AQUALITE

Framed System
User Manual and Installation Guide

FCI Watermakers
THE DIFFERENCE IS CLEAR

1 / GENERAL

Congratulations on joining an elite group of like-minded boat and yacht owners, who value their investment and have chosen the industry's most reliable and advanced marine reverse osmosis system available. A great deal of time and effort has been put into the design and manufacture of your new FCI Watermakers desalination system. Please take time to read this entire manual and familiarize yourself with its operation. It will benefit you by insuring long trouble-free operation.

Thank you for purchasing FCI Watermakers Reverse Osmosis System. Your choice of FCI Watermakers proves that quality, craftsmanship and performance do matter. The system you have chosen is of the highest quality, and it is the most advanced watermaker available today. Over 25 years of experience of engineering and extensive lab testing has gone into the design of your watermaker. In fact many industry standards are a result of innovations made by FCI Watermakers, including one-touch commands, multiple station operation and remote system control. Each component was chosen for its ability to withstand the marine environment and to provide a lifetime of trouble-free operation. Design considerations included noise, size, ease of use and simple maintenance. Its open-frame construction allows quick, easy inspections, and it aids in shipboard or land based maintenance without having to move the system from its location.

The intent of this manual is to allow the operator to become familiar with each component of the reverse osmosis system. By understanding the function, importance, and normal operation of each watermaker module, the operator can readily diagnose minor problems. When such problems first arise, they usually require minor maintenance and the issue is easily corrected. However, if left unattended, a problem in one component may eventually affect the rest of the system and it could lead to further repairs.

FCI Watermakers systems use non-proprietary membranes that are readily available worldwide, and the systems are designed to be more tolerant of water conditions. Your vessel travels around the world and encounters water that varies in both salinity and particulate. FCI utilizes low RPM components that allow full function operation in these conditions.

FCI has the most comprehensive warranty on the market. The Aqualite system is covered for one year on all non-consumable parts. A copy of our warranty is included in this manual. Please read and familiarize yourself with it.

PREFACE

We are committed to customer service that exceeds your expectations. If at any time you have questions about what's covered in this manual, our hands-on technical support will never leave you adrift. This manual contains technical information & instructions for the installation, operation, maintenance, and troubleshooting for FCI Watermakers Desalination Systems. Anyone responsible for the installation, operation, and maintenance of a FCI Watermakers Desalination System must read and understand the contents of this manual, and comply with these instructions, guidelines and safety requirements at all times.

The term *system* will be used throughout this manual, and it generally refers to the FCI Watermakers System. Reading this manual in its entirety will familiarize you with the system and the operation of its components. By understanding the system in its entirety, one can readily operate and diagnose problems.

All references within this manual refer to other sections unless specifically defined. Graphics and illustrations are used for reference only and may not represent the actual part or arrangement of parts in a customized system.

ABOUT SAFETY NOTES

Safety issues requiring users attention are highlighted throughout this manual as follows:

WARNING:
Provides critical information in order to prevent the possibility of injuries and/or death.

CAUTION:
Provides important information to prevent the possibility of damaging the device or equipment.

NOTE:
Provides additional information to safely and properly operate the equipment.

NEW SYSTEM PERFORMANCE

Although each system has been fully tested prior to shipping, there will be a break-in period. During this period, approximately 48 hours, the pumps and membrane performance will change or settle. Small adjustments will need to be made to the high-pressure valve and the water quality and quantity will vary. For a typical installation, the high-pressure valve will need to be increased (turned clockwise) and the water quality produced will improve over this break-in period.

GLOSSARY OF TERMS

Following terms are helpful in becoming familiar with a FCI Watermakers Reverse Osmosis System.

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

If the feed water flow is insufficient, the salts are saturated at the boundary layer and can readily adhere to and pack into the R.O. membrane element surface. For this reason, it is important to maintain sufficient feed water flow through the R.O. membrane element and prevent concentration polarization.

BRINE VELOCITY
The brine velocity, or 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. The salts will foul the R.O. membrane element surface (concentration polarization). If this occurs, the product water flux (production) will decline.

The feed pump integrated design provides a relatively smooth and continual flow of feed water across and through the R.O. membrane element.

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

When the R.O. membrane element is subjected to elevated pressures beyond 1000 PSI, the product water channel becomes squeezed, resulting in restriction and 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 effect on product water quality and quantity. Both factors will increase as the system pressure increases (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 occurs faster at higher pressures and temperatures.

At low temperatures or high salinity feed water, the system will have to operate at higher than normal pressure to maintain the specified amount of product water flow. This is normal 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 single pressure vessel 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 pressure will need to be adjusted to maintain a precise amount of product water flow.

LIMITED WARRANTY

This policy will define, in detail, what is and is not covered under warranty. It will also define how to obtain warranty service and approval.

FCI Watermakers warrants that all commercial systems perform according to the specifications for a period of one year from the date of installation or eighteen (18) months from the date of shipment, whichever is earlier. FCI Watermakers is not, under any circumstances, liable for any damages arising out of or in any way connected with the failure of the system to perform as set forth herein. This limited warranty is in lieu of all other expressed or implied warranties, including those of merchantability and fitness for a particular purpose. This warranty is extended to the original owner / purchaser of record and is not transferable.

NOTE: Warranty registration is required to activate your warranty. Please be sure to fill out the registration included in this manual and provide a copy to FCI Watermakers, Inc.

1.0 WARRANTY PERIOD

1.1 The following items are covered under warranty for the periods designated:

Aqualite Systems:	
System and Accessories	1 (one) year from the date of shipment of the System
Pressure Vessel Tubes	Lifetime
Repairs after warranty	3 (three) months

1.2 The following items are considered normal user maintenance and are NOT covered under limited or implied warranty:

1. Sea Strainer Element
2. Cartridge Filter Elements
3. Pump Packing Assemblies
4. Pump Seal Assemblies
5. Pump Valve Assemblies
6. Pump Crankcase Oil
7. Gauge Instrument Calibration
8. Fuses
9. Valve Seals and Packings
10. Exterior Corrosion
11. Membrane Elements

1.3 Installation of components not supplied by FCI Watermakers, is not covered by this or any limited warranty.

1.4 System failure or component failure or decline in performance as a result of improper installation is not covered by this or any limited warranty.

1.5 The Reverse Osmosis Membrane Elements are not covered under warranty for any specific period by FCI Watermakers. Any misuse or improper operation or maintenance of the system that causes premature fouling of the Membrane Element is not under warranty. The warranty does not cover a Membrane Element which has been subject to: iron fouling (rust), chemical or petroleum products attack, extreme temperatures (over 120°F or under 32°F), drying out or extreme pressures (over 1000 psi).

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

2.0 PROCEDURE FOR OBTAINING WARRANTY

2.1 The defective product or part must be returned to an authorized FCI Watermakers Factory Service Center (dealer) or directly to FCI Watermakers. The end user must pay any transportation and labor expenses incurred in removing and returning the product to the service center or FCI Watermakers, pending evaluation and warranty approval.

3.0 EXCEPTIONS AND LIMITATIONS

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

3.2 FCI Watermakers reserves the right to make changes or improvements in its product, during subsequent production, without incurring the obligation to install such changes or improvements on previously manufactured equipment.

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

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

WARRANTY REGISTRATION

INSTRUCTIONS: At the time of purchase of the FCI Watermakers system, please complete the warranty information listed below. After completing this form, please make a copy and submit the copy using one of the options at the bottom of the page— Keep this copy in your manual for future reference.

SYSTEM INFORMATION:
Model #
Serial #
Operating Voltage:

Date Purchased:

Date Commissioned:

DEALER INFORMATION:
Dealer Name:
Address:
City: State:
Country: Postal Code:
Dealer Invoice #:

CUSTOMER INFORMATION:
Customer Name:
Address:
City:
State: Postal Code:
Country:
Phone: Fax:
E-mail:

VESSEL INFORMATION:
Boat Manufacture:
Boat Model:
Boat Name:
Boat Length:

LAND BASED INFORMATION:
Installation site:
Site Name: (resort, company etc)

Application:

Operator Contact Information:
(person in charge of system maintenance and operation)
Name:
E-mail:
Phone:

COMMERCIAL APPLICATION:
Rig Name:
Rig Location:
Operator Name:
Operator E-mail:

Mail a copy to:

FCI WATERMAKERS, INC
ATTENTION: WARRANTY REGISTRATION
3782 W 2340 S, STE E
WEST VALLEY CITY, UT 84120-7291 USA

EMAIL: info@fciwatermakers.com
Subject: Warranty Registration

FAX: +1-801-883-9985

COPYRIGHT NOTIFICATION

FCI CONTACT INFORMATION

If you have questions regarding your FCI Watermakers system or the contents of this manual, or if you need replacement parts, please do not hesitate to contact us immediately. Our hands-on technical support is always at your service.

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WEST VALLEY CITY, UT 84120-7291

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GENERAL INFORMATION

FCI watermakers are the most advanced desalinating systems available, which produce potable water from seawater or brackish water. For over a twenty years, FCI Watermakers, Inc. has pioneered technology and innovated features that have become standards for today's desalinators: one-touch commands, multiple station operation and remote system control and monitoring. As both engineers and craftsmen, we specialize in high-performance, value-driven watermakers and are proud of the thousands of continuously operating units that have been cruising the globe for decades.

At FCI Watermakers, our commitment and attention to detail transcends beyond materials and construction. Things that are seemingly trivial are never overlooked. For instance, your system's specifications formulate the Model Number. It is comprised of the Series, GPD, and Voltage of the unit:

A | B | C

ALT-200-1

A	B	C
Series ALT: Aqualite Framed System	GPD 200: 200	Voltage 1: 120VAC 2: 240VAC

Your FCI Reverse Osmosis Desalination System is designed to provide lasting performance using high-grade materials and uncompromising engineering. FCI systems utilize high-grade alloys in critical components, where competing brands often use inferior material that compromise system operation and jeopardize the vessel.

NEW SYSTEM PERFORMANCE

Although each system has been fully tested prior to shipping, there will be a break-in period. During this period, approximately 48 hours, the pumps and membrane performance will change or settle. Small adjustments will need to be made to the high-pressure valve. The water quality and quantity will vary. For a typical installation, the high-pressure valve will need to be increased (turned clockwise) and the water quality produced will improve over this break-in period.

THEORY OF OPERATION

The process of reverse osmosis (R.O.) represents the finest level of liquid filtration available today. Though the term sounds mysterious, reverse osmosis isn't really that complicated.

Reverse osmosis is a process in which a semipermeable membrane is used to separate fluids of various qualities into a highly saturated concentrate (brine) and a high quality permeated fluid low in dissolved solids. The separation is accomplished by passing the fluid across the membrane at a specified pressure and velocity (*Figure 1*). The membranes contain pores which approximate two hundred molecular weight in diameter. This allows the fluid and approximately one to two percent of the solids to pass through and be collected for storage. The concentrated solution (brine) unable to pass through the membrane is then processed out of the system. Unlike standard filtration where contaminates continually build up on the filter surface area and gradually decrease the filtering capabilities of the system, reverse osmosis filtration systems provide a self cleaning system by allowing the unfiltered fluid to continuously pass across the membrane surface, removing the contaminants as a concentrated solution, and preventing surface fouling.

Typical applications for reverse osmosis are the purification of seawater, waste water, brackish well water, and city water. However, as the industry grows many more applications are being implemented and researched, many of which have nothing to do with water purification. Presently this technology is being expanded to include gas separation in the oil industry, protein concentration, brew, wine and food processing, maple syrup production, dairy processing, removal of cholesterol from butter, undesirable bacteria removal, undesirable pyrogen removal from I.V.'s, etc. As the market expands the industries future prospects are excellent and should continue to expand well into the next century.

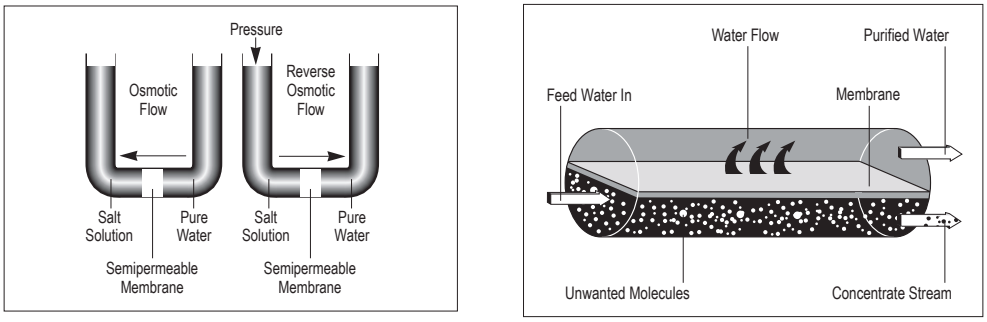


Figure 1: R.O. Process

SEMIPERMEABLE MEMBRANES

Reverse Osmosis Membranes are a spiral wound filtration system using alternating semipermeable and permeable materials to process and separate the product fluid from the concentrate solution. Their filtration capabilities and application are dependent on several factors: chemical composition of the fluid to be filtered, properties of the semipermeable material required due to this composition, fluid temperature, operating pressure, total dissolved solids to be removed, as well as several other small factors to be taken into account. The filter size or permeate flow rates are determined as a function of the square foot of semipermeable material used in the membrane, as well as the factors described above. The typical rejection rate of reverse osmosis filters is 90 to 99.9 percent of Sodium Chloride, as well as many other impurities. This constitutes an excellent utilization of available water resources for large scale water purification requirements. Filter sizes for both commercial and residential applications generally range from 2" x 12" to 8" x 40". These sizes will meet almost all applications in today's water purification industry.

TYPICAL MEMBRANE ELEMENT

- Semipermeable Materials
- Thin Film Composite (TFC)
- Chlorine sensitive, chlorine must be removed up stream of the membrane
- Bacteria resistant
- pH range is 3.0 to 11.0
- Highest water production rate of all reverse osmosis membranes

2 / PRE-INSTALLATION

This section provides key information for a successful install, leading to long-term enjoyment of your FCI desalination system. It includes warnings, cautions and notes associated with the preparatory work necessary to properly install and maintain your watermaking system.

The FCI Watermakers System is supplied with an installation kit which includes an assortment of hoses needed to install the system. Because of the various options with regard to location, voltage and optional accessories, wire is not provided with the system and some installations will require additional hose. Please contact your local dealer for these supplies. Be sure to follow all local codes when installing your new FCI watermaking system.

Always use genuine FCI approved parts to ensure proper operation of your watermaker.

The high-pressure pump ships with oil and is ready to run. Should you need to add oil, be sure NOT to over fill the pump. With the oil fill plug removed, oil will not be visible through the opening—this is normal. The correct level is the middle of the sight glass.

PRE-INSTALLATION PRECAUTIONS

STORAGE PRIOR TO REMOVAL FROM CRATE

Adhere to crate markings:

- **DO NOT store in direct sunlight;**
- **DO NOT store above 120° F (50° C);**
- **DO NOT freeze;**
- **DO NOT store longer than 4 months without flushing with storage chemical;**
- **STORE ONLY on base with ARROWS UP.**
- **KEEP THE R.O. MEMBRANE ELEMENT WET AT ALL TIMES.**

REVERSE OSMOSIS MEMBRANE ELEMENT IS SUSCEPTIBILITY TO CHEMICAL ATTACK

CAUTION: Do Not expose the FCI Watermakers system to intake Feed Water from any chemical, not approved in writing by FCI Watermakers or any of the following chemicals:

- **Hydrogen peroxide**
- **Chlorine dioxide**
- **Bromine phenolic**
- **Chloramines**
- **Hypochlorite**
- **Bromide**
- **Chloramines-T**
- **Chlorine**
- **Disinfectants**
- **N-chlorioisocyanurates**
- **Iodine**
- **Petroleum products**

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 aforementioned chemicals. Example: Do not connect the inlet of the system to the ship's potable water system if the ships system contains chlorinated or brominated water. These chemicals destroy the copolymer components within the R.O. system. These oxidants and others also damage the R.O. membrane element. If equipped, the fresh water flush system can be used to remove chlorine and bromine from the ship's potable water system.

DO NOT PERFORM INSTALLATION UNLESS:

1. **The system feed water sea cock valve is closed.**
2. **The system main electrical disconnect switch is switched OFF, LOCKED, and TAGGED.**
3. **A volt/ohm meter will be necessary.**

WARNING: ELECTRICAL SHOCK HAZARD. The installation procedures expose the installer to HIGH VOLTAGE and electrical shock hazard. Only attempt installation if you are a qualified electrician and only if surrounding conditions are safe.

QUALIFICATIONS

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

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

WARNING: Do not attempt installation, commissioning, troubleshooting, or repair if you are not proficient in the above fields of expertise.

SPECIAL CONSIDERATIONS INSTALLATION CAUTIONS

Do not over tighten PVC fittings. If threaded pipe fittings leak after installation, remove the fitting, clean the mating threads, apply 3 to 4 wraps of Teflon tape to the male threads, apply liquid Teflon pipe sealer sparingly, and thread the parts back together. PVC fittings should only be hand tightened without the use of a wrench. The sea cock valve, in-line pressure gauge, sea strainer, rinse-clean inlet valve, and low pressure feed pump should be installed at or below water level. This will aid the low pressure feed pump in priming.

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

Avoid skin and eye contact with the membrane packaging solution. In case of skin contact, rinse the skin thoroughly with water. In case of eye contact, flush repeatedly with water and notify a physician immediately. R.O. membrane elements are stored in sodium bisulfite.

NEVER mount liquid holding component above any electrical or electronic device. Extensive damage to the electronic device will result if liquid enters device during maintenance and or component failure.

CONNECTION LINE CAUTIONS— All connection lines should be as short and straight as possible using minimum fittings. The connection lines must not be kinked.

ACCESSIBILITY CAUTIONS— This is a simple rule: Install the system and its supporting components in an accessible manner. The electrical control display or panel must be accessible for operation and monitoring of the system.

ELECTRICAL POWER REQUIREMENTS— Ensure that the power source is sufficiently sized to provide the correct voltage and cycles during start up and operation. If unsure, please consult with your local installation specialist or qualified electrician.

R.O. MEMBRANE ELEMENT NOTES

CAUTION: Some systems are shipped WITHOUT the reverse osmosis membrane element. This is to accommodate boat builders that will install the system well in advance of commissioning the boat and the system.

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

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

If the R.O. membrane element has been installed, there will be a R.O. membrane element serial number tag attached to the high pressure vessel(s). Find this serial number tag to ensure that the R.O. membrane element(s) have been installed. If the R.O. membrane element serial number tag is missing or does not contain a serial number then the R.O. membranes are not installed. If the R.O. membrane elements are not installed and you wish to install them at this time, contact FCI Watermakers, Inc. and supply us with your original purchase order number, FCI's invoice number, and this system's serial number.

WARNING: If the reverse osmosis membrane element is not to be installed at this time, ensure that you leave a visible note at the system controller and at the front of the control panel informing the end user that:

> **The reverse osmosis membrane elements are not installed; to contact the factory for the R.O. membrane elements; and DO NOT operate the system without the R.O. membrane elements installed. Extensive damage will occur if the system is operated without the R.O. membrane elements installed.**

Damage to the system caused by the operation of the system without R.O. membrane elements installed:

- **Is NOT covered by the FCI Watermakers, Inc. warranty**
- **Is the liability of the installer if the installer did not notify the end user.**
- **Is the liability of the end user if the installer notified the end user that the R.O. membranes were not installed and to not operate the system without the R.O. membrane elements installed.**

Figure 2 introduces the basic components required for the install. Each component plays an important part in the install and is reference throughout this manual.

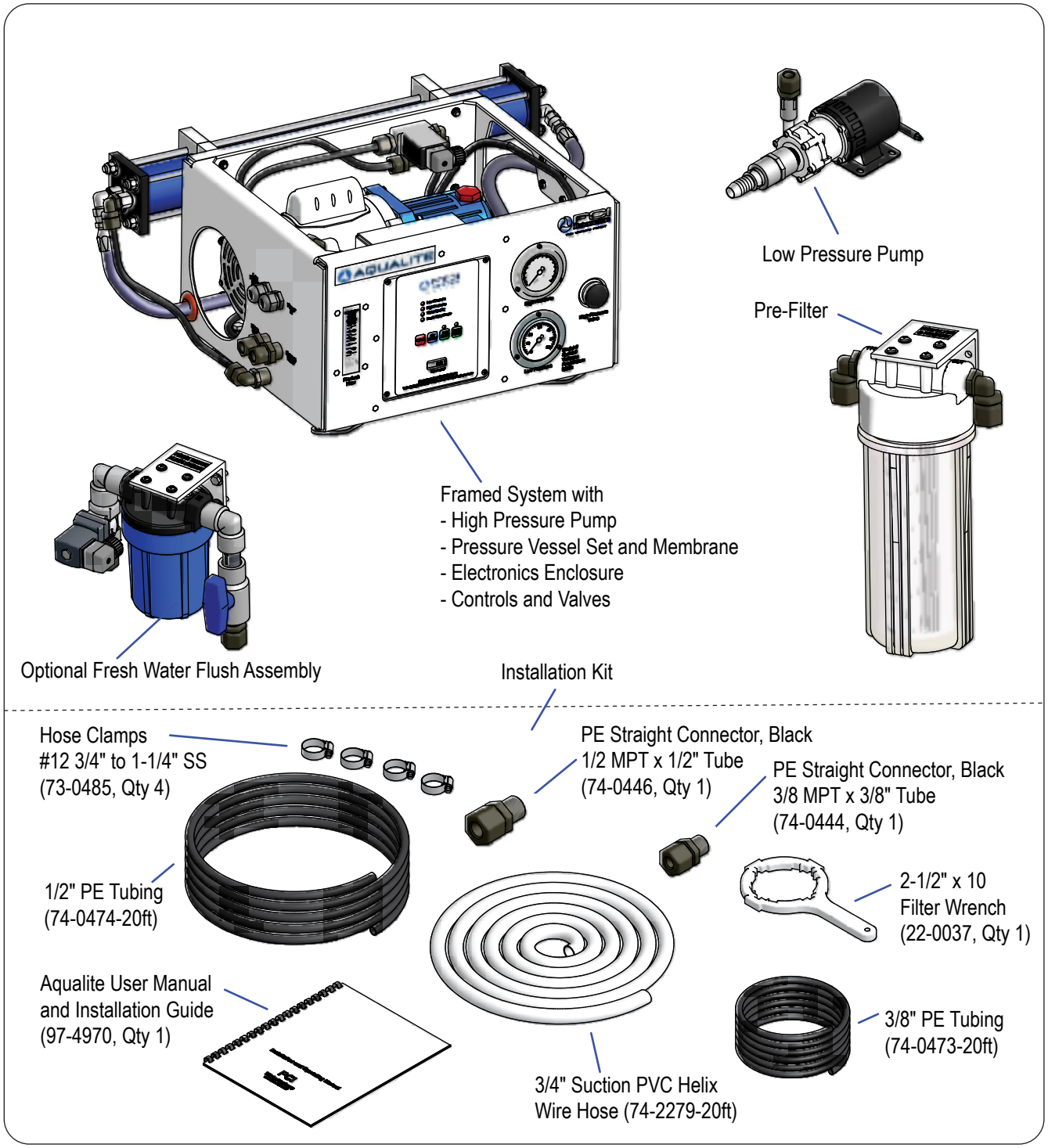


Figure 2: System Components Identification

PIPING & INTERCONNECT DIAGRAM

Figure 3 shows the piping and interconnect of the components, including standard and optional accessory configurations. Determine the pre-filtration and post-filtration components that were supplied with your system, and identify how each component interconnects.

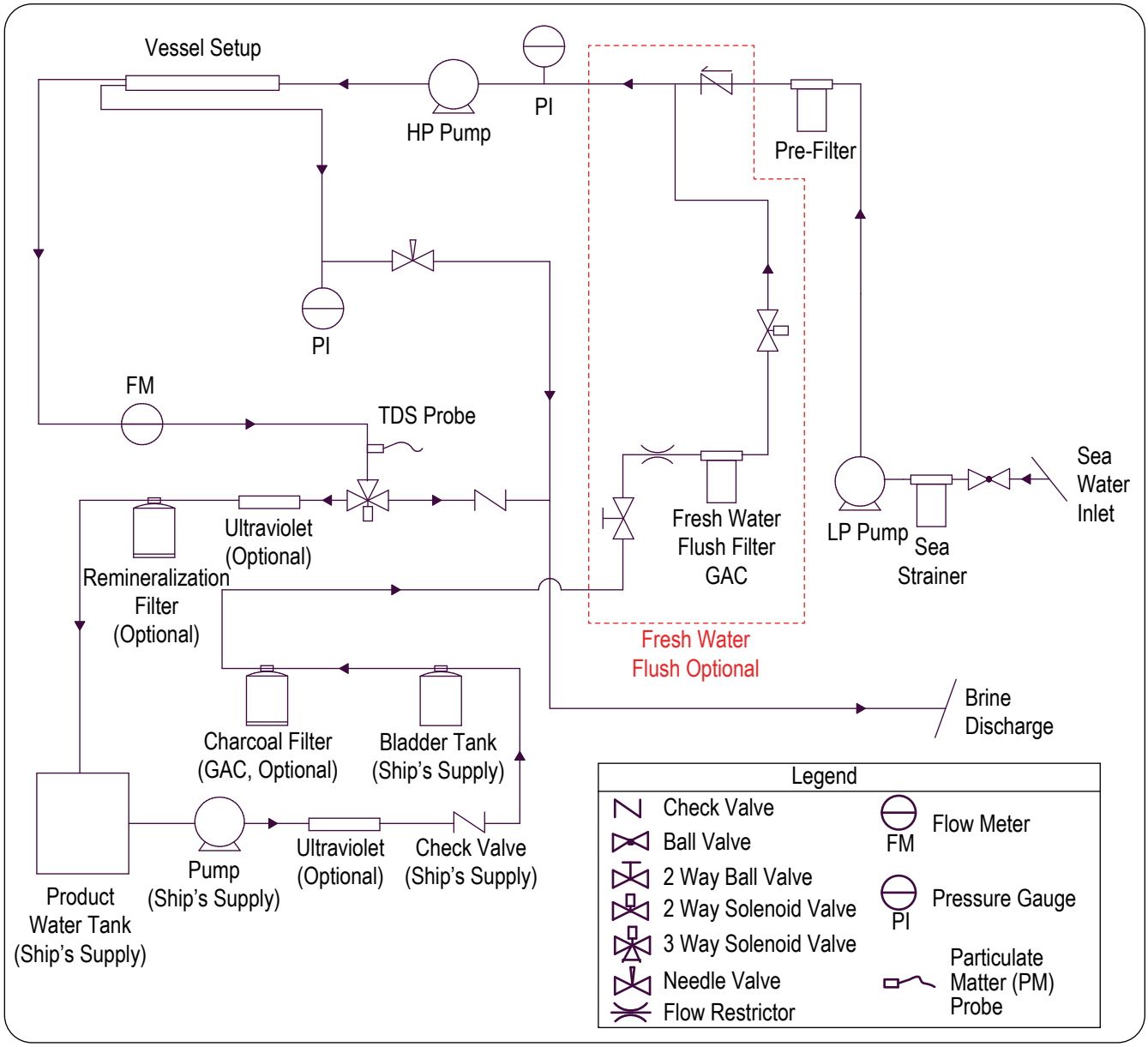
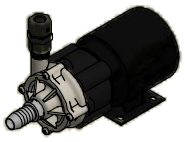


Figure 3: Piping & Interconnect Diagram

COMPONENT DESCRIPTIONS

The standard and optional components are described in this section, and items required for or desired by the installer are listed. The location, operation, and purpose of each major component of your FCI Watermakers system is briefly explained.

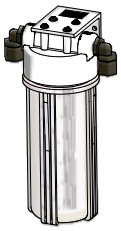
Use of third party, Non-FCI (or unauthorized) components may lead to premature failure, added operating and maintenance costs, and increased labor. Using third party, Non-FCI components may void any and all FCI Watermakers Warranty. We only wish to help you enjoy the luxury of owning a FCI Desalinating System. Treat it properly by using only FCI supplied parts, recommended consumables, and authorized accessories.



LOW PRESSURE PUMP

The low-pressure pump is a 1/40 horsepower with a polypropylene wet end. The inlet connection is 3/4" hose barb and the outlet connection is 1/2" tube. The pump should be mounted at or below the waterline to allow the pump to be flooded. Wiring diagrams are provided in the installation section of this manual. Wire must be installed from the pump into the cable grip on the left panel of the system and attached to the connector block. Wire was not provided with the pump because of unknown distances, and can be provided by the installer or authorized FCI dealer.

NOTE: Follow all local codes when wiring the motor. Connection points for the low-pressure pump to the main control can be found in the electrical schematic section.



PRE-FILTER

The pre-filter has 5 micron, 6-sq. ft. filters. All connections are 1/2" tubing.

The filters should be cleaned or replaced when the low-pressure reading reaches 5-7 PSI, but will vary with installation. The filters can be cleaned once or twice before replacing. When cleaning the filter, do not scrub the pleats to the point that the material begins to fray. If fraying occurs, replace element.

NOTE: The pre-filter is your first line of defense protecting the high-pressure pump and membrane. Keeping the filter in good condition will help insure trouble-free operation.

WARNING: PRE-FILTER ELEMENT Do not use third party pre-filter elements, use only FCI pre-filter elements. Third party pre-filter elements do not properly fit and the seams fall apart. They also allow by-pass resulting in extensive and very costly damage to the high pressure pump as well as premature fouling of the R.O. membrane element(s).

CAUTION: PRE-FILTER ELEMENT Do not use string wound or fiber pre-filter elements. String wound and fiber filter elements are designed for the photographic film developing industry. When used in seawater, they will plug up rapidly in 1/10th or less the time of a FCI supplied pre-filter cartridge element. This will cause frequent shut downs of the system and very frequent changing will result in very high cost of maintenance, and user frustration.

SYSTEM CONTROL PANEL

The Aqualite is designed with a simplified system control panel for easy operation and less detailed set-up (*Figure 4*). These include the control panel (located on cover of the electronics enclosure), high pressure valve, and production flowmeter (located on the left of the control panel. Important system information is conveniently posted right on the front of the system so that everything you need for operation is right at hand.

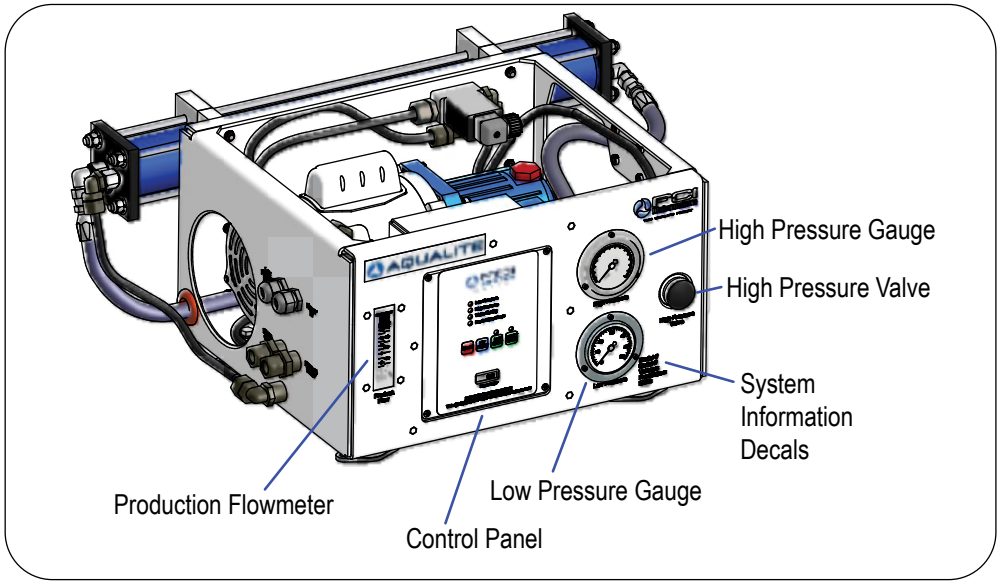
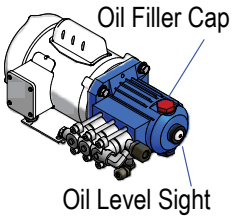
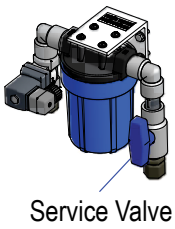


Figure 4: System Control Panel

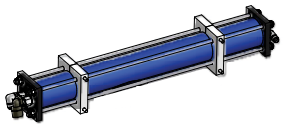
COMPONENT DESCRIPTIONS (continued)



HIGH PRESSURE PUMP ASSEMBLY
The pump and motor is mounted inside the frame with four vibration mounts. This is a direct drive assembly without belts or pulleys. Oil changes are necessary the first 50 hours and every 500 hours thereafter. The connection for low-pressure inlet water from the pre-filter is routed through the right panel of the system and made here.

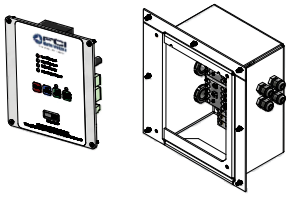


FRESH WATER FLUSH ASSEMBLY (Optional)
The fresh-water-flush feature of the Aqualite allows the system to be flushed with fresh water after each use or on a programmed schedule. Seawater, if left un-flushed, can be more corrosive, can promote biological growth, and can naturally decay materials. The carbon filter removes particulate and chlorine (bleach) from the fresh water holding tank. These elements can be harmful to the membrane. The shut-off service valve allows the filter cartridge to be replaced without having to depressurize the on board pressure system.



PRESSURE VESSEL ASSEMBLY
The vessel houses the membranes, which are the heart of the system. An Aqualite system is equipped with one vessel with 200 GPD rated output.

PRODUCT TDS PROBE
The Product TDS Probe , pre-installed in the frame, samples the total dissolved solids in the product flow. When water quality is acceptable, product water is diverted to the product water storage tank.



ELECTRICAL ENCLOSURE
The enclosure is located behind the control panel and is access by removing the four cover screws. The control panel is attached to the front of the cover, and the PC Board is attached to the back of the cover. Wires and cables are routed into the electrical enclosure through the cable grips on the systems left panel labeled “Low Pressure Pump” and “Power In.” The wires connect to the connector block inside the enclosure. Also, the cable for the optional remote control panel and fresh water flush connect to the PC Board on the back of the enclosure's cover. Switches on the PC Board can set the interval and schedule of the optional fresh water flush.

REMOTE CONTROL (optional)
An optional remote control can be installed to monitor and run the system from a location away from the physical unit. The remote also allows custom programming of the system parameters.

3 / INSTALLATION

Refer to the outline below for an overview of the installation process and the structure of this chapter.

Each system has its unique environment. To allow for this, the instructions are presented in part by discussion rather than by procedure. Start by reading through this chapter completely, matching the tasks to your environment.

COMPONENTS SUPPLIED BY INSTALLER
The first section lists the items not included with the system that you may need to supply for the installation.

DIAGRAMS SHOWING THE COMPONENTS AND LAYOUT
The next following pages contain diagrams of the system components with their dimensions and footprints. The system layout is shown in plumbing diagram. The diagrams are used to become familiar with how the parts fit together.

SYSTEM INSTALLATION / MOUNTING
Following the diagrams are instructions on mounting the components. The footprint and layout diagrams of the previous section are available for reference when mounting the system components.

SYSTEM INSTALLATION / PLUMBING
After the mounting instructions, the installation focuses on plumbing. The plumbing connections are listed, referring to the tubes and hoses by letter. The plumbing diagram presented earlier illustrates the tubes and hoses and calls out their letters. A chart within the plumbing diagram describes the connections, tubes, and hoses. The plumbing diagram is available for reference when connecting the plumbing.

SYSTEM INSTALLATION / ELECTRICAL CONNECTIONS
The next task is connecting the electrical wiring. This includes wiring power from the main source to the frame's electrical enclosure contactor blocks, and wiring power from the frame's contactor blocks to the low pressure pump. If installing the optional remote control panel or the fresh water flush, wiring is routed from the remote through the “Power In” cable grip (on system's left panel) to the PC board located on the back of the enclosure's cover.

WIRING SCHEMATICS
Schematics are available for reference when connecting the wiring.

FINAL INSTALLATION CHECKLIST
After completing the installation, a checklist is provided to help you check your work.

COMPONENTS SUPPLIED BY INSTALLER

Most of what you will need to install your system is included in your package. As each system installation varies, not all installation fittings, hose and tubing can be provided. There are a few items that you will need to consider for your individual system.

Select a suitable location for the components and evaluate where you plan to place them. Obtain a good working estimate as to the footage of hose that will be needed and contact your dealer or FCI for the supplies. Table 1 summarizes the specifications for components supplied by installer.

Table 1: Specifications for Components Supplied by Installer

Connection	Specification
Inlet Thru Hull	1/2" minimum
Connection at Inlet Thru Hull	3/4" hose barb
Brine Discharge Thru Hull	1/2" minimum at water level
Connection at Brine Discharge Thru Hull	1/2" tubing
Connection at Ship's Unpressurized Potable Water Storage Tank	3/8" tubing compression fitting x 3/8" NPT
Connection at Ship's Pressurized Water Supply if using optional fresh water flush equipment	1/2" tubing compression fitting x 1/2" NPT
Incoming Power	110/120 VAC or 220/230 VAC, 50/60 Hz as listed on system serial number plate
Incoming Wire Size	Per local electrical specifications
Current Draw (Actual current draw will vary with incoming power conditions)	8 A for 120 VAC systems, or 4 A for 220 VAC systems

COMPONENTS SUPPLIED BY INSTALLER

CAUTION: All fittings, valves, and piping installed prior to, within, and after the system must not contain iron. If the resulting failure of the R.O. membrane element is attributed to improper installation, it is the liability of the installer.

1 *Inlet Thru Hull Fitting with Forward Facing Scoop and Shut-off Valve:*
The inlet thru hull fitting must be minimum 1/2" and dedicated to only the FCI system. It is important that the installer utilizes a forward-facing scoop so that the system receives a positive flow of water as the boat is under way. The fitting must be installed on the boats hull in a position that provides continual feed water flow without air to the system.

CAUTION:

- **A flush inlet thru-hull fitting will cause a vacuum as the boat is under way, and this will cause loss of feed water flow and cavitation of the booster and high pressure pump, resulting in continual system shut down.**
- **The FCI Watermakers System must receive an uninterrupted supply of feed water without air.**

- **The FCI Watermakers System must not be tied into another existing auxiliary water line already supplying another accessory on the boat.**
- **If the FCI Watermakers System is connected to a sea chest or stand up pipe, DO NOT plumb the FCI Watermakers System feed line to the top of the sea chest or stand up pipe. Plumb the FCI Watermakers System to the bottom of such feed water arrangements to ensure a continual air free supply of feed water to the system.**

2 *Connection at Inlet Thru Hall* is 3/4" barb.

3 *3/4" Sea Strainer*

4 *Brine Discharge Thru Hull* is 1/2" minimum at water level

5 *Connection at the Brine Discharge Thru Hull* is 1/2" tubing.

4 *Connection at the Ship's Unpressurized Potable Water Storage Tank:*
3/8" tubing compression fitting x 3/8" NPT. In order to avoid problems such as reverse flow (osmosis) from the tank to the system and chlorination attack of the R.O. membrane element, the fitting must terminate above the maximum water level.

WARNING: No valves should be installed in this line. A blockage or closed valve in the product water line will cause extensive damage to the system and R.O. membrane element.

5 *Connection at the Ship's Pressurized Water Supply (if using optional fresh water flush equipment):*
1/2" tubing compression fitting x 1/2" NPT.

6 *Circuit Breaker with appropriate Amperage Rating*:
8 A for 120 VAC systems or 4 A for 220 VAC systems.

NOTE Actual current draw will vary with incoming power conditions.

7 Properly sized *Power Cables*. Consult local regulations for proper sizing.

8 *Electrical Power Source* capable of delivering the required constant voltage and cycles during start up and operation of the system:
110/120 VAC or 220/230 VAC, 50/60 Hz as listed on system serial number plate.

Match the components included with the Aqualite installation kit to the items listed in *Figure 5*. If you are also installing the optional fresh water flush assembly, an additional installation kit is included *(Figure 6)*.

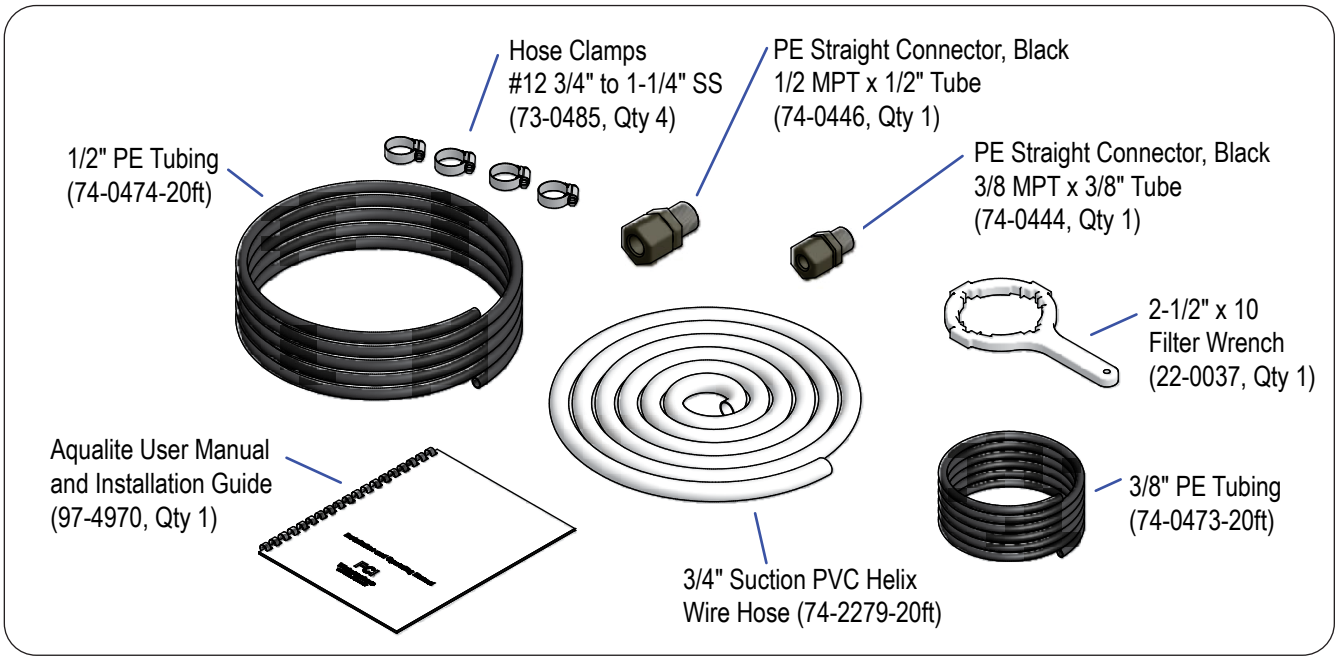


Figure 5: Components with Aqualite Installation Kit

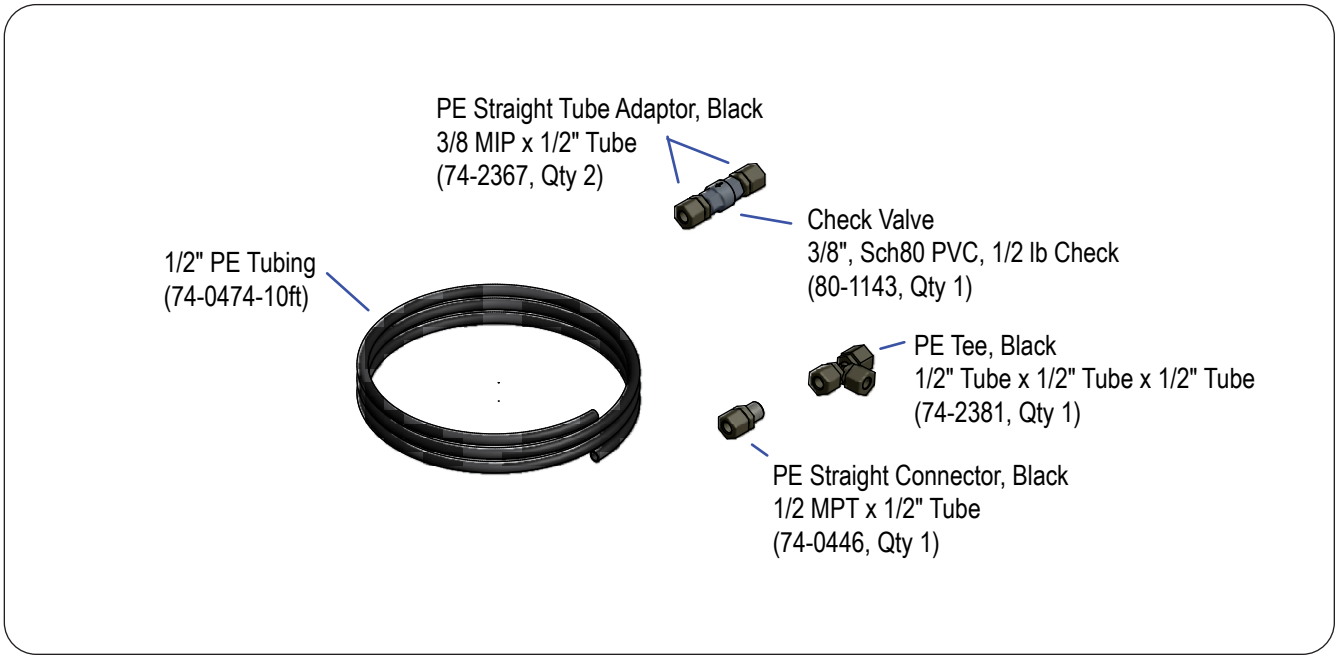


Figure 6: Components with Fresh Water Flush Installation Kit (optional)

Dimensions and footprints of the systems components are shown in *Figure 7* to *Figure 10*. Refer to the figures appropriate to your system components when planning where to mount the components. Planning considerations are discussed in "SYSTEM INSTALLATION / MOUNTING" on page 38.

