

Operations Manual for

WashMaster Universal



By RGF Environmental Group, Inc

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Overview

Introduction

About *RGF*

Congratulations on the purchase of your new *RGF* WashMaster® water treatment system. For over 20 years *RGF* Environmental Group, Inc. has been the industry leader in industrial wash water treatment systems with thousands of installations worldwide.

RGF Environmental Group, Inc. is committed to helping industry comply with strict EPA regulations. Founded in 1985, *RGF* pioneered the development of heavy equipment zero discharge wash water recycling systems. Since then, *RGF* has continuously expanded to encompass the entire scopes of water treatment concerns of industry. Today *RGF* offers a variety of products and services that is among the widest available in the pollution control equipment industry.

How to Use This Manual

As with any piece of new equipment, the first thing you should do is obtain a complete understanding of the operation and maintenance of the system before you begin. The best way to do this is to read the manual and associated documentation sent with the unit well before it is scheduled to be installed. *RGF* has invested a great deal of effort to make our manuals as informative and user friendly as possible to make the task of learning about your new system as enjoyable as possible.

How This Manual Is Organized

This manual is divided into the following major sections.

Shipment Inspection/ Receipt Checklist:

This section should be read immediately upon receipt of your system.

Safety:

A description of the labeling conventions employed in the manual to point out specific items relating to issues of personnel safety and proper operation of the system. General safety concerns and overall operational guidelines for the system.

Chapter 1: The WashMaster[®] System

Unit familiarization, basic system information and system flow diagrams. Covers the overall concepts of the Vision 2000 WashMaster[®] System.

Chapter 2: Installation

Provides important information to ensure proper equipment placement and connection.

Chapter 3: System Startup and Operation

Contains the steps required to properly start up your new system. The Operating Instructions outline the normal course of action for the routine operation of the system.

Chapter 4: Preventative Maintenance Schedule

Recommended periodicities for maintenance routines are located in this section. Personnel who will be maintaining the unit should familiarize themselves fully with this section.

Chapter 5: General Theory

A description of how the RGF WashMaster[®] system actually separates clarifies and treats the waste stream. In depth explanations of the processes and supporting information to help operators understand the physics and chemistry of the system.

Chapter 6: Controlling Water Quality

Without proper water chemistry control, even the most sophisticated systems will fail to perform to expectations. This section covers important topics, which must be continually considered for proper system operation.

Chapter 7: Troubleshooting

This section provides possible remedies for unusual operating conditions that occur from time to time.

Chapter 8: Replacement Parts List

A convenient source for locating part numbers and nomenclature of commonly replaced items on the system.

Chapter 9: Sub-Component Manuals

Additional literature provided on individual components of the system. This section is useful for more detailed knowledge of technical specifications regarding a specific sub-component.

System Warranty

System warranty and policy.

Product Registration and Return Forms

Forms for registering your system, Installation and Start-up Record and Client Questionnaire.

Glossary of Terms

Information section defining some terms used throughout this manual.

Engineering Drawings

Reference drawings and schematics of the system.

Sources of Help

If you are unable to answer questions you have about your system from the information in this manual, *RGF* provides the following additional sources of help.

- 1) Your local **RGF Licensed Distributor**. He has a trained service support staff which is trained on all systems.
- 2) **RGF Web Site Help Page** provides answers to commonly asked questions and late breaking information concerning system operation and maintenance. Access the site at <http://www.rgf.com>
- 3) If you still have questions or have comments, the **RGF Service Department** can be contacted by e-mail at requests@rgf.com

E-mail queries receive first priority through the Service Department. Please include as much information as possible so our service staff can quickly return an answer.

Shipment Inspection

Shipment Inspection

Immediately upon receipt of the **WashMaster® System**, you are responsible as the purchaser to take the shipping containers off the truck and inspect the equipment, storage tanks and parts for damage.

IF ANY VISIBLE DAMAGE TO THE EQUIPMENT IS EVIDENT:

- Notify the driver for the courier company **immediately** and write on the Bill of Lading what is damaged or missing.
- Call **RGF** immediately at **(561)-848-1826** or FAX **(561)-848-9454** a copy of the Bill of Lading with damage or missing items to **RGF**.

Pre-Installation Checklist

Remove the **RGF PACKING SLIP** and the **BILL OF LADING**. Verify the condition and presence of all the parts and components found on the pallets and skids. Remove the **LOOSE PARTS CHECKLIST** from inside of the **LOOSE PARTS BOX** and verify the condition and presence of all the parts and components within the box. If any of the items are missing, please contact your distributor immediately or **RGF** at **(561)-848-1826** or FAX **(561)-848-9454**.

Safety

Labeling Conventions in This Manual

Certain information contained in this manual is **VERY IMPORTANT**. In addition, there are varying degrees of importance of this special information. Since most of the special information regards safety related issues, this section explains the conventions used throughout this manual. The following information explains the various conventions used to highlight important information



This statement directly regards an immediate **RISK TO LIFE**.



This designation, along with its associated graphical representation, denotes information that must be completely understood and heeded in order to prevent **Serious Personal Harm or Significant Environmental Consequences.**



This designation brings special attention to information that sensitizes the reader to the importance of following the instruction carefully. Typically used for information that reduces the risk of equipment damage or increases personal safety of the operator.

Note:

This designation clarifies or brings attention to particularly useful information that increases unit performance or reduces operating costs.

General Safety Issues

- All operating procedures, cautions, and warnings **MUST** be adhered to when operating the **WashMaster**[®] system and when using the recycled water processed through the system.
- All OSHA guidelines should be followed and material safety data sheets (MSDS) for all chemicals being used to treat the recycled water should be posted by the owner or operator of the system in a conspicuous place for all persons coming into contact with the system.
- Appropriate personal protective equipment **MUST** be used by all persons utilizing chemicals when maintaining and operating the system to avoid personal injury.
- Ensure all areas surrounding the system are adequately ventilated.
- Avoid adding excessive chemicals to the recycling system. (Refer to Chapter 6, Controlling Water Quality)

Note:

Additional safety precautions are listed throughout the manual.

Chapter 1: The WashMaster[®] System

The Vision 2000 Concept

The Vision 2000 line of WashMaster[®] systems was designed with modularity in mind, to suit each individual waste stream properly. **RGF** has available several standard models that may be integrated together as shown in Figure 1.1. However, depending on how your particular waste stream needs to be treated, depends on if your distributor or system integrator has added additional components to the standard system. If additional components have been added, it is important to become familiar with the components' names and functions and where they will fit into the waste streams flow through the system.

➤ Basic System Layout

Figure 1.1

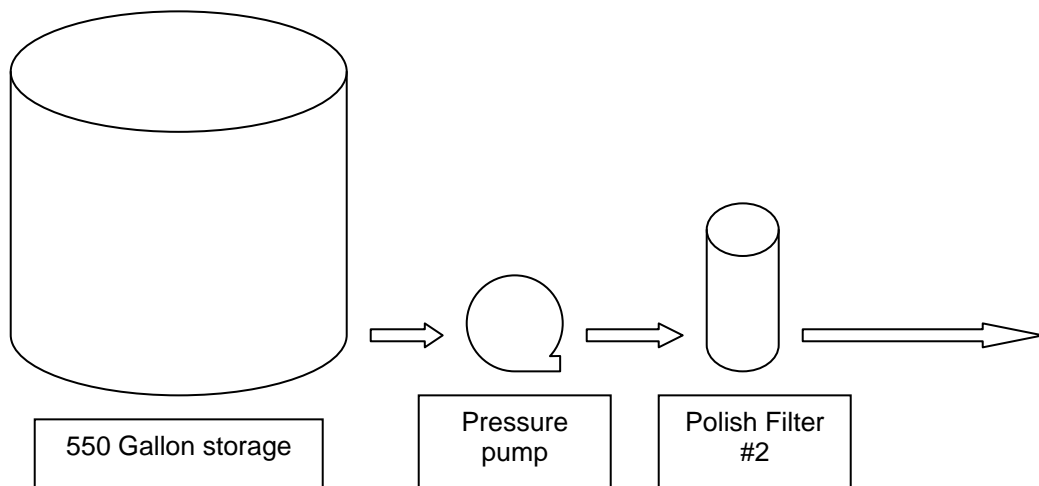
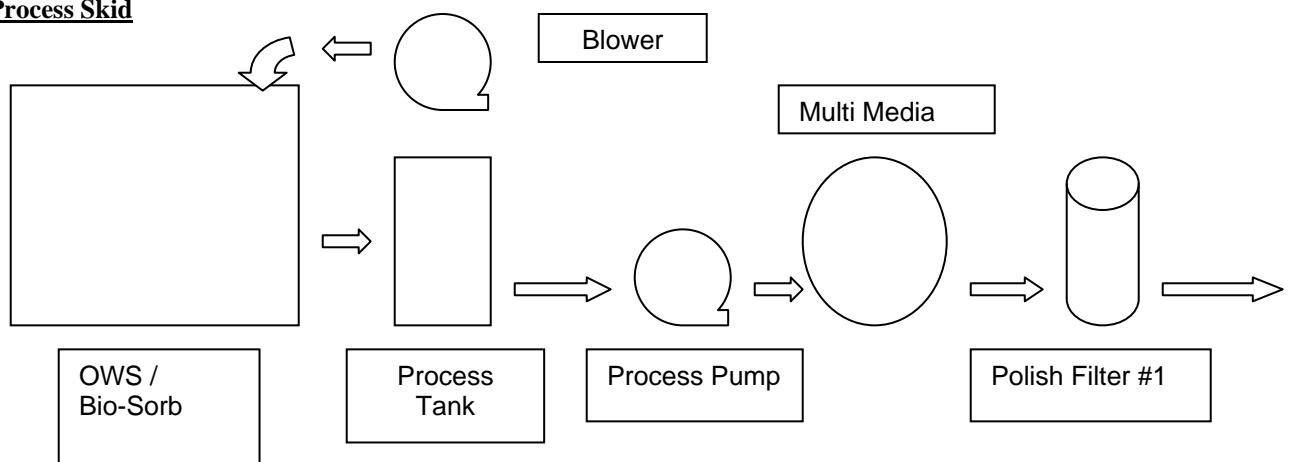


The WashMaster[®] System

This manual contains information on system installation, start-up, operation and maintenance as well as containing useful information on controlling water quality, training bulletins, and the theory behind how the WashMaster[®] System operates. In order to perform installation, start-up and maintenance procedures easily and correctly, it is important to become familiar with the system that you have. Chapter 2 is designed for just this purpose.

Unit Familiarization / Flow Diagram

Process Skid



Chapter 2: Installation

Installation Requirements

The **WASHMASTER® System** must be installed in strict compliance with these procedures in order for the warranty to be activated. The purchaser is responsible for bringing the required utilities (i.e. water, electricity and drainage) to the system and connecting them according to local codes. If the system must be modified by **RGF** or the distributor in order to meet the requirements of local codes, the purchaser will be required to pay the modification costs. When the purchaser has completed all of the above, a field representative will be furnished by the **RGF** Distributor. He will provide installation check-out, testing and training at no charge.

Please read the installation procedure completely and thoroughly before installing and operating the unit.

Installation Procedure

It is important to fully understand Chapter 1 to help you become familiar with all of the components and equipment names for your particular system. This will make for easier installation; start up, operating and maintenance procedures.

NOTE:

Make sure to use Teflon tape or Teflon paste on all threaded connections and PVC glue (medium blue PVC cement) on all slip connections.

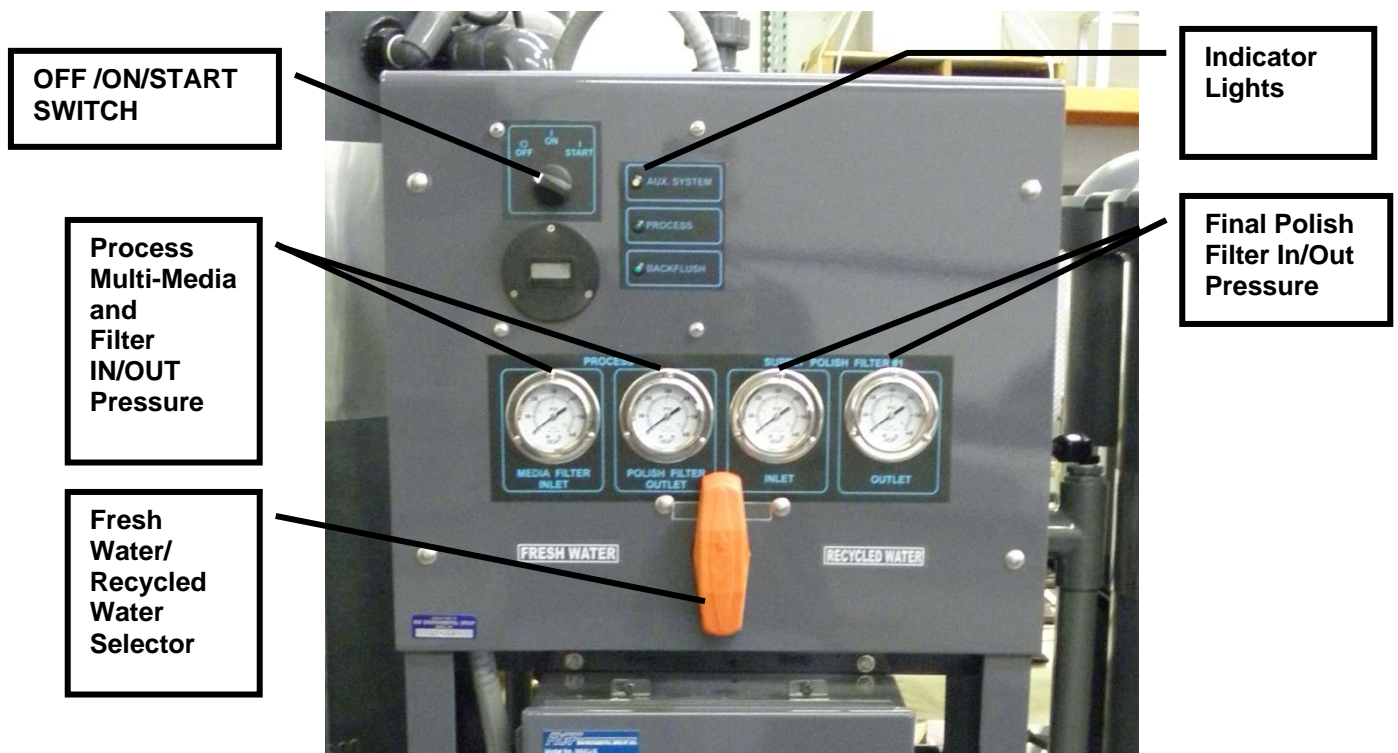
Equipment Placement

Place all of the equipment skids and tanks on the concrete pad location as desired. Allow a minimum of 2' clearance between components for access ways.

Main Drain Return Line

- A. **MAIN DRAIN RETURN LINE** should be imbedded in the equipment pad prior to system installation. If there is not one available, one should be plumbed to accommodate drain return lines from the components of the system. This return line should be readily accessible from the rear of each component such that all of the drain lines from each component can be plumbed into a common manifold and fed into the Main Drain Return Line (refer to the "Suggested Layout").

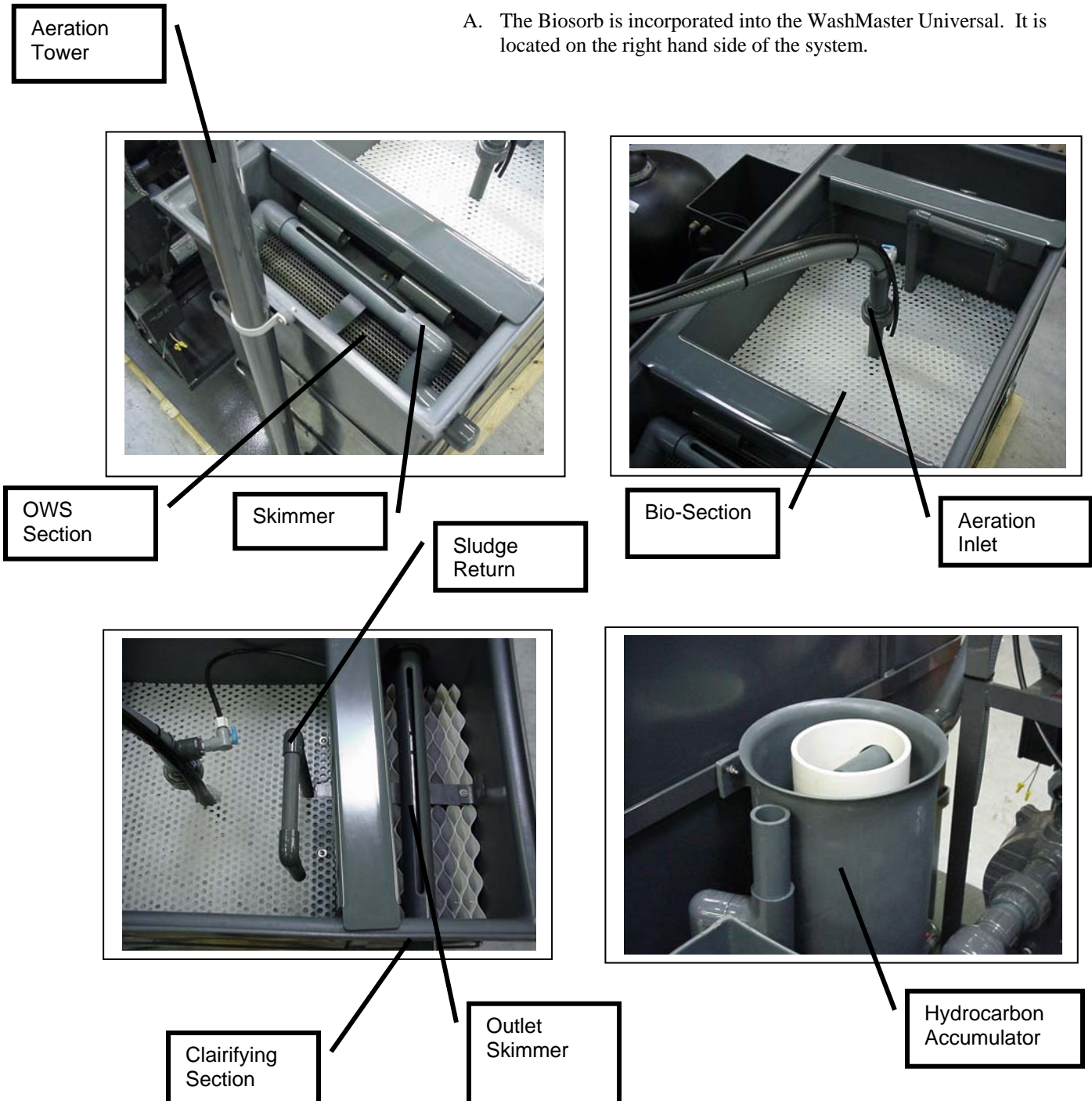
Control Panel



Biosorb Series I

➤ Biosorb Series I and Clarifier

- A. The Biosorb is incorporated into the WashMaster Universal. It is located on the right hand side of the system.



