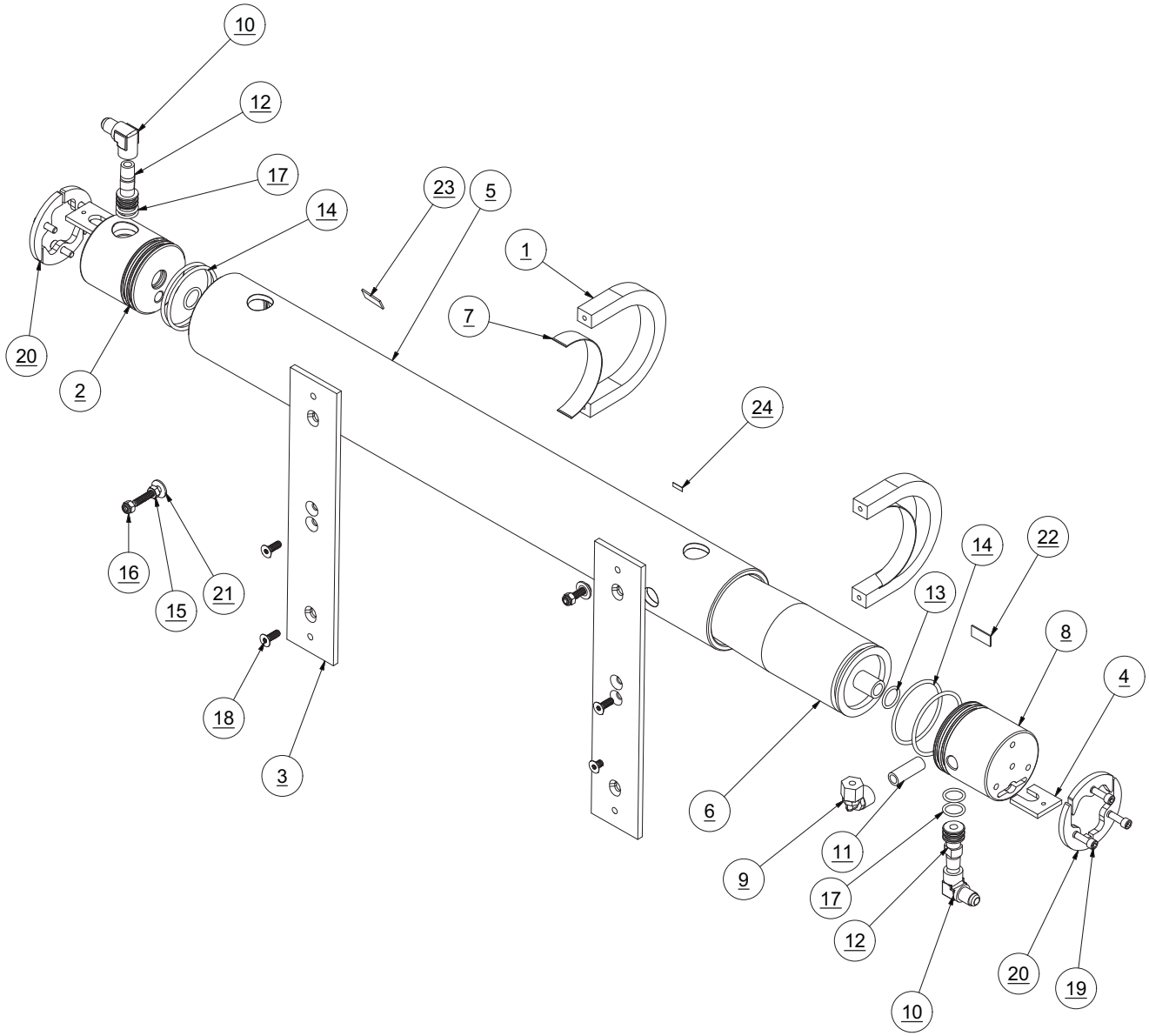
SPECIFY PART NUMBER AND DESCRIPTION OF SPECIFIC HIGH PRESSURE HOSE ASSEMBLY
OR IF A SPECIAL LENGTH IS REQUIRED, SPECIFY MEASURED OVERALL LENGTH: FITTING TO FITTING



OVERALL LENGTH IS + / - 1/4" (6mm)

B198000032 MEMBRANE RACK 450-1 GPD AQM II

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	2	05202401GR	BRACKET,MVA U-CLAMP,3 IN
2	1	2453502400	END PLUG SINGLE 3 AW
3	2	0520051800	MVA RACK AW SERIES
4	2	0520210600	RETAINER PORT MVA
5	1	2408132500	VESSEL HIGH PRESSURE 450GPD
6	1	2724011233	MEMBRANE 450GPD AW W-SEAL
7	2	2615180100	FELT ADHESIVE 0.125 X 0.75 STRIP
8	1	2453512400	END PLUG DUAL 3 IN AW
9	1	0204010869	ELB90 .25 TUBE x .25 FNPT PLASTIC
10	2	1317011769	ELB90 6 FLARE X .25 FPT SS
11	1	0101370815	NIPPLE 0.25 NPT x 1.50
12	2	0117410800	NIPPLE HP MVA AW
13	2	2614010100	O-RING 116 PRODUCT AS-AW
14	4	2614014900	O-RING 230 BRINE 3.0 END PLUG
15	2	061142145016	BOLT HEX .25-20 X 1 SS
16	2	061060045000	NUT HEX .25-20 W-INSERT SS
17	4	2614017900	O-RING 115 INTERCONNECT AW
18	4	061161845012	SC ALLEN FLAT .25-20 X .75 SS
19	6	061162345012	SC SOC CAP .25-20 X .75 SS
20	2	20201030000	SEGMENT RING AW (SET)
21	2	061100043000	WASHER FLAT OS .25 SS
22	1	2213017063	LABEL INLET (WHITE BACKGROUND)
23	1	2213017163	LABEL OUTLET (WHITE BACKGROUND)
24	1	2220010660	LABEL MEMBRANE SERIAL NO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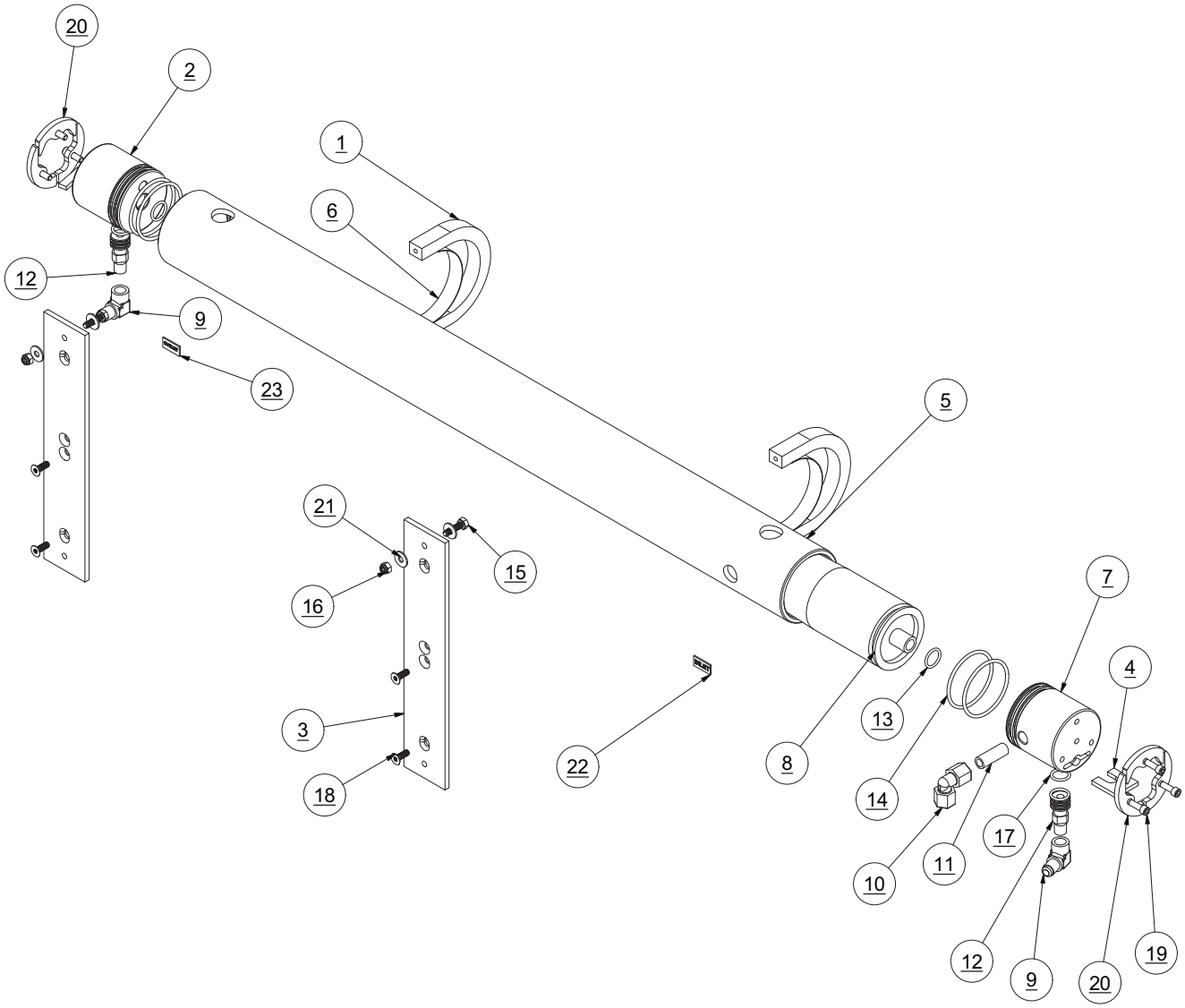
B198000033 MEMBRANE RACK 700-1 STD AQM-II

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	2	05202401GR	BRACKET MVA U-CLAMP
2	1	2453502400	END PLUG SINGLE 3 AW
3	2	0520051800	MVA RACK AW SERIES
4	2	0520210600	RETAINER PORT MVA
5	1	2408132500-01	VESSEL HIGH PRESSURE 700GPD
6	2	2615180100	FELT ADHESIVE 0.125 X 0.75 STRIP
7	1	2453512400	END PLUG DUAL 3 IN AW
8	1	2724011333	MEMBRANE 450GPD AW W-SEAL
9	2	1317011769	ELB90 6 FLARE X .25 FPT SS
10	1	0204010869	ELBOW,PP,1/4 ODx1/4 FT
11	1	0101370815	NIPPLE 0.25 NPT x 1.50
12	2	0117410800	NIPPLE HP MVA AW
13	2	2614010100	O-RING 116 PRODUCT AS-AW
14	4	2614014900	O-RING 230 BRINE 3.0 END PLUG
15	2	061142145016	BOLT HEX .25-20 X 1 SS
16	2	061060045000	NUT HEX .25-20 W-INSERT SS
17	4	2614017900	O-RING 115 INTERCONNECT AW
18	4	061161845012	SC ALLEN FLAT .25-20 X .75 SS
19	6	061162345012	SC SOC CAP .25-20 X .75 SS
20	2	20201030000	SEGMENT RING AW (SET)
21	4	061100043000	WASHER FLAT OS .25 SS
22	1	2213017063	LABEL INLET (WHITE BACKGROUND)
23	1	061161626012	LABEL OUTLET (WHITE BACKGROUND)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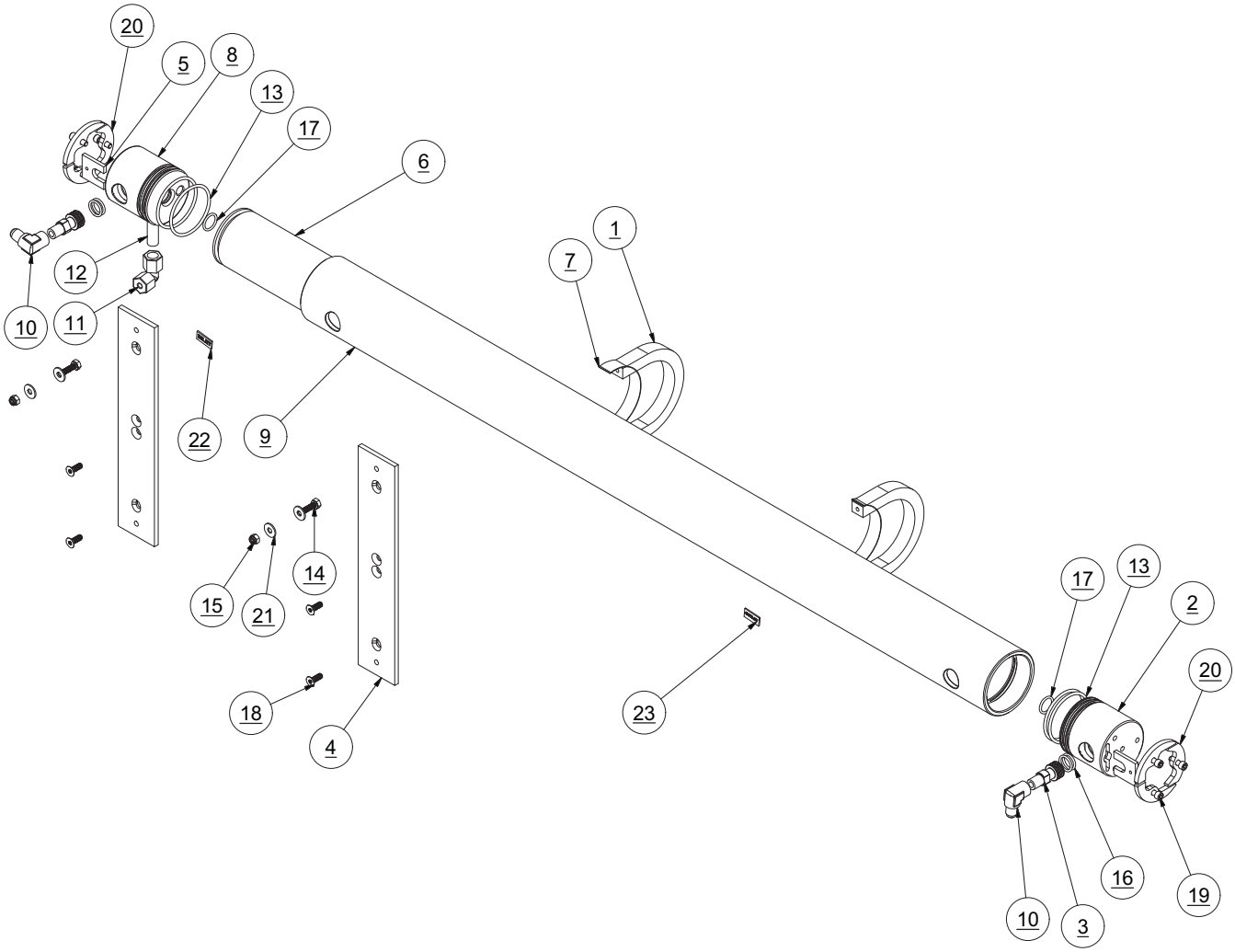
B198000034 MEMBRANE RACK 900-1 STD AQM-II