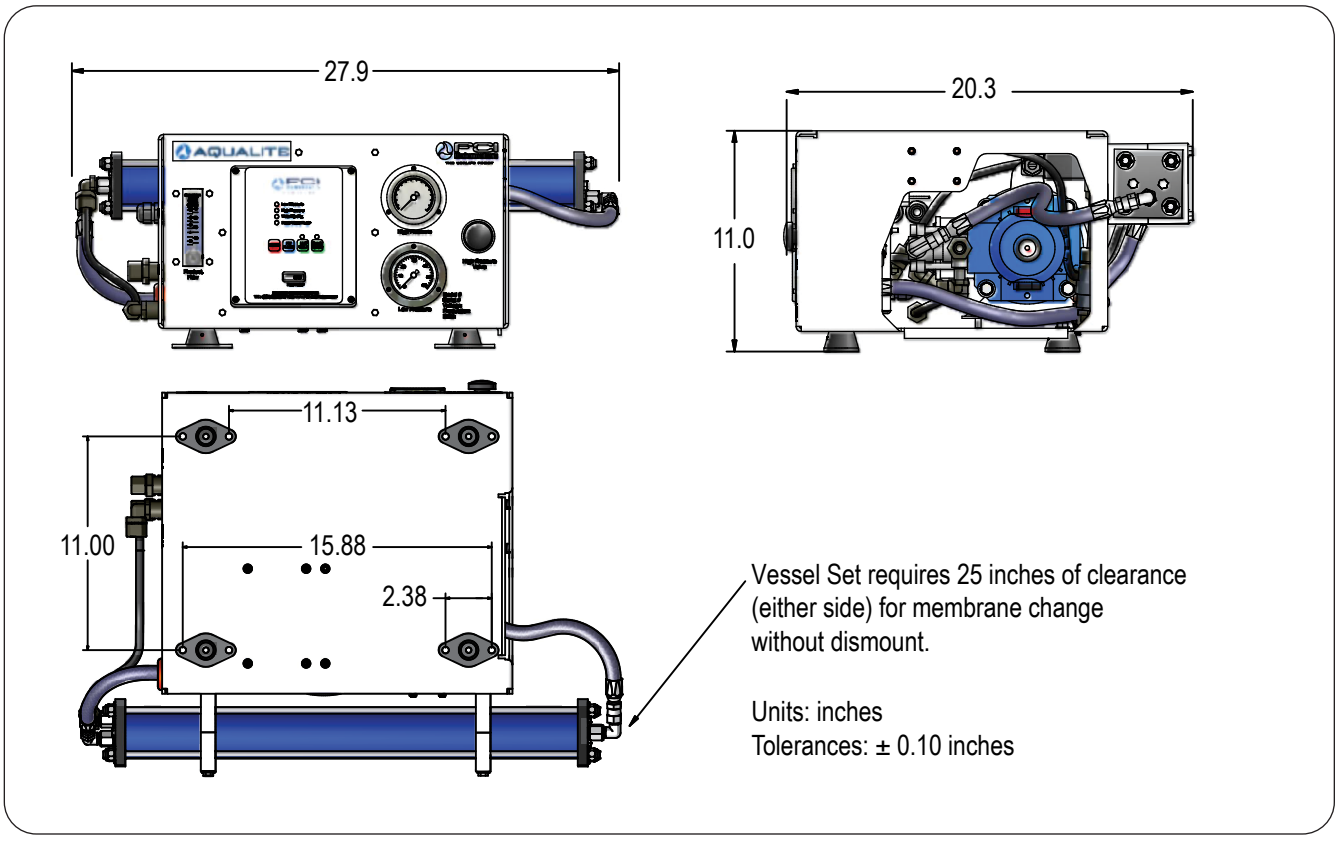


*Figure 7: Dimensions & Footprint for **Framed System***

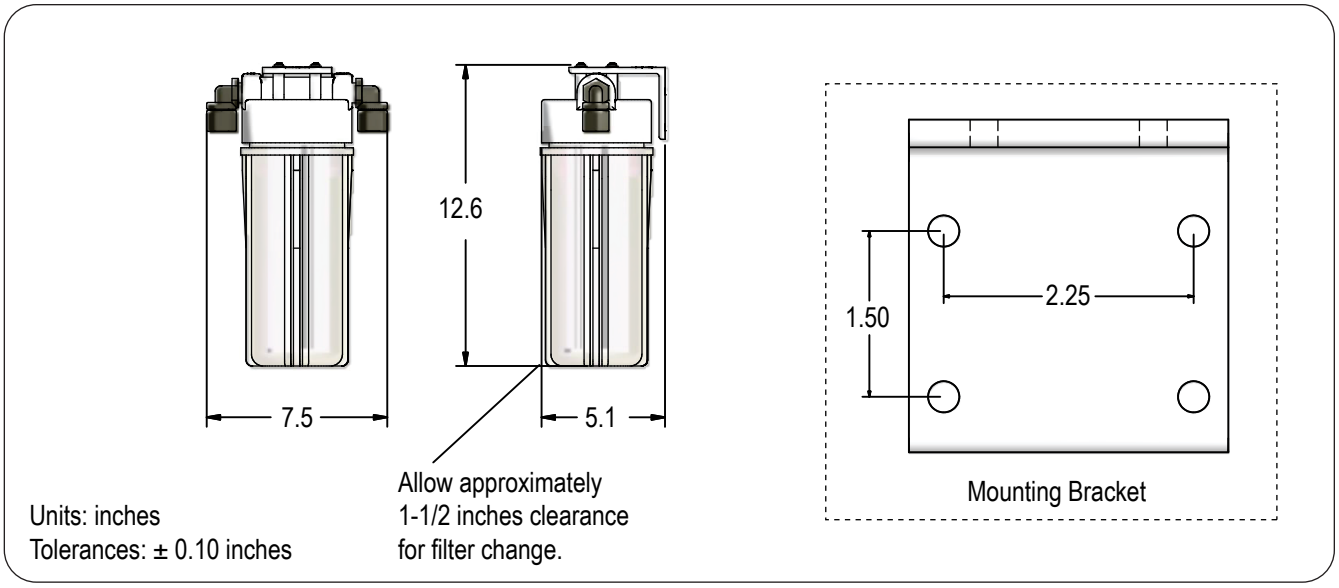


Figure 9: Dimensions, & Footprint for Pre-Filter

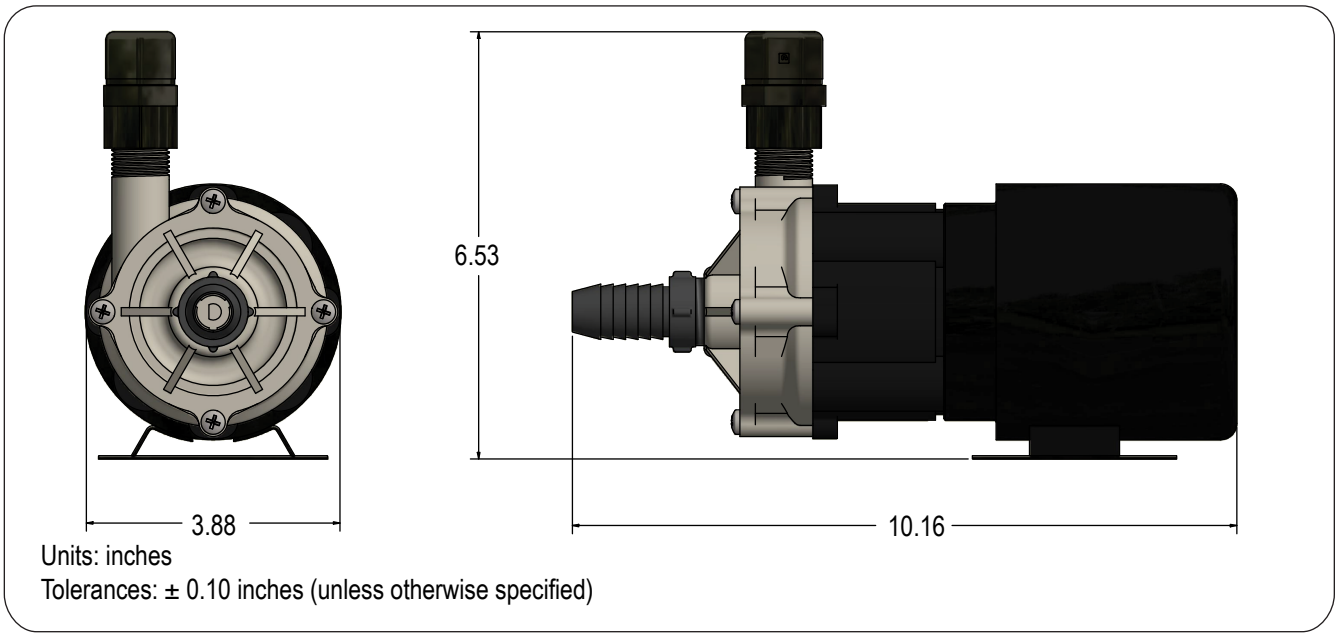


Figure 8: Dimensions, & Footprint for Low Pressure Pump

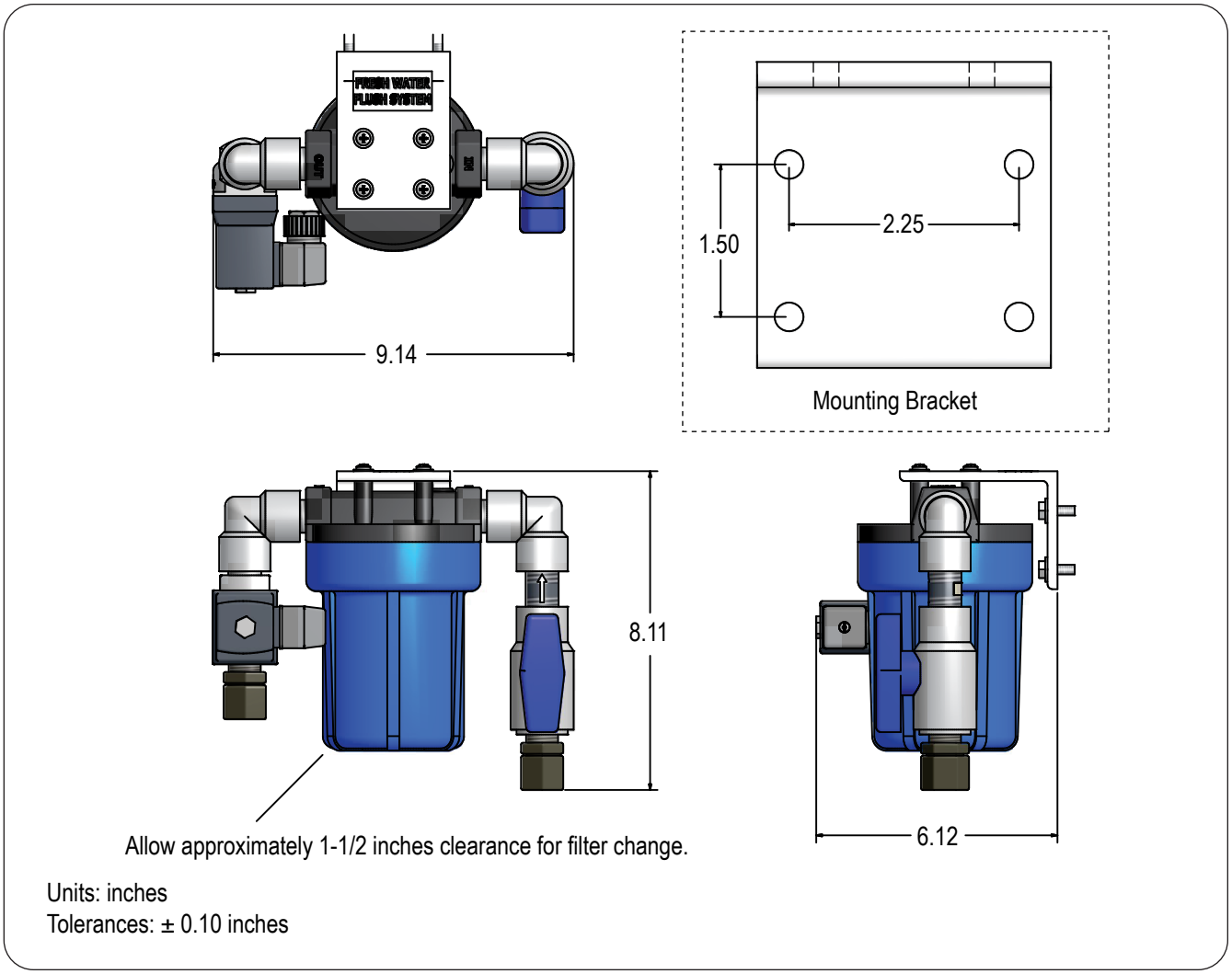


Figure 10: Dimensions & Footprint for Fresh Water Flush (optional)

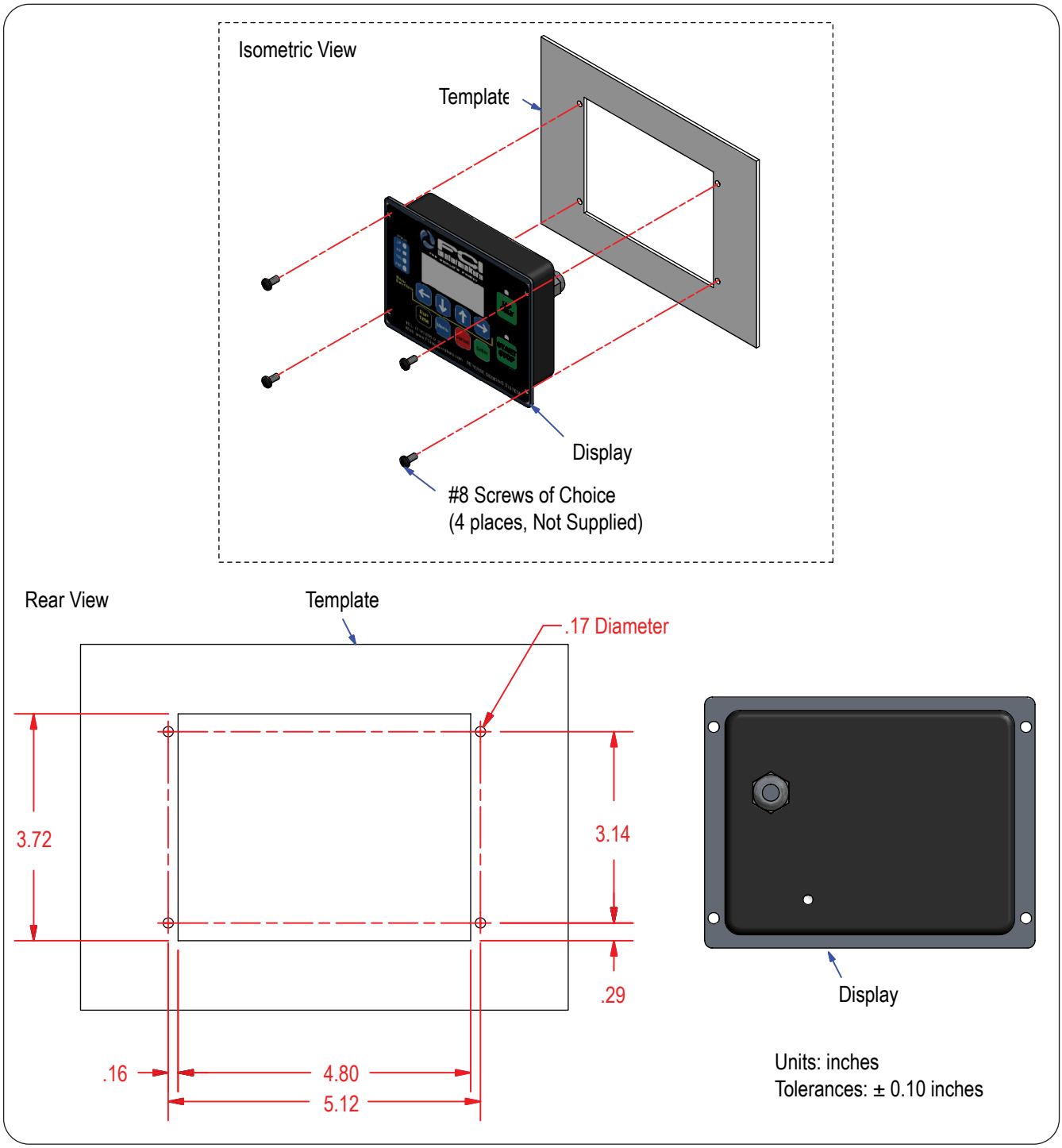
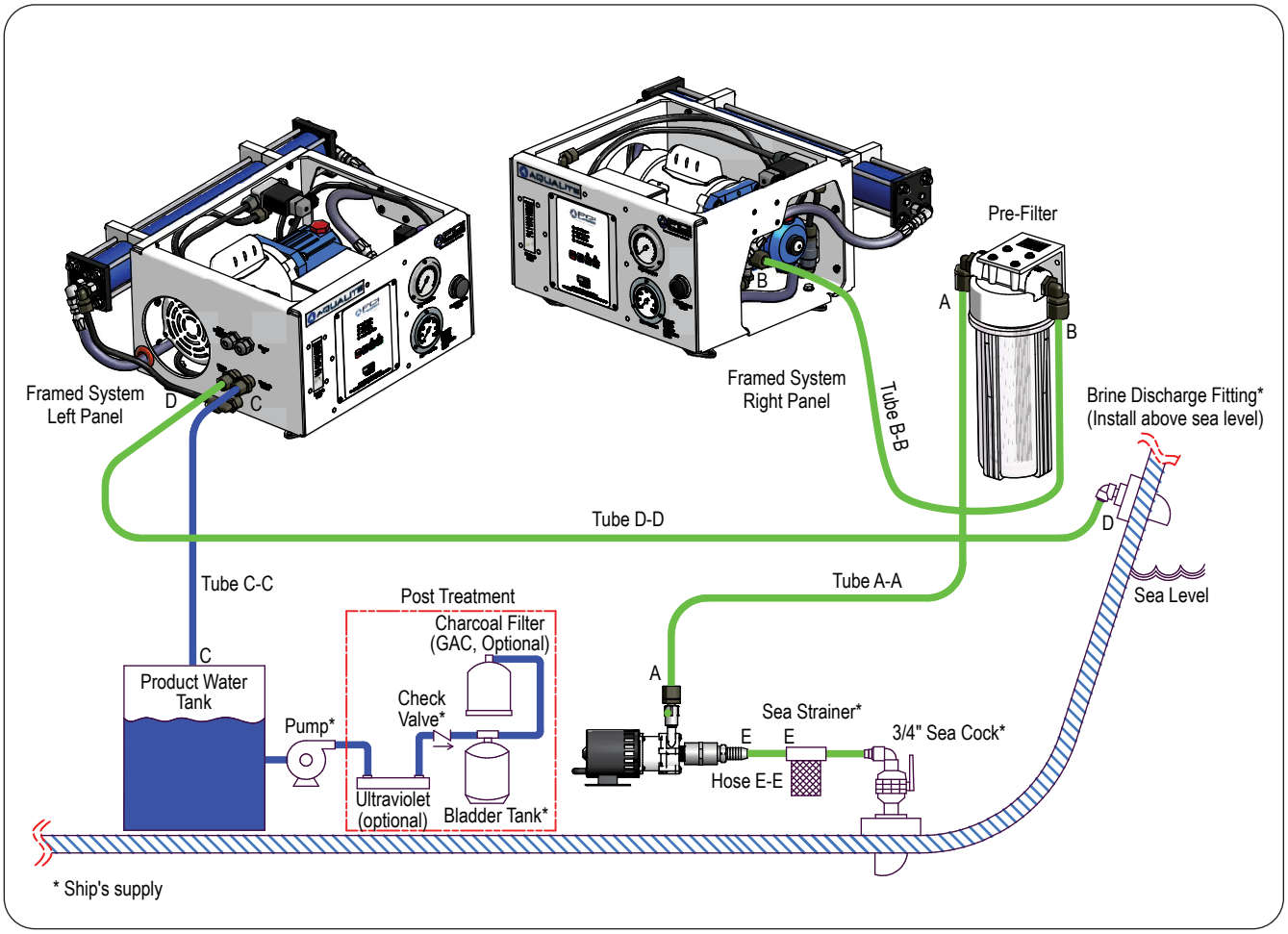


Figure 11: Remote Control Footprint (optional)

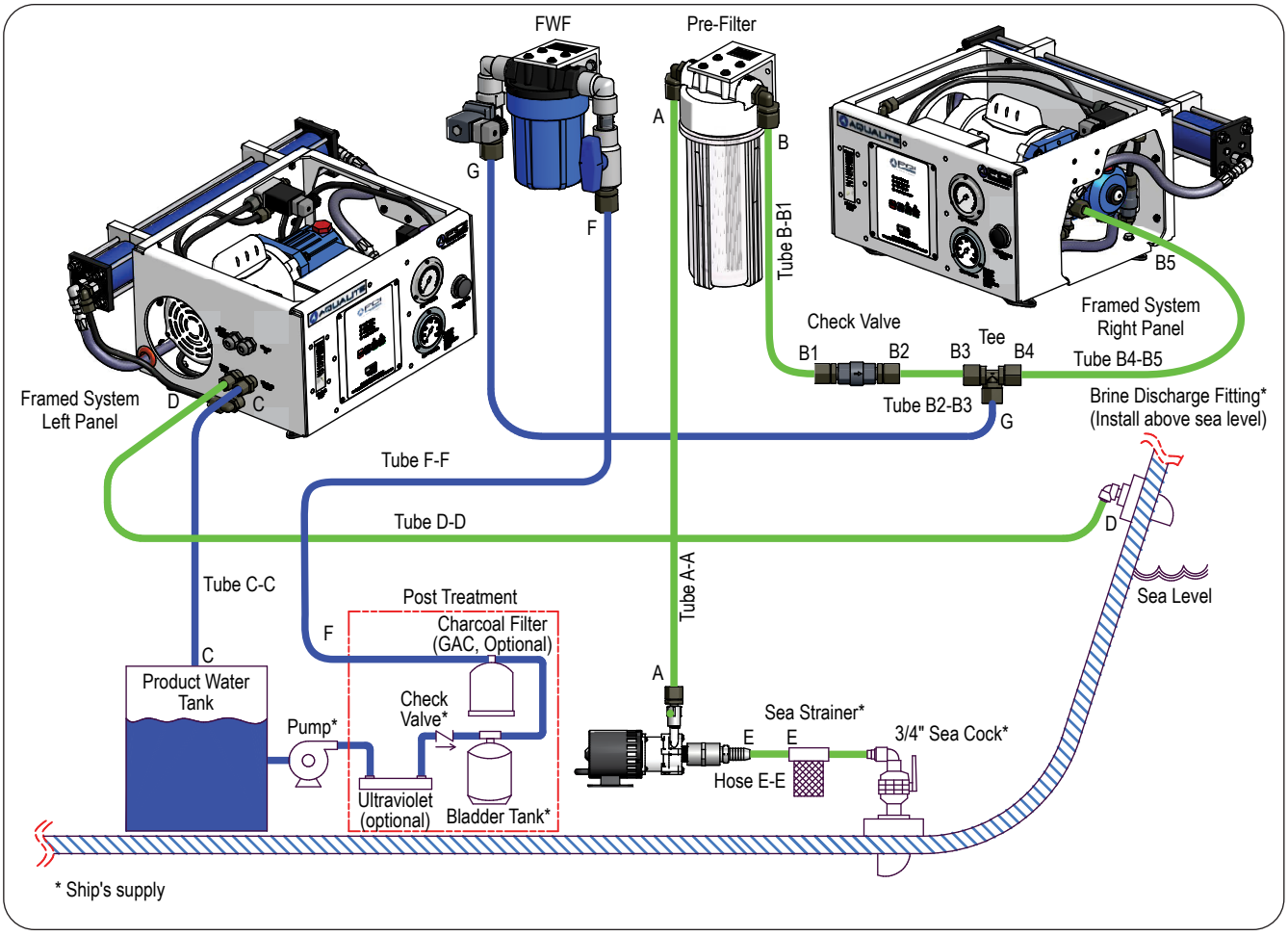
PLUMBING DIAGRAMS

The Aqualite plumbing layout is shown in *Figure 12*. If you are installing the optional fresh water flush with the Aqualite, refer to *Figure 13 on page 37*. The plumbing installation is discussed in "SYSTEM INSTALLATION / PLUMBING" on page 40.



	From	To	Description
A-A	Low Pressure Pump	Pre-Filter Brine Inlet	1/2" PE Tubing
B-B	Pre-Filter Brine Outlet	Right Panel High Pressure Pump Brine Inlet	1/2" PE Tubing
C-C	Left Panel Product Water Out	Product Water Tank	3/8" PE Tubing
D-D	Left Panel Brine Water Out	Brine Discharge Fitting	1/2" PE Tubing
E-E	Sea Strainer	Low Pressure Pump Inlet	3/4" Suction Hose

Figure 12: Plumbing Diagram

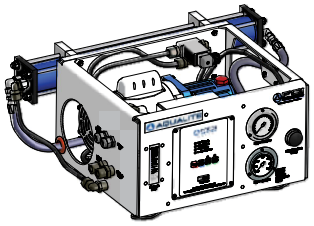


	From	To	Description
A-A	Low Pressure Pump	Pre-Filter Brine Inlet	1/2" PE Tubing
B-B1	Pre-Filter Brine Outlet	Check Valve Inlet	1/2" PE Tubing
B2-B3	Check Valve Outlet	Tee	1/2" PE Tubing
B4-B5	Tee	Right Panel High Pressure Pump Brine Inlet	1/2" PE Tubing
C-C	Left Panel Product Water Out	Product Water Tank	3/8" PE Tubing
D-D	Left Panel Brine Water Out	Brine Discharge Fitting	1/2" PE Tubing
D-D	Left Panel Brine Water Out	Brine Discharge Fitting	1/2" PE Tubing
E-E	Sea Strainer	Low Pressure Pump Inlet	3/4" Suction Hose
F-F	Ship's Pressurized Water Supply	Fresh Water Flush Inlet	1/2" PE Tubing
G-G	Fresh Water Flush Outlet	Tee	1/2" PE Tubing

Figure 13: Plumbing Diagram with FWF (optional)

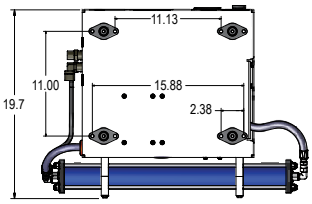
SYSTEM INSTALLATION / MOUNTING

Please refer to the appropriate footprint and layout diagrams from "DIMENSIONS & FOOTPRINT" on page 32 to page 35. All components should be mounted as close to each other as possible while still allowing for easy access for service and operating adjustments. Try to avoid elbows in the plumbing whenever possible and make hose connections as straight and as clean as possible.

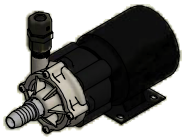


FRAMED SYSTEM

Locate an area to mount the framed system. Choose an area that allows operation of the controls and reading of the flowmeter and system information decals. Choose an area that also allows routing of the plumbing and wires into the left and right panels of the system. Allow clearance to open the electrical enclosure, to check and change the oil in the high pressure pump, and to service the membranes. Do not install over any electrical components in case leakage develops in the future. If the ambient temperature of the mounting location will exceed 120°F, it will be necessary to relocate the pressure vessel to a cooler environment.



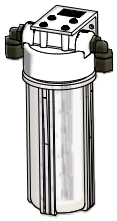
Place the entire system on a platform or shelf. Trace around the four shock mounts, or inside the 1/4" mounting holes on the shock mounts. Remove the frame from the shelf. Remove the shock mounts from the framed system. Following the traced outlines on the shelf, secure the shock mounts onto the shelf with 1/4" lag bolts (or through bolts with backing nuts). Replace the frame on the mounts and secure with the screws previously removed. Because the mounts are rubber, you will be able to bend them out of the way enough to allow the frame to be positioned in place.



LOW PRESSURE PUMP MOUNTING

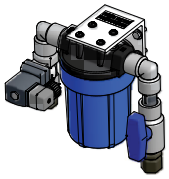
The low-pressure pump should be mounted at or below the waterline. If the low pressure pump must be mounted above the waterline, install a check valve to insure the pump keeps its prime. Allow plenty of room around the pump motor to provide proper ventilation. The suction line should be fitted to allow at least one foot straight section of pipe on the inlet and discharge lines.

Position the pump in the desired location and trace around the mounting holes on the base. Remove the base from the pump by loosening the securing bolts. Mount the base using 5/16" lag bolts or through bolts with back nuts. If desired, a neoprene or rubber pad may be installed under the base to further insolate the pump from the hull or foundation. Replace pump and motor on base and tighten the bolts.



PRE-FILTER MOUNTING

Mount the pre-filter assembly in an accessible area to allow for changing the filter elements. Allow at least 1-1/2" below the housing to allow for removal of the 5-micron cartridge. Do not install over any electrical components in case of leakage or dripping when changing cartridges.



FRESH WATER FLUSH SYSTEM (optional)
Find a suitable location to mount the Fresh Water Flush Assembly. Take into account the filter needs to drop down 1-1/2" to change the cartridge. The inlet source of water is your vessels fresh water re-pressurization system. Do not install over any electrical components in case of leakage or dripping when changing cartridges.

Before proceeding, review *Figure 14* and the notes below to ensure proper tube fittings and hose connections.

PROPER TUBE FITTING AND HOSE CONNECTIONS

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

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

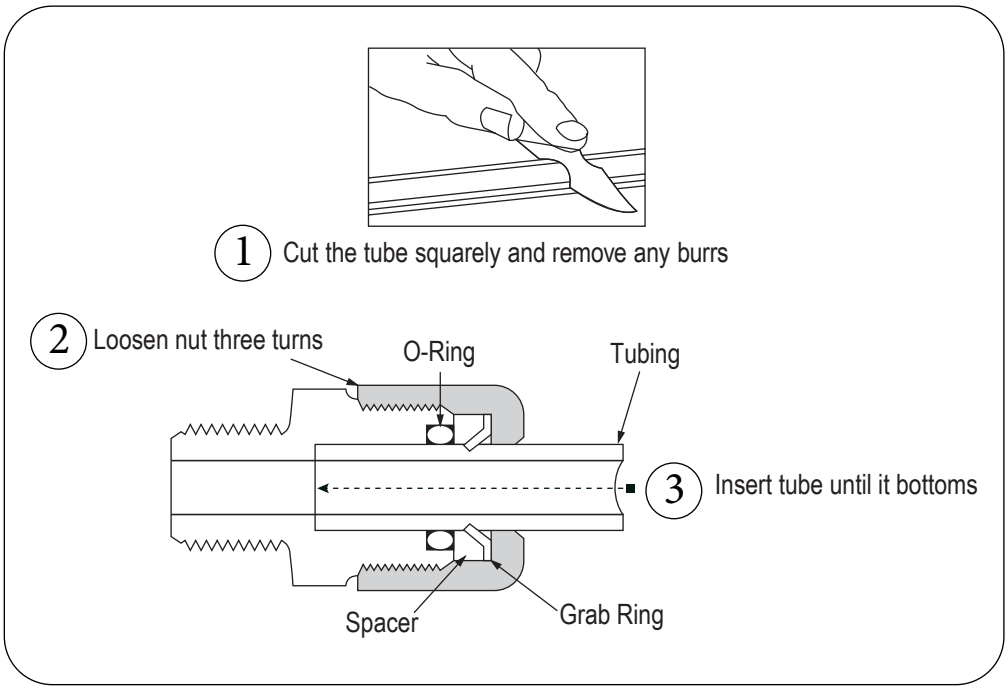


Figure 14: Proper Tube Fitting and Hose Connections

Start the plumbing installation by fitting the ship's water connections. Then complete the "PLUMBING CONNECTIONS" to the system components as described in the instructions on page 42.

- Connections shown in **bold** refer to "COMPONENTS SUPPLIED BY INSTALLER" on page 28.
- Letters A-A to E-E refer to specific tubes and hoses as shown in the "PLUMBING DIAGRAMS" on page 36.

BRINE DISCHARGE CONNECTION
Find the following items from the Aqualite installation kit:

- 1/2" MPT x 1/2" Tube Poly Ethylene (PE) Black Straight Connector
- 1/2" PE Tubing

Using the above connector, attach one end of the 1/2" PE Tubing to the **ship's brine discharge thru hull 1/2" NPT connection**. Be sure the discharge thru-hull is mounted at or above the water line. Measure the run as straight as possible to the left panel of system and cut the tube to length. See *Tube D-D* on the plumbing diagrams.

PRODUCT WATER TO STORAGE TANK CONNECTION
Find the following items from the Aqualite installation kit:

- 3/8" MPT x 3/8" Tube PE Black Straight Connector
- 3/8" PE Tubing

Using the above connector, attach one end of 3/8" PE Tubing to the **ship's unpressurized potable water storage tank 3/8" NPT connection**. Always make the connection on the top of the tank. Measure the run as straight as possible to the left panel of the system and cut the tube to length. (*Tube C-C*)

SHIP'S FRESH WATER SYSTEM TO FRESH WATER FLUSH CONNECTION (optional)
Find the following items from the fresh water flush installation kit:

- 1/2" MPT x 1/2" Tube PE Black Straight Connector
- 1/2" PE Tubing

Using the above connector, connect one end of the 1/2" PE Tubing to the **ship's pressurized water supply 1/2" NPT connection.** This connector should be on the pressure side of the fresh water system after the accumulator tank. Measure the run as straight as possible to the fresh water flush filter, inlet side and cut the tube to length. (See *Tube F-F* on plumbing diagram)

SEAWATER INLET
Find the following items from the installation kit:

- 3/4" Suction PVC Helix Wire Hose (also called 3/4" Wire Flex Hose)
- 3/4" to 1-1/4" Stainless Steel (SS) #12 Hose Clamp

Using a clamp, attach the suction hose to the outlet side of the **3/4" Sea Strainer.** Measure the run as straight as possible to the low pressure pump inlet, and cut the tube to length (*Hose E-E*)

PLUMBING CONNECTIONS
Refer to the plumbing diagram (*Figure 12 on page 36*) and proceed as follows to connect the plumbing to the system components:

1. Attach 1/2" tubing to the fitting at the output of the low-pressure pump. Cut the tube to a length suitable to allow the shortest possible run between the low-pressure pump and the inlet side of the pre-filter assembly. Attach tube to fitting on the inlet of the pre-filter assembly. See *Hose A-A* on the plumbing diagram.
2. Attach 1/2" tubing to the fitting at the outlet of the pre-filter. Route to the fitting at the inlet of the high pressure pump. If you are installing the optional fresh water flush, splice the check valve on the pre-filter side and the tee on the high pressure pump side of the tubing. Be careful to orient the arrow on the check valve so that the flow goes from the pre-filter downstream to the high pressure pump. (See *Tube B-B* for standard installations. See *Tubes B-B1, B2-B3, B4-B5* for installations with optional fresh water flush.)
3. If installing the optional fresh water flush assembly, attach 1/2" tubing to the fitting at the outlet side of the fresh-water-flush filter and route tube to the tee. Attach the tube to the fitting on the tee. (*Tube G-G*)
4. Find the 3/8" tubing previously installed to the fresh water storage tank. Refer to "PRODUCT WATER TO STORAGE TANK CONNECTION" on page 41. Connect the free end of the tubing to the fitting on the left panel of the system labeled, “Product Water Out.” See *Tube C-C*.
5. Find the 1/2" tubing previously installed to brine discharge thru-hull. Refer to "BRINE DISCHARGE CONNECTION" on page 41. Connect the free end of the tubing to the fitting on the left panel of the system labeled, “Brine Water Out.” See *Tube D-D*.
6. Find the 3/4" hose previously installed to the outlet side of the sea strainer. Refer to "SEAWATER INLET" on page 42. Connect the free end of the hose to the inlet side of the low-pressure pump. (Inlet side of the low-pressure pump is always the center fitting, located on the front of the pump). See *Hose E-E*. Secure hose connections with hose clamps.
7. If installing the optional fresh water flush assembly, find the 1/2" tubing previously installed to the ship's freshwater pressure system. Refer to "SHIP'S FRESH WATER SYSTEM TO FRESH WATER FLUSH CONNECTION (optional)" on page 41. Attach the free end of the tubing to the fitting at inlet side of the fresh-water-flush filter. (*Tube F-F*)

SYSTEM INSTALLATION / ELECTRICAL CONNECTIONS

Please refer to the wiring schematic for your unit, immediately following these electrical connections instructions.

CAUTION: DO NOT PERFORM INSTALLATION UNLESS:

1. The system feed water sea cock valve is closed.

2. The system main electrical disconnect switch is switched OFF, LOCKED, and TAGGED.

WARNING: ELECTRICAL SHOCK HAZARD. A volt/ohm meter will be necessary. The following installation procedures expose the installer to HIGH VOLTAGE and electrical shock hazard. Only attempt this if you are a qualified electrician and only if surrounding conditions are safe.

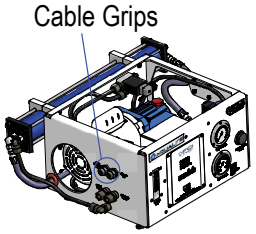
CAUTION: Always allow slack in electrical cables. Allow the cable to enter or leave from the strain relief in a straight manner for several inches to ensure proper connection, to relieve stress to the cable and fitting, and to allow ease of detachment and reattachment for maintenance or replacement.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

NOTE:

- **Always follow all local and Coast Guard codes when installing this system.**
- **Grounding and circuit protection should be done in accordance with National Electrical Code.**
- **Never attempt to hook-up or service this system without disconnecting all power.**
- **Always check to make sure system voltage matches incoming voltage.**
- **If system is 3-phase, be sure to check for correct rotation on all pumps before running system.**

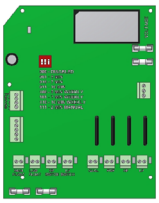
ELECTRICAL ENCLOSURE

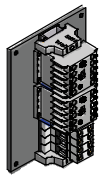
The electrical enclosure is located behind the control panel. Two cable grips are located on the left side of the system to route the main power, the low pressure pump power, and optional remote control panel wires. To open the enclosure, loosen the four screws on the corners of the enclosure's cover. Locate the cover by looking at the control panel. The control panel is located on the front of the cover. Removing the cover will allow access to the PC board (attached to the back of the cover) and the contactor blocks (inside the enclosure).

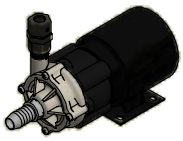


System Left Panel


Cover


PC Board


Contactor Blocks



LOW PRESSURE PUMP

Consult local codes to determine the correct gauge wire and follow standard color coding to wire the low pressure pump's power cord to the system. Feed the wires through to the “Low Pressure Pump” cable grip on the system's left panel and into the electrical enclosure. Attach the wires to terminals #2T1 and #6T3 of the LPP contactor, and #G of the white contactor as described in *Figure 15 on page 45*.

Centrifugal pumps must receive an initial prime in ALL cases. DO NOT START PUMP BEFORE PRIMING. Completely fill the pump volute and suction line. Remove air from volute by removing top pipe plug of volute while filling. After filling, check by turning pump shaft a few times. Add more water if required. If pump does not build up pressure as motor develops speed, shut down and re-prime. DO NOT attempt to prime pump or add liquid while pump is in operation.

INCOMING POWER AND GROUND

Using the proper gauge wire (consult with your local electrical codes), route the wires into the electrical enclosure via the "Power In" cable grip on the system's left panel. Attach the wires to the white contactor block's terminals marked #1, #2, and #G, located inside the electrical enclosure as described in *Figure 15*.

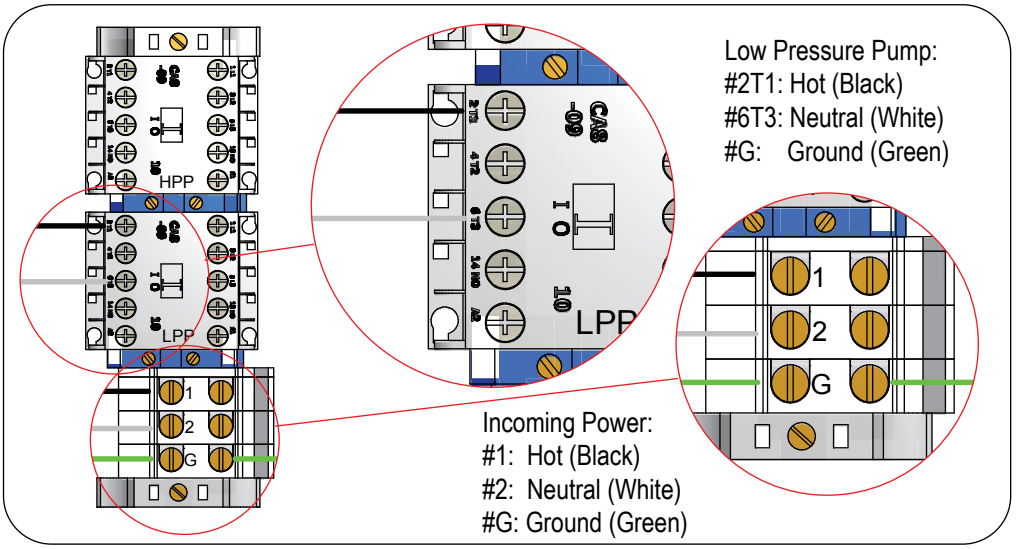


Figure 15: Wiring at the Connector Block

REMOTE CONTROL PANEL (optional)
Mount the remote control panel using four #8 screws of choice (not supplied). See the remote control panel footprint for dimensions. Follow the wire diagram in *Figure 16* and connect the remote control panel to the PC board.

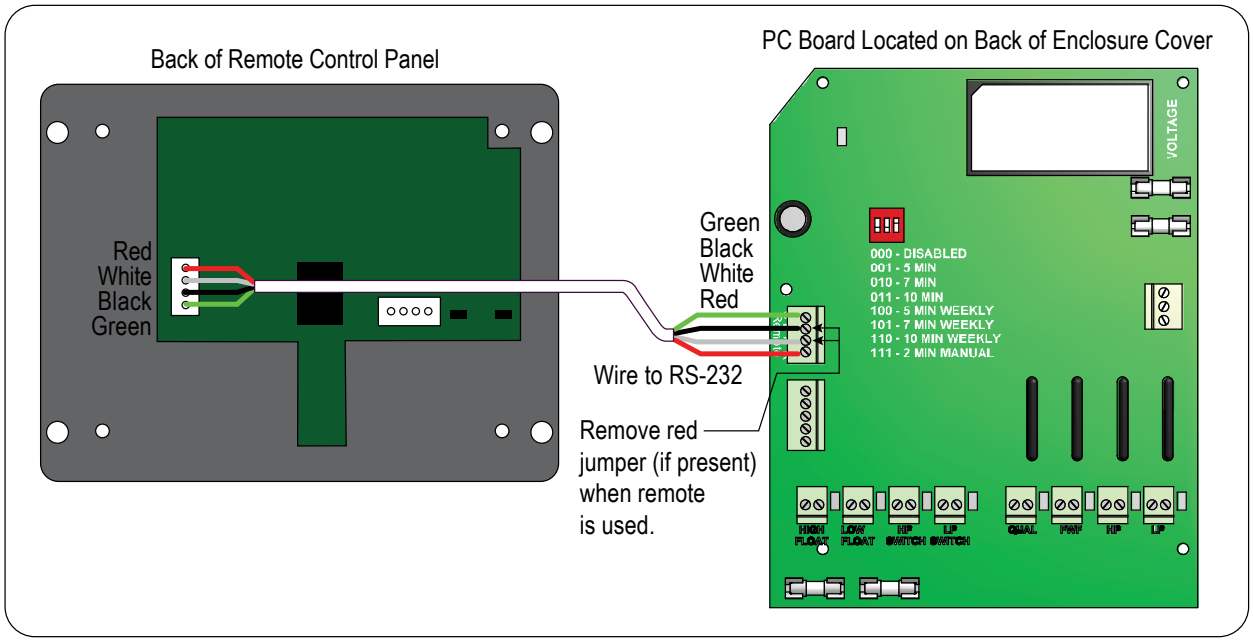


Figure 16: Remote Control Panel Wiring

FRESH WATER FLUSH (optional)
Follow the wire diagram in *Figure 17* and wire the solenoid of the fresh water flush assembly to the PC board. Refer to "SETTING FRESH WATER FLUSH INTERVAL (if equipped)" on page 62 and set the switches to select a FWF interval.