➤ **Inlet Pipe Assembly**

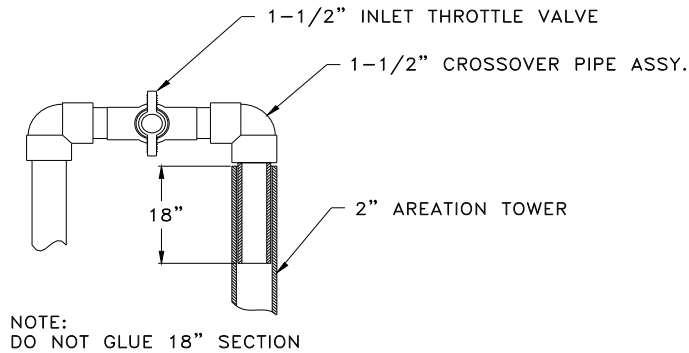


Figure 2.1

- A. Plumb a 1 1/2" line from the settling Pit feed pump to the Inlet of the WashMaster Universal's Biosorb Series I. Include in this line a 1 1/2" Throttle/Isolation ball valve. This valve is provided to throttle the feed flow rate to the Biosorb during operation. Install the line into the aeration tower as shown.

➤ **Fresh Water Inlet Connection**

- A. Plumb a **FRESH WATER SOURCE** to the WashMaster Universal's 3/4" FPT **FRESH WATER INLET**. This line requires the use of an isolation ball valve and backflow preventer (not supplied). This fitting is located on the rear of the system near the Storage Tank

➤ **Drain Return / Bleed Line Connections**

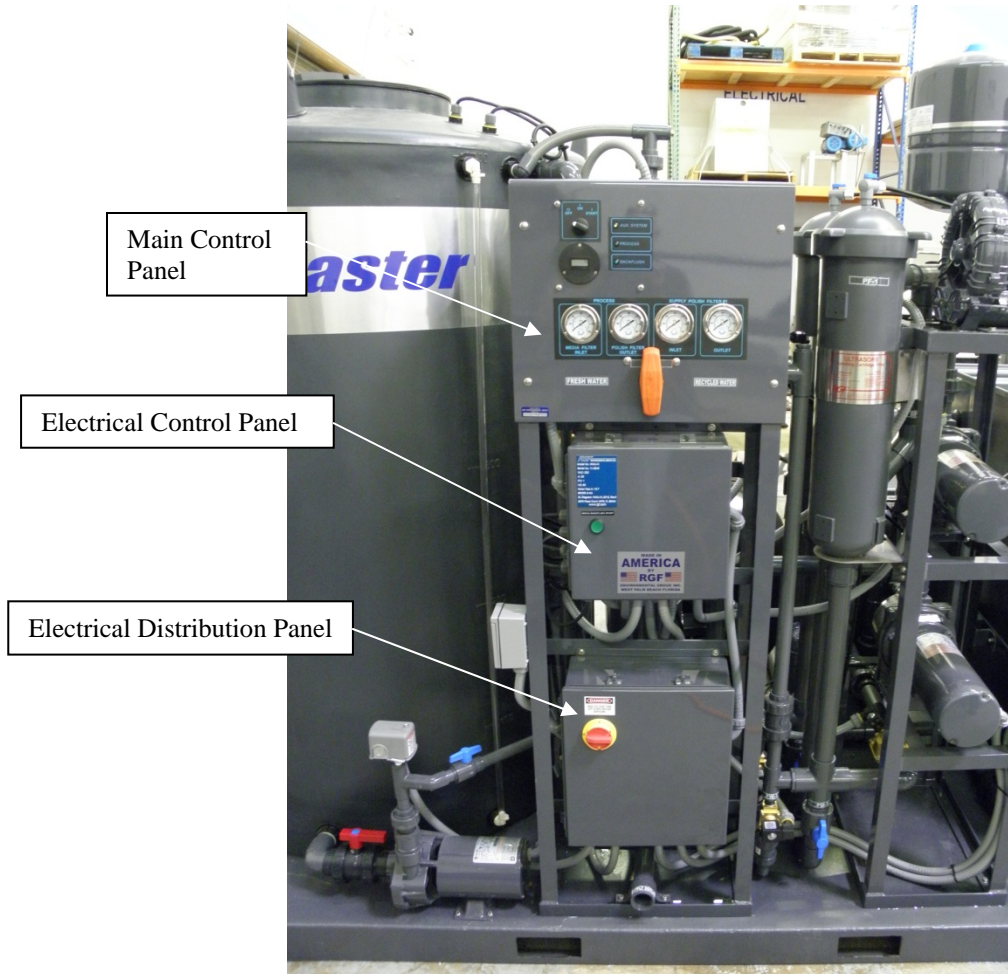
- A. Plumb the 2" Main Drain Line located on the rear of the system to the Main Drain Return to wash pad trench.

➤ **Main Electrical Connection**

- A. The Electrical Connections to the WashMaster Universal should be connected by a certified electrician, according to local and national codes. It is required that the Equipment Frame be directly grounded using a typical Grounding Rod System. (Refer to Electrical Diagrams in the Engineering Drawings section, located at the back of this manual)
- B. **MAIN ELECTRICAL JUNCTION** for the WashMaster Universal System components should be planned into the equipment pad prior to system installation. Most installations will require 220 VAC, 30 amps, 1 phase, 60 Hz with a neutral and a ground as a minimum. 3 Phase option is available on request.
- C. The **MAIN ELECTRICAL DISTRIBUTION BOX** is located just below the Main Control Panel.
- D. The **Equipment Service Disconnect** should be located within 10 feet of the equipment and within eyesight.

IMPORTANT:

Do not turn on the power to the unit until instructed to do so by this manual. Otherwise, damage to the system pumps will result.

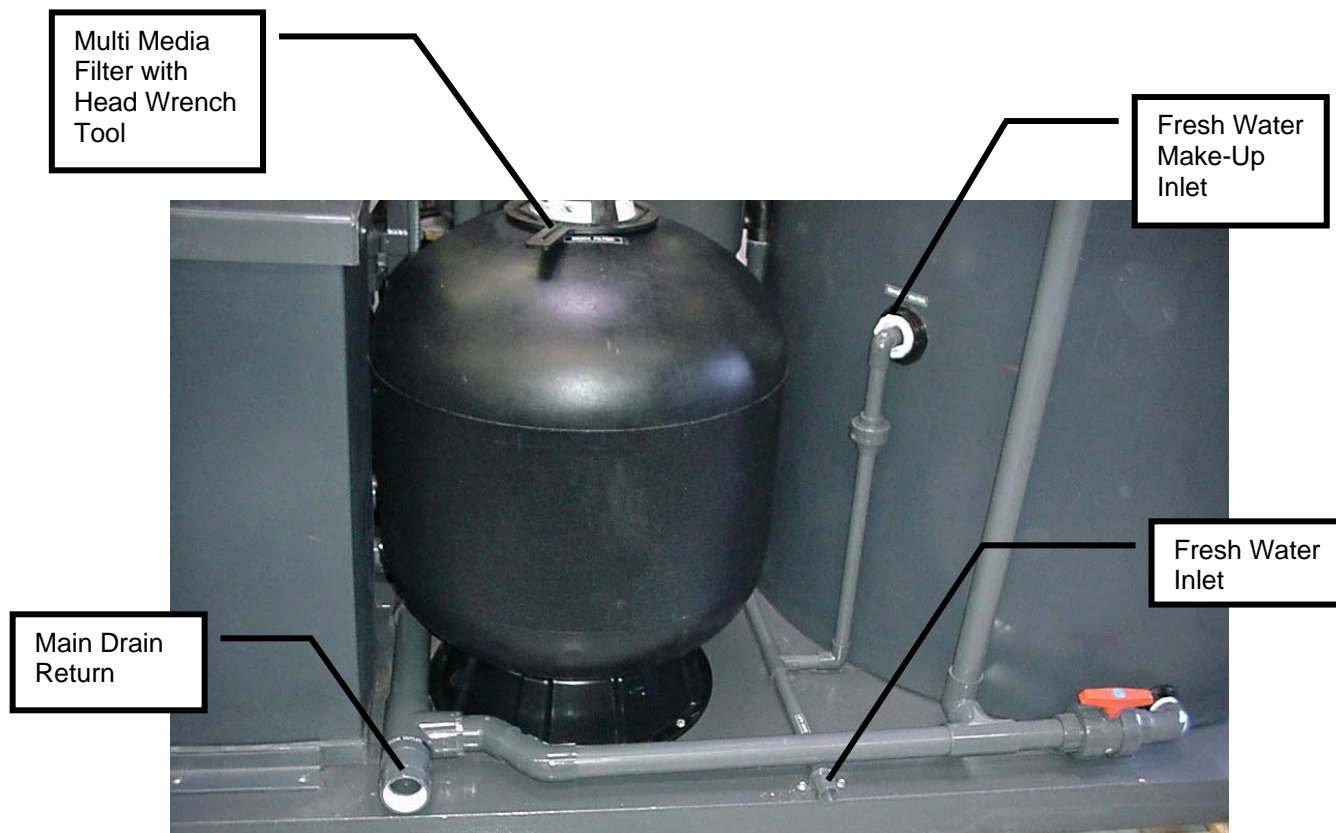


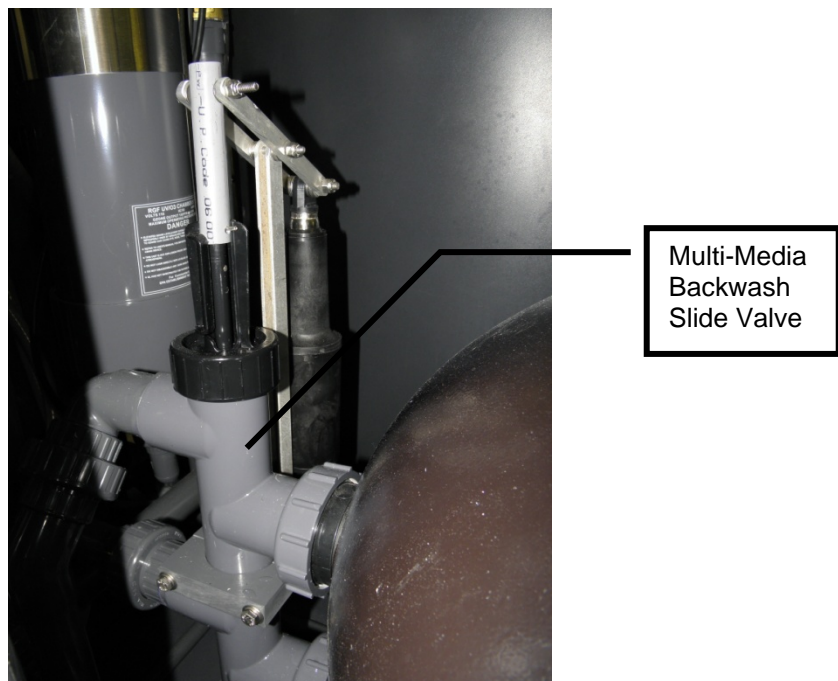
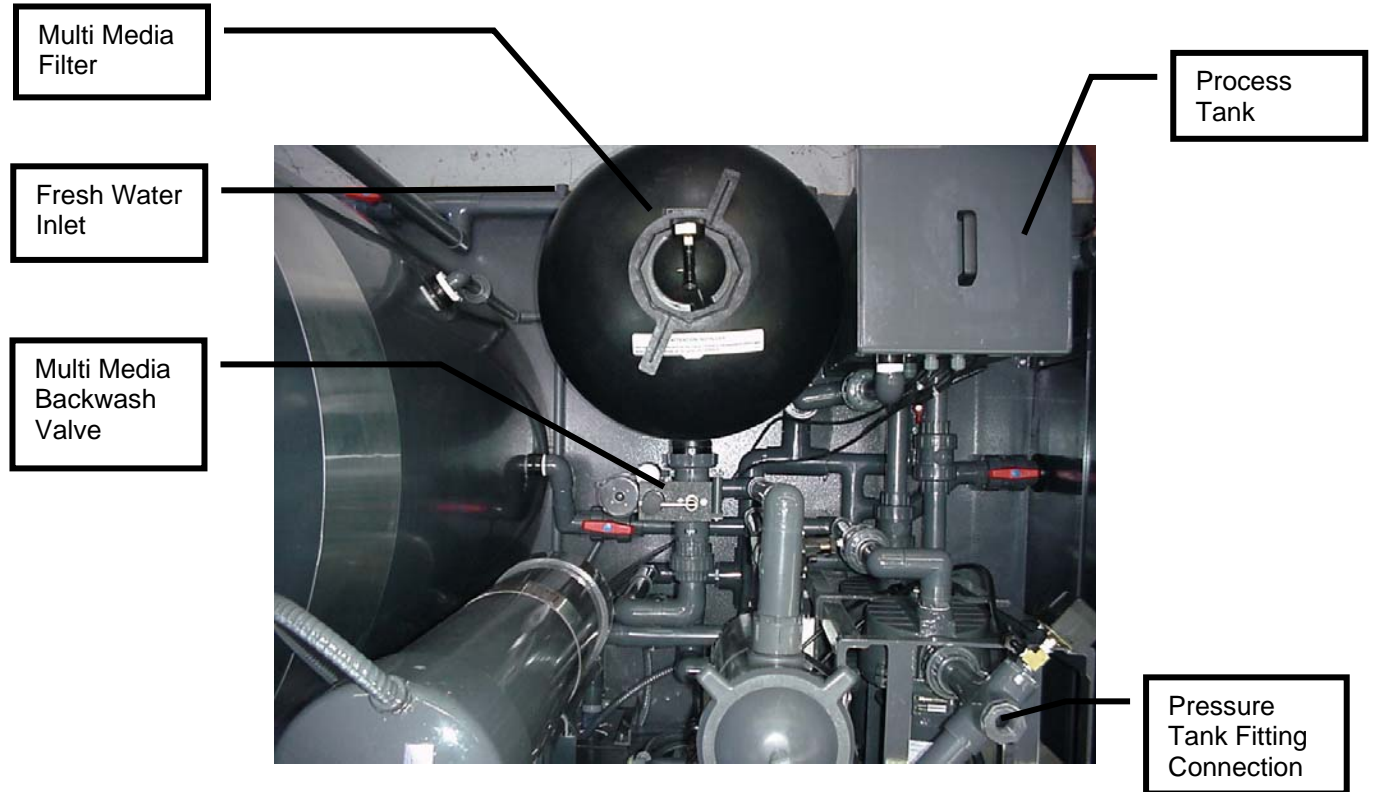
➤ **Multi-Media Filter**

- A. Fill the Multi-Media Filter housing with the supplied media using the following procedure. Remove the Multi-Media Filter head assembly of the filter by unscrewing the lid from the top of the vessel using the supplied head wrench. Remove the head from the body assembly being careful not to lose the o-ring.
- B. Rotate the top diffuser to one side out of center in order to install media.
- C. Fill the media filter with water to just above the laterals to prevent damage during media installation.
- D. Make a funnel out of cardboard to help install the media. First install all of the rock media in the bottom of the housing. Ensure the standpipe remains centered during media installation. Level out the first

layer of media. Next, install all of the sand media into the housing, leveling upon completion. Then, install all of the anthracite carbon media, leveling upon completion.

- E. Reinstall the filter head. Ensure the o-ring for the head is intact before re-installation. Snug with head wrench.





➤ **Fresh Water Inlet Connection**

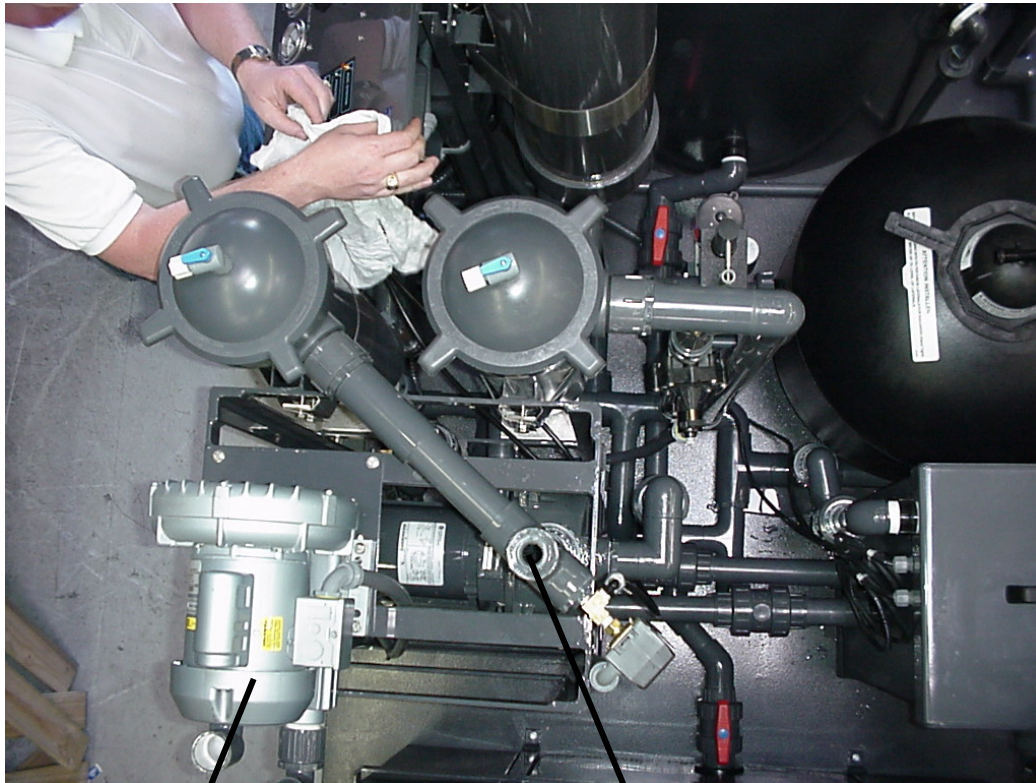
- A. Plumb a **FRESH WATER SOURCE** to the 3/4" slip **FRESH WATER MAKE UP INLET**. This line requires the use of an isolation ball valve and backflow preventer.