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	2	05202401GR	BRACKET MVA U-CLAMP
2	1	2453502400	END PLUG SINGLE 3 AW
3	2	0117410800	HP NIPPLE 0.25 MPT
4	2	0520051800	MVA RACK AW SERIES
5	2	0520210600	RETAINER PORT MVA
6	1	2724011433	MEMBRANE 900 GPD AW W-SEAL
7	2	2615180100	FELT ADHESIVE 0.125 X 0.75 STRIP
8	1	2453512400	END PLUG DUAL 3 IN AW
9	1	2408132500-02	VESSEL HIGH PRESSURE 900GPD
10	2	1317011769	ELB90 6 FLARE X .25 FPT SS
11	1	0204010869	ELBOW,PP,1/4 ODx1/4 FT
12	1	0101370815	NIPPLE 0.25 NPT x 1.50
13	4	2614014900	O-RING 230 BRINE 3.0 END PLUG
14	2	061142145016	BOLT HEX .25-20 X 1 SS
15	2	061060045000	NUT HEX .25-20 W-INSERT SS
16	4	2614017900	O-RING 115 INTERCONNECT AW
17	2	2614010100	O-RING 116 PRODUCT AS-AW
18	4	061161845012	SC ALLEN FLAT .25-20 X .75 SS
19	6	061162345012	SC SOC CAP .25-20 X .75 SS
20	2	20201030000	SEGMENT RING AW (SET)
21	4	061100043000	WASHER FLAT OS .25 SS
22	1	2213017063	LABEL INLET (WHITE BACKGROUND)
23	1	2213017163	LABEL OUTLET (WHITE BACKGROUND)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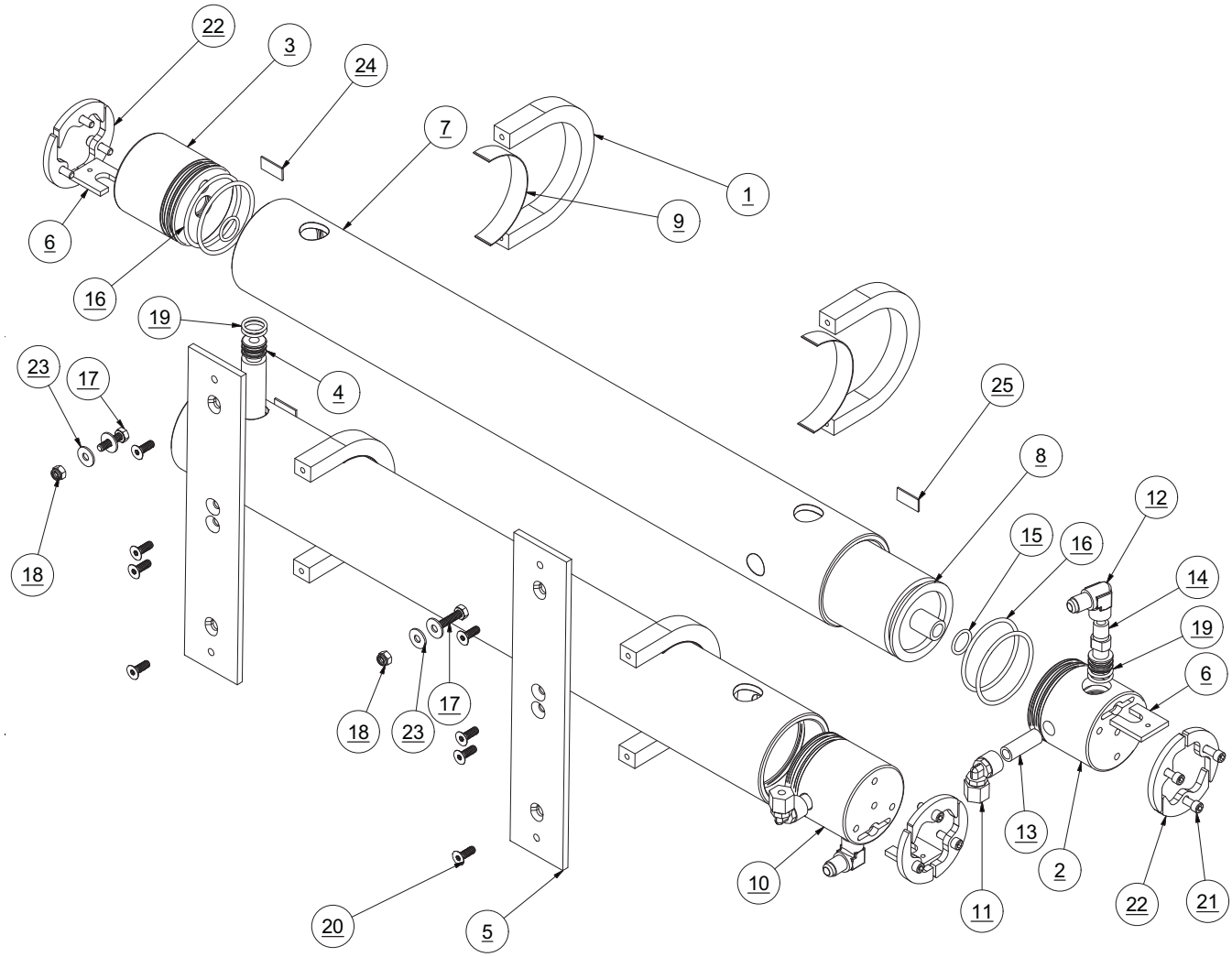
B198000035 MEMBRANE RACK 900-2 STD AQM-II

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	4	05202401GR	BRACKET MVA U-CLAMP
2	1	H36160522400	END PLUG 3 IN DUAL HORIZON SEAFARI
3	2	2453502400	END PLUG SINGLE 3 AW
4	1	2417430800	INTERCONNECT MVA SS
5	2	0520051800	MVA RACK AW SERIES
6	4	0520210600	RETAINER PORT MVA
7	2	2408132500	VESSEL HIGH PRESSURE 450GPD
8	2	2724011233	MEMBRANE 450GPD AW W-SEAL
9	4	2615180100	FELT ADHESIVE 0.125 X 0.75 STRIP
10	1	2453512400	END PLUG DUAL 3 IN AW
11	2	0204010869	ELB90 .25 TUBE x .25 FNPT PLASTIC
12	2	1317011769	ELB90 6 FLARE X .25 FPT SS
13	2	0101370815	NIPPLE 0.25 NPT x 1.50
14	2	0117410800	NIPPLE HP MVA AW
15	4	2614010100	O-RING 116 PRODUCT AS-AW
16	8	2614014900	O-RING 230 BRINE 3.0 END PLUG
17	2	061142145016	BOLT HEX .25-20 X 1 SS
18	2	061060045000	NUT HEX .25-20 W-INSERT SS
19	8	2614017900	O-RING 115 INTERCONNECT AW
20	8	061161845012	SC ALLEN FLAT .25-20 X .75 SS
21	12	061162345012	SC SOC CAP .25-20 X .75 SS
22	4	20201030000	SEGMENT RING AW (SET)
23	4	061100043000	WASHER FLAT OS .25 SS
24	2	2213017063	LABEL INLET (WHITE BACKGROUND)
25	2	2213017163	LABEL OUTLET (WHITE BACKGROUND)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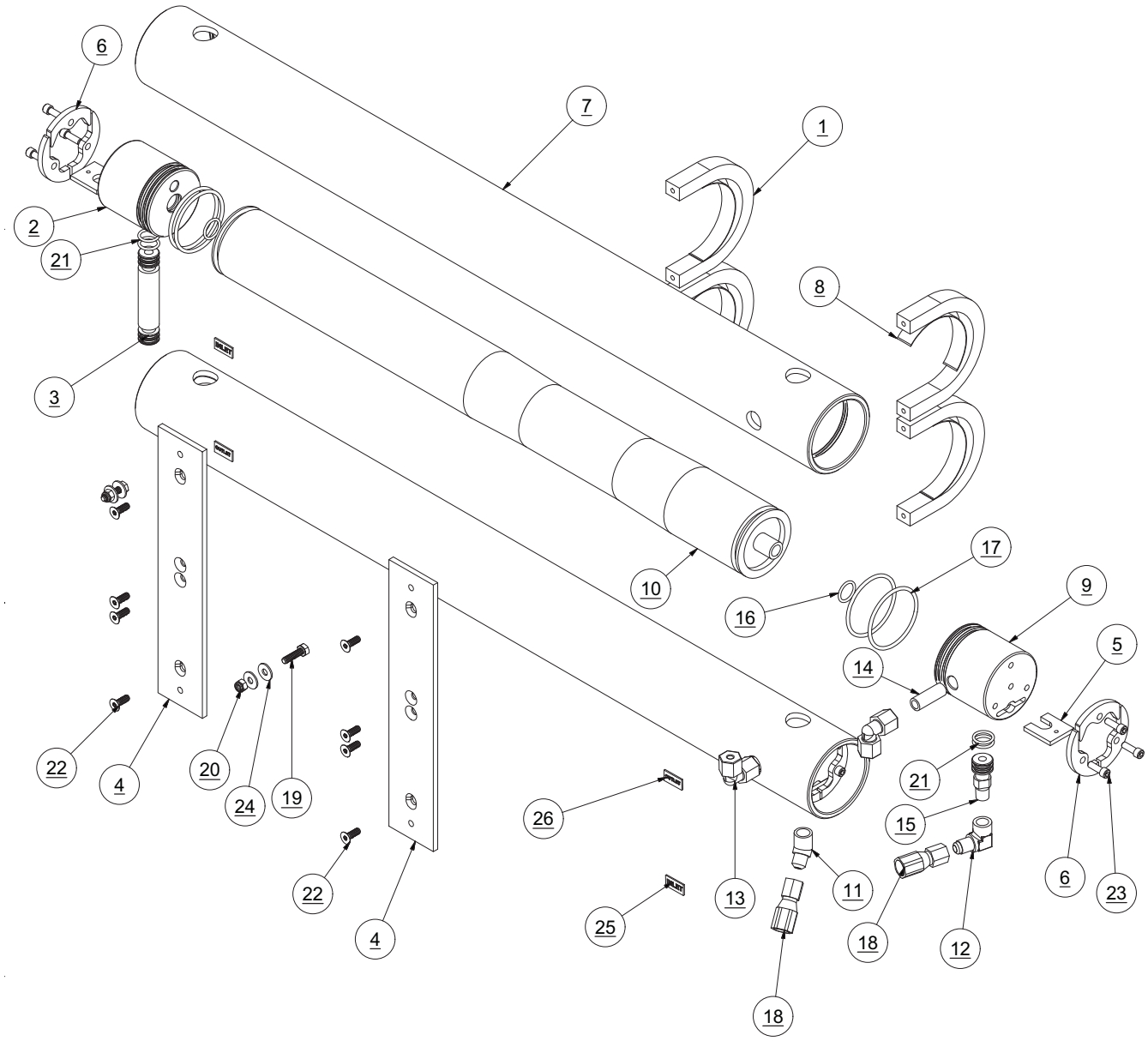
B198000036 MEMBRANE RACK 1400-2 STD AQM-II

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	4	05202401GR	BRACKET MVA U-CLAMP
2	2	2453502400	END PLUG SINGLE 3 AW
3	1	2417430800	INTERCONNECT MVA SS
4	2	0520051800	MVA RACK AW SERIES
5	4	0520210600	RETAINER PORT MVA
6	4	20201030000	SEGMENT RING AW (SET)
7	2	2408132500-01	VESSEL HIGH PRESSURE 700GPD
8	4	2615180100	FELT ADHESIVE 0.125 X 0.75 STRIP
9	2	2453512400	END PLUG DUAL 3 IN AW
10	2	2724011333	MEMBRANE 450GPD AW W-SEAL
11	1	1317064800	ELB45 6 FLARE x .25 FNPT SS
12	1	1317011769	ELB90 6 FLARE X .25 FPT SS
13	2	0204010869	ELBOW,PP,1/4 ODx1/4 FT
14	2	0101370815	NIPPLE 0.25 NPT x 1.50
15	2	0117410800	NIPPLE HP MVA AW
16	4	2614010100	O-RING 116 PRODUCT AS-AW
17	8	2614014900	O-RING 230 BRINE 3.0 END PLUG
18	2	1317481969	SWIVEL FITTING 6 SS P
19	2	061142145016	BOLT HEX .25-20 X 1 SS
20	2	061060045000	NUT HEX .25-20 W-INSERT SS
21	8	2614017900	O-RING 115 INTERCONNECT AW
22	8	061161845012	SC ALLEN FLAT .25-20 X .75 SS
23	12	061162345012	SC SOC CAP .25-20 X .75 SS
24	4	061100043000	WASHER FLAT OS .25 SS
25	2	2213017063	LABEL INLET (WHITE BACKGROUND)
26	2	2213017163	LABEL OUTLET (WHITE BACKGROUND)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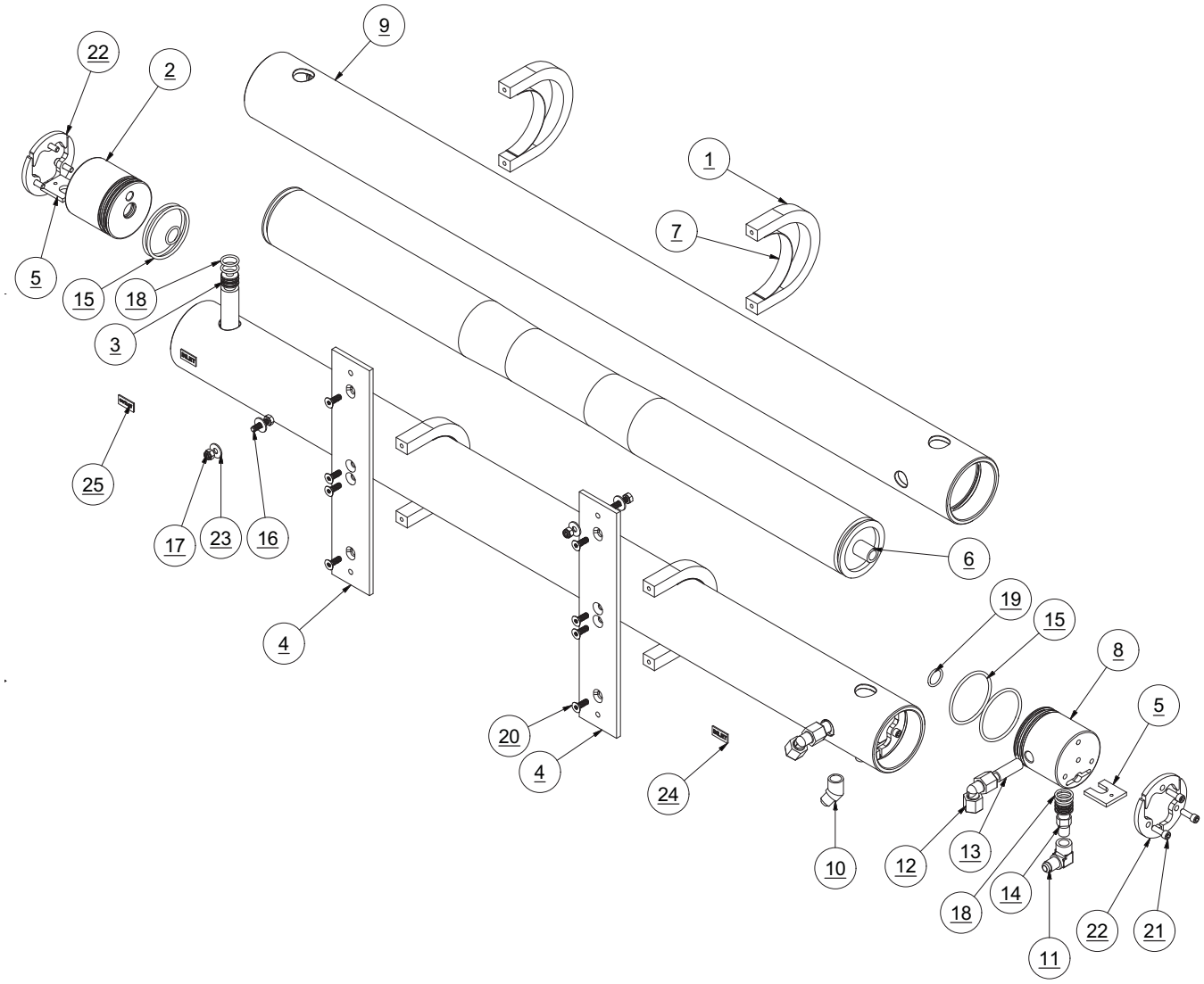
B198000037 MEMBRANE RACK 1800-2