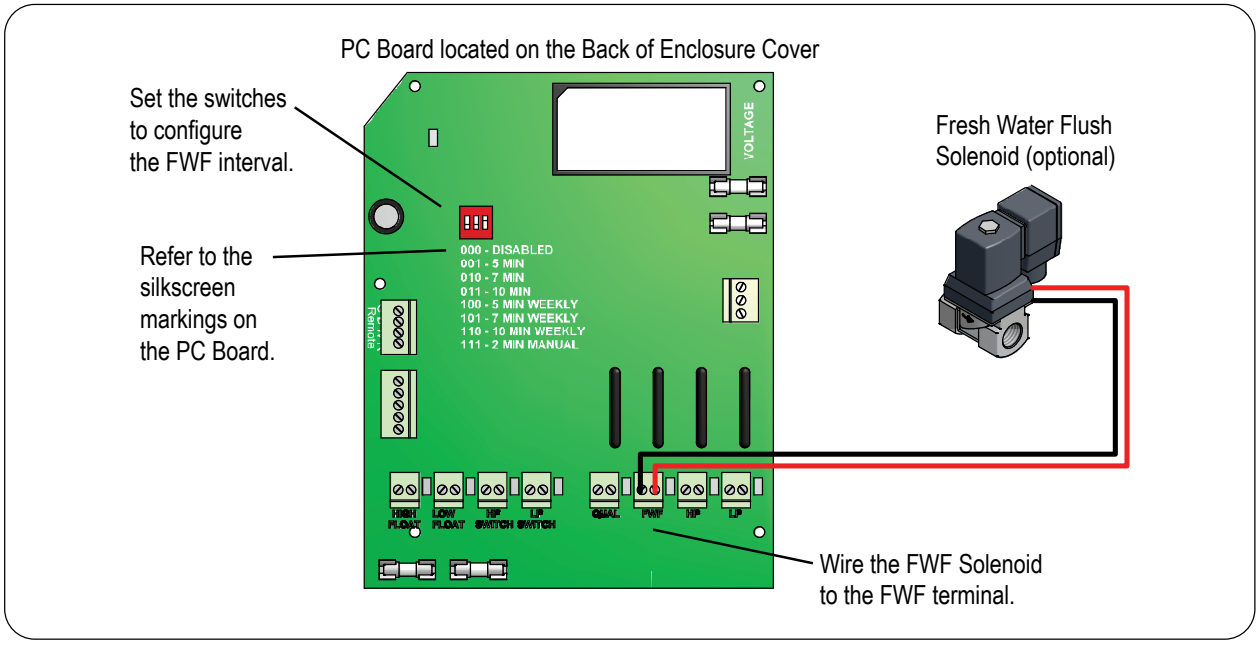
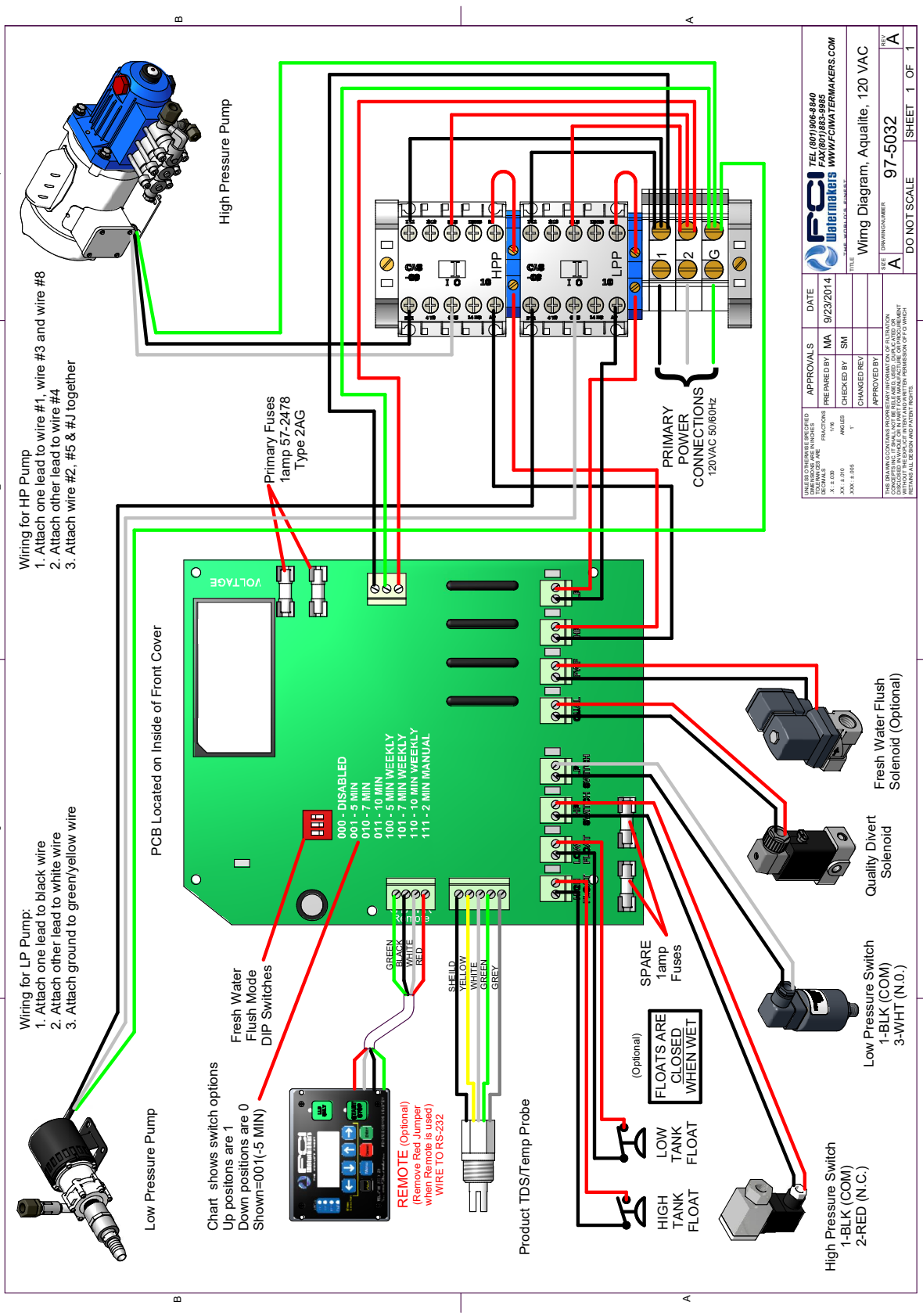
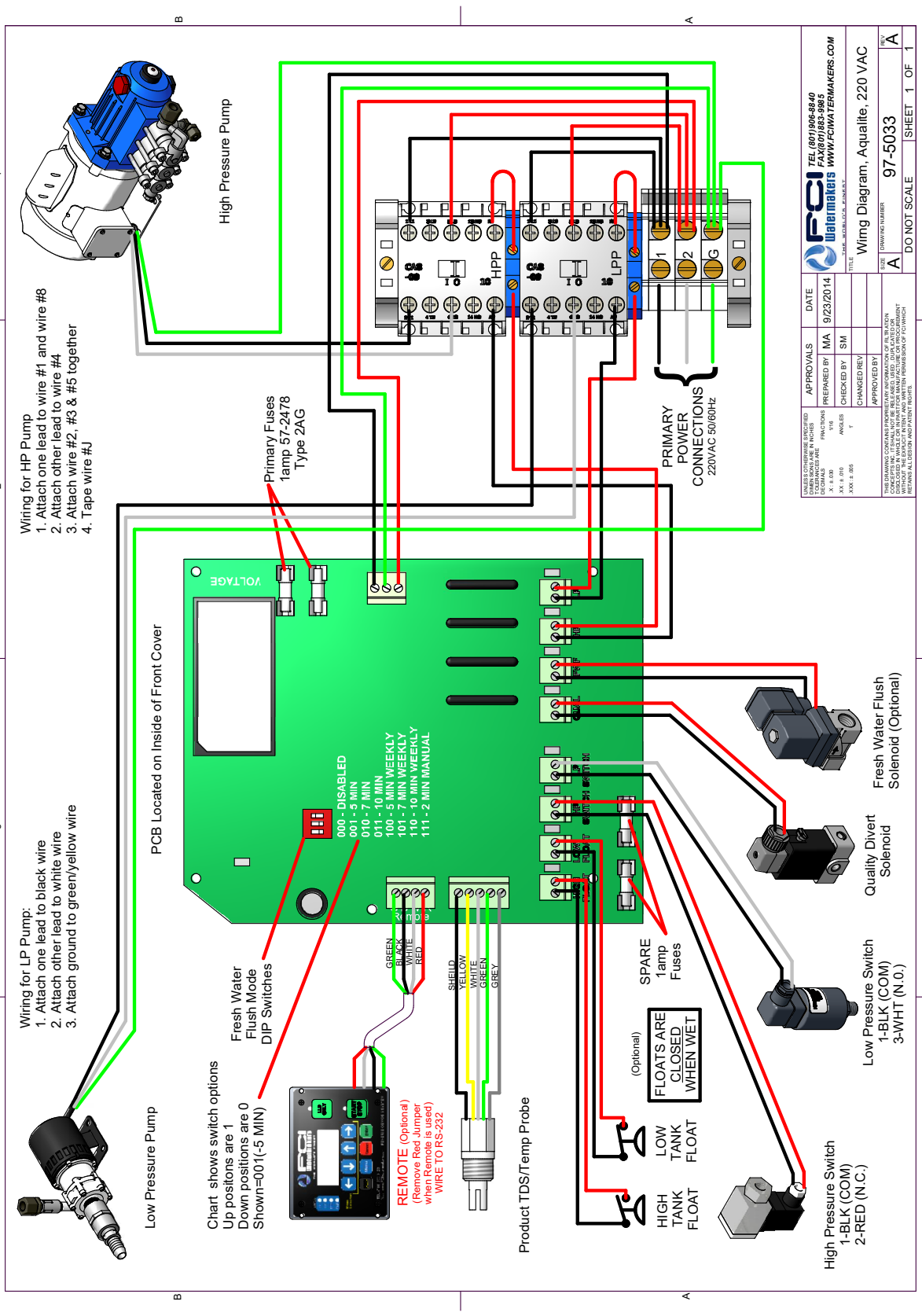


Figure 17: Fresh Water Flush Wiring and Switch

WIRING SCHEMATICS / 120VAC



WIRING SCHEMATICS / 220VAC



FINAL INSTALLATION CHECKLIST

The following list will help ensure a successful installation:

- Ample access around system/components
- All connections are tight
- Supply and discharge valves open
- Electrical connections are secure
- Storage tank is cleaned
- Pump rotations have been checked
- Pump crankcase is filled with oil
- All Coast Guard/local codes have been met
- No iron or ferrous fittings have been used
- Electrical connections are correct
- Plumbing connections do not leak
- Thru hull is open
- Filter housings are tight
- Hose clamps are tight

4 / OPERATIONAL INSTRUCTIONS

Prior to Start-Up, it is important to take note of the following:

FEED WATER — Be aware of the condition of the water the system is processing. Is it muddy, silty, or oily? Does it show signs of other man-made contaminates? If this is the case, DO NOT run the system. If these feed water conditions are unavoidable, additional filtration will be necessary. Consult the factory or your local dealer for further details and assistance with specific water conditions.

SALINITY EFFECT — Like water temperature, the salinity of the seawater has a direct effect on the output of the system and the quality of water produced. Your new watermaker is equipped with protection for overproduction and low quality water produced. When operating in low saline water, like rivers, deltas, or lakes, the high-pressure required will be less. Reduce the pressure to the point where you are making the rated output of your system. If this pressure adjustment is not monitored the system may detect a fault condition, protect itself, and shutdown.

PRESSURE EFFECT — The pressure within a system is regulated by the size of the orifice through which the brine stream flows; thus, creating back pressure in the pressure vessel. This pressure squeezes the fresh water out of the seawater stream. The amount of pressure applied through the system directly affects the quantity and quality of water produced. More pressure is needed in cold water than in warm waters. The reason being, membranes contract in cold water, not allowing the fresh water through as easily. When operating your watermaker always try to maintain the pressure necessary for the system to operate at its rated output. As a safety feature, the system will shutdown when the pressure is too high or too low.

TEMPERATURE & PRESSURE EFFECTS CHART

TEMPERATURE EFFECT — Water temperature has a great effect on the output of the system. Increased water temperatures increases output at a given pressure. Therefore, it is very critical to adjust the pressure of the machine to maintain proper fresh-water production rate. It is more important to produce the rated output than it is to achieve a certain pressure. It is perfectly normal and acceptable for your system to produce good quality water while operating at its rated output at a pressure of 600 PSI. This reduced pressure is most likely caused by an increase in the seawater temperature, or a reduction in seawater salinity. Refer to *Figure 18*.

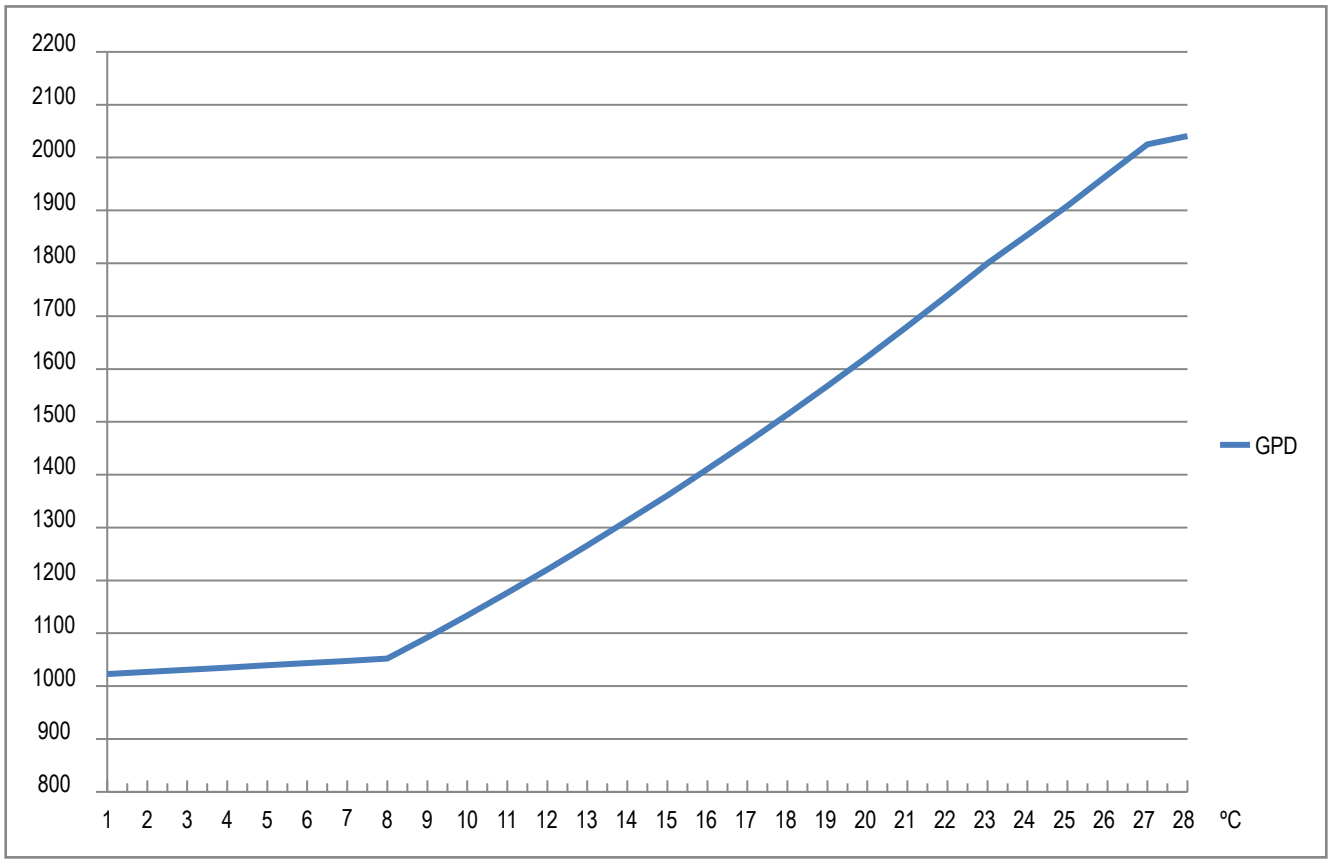


Figure 18: Water Temperature vs. Output (constant pressure)

The Aqualite is designed with simplified controls for easy operation. Refer to *Figure 19* and the descriptions on the following pages to become familiar with the controls and the operation cycle.

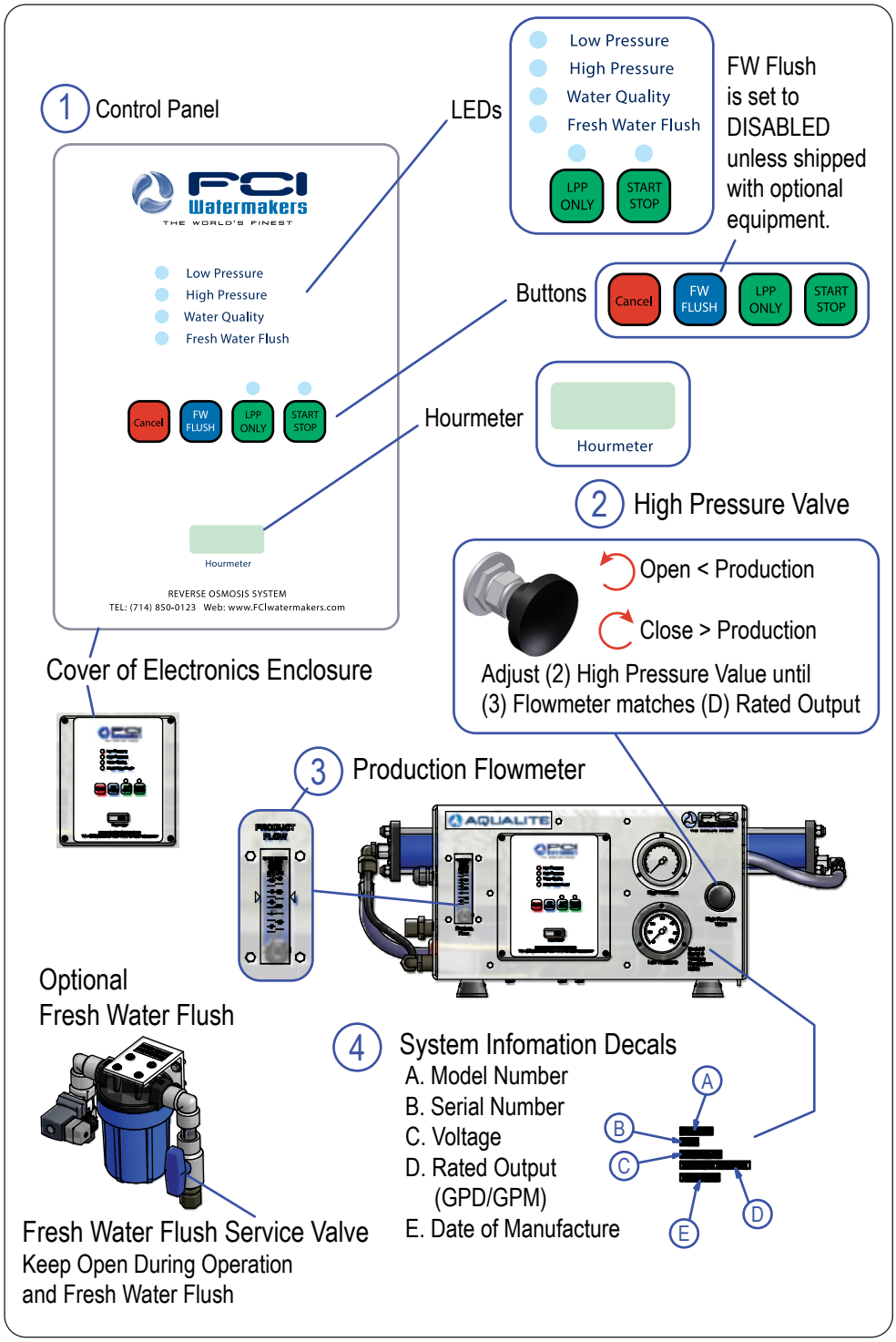


Figure 19: Operational Controls

1

CONTROL PANEL

The control panel features Sure-Touch operation with tactile feedback. At the touch of button, the pre-set automatic operation cycle begins. You can also run the low pressure pump and the fresh water flush (if equipped) independently, should you need extra priming or are performing maintenance. The control panel indicates the state of the operation cycle with green, red, solid and blinking LEDs. The hourmeter located at the bottom of the control panel tracks the system runtime.

The buttons and the LEDs indicators, and how they relate to the operation cycle are illustrated in the section, *"QUICK START AND STOP" on page 56*. A brief explanation of the buttons is listed below:

START STOP — Press once to start operation. Press a second time to stop operation.

LPP ONLY — Press once to run the low pressure pump only. Press a second time to stop low pressure pump.

FW FLUSH — Press to run manual fresh water flush (if equipped).

Cancel — Press once to cancel current phase and go to next phase in the operation cycle. Press once to clear a fault audio alarm, and press a second time to clear the fault.

2

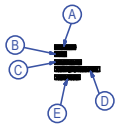
HIGH PRESSURE VALVE

The high pressure valve is used to adjust the water production to its rated output. Turn the valve all the way open (counterclockwise) when starting the cycle. This will start the cycle with the minimum production. After the initiate phase of an automatic operation cycle is complete as indicated by the LEDs, slowly close the valve (clockwise) to increase production until the flowmeter matches the rated output listed on the system information decals. The decals are located on the front of the master control panel.

3

PRODUCTION FLOWMETER

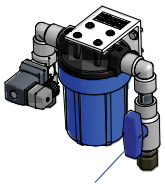
The production flowmeter measures the water output and consists of a float inside a clear tube. The output is indicated by the mark at the widest diameter of the float.



4

SYSTEM INFORMATION DECALS

The rated output and other important information are listed on front of the system with decals. Refer to *Figure 19* for a list of the information included.



FRESH WATER FLUSH SERVICE VALVE (if equipped)

The fresh water flush filter features a service valve. Before replacing the fresh water filter, shutdown the system and close the service valve to isolate the filter. The service valve should always be open when operating the system.

OPERATION CYCLE

The operation cycle is described below and illustrated in *Figure 20*.

PRIME SYSTEM
When operation is started, the low pressure pump starts and the system primes for 60 seconds.

INITIATE SYSTEM
After priming, the high pressure pump starts and the system initiates.

ADJUST PRESSURE
The operator adjusts pressure until the flowmeter shows the rated output as listed in the front panel system information decals.

PRODUCE WATER
When water quality is acceptable, the system diverts production to the fresh water storage tank.

STOP
The system shuts down.

FRESH WATER FLUSH (if equipped)
After operation is stopped, the system performs a fresh water flush for a *time* before shutting down. *Time* refers to the length of time the flush runs. The time is set with switches located on the PC board or by remote control. If set by remote, the switch settings are ignored.

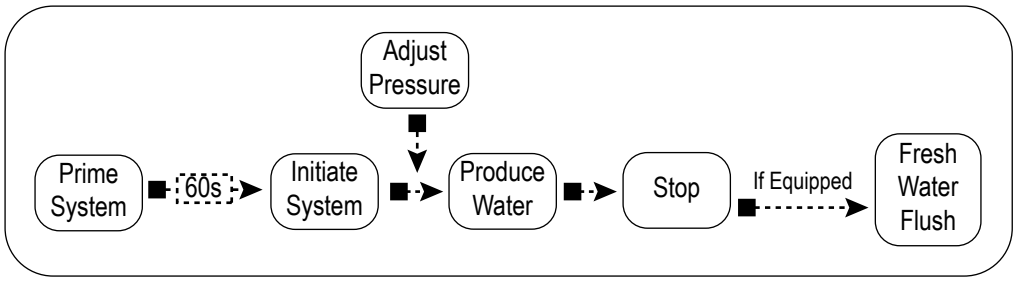


Figure 20: Operation Cycle

Additional monitoring controls let you know the state of the system throughout the operation cycle *(Figure 21)*.

PRESSURE GAUGES

Pressure gauges let you know the system's low and high pressures. If pressure ≤ 1 PSI, or if pressure ≥ 1000 PSI, the system shuts down. If low pressure drops down to 5-7 PSI, the pre-filter elements may need cleaned or changed.

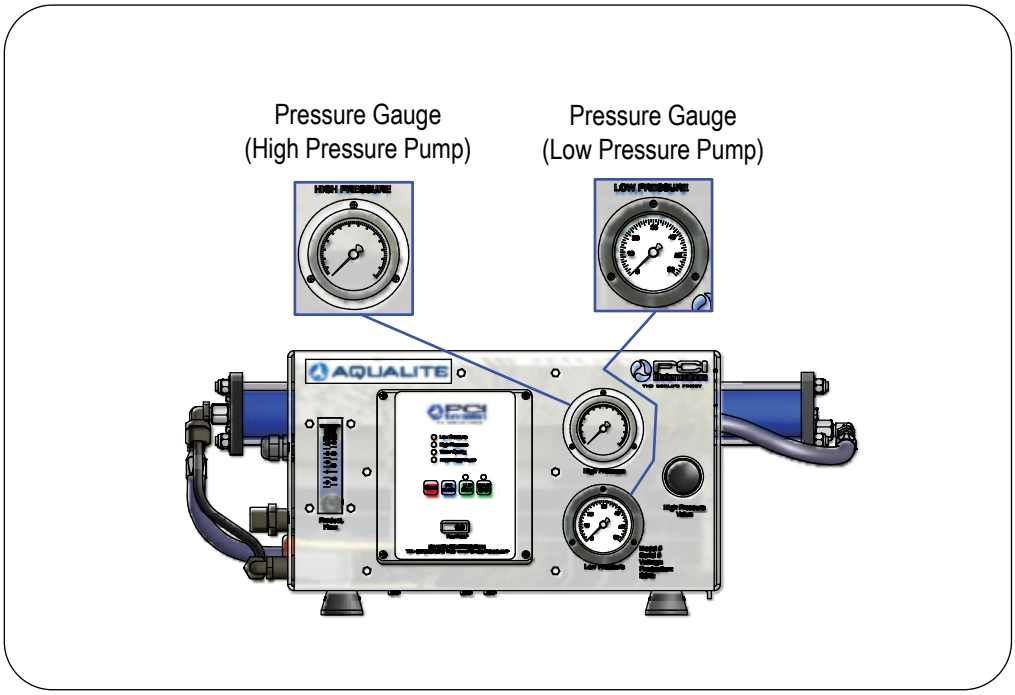


Figure 21: Additional Monitoring Controls

Once installed, your system is ready to run. To begin making water using the preset factory settings, follow the four tasks outlined in *Figure 22* and the discussed in detail in following pages.

OVERVIEW OF QUICK START AND STOP

The normal operation cycle has the four user performed tasks :

1. Open Valves
2. Press the Start Button
3. Adjust Pressure
4. Press the Stop Button

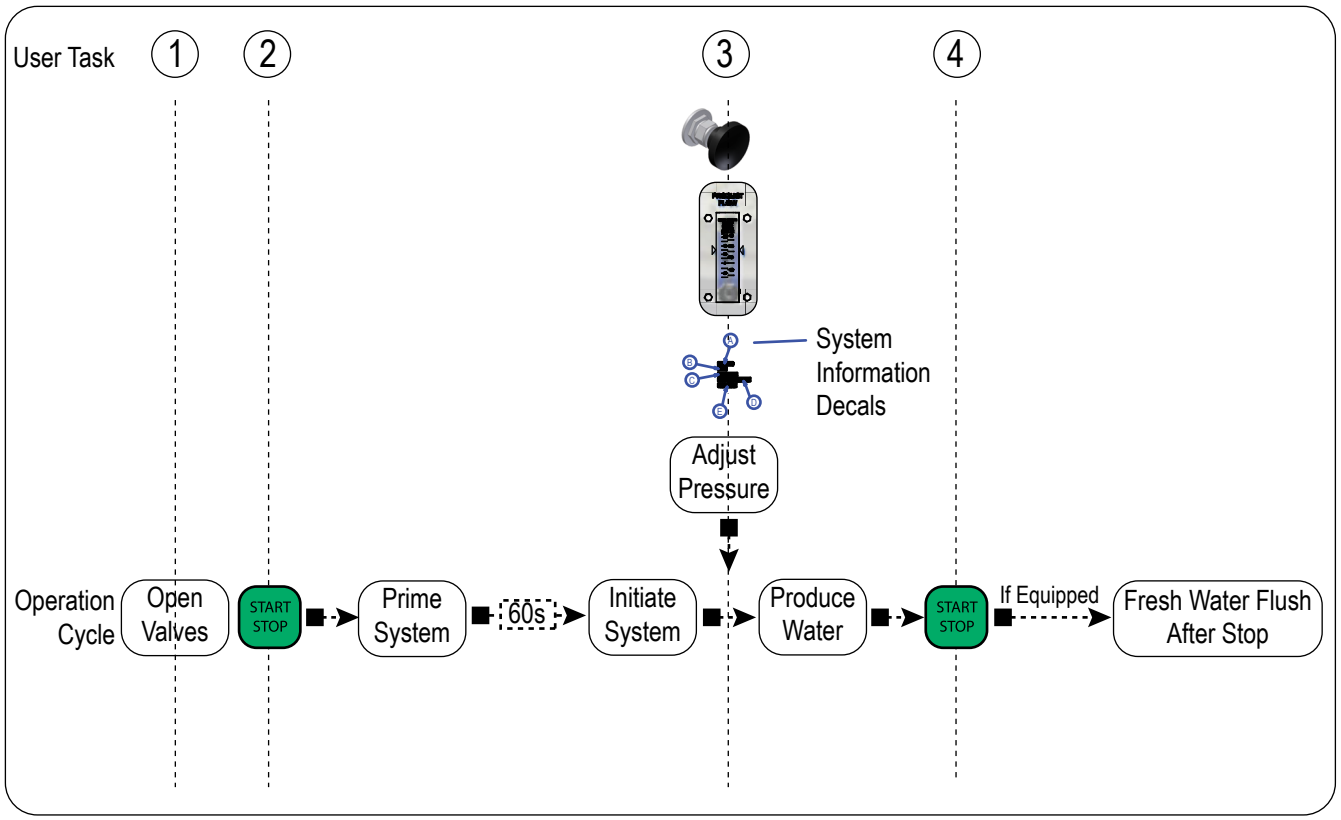


Figure 22: Overview of Quick Start and Stop

TASK 1
Open all the values *(Figure 23)*.

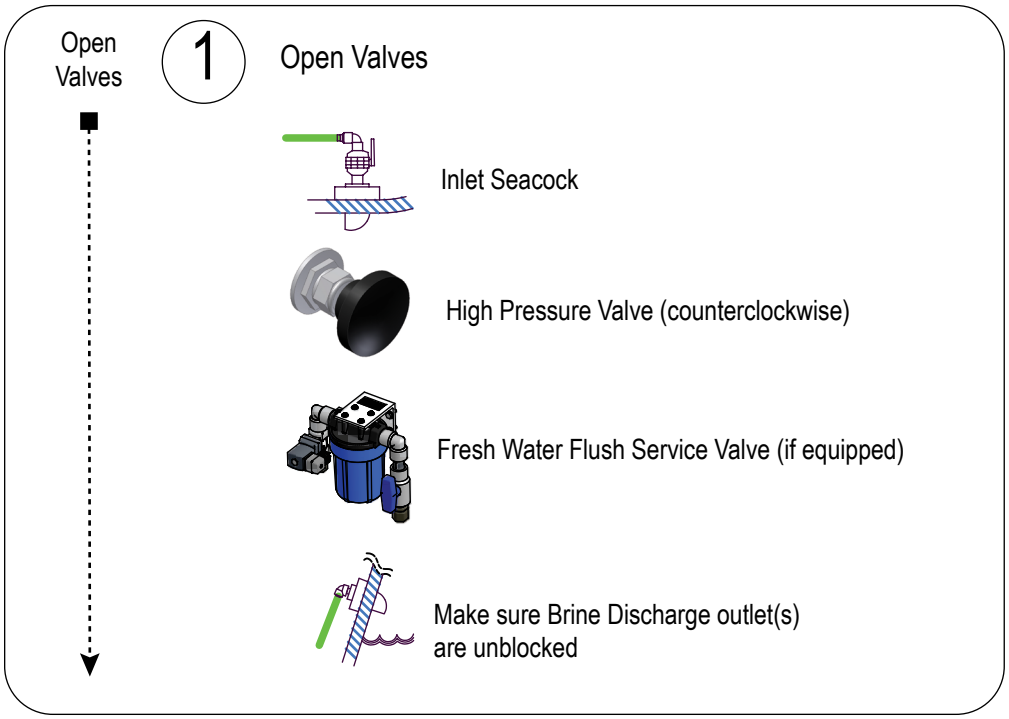


Figure 23: Quick Start and Stop Task 1 (open all valves)

TASK 2

Start the operation by pressing the Start button. The low pressure pump starts to prime system for 60 seconds (*Figure 24*). Should the Low Pressure LED turn SOLID RED, proceed to "ENCOUNTERING A FAULT CONDITION" on page 61.

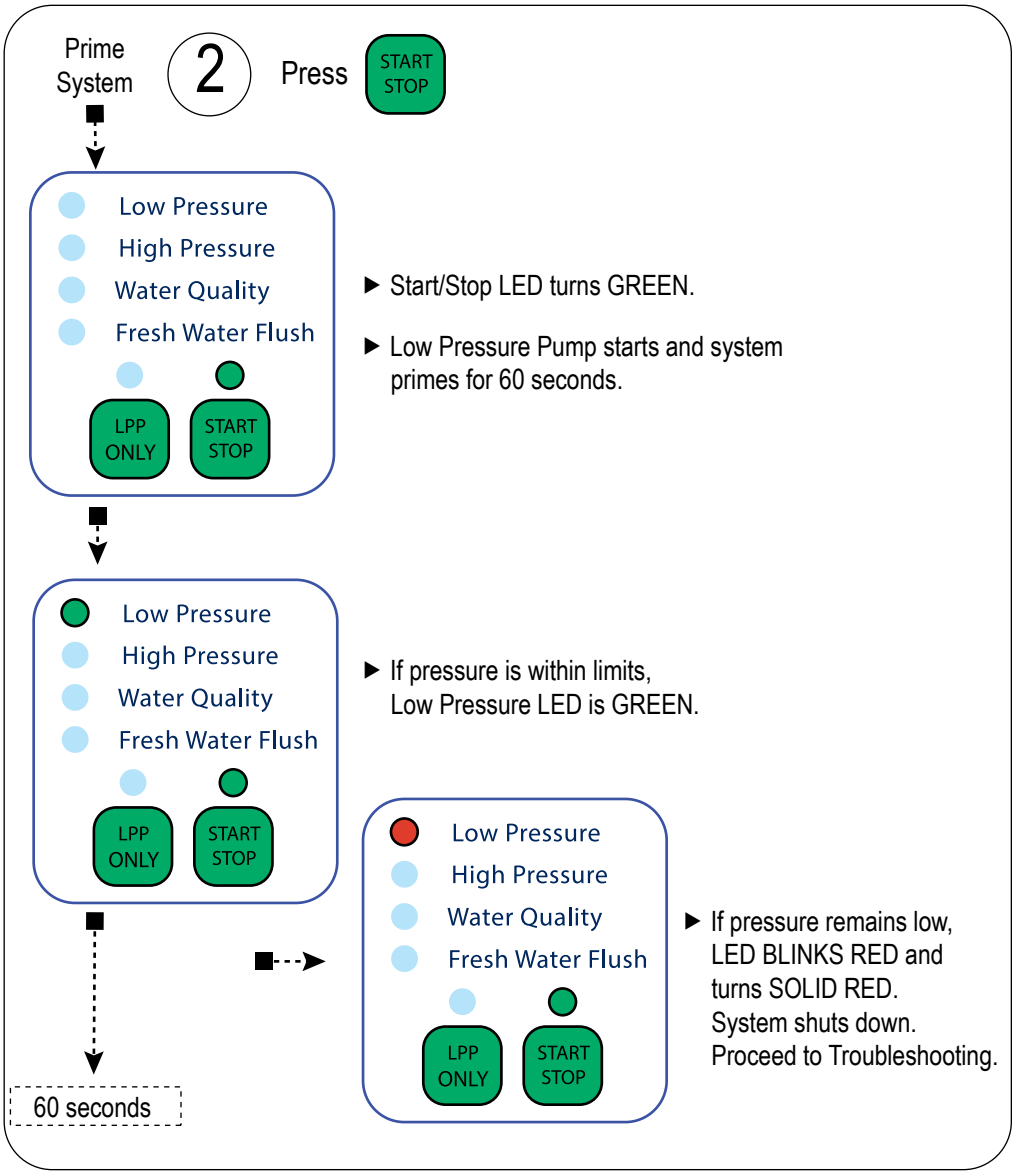


Figure 24: Quick Start and Stop Task 2 (press start/stop button to start)

TASK 3

The high pressure pump starts and initiates the system. After system initiates, adjust pressure until production flowmeter shows the rated output listed in the system information decals (*Figure 25*). Should the High Pressure LED turn SOLID RED, proceed to "ENCOUNTERING A FAULT CONDITION" on page 61.

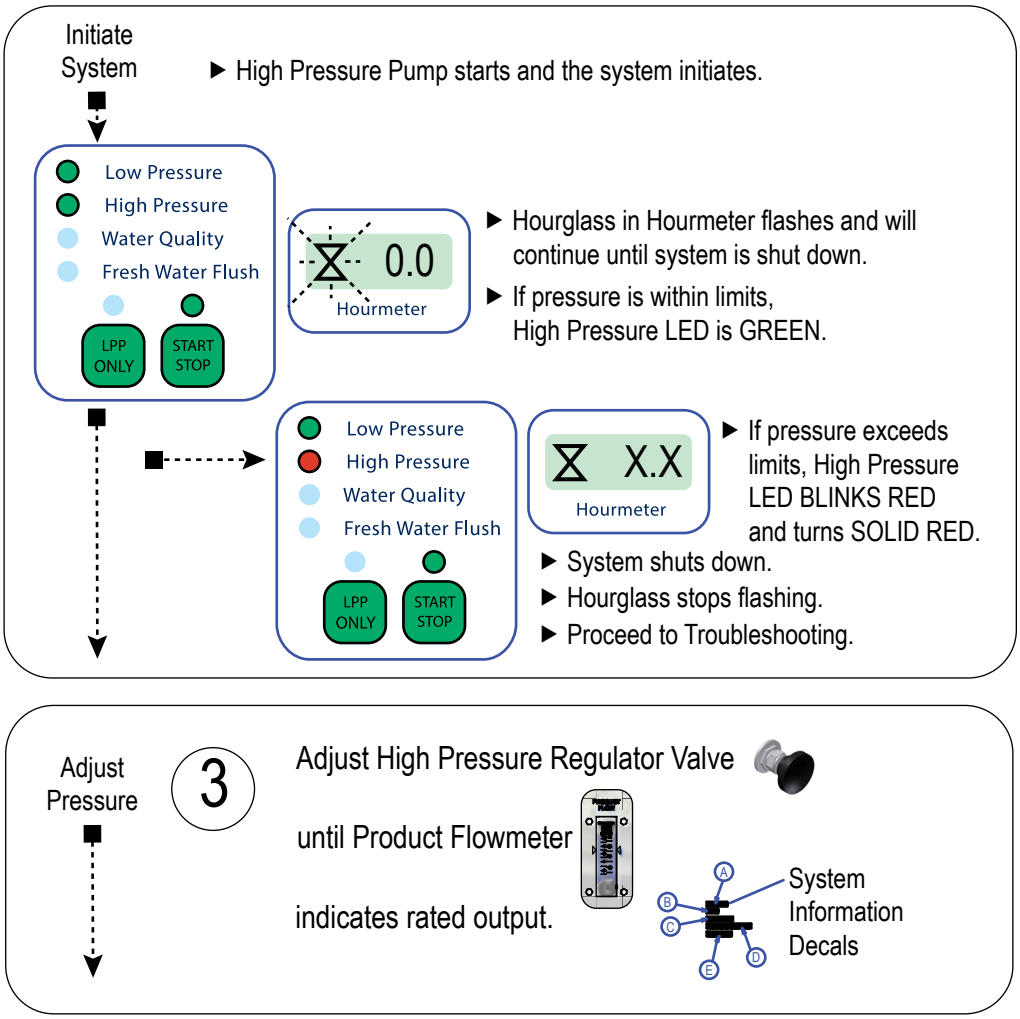


Figure 25: Quick Start and Stop Task 3 (adjust pressure)

TASK 4

After sufficient production of quality water, stop the operation by pressing Stop (*Figure 26*). The system shuts down. If equipped, fresh water flush proceeds for the interval set on PC Board or by remote. Should the Water Quality LED persist RED during production, proceed to "ENCOUNTERING A FAULT CONDITION" on page 61.

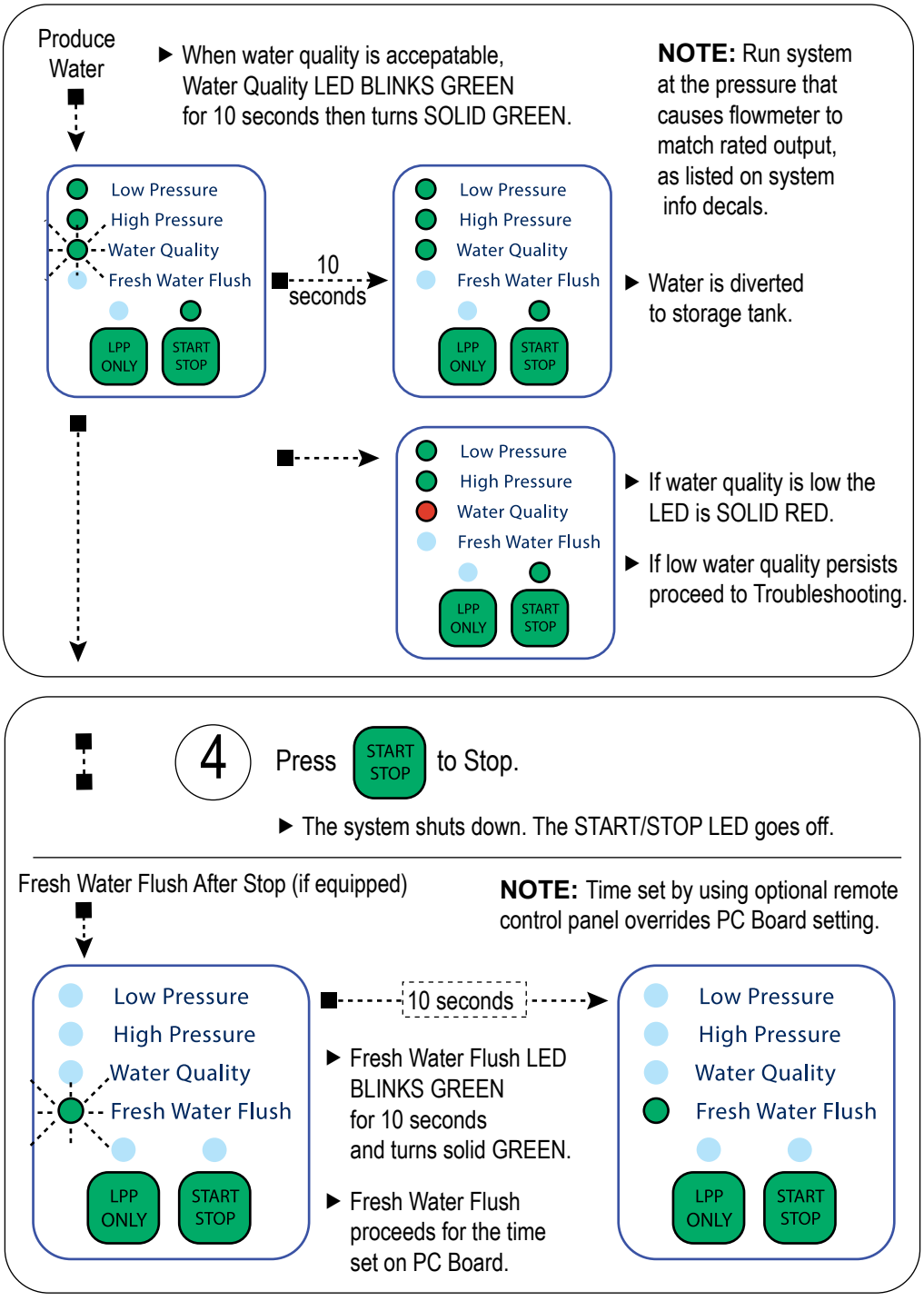


Figure 26: Quick Start and Stop Task 4 (press start/stop button to stop)

ENCOUNTERING A FAULT CONDITION

Should you encounter a fault condition, consult the troubleshooting diagrams in *Figure 27*.