Fresh Water
inlet
connection

➤ **Pressure Tank Installation**

- A. Install the 5 gallon Pressure Tank to the top of the Pressure pump outlet. Wrap Teflon tape around the MPT fitting of the pressure tank and install ensuring correct thread connection.



Regenerative
Blower

Install
Pressure
Tank Here

Chapter 3: System Startup and Operation

System Startup

➤ *Before you begin*

The following startup procedures must be followed thoroughly in order to prevent damage to the system components.



Do not apply power to the system until directed to do so in the specific startup procedure!

Biosorb Series I

➤ *Filling the System*

- A. Close all **DRAIN VALVES** (e.g. valves PD-1 and PD-2).
- B. Close all of the **ISOLATION VALVES** between the components of the system.
- C. Fill the tanks of the system evenly and at the same time in order to prevent damage to the compartment baffles of the tank. Continue to fill the system until the water in the tank starts to flow out of the Clarifier Skimmer.

Storage Tank, Misc. Tanks and Pits

NOTE: Do Not Open the Isolation Valves until directed to do so.

- A. Close the Storage Tank **DRAIN VALVE** and **ISOLATION VALVES**.
- B. Turn on the Fresh Water Supply to the WashMaster Universal. The Storage Tank will fill automatically to the level of the mechanical float assembly. Fill the Storage Tank approximately 3/4 full (400 gallon mark) with fresh water with a garden hose.
- C. Ensure all of the **FLOAT SWITCHES** inside of the Storage Tank are free to swing.

- D. Fill the remaining tanks and pits of the system and wash pad to the position where the level switches are in the engaged position.

Process System

➤ *Filling the System*

- A. Close all **DRAIN VALVES** (e.g. valves PD-1 and PD-2).
- B. Ensure all Polish Filters are installed and the lids are hand tightened then backed off ¼ turn.
- C. Prime the Process Pump by removing the union from the Process and Pressure Pump housing and fill the pump head with water from a hose.
- D. Open all of the purge valves on top of the filter housings (PF-1, PF-2).
- E. Fill the Process Tank with water until all floats are floating. The Process Tank is the square tank located on the rear of the system next to the Biosorb.
- F. Recheck all unions to ensure they are all hand tightened.

NOTE:

Proper priming of this pump is of extreme importance. Failure to ensure proper priming will inhibit proper operation of the pump and destroy it.

➤ *CFC / CO³P System*

- A. Prepare the CFC System for normal operating by opening CFC-1.

Start-Up

- A. Open all of the isolation ball valves between the components of the system.
- B. **POWER CAN NOW BE APPLIED TO THE SYSTEM COMPONENTS.**

CFC SYSTEM START-UP

Start the CFC system by holding the **CFC SYSTEM PRIME LEVER** up (refer to Figure CFC-1) until the CFC pressure reaches approx. 11 psi, then release. The lever should remain in the up position. If it does not, then the CFC System is not properly primed, check the system valves to ensure they are properly opened and re-bleed the CFC pump. Once the CFC System is properly started, the Aux. System light and UV/O³ Catalytic Chamber indicator (blue light on the side of the chamber) should be illuminate indicating that power has been applied to the CFC System. Also, the CFC Pump will run continuously. If in the event the CFC system loses prime, the lever will shut down to prevent equipment damage.

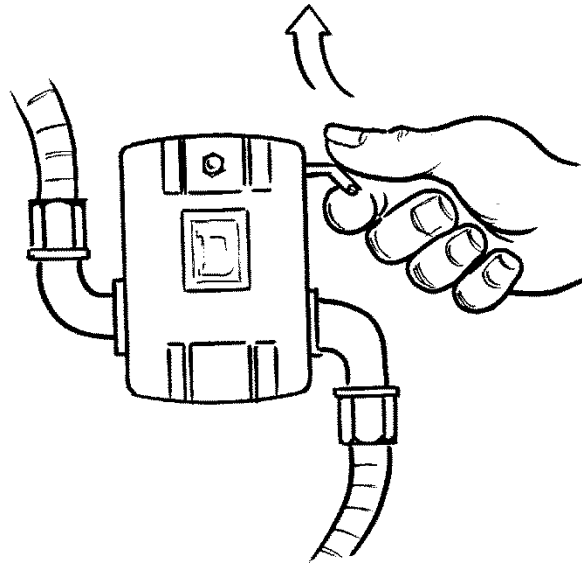


Figure CFC-1

DELIVERY SYSTEM START-UP (Optional)

The **SUPPLY PUMP** (Top pump) will run until a maintained pressure of approximately 45 psi is reached then the pump will shut-down. If the pump continues to run without stopping, re-priming of the pump may be necessary or check to ensure all of the isolation valves are open.

PROCESS SYSTEM START-UP

The Process System is controlled by the **OFF/ ON/ START SWITCH** located on the Control Panel and the float switches located in the Process and Storage tanks. The Off-On-Start Switch can be turned to the Start position for automatic operation of the system, once the process pump starts release the switch allowing it to spring return to the on position. The Process Pump (bottom Pump) will begin processing the water through the filters of the system until all of the water from the process source has been processed to the storage tank or until the storage tank has reached the high level.

System Operation

OWS / Biosorb Series I

➤ *Process Description:*

Primary Treatment – OWS / Biosorb Series I Tank:

Initial treatment includes Aeration in the Aeration Tower the oil water separation in the first compartment of the OWS / Biosorb. There are skimmers installed to collect the free oils for collection in the Hydrocarbon Accumulator installed on the inward side of the Series One. The main job of treating and breaking down the pollutant and biological material in the reclaimed wash water takes place in the aeration chambers or “BIOZONES” of the Biosorb Series I Tank. A large volume of air is supplied to the aeration chambers from the supplied regenerative air blower. This air is introduced at the bottom of the chambers through a series of simple diffusers to create a fully aerated liquid. A complex system of microorganisms, supported on plastic media, uses the aerated conditions to break down the biodegradable material present in the wash water. This form of treatment is called secondary treatment and it produces a much cleaner effluent than the traditional septic tank style of primary treatment.

Clarification Stage – Biosorb Series I Clarifier:

Any solids or flock produced in the Biosorb Series I “Bio-Zones” is settled out in this compartment under quiescent conditions. The sludge that accumulates at the bottom of this chamber is automatically returned to the Biosorb Series I tank for re-activation. The clarified effluent then passes through to the Process Tank.

Process Section

➤ *Process System*

Water enters the Process System from the process tank by the suction of the Process Pump and is passed through the Multi-Media Filter and then through the first Polishing Filter by the process pump where it is delivered to the Storage Tank.

The Multi-Media Filter is automatically controlled and backwashed by the Multi-Media Filter Controller and the Polishing Filters are automatically backwashed by the PB-1, PF-3, PP-1 and PD-2 valves which are electric solenoid valves controlled by the Backwash Timer located in the main electrical control box.

Stored water is then pulled from the Storage Tank by the Pressure Pump and filtered by the Polish Filter #2 and delivered to the System Outlet.

Controlling Flow

Flow through the Process System is controlled by Flow Control Valve at the inlet into the Biosorb, the Multi-Media Filter Valve and the Polishing Filter Valves.

➤ **CFC System (Continuous Flow Control)**

Water is continuously fed through the CFC system from the Storage Tank by the suction of the CFC System Pump and is supplied to the CO³P Process. Flow through the CO³P Process passes recycled water through the Ozone and Chemical Venturi and the UV/O₃ Catalytic Chamber, and is returned to the Storage Tank.

Controlling Flow

Valve CFC-1 should be fully opened for normal operating conditions.

IMPORTANT:

Valve CFC-1 must never be shut completely off. The UV/O₃ Chamber requires continuous flow or the chamber will overheat and malfunction.

➤ **WATER SUPPLY**

The water supply to the washing equipment is supplied by the Supply Pump. This pump maintains pressurized feed to the washing equipment. This system can also supply an optional High Volume Wash Station.

Storage Tank

➤ **Operation**

Water enters the Tank from either the Process Tank or fresh water make-up. The water inside the tank is continuously pumped by the CFC System, through the CO³P Process, and returned. When wash water supply is needed, wash water flow is pumped by the Supply Pump to the point of use. Float switches inside of the tank control the operation of the system.

This system has a high level (pump up) float switch. In addition, if the tank water level reaches a level below 18", the fresh water make-up valve will allow fresh water to enter the tank.

Operational Notes



• UV/O³ CATALYTIC CHAMBER

- 1) DO NOT look at the UV light in the chamber. PERMANENT DAMAGE OR BURNS TO EYES OR SKIN MAY RESULT.
- 2) DO NOT run the UV Chamber without water flow through the Chamber; The UV bulb needs water flow to keep it cool. DAMAGE TO THE BULB WILL RESULT.
- 2) DO NOT open or attempt to repair the chamber. If problems occur, call your serviceman or distributor for further instruction.
- 3) DO NOT BREATHE OR INHALE THE OZONE GAS. PROLONGED BREATHING OF NOTICEABLE AMOUNTS OF OZONE may result in: respiratory irritation to nasal passages, throat, bronchial and pulmonary membranes; headache, nausea, burning, watery irritated eyes. In some instances (such as enclosed spaces and tanks), significant concentrations of ozone may collect. Adequately vent all tanks and enclosed spaces before entering for maintenance or repair until the level of ozone has depleted down to acceptable levels (<0.1 ppm). If an ozone odor is still noticeable, continue ventilating until the odor is non-detectable. Ozone odor is similar to the smell near copy machines when making copies or MIG and TIG welders in operation and is the "fresh air" odor one sometimes notices after a thunderstorm.

GENERAL NOTE:

At a level of 1 ppm, ozone becomes intolerable to humans. A human's reaction to this level is the same as the reaction to a strong bleach or ammonia odor. Usually, the nose will indicate discomfort.



• POLISHING FILTER

- 1) Before servicing be sure to RELIEVE THE PRESSURE on the Polishing Filter(s) by using the drain valve and bleed valve or PERSONAL INJURY COULD RESULT!
- 2) RGF Filters have been lab tested and time tested - COPY FILTERS HAVE BEEN KNOWN TO BREAK UP OR DISSOLVE, THEREBY PLUGGING OTHER PARTS OF THE UNIT CAUSING EXCESSIVE PRESSURE AND EQUIPMENT DAMAGE!!!



• **CFC SYSTEM PUMP:**

- 1) Proper priming of the CFC System Pump is essential to the operation of the pump. Improper priming of the pump will cause poor performance and eventual pump failure.
- 2) DO NOT OPERATE the CFC System Pump if the Storage Tank is emptied or DAMAGE TO THE PUMP WILL RESULT.



• **PROCESS PUMP:**

- 1) TO PREVENT DAMAGE TO THE PROCESS PUMP, DO NOT OPERATE without sufficient prime and net positive suction head (NPSH).
- 2) DO NOT OPERATE THE PUMP while the system valves are closed.



• **SUPPLY PUMP:**

- 1) TO PREVENT DAMAGE TO THE SUPPLY PUMP, DO NOT OPERATE without sufficient prime and net positive suction head (NPSH).
- 2) DO NOT OPERATE THE PUMP while the system valves are closed.

Chapter 4: Preventative Maintenance Schedule

Overview

The following section is developed to keep the **WASHMASTER® System** in top working order. It is **NECESSARY** to follow the maintenance procedures below precisely as stated. The lack of maintenance, in the long run, will reduce productivity and can be both costly and time consuming. It is recommended that this format be copied and incorporated as a regular work routine.



Turn off all power, and release pressure before servicing the system. All gauges must read zero!

Required Tools and Supplies

- | | | |
|---------------------------------|--|--|
| ✓ Hammer | ✓ Adjustable End Wrench | ✓ 5 H.P. Shop VAC For Extracting Old Media |
| ✓ Garden Hose For Back Flushing | ✓ Tube Brush For UV/O ³ Chamber Cleaning | ✓ pH Test Strips |
| ✓ Garden Hose Nozzle | ✓ #1 Flat Head Screw Driver For Venturi Adjustment If Needed | ✓ Garbage Bag For Proper Filter Disposal |
| ✓ Rubber Boots And Gloves | ✓ Proper Safety Equipment | ✓ Square Head Shovel For Digging Out Trench Valley |

Daily Maintenance

BIOSORB[®] System Maintenance

➤ *Weekly Maintenance*

- A. Remove floating solids from the surface of the Clarifier.
- B. Check that the blower, sludge lift, and discharge pump are operating properly.

➤ *Sludge Maintenance Procedure*

Large solids in the wastewater will settle out in both the holding tanks and the primary chamber. These solids collect at the base of these compartments and form sludge. This sludge degrades biologically over time but accumulates gradually and needs to be removed periodically.

It is important that the correct procedure for sludge removal of the “BIOSORB” is carried out. The following steps need to be performed.

IMPORTANT: Please post Health and Safety information and issue a copy to personnel involved in the sludge removal of the system before commencing.

- A. Ensure that all power to the unit is switched off.
- B. Open the drain valves of the Biosorb Series I Tank for 30 seconds to remove settled sludge from the bottom of the tank.
- C. Continue to flush the sludge from the bottom of the tank until approximately six inches (150 mm) of water is removed from each chamber.
- D. Refill the Biosorb Chambers and holding tanks by adding clear water.
- E. After refilling, all electrical power to the units should be restored.

Process Section

➤ *Daily System Check*

Daily, with the system running, log the pressure gauge readings. Check the status of the indicator lights and hour meter. Check the water level in the Storage Tank. Keep an accurate record of all of the readings and indicators to determine when certain components of the equipment skid will need maintenance.

NOTE: Use the following as general rules:

Multi-Media Filter

If the pressure difference across the Multi-Media Filter is greater than 30 psi, the filter will need to be backwashed according to the Multi-Media Filter Procedure.

Polish Filter Gauges

If the pressure difference for the Polishing Filters is 10 psi or more, the filters need to be backwashed or manually cleaned.

Polishing Filters

➤ Daily Maintenance

Daily, or if the inlet and outlet pressure difference on the Polishing Filters is greater than 10 psi, the filters need to be backwashed by the following procedure.

AUTO BACK FLUSH NOTE:

For Automatic Systems, if it is found that the Polishing Filters are not being backwashed properly, then the Auto Backwash Sequence will need to be adjusted accordingly.

UV/O³ Catalytic Chambers

➤ DAILY MAINTENANCE

- A. Ensure the UV/O³ Catalytic Chamber indicator light on the side of the chambers (at the top) is illuminated.

Weekly Maintenance

Trenches, Sumps, Pits, and Clarifiers

➤ *Weekly Maintenance*

Weekly, or as required, the trenches, sumps, pits and clarifiers of the pad need to be checked for sediment level. The trenches' sediment level should not be more than half of the depth of the trench. Dig out the trench using a shovel, and dispose of the waste accordingly. The sumps and pits should be dug out if there is at least 1/4 of the depth full of sediment. The clarifiers should be removed and dug out on a weekly basis, or as required, regardless of the amount of sediment.

IMPORTANT:

Dig out the trenches, sumps, pits and clarifiers as regularly as possible. Keeping them cleared of sediment build up will result in better water quality throughout the entire system.

Multi-Media Filter

➤ **Weekly Maintenance**

Weekly, or if the pressure difference across the Multi-Media Filter is greater than 30 psi, then the filter will need to be manually backwashed by the following procedure.

AUTOMATIC MULTI-MEDIA FILTERS

Backwashing the Multi-Media Filter

- A.** The OFF/ ON/ START Control Switch must remain in the **ON** position for this operation.
- B.** Ensure there is sufficient water in the Process Tank to perform a sufficient backwash. Once the system starts to backwash, the Supply Pump will continually fill the Process Tank.
- C.** Initiate a manual backwash cycle by pressing and releasing the **START BACKWASH** switch. The following control sequence will occur:
 - The Process Pump will turn off.
 - Polish filter #2 will start to backwash with fresh water.
 - The backwash valve will move to the backwash position.
 - The Process Pump will restart, moving the water through the filter in the backwash direction then to the waste line. Backwashing will continue for approximately 3 minutes.
 - Polish Filter #1 will backwash with fresh water.
 - The process Pump will turn off.
 - The Backwash valve will move back to the filter position.
 - The Process Pump will turn back on and normal filtering will proceed.

Polishing Filters

➤ *Weekly Maintenance*

Weekly the Polishing Filters need to be removed and manually cleaned by the following procedure:

Manually Cleaning

- A.** Turn the OFF/ ON/ START Switch to **OFF**.
- B.** **OPEN** the Polishing Filters, drain valve (PD-1/ PD-2) and solids bleed valves.
- C.** Allow to drain and relieve pressure. **The Pressure Gauges Should Read “Zero”**.
- D.** Disconnect all of the air bleed lines from the lids.
- E.** Remove the Polishing Filter Lids by turning them counterclockwise.
- F.** Remove and manually clean the Polishing Filters using a fresh water hose to flush all debris from the filter and the inside of the filter housings. Replace filters to the housings.
- G.** Replace the lids by turning clockwise; ensure the filter seals are in place on the housings.
- H.** Replace all of the air bleed lines to the lids.
- I** **SHUT** the Polishing Filter drain and solids bleed valves.
- J** Turn the OFF/ ON/ START Switch to START position then release.

Storage Tanks

➤ *Weekly Maintenance*

- A.** Open the drain valve to the Storage Tank and allow draining for 1 minute to remove any accumulated solids from the bottom of the tank.
- B.** Check inside the tank to ensure the float switches are free to swing. Remove any accumulated debris or scum from the surface of the tank water.

Monthly Maintenance

OXYPUCK

➤ *Monthly Maintenance*

- A. Add OxyPucks once a month.