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	4	05202401GR	BRACKET MVA U-CLAMP
2	2	2453502400	END PLUG SINGLE 3 AW
3	1	2417430800	INTERCONNECT MVA SS
4	2	0520051800	MVA RACK AW SERIES
5	4	0520210600	RETAINER PORT MVA
6	2	2724011433	MEMBRANE 900 GPD AW W-SEAL
7	4	2615180100	FELT ADHESIVE 0.125 X 0.75 STRIP
8	2	2453512400	END PLUG DUAL 3 IN AW
9	2	2408132500-02	VESSEL HIGH PRESSURE 900GPD
10	1	1317064800	ELB45 6 FLARE x .25 FNPT SS
11	1	1317011769	ELB90 6 FLARE X .25 FPT SS
12	2	0204010869	ELBOW,PP,1/4 ODx1/4 FT
13	2	0101370815	NIPPLE 0.25 NPT x 1.50
14	2	0117410800	NIPPLE HP MVA AW
15	8	2614014900	O-RING 230 BRINE 3.0 END PLUG
16	2	061142145016	BOLT HEX .25-20 X 1 SS
17	2	061060045000	NUT HEX .25-20 W-INSERT SS
18	8	2614017900	O-RING 115 INTERCONNECT AW
19	4	2614010100	O-RING 116 PRODUCT AS-AW
20	8	061161845012	SC ALLEN FLAT .25-20 X .75 SS
21	12	061162345012	SC SOC CAP .25-20 X .75 SS
22	4	20201030000	SEGMENT RING AW (SET)
23	4	061100043000	WASHER FLAT OS .25 SS
24	2	2213017063	LABEL INLET (WHITE BACKGROUND)
25	2	2213017163	LABEL OUTLET (WHITE BACKGROUND)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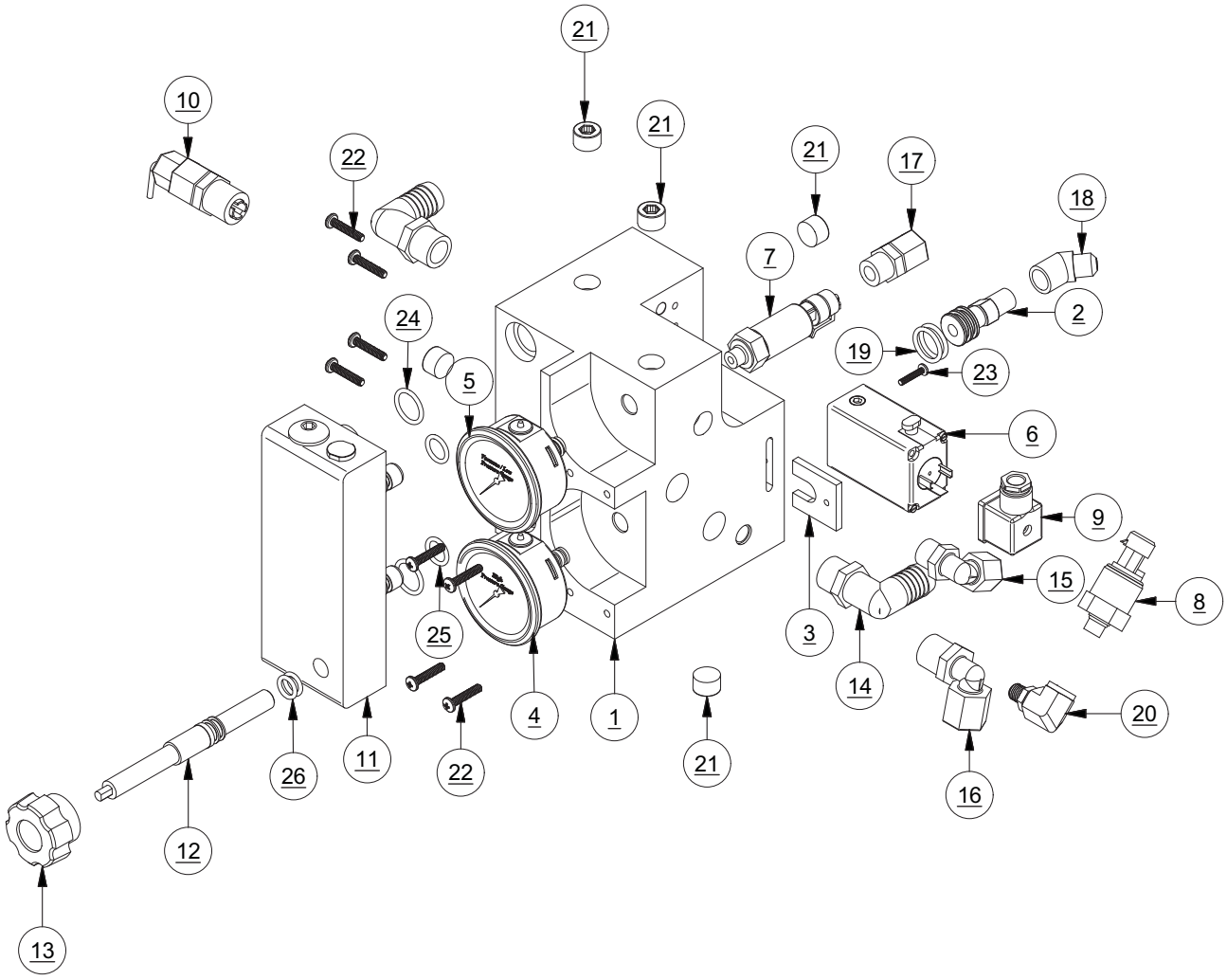
B502950001 MANIFOLD CONTRL SYS ASSY AWP

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	5353370700	MANIFOLD,CONTRL SYS,AWP
2	1	0117410800	HP NIPPLE 0.25 MPT
3	1	0520210600	RETAINER PORT MVA
4	1	10181421CC	GAUGE 0-1400 CBM.O-RING SEAL
5	1	10181523CC	GAUGE 0-70 CBM.NPT
6	1	1401096100	VALVE SOLENOID 12VDC
7	1	2317100200	TRANSDUCER 0-200 PSI .437 SAE
8	1	2317100300	TRANSDUCER 0-2000 PSI .437 SAE
9	1	3131682000	PLUG (CONNECTOR) DIN 4-PIN, CABLE DIAM 6-7MM
10	1	B511080003	SALINITY PROBE ASSY
11	1	H2510210001	FLOW METER.5-5GPM & 7-70GPH
12	1	H317481121005	BACKPRESSURE REGULATOR SHAFT HORIZON SEAFARI
13	1	H32458020158	KNOB BP REGULATOR
14	2	0112072600	ELB90 0.50 MPT x 0.75 BARB NYLON
15	2	0204021869	ELBOW,PP,3/8 ODx3/8 MT
16	1	0204022569	ELBOW,PP,1/2 ODx1/2 MT
17	2	0204091869	FITTING,PP,3/8 ODx3/8 MT
18	1	1317064800	ELB45 -6 FLARE x 0.25 FNPT SS
19	2	2614010100	O-RING 116 PRODUCT AS-AW
20	1	01172308BN	ELB90 ST 1/4 MPT X1/4 FPT 316SS -W/ORING
21	5	0117341869	PLUG .375 MNPT SS
22	8	061160630016	SC PHIL PAN #10-24x1 L SS
23	1	061170618109	SC PHIL PAN A #6 X .75 SS
24	2	2614010100	O-RING 116 PRODUCT AS-AW
25	2	2614014600	O-RING 113 PLUG PRODUCT AW-FM
26	2	2614017100	O-RING 111 SALINITY PRB-BPR CS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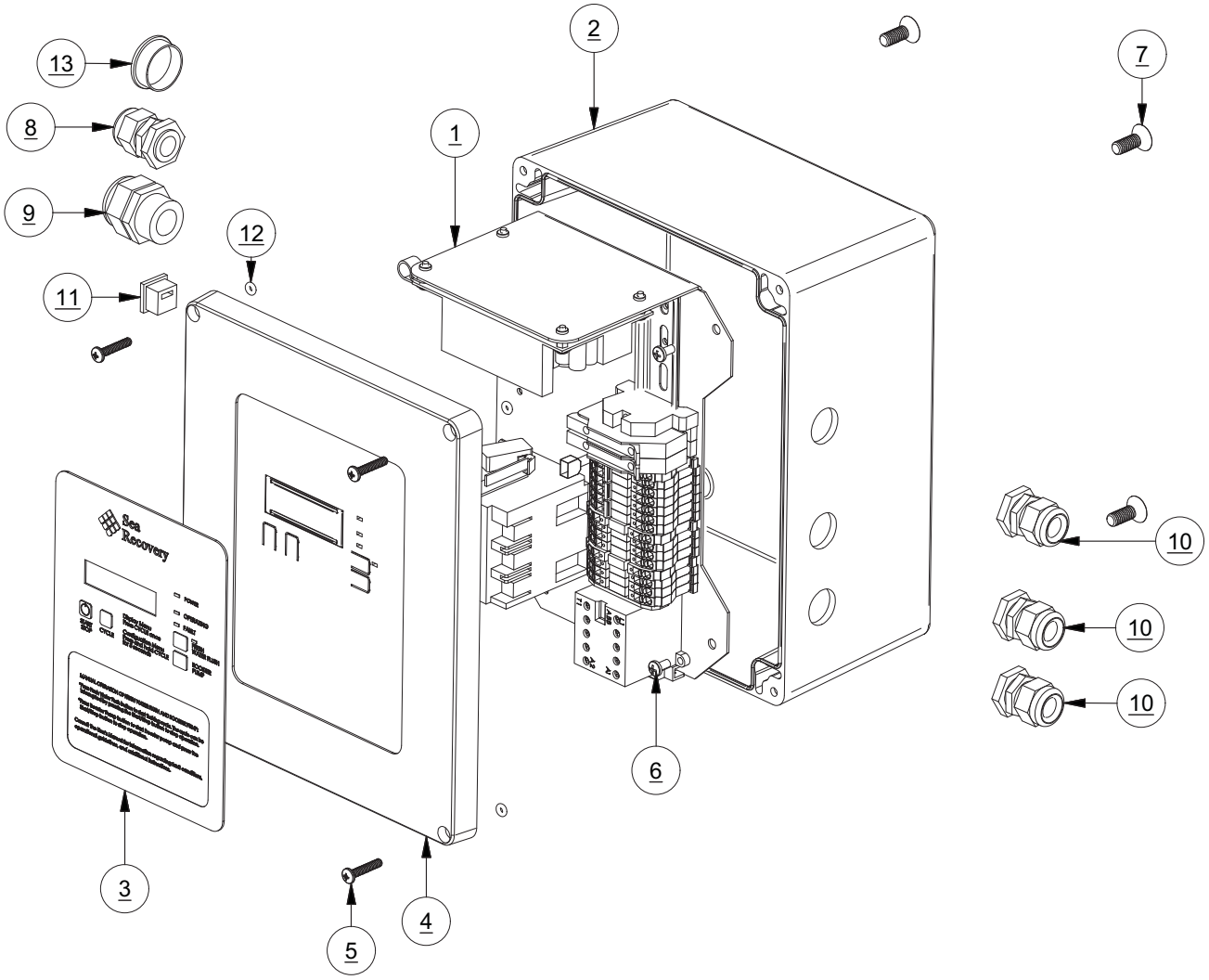
B595950001 CONTROLLER AWPC 110-220-1PH