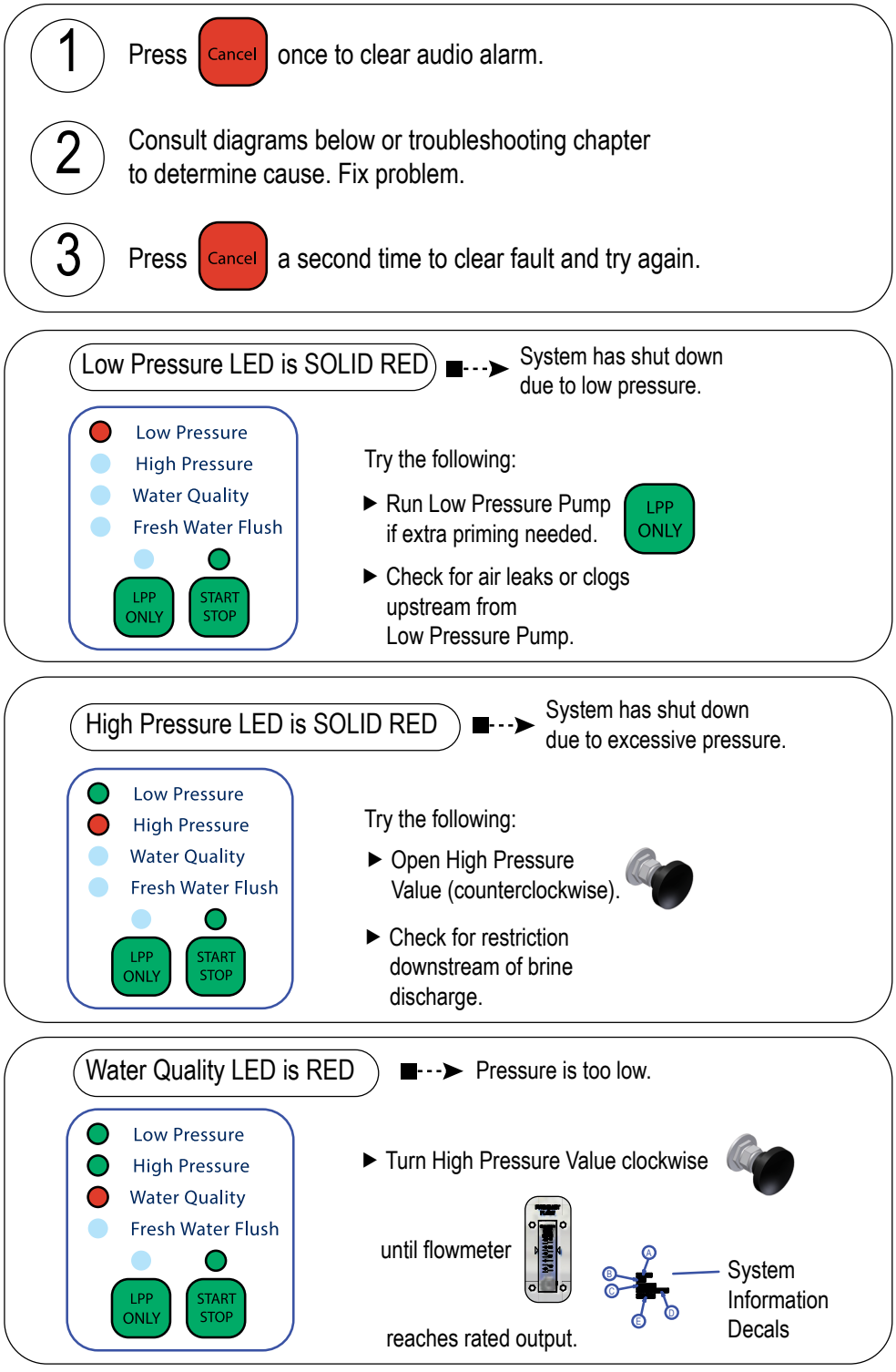
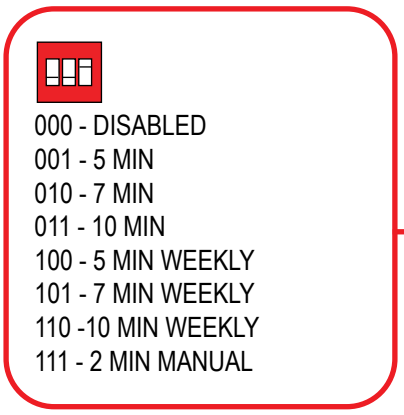


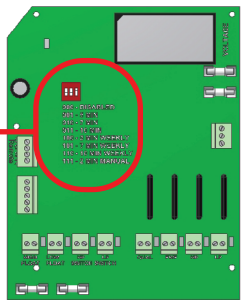
Figure 27: Quick Start and Stop (fault conditions)

SETTING FRESH WATER FLUSH INTERVAL (if equipped)

If equipped and enabled, fresh water flush occurs after stopping operation. Also, flush can be set to run on an schedule when the watermaker is not in use. To set the time (how long the flush runs) and the schedule at which the flush runs when not in use), follow the procedure in *Figure 28*.

1. Remove power from system.
2. Open electrical enclosure to gain access to PC Board on back of enclosure cover.
3. Set the switches on the PC Board as shown in the diagram below.





DISABLED	Fresh water flush is off.
MIN	Fresh water flush runs for # minutes after stop or when manually run.
MIN WEEKLY	When system is not in use, fresh water flush runs for # minutes every week. When system is in use, fresh water flush runs for # minutes after stop or when manually run.
MIN MANUAL	Fresh water flush is run for # minutes when manually run.
0	Switch is in DOWN position.
1	Switch is in UP position.

Default: Set to DISABLED when shipped.

NOTE: Interval set by optional remote control panel overrides interval set by switches.

Figure 28: Setting Fresh Water Flush Interval (if equipped)

If equipped, fresh water flush can be run manually when the R.O. membranes need rinsing or preparing for storage (*Figure 29*). Manual fresh water flush operates independently from automatic fresh water flush.

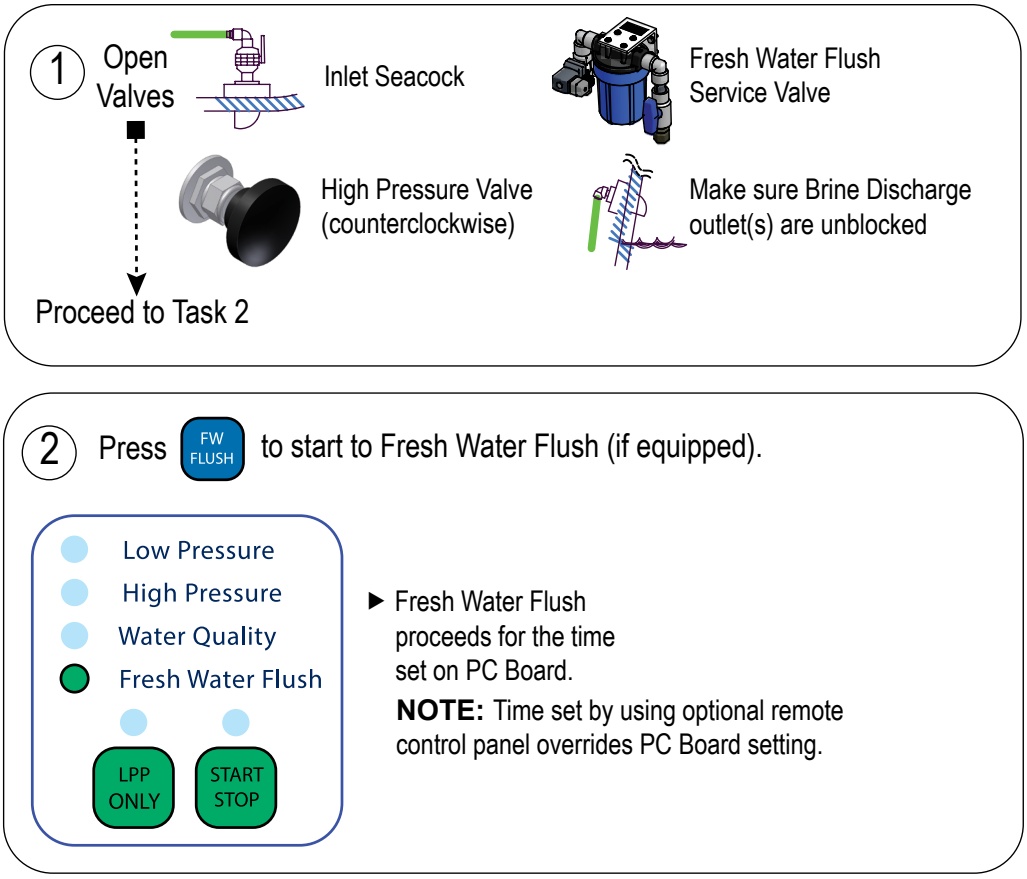


Figure 29: Manual Fresh Water Flush (if equipped)

The low pressure pump can be manually turned on. This is useful if extra priming is needed before start up. Refer to *Figure 30*.

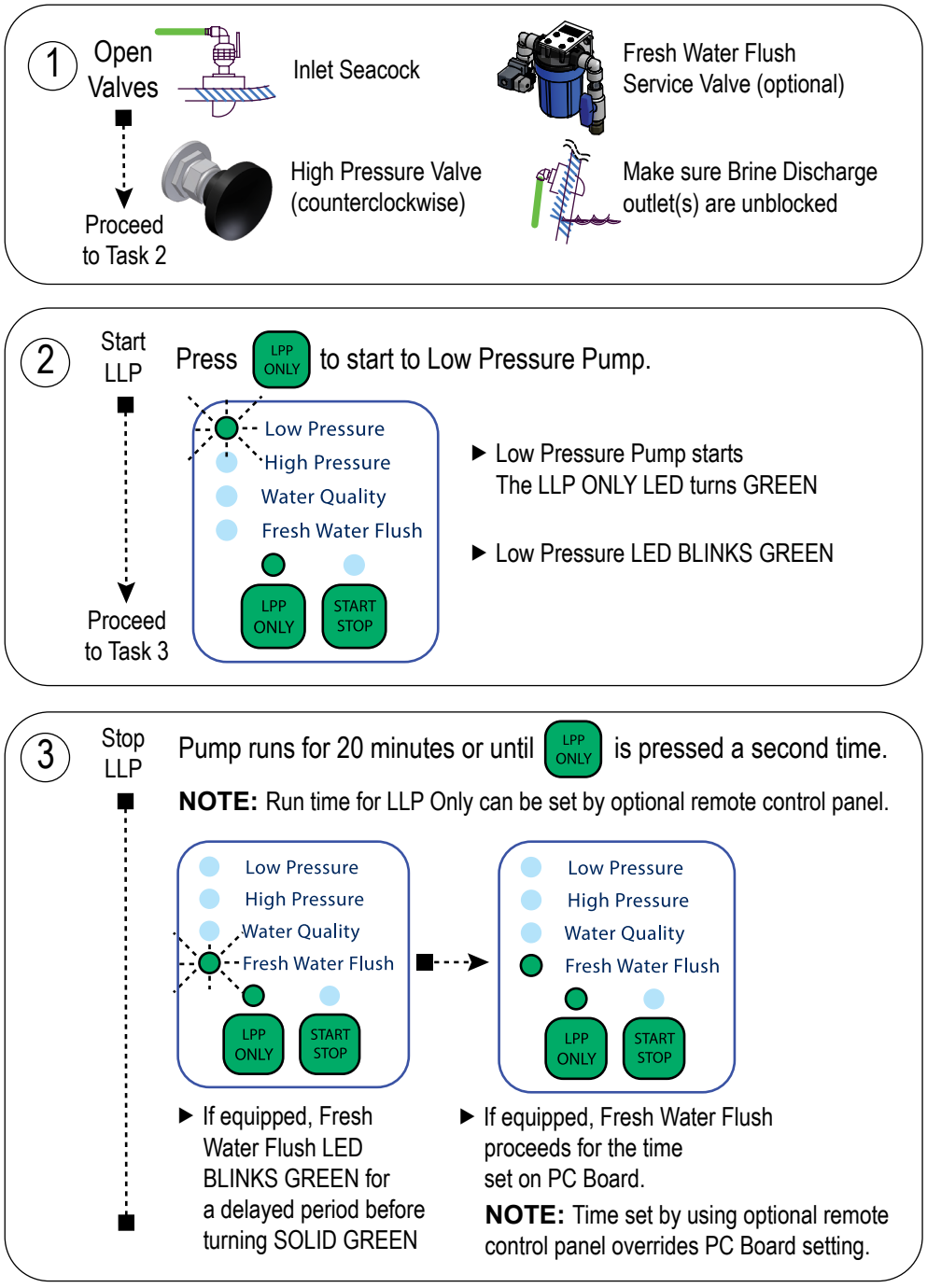


Figure 30: Manual Low Pressure Pump Operation

PC BOARD LED INDICATORS

As a reference, *Figure 31* shows the PC Board LED sequence during an operation cycle. Also noted are the LED sequences for manual fresh water flush and manual low pressure pump operation.

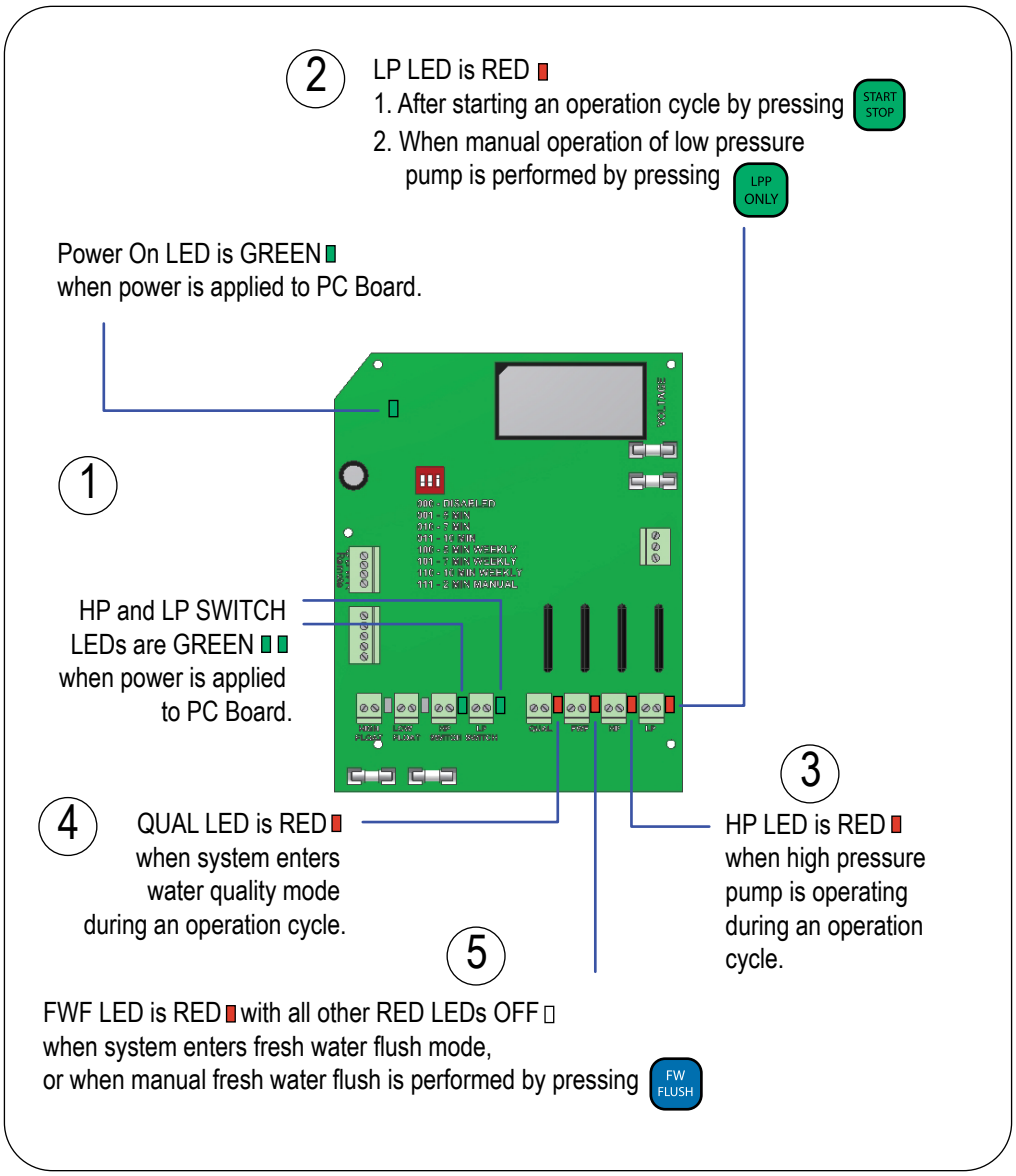


Figure 31: PC Board LED Indicators

5 / REMOTE CONTROL (optional)

An optional remote control panel is available that allows you to control and monitor the system from a separate location. Through a menu hierarchy system, the remote control panel also allows customization of the system parameters, should you find yourself in difficult environments.

This chapter summarizes how to operate the remote control by comparing and contrasting the remote to the system controls.

OVERVIEW

This chapter discusses the following topics:

- Remote Control LEDs & Buttons
- Remove Control Display
- Remote Control Fault Screens
- Remote Control Menu Hierarchy

REMOTE CONTROL LEDS & BUTTONS

The remote control panel operates the system similar to the system control panel. In addition, the remote has a hierarchy of menus that allow custom setting of the system parameters. Refer to *Figure 32* for an overview of the remote.

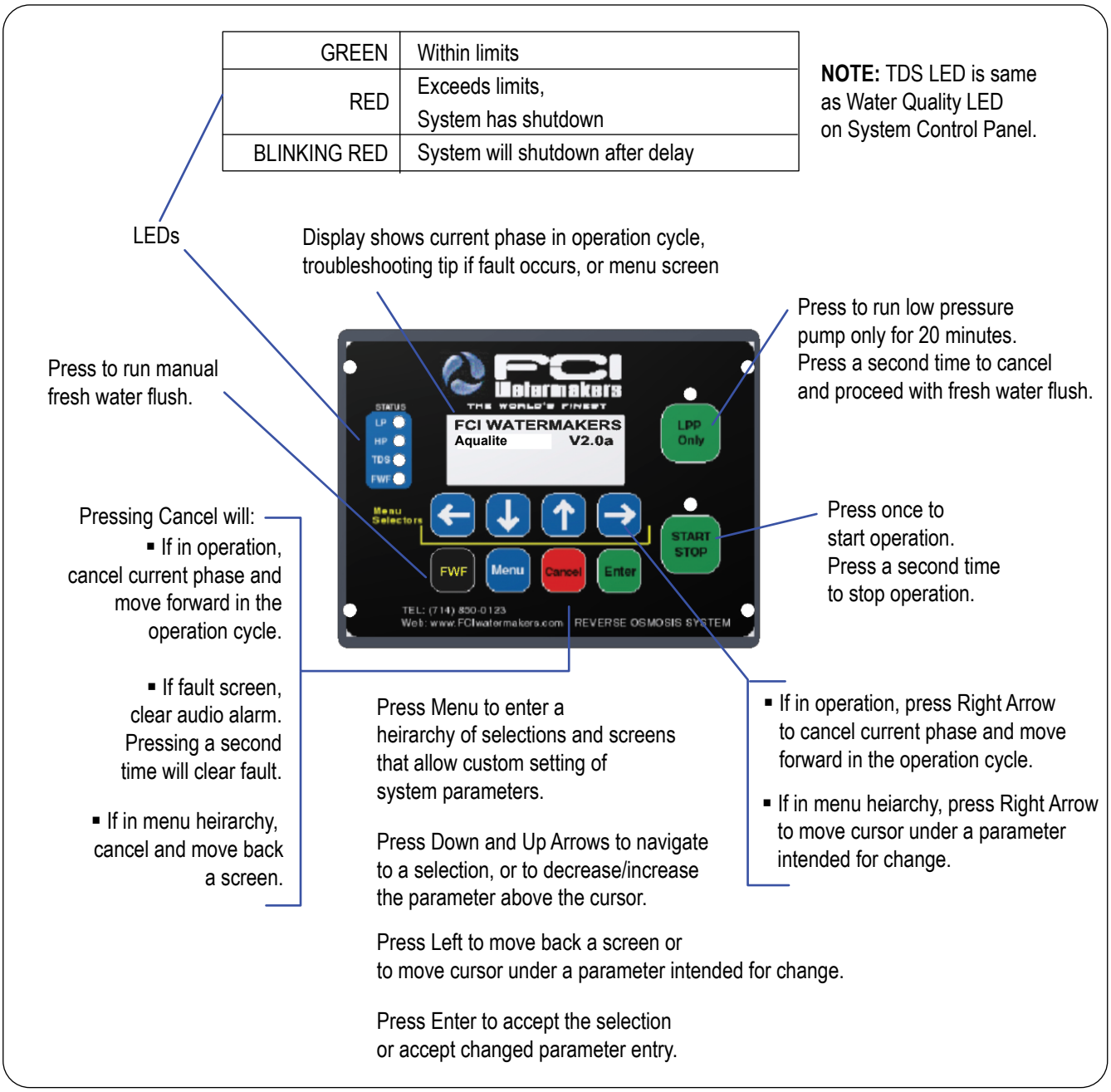


Figure 32: The Remote Control Panel

For operation, follow the same tasks as presented in "QUICK START AND STOP" on page 56. The current phase of the cycle is displayed on the remote (*Figure 33*).

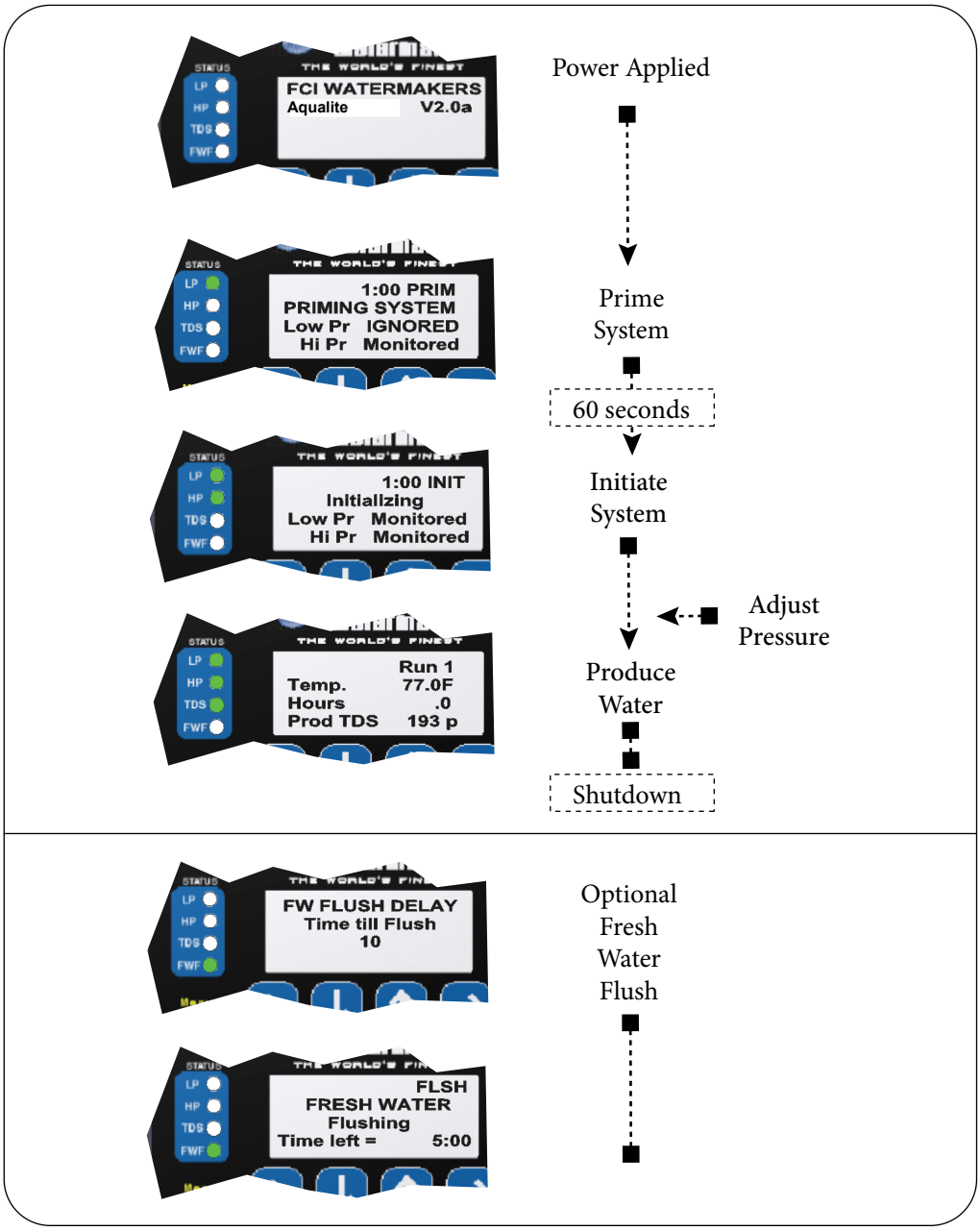


Figure 33: The Remote Control Display in an Operation Cycle

To operate the low pressure pump manually for extra priming, follow the same tasks as presented in "MANUAL LOW PRESSURE PUMP OPERATION" on page 64.

Refer to *Figure 34* for the screen associated with LPP Only.

Manual Low Pressure Pump Operation

Figure 34: Remote Control Display for LPP Only Operation

Should you encounter a fault (for example, low pressure, high pressure, or water quality measurements exceed operating parameters) the remote displays troubleshooting tips (*Figure 35*).

Additional troubleshooting tips are listed in "REMOTE CONTROL FAULT CODES / CAUSE & FIX (if equipped)" on page 112.

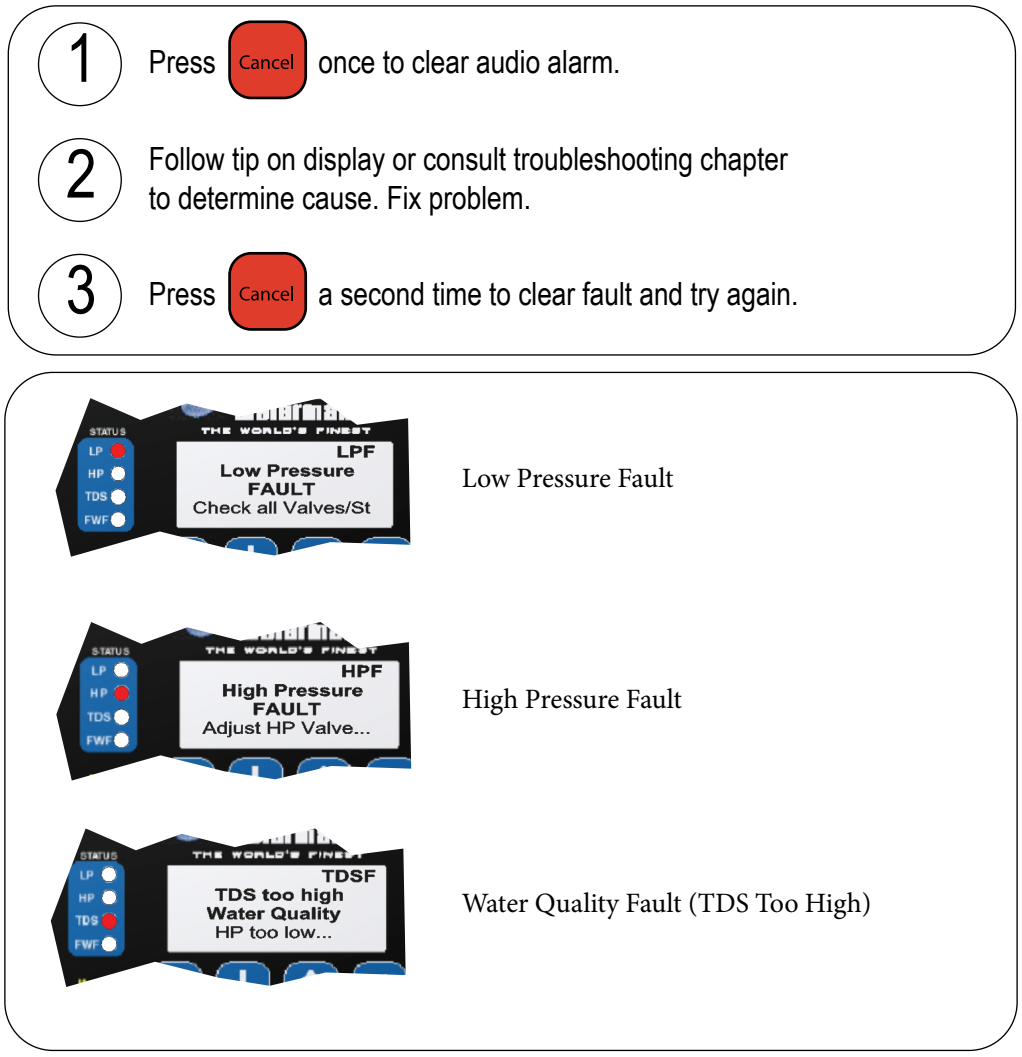


Figure 35: Examples of Remote Control Fault Screens

Press the menu button to enter the system hierarchy of screens that will allow you to customize the system parameters.

HOW TO NAVIGATE THROUGH THE MENUS

To access the main menu options press MENU on the control pad (*Figure 36*). The screen will display the following list of options:

- Display Options
- System Options
- Timers
- Default Values

Use the Up and Down Arrows to move to your selection or desired location and press the Enter button.

After your entry has been accepted, the menu will return to the previous screen.

You can use the Left Arrow, or press CANCEL, to move back to the previous screen, or choose the appropriate arrow to make another selection.

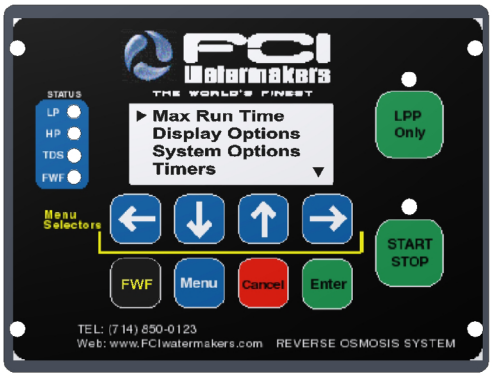


Figure 36: Remote Menu Screen

HOW TO SET NUMERICAL SET POINTS

Using the Arrow Keys, move the cursor under the digit you wish to change. Use the Up and Down Arrows to increase or decrease the value. When the desired value is reached, press the ENTER button. The screen will display "ENTRY Accepted" and return to the previous screen. (*Figure 37*)

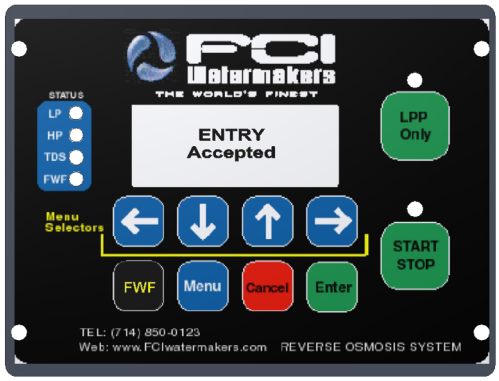


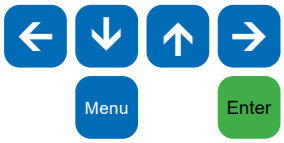
Figure 37: Remote Menu Screen

Table 2 maps the system menu hierarchy, and shows original factory settings ***(in italics)***. Please refer to this list and your system's Test Card for original settings. Custom settings can be reset to factory defaults at any time.

*Table 2: Menu Hierarchy and Original Factory Settings (in **italics**)*

Run Options	
Max Run Time	Enabled ***Disabled*** Enabled Set Max (Run) Time ***60 minutes***
Display Options	
Volume	Key Beep Volume—Adjust Volume for keypad Beeps (< >) Then press Enter
	Alarm Volume—Adjust Volume for alarm sounds (< >) Then press Enter
Backlight	Normal = As viewed in standby mode—Adjust Backlight (< >) Then press Enter
	Active = As viewed while in use—Adjust Backlight (< >) Then press Enter
Temp ºF/ºC	***Fahrenheit*** Celsius
System Options	
Inputs	
Tank Floats	Use Tank Floats [No/Yes]
Setpoints	
TDS to Divert	Edit Maximum Product TDS [***500***] PPM
Timers	
Sequence Times	
LPP Only Time	Maximum Time for LPP Only Mode [1200] minutes
Prime Time	Edit Time for PRIME Mode [***60***] seconds
Initialize Time	Edit Time for Initialize Mode [***60***] seconds
LP Fault Delay	Edit Delay time before LP Fault [***1***] seconds
Good TDS Delay	Edit Time for Good TDS Delay [***10***] seconds
TDS Alarm Delay	Sound TDS Alarm after [***120***] seconds
TDS Fault Delay	Edit Time for TDS Fault Delay [***180***] seconds
Tank Float Delay	Edit time for Tank Float Delay [***5***] seconds
Flush Times	
Flush Time	Edit Time for Fresh Water Flush [***300***] seconds
Flush Interval	Edit Time for Flush Interval [***00***] days
Default Values	
Save User Defaults?	Yes/No
Restore User Defaults?	Yes/No
Restore Factory Defaults?	Yes/No

The following are examples of changing the system's settings using step-by-step instructions. For all other settings and operations refer to the system menu and/or contact FCI for assistance.



PROCEDURE FOR RESTORING FACTORY DEFAULTS

1 Press the MENU button.

2 Using the Down Arrow, scroll down to "Default Values."

3 Press ENTER.

4 Move the cursor to "Factory Default," press ENTER.

5 The screen will display a series of questions confirming you want to make this change—Answer YES each time.

When complete, the screen will return to the menu screen. If this is done while the system is running the system will shutdown and reboot.

PROCEDURE TO SET USER DEFAULTS

When modifications are made to the factory default settings it is best to save those settings as User defaults so they can be recalled in case the control is restored to factory defaults.

1 Press the MENU button.

2 Using the Down Arrow, scroll down to "Default Values."

3 Press ENTER.

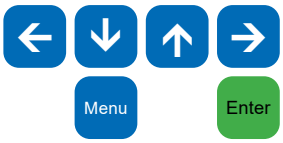
4 Choose "Save User Defs," press ENTER.

5 You will be asked multiple times to confirm your choice.

Each time answer YES.

6 At the end, will return to the menu screen.

7 Press MENU to exit to the home screen.



PROCEDURE FOR SETTING MAX RUN TIME

1 Press the MENU button.

2 Using the arrow keys, scroll to "Max Run Time."

3 Press ENTER.

4 The display will show 3 choices: "Enabled," "Disabled," and "Set Max Time."

5 The cursor on the right side indicates the current setting. The default setting is "Disabled." If the system is set to "Enabled," move the cursor on the left to point to "Disabled," and press [enter]. The cursor on the right will move to that position indicating the new setting.

6 Press MENU to exit to the home screen

To confirm settings, repeat the above steps to view stored settings.

PROCEDURE FOR SETTING FLUSH INTERVAL

NOTE: Set flush interval only if system is equipped with optional Fresh Water Flush assembly.

1 Press the MENU button.

2 Using the Down Arrow, scroll down to "Timers," press ENTER.

3 Scroll to "Flush Times," press ENTER.

4 Scroll to "Flush Interval," press ENTER]

5 The screen will show "00" and the cursor will be under the digits. Using the up and down arrow keys increase or decrease the setting to the amount of days between automatic flushes.

6 Press ENTER] The display will flash "ENTRY Accepted."

7 Press MENU to exit to the home screen .

NOTE: The default setting from the factory is "00." The timer will start from the day you set it or from the most recent flush cycle.

Troubleshooting and subsequent correction or repair of your watermaker will require understanding of:

- Electrical circuits
- Hydraulic systems
- Mechanical knowledge
- Electronic circuits
- Liquid pressures and flows

DO NOT attempt troubleshooting 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 feed water sea cock valve is closed**
2. **The system main electrical disconnect switch is OFF, LOCKED, and TAGGED.**

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.

CAUTION: AVOID CHEMICAL ATTACK TO THE SYSTEM:
Do not use for storage and do not expose the watermaker to:

- **Hydrogen Peroxide**
- **Chlorine Dioxide**
- **Bromine**
- **Chloramines**
- **Hypochlorite**
- **Bromide**
- **Chlorine**
- **Phenolic Disinfectants**
- **N-chloroisocyanurates**
- **Iodine**
- **Petroleum Products**

Or any other specific chemical not approved in writing by FCI Watermakers Inc. Use of non- authorized or misuse of authorized chemicals voids warranty. Never use third party cleaners or storage chemicals. Third party chemicals will dissolve copolymer components within the watermaker and will destroy the membrane element. Use of and subsequent damage caused by non FCI Watermaker chemicals are the liability and responsibility of the operator and are not covered by the FCI Watermakers warranty.

DO NOT connect any water line to the watermaker system that may contain any of the above listed chemicals.

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 and electric motor since they are subject to increased vibration.
2. Clean any salt water or salt deposits from the system with a wet rag.
3. Check for water leaks throughout the system and supporting water lines.
4. Check all tubing and high-pressure hoses for wear and abrasion against rough surfaces. The hoses must not contact heated or abrasive surfaces.

COMPONENT 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 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 *(Table 3)* is an estimate of the time intervals at which maintenance may be required on the various system components. This is based upon factual data compiled from FCI Watermakers installations around the world. However, this schedule must be adjusted to each individual system depending upon the variables listed.

Table 3: Component Maintenance Intervals

Component	Maintenance Required	Time Interval Continuous	Time Interval Intermittent Duty
SEA STRAINER	Inspect & Clean Screen & Housing	Weekly	100 Hours
PRE-FILTER	Replace element(s)	Low Pressure reaches 5-7 PSI	Low Pressure reaches 5-7 PSI
HIGH PRESSURE PUMP	Seals	6 weeks	1000 hours
	Valves	8 weeks	1500 hours
	Oil	First 50 / 500 hours	500 hours
PULSATION DAMPENER (if equipped)	Check Pre-charge	Every 4000 hours	Annually
MEMBRANE	Clean element	When production or salt rejection decreases by 10%	
BELT (if equipped)	Inspect	Monthly (3-4 mm deflection)	6 months (3-4 mm deflection)
SALINITY PROBE	Clean probe	Annually	Annually
FRESH WATER FLUSH FILTER (if equipped)	Replace Element	3 months	3 months
PH NEUTRALIZING CARTRIDGE (if equipped)	Replace Element	When Granules are depleted	
U.V. STERILIZER (if equipped)	Replace lamp	Annually	7000 hours
	Replace quartz sleeve	As needed	As needed
CARBON DOCK FILL TANK (if equipped)	Replace Carbon	25,000 gallons of flow	Annually
ELECTRICAL BOX	Inspect and tighten all connections	6 months	6 months

WARNING: Components, spares, and consumables utilized within the FCI Watermakers System can be specific to FCI Watermakers specifications and are not commercially available from other sources. Many of these special components can appear to be similar to FCI Watermakers components. Extensive and expensive damage to the FCI Watermakers System WILL result if incompatible components are used in the FCI Watermakers System. Damage caused to the FCI Watermakers System as a result of third party components is the liability and responsibility of both the marine dealer that sold the component for use in the FCI Watermakers System as well as the owner/operator that purchased and installed the third party component in the FCI Watermakers System and is not covered by the FCI Watermakers Warranty.

ALWAYS INSIST ON ONLY FCI WATERMAKERS SUPPLIED COMPONENTS, SPARES, AND CONSUMABLES.

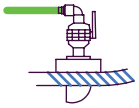
Performing routine maintenance and following proper procedures will ensure worry-free operation for the long haul.

AFTER 50 HOURS / BREAK-IN PERIOD

- Change oil in high-pressure pump
- Check low pressure pump for leaks
- Check inlet hosing and all connections for leaks

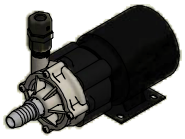
PERIODIC MAINTENANCE

Do a 10-minute visual inspection of the entire system every 500 hours. Start the system and trace the lines from the feed thru-hull to the discharge thru-hull, as well as the fresh water line to tank. This type of preventative check can save time and money in the future.



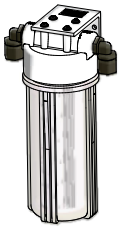
INLET THRU HULL FITTING

Keep the inlet thru hull fitting free and clear of debris and marine growth.



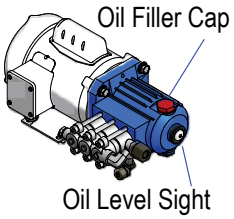
LOW-PRESSURE PUMP

Clean pump as needed. See low pressure pump exploded view towards the back of this manual (*Figure 38 on page 85*).



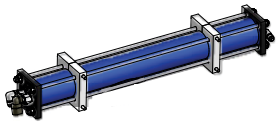
PRE-FILTER

The pre-filter is changed as needed. The cartridge should be changed when the low-pressure reading reaches 5-7 PSI. The cartridge can be cleaned once, using a soft brush or a nozzle on the end of a hose. Gently separate the pleats and remove as much debris as possible. Be careful not to fray the filter material. If the filter shows signs of fraying or does not come clean, replace the cartridge. The cost of a cartridge is not worth the risk of damaging a membrane or high-pressure pump seal.



HIGH-PRESSURE PUMP

Replace the seals every 1500 hours and the valves every 3000 hours. Replace the oil the first 50 hours and every 500 hours thereafter. See high pressure pump exploded view towards the back of this manual (*Figure 49 on page 96*).



MEMBRANE

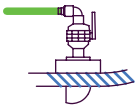
The membranes are rated for 3 years of operation. This includes operation time and down time. However, with proper care and rinsing, you can achieve significantly longer life. When the PPM reading on the control pad starts to climb or the product output is reduced, it may be time to either clean the membranes or replace them. It is best to contact your local FCI representative or the factory for guidance. Your Aqualite Reverse Osmosis Desalinating System uses a special high-output membrane. This is how we are able to achieve the great quality and quantity of fresh water you have become accustom to. Since our membranes are non-proprietary (or readily available), be sure your technician uses the same type of membrane when they are replaced. Use of membrane brands such as Hydranautics or AquaPro are not recommended, and their use may affect the quality and quantity of water produced.

CLEANING AND STORAGE

Follow the procedures in "CLEANING AND STORAGE PROCEDURES" on page 101 if the system is shutdown for short term (up to 6 months), shutdown for long term, is subject to freezing temperatures , or needs to be cleaned.

INLET THRU HULL MAINTENANCE & REPAIR

The components are shown on the plumbing and interconnect diagrams located in Installation chapter of this User's Manual.



INLET THRU HULL FITTING
Non FCI Watermakers 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.

Blockage at the inlet thru hull fitting causes the system to shut off due to lack of feed water flow. Unfortunately, since it is under water, operators are reluctant to thoroughly inspect the inlet thru hull fitting for problems. This can cause time-consuming frustrations in attempting to gain feed water flow by troubleshooting other components in the system.