UV/O³ Catalytic Chambers

➤ *Monthly Maintenance*

Once a month, or as required, the UV/O³ Catalytic Chamber needs to be cleaned by the following procedure:



Shut off all power to the system before attempting to service or repair the UV/O³ Catalytic Chamber. The chamber operates under high voltage, which can cause severe shock if ends are removed while power is applied.

- A. Turn the main power to the system **OFF**.
- B. Close the Isolation Ball Valves (CFC-1) to the CFC System.
- C. Disconnect the union at the top of the **UV/O³** chamber. Disconnect the bottom union to thoroughly clean the lower portion of the tube.

NOTE:

Use caution in handling the UV/O³ Catalytic Chamber. The UV bulb is extremely fragile and will break if the chamber is mishandled.

- D. Insert an appropriate sized bottle brush and scrub the interior of the quartz glass tube. If a heavy build up of scale is present, prepare a solution of Citric Acid and scrub the tube until clean.
- E. Reconnect the inlet and outlet and open isolation ball valve (CFC-1).
- F. Turn the main power to the system back **ON**.

As Required Maintenance

Multi-Media Filter

➤ *As Required Maintenance*

If the Multi-Media Filter has a high-pressure differential after continued backwashing or if the Polishing Filters are continually fouled, then the media will have to be changed by the following procedure.

Changing the Filter Media

- A.** Turn the Process Control Switch to **OFF**.
- B.** Ensure all pressure is relieved from the system (all gauges should read zero). Use the supplied tool to remove the top cap. Remove the drain Plug from the bottom of the Multi-Media Filter.
- C.** Once all of the water has drained, use a 5 horsepower wet / dry shop vacuum to remove the old media. Once all the media has been removed, thoroughly clean and flush out the filter housing.
- D.** Replace the media with RGF Filter part # FL-078 and replace media to filter housing according to the Multi-Media Filter installation instructions.
- E.** Re-assemble the filter housing and return to normal operation.

Programmable Auto Backwash

Change the Programmable Auto-Backwash sequence if the filters need to be backwashed more frequently. The Auto Backwash Timer is factory pre-set to 24 hours between backwashes (T OFF dial) and two minutes of backwash (T On dial).

- A.** Turn the main power to the system **OFF**.
- B.** Open the Electrical Control Box and remove the ODR relay.
- C.** The dials on the face of the relay control the amount of time between backwashes (T OFF dial) and the amount of time the backwash is performed (T ON dial).

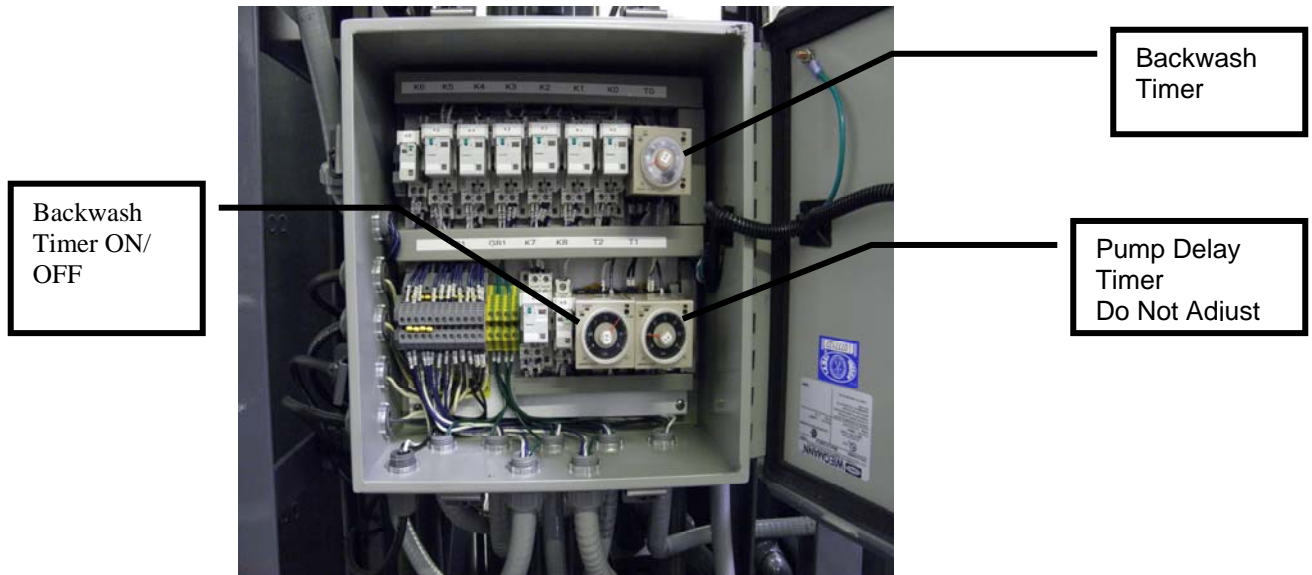
To change the amount of time between backwashes, turn the **T OFF** dial to the desired amount of time (scale is in hours). To change the amount of time the backwash is performed, turn the **T ON** dial to the desired amount of time (scale is in minutes). An example of a setting is illustrated:

Timer Setting Example:

Time between backwash cycles = 5 hours

Length of time of backwash = 2 minutes

Dial settings:



NOTE:

If the power to the system is turned OFF, the timer restarts its cycle from zero. The timer relay does not retain its time cycle during power OFF.

Winterizing the System

In areas of the country where the system will be shut down for the winter or there is a possibility of local freezing, the system will need to be drained down to prevent damage to the internal components and piping of the system. The water from the system should be hauled off or evaporated. All main sumps to the system should be turned off, pumps removed and covered to prevent damage to the sump basins. All power to the system should be shut off completely. The components of the system should be drained completely (e.g. pumps, filter housings, UV/O³ Chamber)

Chapter 5: General Theory

Overview

The Piping and Instrumentation Diagram in the Engineering Diagram Section outlines the path that the waste stream takes as it is recycled. The General Theory section explains each process of the recycling process. A comprehensive understanding of theory of the **WASHMASTER® System** should be achieved to assist in the proper installation, operation and maintenance of the system.

OWS / Biosorb Series I System

OWS / Biosorb Series I

The Biosorb was designed to accommodate a variety of wastewater applications with high B.O.D. and C.O.D. levels. Our goal in treating wastewater high in organic contaminants is to convert the carbon into microorganisms that we can remove from the water by settling. The Biosorb provides an aerobic environment that encourages the growth of organisms - organisms that use organic material for both their carbon and energy source. The clarifier provides a method for settling out the bugs and re-activating them within the system.

Series II Equipment Skid

Process System

The process water enters the Process System of the WashMaster Universal equipment Skid by the suction of the Process Pump. The water is filtered through the Multi-Media Filter removing large particulate from the waste stream then passed through the first Polishing Filter for initial polishing of the water. The Multi-Media and Polishing Filters are periodically backwashed to remove accumulated particulate.

The water is then placed in the 550 gallon storage tank. The Polishing Filters are equipped with air and solids purge valves and have a system for back flushing the filters. From the storage tank the water is filtered again through Polish Filter #2 and directed to the System Outlet.

The CFC System circulates the stored water through the UV/03 chamber then back to the storage tank.

Supply Header

The supply header comprises a manifold of piping and valves, which allows the operator to select the water source to be supplied to the wash equipment. The operator may select either wash or rinse water to be delivered to the wash equipment. Rinse water typically is municipally supplied 40-60 psig "tap" water. Recycled wash water will come from one of the following sources depending on system parameters:

Continuous Flow Control System (CFC System)

The CFC system consists of the CFC Pump, the UV/O³ Chamber, and venturi injection. The purpose of the system is to continuously provide recycled water at moderate supply header pressure and to continuously circulate water through the Catalytic Oxidation Process (CO³P). The terms CFC and CO³P are related and the systems utilize the same components. CFC refers to the mechanism for the hydraulic delivery system, and CO³P refers to the chemical and photochemical process for water treatment.

CFC Pump

The CFC Pump is a 1/2 Hp. centrifugal circulation pump that pumps the processed water from the storage tank to the Supply Header and through the CO³P system.

Catalytic Oxidation Process (CO³P System)

The Catalytic Oxidation Process is designed to reduce the Biologic Oxygen Demand (B.O.D.) and Chemical Oxygen Demand (C.O.D) of the recycled water. This is accomplished through the contact with ozone and ultraviolet light. The tri-reaction is completed when the ultraviolet light (catalyst and oxidizer) in the chamber excites the ozone (oxidizer) and OxyPuck (oxidizer) to cause them to react faster in the aqueous solution (refer to Figure UV/O3-1). Ultraviolet light is also a remarkable sterilizer of living organics such as bacteria and algae. In turn, the three works together in breaking down organics to clarify the water before it is reused. This is all accomplished by the CFC system, which transfers the water from the tank passing it by the ozone injection and through the UV/O³ Catalytic Chamber and returning it back to the tank.

UV/O3 Catalytic Chamber

A cylindrical vessel used to produce Ozone (O₃) which is venturi injected in the CFC system, to prevent bacteria or algae growth. The chamber also produces ultraviolet light, which is a sterilizer used to UV destruct organics and excite ozone in the Catalytic Oxidation Process (CO³P) as the water passes through the chamber (refer to figure UV/O3-1).

UV/O3 Catalytic Chamber

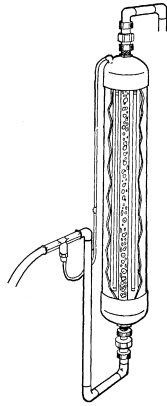


Figure UV/O3-1

Pressure Pump

The Supply pump is utilized to deliver the recycled water to the washing equipment this pump supplies the water from 20 - 40 psi at up to 45 gallons per minute. The pump contains a pressure switch and pressure tank.

Chapter 6: Controlling Water Quality

Overview

Controlling the waste water quality on the **WASHMASTER® System** is a very important process that can greatly enhance the quality of your recycled water. By controlling the pH level, Total Alkalinity, the amount of oxidizers and soaps that are used, you will be able to improve the quality of water in your system. There are many factors which control the water quality. These factors are listed below in order of their appearance in the following section:

pH / Alkalinity

- pH

- Total Alkalinity

Oxidizers

- OxyPuck

- Ozone

- Ultraviolet Light

Cleaning Agents

- Enviro-Control

- Water Conditioner 1 (WC-1)

Solids

- Total Dissolved Solids (T.D.S.)

- Total Suspended Solids (T.S.S.)

PH / Alkalinity

PH

PH (potential hydrogen) is a relative measure to indicate how acidic or alkaline a substance is. Thus, it denotes the degree or strength of alkaline or acidity. Some acids or alkaline substances are stronger than others and, in order to compare them, the pH scale has been devised. The pH numerical index ranges from 1.0 (extremely acidic) to 14.0 (extremely alkaline). The midpoint of 7.0 indicates that the solution is neutral. That is, it is neither acidic nor alkaline. Pure distilled water is a neutral solution. Note: High PH tends to emulsify oils and reduce the efficiency of the unit. The use of high PH cleaners should be minimized.

The PH scale is a logarithmic scale and even though the difference from 0 to 14.0 doesn't seem very great, every unit on the pH scale is a difference of 10 times, and every two units is a difference of 100. For example, if you have an alkaline cleaning solution of 10.0 and increase it to 11.0, you are making that solution 10 times more alkaline. If you go up two units to a PH of 12.0, the solution becomes 100 times more alkaline, and so on.

➤ **Controlling PH:**

To Raise PH:

One chemical usually added to raise the PH level is Sodium Carbonate. How much to add is basically a trial and error operation, but a general rule of thumb that is good to follow is to add 1/4 pounds of Soda Ash for every 1,000 gallons of water within the system. After adding the Soda Ash, wait for about an hour before re-checking the PH level. Take whatever further action is indicated by the test.

To Lower PH:

The chemical normally added to lower the PH level is called Muriatic Acid, which is actually a dilute form of the more hazardous hydrochloric acid and comes in liquid form. Another acid product is the so called Dry Acid or Sodium Sulfate, which comes in a granular form. **Acid of any type should always be added directly to the water, NEVER the water to the acid! The amount of acid required is determined by performing an acid demand test with the water test kit.**

Total Alkalinity

Total Alkalinity is the measure of the total amount of alkaline chemicals in the water and not the same as PH. PH measures the strength of an alkaline (or acid), while alkalinity measures the amount of alkalis present. While PH and Total Alkalinity is not the same thing, **Total Alkalinity can have an effect on how fast or easily changes in PH can be accomplished.**

➤ **Controlling Alkalinity**

For our purposes, the **Total Alkalinity should be kept at about 150 ppm**. In general, alkalinity has not been a problem for recycling, providing you are using a **neutral soap**. If you have a drum of water and introduce a scoop of alkaline clearer, you may change the pH and get a reading of 12. That does not mean that if you add a second scoop of cleaner, you will get a different reading - in fact, it will probably be identical. What will change is the Total Alkalinity.

Oxidizers

OxyPuck

OxyPuck is an oxidizer that exhibits outstanding purifying characteristics. It is not affected by the pH level and the only byproducts after oxidation are oxygen and water. Also, the OxyPuck does not need to be closely controlled. It will significantly reduce the amount of B.O.D. (biological oxygen demand) and C.O.D. (chemical oxygen demand) and will also remove any odors that may be present and increase the clarity of the water.

Ozone

Ozone is another oxidizer that exhibits outstanding purifying characteristics. Ozone is different than OxyPuck in that it is not in a liquid form. Ozone is produced by a unique process developed by **RGF** in which a special chamber called the **TurboHydrozone®** uses air as its agent to produce the ozone. A simple look at the blue indicator light on the chamber assures ozone is being produced. The ozonated air is then bubbled inside of the storage tank or is vacuum dragged into the CO³P System by the Ozone Venturi, which agitates the water thus oxidizing it, which reduces B.O.D.'s and C.O.D.'s, removes odors and improves water clarity.

UltraViolet Light

UltraViolet (UV) light is the third oxidizer used by **RGF** to complete the catalytic oxidation process (CO³P). UV light is a sterilizer, which kills organics by emitting ultraviolet light inside of the UV Catalytic Chamber. This ultraviolet energy is also used to excite the OxyPuck and the ozone that is already in the water to enhance their individual oxidation potentials.

Cleaning Agents

In discharge systems the use of soaps or chemical additives is not recommended. If one must use detergents or additives they should be neutral pH, quick splitting variety and used sparingly. Cleaning Agents are added to open-looped recycling water systems to help remove the oils and road film off of the equipment being cleaned. Cleaning agents contain surfactants, which help to relieve the surface tension of the water, enabling the oils and particles to detach more readily from the equipment being cleaned. Some cleaning agents, however, may cause the oils to emulsify, which will not allow for easy removal, which in turn may end up back on the equipment. In order to prevent this, the cleaning agents in consideration for use with the system should be formulated with low to moderate foaming and limited oil emulsifying properties while remaining a neutral pH cleaner. **RGF** recommends the following two cleaning agents to be used with your system.

Enviro-Control

RGF has developed a specially formulated soap for closed-looped recycling systems called **Enviro-Control** to use with your system. This soap is a water white blend of biodegradable surfactants containing all of the qualities listed above, plus it helps prevent bacteria and algae growth, inhibit corrosion. It has no dyes, perfumes or thickeners added, and it helps to flocculate oil accumulation.

Enviro-Control can be purchased in a super concentrated form through your distributor or **RGF** at 1-561-848-1826 or FAX 1-561-848-9454.

Water Conditioner-1 (WC-1)

Water conditioners are a good addition to a recycling system because they help to maintain good water quality and help in releasing suspended solids. **RGF** has available a water conditioner that can do all of this and more, the **Water Conditioner 1 (WC-1)**. This water conditioner has many water quality improving abilities. It aids in the flocculation of suspended solids, reduces B.O.D. and C.O.D. loading, and helps to soften the water. WC-1 also inhibits corrosion on your system, providing more years of service and will help to lower the total suspended solids count, which will improve the color and clarity of your recycled water. Since WC-1 can provide all of these benefits, it should be made a regular part of the chemical additions to your system.

Dissolved and Suspended Solids

Total Dissolved Solids (T.D.S.)

T.D.S. represents the total conductive material actually dissolved in the water. It is the same as salt or sugar dissolved in water and should not be confused with suspended solids or turbidity. Total dissolved solids can include both organic and inorganic materials. Inorganic materials can be soluble in many cases and add to T.D.S. Any chemical addition to the water will increase T.D.S. (except OxyPuck). Water treatment chemicals often solve one problem but create another problem. While the addition of a flocking agent may remove suspended solids and turbidity, it may drastically increase T.D.S.

Eventually, a solution with increasing T.D.S. will reach a level where it is considered to be saturated (i.e. it has reached its solubility constant). Saturation is when the addition of a soluble or dissolved solid reaches the maximum ability of the water to hold it in solution at a given temperature. When the T.D.S. level exceeds this level, the material comes out of solution and either settles or forms crystals, which is how rock candy is made.

T.D.S. is measured by a special conductivity meter, which works on the principle that "pure" water has no conductivity of electrical current. The addition of material such as T.D.S. increases the electrical conductivity; therefore, the higher the reading, the higher the T.D.S. level. Readings are in Micro-Siemens - a unit used to measure low electrical current.

Total Suspended Solids

T.S.S. represents the total amount of fine colloidal particles floating in a liquid, too small to settle out, but kept in motion by Brownian movement. Brownian movement is the rapid vibratory motion of particles suspended in a liquid caused by the bombardment of the particle by the moving molecules of the liquid. The velocity varies inversely with the size of the particles and also depends on the viscosity of the medium. T.S.S., unlike T.D.S. (Total Dissolved Solids), does not dissolve in water and are deemed important because these solids will create unsightly conditions, sludge deposits and a demand for oxygen. Suspended solids can be organic or inorganic.

The standard way of testing waste water for suspended solids is to filter the waste water through a 0.45 μm (1 micron = 1 millionth of a meter) porosity filter. Anything on the filter paper after drying at a temperature of approximately 103°C is considered a portion of the suspended solids. Another way to measure suspended solids is by a device called a spectrophotometer. This device is used to measure photo metrically the quantity of light of a particular wavelength (S.S. = 810 nm) that is absorbed by the suspended solids in solution.