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	H619110003	CHASSIS CONTROLLER SEAFARI VERS, 1 PHASE
2	1	31312282CH	ENCLOUSRE CONNECTION, HORIZON SEAFARI, REAR
3	1	3131561601	OVERLAY, TOUCH PAD (SRC)
4	1	R-31809001RS	LID,CONTROLLER,LCD,9.27 IN X 11.27 IN
5	4	061160630016	SC PHIL PAN #10-24x1 L SS
6	4	061160631005	SC PHIL PAN #10-32 X .31 SS
7	4	061161850014	SC ALLEN FLAT .31-18 X .875 SS
8	1	1904010043	STRAIN RELIEF 3217 .50 IN GREY
9	1	1904010243	STRAIN RELIEF 3222 .75 BLK
10	3	1904011800	STRAIN RELIEF 3 HOLE X 6MM
11	1	1904019243	STRAIN RELIEF 1834
12	4	2614012653	ORING GUIDE ROD 40 GPM 104
13	1	H31031100777	PLUG WHITE DOME 2723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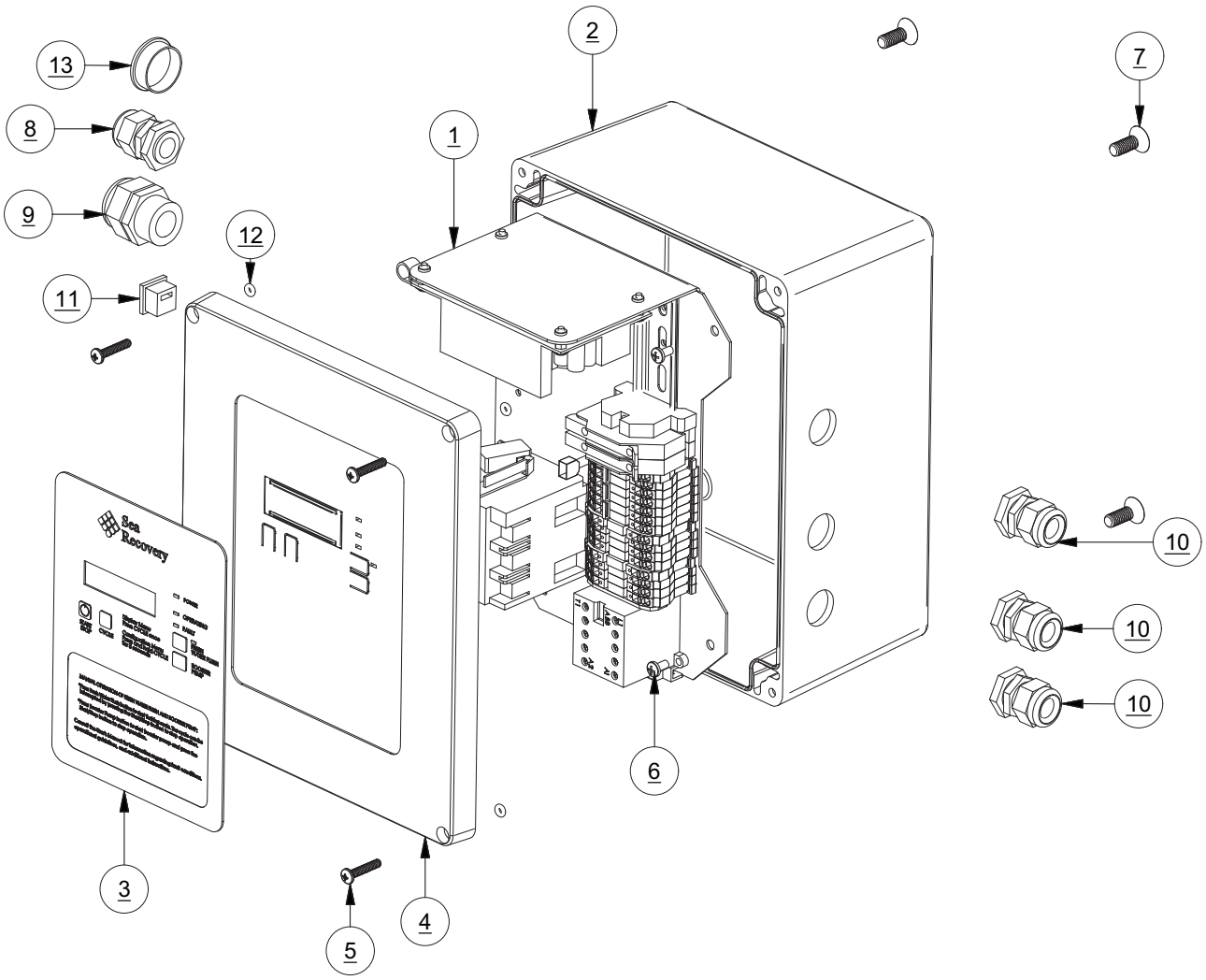
B595950002 CONTROLLER AWPC 220-380-3PH

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	H619110004	CHASSIS CONTROLLER SEAFARI VERS, 3 PHASE
2	1	31312282CH	ENCLOUSRE CONNECTION, HORIZON SEAFARI, REAR
3	1	3131561601	OVERLAY, TOUCH PAD (SRC)
4	1	R-31809001RS	LID,CONTROLLER,LCD,9.27 IN X 11.27 IN
5	4	061160630016	SC PHIL PAN #10-24x1 L SS
6	4	061160631005	SC PHIL PAN #10-32 X .31 SS
7	4	061161850014	SC ALLEN FLAT .31-18 X .875 SS
8	1	1904010043	STRAIN RELIEF 3217 .50 IN GREY
9	1	1904010243	STRAIN RELIEF 3222 .75 BLK
10	3	1904011800	STRAIN RELIEF 3 HOLE X 6MM
11	1	1904019243	STRAIN RELIEF 1834
12	4	2614012653	ORING GUIDE ROD 40 GPM 104
13	1	H31031100777	PLUG WHITE DOME 2723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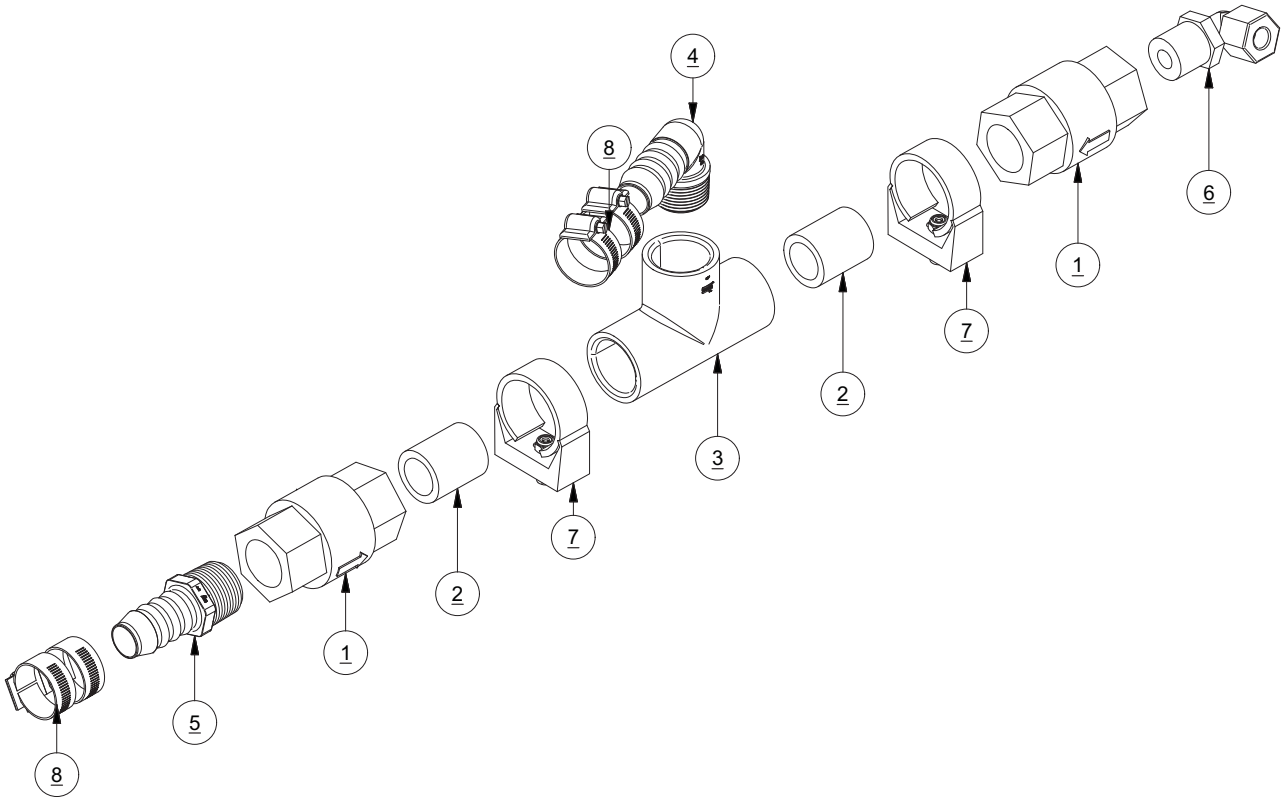
B501950003 CHECK VALVE ASSY AWPC

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	2	14012118AR	VALVE CHECK .75 FPT WITH VITO
2	2	101013737CL	NIPPLE 0.75 NPT x CL
3	1	0101423783	TEE 0.75 FT x FT x FT
4	1	01120737DG	ELB90 0.75 MPT x BARB NYLON
5	1	0112653700	ADAP .75 MPT X.75 BARB NYLON
6	1	0204021969	ELBOW,PP,3/8 ODx1/2 MT
7	2	0501164200	PIPE SUPPORT 1.125
8	4	05181434AA	HOSE CLAMP .75 SS
9	2	061060026000	NUT,HEX 8-32 W-INSERT SS
10	2	061161626012	SC PHIL FLAT #8-32 X .75 SS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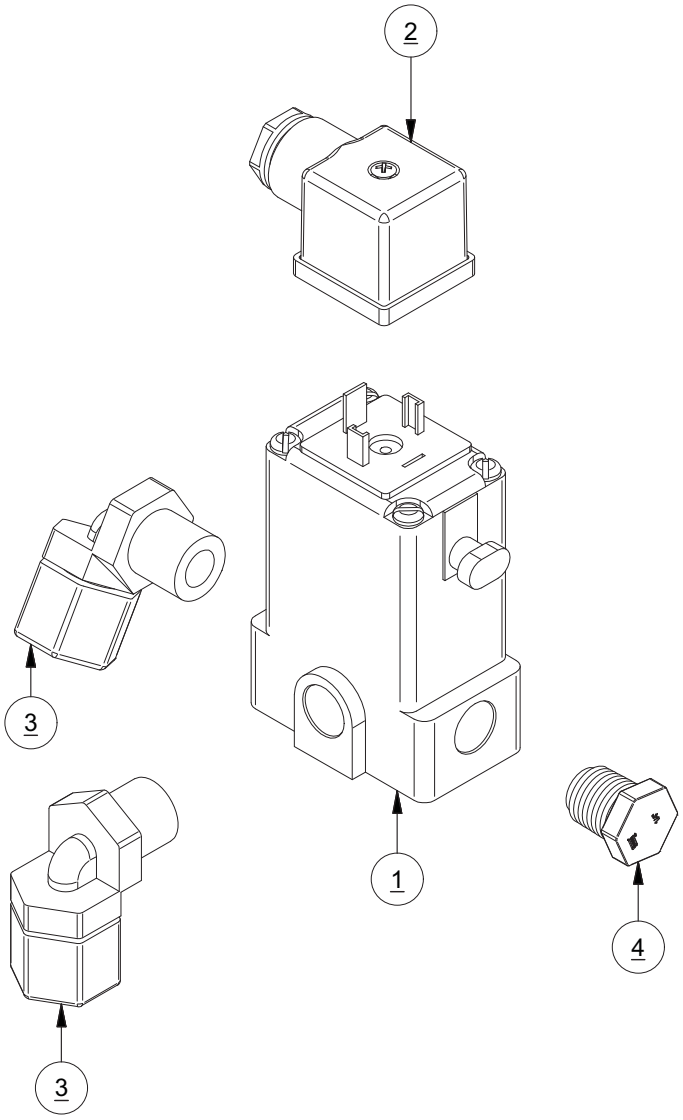
B516950003 FWF DIV VALVE ASSY AWPC

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	1401095998	SOLENOID VALVE EXTERNAL PORT
2	1	3131680298	PLUG CONNECTOR DIN 3-PIN
4	1	0101340883	PLUG 0.25 MT
3	2	0204021769	FITTING,PP,3-8 ODx1-4 MT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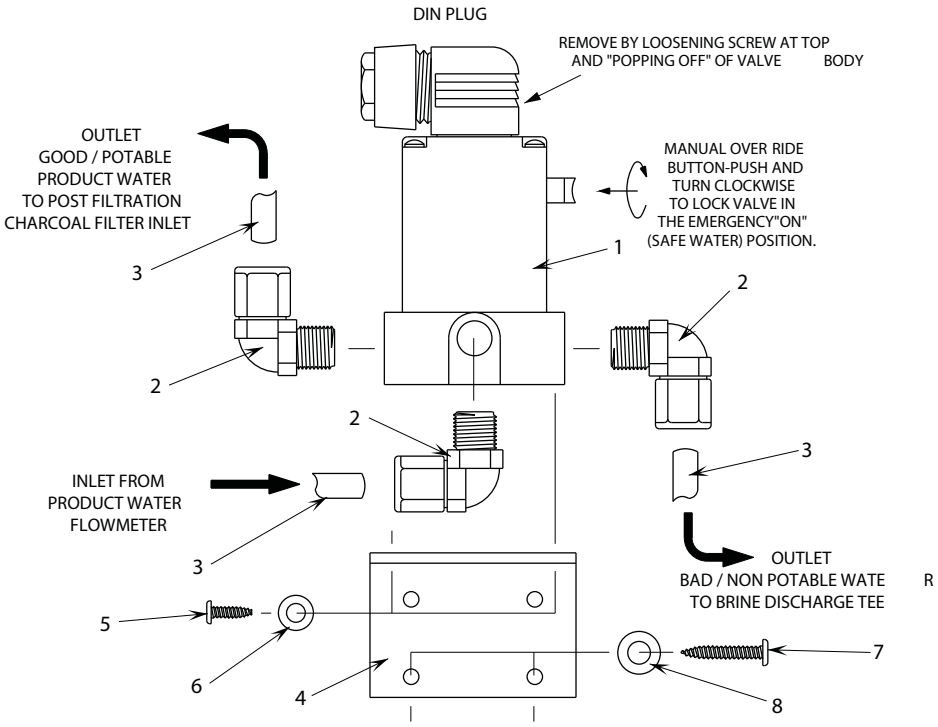
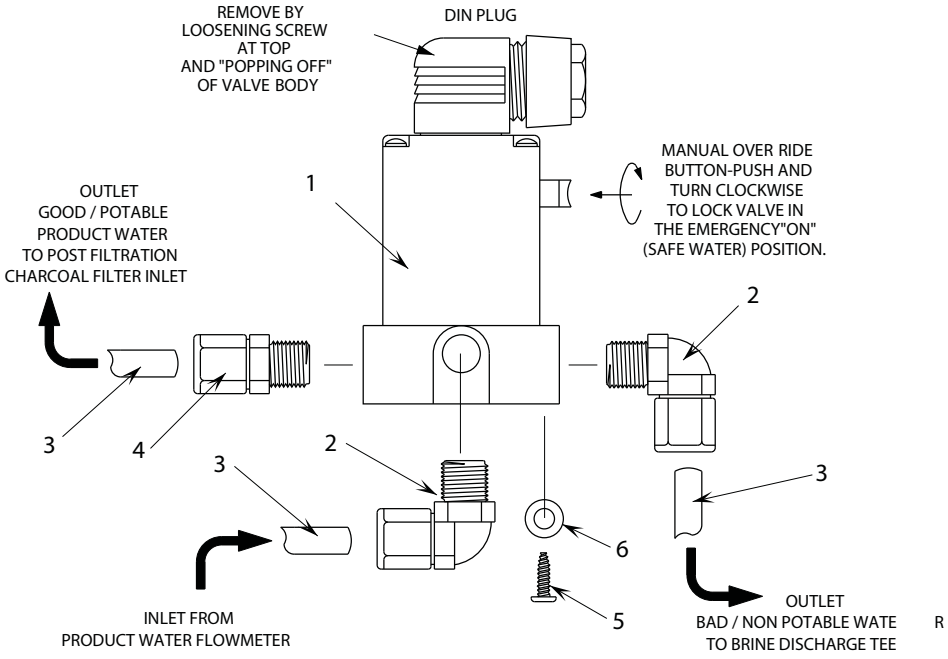
3-WAY PRODUCT WATER DIVERSION SOLENOID VALVE PORT DESIGNATION & WATER FLOW DESCRIPTION