The inlet thru hull fitting must be free and clear allowing the system to draw 1 U.S. Gallons Per Minute / 3.874 Liters Per Minute with minimal resistance. Any blockage at the inlet thru hull fitting will cause low pressure and low flow problems at the system. This inlet thru hull fitting must be a forward facing scoop so that the system receives a positive flow of water as the boat is under way. It must be minimum 3/4" inside diameter. It must be installed in a position on the bottom of the hull so as to allow free flowing feed water without air.

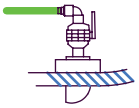
CAUTION: A flat profile, flush mount, inlet thru-hull fitting will cause a vacuum as the boat is under way, and this will cause loss of feed water flow and cavitation of the booster pump and high pressure pump resulting in continual system shut down due to low feed water flow and pressure. The resulting 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 FCI Watermakers warranty.

CAUTION: If the thru-hull fitting has been 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 FCI Watermakers warranty.

CAUTION: The FCI Watermakers 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 FCI Watermakers 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 FCI Watermakers warranty.

CAUTION: If the FCI Watermakers System is connected to a sea chest or stand up pipe, do not plumb the FCI Watermakers System feed line to the top of the sea chest or stand up pipe. If plumbed into the top of these feed water arrangements, the FCI Watermakers System will experience continual shut down due to air inducement into the system. 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 FCI Watermakers warranty. Plumb the FCI Watermakers System to the bottom of such feed water arrangements to ensure a continual air free supply of feed water to the system.

INLET THRU HULL MAINTENANCE & REPAIR (continued)

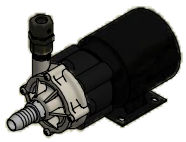


SEA COCK VALVE
This is a non-FCI Watermakers component. The packing and connections of the inlet sea cock valve must be tight and must properly seal. Clean the valve cavity of debris or replace the seal and seat or the entire valve, as required. This section is under a vacuum condition while operating the system. Loose fittings or a worn seal will allow air to enter the system causing continual shut down due to subsequent low feed water pressure.

INLET CONNECTION
Replace if damaged.

SEA STRAINER
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.

LOW PRESSURE PUMP / MAINTENANCE & REPAIR



LOW PRESSURE PUMP - ELECTRIC MOTOR
Pump is centrifugal, with a counter clockwise rotation as viewed from volute end (front) of pump.

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 repair. However, 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 or else the replaced or repaired motor will fail again.

FAILURES OF THE ELECTRIC MOTOR MAY BE:

A Bearing failure: Bearings are field replaceable.

B Winding failure: Generally caused by low or high power, below or above the specified voltage requirements of the system. This is NOT economically repairable.

C Internal centrifugal switch: Generally caused by mechanical failure of the switch. Field replaceable.

D Capacitor failure: Generally caused by low power feeding the motor or low cycles from the power source. Also caused by rapidly repeating starting and stopping of the motor. Field replaceable.

THE ELECTRIC MOTOR IS:

- 1/40 horse power
- Open air cooled
- 2 pole, dual cycle
- Dual voltage.

WARNING: The feed pump MUST rotate in the COUNTER CLOCKWISE DIRECTION ONLY Rotating the feed pump in the clockwise direction will cause extensive damage to it. Never operate the feed pump in the clockwise direction.

WARNING: When switching from three phase generator power to three phase shore power ALWAYS check phases prior to operating the system else reverse rotation along with extensive damage to the feed pump will occur should the power be out of phase.

PROBLEMS & SYMPTOMS APPEARING AND CAUSED BY THE FEED PUMP OR ITS ELECTRIC MOTOR:

1 The single phase (115 or 230 VAC) electric motor hums, pulls starting current (locked rotor) amperage, does not rotate, and trips the supply power circuit breaker when attempting to operate the System.

The single phase electric motor is a capacitor start motor. If the motor was started with low voltage, a drop in voltage during starting, and if this was repeated several times in rapid concession the capacitor will short out. Without the aid of a working capacitor the motor will hum,

pull starting current (locked rotor) amperage, not rotate, and trip the supply power circuit breaker when attempting to operate the system.

Low voltage will also cause the same symptom. Low voltage is caused by an undersized power supply or generator, undersized power lead wires to the system or motor, loose power wire, loose connection at the motor or within the power supply line, and burnt contacts on the motor starter relay (contactor).

SOLUTIONS: Check wiring size and connections to, from, and in between the power supply and the electric motor. Correct wire size or any loose wires. Check the capacitor on the motor, and replace it if it has shorted out. Measure voltage at the motor during attempt to start it. If voltage drops more than 10% locate and correct the reason. Check the motor starter relay (contactor) for burnt contacts.

2 The Electric Motor makes an unusual grinding sound when operated.

SOLUTIONS: Check and replace as necessary the front and rear bearings.

LUBRICATING BEARINGS

Some electric motors supplied by FCI Watermakers have permanently sealed and lubricated bearings. Others require lubrication from time to time. If your electric motor has grease jerks at each end of the motor, over the front and rear bearings, the bearings require lubrication every 6 months. Give three pumps of high temperature motor bearing lubricant into each grease jerk. Use a Polyurea Base Grease such as Chevron SRI (Polyurea Base) or Shell Dolium R (Polyurea Base). DO NOT USE LITHIUM OR SILICONE BASE GREASE.

CLEANING THE LOW PRESSURE PUMP

To clean the pump, refer to *Figure 38 on page 85*. and proceed as follows:

1 Disconnect the electrical power to the system.

2 Remove the six self-tapping stainless steel screws (Item 1) holding the cover to the motor bracket. Remove the cover.

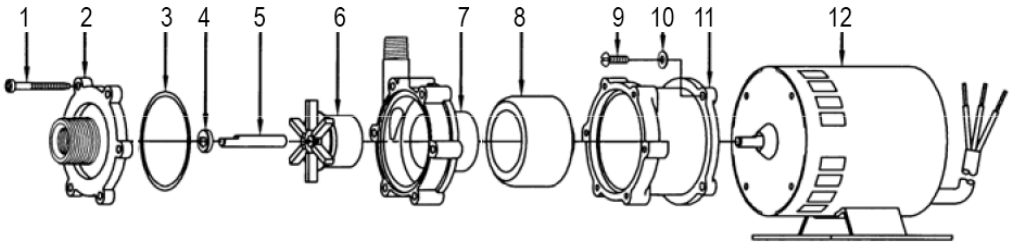
3 Remove the o-ring (Item 3) and thrust washer (Item 4).

4 Remove the impeller bare magnet (Item 6) and shaft (Item 5).

5 Remove the rear housing (Item 7).

6 Clean all parts of salt deposits and debris.

7 Reassemble by reversing the steps above. When reassembling, lubricate the shaft with water and use a new o-ring.



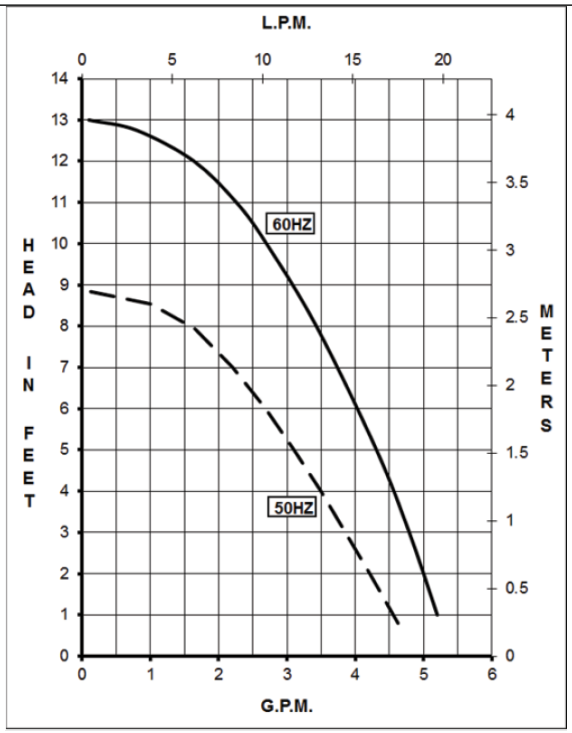
NOTE: When attaching the Drive Magnet to the motor shaft, position the face of the Drive Magnet 1/16 inch below the face of the Motor Bracket.

Figure 38: Low Pressure Pump Exploded View

Table 4: Low Pressure Pump Parts List

Item	Description	Material	Size (Inches)	Qty
1	Self-Tapping Screw	Stainless	#7-19 x 1-7/16 Lg	6
2	Cover	Polypropylene	3/8 FPT x 3/4 MPT	1
3	O Ring	Viton	3/32 CS x 2-3/16 OD	1
		Buna N (Option)	3/32 CS x 2-3/16 OD	1
4	Thrust Washer	Ceramic		1
5	Shaft	Ceramic		1
		Stainless (Option)		1
6	Impeller Bare Magnet	Polypropylene/Ceramic		1
7	Rear Housing	Polypropylene	1/4 MPT	1
8	Drive Magnet		0.250 Bore	1
9	Screw	Stainless	#8-32 x 1/2 Lg	4
10	Washer	Stainless	#8	4
11	Motor Bracket	Plastic		1
12	Motor, 115V, 50/60Hz, Air Cooled			1
	Motor, 230V, 50/60Hz, Air Cooled			1

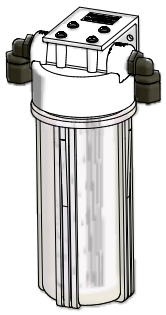
Table 5: Low Pressure Pump Specifications



NOTE: All specifications and data are based on pumping water and are intended as a guideline only.

Item		Specification
Motor Type		Air Cooled
Rating		U.L. listed motor
Duty		Continuous
Max Flow		5 gpm, 60Hz (18.5 lpm, 50Hz)
Max Head		13 ft / 5.7 psi, 60Hz (2.7 m, 50Hz)
Inlet		3/8" FPT and 3/4" MPT
Outlet		1/4" MPT
Max Internal Pressure		50 psi (3.4 bar)
Liquid Temperature		190°F (87°C) Max
Overall Size H x W x L		4.5" x 3.5" x 7.39" (11.4 cm x 8.8 cm x 18.7 cm)
Watts	115V	77W (60Hz), 84W (50Hz)
	230V	75W (60Hz) , 82W (50Hz)
Amps		1.2A@115V (0.6A@230V)
HP (KW)		1/40 HP (0.018 KW)
RPM		3450 (60Hz), 2850 (50Hz)
Packed Weight		4.20 lbs (1.90 kg)
Electrical Connection		3 ft (0.9 m) Cord
Materials in Contact with Solution		Polypropylene, Ceramic, Viton, Ceramic Magnet

PRE-FILTER ELEMENT REPLACEMENT



PRE-FILTER ELEMENT REPLACEMENT

The pre-filter pleated cartridge element may be cleaned with water spray once or twice. After cleaning the expected life will be reduced in 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. At slightly below 5 PSI the system will turn off and display a fault screen indicating low pressure.

CAUTION: Do not use third party pre-filter elements; use only FCI Watermakers pre-filter elements. Third party pre-filter elements on the market do not properly fit, the seams fall apart, they will allow by-pass.

WARNING: By-pass of debris through the third party element will prematurely foul the R.O. membrane element. Use of third party pre-filter elements will void any and all FCI Watermakers warranty to the R.O. membrane element.

IMPORTANT: Do not use string wound or fiber pre-filter elements. These type 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 pre-filter elements will void any and all FCI Watermakers warranty to the R.O. membrane element.

DO NOT ACCEPT THIRD PARTY PRE-FILTER ELEMENTS FROM ANY MARINE DEALER. USE ONLY FCI WATERMAKERS SUPPLIED PRE-FILTER ELEMENTS.

The resulting failure of the system to remain in operation, and or damage to the FCI Watermakers System caused by third party pre-filter elements is attributed to improper maintenance and operation, is the liability of the operator and owner, and is not covered by the FCI Watermakers warranty.

TO REPLACE PRE-FILTER ELEMENTS
Refer to *Figure 39* and proceed as follows:

1 With system off and thru-hull closed, unscrew the filter bowl counter-clockwise. When the bowl is free from the lid, the bowl has room to drop down about an inch and then the cup can be tilted and removed from the assembly.

2 Remove cartridge, drain and clean debris from inside bowl. Be sure not to discard the O-rings when emptying bowl.

3 Install new FCI cartridge, P/N 20-0019 for 5 micron white.

7 Replace the bowl.

8 After a cartridge change, the watermaker may need to be primed and the housing bled of air.

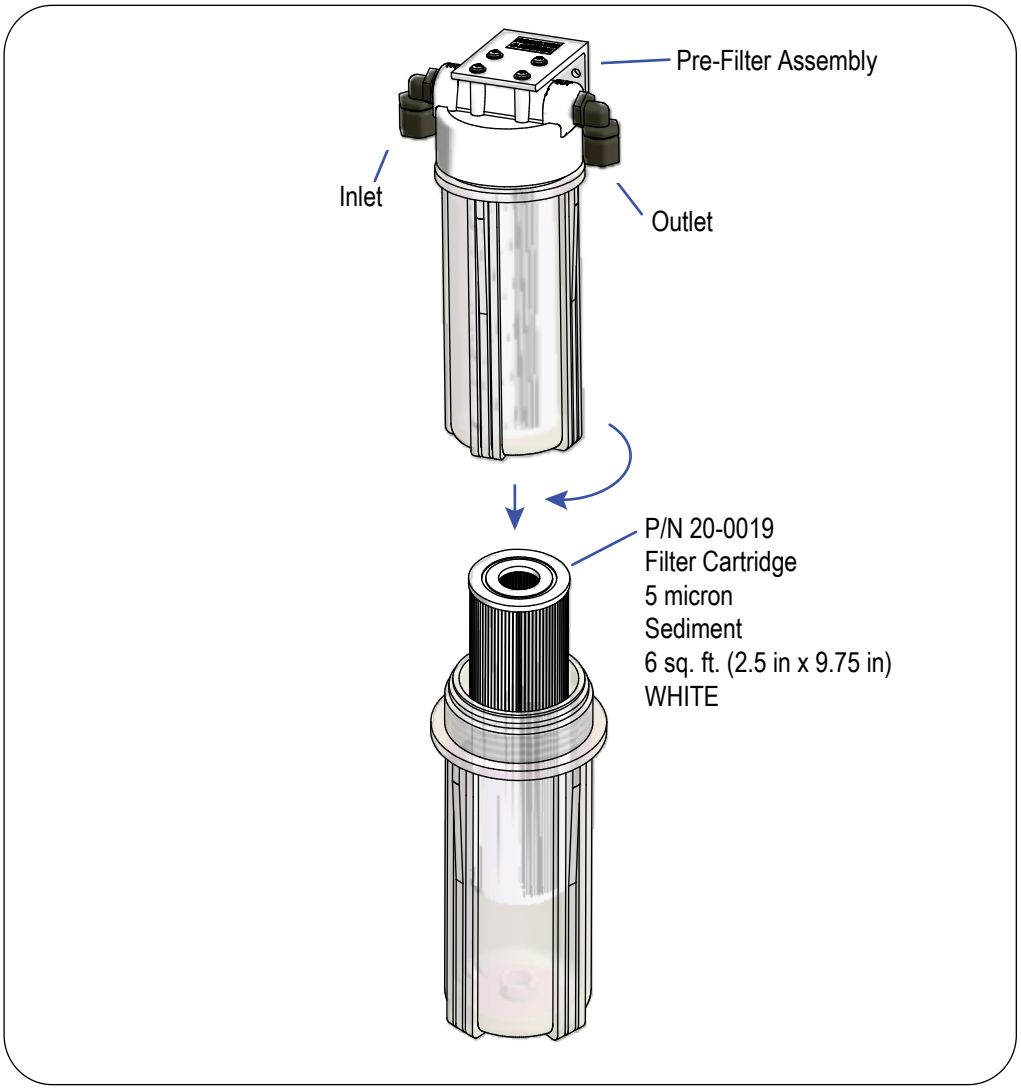
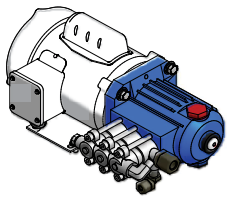


Figure 39: Replacing Pre-Filter Elements



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 repair. However, 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 or else the replaced or repaired motor will fail again.

FAILURES OF THE ELECTRIC MOTOR MAY BE:

A Bearing failure: Bearings are field replaceable.

B Winding failure: Generally caused by low or high power, below or above the specified voltage requirements of the system. This is NOT economically repairable.

C Internal centrifugal switch: Generally caused by mechanical failure of the switch. Field replaceable.

D Capacitor failure: Generally caused by low power feeding the motor or low cycles from the power source. Also caused by rapidly repeating starting and stopping of the motor. Field replaceable.

THE ELECTRIC MOTOR IS:

- 3/4 horse power
- Totally enclosed fan cooled
- 2 pole
- Dual cycle
- Dual voltage.

WARNING: The high pressure pump MUST rotate in the COUNTER CLOCKWISE DIRECTION ONLY. Never operate the high pressure pump in the clockwise direction.

WARNING: When switching from three phase generator power to three phase shore power ALWAYS check phases prior to operating the watermaker. Reverse Rotation will occur should the power be out of phase.

PROBLEMS & SYMPTOMS APPEARING AND CAUSED BY THE HIGH PRESSURE PUMP OR ITS ELECTRIC MOTOR

The single phase (115 or 230 VAC) electric motor hums, pulls starting current (locked rotor) amperage, does not rotate, and trips the supply power circuit breaker when attempting to operate the system.

The single phase electric motor is a capacitor start motor. If the motor was started with low voltage, or a drop in voltage occurred during starting, and if this was repeated several times in rapid concession, the capacitor will short out. Without the aid of a working capacitor the motor will hum, pull starting current (locked rotor) amperage, not rotate, and trip the supply power circuit breaker when attempting to operate the system.

Low voltage will also cause the same symptom. Low voltage is caused by an undersized power supply or generator, undersized power lead wires to the system

or motor, loose power wire, loose connection at the motor or within the power supply line, and burnt contacts on the motor starter relay (contactor).

SOLUTIONS: Check wiring size and connections to, from, and in between the power supply and the electric motor. Correct wire size or any loose wires. Check the capacitor on the motor and replace it if it has shorted out. Measure voltage at the motor during attempt to start it. If voltage drops more than 10% locate and correct the reason. Check the motor starter relay (contactor) for burnt contacts.

SERVICING THE VALVES

Disassembly of the Discharge Valve Assembly

1. Disconnect all plumbing for ease in servicing.
2. Inspect oil for proper level, presence of water or discoloration and replace as needed.
3. Using a standard M6 Allen wrench, remove the six (6) Socket Head Screws from the manifold. Remove the outer screws first, then the center screws.
4. Using a soft mallet tap the back side of the Discharge Manifold from alternate sides to maintain alignment and avoid damage to the plungers.

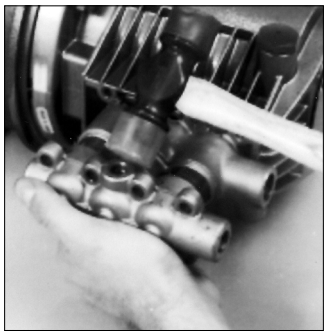


Figure 40: Removal of Discharge Manifold

5. Grasp the Discharge Manifold from the underside and gradually lift manifold while you pull away from the Crankcase.
6. The Adapter Spacers may stay with either the Discharge or Inlet Manifold. By inserting two opposing screwdrivers between Spacer and manifold you can easily pry them out of the Discharge Manifold. If they stay in the Inlet Manifold, gently work them up and down as you pull away from the Inlet Manifold.

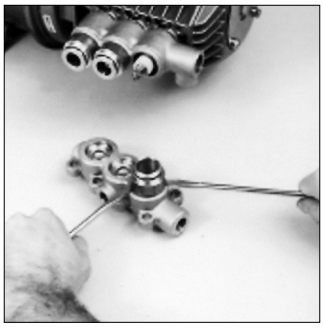


Figure 41: Removal of Adapter from Discharge Manifold

Figure 42: Removal of Adapter from Inlet Manifold

7. The valve assemblies are in the Discharge Manifold ports and will fall out when manifold is turned over. A complete valve assembly includes: Retainer, Spring, Valve and Seat.

Figure 43: Adapter and Discharge Valve Assembly

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 buildup or wear 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 per chart. Use torque sequence chart.
10. If oil was not changed, be certain oil is to mark on Oil Gauge before resuming operation.

SERVICING THE SEALS

Disassembly of the Seal Assembly

1. Remove the Inlet Valve Assembly from the exposed plunger rod ends, including Cotterpin, Nut, Washer, Spring, Spacer and Inlet Valve.

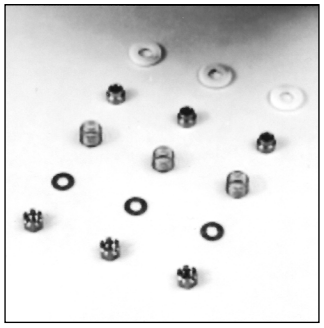


Figure 44: Inlet Valve Assembly

2. Grasp the Inlet Manifold from the front and underside and pull to remove from Plunger Rods.

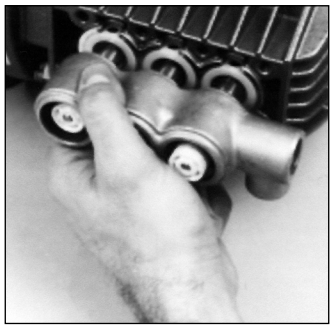


Figure 45: Removal of Inlet Manifold

3. Carefully examine back side of Lo-Pressure Seal before removing from the Inlet Manifold as it will be damaged during removal. If worn, insert screwdriver into I. D. of seal and pry out from the backside of the I.M. Exercise caution to avoid damage to the Inlet Manifold.

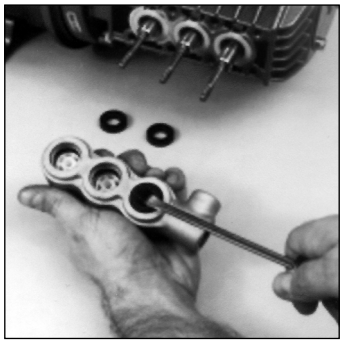


Figure 46: Removal of Lo-Pressure Seal

4. Press ceramic Plunger with thumb or soft tool from back side of Inlet Manifold. The Hi-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 a 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, Lo-Pressure Seals, V-Packings for scoring, cracks and wear and replace.

Figure 47: Plunger and Seals Arrangement

8. Examine the Sleeve for grooves for scale buildup and replace as needed. Grasp the Sleeve by hand and pull from the Plunger Rod.
9. Examine the O-Ring and Back-up-Ring under the Sleeve for cuts or wear and replace.
10. Examine the Barrier Slinger for wear and replace as needed. Install the Barrier Slinger with the concave side facing away from the Crankcase.

Reassembly of Seal Assembly

1. With Inlet and Discharge Manifold removed, 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 Lo-Pressure Seals and press into position with garter spring down. Be certain the seal is seated squarely on the shoulder in the inlet manifold chamber.

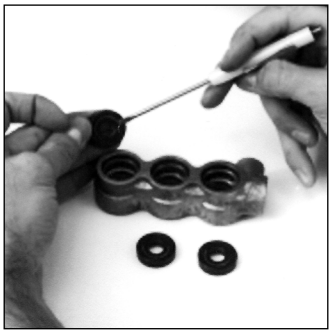


Figure 48: Installation of Lo-Pressure Seals

4. Place Inlet Manifold on work surface with Crankcase side down (larger I.D. ports up).
5. Carefully examine the Plungers for scoring or cracks and replace if worn.

6. Lubricate Ceramic Plungers and new Hi-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 back side.

7. 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. Install the Plungers onto the plunger rods. Press into position using the larger I.D. end of Valve Spacer

10. Examine Inlet Valve and replace if worn. Inlet valves cannot be reversed if worn. The S.S. Inlet Valves may be lapped if not badly worn. Install the S.S. Inlet valves with square edges towards the plungers (round edges towards the discharge). Install the Nylon Inlet Valve with ridged side towards the discharge.

11. Examine Spacers for wear and replace as needed. Install Spacer on each Plunger Rod with smaller O.D. towards inlet valve.

12. Examine Springs for damage or fatigue and replace as needed. Place on Plunger Rods.

13. Install Washers next with concave side towards Inlet Manifold.

14. Install Nuts and torque per chart.

15. Always install new Cotterpins and turn ends to secure in position.

16. Refer to steps 7-10 under "Reassembly of the Discharge Valve Assembly" on page 91 to replace the Discharge Manifold.

17. Torque diagonally in order shown. The outer four (4) screws then center screws all hand tight. Then repeat series to specifications in "Table 6: Torque Chart" on page 95.

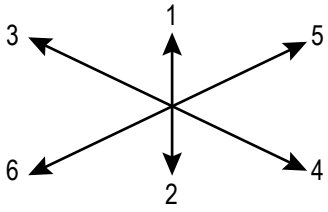


Table 6: Torque Chart

Pump Item	Thread	Tool Size	Torque		
			in.lbs.	ft.lbs.	Nm
Outer Bearing Case Screw	M6	M10 Hex/Phil.	50	4.0	6
Inner Bearing Case Screw	M6	M10 Hex/Phil.	50	4.0	6
Manifold Screw	M8	M6 Allen	115	9.4	13
Plunger Rod Nut	M6	M10 Hex	55	4.4	6
Bubble Oil Gauge	M28	Oil Gauge Tool	45	3.	6 5
Mounting					
Adapter Plate to Gas Engine	5/16-24	1/2" Hex	90	7.2	10
Pump to Adapter Plate	3/8-16	9/16" Hex	110	9.0	12
Pump to Electric Motor	3/8-16	9/16" Hex	110	9.0	12

SERVICING THE CRANKCASE SECTION

1. While Inlet Manifold, Plungers and Seal Retainers are removed, examine Crankcase Seals for wear.
2. Check oil level and for evidence of water in oil.
3. Rotate Crankshaft by hand to feel for smooth bearing movement.
4. Examine Crankshaft Oil Seal externally for drying, cracking or leaking.
5. Consult FCI Watermakers or your local distributor if Crankcase service is required.

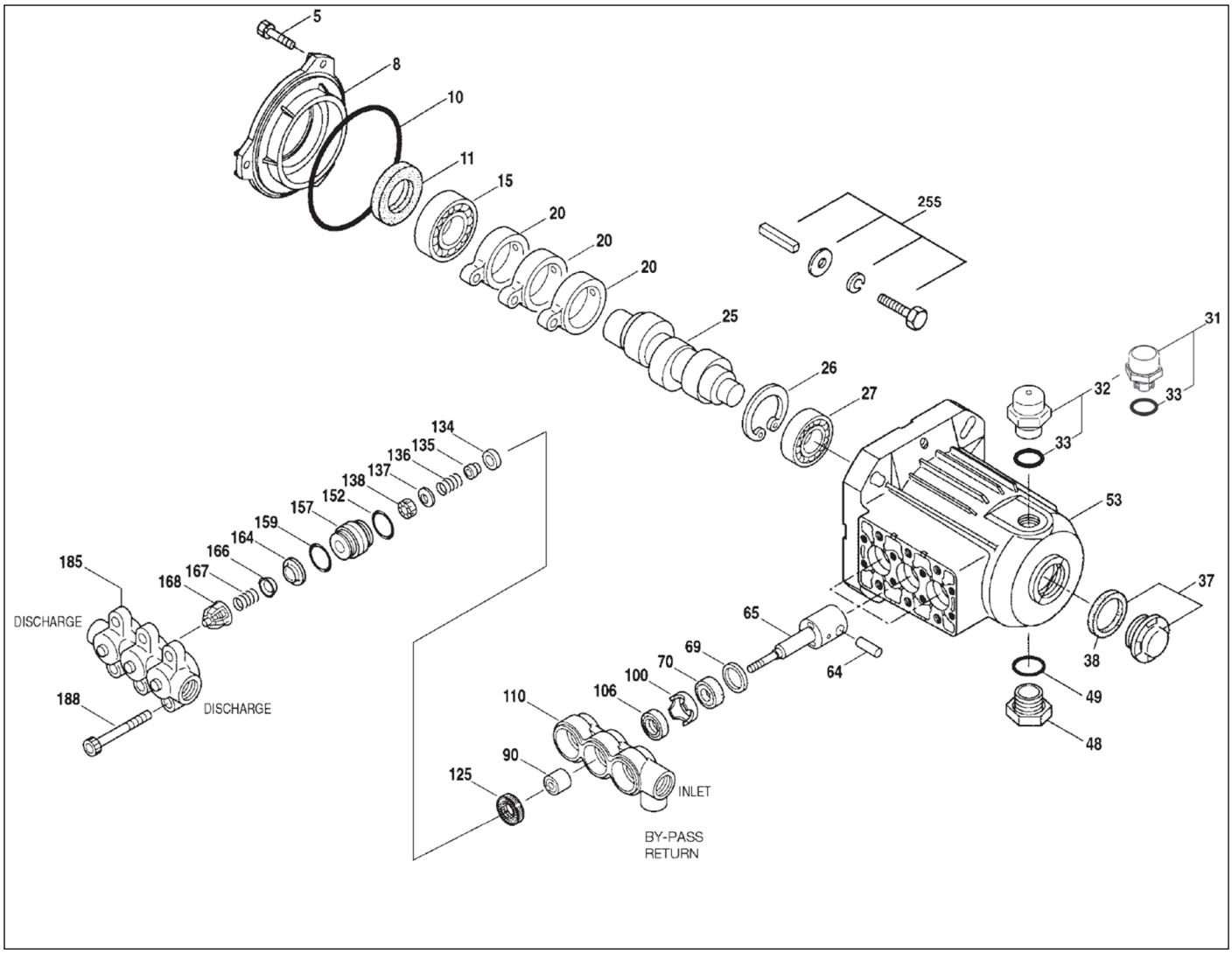


Figure 49: High Pressure Pump Exploded View

Table 7: High Pressure Pump Parts List

Item	Material	Description	Qty
5	S	Screw, HHC Sems (M6x14)	3
8	AL	Cover, Bearing	1
10	NBR	O-Ring, Bearing Cover-70D	1
11	NBR	Seal, Oil, Crankshaft -70D	1
15	STL	Bearing, Ball - Inner	1
20	TNM	Rod, Connecting	3
25	CM	Crankshaft, 3.1mm	1
26	STL	Ring, Retaining, Bearing	1
27	STL	Bearing, Ball - Outer	1
31	—	Cap, Vented w/O-Ring	1
32	RTP	Cap, Oil Filler w/O-Ring	1
33	NBR	O-Ring, Oil Filler Cap - 70D	1

Table 4: High Pressure Pump Parts List (continued)

Item	Material	Description	Qty
37	–	Gauge, Oil w/Gasket - 80D	1
38	NBR	Gasket, Flat, Oil Gauge - 80D	1
48	NY	Plug, Drain	1
49	NBR	O-Ring, Drain Plug - 70D	1
53	AL	Crankcase	1
64	CM	Pin, Crosshead	3
65	SSZZ	Rod, Plunger	3
69	STCP R	Washer, Oil Seal	3
70	NBR	Seal, Oil Crankcase	3
90	CC	Plunger, Ceramic (M18x18)	3
100	PVDF	Retainer, Seal	3
106	NBR	Seal, LPS w/SS-Spg	3
	FPM	*Seal, LPS w/SS-Spg*	*3*
	EPDM	*Seal, LPS w/SS-Spg*	*3*
110	SS	Manifold, Inlet	1
125	SNG	Seal, HPS w/SS	3
	HT	*Seal, Hi-Temp, 2-Pc w/S-Support*	3
134	SS	Valve, Inlet	3
	NY	*Valve, Inlet*	*3*
135	SS	Spacer 3	
136	SS	Spring, Inlet Valve	3
137	S	Washer, Conical (M6)	3
138	SS	Nut (M6)	3
152	NBR	O-Ring, Adapter Spacer, Inner-80D	3
	FPM	*O-Ring, Adapter Spacer, Inner-80D*	*3*
	EPDM	*O-Ring, Adapter Spacer, Inner-80D*	*3*
157	SS	Adapter, Valve	3
159	NBR	O-Ring, Adapter Spacer, Outer-80D	3
	FPM	*O-Ring, Adapter Spacer, Outer-80D*	*3*
	EPDM	*O-Ring, Adapter Spacer, Outer-80D*	*3*
164	SS	Seat	3
166	SS	Valve	3
167	SS	Spring	3
168	PVDF	Retainer, Spring	3
185	SS	Manifold, Discharge	1
188	S	Screw, HSH (M8x80)	6
255	STZP R	Assy, Bolt Mount	1
283	–	Kit, Oil Drain 1	
285	STL	Screw (M8-1.25x80) (Motor Removal) (Not Shown)	2
300	NBR	Kit, Seal (Inclds: 106, 125, 152, 159)	1
	FPM	*Kit, Seal (Inclds: 106, 125, 152, 159)*	*1*

Table 4: High Pressure Pump Parts List (continued)

Item	Material	Description	Qty
	EPDM	*Kit, Seal (Inclds: 106, 125, 152, 159)*	*1*
310	NBR	Kit, Valve (Inclds: 152,159,164,166,167,168)	1
	FPM	*Kit, Valve (Inclds: 152,159,164,166,167,168)*	*1*
	EPDM	*Kit, Valve (Inclds: 152,159,164,166,167,168)*	*1*
311	NBR	Kit, Inlet Valve w/SS-IV (Inclds: 134-138,152,159)	1
	NBR	*Kit, Inlet Valve w/NY-IV (Inclds: 134-138,152,159)*	*1*
	FPM	*Kit, Inlet Valve w/NY-IV (Inclds: 134-138,152,159)*	*1*
	EPDM	*Kit, Inlet Valve w/NY-IV (Inclds: 134-138,152,159)*	*1*
352	STZP	Tool, Oil Gauge Removal	1
–	–	Oil, Bottle (21 oz) ISO-68 Hydraulic (Fill to specified crankcase capacity prior to start-up)	1

NOTE:
- Italics are optional items.
- R Components comply with RoHS Directive.

MATERIAL CODES:
AL=Aluminum; CC=Ceramic; CM=Chrome-Moly; EPDM=Ethylene Propylene Diene Monamer; FPM=Fluorocarbon; HT=Hi-Temp (EPDM Alternative); NBR=Medium Nitrile (Buna-N); NY=Nylon; PVDF=Polyvinylidene Fluoride; RTP=Reinforced Composite; S=304SS; SNG=Special Blend (Buna); SS=316SS; SSZZ=316SS Zamak; STL=Steel; STCP=Steel/Chrome Plated; STZP=Steel/ZincPlated; TNM=Special High Strength

Table 8: High Pressure Pump Specifications

Item	Value
Discharge Pressure Range	100-1200 psi (7-85 bar)
Inlet Pressure Range	Flooded to 60 psi (4 bar)
Shaft Diameter	5/8" (15.9 mm)
RPM	1725 rpm
Bore	0.709" (18 mm)
Maximum Liquid Temperature	160°F (70°C)
Crankcase Capacity	11.15 oz. (0.33 l)
Inlet Port	3/8" NPT(F)
Discharge Ports	3/8" NPT(F)
By-Pass Return Port	1/4" NPT(F)
Weight (Pump Only)	8.9 lbs. (4 kg)
Dimensions (Pump Only)	6.8 x 8.7 x 5.2" (173 x 221 x 133 mm)
Flow (60 Hz-1725 rpm)	1.0 gpm (3.8 lpm)
Flow (50 Hz-1450 rpm)	.0.84 gpm (3.1 lpm)
Stroke	0.122" (3.1 mm)

MEMBRANE REPLACEMENT

MEMBRANE REPLACEMENT PROCEDURE

As your Watermaker ages, your membrane will start to deteriorate and produce lower grade water. When this happens you may try to chemically clean the membrane(s) to recover the performance. If this fails you will need to replace the membrane. Refer to *Figure 50 on page 100* and proceed as follows:

1 Shut the thru-hull, and disconnect the high-pressure (and low-pressure if needed) hose connections from the end of the vessel in question.

2 Using a 9/16 open-end wrench and a slotted screwdriver, remove the four (4) nuts on the end of the pressure vessel.

3 With the nuts off, push the rods back clear of the black anodized plate.

4 Holding the black anodized plate in both hands, twist and pull the plate clear of the vessel. The end plug assembly will be removed with the plate, and the membrane will now be visible inside the pressure vessel.

5 Using a pair of needle-nose pliers, grab the exposed white tube. With a firm grip, pull the membrane out of the vessel. If you are taking the membrane(s) out to be returned to FCI for evaluation, do not damage or mar the white tube—doing so will make it impossible for us to evaluate the membrane.

6 Notice the position of the Brine-Seal when the membrane was pulled from the vessel. There is only one brine seal per membrane. The cup portion of the seal must face the incoming flow from the high-pressure pump.

7 Take the new membrane out of the bag. Take care NOT to get the membrane dirty.

8 If the old membrane is being returned to FCI, rinse well with fresh water and place into the bag. Seal the end with tape and return immediately.

9 With the new membrane in hand, lubricate the brine seal and slide into the vessel in the same position as the original came out. Be sure the brine seal has not become UN-seated.

10 Inspect the o-rings on the end plug, replace if needed, lubricate the o-ring and slide into the vessel.

11 Slide rods forward through the mounting holes and re-assemble nuts. Tighten until the washer does not spin freely. DO NOT OVERTIGHTEN

12 Reconnect the hoses.

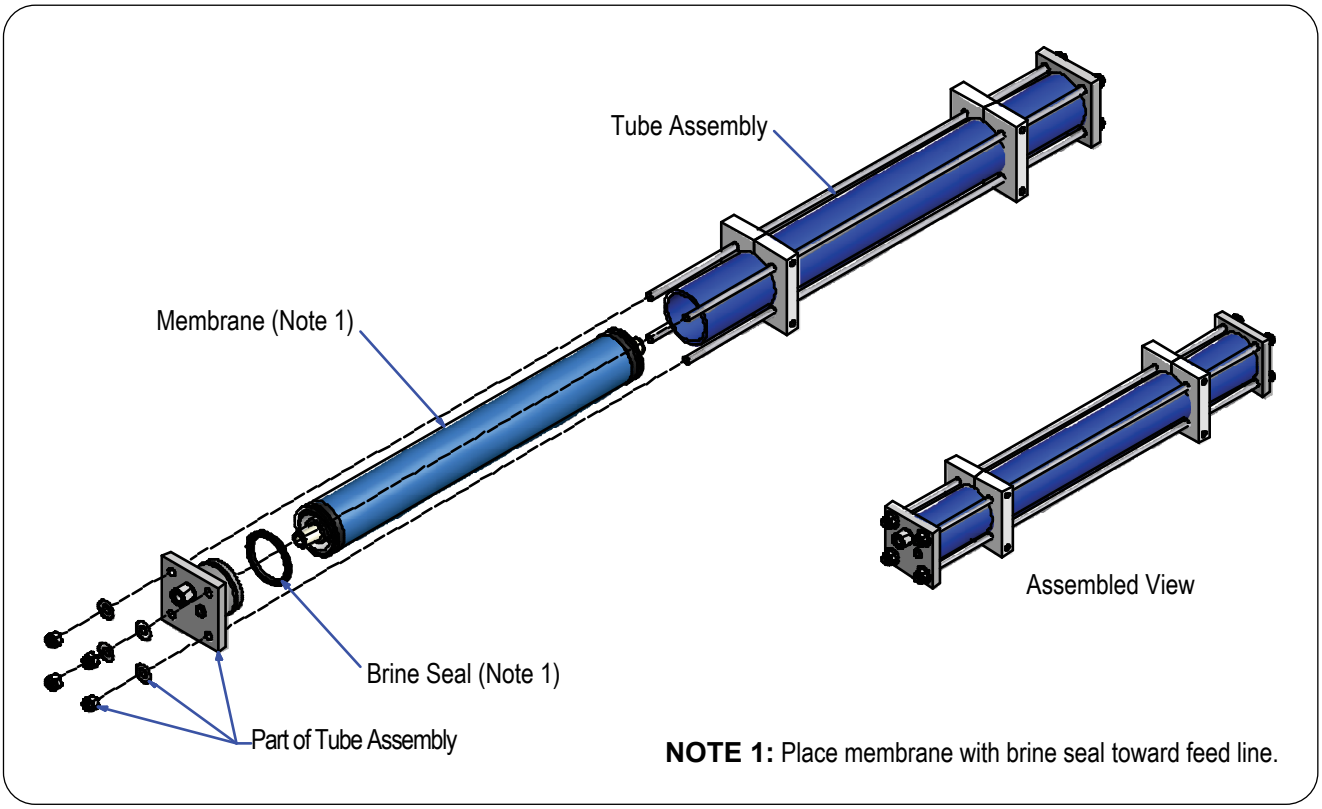


Figure 50: Replacing the Membrane

CLEANING AND STORAGE PROCEDURES

Invariably there will be times when the watermaker will not be used. During this time, it is recommended that the system be shut down and certain precautions are taken. By following these simple instructions, your FCI System will continue to provide you with fresh water for years to come.

SHORT TERM SHUTDOWN (UP TO 6 MONTHS)

If the system has the optional fresh water flush installed, you can perform a fresh water flush cycle before shutdown, and no additional procedures are necessary. For systems without the flush installed, it is recommended to manually run fresh water through the system at "0" high pressure, until the majority of the seawater has been displaced by fresh water.

LONG TERM

If the system has the optional fresh water flush installed, set the control system to automatically flush the system every week. (See "SETTING FRESH WATER FLUSH INTERVAL (if equipped)" on page 62.) Another method for systems with or without the flush installed, is to pickle, or preserve the system, which will last up to six months. Please refer to "STORAGE PROCEDURE" on page 104.

WARNING: FRESH WATER FLUSH

There must be sufficient fresh water in the potable water storage tank: In order to provide the required flow of water to the system during the fresh water flush cycle, the boat or home's fresh water pressure system must deliver minimum 1 U.S. Gallons (3.8 Liters) Per Minute at minimum 25 PSI (172 kPa) and maximum 60 PSI (414 kPa).

WARNING: FREEZING TEMPERATURE

The system must be protected from freezing if it will be exposed to temperatures below 32° Fahrenheit (0° Celsius). Freezing temperatures (below 32° F / 0° C) will cause extensive damage to the system as the water expands within the system during the freezing process. Resulting damage to the System caused by freezing temperatures is the liability of the operator. DO NOT subject the system to temperatures below 32° Fahrenheit (0° Celsius) unless the system has been rinsed with a solution of product water with twenty percent (20%) food-grade glycerin (propylene glycol).

NOTE: USE OF CHEMICALS

Although chemicals are necessary in some instances, FCI recommends using them only as needed. The chemicals can attack the membrane polymers and weaken the integrity of the membrane.

WINTERIZING PROCEDURE

If the system will be exposed to freezing temperatures the system must be drained of all product water, and rinsed with a solution of product water with 20% food-grade glycerin (propyline glycol). After rinsing with glycerin, if system is equipped with the following optional equipment, perform the following:

- Charcoal Filter (if equipped)

    1. Remove the charcoal filter bowl.
    2. Remove the water from the bowl.
    3. Replace the charcoal filter element with a new charcoal filter element.
    4. Replace the bowl back onto the lid.

- pH Neutralizing Filter (if equipped)

    1. Remove the pH neutralizing bowl.
    2. Remove the water from the bowl.
    3. Replace the bowl and pH element back onto the lid.

- UV Sterilizer (if equipped)

    Disconnect the product water line from the UV sterilizer filter and drain product water from it.

Switch the power to the system OFF. Lock and tag the power breaker to ensure that no one will accidentally operate the system and displace the winterizing mixture with feed or fresh water. Discard the storage chemical in an environmentally safe manner.

CLEANING PROCEDURE

HIGH PH CLEANER (Green Cap — Part# 14-0013)

1 Disconnect system feed line, turn system on and let drain for 30 seconds.

2 Place feed line and discharge line in a container filled with clean de-chlorinated fresh water.

3 Mix one pound of chemical for every 15 gallons of water.

4 With regulator valves completely open, and a maximum of 50 PSI on the system, circulate the solution through the system for 30 minutes. If solution discolors, dump solution after 15 minutes and start at *Step 2* again.

5 Remove suction line from container and let system drain for 30 seconds.

6 Rinse the system with fresh water, to drain, for 15 minutes.

7 When R.O. unit is first restarted, product water should be diverted to drain for the first 15 minutes.

LOW PH CLEANER (Red Cap — Part# 14-0014)

1 Disconnect system feed line, turn system on and let drain for 30 seconds.

2 Place feed line and discharge line in a clean container filled with de-chlorinated fresh water.

3 Mix one pound of chemical for every 15 gallons of water.

4 With regulator valves complete open, and a maximum of 50 PSI on the system, circulate the solution through the system for 30 minutes. If solution discolors, dump solution after 15 minutes and start *Step 2* again.