Chapter 7: Troubleshooting

Flow

SYMPTOM	PROBABLE CAUSE	SOLUTION
PROCESS SYSTEM		
1. PROCESS PUMP NOT OPERATING	<p>A) POWER IS NOT APPLIED TO PUMP</p> <p>B) PUMP HAS LOST PRIME</p> <p>C) SYSTEM VALVES ARE IMPROPERLY ALIGNED</p>	<p>A) VERIFY POWER IS APPLIED; THE PROCESS SYSTEM CONTROL SWITCH IS IN THE PROCESS POSITION AND THE BREAKER IS SHUT. ENSURE FLOAT SWITCHES ARE PROPERLY POSITIONED, UNOBSTRUCTED AND FREE TO SWING AND ADEQUATE WATER IS IN BOTH SUCTION AND DISCHARGE TANKS. ENSURE THE PROPER ELECTRICAL CONNECTIONS WERE MADE TO THE SYSTEM. REFER TO THE PROCESS PUMP COMPONENT MANUAL.</p> <p>B) VERIFY SYSTEM LINEUP. ENSURE UNOBSTRUCTED FLOW TO PUMP SUCTION. REPRIME PUMP ENSURING THAT PUMP CASING IS WATER FILLED. OPEN THE PRIMING PLUG AND RE-PRIME PUMP.</p> <p>C) CONDUCT VALVE LINEUP WITH P&ID.</p>
2. NO OR LOW FLOW THROUGH PROCESS SYSTEM	A) POLISH FILTERS ARE CLOGGED WITH PARTICULATE	A) PERFORM A POLISHING FILTER BACK FLUSH IN ACCORDANCE WITH PMS. IF THIS DOES NOT REMEDY PROBLEM THEN FILTERS ARE FOULED AND NEED TO BE REPLACED.

2. NO OR LOW FLOW THROUGH PROCESS SYSTEM	<p>A) MULTI-MEDIA FILTER IS CLOGGED WITH PARTICULATE</p> <p>B) POLISH FILTERS ARE CLOGGED WITH PARTICULATE</p>	<p>A) PERFORM A MULTI-MEDIA FILTER BACK FLUSH IN ACCORDANCE WITH PMS. IF THIS DOES NOT REMEDY PROBLEM THEN FILTER IS FOULED AND NEEDS TO BE REPLACED.</p> <p>B) PERFORM A POLISHING FILTER BACK FLUSH IN ACCORDANCE WITH PMS. IF THIS DOES NOT REMEDY PROBLEM THEN FILTERS ARE FOULED AND NEED TO BE REPLACED.</p>
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CFC SYSTEM		
1. CFC PUMP NOT OPERATING	<p>A) POWER IS NOT APPLIED TO PUMP</p> <p>B) PUMP HAS LOST PRIME</p> <p>C) SYSTEM VALVE IS IMPROPERLY ALIGNED</p>	<p>A) VERIFY POWER IS APPLIED; BREAKER IS SHUT. ENSURE THE PROPER ELECTRICAL CONNECTIONS WERE MADE TO THE SYSTEM. REFER TO THE CFC PUMP COMPONENT MANUAL.</p> <p>B) CHECK WATER LEVEL IN STORAGE TANK. ENSURE UNOBSTRUCTED FLOW TO PUMP SUCTION. REPRIME PUMP ENSURING THAT PUMP CASING IS WATER FILLED. CONDUCT VALVE LINEUP WITH P&ID.</p> <p>C) CONDUCT VALVE LINEUP WITH P&ID.</p>
2. UV/O3 CHAMBER ON HOUSING IS OFF	A) OZONE GENERATOR IS DEFECTIVE	A) CALL YOUR DISTRIBUTOR OR RGF FOR FURTHER TROUBLESHOOTING ADVICE.
3. UV/O3 CHAMBER LEAKS	<p>A) UV BULB RUBBER GROMMET IS IMPROPERLY SEATED.</p> <p>B) UV CHAMBER IS OVER PRESSURIZED</p> <p>C) INNER CHAMBER GLASS IS CRACKED OR BROKEN.</p>	<p>A) RE-SEAT BULB INTO GROMMET.</p> <p>B) ENSURE UNOBSTRUCTED FLOW. CONDUCT VALVE LINEUP WITH P&ID.</p> <p>C) INNER CHAMBER MUST BE REPLACED.</p>

Electrical

The WashMaster® system should be installed by a licensed electrician and should have a properly sized over-current protection (i.e. circuit breaker) device installed upstream of the device. Electrical Troubleshooting should be conducted by an electrically trained individual after he has carefully reviewed the electrical drawings in Engineering Drawings section. All indications should be considered: LED illumination, pump rotation and fluid flow.

SYMPTOM	PROBABLE CAUSE	SOLUTION
PROCESS SYSTEM		
1. INDICATOR LIGHTS NOT OPERATING	A) POWER IS NOT APPLIED B) LIGHT IS BLOWN OUT C) LOOSE WIRES D) BAD GROUND	A) VERIFY POWER IS APPLIED; THE SYSTEM B) CONSULT TECHNICIAN OR REMOVE 4X4 ELECT. BOX FROM REAR OF PANEL AND REPLACE LIGHT. C) CHECK ALL WIRE CONNECTIONS WITH MAIN POWER TURNED OFF AND TIGHTEN IF LOOSE. D) OPEN MAIN ELECT. BOX, CHECK GROUND STRIPS FOR LOOSE WIRE THEN TIGHTEN, IF NECESSARY
2. PROCESS SWITCHES NOT OPERATING	A) POWER IS NOT APPLIED B) LOOSE WIRES C) BAD GROUND D) BLOWN SWITCH	A) VERIFY POWER IS APPLIED; THE SYSTEM CONSULT TECHNICIAN OR REMOVE 4X4 ELECT. BOX FROM REAR OF PANEL AND REPLACE. B) CHECK ALL WIRE CONNECTIONS WITH MAIN POWER TURNED OFF AND TIGHTEN IF LOOSE. C) OPEN MAIN ELECT. BOX, CHECK GROUND STRIPS FOR LOOSE WIRE THEN TIGHTEN IF NECESSARY D) REMOVE 4X4 BOX ON REAR OF PANEL AND REPLACE PER ELECT. DIAGRAM.
3. UV/O3 LIGHT NOT OPERATING	A) GFI BLOWN BREAKER B) GFI LOOSE WIRES C) BURNED OUT BULB	A) OPEN GFI COVER AND PRESS RESET B) CHECK ALL WIRE CONNECTIONS WITH MAIN POWER TURNED OFF AND TIGHTEN IF LOOSE. C) CALL RGF OR YOUR DISTRIBUTOR

Chemistry

SYMPTOM	PROBABLE CAUSE	SOLUTION
CHEMICAL		
1. EFFLUENT RECYCLED WATER SMELLS	A) OXYPUCK FEED SYSTEM SOLUTION IS LOW OR EMPTY. B) OXYPUCK FEED SYSTEM IS NOT WORKING PROPERLY. C) UV/O3 CHAMBER NOT OPERATING.	A) REFILL OXYPUCK FEED SYSTEM. B) REFER TO THE LMI PUMP OPERATION MANUAL. C) SEE ELECTRICAL: UV/O3 CHAMBER NOT OPERATING.
2. EFFLUENT RECYCLED WATER IS VERY CLOUDY.	A) OXYPUCK FEED SYSTEM SOLUTION IS LOW OR EMPTY. B) OXYPUCK FEED SYSTEM IS NOT WORKING PROPERLY. C) UV/O3 CHAMBER NOT OPERATING. D) THE WATER CONDITIONER (WC-1, OPTIONAL) HAS NOT BEEN ADDED OR RESIDUAL LEVEL IS LOW.	A) REFILL OXYPUCK FEED SYSTEM. B) REFER TO THE LMI PUMP OPERATION MANUAL C) SEE ELECTRICAL: UV/O3 CHAMBER NOT OPERATING. D) INCREASE THE WC-1 INJECTION RATE.

NOTE:

If repeated attempts to reduce smell or clear up the recycled water fail to improve the water quality, or if the amount of soap needed to clean adequately rises to an unacceptable level. The water has become overburden with dissolved and suspended solids. The system should be drained and the spent water disposed of in accordance with local, state and federal regulations.

Chapter 8: Replacement Parts

General Ordering Information

When preparing to order replacement parts for your system:

- Have the **Model #** and **Serial #** of the unit ready when placing the order.
- Have the ship to address ready.
- Identify the part needed with the part # and description and call *RGF* or your local distributor to place an order.

Replacement Parts List

The following is a list of commonly needed replacement parts.

PART #	DESCRIPTION
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Filters and Parts

FL-078	FILTER MEDIA FOR MULTI-MEDIA FILTER
FP-073	MULTI-MEDIA FILTER VALVE ASSEMBLY
FL-086	25 micron POLISHING FILTER CARTRIDGE (ONE)
FP-051	O-RING FOR POLY FILTER HOUSING

Chemicals

CE-029	OXYPUCKS (18 PER PKG.)
EC-1-5	ENVIRO-CONTROL - 55 GALLONS
WC-1-5	WC-1 WATER CONDITIONER - 5 GALLONS

Pumps and Parts

PU-130	1/2 Hp. CFC SYSTEM PUMP
PU-140	1-1/2 Hp. CENTRIFUGAL PROCESS PUMP
PU-142	VITON SEAL FOR 1 1/2 Hp., PUMP
PU-32	1/3 Hp. S.S. LIFT STATION SUMP PUMP
PU-20	PUMP UP FLOAT SWITCH (30' CORD)
PU-25	PUMP DOWN FLOAT SWITCH (30' CORD)

Valves and Unions

VA-06-1	3/4" PVC BALL VALVE
VA-06-4	1 1/2" PVC BALL VALVE
VA-100	3/4" SOLENOID VALVE ASSEMBLY (NORMALLY CLOSED)
VA-100-1	3/4" 1 1/2" SOLENOID COIL ONLY (120 VAC
VA-22	1/2" BRASS FLOAT VALVE WITH FLOAT
VA-110	1 1/2" SOLENOID VALVE ASSEMBLY (NORMALLY CLOSED)
PF-253	3/4" PVC UNION
PF-256	1 1/2" PVC UNION
VA-51	1/4" FPT X 3/8" TUBE 90 DEG PVC VALVE

Misc. Parts

EL-580 – EL-582	PANEL INDICATOR LIGHTS (SPECIFY COLOR)
EL-160	OFF/ ON/ START SWITCH)
SA- 005T-16	UV/O3 CHAMBER
PT-117	OZONE VENTURI
PT-12	RGF GREY TOUCH-UP PAINT
HF-23	1/4" O.D. POLYETHYLENE TUBING

Chapter 9: Sub-Component Manuals

Process Pump and Pressure Pump



ITT

BGT

Residential Water Systems

Goulds Pumps

GT IRRI-GATOR™ Self-Priming[®]
Centrifugal Pumps – 60 Hz



New base on 1½ – 3 HP models.



Goulds Pumps is a brand of ITT Corporation.

www.goulds.com

Engineered for life

FEATURES

- ① ■ **Self-Priming Design:** Once pump is initially primed, filled with water, it will reprime when the water level rises above the end of the suction pipe.
- **Serviceable:**
 - Back pullout design allows disassembly of pump for service without disturbing piping.
 - Two compartment motor for easy access to motor wiring and replaceable components.
- **Diffuser (Guidevane):** Bolt down diffuser provides positive alignment with impeller. Diffuser has stainless wear ring for extended performance in abrasive conditions. F.D.A. compliant, injection molded, food grade, glass filled Lexan[®] for durability and abrasion resistance.
- **Impeller:** F.D.A. compliant, glass filled Noryl[®]. Corrosion and abrasion resistant.
- **Corrosion Resistant:** Electro-coat paint process is applied inside and out, then baked on.
- **Casing:** Cast iron construction. Four (4) bolt, back pull-out design. Tapped openings provided for vacuum gauge and casing drain.
- **Powered for Continuous Operation:** Pump ratings are within the motor manufacturer's recommended working limits. Can be operated continuously without damage.
- **Mechanical Seal:** Carbon/ceramic faces, BUNA elastomers. 300 series stainless steel metal parts. Pump design prevents the seal from running dry.

Goulds Pumps

GT Iri-Gator Self-Priming Centrifugal Pumps

APPLICATIONS

Specifically designed for the following uses:

- Lawn sprinkling
- Irrigation
- Air conditioning systems
- Heat pumps
- Water transfer
- Dewatering

SPECIFICATIONS

Pump:

- Pipe connections:
1½" NPT suction
1½" NPT discharge
- Capacities: to 110 GPM at 5 foot suction lift.
- Heads: to 128 feet.
- Reprime capabilities: to 25 feet suction lift.

- Maximum working pressure: 125 PSIG.
- Maximum water temperature: 140° F (60° C).
- Rotation: clockwise when viewed from motor end.

Motor:

- NEMA standard open drip proof.
- 60 Hz, 3500 RPM.
- Stainless steel shaft.
- Single phase: ¼–1½ HP, 115/230 V; 2 and 3 HP, 230 V only. Built-in overload with automatic reset.
- Three phase: 230/460 V. Overload protection must be provided in starter unit. Starter and heaters (3) must be ordered separately.
- Optional TEFC motors are available. See price book for order numbers.

AGENCY LISTINGS



Canadian Standards Association



Underwriters Laboratories

Goulds Pumps is ISO 9001 Registered.

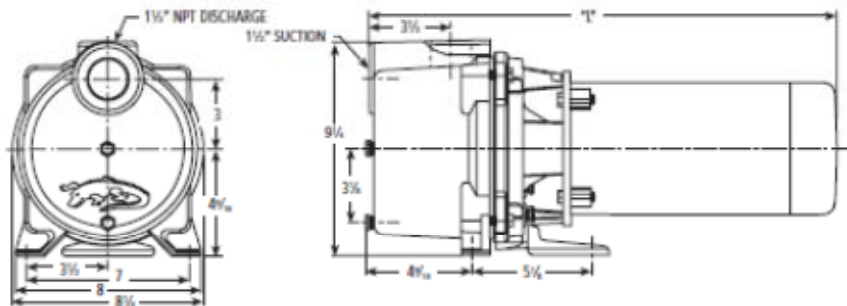
STANDARD ODP MODELS

Model	HP	Phase
GT07	¼	1
GT10	1	
GT15	1½	
GT20	2	
GT30	3	3
GT073	¼	
GT103	1	
GT153	1½	
GT203	2	
GT303	3	

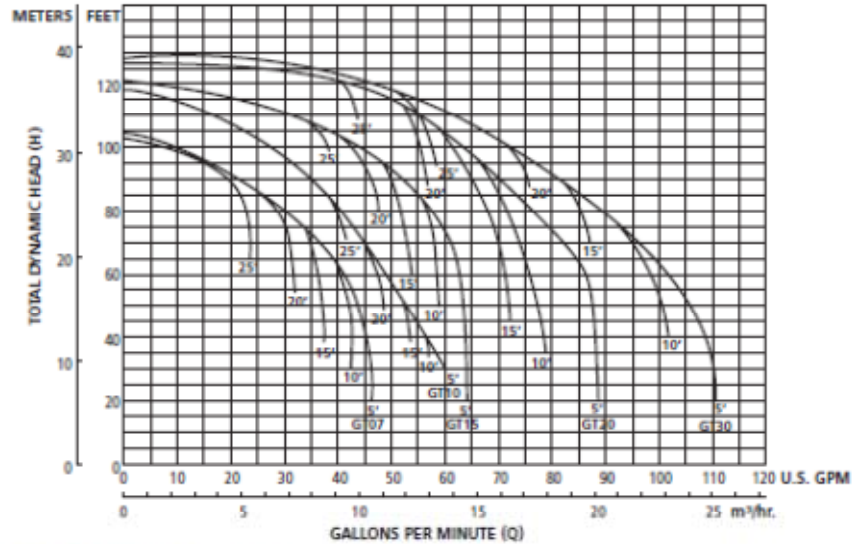
DIMENSIONS AND WEIGHTS

Model	GT07	GT10	GT15	GT20	GT30	GT073	GT103	GT153	GT203	GT303
HP	¼	1	1½	2	3	¼	1	1½	2	3
Length "L"	19½	19½	21½	20½	21½	19	19½	20½	20½	21½
Width	8½									
Height	9½									
Weight (lbs.)	48	52	60	65	76	49	52	55	69	71
Phase	Single					Three				

(All dimensions are in inches and weights in lbs. Do not use for construction purposes.)



PERFORMANCE CURVE



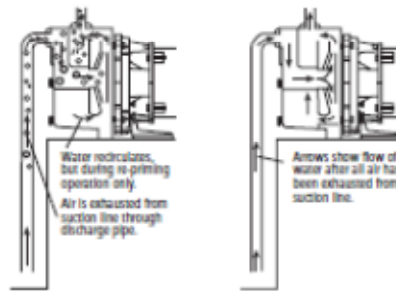
Single and three phase have same performance.

PERFORMANCE RATINGS

Model	PSI Discharge Pressure	Section Lift in Feet				
		5	10	15	20	25
GT07/ GT073	20	44	41	36	31	24
	30	34	31	26	22	14
	40	10	4	0	0	0
GT10/ GT103	20	53	51	49	46	41
	30	43	41	38	36	32
	40	29	22	16	8	0
GT15/ GT153	20	63	59	54	49	39
	30	60	55	51	46	37
	40	45	38	33	20	14
GT20/ GT203	20	86	77	70	59	46
	30	80	72	67	57	44
	40	65	60	57	50	43
GT30/ GT303	20	105	100	88	76	60
	30	92	90	84	75	57
	40	73	67	62	55	50

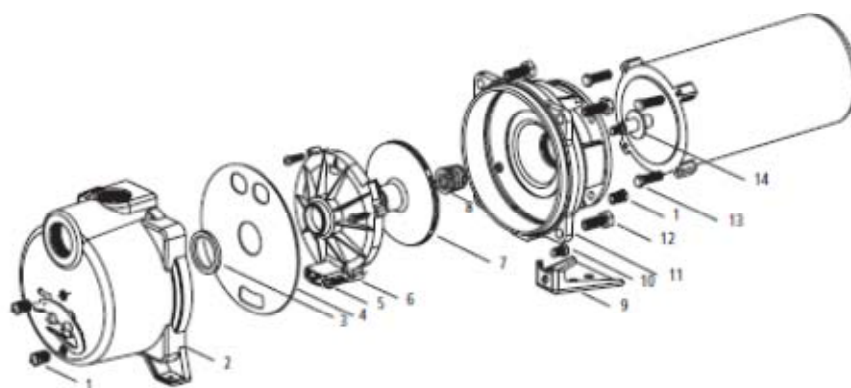
Performance ratings are in GPM.