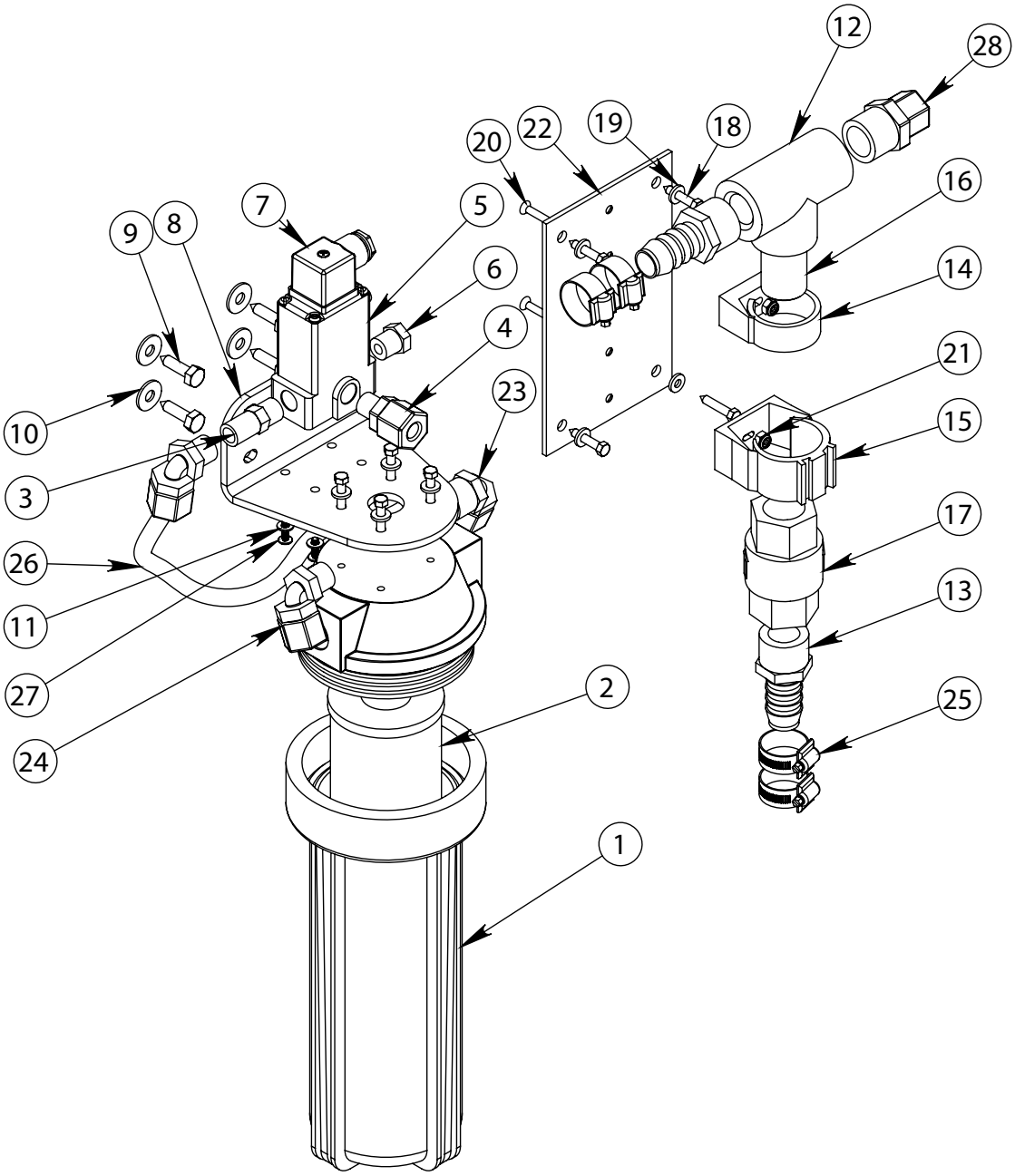
PLUMBING CONNECTIONS
"P" = INLET (COMMON)
"B" = NORMALLY OPEN -TO DISCHARGE (BAD WATER)
"A" = NORMALLY CLOSED -TO CHARCOAL FILTER INLET (GOOD WATER)



PLUMBING CONNECTIONS
"P" = INLET (COMMON)
"B" = NORMALLY OPEN -TO DISCHARGE (BAD WATER)
"A" = NORMALLY CLOSED -TO CHARCOAL FILTER INLET (GOOD WATER)

B598000008 FRESH WATER FLUSH (0.50 INCH)

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	0713020873	FILTER HOUSING 1/2 X 10"
2	1	0803004773	CHARCOAL FILTER 10 IN
3	1	14172105AT	VALVE CHECK .25 MNPT SS
4	1	0204091769	CONN 3/8 TUBE X 1/4 MPT PLASTIC
5	1	1401095998	VALVE SOLENOID 12VDC AED/CSFE
6	1	0101340883	PLUG 1/4 MPT PVC
7	1	3131680298	PLUG CONNECTOR DIN 3-PIN
8	1	20200402102	SINGLE FILTER BRACKET
9	4	061172143016	SC HEX "A" 1/4 X 1.0 SS
10	4	061100043000	WASHER FLAT OS 1/4"SS
11	4	065080023000	WASHER FLAT #8 NYLON
12	1	0101423783	TEE .75 FNPT x .75 FNPT x .75 FNPT PVC
13	2	0101653783	ADAP 3/4 MPT X 3/4 BARB PVC
14	1	0501164200	PIPE SUPPORT 1 1/8" #36
15	1	0501164500	PIPE SUPPORT 1 1/4"
16	1	01013737CL	NIPPLE .75 NPT X CLOSE PVC
17	1	14012118AR	VALVE CHECK .75 FNPT WITH VITO
18	8	061170628016	SC PHIL PAN "A" 10 X 1 SS
19	8	065080028000	WASHER FLAT #10 NYLON
20	2	061161626012	SC PHIL FLAT 8-32 X 3/4 SS
21	2	061060026000	NUT HEX 8-32 W/INSERT SS
22	1	2020040002	BRACKET CHECK VALVE FWF
23	1	0204011769	ELB90 3/8 TUBE X 1/2 MPT PLAST
24	2	0204011769	ELB90 .375 TUBE x .25 FNPT PLASTIC
25	4	05181432AA	HOSE CLAMP 1/2" SS
26	1	0312123569	TUBE .375 BLACK
27	4	061170623008	SC PHIL PAN "B" #8 X 1/2" SS
28	1	0204092069	CONN 3/8 TUBE X 3/4 MPT PLASTIC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24
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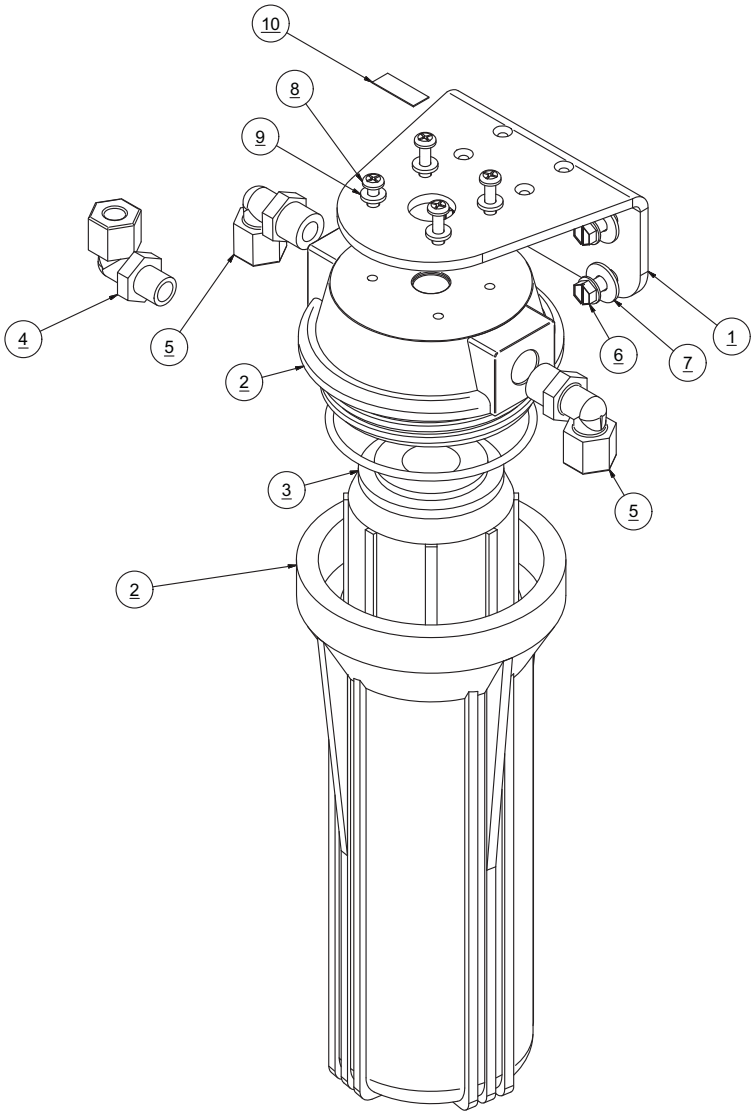
B561080001 PH NEUTRALIZER ASSY 0.5-1.5 GPM

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	20200402102	BRACKET SINGLE FILTER
2	1	0713020573	FILTER HOUSING-LID .375 X 10 ASM
3	1	08251950AS	ELEMENT POST FILTER PH 9.75 IN
4	2	0204020969	ELB90 .25 TUBE x .375 MPT PLASTIC
5	2	0204021869	ELBOW,SS,3/8 ODx3/8 MT
6	4	061172143016	SCREX,HEX A,.25x1.00,SS
7	4	061100043000	WASHER,FLAT,OS,1/4",SS
8	4	061170628016	SC PHIL PAN A #10 X 1 SS
9	1	065080028000	WASHER FLAT #10 NYLON
10	1	2224018760	LABEL,PH NEUTRALIZER

RECOMMENDED SPARES

PART NUMBER	DESCRIPTION
2614010473	O-RING BLUE HSG 237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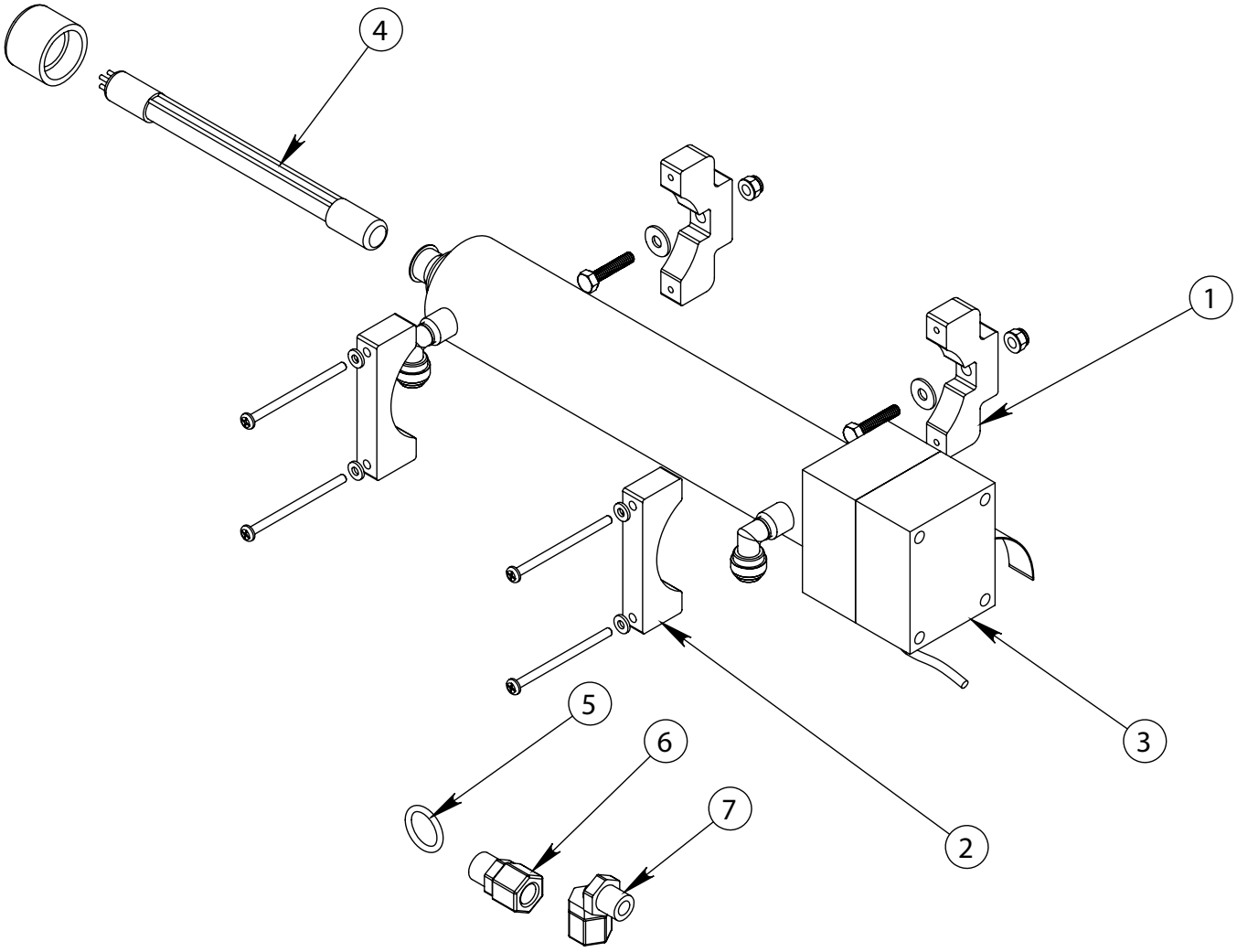
B5262000CV UV STERILIZER 12VDC 2GPM