5 Remove suction line from container and let system drain for 30 seconds.

6 Rinse system with fresh water, to drain, for 15 minutes.

7 When R.O. unit is first restarted, product water should be diverted to drain for the first 15 minutes.

STORAGE PROCEDURE

MEMBRANE STORAGE AGENT (Blue Cap — Part# 14-0015)

1 Membranes should be cleaned prior to storage. See "CLEANING PROCEDURE" on page 103.

2 Disconnect system feed line, turn system on and let drain for 30 seconds.

3 Place feed line and discharge line in a container filled with clean de-chlorinated fresh water.

4 Mix one pound of chemical for every 10 gallons of water. For 2-1/2" membranes use 15 gallons of water.

5 With regulator valves completely open, and a maximum of 50 PSI on the system, circulate the solution through the system for 10 minutes.

6 After circulation, shut system down and close valves. Make sure solution does not drain out.

7 Upon start up, after storage, open valves for operation. Start the system up and run for 15 minutes, with no applied pressure.

8 When R.O. unit is first restarted, product water should be diverted for 15 minutes.

If you experience drastic changes in performance, take note of the following...

During performance comparisons, feed water temperature, feed water salinity, and system operating pressure must be taken into consideration and be compensated for. After compensations, a 15% decline in productivity (GPH Flow) and/or a 15% increase in salt passage indicate that the R.O. membrane element may require cleaning.

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

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

For "System Troubleshooting Guide" refer to *Table 9 on page 106*

SYSTEM TROUBLESHOOTING GUIDE

Table 9: System Troubleshooting Guide

Problem	Probable Cause	Solution
LP FAULT • Low Pressure Feed Pressure Too Low	Pre-filter clogged	Clean (up to 2X) or replace
	Sea strainer clogged	Clean
	Thru-hull obstructed	Clear obstruction
	Kink in feed hose	Correct hose run or replace hose
	LP pump lost prime	Prime Low-pressure pump
	Thru-hull valve closed	Open Thru-hull valve
	Pump Rotation incorrect	Reverse rotation
	Low-pressure switch	Replace switch
		Tighten wire connections
		Replace cable
	Air in feed line	Install forward facing scoop
		Move thru-hull position
		Use dedicated thru-hull
LP FAULT • LP pump won't run	Fuse blown on Controller	Replace fuse – see electrical diagram
	Capacitor blown on motor	Replace
	Thermal overload tripped on motor	Will automatically reset when cools down
	Thermal overload on contactor tripped (if equipped)	Press reset button on thermal overload (inside electrical box)
	Loose wire in junction box	Check and secure
	Loose wire on control board	Check and secure
	Contactor faulty	Replace
	Loose wire on contactor coil A1, A2	Check and secure
LP OVER • Low Pressure Pump Over Amperage Fault	Low voltage	Trip point set too low
	Correct under voltage condition	Adjust set point to 20% over nameplate rating
PRE-FILTER LEAKS	O-ring needs replacing	Replace
HP FAULT • System Pressure Too High	Pressure beyond high pressure trip point	Reduce pressure
		Adjust trip point
	Switch has failed or wire connections to switch are loose	Replace switch
		Check wire connection
		Replace wire
	Restriction downstream of brine discharge	Remove restriction

Table 3: System Troubleshooting Guide (continued)

Problem	Probable Cause	Solution
High-pressure Pump Won't Run	Fuse blown on controller	Replace fuse – see electrical diagram
	Capacitors blown (run or start)	Replace
	Motor bearings failed	Replace bearing
	Thermal Overload tripped (if equipped)	Press reset button
	Loose wire in junction box	Check and secure
	Loose wire on control board	Check and secure
	Contactor faulty	Replace
	Loose wire on contactor coil , A1, A2	Check and secure
	High pressure pump has seized	Check and take necessary action
HP OVER • High Pressure Pump Over Current Fault	HP motor drawing more amperes than setting trip point because line voltage too low	Correct line voltage to name plate voltage within 10%
	HP motor drawing more amperes than setting trip point because setting too low	Adjust trip point to 20% over nameplate full load amperes
TDS FAULT	Membrane Fouling	Clean or replace membrane
	Loss of feed flow from HP Pump	Check pump RPM, Adjust Belt tension, Service pump seals
	Pressure too low	Increase pressure to rated output
	Product Probe Needs Cleaning	Wipe down probe pins
	Pressure not being applied to system soon enough to allow for water to be made prior to the 3 minute shutdown	Apply pressure when screen advances to the "init" screen to allow for the system to make water sooner
PERM FAULT (Permeate)	System making water beyond rated capacity	Reduce pressure to bring product flow rate within design specifications
System has power, but display is blank	Possible short on flow sensors or switches resulting in power supply shutting down	Kill power to unit. Unplug the flow sensors and transducers. Reapply power. If display comes on, plug each component in one by one and see which one brings the screen down. Replace identified item
	Power supply down on main control board	Check output on power supply. If not 12 VDC return to factory for repair
System has power, but pumps will not turn on	Main fuse on control board has blown. Usually caused by one of the coils in the solenoids or contactors	Replace fuse. Monitor system and determine at what stage the fuse blows. (Ex. When HP pump starts, when fresh water flush solenoid engages etc.) Check connections to that component, secure wires or replace component

Table 3: System Troubleshooting Guide (continued)

Problem	Probable Cause	Solution
System turns off by itself, no fault condition showing	Loss of power	No action
	Program set up to run for a certain amount of time	Adjust as needed (see control section)
	Program set to make a specified amount of water	Adjust as needed (see control section)
	Program set to turn on or off at specified times	Adjust as needed (see control section)
Display Shows Large FCI Watermakers	Loss of communication with main control board. Usually caused by power issue, lightening strike or high voltage spike	Control and displays need to be sent back to factory for repair
Display shows RS232 is PC, searching for UROC	Lost communication with main control. Usually caused by power issue or loose wire	Control needs to be sent to manufacturer for repair
Display shows "Locating UROC"	Display connected to wrong connector (RS232 for Aqualite)	Wire to correct connector for your system. See sections on wiring, and electrical diagrams.
Display Buttons do not function	Display has been set to be "display only". (remote display)	Access display menu on main display and set to desired setting.
	Tactile dome on touch pad has been damaged	Return display to factory for repair
Loss of Voltage Reading on Display	Control Board fuse(s) has blown	Replace
Low-pressure pump will not shut off	Isolation relay on main control board is faulty	Send to factory for repair
	Tactile dome on display pad is faulty	Send to factory for repair
High-pressure pump will not shut off	Isolation relay on main control board is faulty	Send to factory for repair
	Tactile dome on display pad is faulty	Send to factory for repair
Brine flow does not stop after shutdown	System is in a fresh water flush mode	Wait for fresh water flush to time out
	Fresh water flush solenoid valve is faulty	Replace or repair valve
	Fresh water flush relay on control board has failed	Send to factory for repair
System is making good water but not diverting to fresh water tank	Quality solenoid has failed	Check wiring / Replace valve (use over ride button on valve to divert water until repaired)
	Quality solenoid relay on control board has failed	Return control board to factory for repair
Brine flow is too low	High pressure pump seals worn	Replace seals
Product flow is low	System pressure to low	Increase pressure
	Feed TDS high	Adjust pressure up to 1000 PSI to compensate for high TDS
	Water temperature low	Adjust pressure up to 1000 PSI to compensate for low temperature
	Membranes are fouled	Clean or replace membranes
System does not turn on when power button is pressed	Fuses blown on main control	Replace fuses
	Power not on	Apply power

Table 3: System Troubleshooting Guide (continued)

Problem	Probable Cause	Solution
System draws high amperes	Low or incorrect voltage applied	Adjust voltage to system specifications
High pressure not increasing when HP Valve is turned counter clockwise	HP pump seals need service	Repair high pressure pump
	Valve stem worn	Replace high pressure valve
High quality light does not come on	Pressure too low on system	Increase pressure to rated output
	Membrane is fouled	Clean or replace membrane
	Probe needs to be cleaned	Clean or replace probe

HIGH PRESSURE PUMP TROUBLESHOOTING GUIDE

One of the most important steps in a high pressure system is to establish a regular maintenance program. This will vary slightly with each system and is determined by various elements such as the duty cycle, the liquid being pumped, the actual specifications vs rated specifications of the pump, the ambient conditions, the inlet conditions and the accessories in the system. A careful review of the necessary inlet conditions and protection devices required before the system is installed will eliminate many potential problems.

These pumps are very easy pumps to service and require far less frequent service than most pumps. Typically, only common tools are required, making in-field service convenient, however, there are a few custom tools special to certain models that do simplify the process. This section of this manual is designed to assist you with the disassembly and reassembly of your pump. *Table 10* will assist in determining the cause and remedy to various operating conditions.

Table 10: High Pressure Pump Troubleshooting Guide

Problem	Probable Cause	Solution
LOW PRESSURE	Belt slippage (if equipped).	Tighten belt(s) or install new belt(s).
	Air leak in inlet plumbing.	Tighten fittings and hoses. Use PTFE liquid or tape.
	Pressure gauge inoperative or not registering accurately.	Check with new gauge. Replace worn or damaged gauge.
	Inlet suction strainer (filter) clogged or improperly sized.	Clean/adjust relief valve. Replace worn seats/valves and o-rings.
	Abrasives in pumped liquid.	Clean filter. Use adequate size filter. Check more frequently. Install proper filter.
	Leaky discharge hose.	Replace discharge hose with proper rating for system.
	Inadequate liquid supply.	Pressurize inlet.
	Severe cavitation.	Check inlet conditions.
	Worn seals.	Install new seal kit. Increase frequency of service
	Worn or dirty inlet/ discharge valves.	Clean inlet/discharge valves or install new valve kit.
PULSATION	Faulty Pulsation Dampener (if equipped)	Check pre-charge. If low, recharge, or install a new dampener.
	Foreign material trapped in inlet/discharge valves.	Clean inlet/discharge valves or install new valve kit. SEE Pulsation Dampener section.
WATER LEAK • Under the manifold • Into the crankcase	Worn V-Packings or Lo-Pressure Seals.	Install new seal kit. Increase frequency of service.
	Worn adapter o-rings.	Install new o-rings.
	Humid air condensing into water inside the crankcase.	Install oil cap protector. Change oil every 3 months or 500 hours.
	Excessive wear to seals and V-Packings.	Install new seal kit. Increase frequency of service.

Table 4: High Pressure Pump Troubleshooting Guide (continued)

Problem	Probable Cause	Solution
KNOCKING NOISE • Inlet supply • Bearing • Pulley	Inadequate inlet liquid supply.	Check liquid supply. Increase line size, pressurize or install C.A.T.
	Broken or worn bearing.	Replace bearing.
	Loose pulley on crankshaft	Check key and tighten set screw.
OIL LEAK • Crankcase oil seals. • Crankshaft oil seals and o-rings. • Drain plug • Bubble gauge • Rear Cover • Filler cap	Worn crankcase oil seals.	Replace crankcase oil seals.
	Worn crankshaft oil seals or o-rings on bearing cover.	Remove bearing cover and replace o-rings and/or oil seals.
	Loose drain plug or worn drain plug o-ring.	Tighten drain plug or replace o-ring.
	Loose bubble gauge or worn bubble gauge gasket.	Tighten bubble gauge or replace gasket.
	Loose rear cover or worn rear cover o-ring.	Tighten rear cover or replace o-ring.
	Loose filler cap or excessive oil in crankcase.	Tighten filler cap. Fill crankcase to specified capacity.
PUMP RUNS EXTREMELY ROUGH • Inlet conditions • Pump valves • Pump seals	Restricted inlet or air entering the inlet plumbing.	Correct inlet size plumbing. Check for air tight seal.
	Stuck inlet/discharge valves.	Clean out foreign material or install new valve kit.
	Leaking V-Packings or Lo-Pressure seals.	Install new seal kit. Increase frequency of service.
PREMATURE SEAL FAILURE	Scored plungers.	Replace plungers.
	Over pressure to inlet manifold.	Reduce inlet pressure per specifications.
	Abrasive material in the liquid being pumped.	Install proper filtration at pump inlet and clean regularly.
	Excessive pressure and/or temperature of pumped liquid.	Check pressure and inlet liquid temperature. DO NOT RUN PUMP WITHOUT LIQUID.
	Running pump dry.	Increase hose one size larger than inlet port size. Pressurize and install C.A.T.
	Starving pump of adequate liquid.	Increase hose one size larger than inlet port size. Pressurize and install C.A.T.
	Eroded manifold.	Replace manifold. Check liquid compatibility.

REMOTE CONTROL FAULT CODES / CAUSE & FIX (if equipped)

If you have the optional remote control installed, you may encounter the system fault readings as shown in *Figure 51*. Please refer to the troubleshooting tips (*Table 11 on page 113)* before contacting your authorized FCI dealer or FCI Customer Support.

RECOGNIZING A SYSTEM FAULT READING

During a System Fault, an audible alarm will sound. The Remote Control Panel Display will provide the primary cause, and the on-screen troubleshooting tips will provide probabilities.

HOW TO CLEAR FAULT SCREEN

Should a system fault occur, take note of fault and possible causes prior to clearing the system. To clear the system, press [CANCEL] once (1) to turn off audible alarm, and a second time (2) to clear the fault screen and return to operation.

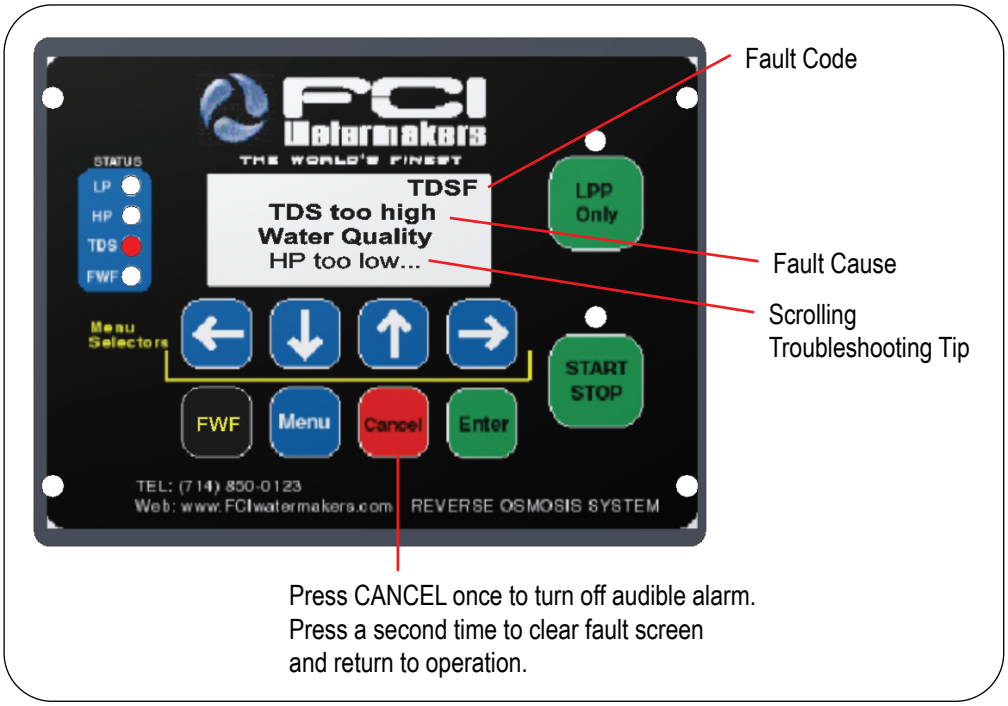


Figure 51: Remote Control Fault Codes

Table 11: Remote Control Fault Codes, Cause & Fix

Fault Code	Cause	Fix
HP FAULT	System Pressure Too High	Adjust HP valve
		Restriction downstream of HP pump
LP FAULT	Low Pressure Feed Pressure Too Low	Check all valves and strainer
		Clean or replace pre-filters
LP OVER	Low Pressure Pump Over Current Fault	Check current draw
		Voltage could be too low
		Wire size to small
		Loose connection
TDS FAULT	Too High Water Quality or Brine Flow Too Low	Membranes may need service
		HP too low
		HPP seals may need service

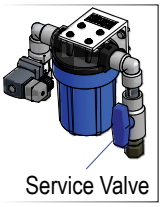
8 / ACCESSORIES & OPTIONAL EQUIPMENT

Contact your authorized FCI dealer for the following items:

- REPLACEMENT PARTS
- ACCESSORIES AND OPTIONAL EQUIPMENT

For more information, please call toll-free 1-800-850-0123, or visit us online at www.fciwatermakers.com.

REMOTE CONTROL PANEL
Monitor and access the system from a remote location, for example, the bridge, salon or engineering room. In the case of an island installation place one anywhere remote control and monitoring is desired.



FRESH WATER FLUSH
The Fresh Water Flush assembly allows the system to be flushed with fresh water after each use or on a programmed schedule. Seawater, if left un-flushed, can be more corrosive, can promote biological growth, and can naturally decay materials. The carbon filter removes particulate and chlorine (bleach) from the fresh water holding tank. These elements can be harmful to the membrane. The shut-off service valve allows the filter cartridge to be replaced without having to depressurize the on board pressure system.

ULTRA-VIOLET STERILIZERS
Stainless steel, ultra-violet sterilizers provide 99.8% sterilization of bacteria and micro-organisms in water. Available in a variety of flow rates.

Recommended installation is after the holding tank, not immediately after the watermaker, as specified by other manufacturers and/or installers. The reason for this is that in addition to receiving clean water from the on-board watermaker, holding tanks are vented (inviting potential for contaminants) and are also fed by dockside fillings from shore—there is no control of water quality in the holding tank itself. If a UV sterilizer is used, it should be sized to accommodate the requirements of the boat's fresh water pump.

POST GRANULAR ACTIVATED CARBON FILTERS
Granular-activated charcoal filters are great for post-tank filtration, and remove particulate, chlorine and other contaminants found in your fresh water holding tank.

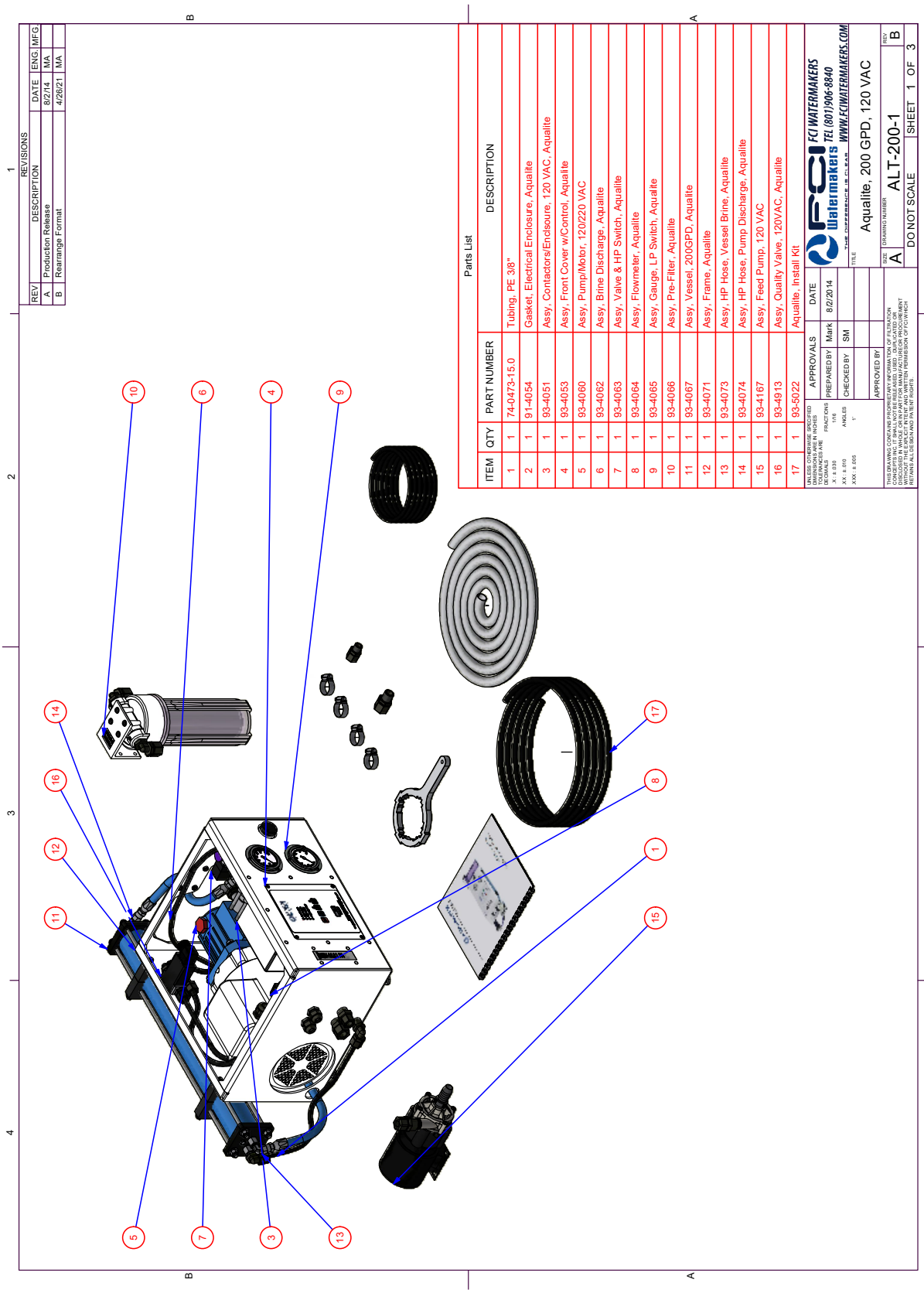
REPLACEMENT PARTS
FCI carries a complete line of replacement parts including filters, membranes, hoses, fittings, spanners, o-rings and more.

9 / PARTS

Refer to the General Assembly Diagrams included in this chapter for information about parts used in the system.

The General Assembly Diagrams in this chapter are organized in the following order:

- System
- Frame
- LP Pump
- Pre-Filter
- HP Pump
- Flowmeter
- HP Valve, Switch, Gauge
- LP Switch, Gauge
- Quality Valve
- Brine Discharge
- HP Hose
- Electrical
- Pressure Vessel
- Installation Kit
- Fresh Water Flush (optional)
- FWF Installation Kit (optional)


REVISIONS
REV DESCRIPTION DATE ENG. MFG
A Production Release 8/2/14 MA
B Rearrange Format 4/26/21 MA
Parts List
ITEM QTY PART NUMBER DESCRIPTION
1 1 74-0473-15.0 Tubing, PE 3/8"
2 1 91-4054 Gasket, Electrical Enclosure, Aqualite
3 1 93-4051 Assy, Contactors/Endsoure, 120 VAC, Aqualite
4 1 93-4053 Assy, Front Cover w/Control, Aqualite
5 1 93-4060 Assy, Pump/Motor, 120/220 VAC
6 1 93-4062 Assy, Brine Discharge, Aqualite
7 1 93-4063 Assy, Valve & HP Switch, Aqualite
8 1 93-4064 Assy, Flowmeter, Aqualite
9 1 93-4065 Assy, Gauge, LP Switch, Aqualite
10 1 93-4066 Assy, Pre-Filter, Aqualite
11 1 93-4067 Assy, Vessel, 200GPD, Aqualite
12 1 93-4071 Assy, Frame, Aqualite
13 1 93-4073 Assy, HP Hose, Vessel Brine, Aqualite
14 1 93-4074 Assy, HP Hose, Pump Discharge, Aqualite
15 1 93-4167 Assy, Feed Pump, 120 VAC
16 1 93-4913 Assy, Quality Valve, 120VAC, Aqualite
17 1 93-5022 Aqualite, Install Kit
APPROVALS DATE
PREPARED BY Mark 8/2/2014
CHECKED BY SM
APPROVED BY
FCI Watermakers
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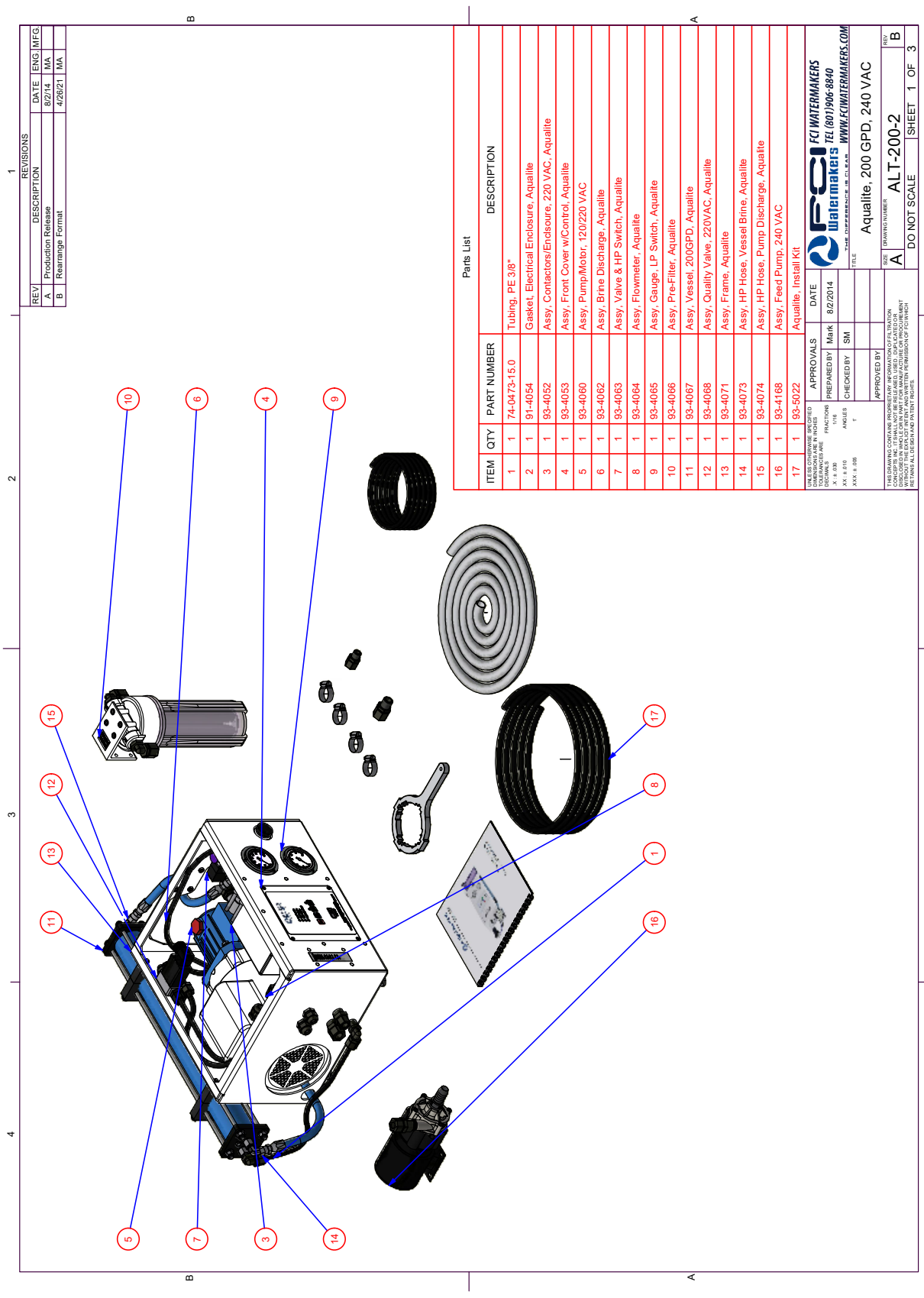
Aqualite, 200 GPD, 120 VAC
SIZE A
DRAWING NUMBER ALT-200-1
REV B
DO NOT SCALE
SHEET 1 OF 3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REV DESCRIPTION DATE ENG. MFG.
A Production Release 8/2/14 MA
B Rearrange Format 4/26/21 MA
Parts List
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1 1 74-0473-15.0 Tubing, PE 3/8"
2 1 91-4054 Gasket, Electrical Enclosure, Aqualite
3 1 93-4052 Assy, Contactors/Enclsoure, 220 VAC, Aqualite
4 1 93-4053 Assy, Front Cover w/Control, Aqualite
5 1 93-4060 Assy, Pump/Motor, 120/220 VAC
6 1 93-4062 Assy, Brine Discharge, Aqualite
7 1 93-4063 Assy, Valve & HP Switch, Aqualite
8 1 93-4064 Assy, Flowmeter, Aqualite
9 1 93-4065 Assy, Gauge, LP Switch, Aqualite
10 1 93-4066 Assy, Pre-Filter, Aqualite
11 1 93-4067 Assy, Vessel, 200GPD, Aqualite
12 1 93-4068 Assy, Quality Valve, 220VAC, Aqualite
13 1 93-4071 Assy, Frame, Aqualite
14 1 93-4073 Assy, HP Hose, Vessel Brine, Aqualite
15 1 93-4074 Assy, HP Hose, Pump Discharge, Aqualite
16 1 93-4168 Assy, Feed Pump, 240 VAC
17 1 93-5022 Aqualite, Install Kit
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SIZE A DRAWING NUMBER ALT-200-2 REV B
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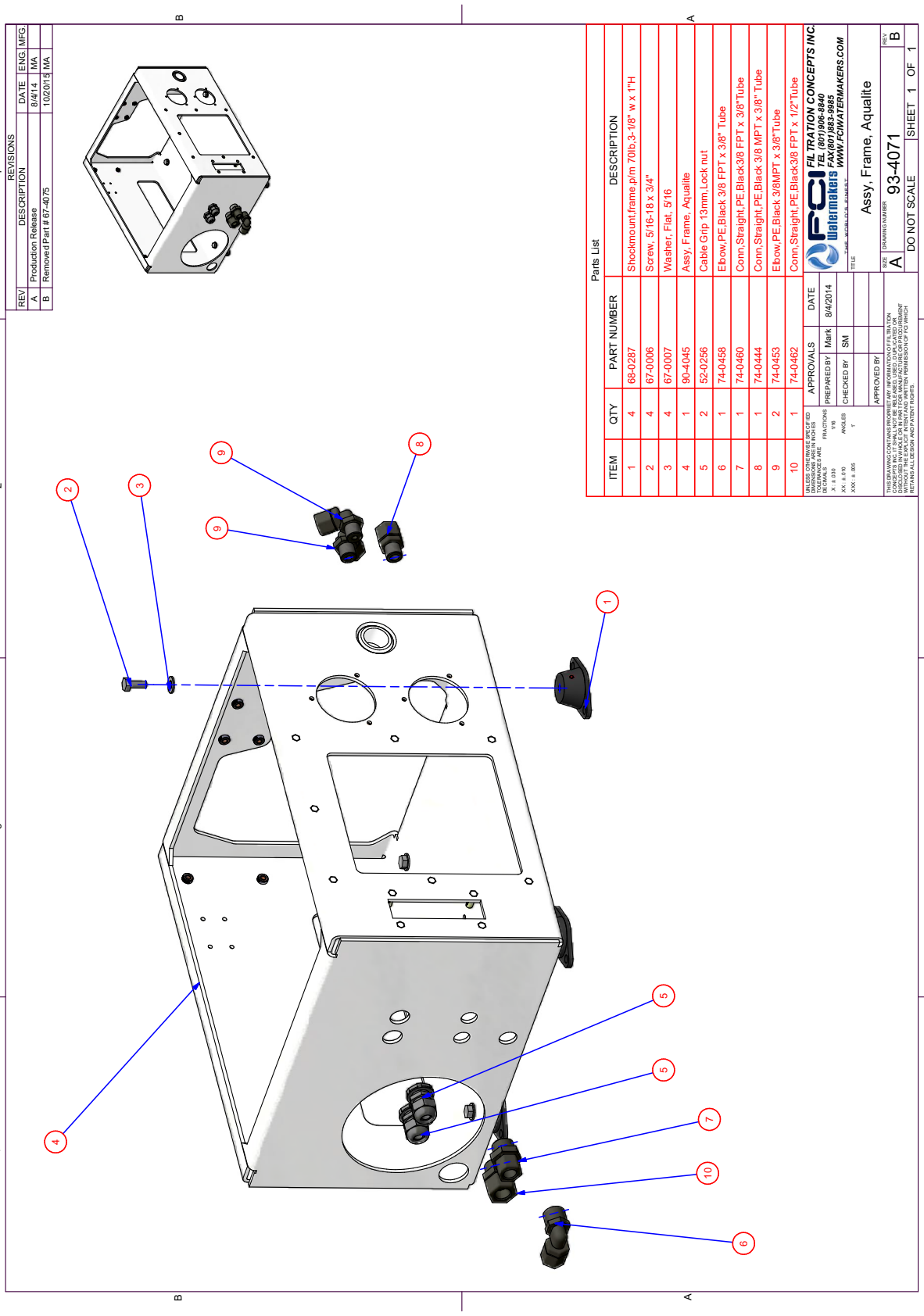
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A Production Release 8/4/14 MA
B Removed Part # 67-4075 10/20/15 MA
Parts List
ITEM QTY PART NUMBER DESCRIPTION
1 4 68-0287 Shockmount,frame,p/m 70lb,3-1/8" w x 1"H
2 4 67-0006 Screw, 5/16-18 x 3/4"
3 4 67-0007 Washer, Flat, 5/16
4 1 90-4045 Assy, Frame, Aqualite
5 2 52-0256 Cable Grip 13mm,Lock nut
6 1 74-0458 Elbow,PE,Black 3/8 FPT x 3/8" Tube
7 1 74-0460 Conn,Straight,PE,Black3/8 FPT x 3/8"Tube
8 1 74-0444 Conn,Straight,PE,Black 3/8 MPT x 3/8" Tube
9 2 74-0453 Elbow,PE,Black 3/8MPT x 3/8"Tube
10 1 74-0462 Conn,Straight,PE,Black3/8 FPT x 1/2"Tube
APPROVALS DATE
PREPARED BY Mark 8/4/2014
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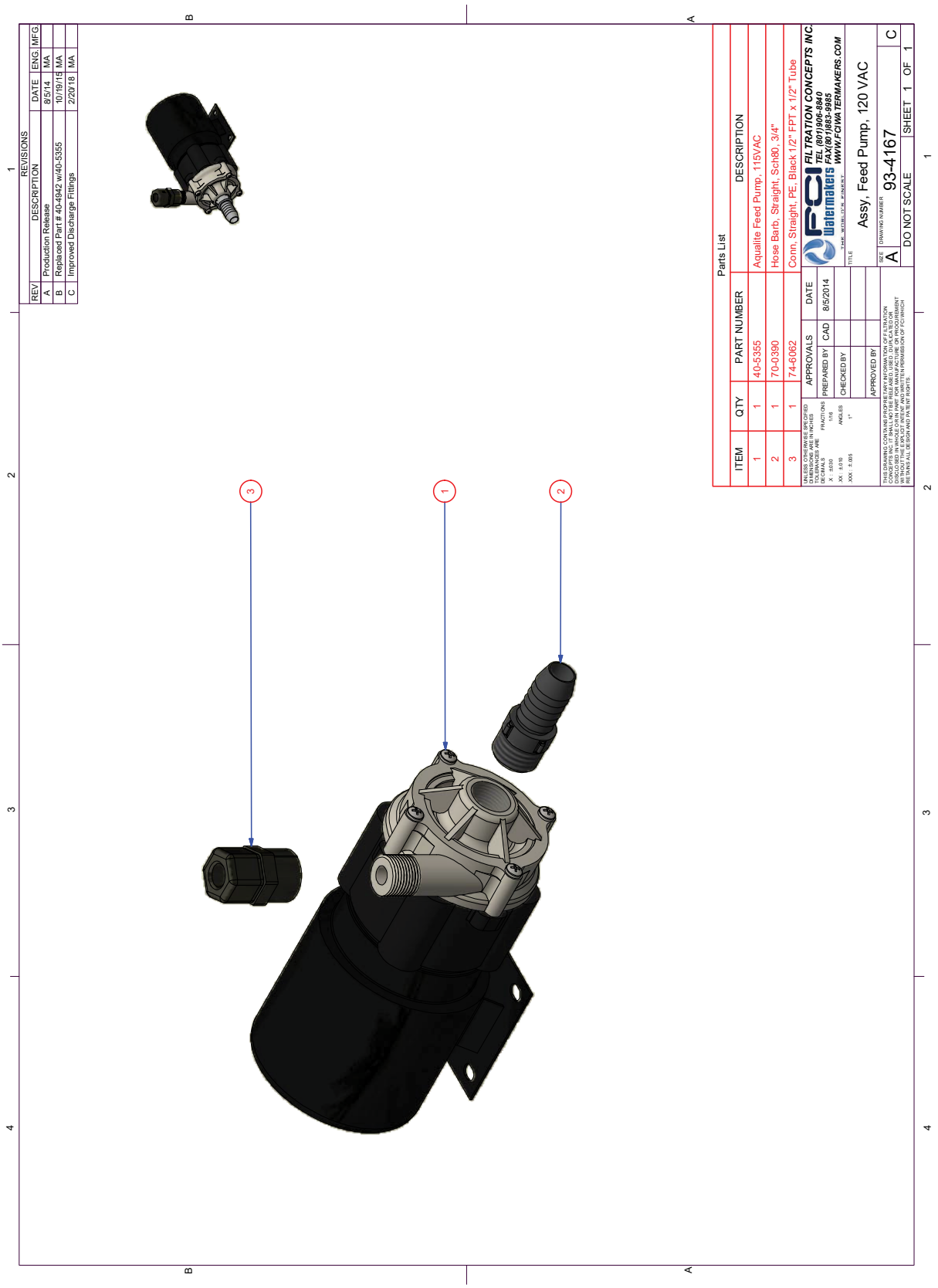
FAX: (801) 983-9945
Watermakers WWW.FCIWATERMAKERS.COM
Assy, Frame, Aqualite
SIZE A DRAWING NUMBER 93-4071 REV B
DO NOT SCALE SHEET 1 OF 1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REV DESCRIPTION DATE ENG. MFG.
A Production Release 8/5/14 MA
B Replaced Part # 40-4942 w/40-5355 10/19/15 MA
C Improved Discharge Fittings 2/20/18 MA
Parts List
ITEM QTY PART NUMBER DESCRIPTION
1 1 40-5355 Aqualite Feed Pump, 115VAC
2 1 70-0390 Hose Barb, Straight, Sch80, 3/4"
3 1 74-6062 Conn, Straight, PE, Black 1/2" FPT x 1/2" Tube
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PREPARED BY CAD 8/5/2014
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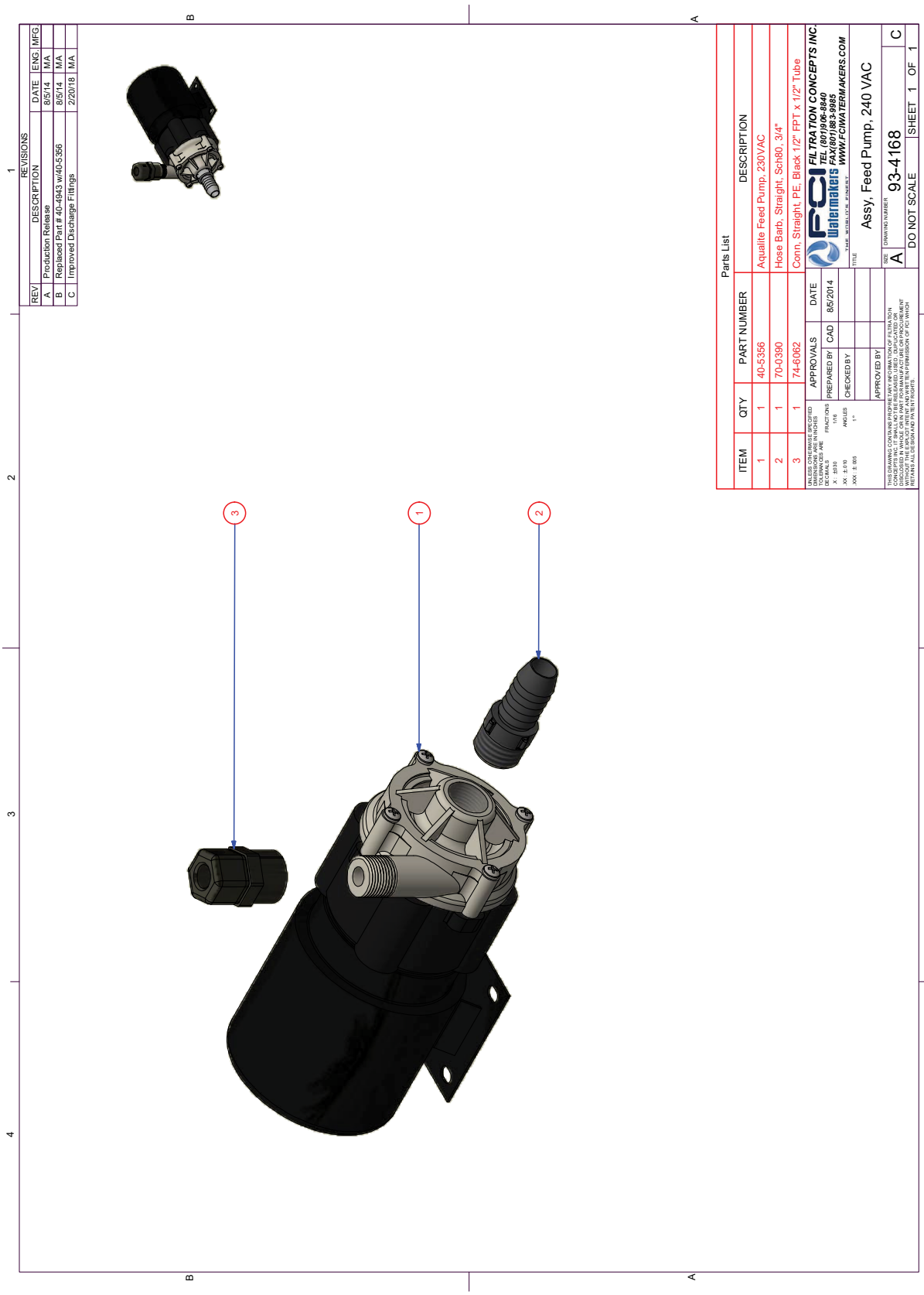
APPROVED BY
TITLE
Assy, Feed Pump, 120 VAC
SIZE DRAWING NUMBER
A 93-4167 C
DO NOT SCALE SHEET 1 OF 1
1
2
3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B | Replaced Part # 40-4943 w/40-5366 | 8/5/14 | MA
C | Improved Discharge Fittings | 2/20/18 | MA
Parts List
ITEM | QTY | PART NUMBER | DESCRIPTION
1 | 1 | 40-5356 | Aqualite Feed Pump, 230VAC
2 | 1 | 70-0390 | Hose Barb, Straight, Sch80, 3/4"
3 | 1 | 74-6062 | Conn, Straight, PE, Black 1/2" FPT x 1/2" Tube
APPROVALS | DATE
PREPARED BY | CAD | 8/5/2014
CHECKED BY
APPROVED BY
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Assy, Feed Pump, 240 VAC
SIZE A | DRAWING NUMBER 93-4168 | C
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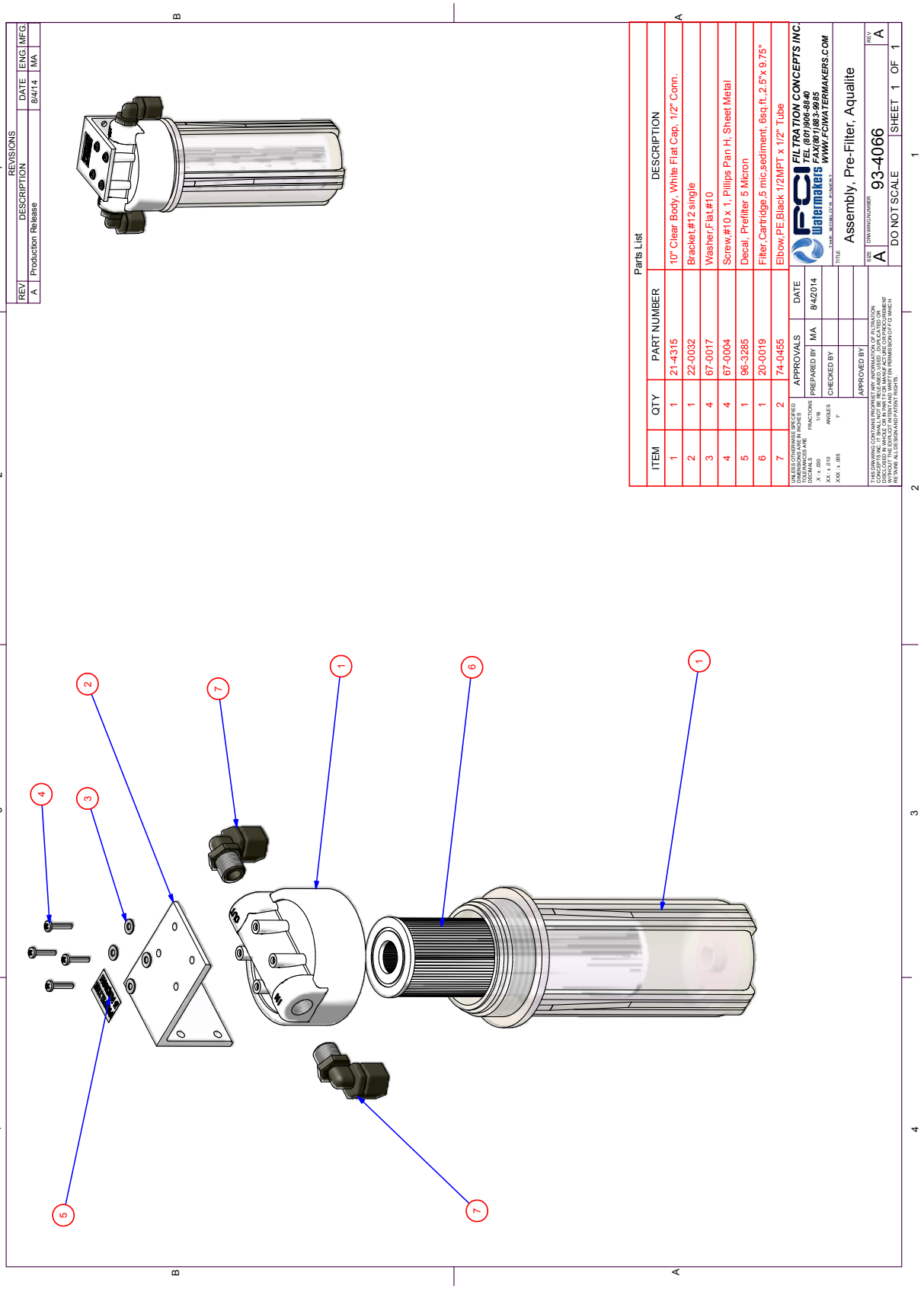
GENERAL ASSEMBLY DIAGRAMS / PRE-FILTER