SELF-PRIMING (AFTER INITIAL PRIME)[®]



COMPONENTS

Item No.	Description
1	Plug - 1/2" NPT
2	Casing
3	Seal ring - diffuser
4	Diaphragm
5	Machine screw
6	Diffuser
7	Impeller
8	Mechanical seal
9	Foot
10	Bolt - foot to adapter
11	Motor adapter
12	Bolt - casing to adapter
13	Bolt - adapter to motor
14	Deflector



ITT
2881 East Bayard Street, Seneca Falls, NY 13148
Phone: (315) 568-7123 • Fax: (315) 568-7973
www.goulds.com

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CFC System Pump

STA-RITE[®]

“LT” SERIES CENTRIFUGAL PUMPS

O W N E R ' S M A N U A L

INSTALLATION, OPERATION & PARTS

MODELS

1/6 HP	LT1/6L
1/2 HP	LTACL
3/4 HP	LTADL
3/4-1/8 HP	LTAYDRL

This manual should be furnished to the end user of this pump; its use will reduce service calls and chance of injury and will lengthen pump life.

Sta-Rite Pool/Spa Group

296 Wright Street, Delavan, WI 53115

International: 262-728-6551, FAX: 262-728-7550

www.sta-rite.com

Union City, TN • Delavan, WI • Mississauga, Ont. • Montreal, Q.C.

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S68 (Rev. 4/19/04)

'LT' SERIES CENTRIFUGAL PUMP

To avoid unneeded service calls, prevent possible injuries, and get the most out of your pump, **READ THIS MANUAL CAREFULLY!**

The Sta-Rite 'LT' Series pump:

- Is designed to circulate water in above ground swimming pools, and in spas, hot tubs, and solar systems
- Is an excellent performer; durable, reliable, with non-clogging impeller.

Table of Contents

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Troubleshooting Guide.....	11
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IMPORTANT SAFETY INSTRUCTIONS

Always follow basic safety precautions with this equipment, including the following:

⚠ WARNING To reduce the risk of injury, do not permit children to use this product unless they are closely supervised at all times.

⚠ CAUTION This pump is for use with permanently installed pools and may also be used with hot tubs and spas if so marked. Do not use with storable pools. A permanently installed pool is constructed in or on the ground or in a building such that it cannot be readily disassembled for storage. A storable pool is constructed so that it may be readily disassembled for storage and reassembled to its original integrity.

SAVE THESE INSTRUCTIONS

READ AND FOLLOW SAFETY INSTRUCTIONS!

⚠ This is the safety alert symbol. When you see this symbol on your system or in this manual, look for one of the following signal words and be alert to the potential for personal injury.

⚠ DANGER warns about hazards that will cause death, serious personal injury, or major property damage if ignored.

⚠ WARNING warns about hazards that can cause death, serious personal injury, or major property damage if ignored.

⚠ CAUTION warns about hazards that will or can cause minor personal injury or property damage if ignored.

NOTICE indicates special instructions not related to hazards.

Carefully read and follow all safety instructions in this manual and on equipment. Keep safety labels in good condition; replace if missing or damaged.

⚠ WARNING Incorrectly installed or tested equipment may fail, causing severe injury or property damage. Read and follow instructions in owner's manual when installing and operating equipment. Have a trained pool professional perform all pressure tests.

1. Do not connect system to a high pressure or city water system.
2. Use equipment only in a pool or spa installation.
3. Trapped air in system can cause explosion. BE SURE all air is out of system before operating or testing equipment.

Before pressure testing, make the following safety checks:

- Check all clamps, bolts, lids, and system accessories before testing.
- Release all air in system before testing.
- Tighten Sta-Rite trap lids to 30 ft. lbs. (4.1 kg-m) torque for testing.
- Water pressure for test must be less than 25 PSI (7.5 kg/cm²).
- Water Temperature for test must be less than 100° F. (38° C).
- Limit test to 24 hours. After test, visually check system to be sure it is ready for operation. Remove trap lid and retighten hand tight only.

NOTICE: These parameters apply to Sta-Rite equipment only. For non-Sta-Rite equipment, consult manufacturer.

⚠ CAUTION Motor normally operates at high temperature and will be too hot to touch. It is protected from heat damage during operation by an automatic internal cut off switch. Before handling pump or motor, stop motor and allow it to cool for twenty minutes.

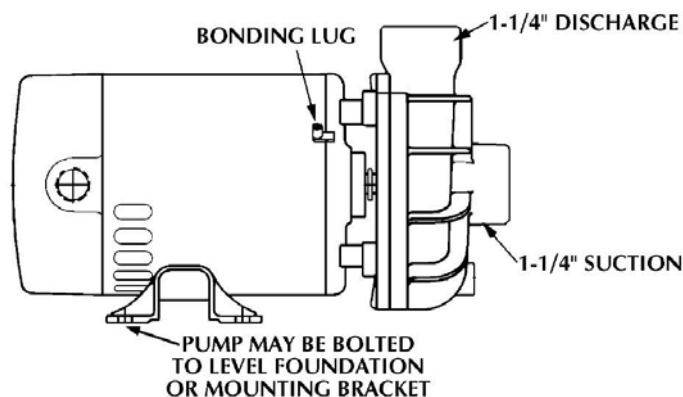


FIGURE 1

INSTALLATION

Only qualified, licensed personnel should install pump and wiring.

Pump mount must:

Be solid - Level - Rigid - Vibration free. (To reduce vibration and pipe stress, bolt pump to mount.)

Allow pump suction inlet height to be as close to water level as possible.

Allow use of short, direct suction pipe (To reduce friction losses).

Allow for gate valves in suction and discharge piping.

Have adequate floor drainage to prevent flooding.

Be protected from excess moisture.

Allow adequate access for servicing pump and piping.

NOTICE: Use Teflon tape or Plasto-Joint Stik¹ for making all threaded connections to the pump. Do not use pipe dope; pipe dope will cause stress cracking in the pump.

NOTICE: Pump suction and discharge connections have molded in thread stops. DO NOT try to screw pipe in beyond these stops.

Teflon Taping Instructions:

Use only new or clean PVC pipe fittings.

Wrap male pipe threads with one to two layers of Teflon tape. Cover entire threaded portion of pipe.

Do not overtighten or tighten past thread stop in pump port!

If leaks occur, remove pipe, clean off old tape, rewrap with one to two additional layers of tape and remake the connection.

NOTICE: Support all piping connected with pump!

¹Lake Chemical Co., Chicago, Illinois

Piping:

Use at least 1-1/4" (32mm) IPS PVC. Increase size if a long run is needed.

To avoid strains on the pump, support both suction and discharge pipes independently. Place these supports near the pump.

To avoid a strain left by a gap at the last connection, start all piping at the pump and run pipe away from the pump.

Never use a suction pipe smaller than pump suction connection.

To avoid airlocking, slope suction pipe slightly upward toward the pump.

NOTICE: To prevent flooding when removing pump for service, all flooded suction systems must have gate valves in suction and discharge pipes.

Fittings:

Fittings restrict flow; for best efficiency use fewest possible fittings.

Avoid fittings which could cause an air trap.

Pool fittings must conform to International Association of Plumbing and Mechanical Officials (IAPMO) standards.

Use only non-entraping suction fitting or double suction.

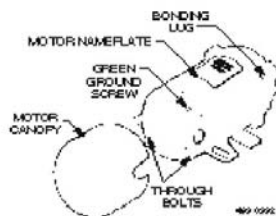


Figure 2 – Typical ground screw and bonding lug locations.

ELECTRICAL

⚠ Ground motor before connecting to electrical power supply. Failure to ground motor can cause severe or fatal electrical shock hazard.

⚠ Do not ground to a gas supply line.

⚠ To avoid dangerous or fatal electrical shock, turn OFF power to motor before working on electrical connections.

⚠ Ground Fault Circuit Interrupter (GFCI) tripping indicates an electrical problem. If GFCI trips and will not reset, have a qualified electrician inspect and repair electrical system.

⚠ Exactly match supply voltage to nameplate voltage (115 Volt single phase only). Incorrect voltage can cause fire or seriously damage motor and voids warranty. If in doubt consult a licensed electrician.

Voltage

Voltage at motor must be not more than 10% above or below motor nameplate rated voltage or motor may overheat, causing overload tripping and reduced component life. If voltage is less than 90% or more than 110% of rated voltage when motor is running at full load, consult power company.

Grounding/Bonding

Install, ground, bond and wire motor according to local or National Electrical Code requirements.

Permanently ground motor. Use green ground terminal provided under motor canopy or access plate (See Figure 2); use size and type wire required by code. Connect motor ground terminal to electrical service ground.

Bond motor to pool structure. Use a solid copper conductor, size No. 8 AWC (8.4 sq. mm) or larger. Run wire from external bonding lug (see Figure 2) to reinforcing rod or mesh.

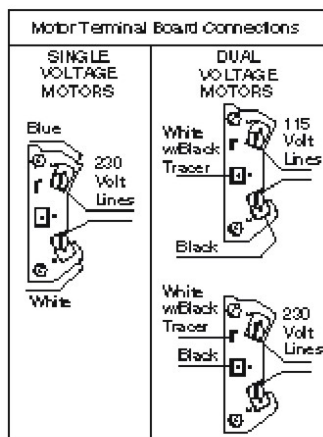


Figure 3A - Wiring hook-up diagram.

Connect a No. 8 AWC (8.4 sq. mm) solid copper bonding wire to the pressure wire connector provided on the motor housing and to all metal parts of the swimming pool, spa, or hot tub and to all electrical equipment, metal piping or conduit within 5 feet (1.5 m) of the inside walls of swimming pool, spa, or hot tub.

Wiring

Pump must be permanently connected to circuit. Table I gives correct wire and circuit breaker sizes for the pump alone. If other lights or appliances are also on the same circuit, be sure to add their amp loads to pump amp load before figuring wire and circuit breaker sizes. (If unsure how to do this or if this is confusing, consult a licensed electrician.) Use the load circuit breaker as the master on-off switch.

Install a Ground Fault Circuit Interrupter (GFCI) in circuit; it will sense a short-circuit to ground and disconnect power before it becomes dangerous to pool users. For size of GFCI required and test procedures for GFCI, see manufacturer's instruction.

In case of power outage, check GFCI for tripping (which will prevent normal pump operation). Reset if necessary.

NOTICE: If you do not use conduit when wiring motor, be sure to seal wire opening on end of motor to prevent dirt, bugs, etc., from entering.

⚠ Values given in table below are for PUMP ONLY. If additional accessories are installed on pump motor circuit (heater, blower, etc.), include their amperage draw when figuring wire and circuit breaker sizes.

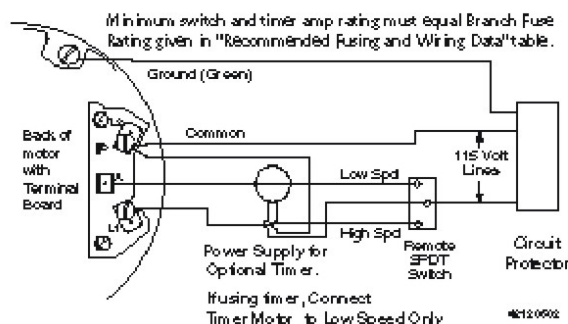


Figure 3B - Remote switching for 115V 2-Speed pumps. Timer supply should be unswitched.

TABLE I - RECOMMENDED FUSING AND WIRING DATA - 60 Cycle Motors

Pump Model	Motor HP	Branch Fuse Rating Amps*	Max Load Amps	Voltage/Hz/Phase	Serv. to Motor - Dist. in Ft. (M)		
					0-100' (0-30 M)	101-200' (30.6-60 M)	201-300' (60.9-90 M)
LT1/6L	1/6	15	4.5	115/60/1	14(2)	14(2)	14(2)
LTACL	1/2	15	8.4	115/60/1	14(2)	12(3)	10(5.5)
LTADL	3/4	15	11.4	115/60/1	14(2)	10(5.5)	8(8.4)
LTAYDRL	3/4-1/8	15	10.0-3.0	115/60/1	14(2)	12(3)	10(5.5)

* Branch Short Circuit Protection (Non Time-Delay Fuse).

⚠ CAUTION

⚠ WARNING



Hazardous suction.
Can trap hair or
body parts, causing
severe injury
or death.

Do not block
suction.

⚠ DANGER



**Too much heat
can cause nausea,
dizziness, fainting or
death.**

Check temperature
before using spa.

OPERATION

NEVER run pump dry. Running pump dry may damage seals, causing leakage and flooding. Fill pump with water before starting motor.

⚠ Do not add chemicals to spa system directly in front of pump suction.
Adding undiluted chemicals may damage pump and voids warranty.

Open gate valves before starting system.

Pump will prime itself when used in flooded suction system.

Be sure to release all air from filter and piping system; see spa/filter owner's manual.

On 2-Speed models, low speed is used for filtration and heating; high speed provides therapy jet action.

⚠ Do not block pump suction. To do so with body may cause severe or fatal injury. Small children using spa must ALWAYS have close adult supervision.

- Tub should have dual suction outlets to prevent body or hair entrapment.
- Use only tub suction fittings certified to meet ASME/ANSI standard A112.19.8M-1987.

NOTICE: Do not block pool return or spa jets! To do so may flood area causing damage to equipment and water damage to surrounding area.

Spa or Tub Water:

Keep water level at least two inches above bottom of skimmer opening when system is not in use. Failure to do so can allow air to enter system, causing pump to lose its prime.

Keep water temperature at 104°F (40°C) or below.

Age or health conditions may require a lower temperature; consult a physician for more information.

If in doubt, start at a lower temperature and gradually increase it according to your experience.

Keep an accurate thermometer in bath; check it before getting in.

⚠ Do not use or allow the use of the spa by anyone using alcohol or drugs. The effects of hot water, alcohol and/or drugs can cause dizziness and falling, loss of consciousness, or heart attack.

⚠ A long bath in hot water may cause hyperthermia (too much heat in the body) which can be fatal. Some symptoms of hyperthermia are:

- Nausea
- Dizziness
- Fainting

If these symptoms appear while in the spa, **GET OUT AT ONCE!**

Cool the body at once with cold towels or a cool shower.

Call a doctor if symptoms do not go away.



Draining Pump



To avoid dangerous or fatal electrical shock hazard, turn **OFF** power to motor before draining pump.

Storage/Winterizing:



Explosion hazard. Purging the system with compressed air can cause components to explode, with risk of severe injury or death to anyone nearby. Use only a low pressure (below 5 PSI), high volume blower when air purging the pump, filter, or piping.

NOTICE: Allowing pump to freeze will damage pump and void warranty!

NOTICE: Do not use anti-freeze solutions (except propylene glycol) in your pool/spa system. Propylene glycol is non-toxic and will not damage plastic system components; other anti-freezes are highly toxic and may also damage plastic components in the system.

Drain all water from pump and piping when expecting freezing temperatures or when storing pump for a long time (see instructions below).

Keep motor dry and covered during storage.

To avoid condensation/corrosion problems, do not cover pump with plastic.

For outdoor/unprotected installations:

1. Gravity drain system as far as possible.
2. Protect areas which retain water with non-toxic propylene glycol antifreeze ("RV antifreeze").
3. Enclose entire system in a weatherproof enclosure.
4. To avoid condensation/corrosion damage, allow ventilation; do not wrap system in plastic.
5. Use a 40% propylene glycol/60% water solution to protect pump to -50 degrees F (-46 degrees C).

Startup For Winterized Equipment

1. Remove any temporary weather protection placed around system.
2. Follow filter manufacturer's instructions for reactivation of the filter.
3. Inspect all electrical wiring for damage or deterioration over the shutdown period. Have a qualified serviceman repair wiring as needed.
4. Inspect and tighten all watertight connections.
5. Open all valves in suction and return piping.
6. Remove any winterizing plugs in piping system.
7. Drain all antifreeze from system.
8. Close all drain valves and replace all drain plugs in piping system.
9. Prime pump according to instructions on Page 7.

PUMP SERVICE



To avoid dangerous or fatal electrical shock hazard, turn **OFF** power to motor before working on pump or motor.

No lubrication or regular maintenance is needed beyond reasonable care and periodic cleaning.



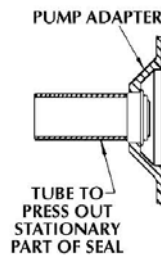


Figure 4

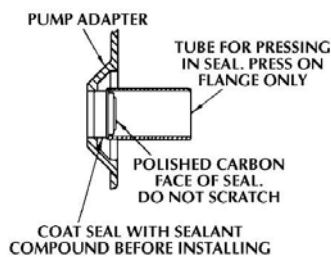


Figure 5

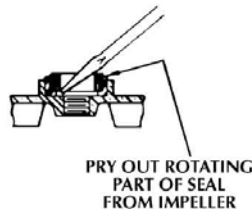


Figure 6



Figure 7

If shaft seal is damaged, repair as follows:

Removing Old Seal

1. Disconnect power to pump motor.
2. Drain water to below level of suction and discharge piping and disconnect pipes from pump body.
3. Remove nine capscrews, Key No. 10, Page 11, from pump body, Key No. 8.
4. Remove pump body from seal plate, Key No. 3. Use care to not damage gasket, Key No. 4, when opening pump body. If damaged, replace.
5. Remove cover from end of motor to expose shaft and electrical components.
6. Place a 7/16" open end wrench on flats of motor shaft at cover end below centrifugal switch mechanism. Hold shaft, and when looking at impeller, turn impeller clockwise and remove from shaft.
7. Unscrew four through-bolts under motor cover to remove seal plate from motor.
8. Drive stationary part of shaft seal out of seal plate using rigid tubing or pipe as shown in Figure 4.
9. Clean seal plate cavity and motor shaft.