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	2	20010418002A	VALVE BRACKET CLEAN/RINSE KIT
2	2	20010418001A	BRACKET MNT SADDLE UV-AW TOP
3	1	40000306CV	UV STERILIZER 2 GPM 12VDC
4	1	40000100CV	UV LAMP 2 GPM
5	1	2614019000	O-RING 212 QUARTZ SLEEVE
6	1	0204091869	CONN 3/8 TUBE X 3/8 MPT PLASTIC
7	1	0204021769	ELB90 3/8 TUBE X 1/4 MPT PLASTIC


4
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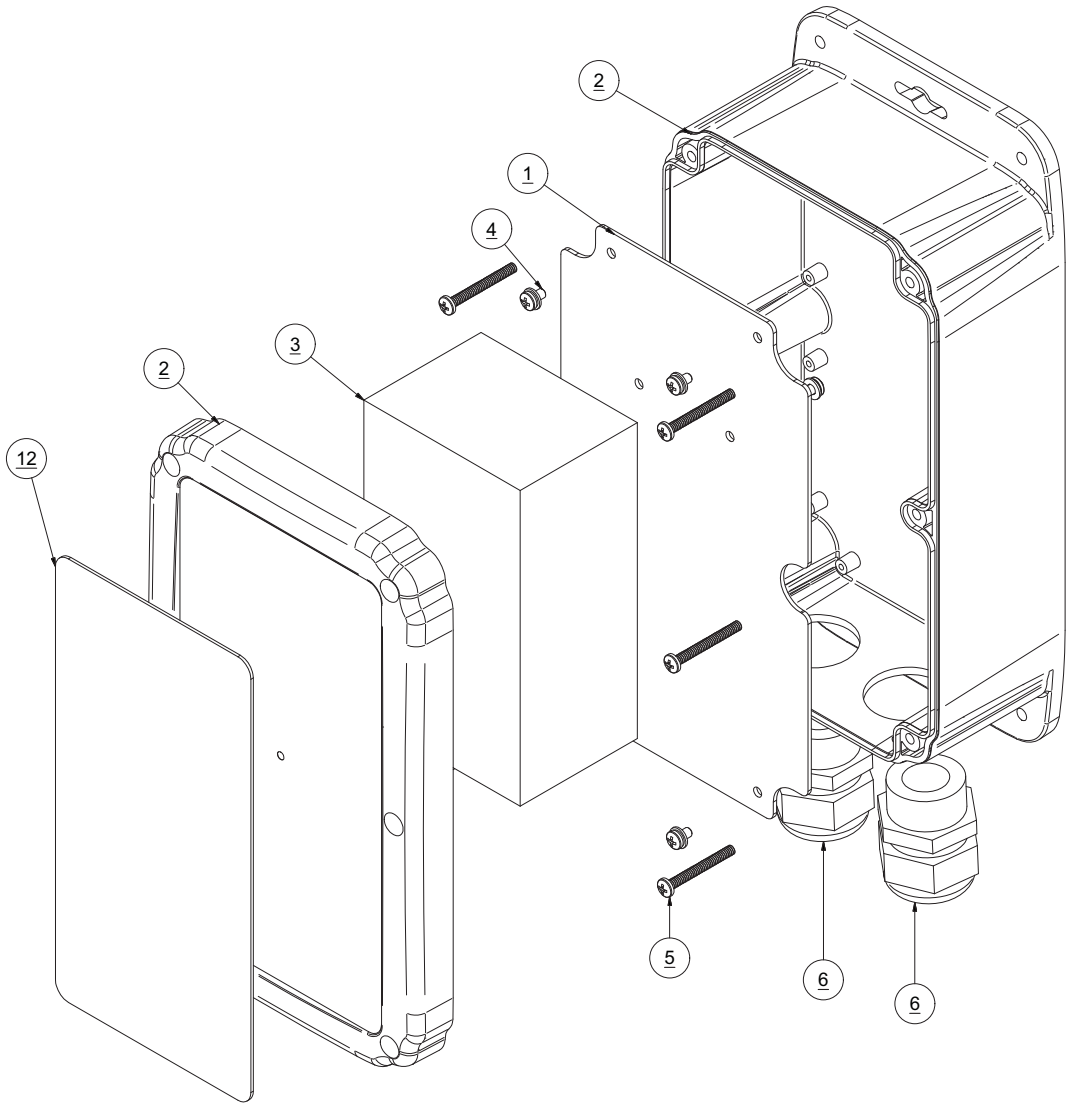
B596800014 SOFTSTART 230V 50-60HZ SURESTART

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	3131232000	CHASSIS PLATE,SOFTSTART,AL
2	1	3120220600	ENCLOSURE,SOFTSTART,POLYCARBON
3	1	3131114002	SOFTSTART, 230V, 1PH, 3HP, SURESTART
4	6	061160620005	SC PHIL PAN #6-32 x 0.25 SPECIAL
5	6	061160620020	SC PHIL PAN 6-32 X 1 1/4 SS
6	2	1904010343	STRAIN RELIEF 3223 .75 GREY
7	1	3131160500	TERMINAL, FEMALE DISCONNECTS,1
8	12 FEET	3131164300	WIRE MARKER 1" 12 - 10 AWG
9	2	3131210495	WIRE NUT YELLOW
10	6 FEET	4932231223	WIRE 10/3 SO
11	6 FEET	4932241021	WIRE 14/4 SO BLACK JACKET
12	1	2213018800	LABEL SOFTSTART 230V SURESTART


2
1
4
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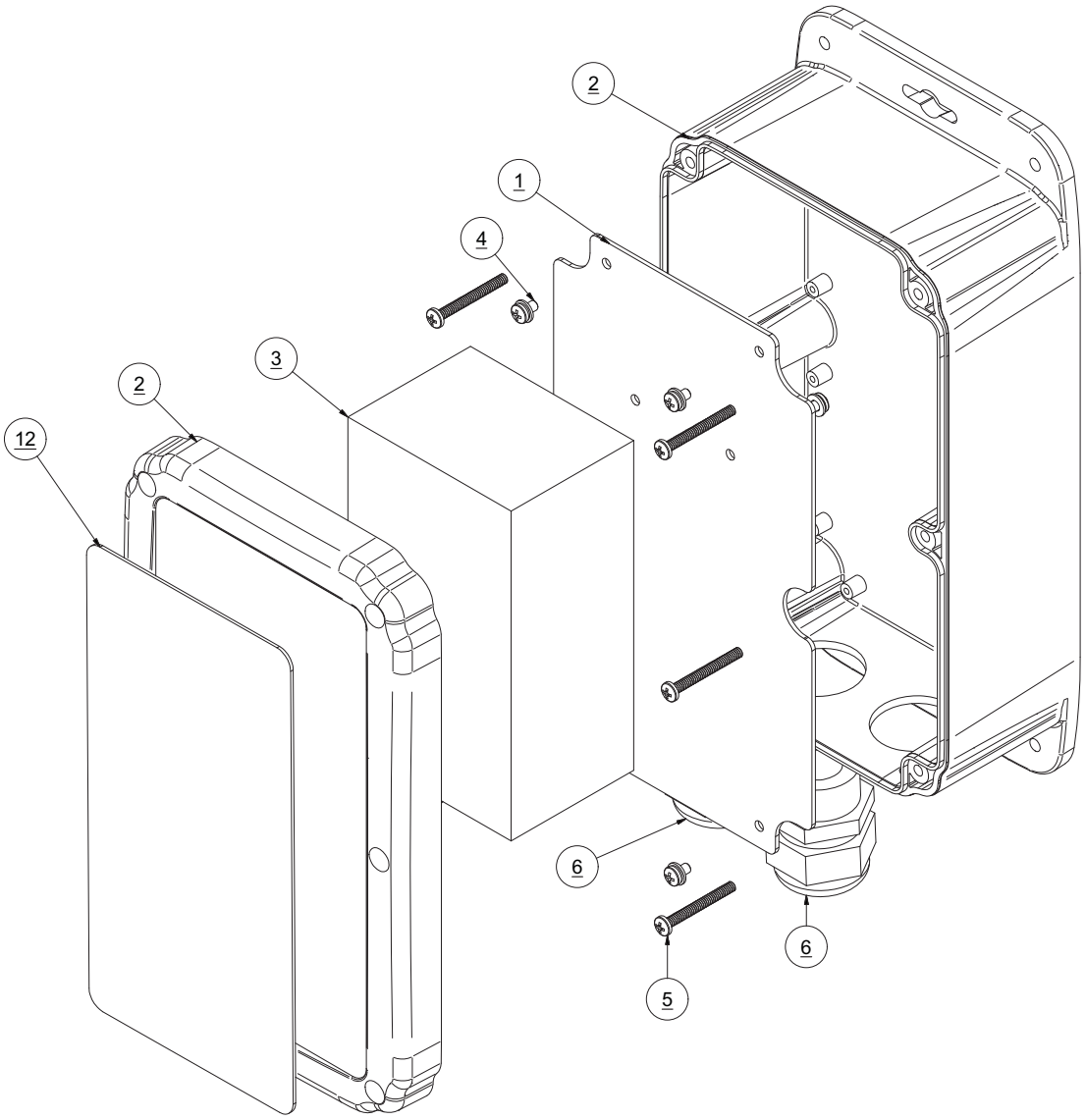
12
5
6
6

B596800015 SOFTSTART 115V 50-60HZ SURESTART

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	3131232000	CHASSIS PLATE,SOFTSTART,AL
2	1	3120220600	ENCLOSURE,SOFTSTART,POLYCARBON
3	1	3131114001	SOFTSTART, 115V, 1PH, 3HP, SURESTART
4	6	061160620005	SC PHIL PAN #6-32 x 0.25 SPECIAL
5	6	061160620020	SC PHIL PAN 6-32 X 1 1/4 SS
6	2	1904010343	STRAIN RELIEF 3223 .75 GREY
7	1	3131160500	TERMINAL, FEMALE DISCONNECTS,1
8	12 FEET	3131164300	WIRE MARKER 1" 12 - 10 AWG
9	2	3131210495	WIRE NUT YELLOW
10	6 FEET	4932231223	WIRE 10/3 SO
11	6 FEET	4932251021	WIRE 14/5 SO BLACK JACKET
12	1	2213018700	LABEL SOFTSTART 115V SURESTART


2
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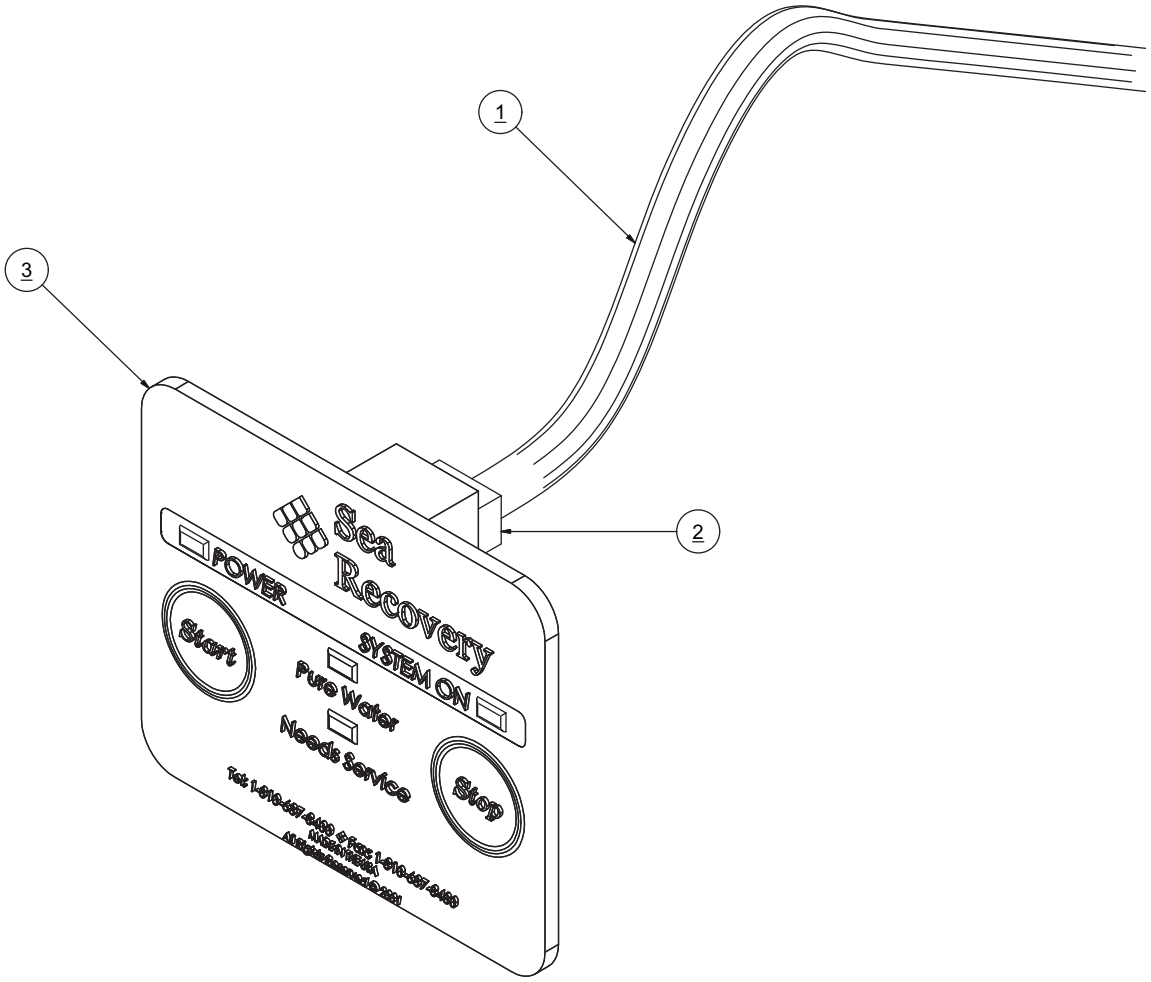
B611000004 REMOTE ASSY LCD CONTROLLER 80

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	4900283104	CABLE MULTIST 8 CON WHT
2	2	3131100900	EZ PLUG RJ45
3	1	31315606WE	REMOTE TOUCH PAD 170


1
2
3
Sea Recovery
POWER
SYSTEM ON
Start
Pure Water
Needs Service
Stop

Chapter 13

Appendix

ABS Certificate of Design Assessment

Certificate Number: 05-HS122694E-2-PDA

Confirmation of Product Type Approval 22/FEB/2011

Please refer to the "Service Restrictions" shown below to determine if Unit Certification is required for this product.