REVISIONS			
REV	DESCRIPTION	DATE	ENG. MFG.
A	Production Release	8/4/14	MA

Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	21-4315	10" Clear Body, White Flat Cap, 1/2" Conn.
2	1	22-0032	Bracket,#12 single
3	4	67-0017	Washer,Flat,#10
4	4	67-0004	Screw,#10 x 1, Pillips Pan H, Sheet Metal
5	1	96-3285	Decal, Prefilter 5 Micron
6	1	20-0019	Filter, Cartridge,5 mic.sediment, 6sq.ft.,2.5"x 9.75"
7	2	74-0455	Elbow,PE,Black 1/2MPT x 1/2" Tube

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
DECIMALS FRACTIONS
X ± .030 1/16
XX ± .010 ANGLES
XXX ± .005 1°

APPROVALS		DATE
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TITLE: Assembly, Pre-Filter, Aqualite

SIZE	DRAWING NUMBER	REV
A	93-4066	A

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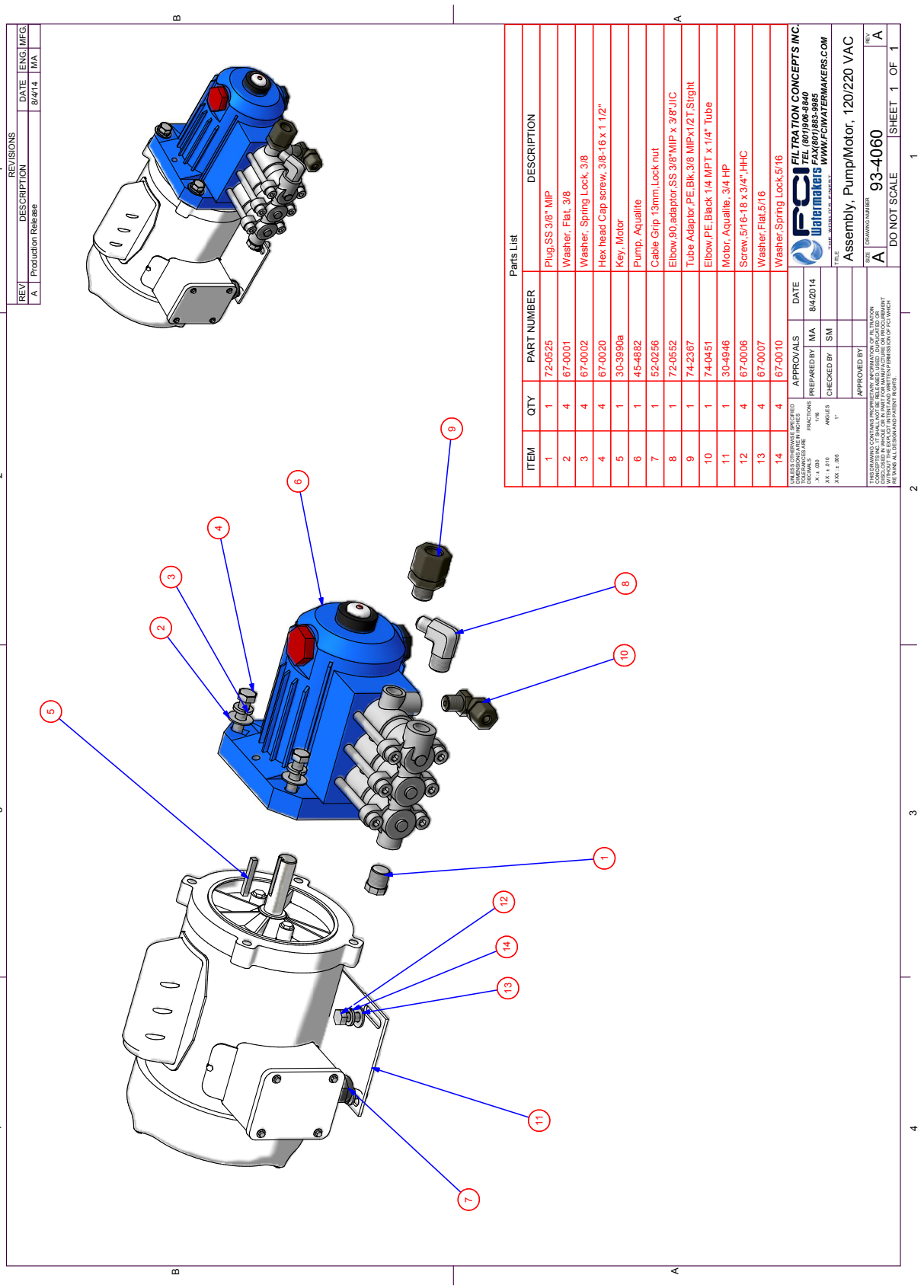
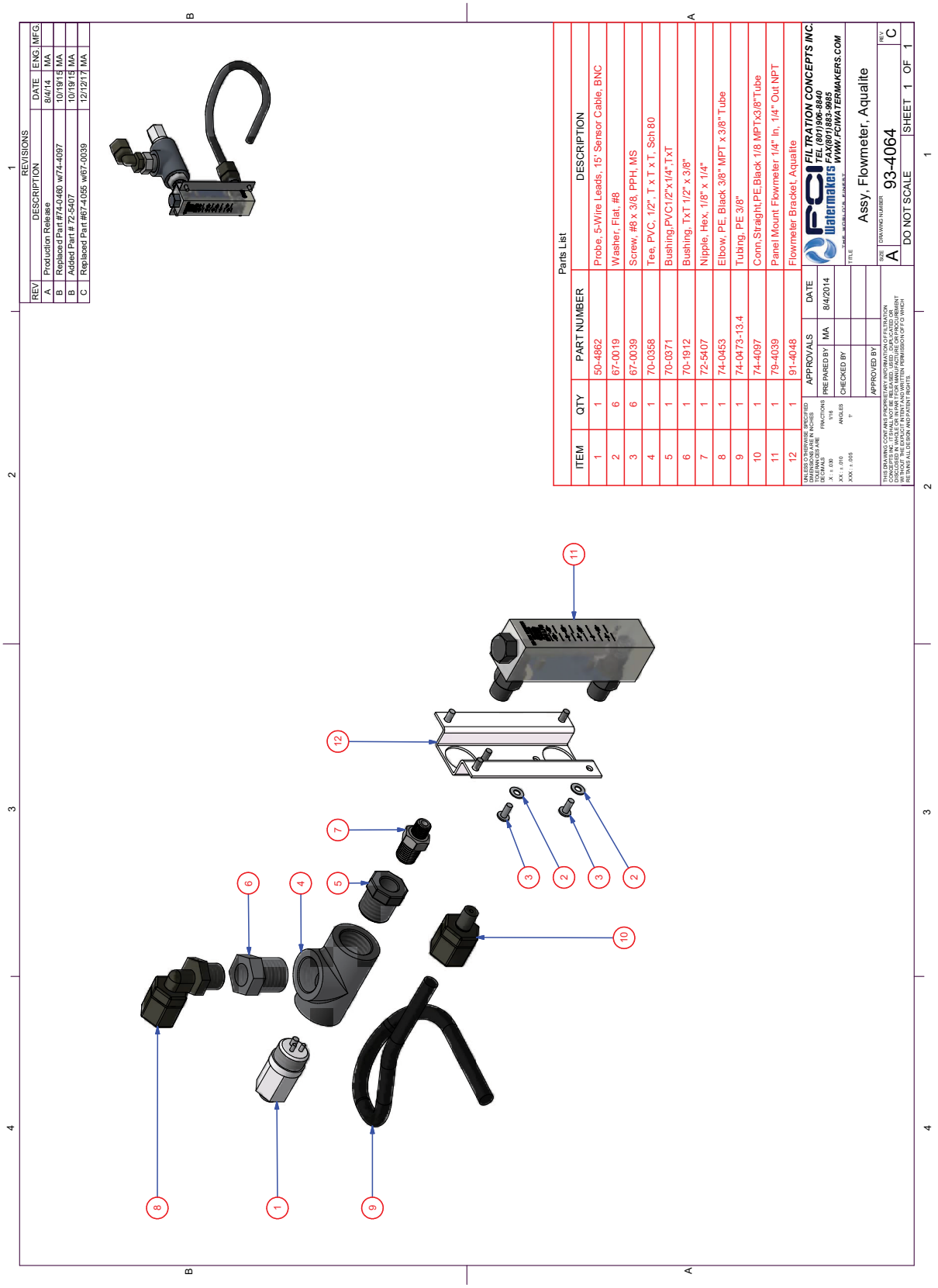
GENERAL ASSEMBLY DIAGRAMS / HP PUMP





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A	Production Release	8/4/14	MA	
B	Replaced Part #74-0480 w/74-4097	10/19/15	MA	
B	Added Part # 72-5407	10/19/15	MA	
C	Replaced Part #67-4055 w/67-0039	12/12/17	MA	

Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	50-4862	Probe, 5-Wire Leads, 15' Sensor Cable, BNC
2	6	67-0019	Washer, Flat, #8
3	6	67-0039	Screw, #8 x 3/8, PPH, MS
4	1	70-0358	Tee, PVC, 1/2", T x T x T, Sch 80
5	1	70-0371	Bushing,PVC1/2"x1/4" TxT
6	1	70-1912	Bushing, TxT 1/2" x 3/8"
7	1	72-5407	Nipple, Hex, 1/8" x 1/4"
8	1	74-0453	Elbow, PE, Black 3/8" MPT x 3/8" Tube
9	1	74-0473-13.4	Tubing, PE 3/8"
10	1	74-4097	Conn,Straight,PE,Black 1/8 MPTx3/8"Tube
11	1	79-4039	Panel Mount Flowmeter 1/4" In, 1/4" Out NPT
12	1	91-4048	Flowmeter Bracket, Aqualite

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ±1/16 X. ± .030 XX. ± .010 XXX. ± .005 ANGLES ±1°

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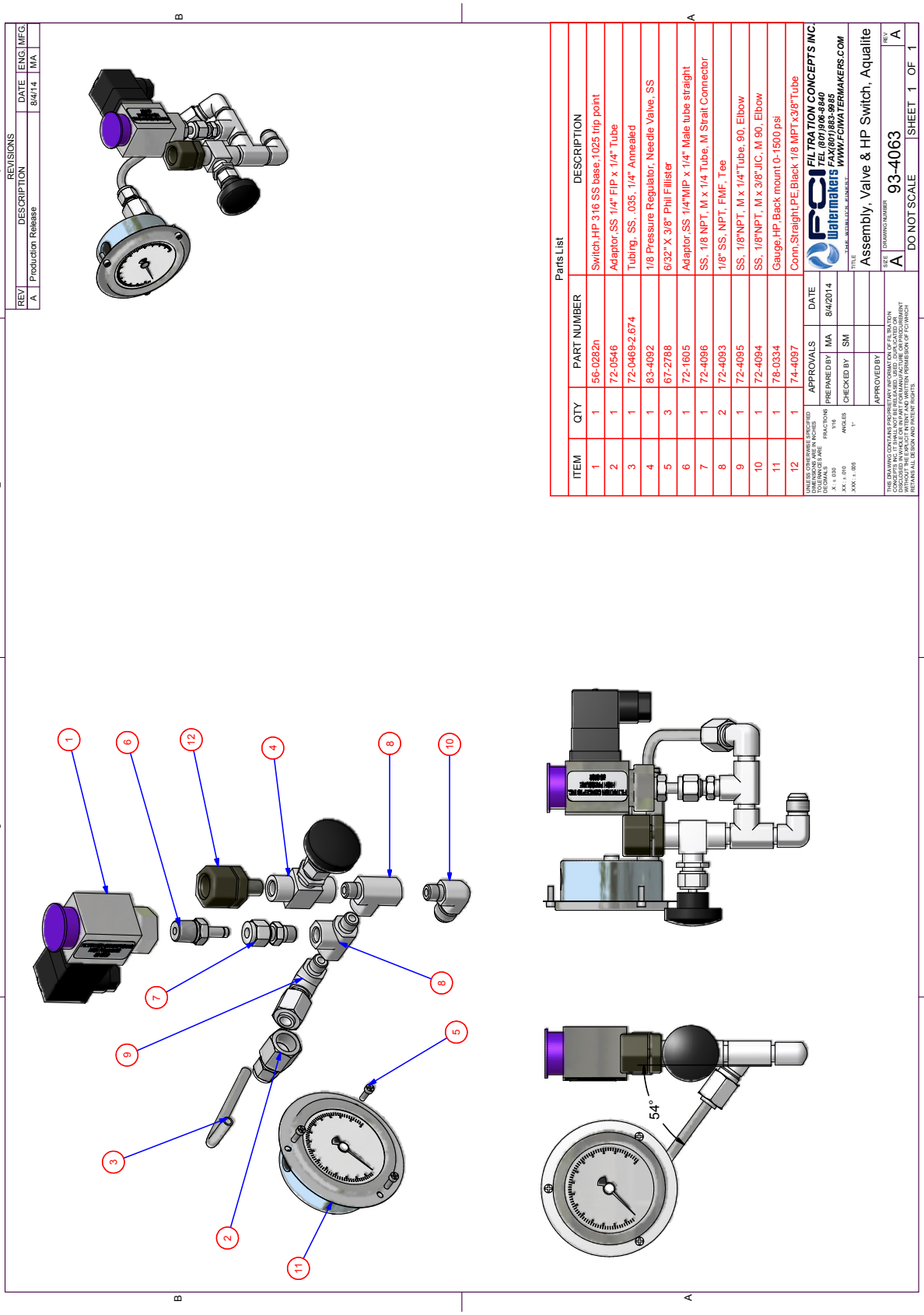
TITLE: Assy, Flowmeter, Aqualite

SIZE: A | DRAWING NUMBER: 93-4064 | REV: C

DO NOT SCALE | SHEET 1 OF 1


REVISIONS
REV | DESCRIPTION | DATE | ENG | MFG
A | Production Release | 8/4/14 | MA |
Parts List
ITEM | QTY | PART NUMBER | DESCRIPTION
1 | 1 | 56-0282n | Switch,HP 316 SS base,1025 trip point
2 | 1 | 72-0546 | Adaptor,SS 1/4" FIP x 1/4" Tube
3 | 1 | 72-0469-2.674 | Tubing, SS, .035, 1/4" Annealed
4 | 1 | 83-4092 | 1/8 Pressure Regulator, Needle Valve, SS
5 | 3 | 67-2788 | 6/32" X 3/8" Phil Fillister
6 | 1 | 72-1605 | Adaptor,SS 1/4"MIP x 1/4" Male tube straight
7 | 1 | 72-4096 | SS, 1/8 NPT, M x 1/4 Tube, M Strait Connector
8 | 2 | 72-4093 | 1/8" SS, NPT, FMF, Tee
9 | 1 | 72-4095 | SS, 1/8"NPT, M x 1/4"Tube, 90, Elbow
10 | 1 | 72-4094 | SS, 1/8"NPT, M x 3/8"JIC, M 90, Elbow
11 | 1 | 78-0334 | Gauge,HP,Back mount 0-1500 psi
12 | 1 | 74-4097 | Conn,Straight,PE,Black 1/8 MPTx3/8"Tube
APPROVALS | DATE
PREPARED BY | MA | 8/4/2014
CHECKED BY | SM
APPROVED BY
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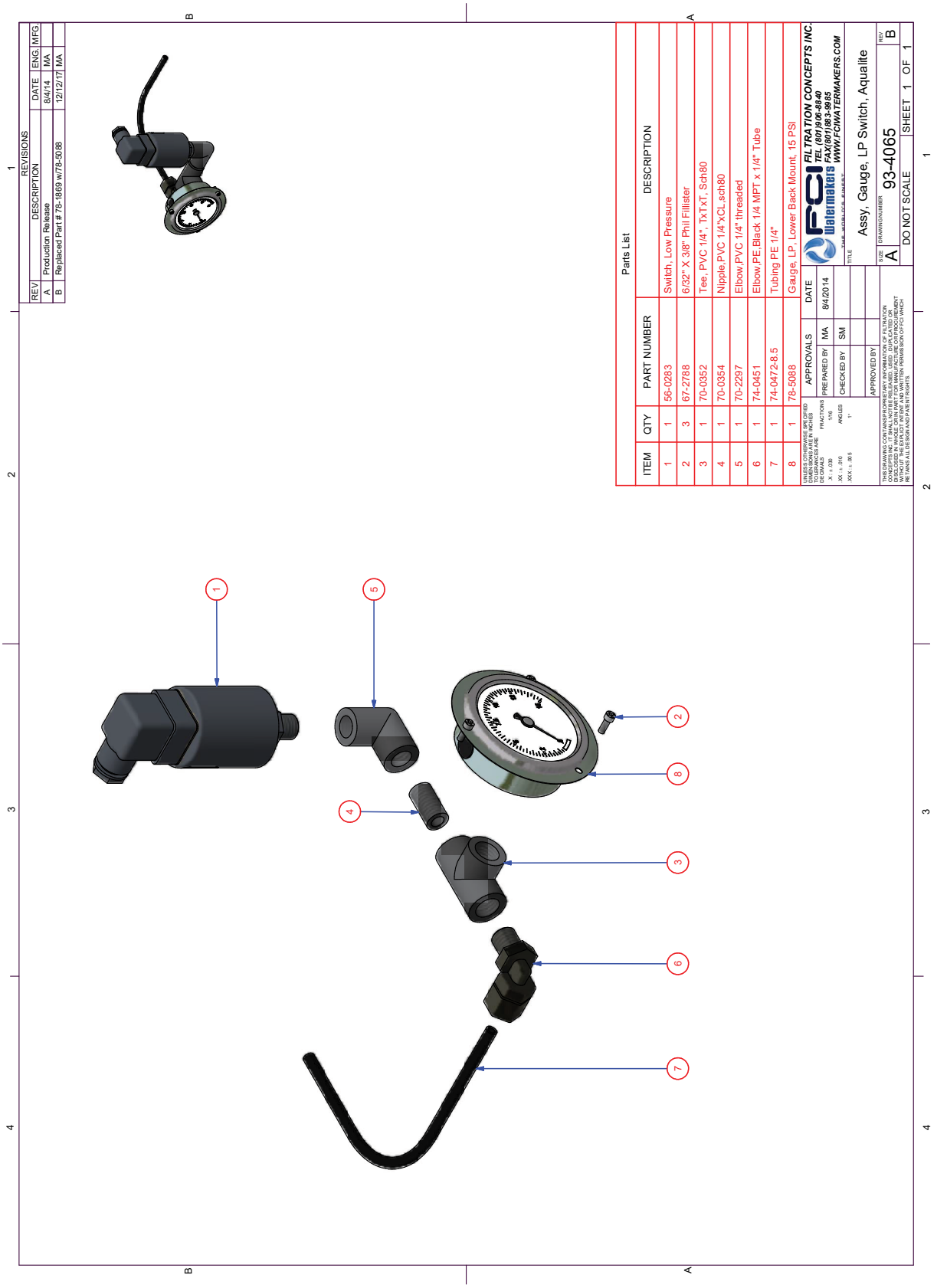
TITLE
Assembly, Valve & HP Switch, Aqualite
SIZE | DRAWING NUMBER | REV
A | 93-4063 | A
DO NOT SCALE | SHEET 1 OF 1
54°


REVISIONS
REV | DESCRIPTION | DATE | ENG. MFG.
A | Production Release | 8/4/14 | MA
B | Replaced Part # 78-1869 w/78-5088 | 12/12/17 | MA
Parts List
ITEM | QTY | PART NUMBER | DESCRIPTION
1 | 1 | 56-0283 | Switch, Low Pressure
2 | 3 | 67-2788 | 6/32" X 3/8" Phil Fillister
3 | 1 | 70-0352 | Tee, PVC 1/4", TxTxT, Sch80
4 | 1 | 70-0354 | Nipple,PVC 1/4"xCL,sch80
5 | 1 | 70-2297 | Elbow,PVC 1/4" threaded
6 | 1 | 74-0451 | Elbow,PE,Black 1/4 MPT x 1/4" Tube
7 | 1 | 74-0472-8.5 | Tubing PE 1/4"
8 | 1 | 78-5088 | Gauge, LP, Lower Back Mount, 15 PSI
APPROVALS | DATE
PREPARED BY | MA | 8/4/2014
CHECKED BY | SM
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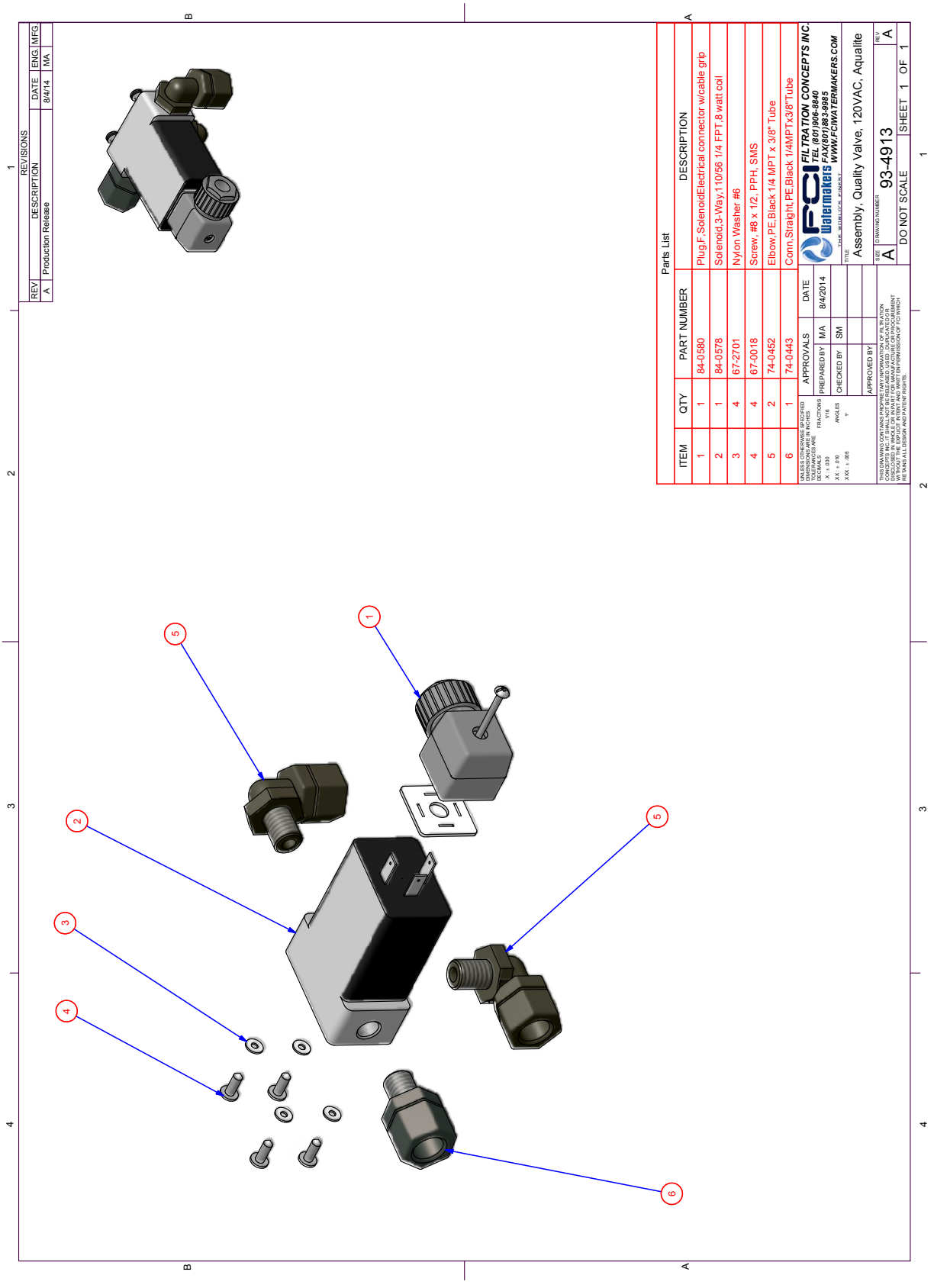
TITLE
Assy, Gauge, LP Switch, Aqualite
SIZE A | DRAWING NUMBER 93-4065 | REV B
DO NOT SCALE | SHEET 1 OF 1


REVISIONS
REV
DESCRIPTION
DATE
ENG.
MFG.
A
Production Release
8/4/14
MA
Parts List
ITEM
QTY
PART NUMBER
DESCRIPTION
1
1
84-0580
Plug,F,SolenoidElectrical connector w/cable grip
2
1
84-0578
Solenoid,3-Way,110/56 1/4 FPT,8 watt coil
3
4
67-2701
Nylon Washer #6
4
4
67-0018
Screw, #8 x 1/2, PPH, SMS
5
2
74-0452
Elbow,PE,Black 1/4 MPT x 3/8" Tube
6
1
74-0443
Conn,Straight,PE,Black 1/4MPTx3/8"Tube
APPROVALS
DATE
PREPARED BY
MA
8/4/2014
CHECKED BY
SM
APPROVED BY
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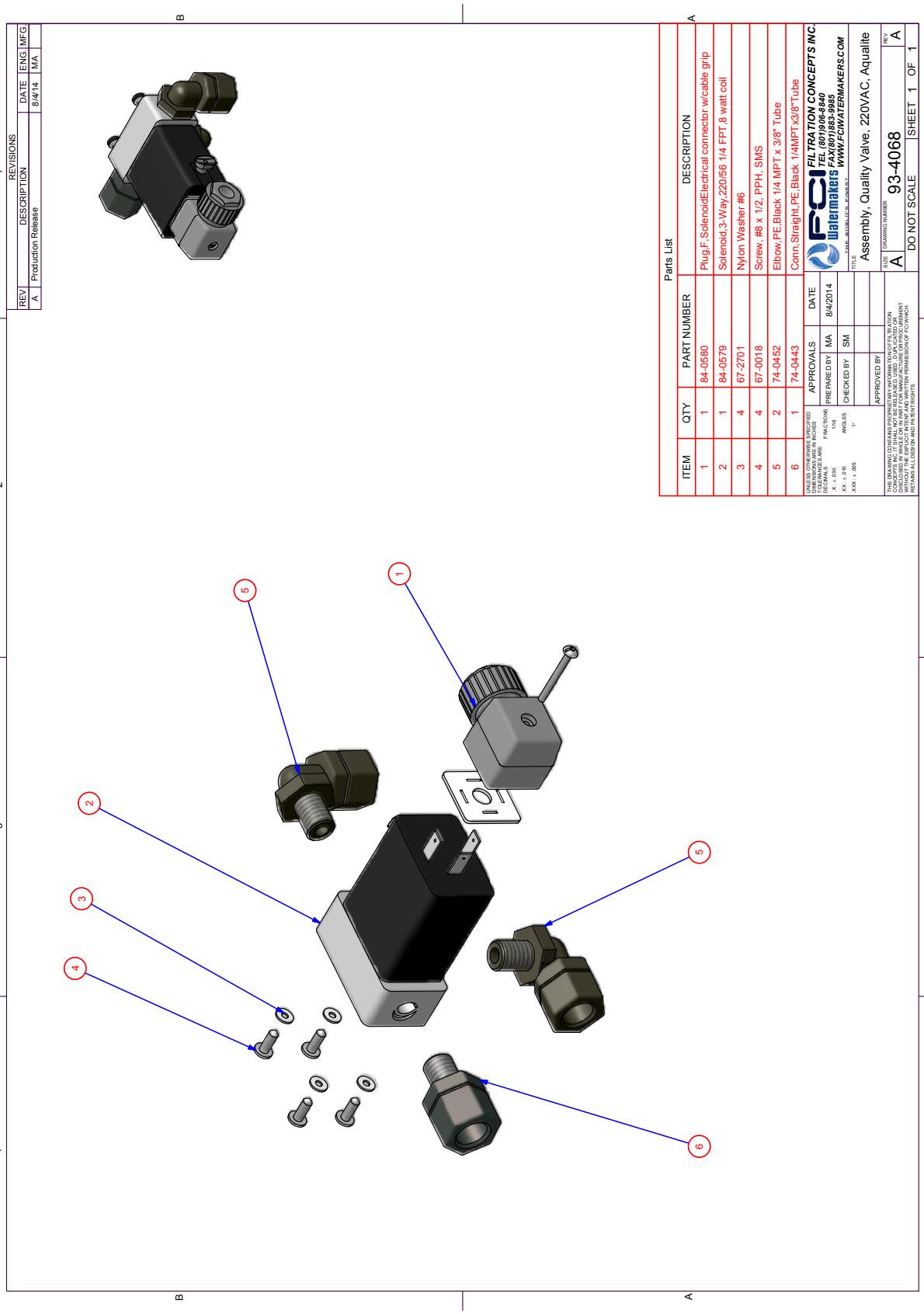
TITLE
Assembly, Quality Valve, 120VAC, Aqualite
SIZE
A
D RAWING NUMBER
93-4913
REV
A
DO NOT SCALE
SHEET 1 OF 1


REVISIONS
REV DESCRIPTION DATE ENG. MFG.
A Production Release 8/4/14 MA
Parts List
ITEM QTY PART NUMBER DESCRIPTION
1 1 84-0580 Plug,F.SolenoidElectrical connector w/cable grip
2 1 84-0579 Solenoid,3-Way,220/56 1/4 FPT,8 watt coil
3 4 67-2701 Nylon Washer #6
4 4 67-0018 Screw, #8 x 1/2, PPH, SMS
5 2 74-0452 Elbow,PE,Black 1/4 MPT x 3/8" Tube
6 1 74-0443 Conn,Straight,PE,Black 1/4MPT x3/8"Tube
APPROVALS DATE
PREPARED BY MA 8/4/2014
CHECKED BY SM
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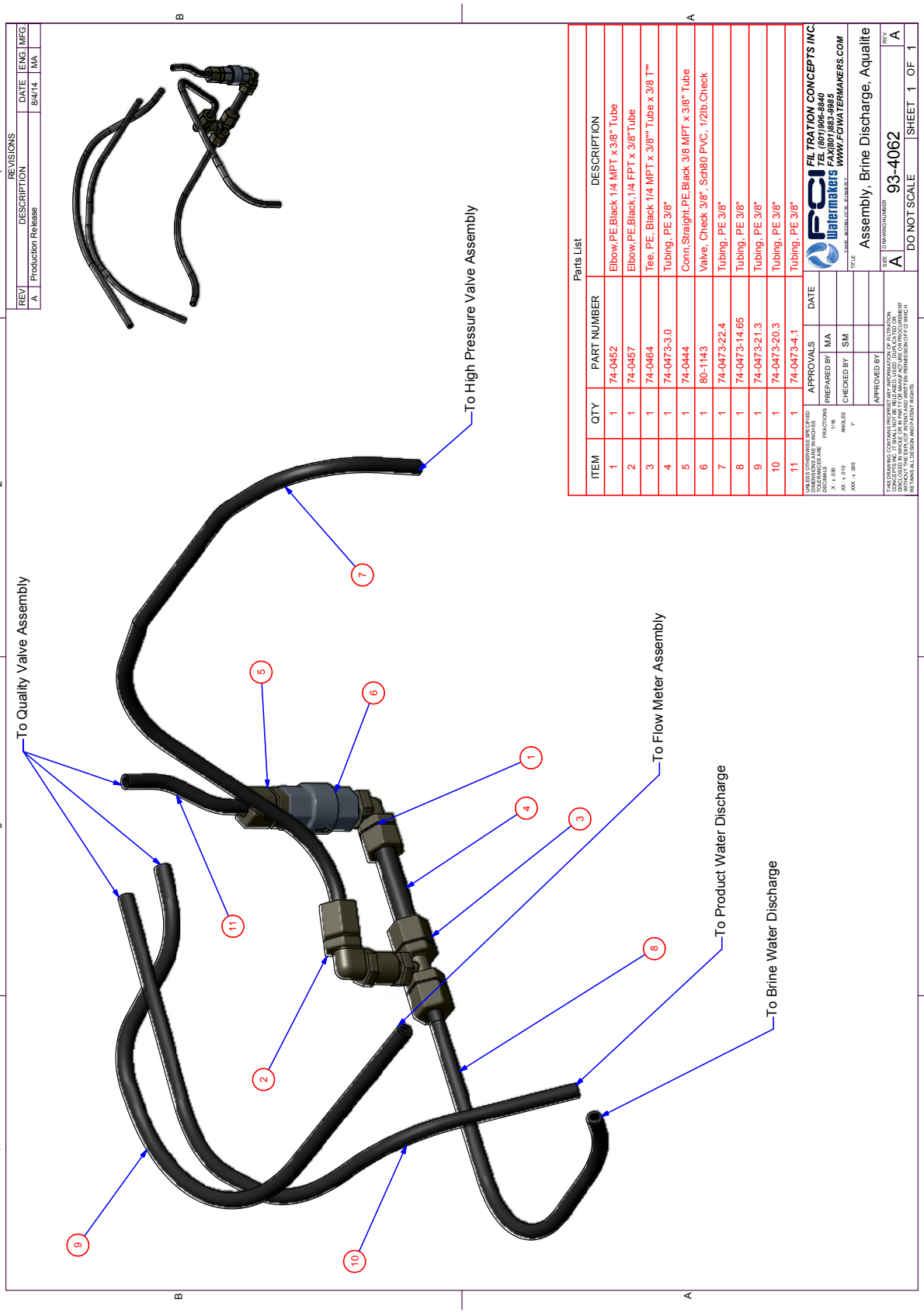
TITLE
Assembly, Quality Valve, 220VAC, Aqualite
SIZE DRAWING NUMBER REV
A 93-4068 A
DO NOT SCALE SHEET 1 OF 1
1
2
3
4
5
6

GENERAL ASSEMBLY DIAGRAMS / BRINE DISCHARGE



REVISIONS

REV	DESCRIPTION	DATE	ENG.	MFG.
A	Production Release	8/4/14	MA	

Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	74-0452	Elbow,PE,Black 1/4 MPT x 3/8" Tube
2	1	74-0457	Elbow,PE,Black,1/4 FPT x 3/8"Tube
3	1	74-0464	Tee, PE, Black 1/4 MPT x 3/8"" Tube x 3/8 T""
4	1	74-0473-3.0	Tubing, PE 3/8"
5	1	74-0444	Conn,Straight,PE,Black 3/8 MPT x 3/8" Tube
6	1	80-1143	Valve, Check 3/8", Sch80 PVC, 1/2lb.Check
7	1	74-0473-22.4	Tubing, PE 3/8"
8	1	74-0473-14.65	Tubing, PE 3/8"
9	1	74-0473-21.3	Tubing, PE 3/8"
10	1	74-0473-20.3	Tubing, PE 3/8"
11	1	74-0473-4.1	Tubing, PE 3/8"

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE IN INCHES
DECIMALS: X: ± .030, XX: ± .010, XXX: ± .005
FRACTIONS: 1/16
ANGLES: ±°

	APPROVALS	DATE
PREPARED BY	MA	
CHECKED BY	SM	
APPROVED BY		

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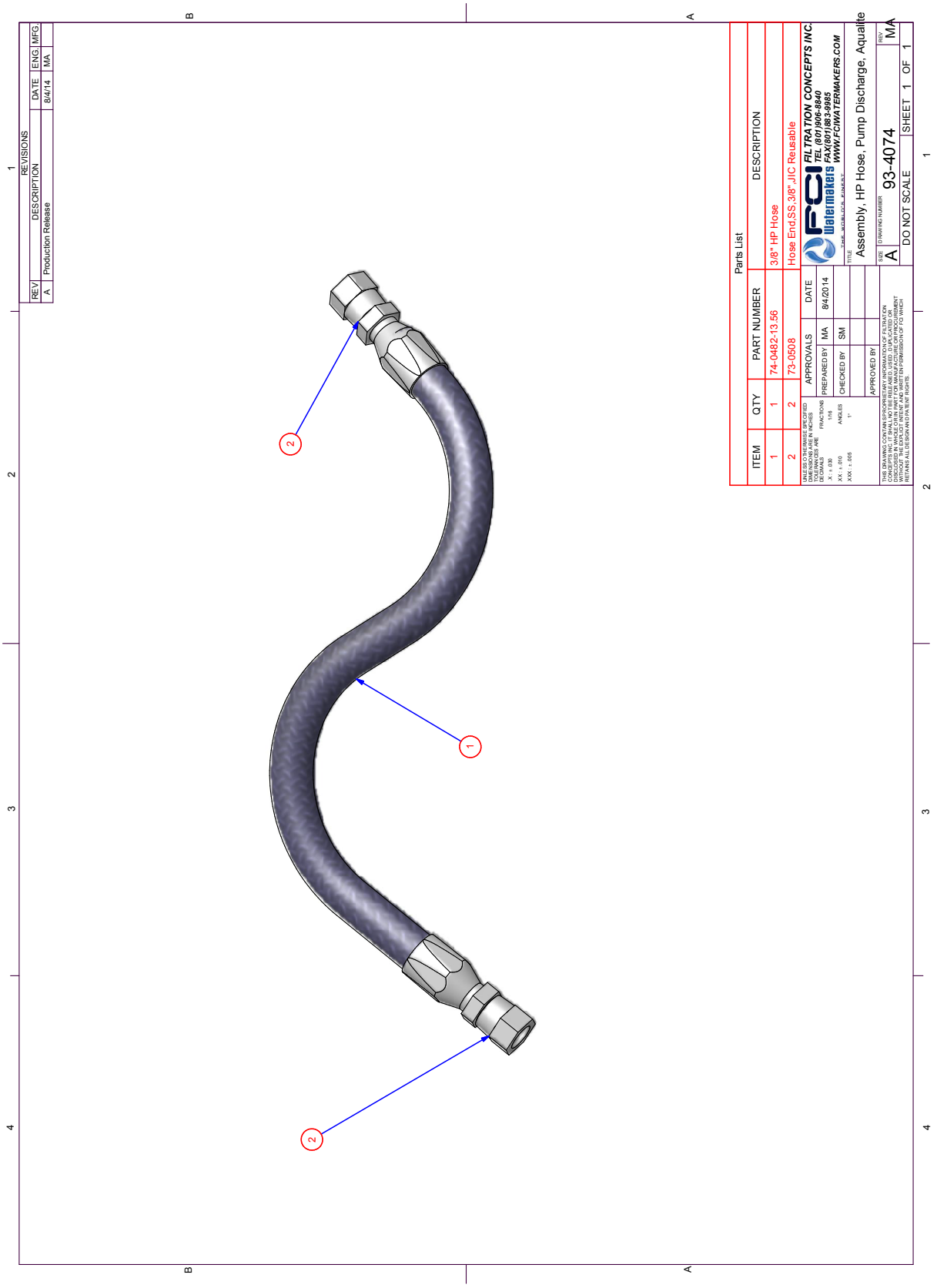
TITLE: Assembly, Brine Discharge, Aqualite