Installing New Seal

1. Coat seal cup with Sealastic #732 RTV sealant before pressing seal into seal cavity. Press into place with a tube or pipe of correct diameter to press on seal cup rim only, as shown in Figure 5.
2. Pry loose the ceramic seal seat in back of impeller, using screwdriver between seat and cavity in impeller as shown in Figure 6. Clean cavity from which seat was removed.
3. Lubricate O-Ring on seal seat with liquid soap solution. Press seat into impeller cavity with polished face up as shown in Figure 7. Use cardboard disc or large washer to protect surface of ceramic seat of new seal.
BE SURE you do not scratch or nick seal surface.
4. To Reassemble pump, reverse steps one through seven. See Exploded View, Page 11.



TROUBLESHOOTING GUIDE

- ⚠ Read and understand safety and operating instructions in this manual before doing any work on pump!
- ⚠ Only qualified personnel should electrically test pump motor!

Pump does not operate:

1. Check GFCI for proper operation according to GFCI manufacturer's instructions.
2. Check for plugged impeller. Follow disassembly/assembly instructions under "Pump Service", Page 8.
3. Consult dealer/installer or service representative.

Inadequate circulation or jet action:

1. Check for blocked fittings. Block fittings will cause poor flow and poor jet action.
2. Consult dealer/installer or service representative.

Excessive air in system - pump loses primes:

1. Make sure water level is at least 2" (51 mm) above top of jets with system not operating.
2. Make sure there are no leaks in suction piping.
3. Make sure there is no vortex (whirlpool) at the suction.
4. Consult dealer/installer or service representative.

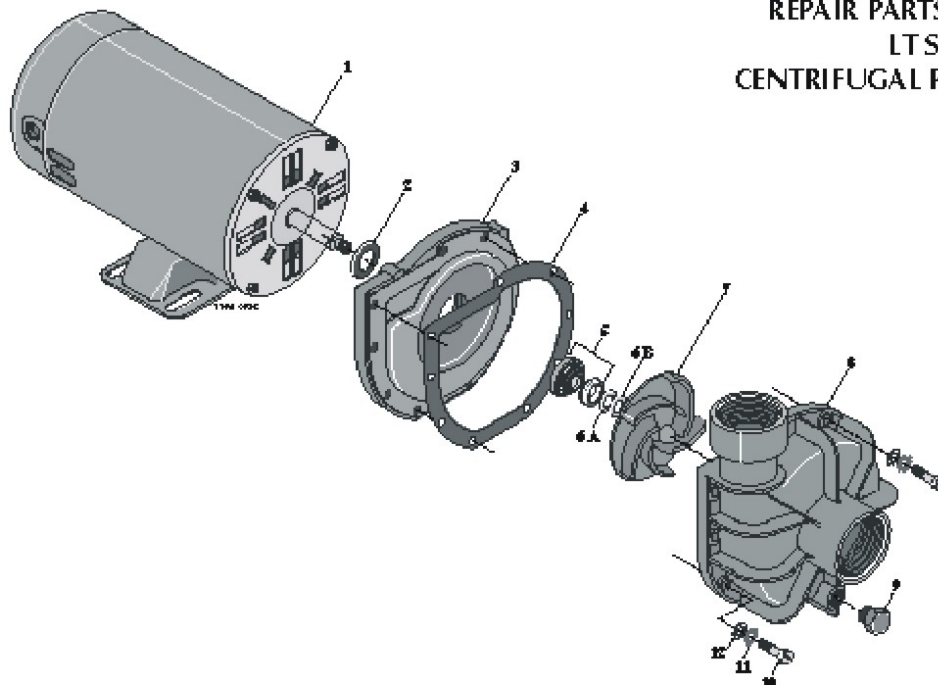
Circuit breaker in home panel trips repeatedly:

1. Breaker must be of adequate capacity.
2. For GFCI breaker: test according to GFCI manufacturer's instructions.
3. Be sure no other lights and appliances are on circuit.
4. Consult dealer/installer or service representative.

Mechanical troubles and noises:

1. If pump suction and discharge piping are not adequately supported, pump assembly will be strained. See "Installation", Page 4.
2. Do not mount pump on a wooden platform! Securely mount on a concrete platform for quietest performance.
3. Air leak in suction line (bubbles in water returning to pool). Repair leak. Tighten trap lid.
4. Foreign matter (gravel, metal, etc.) in pump impeller. Disassemble pump, clean impeller, follow "Pump Service" instructions on Page 8 for reassembly.
5. Cavitation.
Improve suction conditions by increasing pipe size, decreasing number of fittings. Increase discharge pressure (reduce flow by throttling discharge gate valve).

**REPAIR PARTS LIST
LT SERIES
CENTRIFUGAL PUMP**



Key No.	Description	Qty.	Model Number			
			LT1x1L ½ HP	LTACL ½ HP	LTADL ½ HP	LTAYDRL ¾-1 HP
1	Motor 115V/60Hz/1 Ph.*	1	A800A16L	A800C1LL	A800DLL	A800DLL-Y
2	Slinger	1	C69-7	C69-7	C69-7	C69-7
3	Seal Plate	1	C1-84P2	C1-84P2	C1-84P2	C1-84P2
4	Gasket	1	C20-31B	C20-31B	C20-31B	C20-31B
5	Shaft Seal	1	U109-68SS	U109-68SS	U109-68SS	U109-68SS
6A	Shim (.010 Thick) As Required	2	C43-21D	C43-21D	C43-21D	C43-21D
6B	Shim (.029 Thick) As Required	2	C43-22D	C43-22D	C43-22D	C43-22D
7	Impeller	1	C5-151P2	C5-151P1	C5-175P	C5-175P
8	Volute	1	C101-247P	C101-247P	C101-247P	C101-247P
9	Pipe Plug, ½" NPT	1	WC78-40T	WC78-40T	WC78-40T	WC78-40T
10	Cap screw, 10x½"	9	U30-871SS	U30-871SS	U30-871SS	U30-871SS
11	Lockwasher	9	U43-22SS	U43-22SS	U43-22SS	U43-22SS
12	Washer, Flat	9	U43-113SS	U43-113SS	U43-113SS	U43-113SS
SERVICE PARTS						
	Seal and Gasket Kit	1	PP1075	PP1075	PP1075	PP1075
	Overhaul Kit	1	PP1080	PP1081	PP1082	PP1082
	Adapter, Union - 1-1/2" Slip	1	U11-183P	U11-183P	U11-183P	U11-183P
	Collar, Union	1	U11-182P	U11-182P	U11-182P	U11-182P
	O-Ring, Union	1	U9-225	U9-225	U9-225	U9-225
	Adapter, Union - 1-1/4" MPT	1	U11-186P	U11-186P	U11-186P	U11-186P

* For SK110 or SK220 Series Cabinet Spa, order Motor No. C218-221 E.

NOTE: Includes quick disconnect Union Assemblies. Part No. U11-186P (2).

Contains 2 each of - U11-182P1, U11-183P1, U11-186P and U9-225.

STA-RITE LIMITED WARRANTY

Pumps, filters, skimmers, underwater lights (except bulbs), accessories and fittings manufactured by Sta-Rite are warranted to be free of defects in material and workmanship for one (1) year from date of installation.

Product specific warranties: Year from date of installation

HRPS, DEPS, System 3, System 2 and Post-Clear
Tanks 10 years
Internal filter components and valves 1 year

Max-Si[®] term - Pool/Spa Heaters 2 years
Heater Enclosure only (Upper RH & LH; lower enclosure; and control board enclosure).... 10 years

Automatic Pool Cleaners including Hose 2 years

Crystal-Flo filters - Tanks 10 years pro-rated*
Valve and internal components 1 year

Post-Flo II - Tanks 10 years
Elements 1 year

PFC Cartridge -
Filter Tanks 5 years pro-rated (1st 2 years full)
Elements 1 year

System 2 Above Ground Systems - Tanks 10 years
Pumps / Platform and Internals 1 year

Pumps 1 year
When equipped with A. O. Smith
2-compartment motors (Does not include pumps sold as part of a systems package) 2 years

Traps / In-Line Strainers 1 year

Vertical Commercial Filter - Tanks 10 years
Internals 1 year

Horizontal Commercial Filter
Tanks 5 years
(Years 6-9, Promoted declining 20%/year, Yr. 10 - 10%)
Internals 1 year

* Full warranty coverage is in effect for one year after installation. The pro-rated warranty covers the *tank only* during the 2nd through 10th year after installation. The amount covered decreases by 10% each year. (i.e., 2nd year 90% covered, 3rd year 80% covered, etc.).

The foregoing warranties relate to the original consumer purchaser ("Purchaser") only. Sta-Rite shall have the option to repair or replace the defective product, at its sole discretion. Purchasers must pay all labor and shipping charges necessary to replace the product covered by this warranty. Requests for warranty service must be made through the installing dealer. This warranty shall not apply to any product that has been subject to negligence, misapplication, improper installation or maintenance, or other circumstances which are not in Sta-Rite's direct control.

This warranty sets forth Sta-Rite's sole obligation and Purchaser's exclusive remedy for defective products.

STA-RITE SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL OR CONTINGENT DAMAGES WHATSOEVER.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES. IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL NOT EXTEND BEYOND THE DURATION OF THE APPLICABLE EXPRESS WARRANTIES PROVIDED HEREIN.

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitations on how long an implied warranty lasts, so the above limitations or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

Supersedes all previous publications.

Sta-Rite Industries
293 Wright St., Delavan, WI 53115

▲ Retain Warranty Certificate (upper portion) in a safe and convenient location for your records.

DETACH HERE: Fill out bottom portion completely and mail within 10 days of purchase/installation to:
Sta-Rite, Attn: Warranty Dept., 293 Wright St., Delavan, WI 53115



Warranty Registration Card

Name _____

Address _____

City _____ State _____ Zip _____

Purchase Date _____

Product Purchased _____

☐ New installation ☐ Replacement

Type of Pool ☐ Inground ☐ Vinyl ☐ Fiberglass ☐ Gunite

Size of Pool _____

Years pool has been in service ☐ less than 1 ☐ 1-5 ☐ 5-10

Purchased from: _____

Company name _____

Address _____

City _____ State _____ Zip _____

Please send me more information on these other products from Sta-Rite.

- ☐ Pumps ☐ Filters ☐ Automatic Pool Cleaners
☐ Maintenance Equipment ☐ Test Strips
☐ Heaters

6457779 (Rev. 11/24/05)

Auto Backwash Timer

OMRON[®]

Solid-State Repeat-Cycle Timer

H3CR-F

1/16 DIN Solid-State Repeat-Cycle Timer

- Wide power supply ranges of 100 to 240 VAC 24 VAC/VDC, 12VDC
- Combinations of independent long or short ON/OFF time settings are possible
- Fourteen time ranges from 0.05 s to 30 h or 1.2 s to 300 h
- Repeat cycle models with either ON start or OFF start operating functions
- Easy sequence checks through instantaneous outputs for a zero set value at any time range
- 11-pin and 8-pin models are available



Ordering Information

Part number	Repeat cycle OFF start	H3CR-F	H3CR-F8	H3CR-F-300	H3CR-F8-300
	Repeat cycle ON start	H3CR-FN	H3CR-F8N	H3CR-FN-300	H3CR-F8N-300
Timing units	0.05 s to 30 h			1.2 s to 300 h	
Terminal form	11-pin models		8-pin models	11-pin models	8-pin models
Supply voltages	100 to 240 VAC, 24 VAC/DC, 12 VDC				
Operating mode	Repeat cycle				

Note: Specify both the model number and supply voltage when ordering.

Example: H3CR-F 24 VAC/DC

Supply voltage

MODEL NUMBER LEGEND

H3CR - -
 1 2 3 4

1. Classification

F: Repeat cycle timers

2. Configuration

None: 11-pin socket

8: 8-pin socket

3. Repeat cycle mode

None: OFF start

N: ON start

4. Specified Type

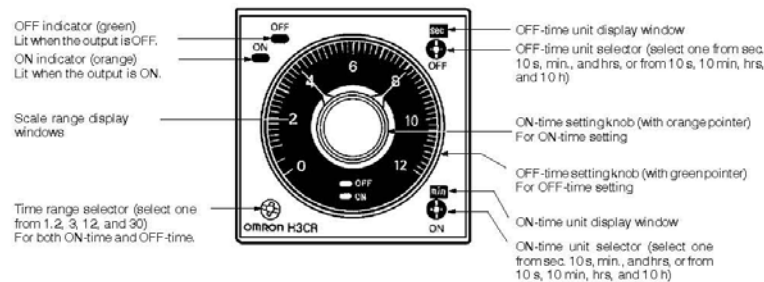
300: Long time range (1.2 s to 300 h) type

H3CR-F ———— OMRON ———— H3CR-F

■ **ACCESSORIES**

Description			Part number
Sockets	11-pin	Bottom surface or track mounting, top screw terminals	P2CF-11
		Bottom surface or track mounting, top screw terminals, finger-safe terminal conforms to VDE0106/P100	P2CF-11-E
		Back mounting, for use with Y92F-30 mounting adapter, bottom screw terminals	P3GA-11
	8-pin	Bottom surface or track mounting, top screw terminals	P2CF-08
		Bottom surface or track mounting, top screw terminals, finger-safe terminal conforms to VDE0106/P100	P2CF-08-E
		Back mounting, for use with Y92F-30 mounting adapter, bottom screw terminals	P3G-08
		Terminal cover for P3G sockets, conforms to VDE0106/P100	Y92A-486
Panel mounting adapter	Fits behind panel, ideal for side-by-side installation. Use P3G _ _ sockets		Y92F-30
	Panel-mounting adapter (88 mm x 58 mm x 66 mm)		Y92F-73
	Panel-mounting adapter (58 mm x 50 mm x 66 mm)		Y92F-74
Protective cover	Hard plastic cover protects against dust, dirt and water; not for use with panel covers		Y92A-48B
NEMA 4 cover	Waterproof front cover		Y92A-48N
Colored panel covers	Light gray (Munsell No. 5Y7/1) to match case		Y92P-48GL
	Medium gray (Munsell No. 5Y5/1)		Y92P-48GM
	Black (Munsell No. N1.5)		Y92P-48GB
Mounting track	DIN rail, 50 cm (1.64 ft) length; 7.3 mm thick		PFP-50N
	DIN rail, 1 m (3.28 ft) length; 7.3 mm thick		PFP-100N
	DIN rail, 1 m (3.28 ft) length; 16 mm thick		PFP-100N2
End plate			PFP-M
Spacer			PFP-S

■ **RANGE SELECTION**



0.05 s to 30 h Models

Time range	Time units			
	s (sec)	x 10 s (10 s)	min	h (hrs)
1.2	0.05 to 1.2	1.2 to 12	0.12 to 1.2	
3	0.3 to 3	3 to 30	0.3 to 3	
12	1.2 to 12	12 to 120	1.2 to 12	
30	3 to 30	30 to 300	3 to 30	

Note: Instantaneous output is available at any time range. To obtain instantaneous output, set to below 0.

1.2 s to 300 h Models

Time range	Time units			
	x 10 s (10 s)	x 10 min (10 min)	h (hrs)	x 10 h (10 h)
1.2	1.2 to 12	1.2 to 12	0.12 to 1.2	1.2 to 12
3	3 to 30	3 to 30	0.3 to 3	3 to 30
12	12 to 120	12 to 120	1.2 to 12	12 to 120
30	30 to 300	30 to 300	3 to 30	30 to 300

Note: Instantaneous output is available at any time range. To obtain instantaneous output, set to below 0.

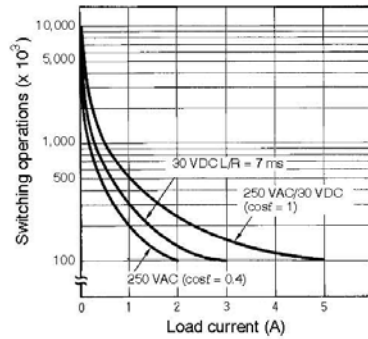
H3CR-F ————— Omron ————— H3CR-F

Specifications

Part number		H3CR-F/-F-300	H3CR-F8/-F8-300	H3CR-FN/-FN-300	H3CR-F8N/-F8N-300
Operating mode		OFF start		ON start	
Supply voltage (see note)	AC	100 to 240 VAC (50/60 Hz)			
	AC/DC	24 VAC/DC (50/60 Hz)			
	DC	12 VDC			
Operating voltage range		85% to 110% of rated supply voltage, 90% to 110% with 12-VDC models			
Power consumption	AC	100 to 240 VAC: 10 VA (100 VAC applied)			
	AC/DC	24 VAC/DC: 2 VA (24 VAC applied)/1 W (24 VDC applied)			
	DC	12 VDC: 1 W			
Start, Reset, Gate inputs		ON-impedance: 1 k Ω max. ON residual voltage: 1 V max OFF impedance: 500 k Ω min.			
Control outputs	Type	DPDT relay			
	Max. load	5 A at 250 VAC, p.f. = 1			
	Min. load	10mA at 5 VDC			
Repeat accuracy		\pm 0.3% full scale max. (\pm 0.3% full scale max. \pm 10 ms in ranges of 1.2 and 3 s)			
Setting error		\pm 5% full scale max \pm 0.05 s max.			
Resetting system		Time-limit operation/time-limit reset or self-reset			
Resetting time		Minimum power-opening time: 0.1 sec			
Indicators		Output ON indicator (orange LED), output OFF indicator (green LED)			
Materials		Plastic case (light gray Munsell 5Y7/1)			
Mounting		Panel, DIN track, or surface depending on socket selected			
Connections		11-pin round socket	8-pin round socket	11-pin round socket	8-pin round socket
Weight		Approx. 100 g (4.23 oz.)			
Approvals		UL, CSA, CE			
Ambient temperature	Operating	-10° to 55°C (14° to 131°F) with no icing			
	Storage	-25° to 65°C (-13° to 149°F) with no icing			
Humidity		35% to 85%			
Vibration	Mechanical durability	10 to 55 Hz with 0.75-mm single amplitude each in three directions			
	Malfunction durability	10 to 55 Hz with 0.5-mm single amplitude each in three directions			
Shock	Mechanical durability	980 m/s ² (100G) each in three directions			
	Malfunction durability	98 m/s ² (10G) each in three directions			
Variation due to voltage change		\pm 0.5% full scale max. (\pm 0.5% full scale max. \pm 10 ms in ranges of 1.2 and 3 s)			
Variation due to temperature change		\pm 2% full scale max. (\pm 2% full scale max. \pm 10 ms in ranges of 1.2 and 3 s)			
Service life	Mechanical	20 million operations min. (under no load at 1,800 operations/h)			
	Electrical	100,000 operations min. (5 A at 250 VAC, resistive load at 1,800 operations/h)			
Insulation resistance		100 M Ω min. (at 500 VDC)			

Note: A power supply with a ripple of 20% max. (single-phase power supply with full-wave rectification) can be used with each DC model.