This is to certify that, pursuant to the Rules of the American Bureau of Shipping (ABS), the manufacturer of the below listed product held a valid Manufacturing Assessment (MA) with expiration date of 19/MAY/2014. The continued validity of the Manufacturing Assessment is dependent on completion of satisfactory audits as required by the ABS Rules.

And; a Product Design Assessment (PDA) valid until 22/NOV/2015 subject to continued compliance with the Rules or standards used in the evaluation of the product.

The above entitle the product to be called Product Type Approved.

The Product Design Assessment is valid for products intended for use on ABS classed vessels, MODUs or facilities which are in existence or under contract for construction on the date of the ABS Rules used to evaluate the Product.

ABS makes no representations regarding Type Approval of the Product for use on vessels, MODUs or facilities built after the date of the ABS Rules used for this evaluation.

Due to wide variety of specifications used in the products ABS has evaluated for Type Approval, it is part of our contract that; whether the standard is an ABS Rule or a non-ABS Rule, the Client has full responsibility for continued compliance with the standard.

SEA RECOVERY CORP.
Model Name(s): Aqua Whisper Series

Presented to:
SEA RECOVERY CORP.
19610 S. RANCHO WAY
RANCHO DOMINGUEZ
United States

Intended Service:	Marine & Offshore Application - Production of Fresh Water by Sea Desalination
Description:	Reverse Osmosis Desalination Unit
Ratings:	Model: SRC 450: Rating Gallons Per Day (GPD): 450; Model: SRC 700: Rating (GPD): 700; Model: SRC 900: Rating (GPD): 900; Model: SRC 1400: Rating (GPD): 1400; Model: SRC 1800: Rating (GPD): 1800
Service Restrictions:	Unit Certification is not required for this product. If the manufacturer or purchaser request an ABS Certificate for compliance with a specification or standard, the specification or standard, including inspection standards and tolerances, must be clearly defined.
Comments:	1) If the system is to be installed on a US Flag Vessel, the hoses and associated fittings are to be manufactured to SAE J1942 standard and are to be suitable for the intended application; 2) The use of PVC piping is limited to 225 psi for water application.
Notes / Documentation:	Supporting Documentation: Drawing No. AquaWhisper Compact 450-1 Vessel Assy.
Term of Validity:	This Product Design Assessment (PDA) Certificate 05-HS122694E-2-PDA, dated 23/Nov/2010 remains valid until 22/Nov/2015 or until the Rules or specifications used in the assessment are revised (whichever occurs first). This PDA is intended for a product to be installed on an ABS classed vessel, MODU or facility which is in existence or under contract for construction on the date of the ABS Rules or specifications used to evaluate the Product. Use of the Product on an ABS classed

	vessel, MODU or facility which is contracted after the validity date of the ABS Rules and specifications used to evaluate the Product, will require re-evaluation of the PDA. Use of the Product for non ABS classed vessels, MODUs or facilities is to be to an agreement between the manufacturer and intended client.
ABS Rules:	2010 Steel Vessels Rules 1-1-4/7.7, 1-1-Appendix 3, 4-6-2/5.7
National Standards:	
International Standards:	
Government Authority:	
EUMED:	
Others:	None

Model Certificate	Model Certificate No	Issue Date	Expiry Date
PDA	05-HS122694E-2-PDA	23/NOV/2010	22/NOV/2015

ABS Programs

ABS has used due diligence in the preparation of this certificate and it represents the information on the product in the ABS Records as of the date and time the certificate was printed. Type Approval requires Drawing Assessment, Prototype Testing and assessment of the manufacturer's quality assurance and quality control arrangements. Limited circumstances may allow only Prototype Testing to satisfy Type Approval. The approvals of Drawings and Products remain valid as long as the ABS Rule, to which they were assessed, remains valid. ABS cautions manufacturers to review and maintain compliance with all other specifications to which the product may have been assessed. Further, unless it is specifically indicated in the description of the product; Type Approval does not necessarily waive witnessed inspection or survey procedures (where otherwise required) for products to be used in a vessel, MODU or facility intended to be ABS classed or that is presently in class with ABS. Questions regarding the validity of ABS Rules or the need for supplemental testing or inspection of such products should, in all cases, be addressed to ABS.

Declaration of Conformity

Declaration of Conformity

CE

SEA RECOVERY declares that the following models conform to the EN 55011A and EN 50082-2 standards:

Product Series:
Aqua Matic Series
Aqua Whisper Series
Aqua Whisper Mini Series
Ultra Whisper Series
Coral Sea Series

Model Names:
Aqua Matic
Aqua Whisper / DX/PRO
Aqua Whisper Mini
Ultra Whisper
Coral Sea

Supplementary Information:
"The product complies with the Requirements of the EMC Directive 89/336/EEC."

Sea Recovery

Manufacturer's Name:
Sea Recovery
Manufacturer's Address:
2630 East El Presidio Street
Carson, CA 90810
U.S.A.

SEA RECOVERY CORPORATION Seal of Quality RANCHO DOMINGUEZ CA

Official Seal

Lisa Gomez

Lisa Gomez
Quality & Environmental Manager
Manufacturer's Contact

FCC Compliance

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**

CKC LABORATORIES, INC. Testing the Future

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

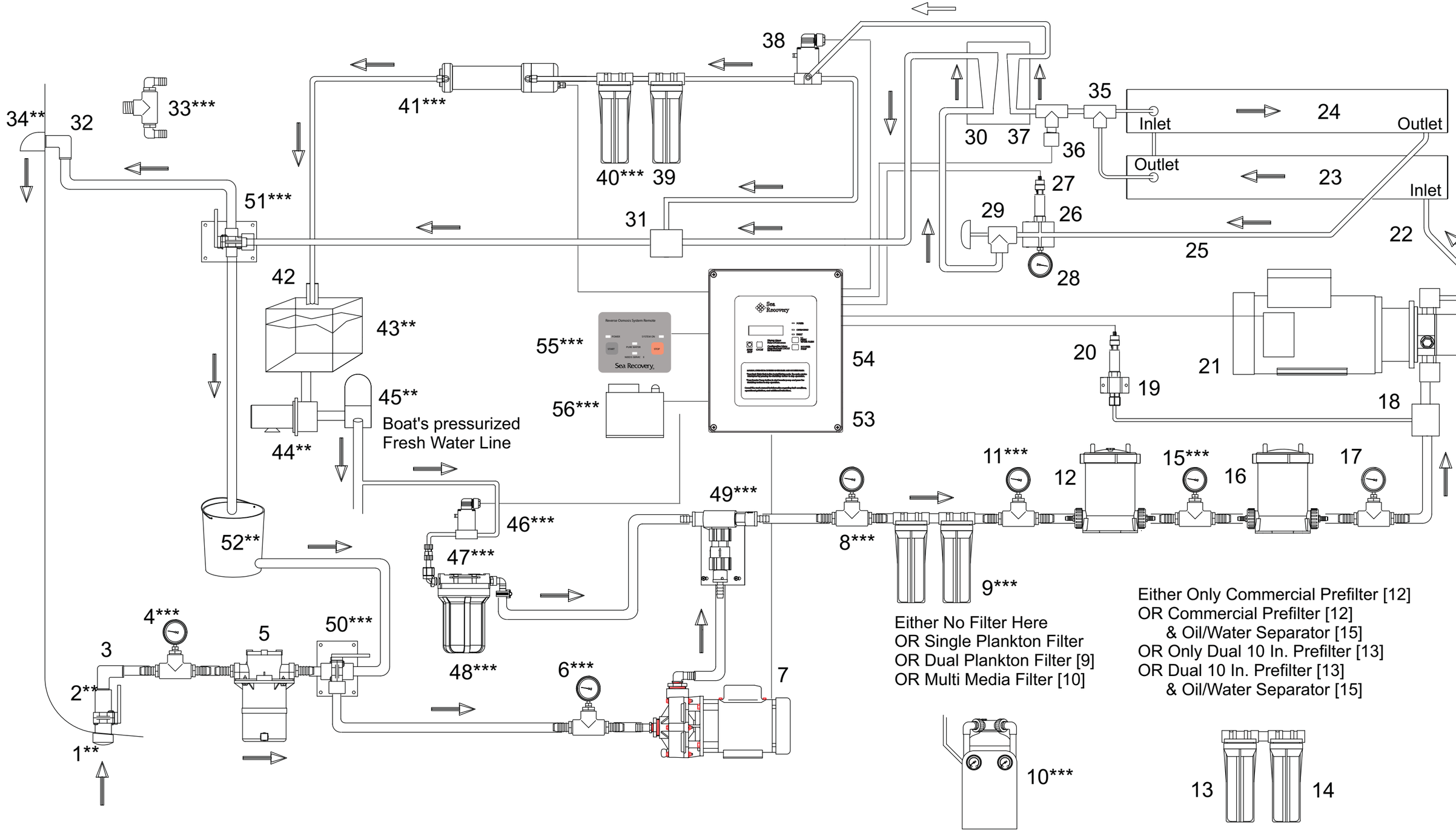
Tracy Phillips
Documentation Control Supervisor

Dennis Ward
Director of Laboratories

Chapter 14

Diagrams

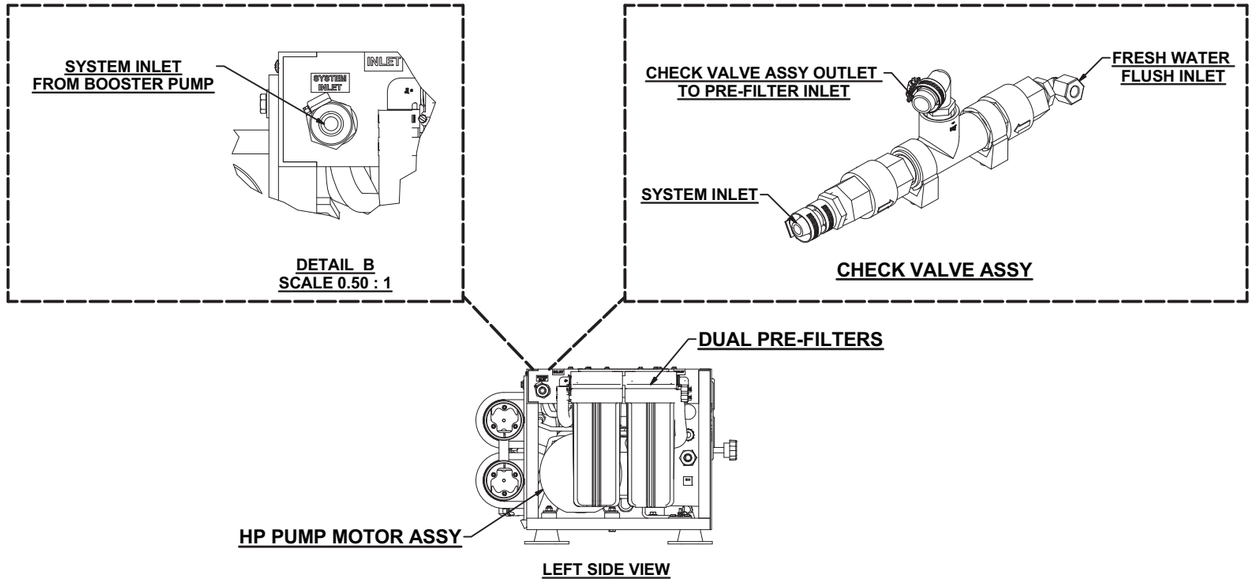
Component Identification Diagram

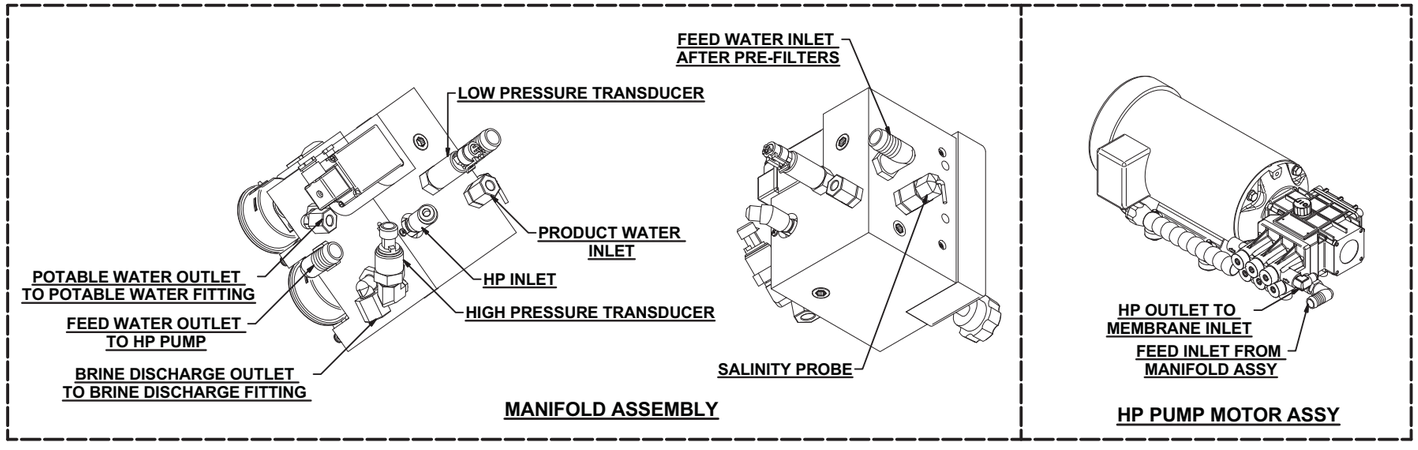


Either No Filter Here
OR Single Plankton Filter
OR Dual Plankton Filter [9]
OR Multi Media Filter [10]