SIZE: A | DRAWING NUMBER: 93-4062 | REV: A

DO NOT SCALE | SHEET 1 OF 1


REVISIONS
REV | DESCRIPTION | DATE | ENG. MFG.
A | Production Release | 8/4/14 | MA
Parts List
ITEM | QTY | PART NUMBER | DESCRIPTION
1 | 1 | 74-0482-13.56 | 3/8" HP Hose
2 | 2 | 73-0508 | Hose End,SS,3/8" JIC Reusable
APPROVALS | DATE
PREPARED BY | MA | 8/4/2014
CHECKED BY | SM
APPROVED BY
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Assembly, HP Hose, Pump Discharge, Aqualite
SIZE A | D/RAWING NUMBER 93-4074 | REV MA
DO NOT SCALE | SHEET 1 OF 1
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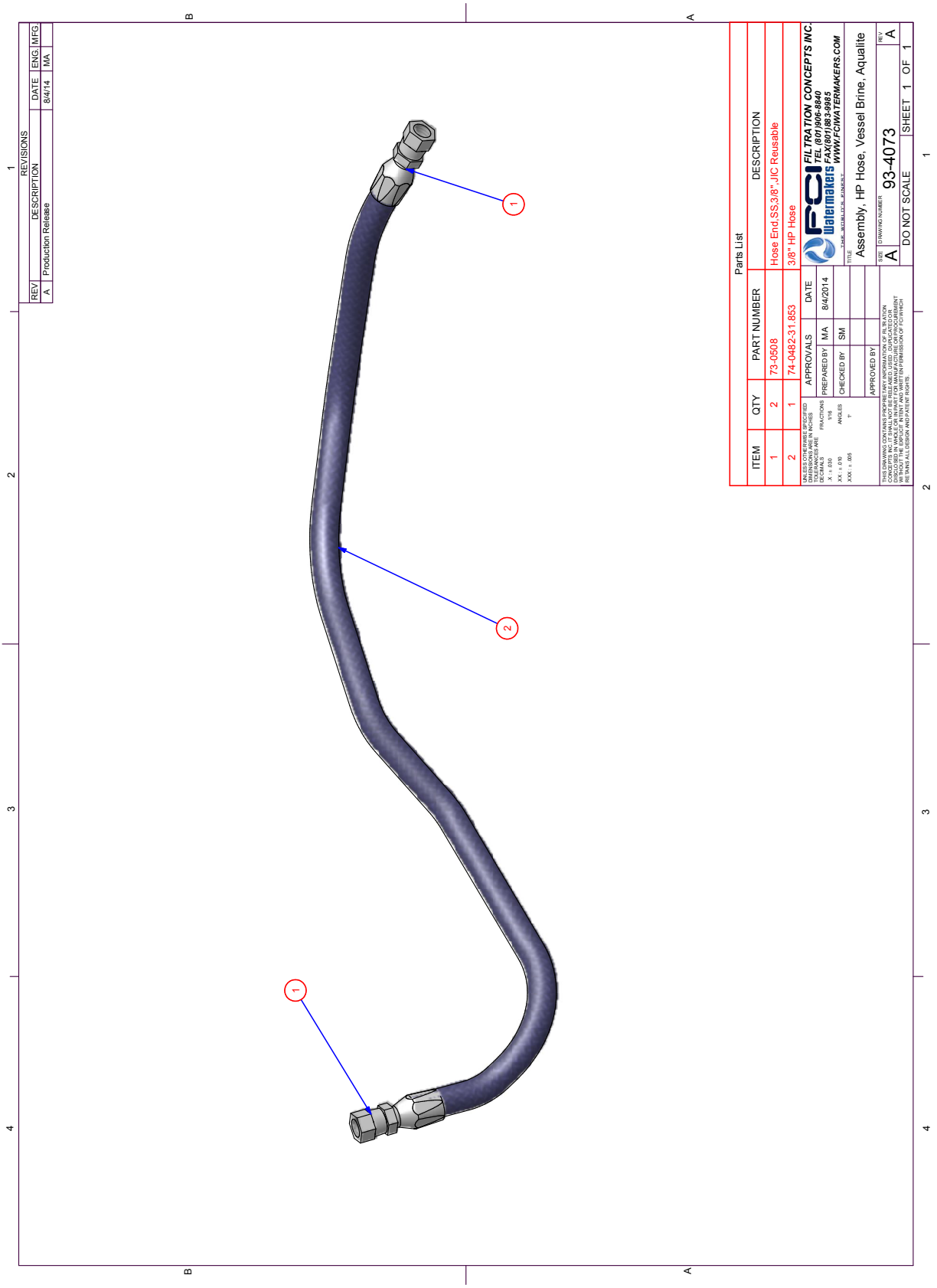
REVISIONS
REV DESCRIPTION DATE ENG MFG
A Production Release 8/4/14 MA
Parts List
ITEM QTY PART NUMBER DESCRIPTION
1 2 73-0508 Hose End,SS,3/8",JIC Reusable
2 1 74-0482-31.853 3/8" HP Hose
APPROVALS DATE
PREPARED BY MA 8/4/2014
CHECKED BY SM
APPROVED BY
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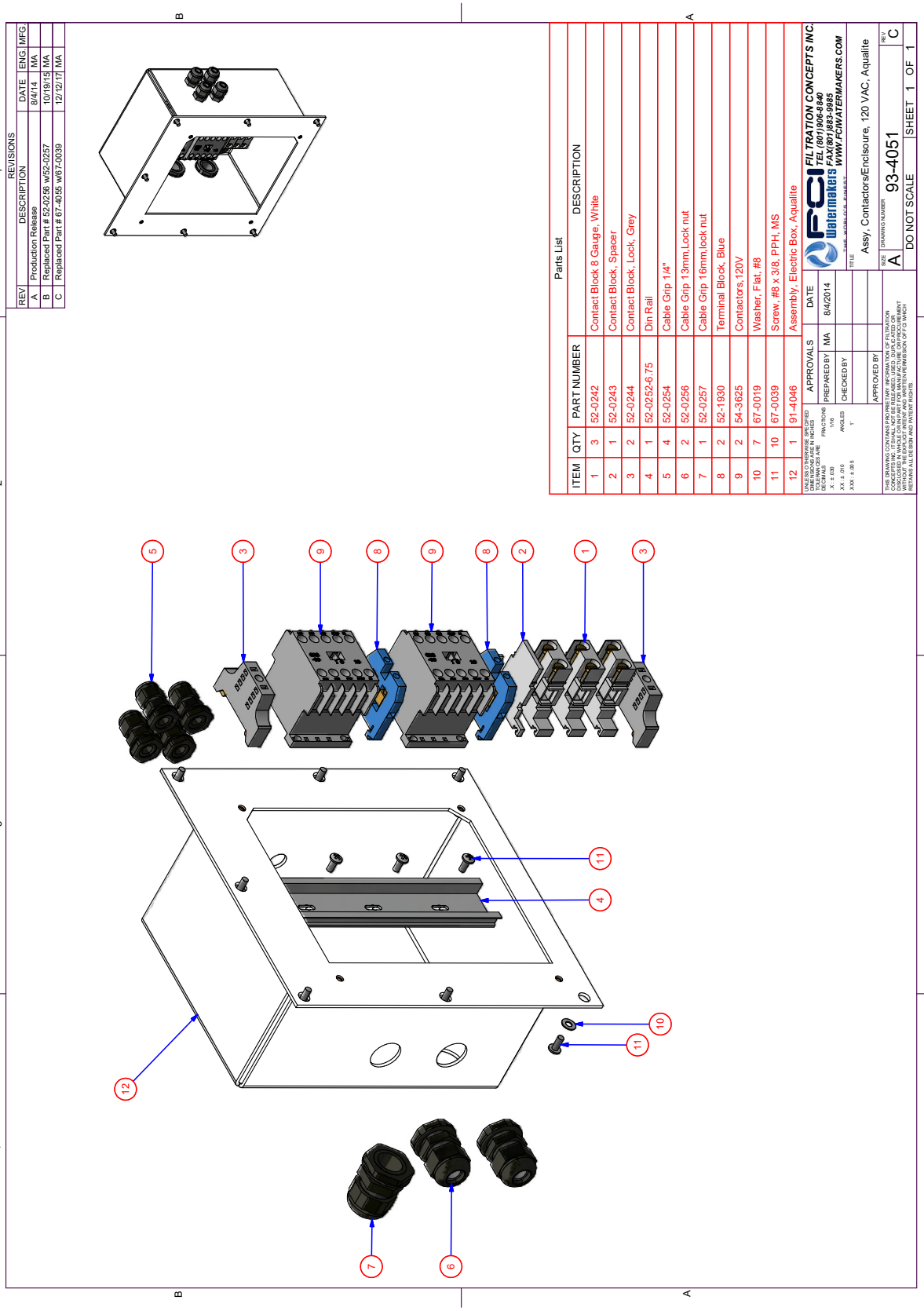
TITLE
Assembly, HP Hose, Vessel Brine, Aqualite
SIZE A
DRAWING NUMBER 93-4073
REV A
DO NOT SCALE
SHEET 1 OF 1

GENERAL ASSEMBLY DIAGRAMS / ELECTRICAL



REVISIONS

REV	DESCRIPTION	DATE	ENG. MFG.
A	Production Release	8/4/14	MA
B	Replaced Part # 52-0256 w/52-0257	10/19/15	MA
C	Replaced Part # 67-40/55 w/67-0039	12/12/17	MA

Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
1	3	52-0242	Contact Block 8 Gauge, White
2	1	52-0243	Contact Block, Spacer
3	2	52-0244	Contact Block, Lock, Grey
4	1	52-0252-6.75	Din Rail
5	4	52-0254	Cable Grip 1/4"
6	2	52-0256	Cable Grip 13mm,Lock nut
7	1	52-0257	Cable Grip 16mm,lock nut
8	2	52-1930	Terminal Block, Blue
9	2	54-3625	Contactors,120V
10	7	67-0019	Washer, Flat, #8
11	10	67-0039	Screw, #8 x 3/8, PPH, MS
12	1	91-4046	Assembly, Electric Box, Aqualite

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: DECIMALS .X ± .030 .XX ± .010 .XXX ± .005 FRACTIONS 1/16 ANGLES 1°

APPROVALS | DATE
PREPARED BY | MA | 8/4/2014
CHECKED BY
APPROVED BY

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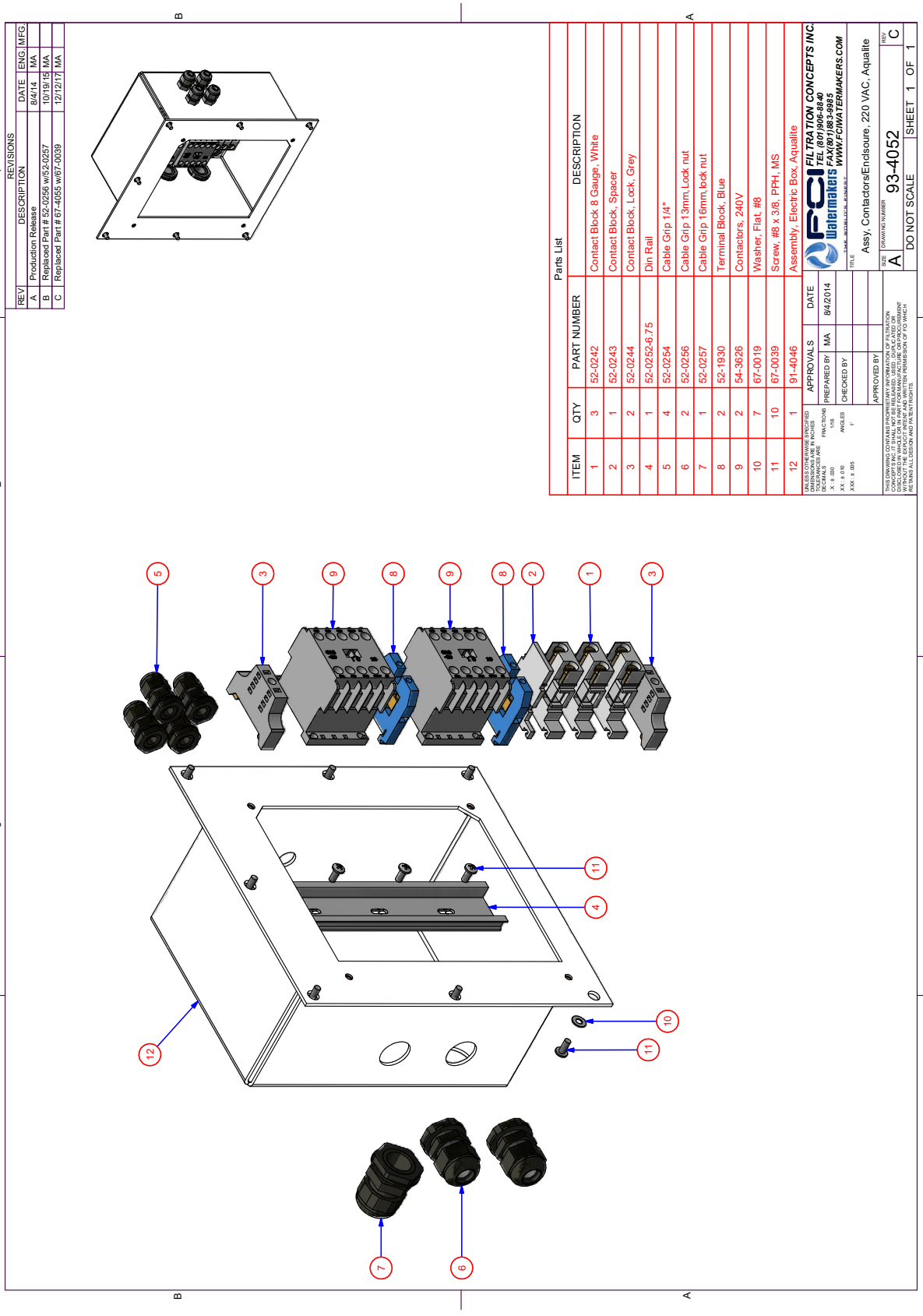
TITLE: Assy, Contactors/Enclsoure, 120 VAC, Aqualite

SIZE: A | DRAWING NUMBER: 93-4051 | REV: C

DO NOT SCALE | SHEET 1 OF 1


REVISIONS
REV DESCRIPTION DATE ENG MFG
A Production Release 8/4/14 MA
B Replaced Part # 52-0256 w/52-0257 10/19/15 MA
C Replaced Part # 67-4055 w/67-0039 12/12/17 MA
Parts List
ITEM QTY PART NUMBER DESCRIPTION
1 3 52-0242 Contact Block 8 Gauge, White
2 1 52-0243 Contact Block, Spacer
3 2 52-0244 Contact Block, Lock, Grey
4 1 52-0252-6.75 Din Rail
5 4 52-0254 Cable Grip 1/4"
6 2 52-0256 Cable Grip 13mm Lock nut
7 1 52-0257 Cable Grip 16mm,lock nut
8 2 52-1930 Terminal Block, Blue
9 2 54-3626 Contactors, 240V
10 7 67-0019 Washer, Flat, #8
11 10 67-0039 Screw, #8 x 3/8, PPH, MS
12 1 91-4046 Assembly, Electric Box, Aqualite
APPROVALS DATE
PREPARED BY MA 8/4/2014
CHECKED BY
APPROVED BY
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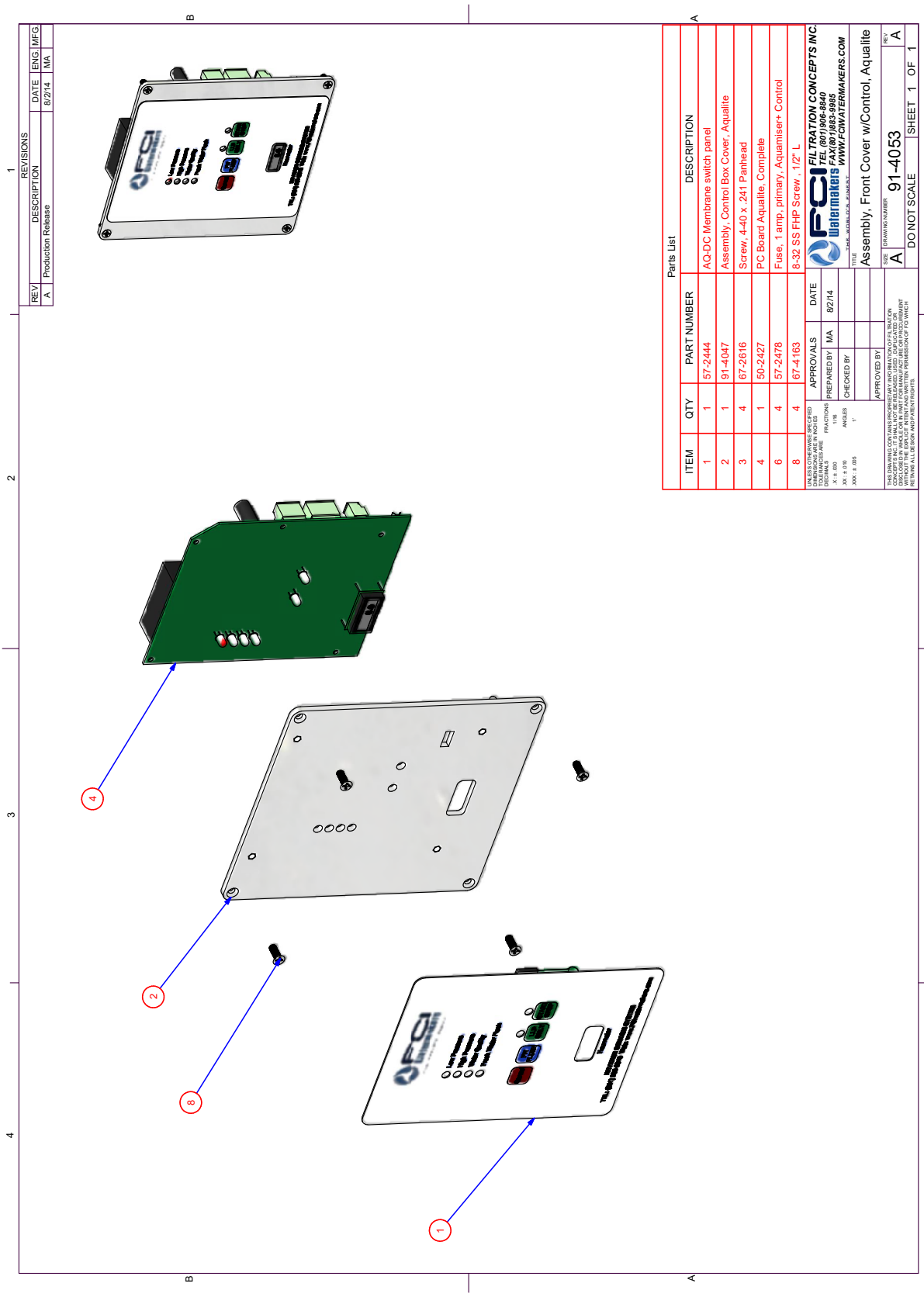
Assy, Contactors/Enclsoure, 220 VAC, Aqualite
SIZE A DRAWING NUMBER 93-4052 REV C
DO NOT SCALE SHEET 1 OF 1


REVISIONS
REV | DESCRIPTION | DATE | ENG. MFG.
A | Production Release | 8/2/14 | MA
Parts List
ITEM | QTY | PART NUMBER | DESCRIPTION
1 | 1 | 57-2444 | AQ-DC Membrane switch panel
2 | 1 | 91-4047 | Assembly, Control Box Cover, Aqualite
3 | 4 | 67-2616 | Screw, 4-40 x .241 Panhead
4 | 1 | 50-2427 | PC Board Aqualite, Complete
6 | 4 | 57-2478 | Fuse, 1 amp, primary, Aquamiser+ Control
8 | 4 | 67-4163 | 8-32 SS FHP Screw, 1/2" L
APPROVALS | DATE
PREPARED BY | MA | 8/2/14
CHECKED BY
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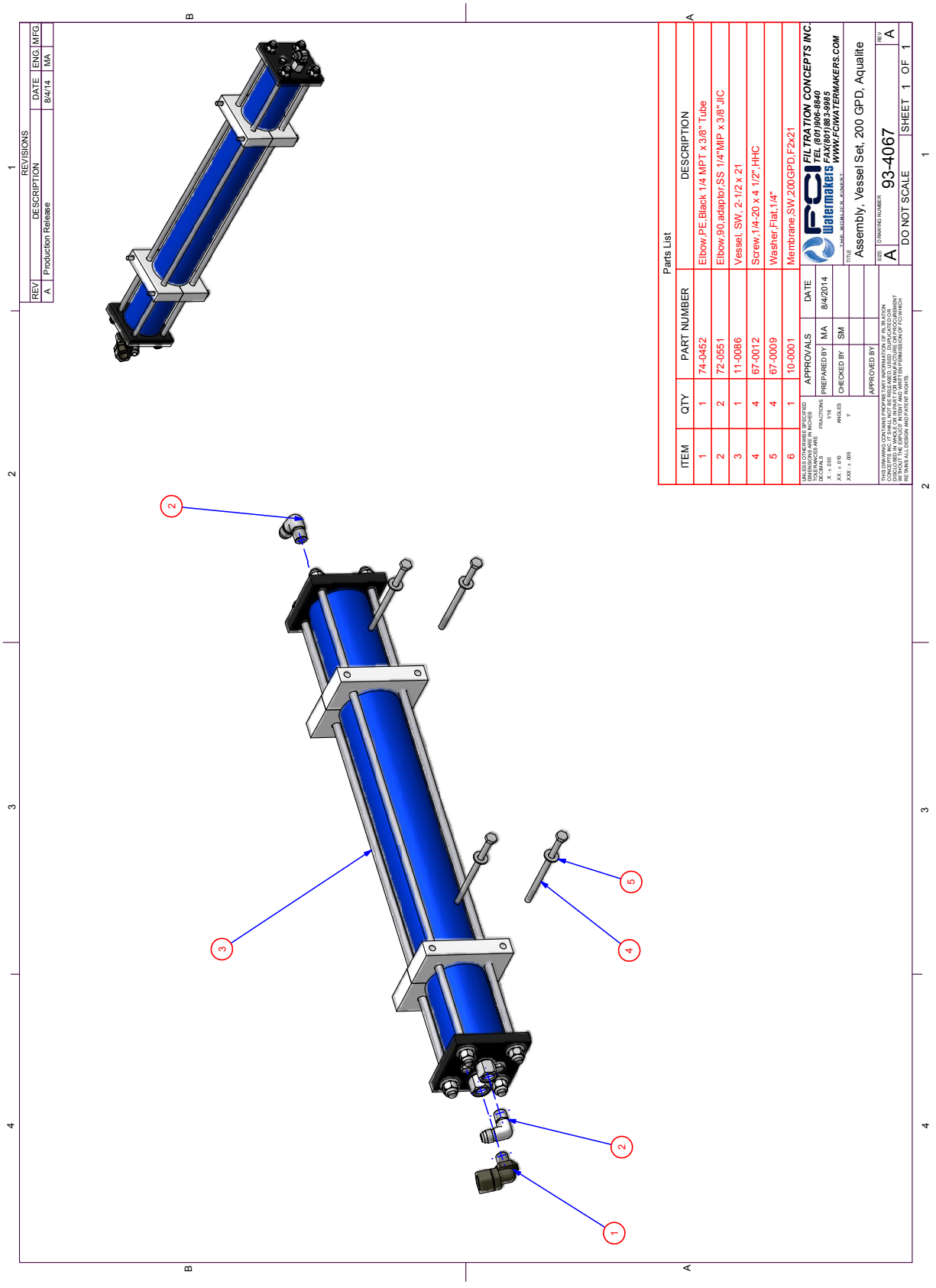
TITLE
Assembly, Front Cover w/Control, Aqualite
SIZE | DRAWING NUMBER | REV
A | 91-4053 | A
DO NOT SCALE | SHEET 1 OF 1
4
8
2
1


REVISIONS
REV
DESCRIPTION
DATE
ENG.
MFG.
A
Production Release
8/4/14
MA
Parts List
ITEM
QTY
PART NUMBER
DESCRIPTION
1
1
74-0452
Elbow,PE,Black 1/4 MPT x 3/8" Tube
2
2
72-0551
Elbow,90,adaptor,SS 1/4"MIP x 3/8"JIC
3
1
11-0086
Vessel, SW, 2-1/2 x 21
4
4
67-0012
Screw,1/4-20 x 4 1/2",HHC
5
4
67-0009
Washer,Flat,1/4"
6
1
10-0001
Membrane,SW,200GPD,F2x21
APPROVALS
DATE
PREPARED BY
MA
8/4/2014
CHECKED BY
SM
APPROVED BY
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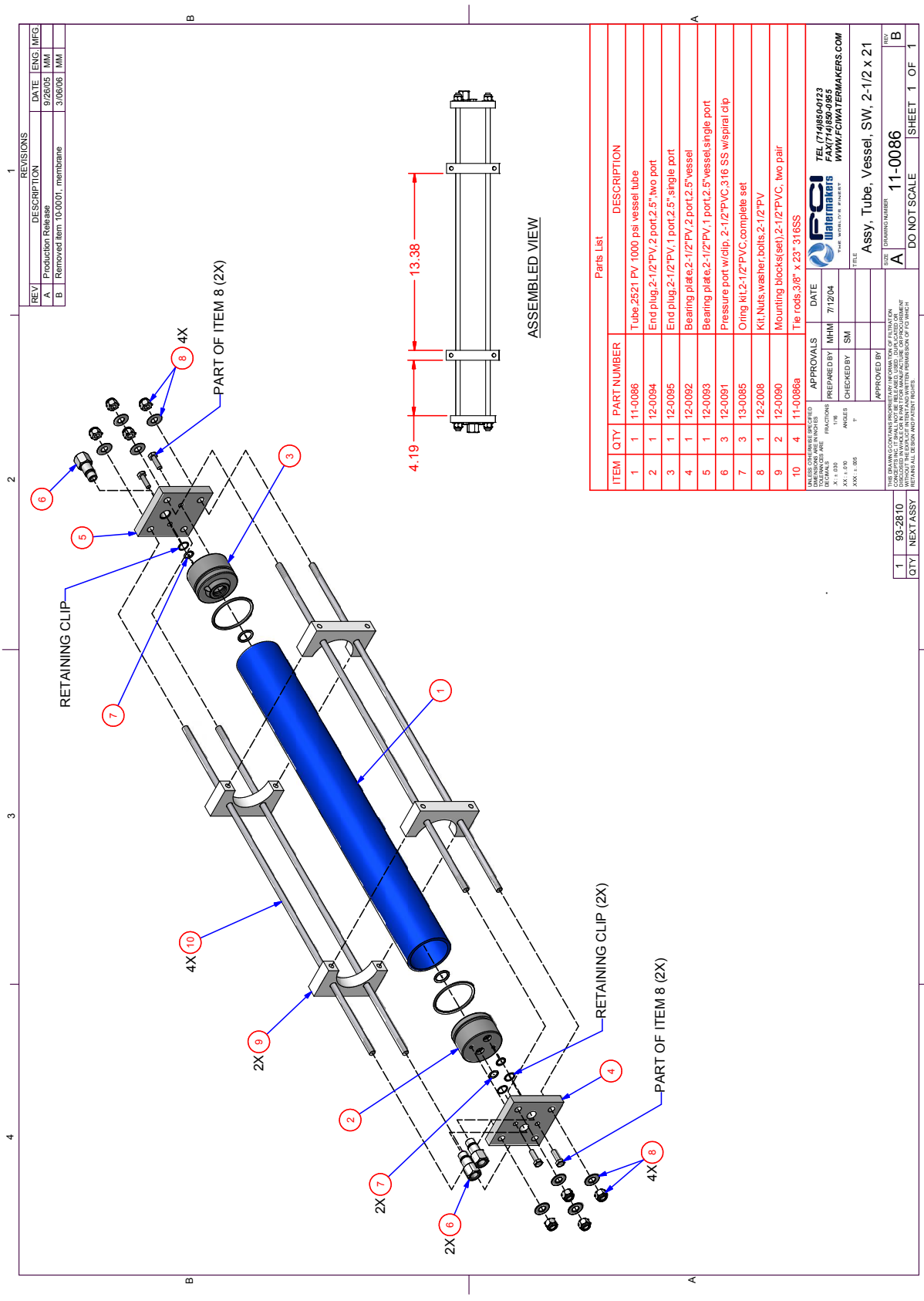
TITLE
Assembly, Vessel Set, 200 GPD, Aqualite
SIZE
A
D RAWING NUMBER
93-4067
REV
A
DO NOT SCALE
SHEET 1 OF 1


ASSEMBLED VIEW
13.38
4.19
PART OF ITEM 8 (2X)
4X
RETAINING CLIP
RETAINING CLIP (2X)
PART OF ITEM 8 (2X)
4X
2X
2X
2X
4X
REVISIONS
REV DESCRIPTION DATE ENG MFG
A Production Release 9/26/05 MM
B Removed Item 10-0001, membrane 3/06/06 MM
Parts List
ITEM QTY PART NUMBER DESCRIPTION
1 1 11-0086 Tube,2521 PV 1000 psi vessel tube
2 1 12-0094 End plug,2-1/2"PV,2 port,2.5" two port
3 1 12-0095 End plug,2-1/2"PV,1 port,2.5" single port
4 1 12-0092 Bearing plate,2-1/2"PV,2 port,2.5"vessel
5 1 12-0093 Bearing plate,2-1/2"PV,1 port,2.5"vessel,single port
6 3 12-0091 Pressure port w/clip, 2-1/2"PVC,316 SS w/spiral clip
7 3 13-0085 Oring kit,2-1/2"PVC,complete set
8 1 12-2008 Kit,Nuts,washer,bolts,2-1/2"PV
9 2 12-0090 Mounting blocks(set),2-1/2"PVC, two pair
10 4 11-0086a Tie rods,3/8" x 23" 316SS
APPROVALS DATE
PREPARED BY MHM 7/12/04
CHECKED BY SM
APPROVED BY
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FAX(714)850-0965
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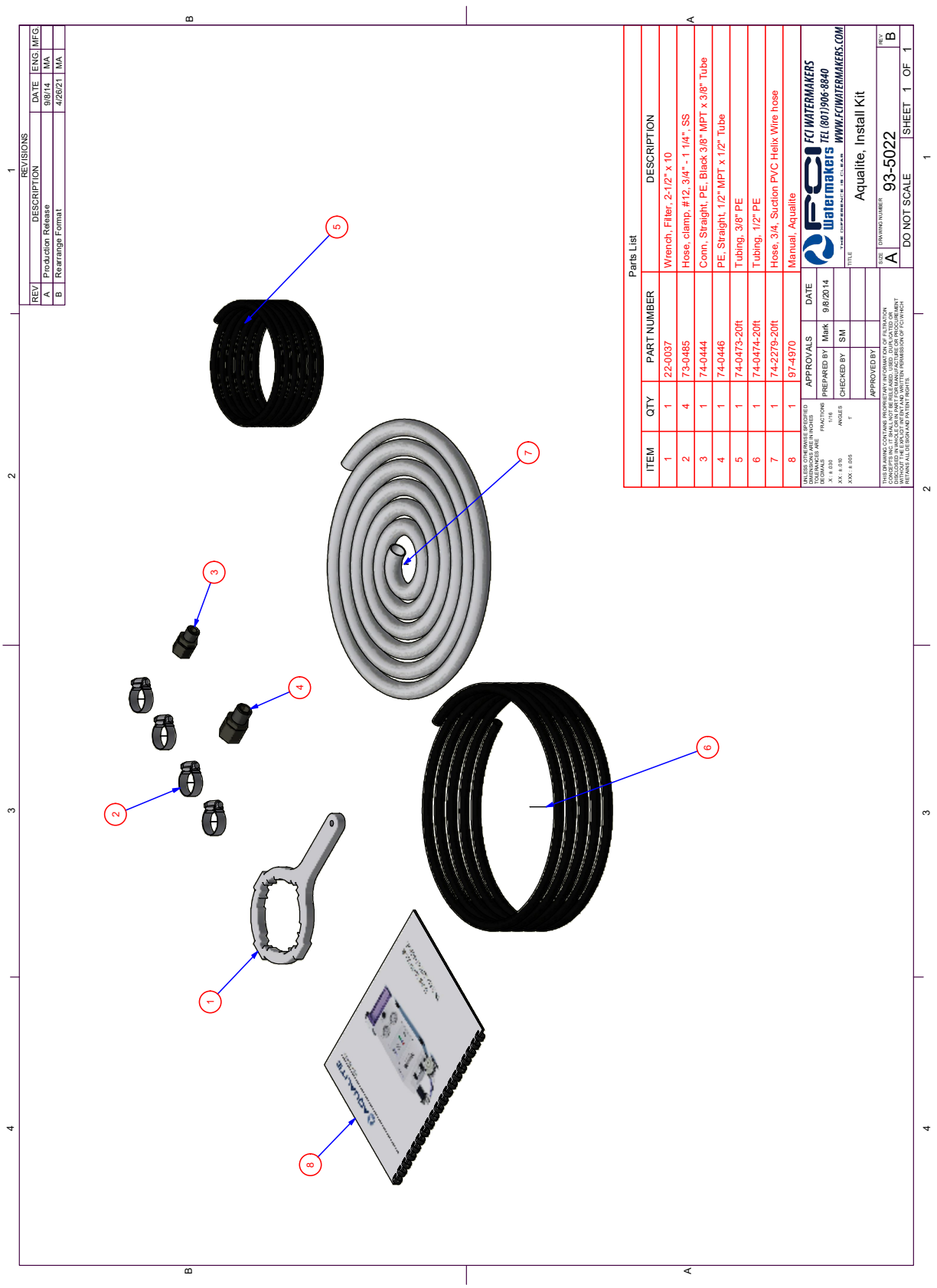
TITLE
Assy, Tube, Vessel, SW, 2-1/2 x 21
SIZE DRAWING NUMBER REV
A 11-0086 B
DO NOT SCALE SHEET 1 OF 1
1 93-2810
QTY NEXT ASSY


REVISIONS
REV DESCRIPTION DATE ENG. MFG.
A Production Release 9/8/14 MA
B Rearrange Format 4/26/21 MA
Parts List
ITEM QTY PART NUMBER DESCRIPTION
1 1 22-0037 Wrench, Filter, 2-1/2" x 10
2 4 73-0485 Hose, clamp, #12, 3/4" - 1 1/4", SS
3 1 74-0444 Conn, Straight, PE, Black 3/8" MPT x 3/8" Tube
4 1 74-0446 PE, Straight, 1/2" MPT x 1/2" Tube
5 1 74-0473-20ft Tubing, 3/8" PE
6 1 74-0474-20ft Tubing, 1/2" PE
7 1 74-2279-20ft Hose, 3/4, Suction PVC Helix Wire hose
8 1 97-4970 Manual, Aqualite
APPROVALS DATE
PREPARED BY Mark 9/8/2014
CHECKED BY SM
APPROVED BY
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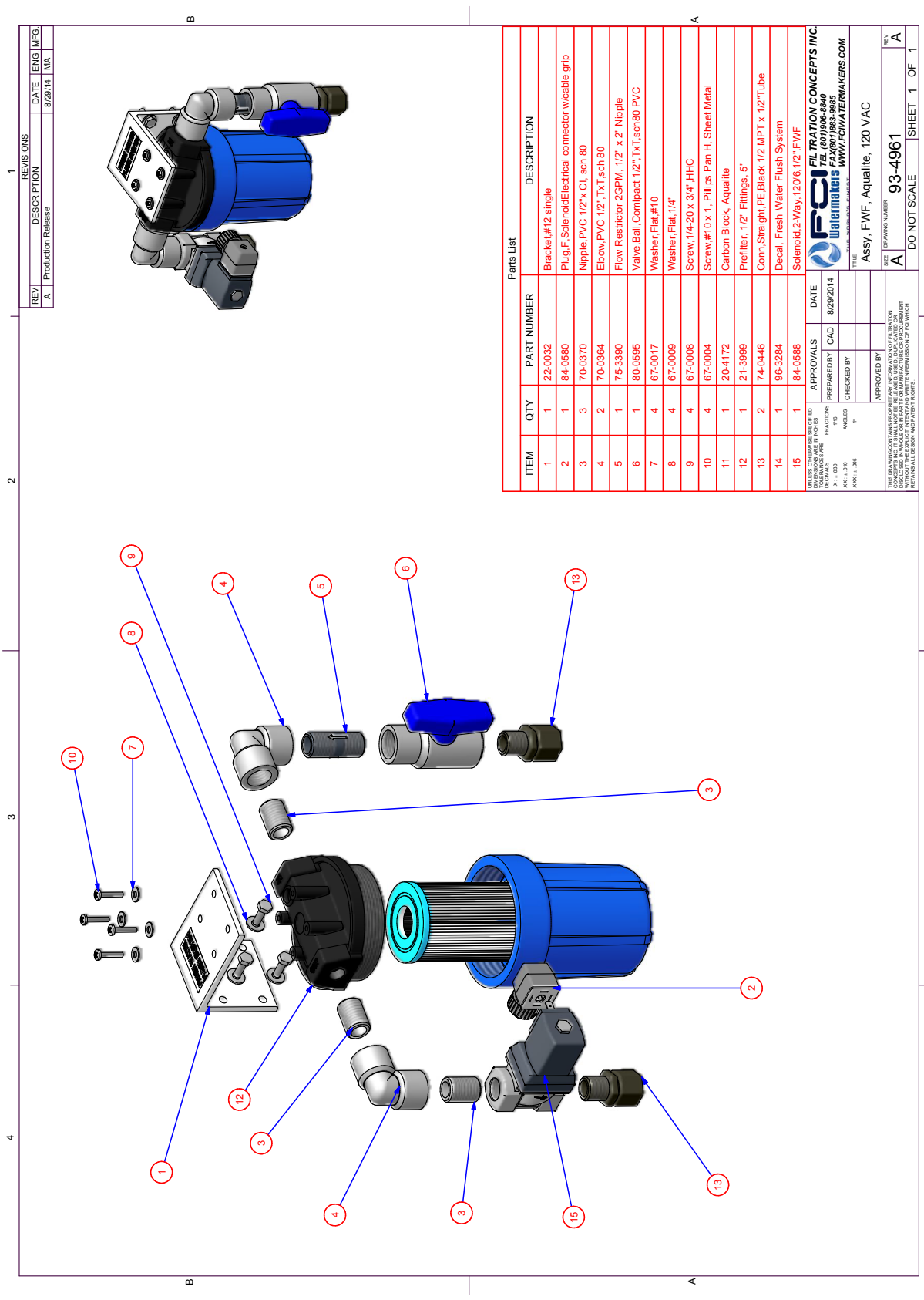
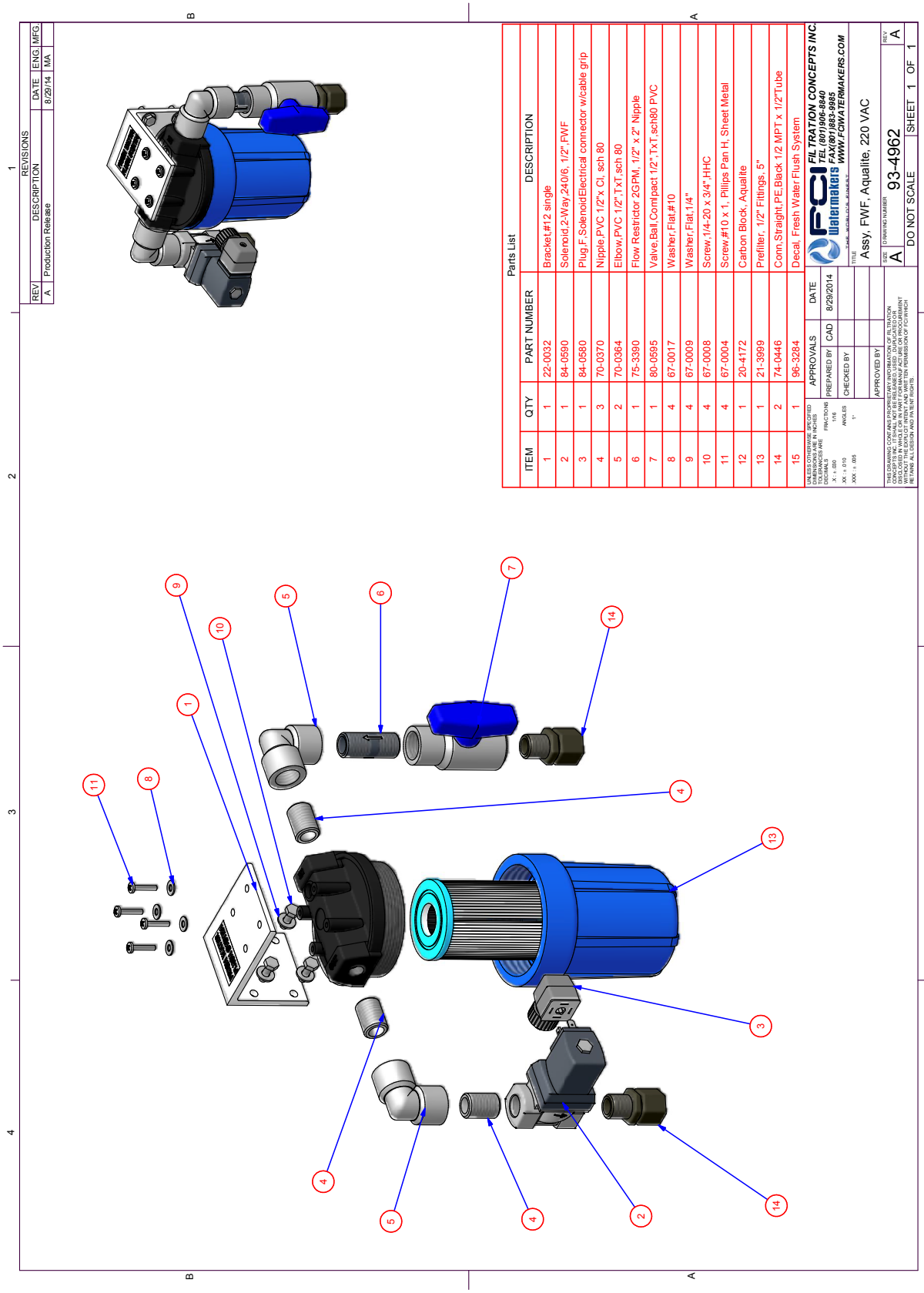
Aqualite, Install Kit
SIZE A
DRAWING NUMBER 93-5022
REV B
DO NOT SCALE
SHEET 1 OF 1

GENERAL ASSEMBLY DIAGRAMS / FRESH WATER FLUSH (optional)




REVISIONS
REV DESCRIPTION DATE ENG. MFG.
A Production Release 8/29/14 MA
Parts List
ITEM QTY PART NUMBER DESCRIPTION
1 1 22-0032 Bracket,#12 single
2 1 84-0590 Solenoid,2-Way,240/6, 1/2",FWF
3 1 84-0580 Plug,F,SolenoidElectrical connector w/cable grip
4 3 70-0370 Nipple,PVC 1/2"x Cl, sch 80
5 2 70-0364 Elbow,PVC 1/2",TxT,sch 80
6 1 75-3390 Flow Restrictor 2GPM, 1/2" x 2" Nipple
7 1 80-0595 Valve,Ball,Compact 1/2",TxT,sch80 PVC
8 4 67-0017 Washer,Flat,#10
9 4 67-0009 Washer,Flat,1/4"
10 4 67-0008 Screw,1/4-20 x 3/4",HHC
11 4 67-0004 Screw,#10 x 1, Pilips Pan H, Sheet Metal
12 1 20-4172 Carbon Block, Aqualite
13 1 21-3999 Prefilter, 1/2" Fittings, 5"
14 2 74-0446 Conn,Straight,PE,Black 1/2 MPT x 1/2"Tube
15 1 96-3284 Decal, Fresh Water Flush System
APPROVALS DATE
PREPARED BY CAD 8/29/2014
CHECKED BY
APPROVED BY
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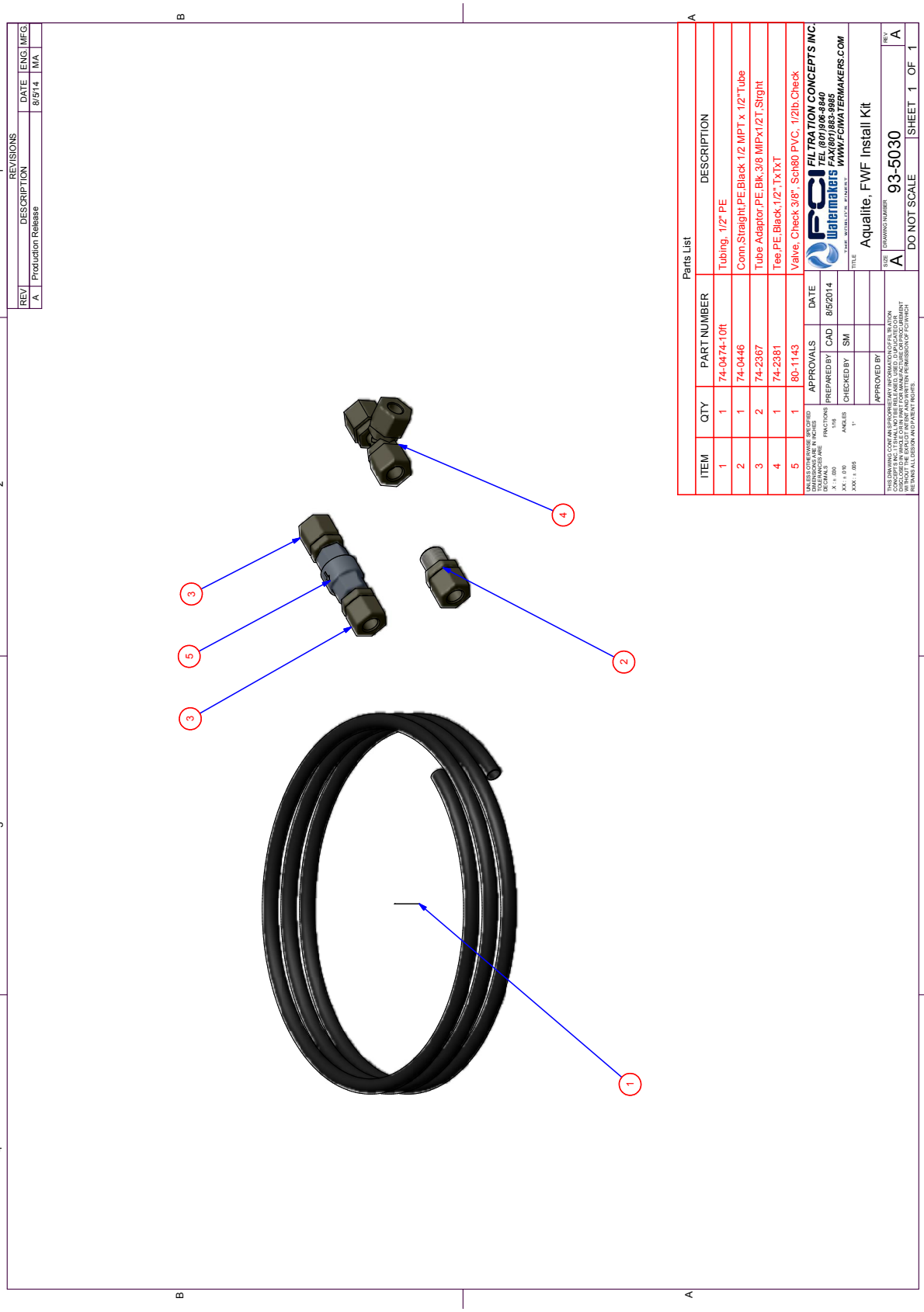
TITLE
Assy, FWF, Aqualite, 220 VAC
SIZE DRAWING NUMBER REV
A 93-4962 A
DO NOT SCALE SHEET 1 OF 1

GENERAL ASSEMBLY DIAGRAMS / FWF INSTALL KIT (optional)



10 / REVISION HISTORY

REVISION HISTORY

Revision	Date	Description
A	09/29/2014	Initial release.
B	04/15/2018	General Assembly Diagrams 93-4051, 93-4052, 93-4064, 93-4065, 93-4167, and 93-4168 updated. Voltages in Part Number decoder updated. Dimensions of LPP updated.
C	07/07/2021	Logo and cover format updated. General Assembly Diagrams for systems, frame, and installation kit updated. Part List table removed from General Assembly Diagram chapter.

Document Part Number: 97-4970 Revision C

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