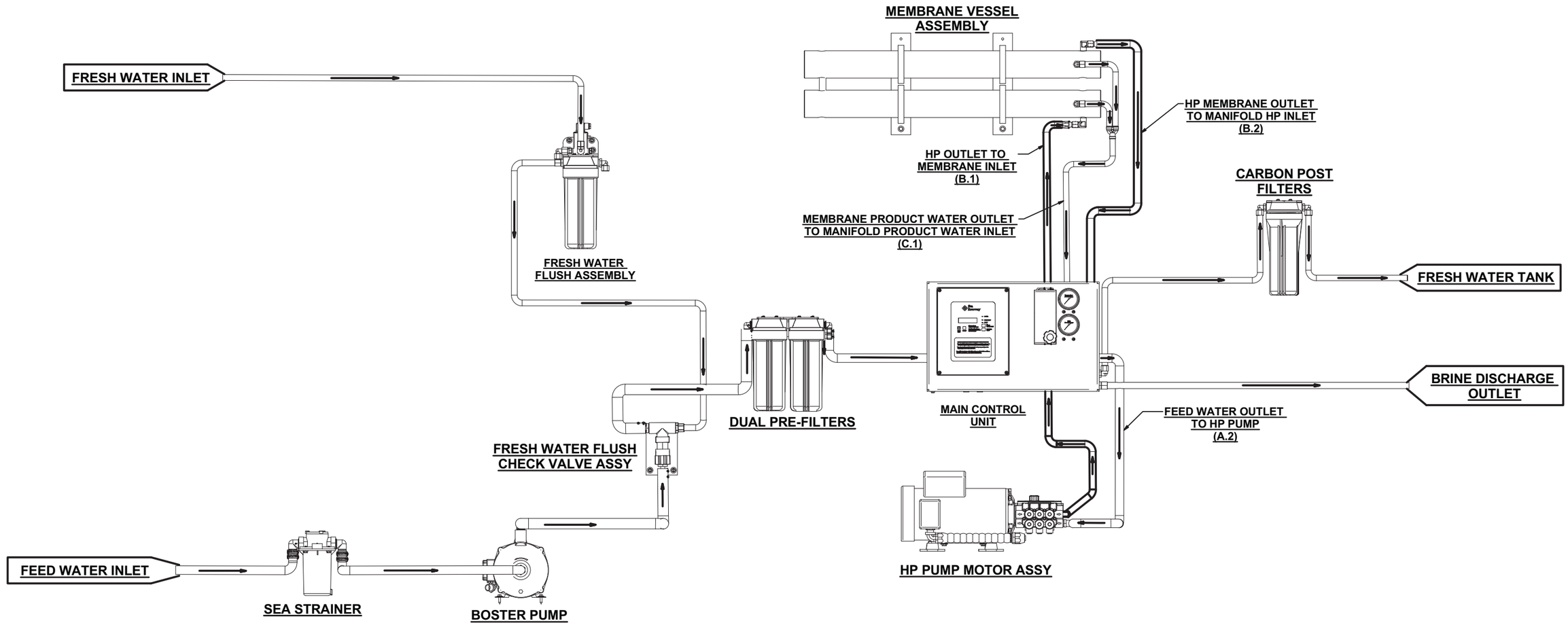
Either Only Commercial Prefilter [12]
OR Commercial Prefilter [12]
& Oil/Water Separator [15]
OR Only Dual 10 In. Prefilter [13]
OR Dual 10 In. Prefilter [13]
& Oil/Water Separator [15]

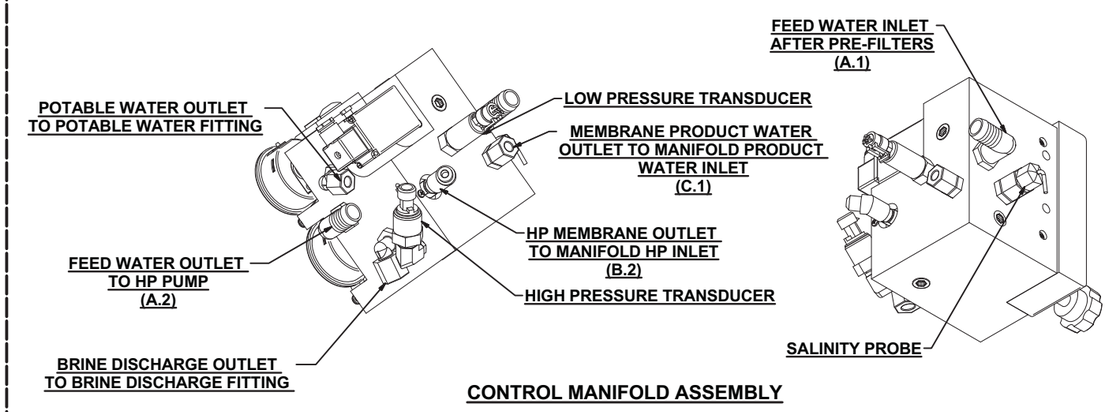
Installation Diagram Aqua Whisper Pro Compact

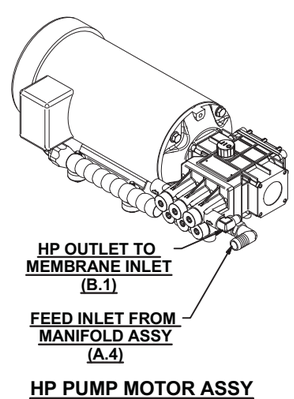




Installation Diagram Aqua Whisper Pro Modular



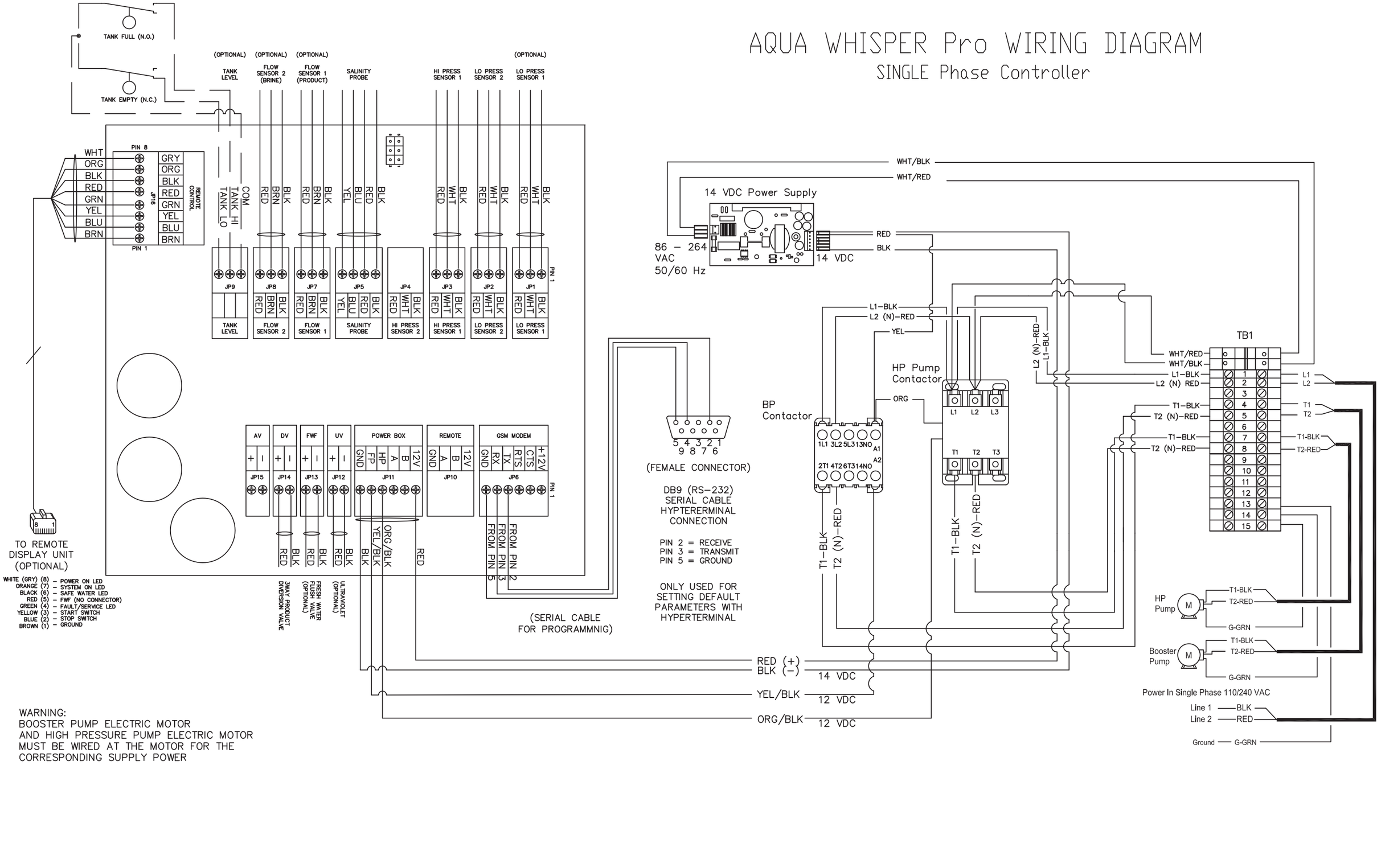




NOTES:
1. PRESSURE CONNECTION INDICATES BY:
   A - FEED WATER CONNECTIONS
   B - HIGH PRESSURE CONNECTIONS
   C - PRODUCT WATER CONNECTIONS

AQUA WHISPER Pro WIRING DIAGRAM

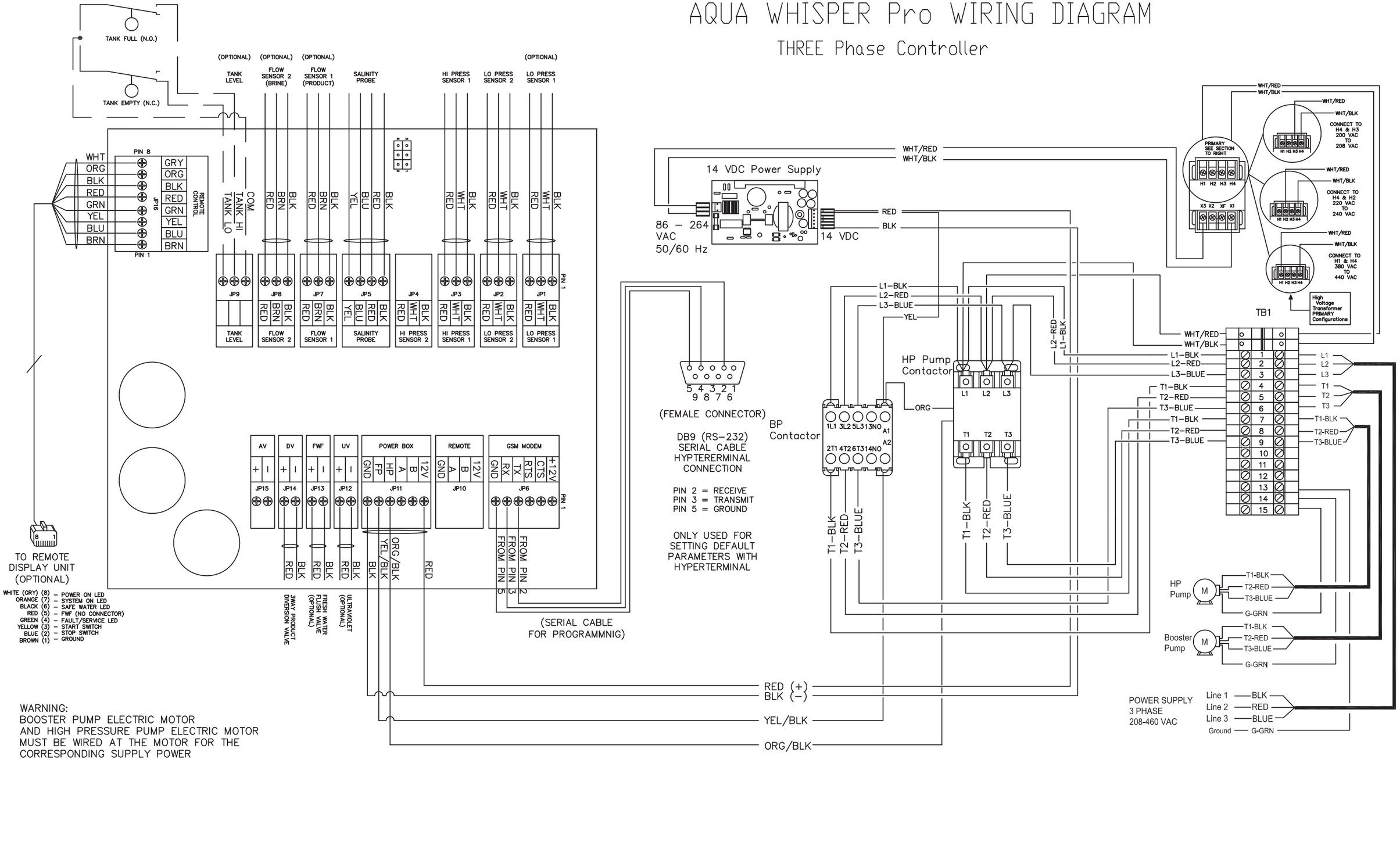
SINGLE Phase Controller



WARNING:
BOOSTER PUMP ELECTRIC MOTOR AND HIGH PRESSURE PUMP ELECTRIC MOTOR MUST BE WIRED AT THE MOTOR FOR THE CORRESPONDING SUPPLY POWER

AQUA WHISPER Pro WIRING DIAGRAM

THREE Phase Controller



WARNING:
BOOSTER PUMP ELECTRIC MOTOR
AND HIGH PRESSURE PUMP ELECTRIC MOTOR
MUST BE WIRED AT THE MOTOR FOR THE
CORRESPONDING SUPPLY POWER

Sea Recovery
2630 E. El Presidio Street
Carson, CA 90810
sales@searecovery.com

www.searecovery.com