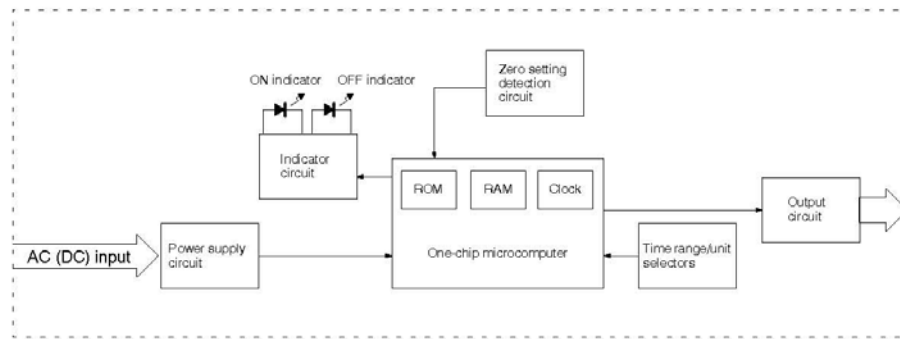
Engineering Data



Note: A maximum current of 0.15 A can be switched at 125 VDC (cosφ = 1) and a maximum current of 0.1 A can be switched if L/R is 7 ms. In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 10 mA at 5 VDC (failure level: P).

Operation

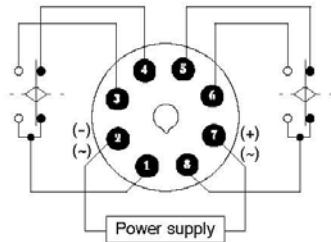
■ BLOCK DIAGRAMS



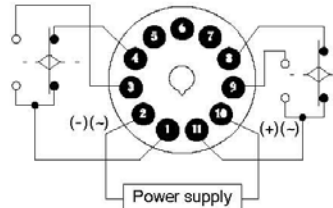
H3CR-F ————— Omron ————— H3CR-F

Timing Charts

H3CR-F8
H3CR-F8N
H3CR-F8-300
H3CR-F8N-300



H3CR-F
H3CR-FN
H3CR-F-300
H3CR-FN-300



Note: Leave terminals 5, 6, and 7 open.
Do not use them as relay terminals.

Note: Part numbers with an "N" included are Repeat cycle ON start timers. All others are Repeat cycle OFF start timers.

Operating mode	Timing chart
Repeat cycle OFF start	<p>tON: ON set time tOFF: OFF set time</p>
Repeat cycle ON start	<p>tON: ON set time tOFF: OFF set time</p>

H3CR-F

OMRON

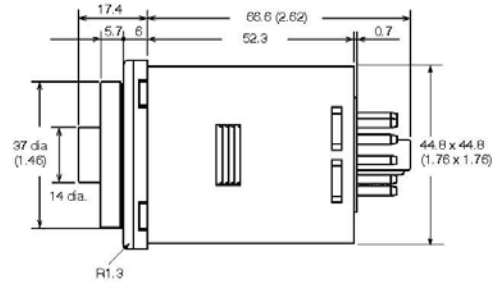
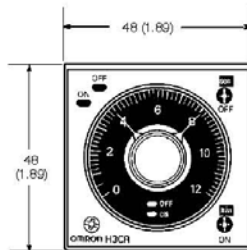
H3CR-F

Dimensions

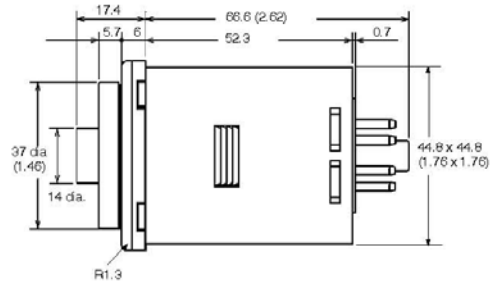
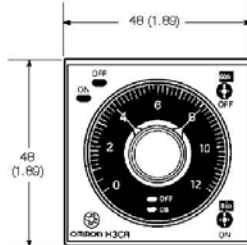
■ TIMERS

Unit: mm (inch)

H3CR-F
H3CR-FN
H3CR-F-300
H3CR-FN-300



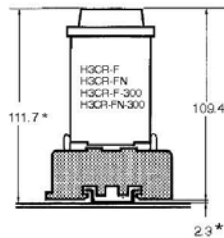
H3CR-F8
H3CR-F8N
H3CR-F8-300
H3CR-F8N-300



■ TRACK MOUNTING

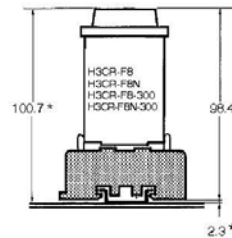
11-Pin Models

P2CF-11/P2CF-11-E



8-Pin Models

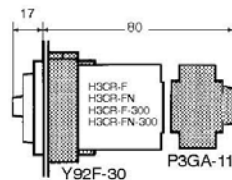
P2CF-08/P2CF-08-E



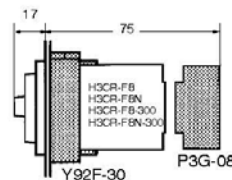
* These dimensions vary with the kind of DIN track (reference value).

■ PANEL MOUNTING

11-Pin Models



8-Pin Models



H3CR-F

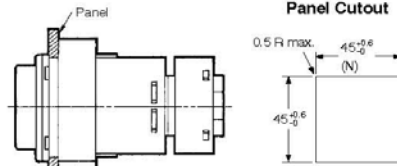
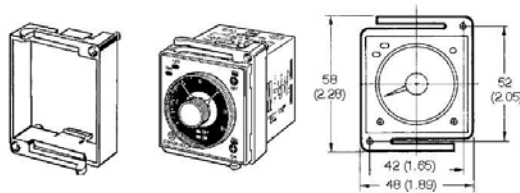
OMRON

H3CR-F

■ PANEL-MOUNTING ADAPTERS

Unit: mm (inch)

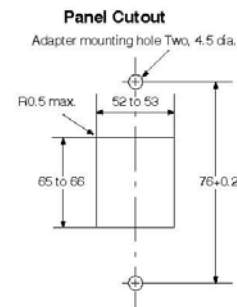
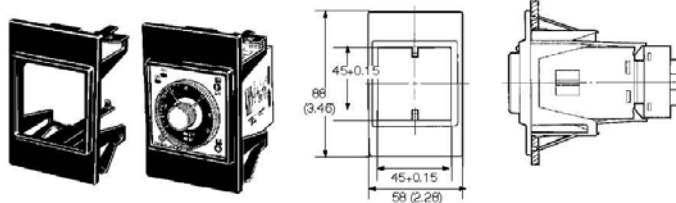
Y92F-30



Note: Recommended panel thickness is 1 to 3.2 mm.

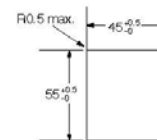
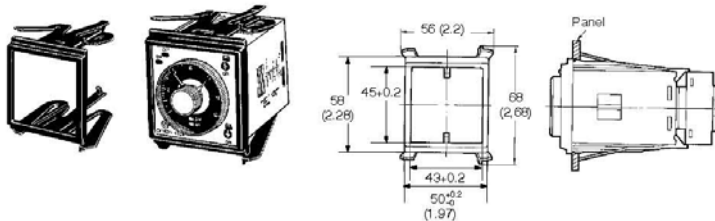
Note: Adapter installs behind the panel. It is ideal for side by side installation. Use P3G-11 or P3G-08 sockets.

Y92F-73



Note: The mounting panel thickness should be 1 to 3.2 mm.

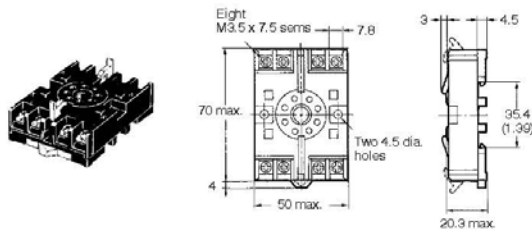
Y92F-74



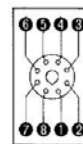
Note: The mounting panel thickness should be 1 to 3.2 mm.

■ SOCKETS

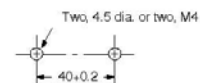
Track-Mounting/Front-Connecting Socket
P2CF-08



Terminal Arrangement/
Internal Connections
(Top View)



Surface Mounting Holes



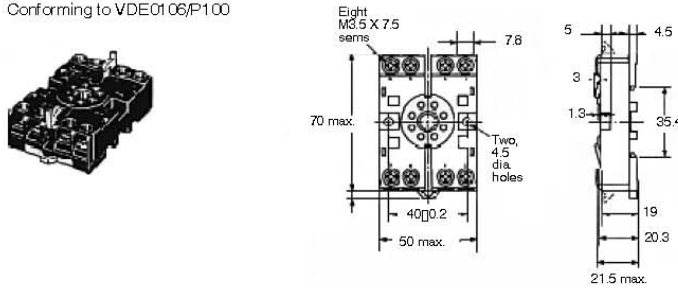
H3CR-F

OMRON

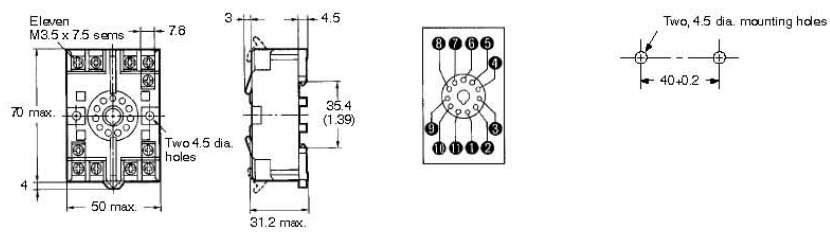
H3CR-F

P2CF-08-E (Finger-Safe Terminal Type)

Conforming to VDE01 06/P100

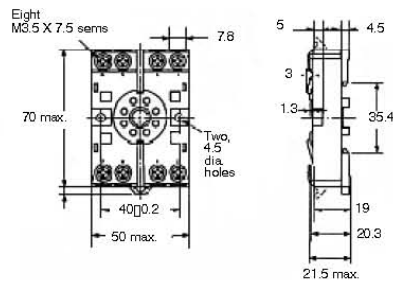


P2CF-11



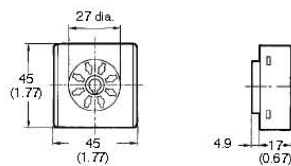
P2CF-08-E (Finger-Safe Terminal Type)

Conforming to VDE01 06/P100



Back-Mounting Socket

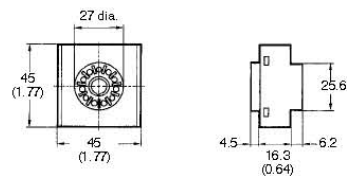
P3G-08



**Terminal Arrangement/
Internal Connections
(Bottom View)**



P3GA-11



H3CR-F

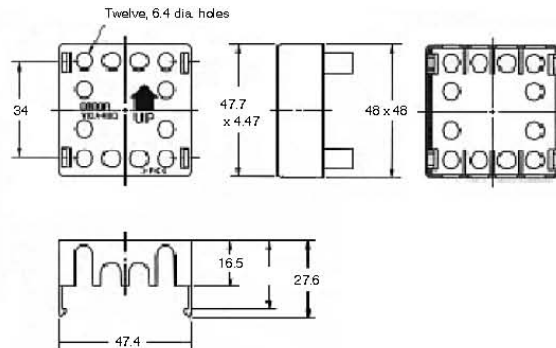
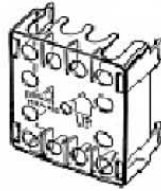
OMRON

H3CR-F

Finger-Safe Terminal Cover for P3G(A)

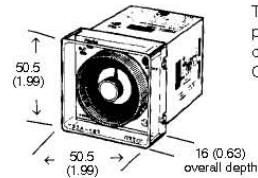
Conforming to VDE0106/P100

Y92A-48G



PROTECTIVE COVER

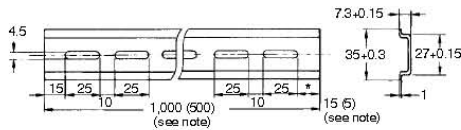
Y92A-48B



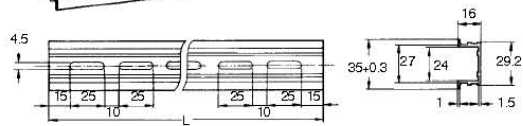
The hard plastic protective cover prevents accidental resetting. It also shields the front panel from dirt and water. The cover is intended for use in areas where unusual service conditions do not exist. The Y92A-48B cover cannot be used with the Y92P Panel Covers below.

MOUNTING TRACK AND ACCESSORIES

PFP-100N/PFP-50N

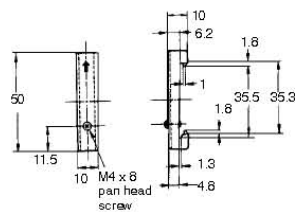
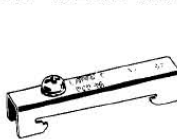


PFP-100N2

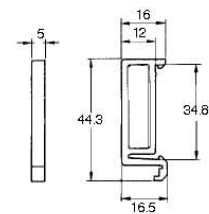


Note: The values shown in parentheses are for the PFP-50N.

PFP-M End Plate



PFP-S Spacer





RGF[®]
ENVIRONMENTAL GROUP, INC.

System Warranty



ULTRASORB® System Limited Warranty

This warranty supersedes and replaces any warranty statements orally made by the Sales Person, Distributor, or Dealer or contained in written instructions or other Brochures or informational documents in relation to this product.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF

The Manufacturer Warrants, parts only for a period of twelve (12) months from the time of startup, not to exceed fourteen (14) months from the date of shipment, the new **ULTRASORB®** System to be free from defects in material and workmanship under the normal use and service when operated and maintained in strict accordance with the **ULTRASORB®** System operating instructions.

The Manufacturer's obligations under this warranty is being limited to repairing or replacing any part found to its satisfaction to be so defective, provided that such part is, upon request, returned to the Distributor or Manufacturer, with freight prepaid. This warranty does not cover parts damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, abuse, or any other than its intended use, accident, neglect, or from improper operation, maintenance, installation, modification or adjustments.

This warranty does not cover parts or equipment used with the **ULTRASORB®** System that is not made by the manufacturer, since these items are covered by warranties from the respective manufacturer. The Manufacturer makes no warranty as to electrical apparatus or other materials not of its manufacturer.

The Manufacturer's sole responsibility shall be limited to repair or replacement of the equipment within the terms stated herein above.

The Manufacturer shall not be liable for consequential or punitive damages whether or not caused by manufacturer's negligence or resulting from any expressed or implied warranty or breach thereof. Consequential damages for the purpose of this agreement shall include, but are not limited to, the loss of use, income or profit, or loss of or damage to property occasioned by or arising out of in-operation, use, the operation, installation, repair, or replacement of the equipment or otherwise.

It is understood that any controversy or claim arising out of or relating to the **ULTRASORB® System Warranty** herein or the alleged breach thereof, shall be settled by arbitration in accordance with the rules of the Arbitration Association of America, Palm Beach County, Florida, and judgment upon the award rendered by the arbitrator(s) may be entered in any court baring jurisdiction thereof.

PROCESS PERFORMANCE WARRANTY

The Manufacturer Warrants that when installed and operated in accordance with the Manufacturer's written instructions, the **ULTRASORB®** System will remove dirt, oil, and grease from wash water. No other warranty expressed or implied should be considered valid. There are numerous operating conditions which will affect the efficiency of the **ULTRASORB®** System, thereby making any general water quality statement unrealistic.

WARRANTY SERVICE

In order to validate your warranty, fill out the **Warranty Validation Form** and return to **RGF** at the address below:

RGF WARRANTY DEPARTMENT

Outside of Florida (800) - 842 - 7771

In Florida (561) - 848 - 1826

FAX (561) - 848 - 9454

To obtain warranty service contact **RGF** and a warranty representative will help with the warranty problem and determine the status and a **Warranty Authorization Number** will be given at that time. Be prepared to answer specific questions on the problem at hand. If there are warranted parts that need to be returned, fill in the **Warranty Authorization Number on the Warranty Request Form** along with the items being submitted for warranty and a brief explanation of the problem or defect and return it and the part(s) to:

RGF Environmental Group, Inc.

C/o Warranty Department

3875 Fiscal Court

West Palm Beach, Florida 33404



ULTRASORB[®] System Limited Warranty Policy

RGF ENVIRONMENTAL GROUP, INC. ["Manufacturer"] Warrants the **ULTRASORB[®] System** to be free from DEFECTS in Material and Workmanship.

HOW LONG IS THE WARRANTY?

- For twelve (12) months from the date of initial startup of the system; not to exceed fourteen (14) months from the date of delivery.
- The Installation / Startup Record and Warranty Registration Form should be signed and dated by an authorized officer or employee of the customer and returned to RGF promptly to activate the warranty.

HOW DO I CONTACT RGF ENVIRONMENTAL GROUP ABOUT MY WARRANTY, A QUESTION, OR A COMPLAINT?

- A question or a complaint may be addressed directly by your local Distributor or dealer.
- If they cannot answer the question or complaint directly, then call or FAX the Warranty Department at RGF at:

RGF WARRANTY DEPARTMENT
Outside of Florida (800) - 842 - 7771
In Florida (561) - 848 - 1826
FAX (561) - 848 - 9454

ARE THERE ANY PARTS THAT ARE NOT COVERED BY THIS WARRANTY? (That the Manufacturer will not repair or replace)

- Parts that are damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, abuse, any other than it's intended use, accident, neglect, or from improper operation, maintenance, installation modification or adjustments.
- Parts not made by the Manufacturer, such as the electric pressure pump motor or other materials not of its manufacturer. However, RGF will process the claim with the pump or other manufacturer.

WHAT SHOULD BE DONE IN THE EVENT THAT THE EQUIPMENT IS DAMAGED BY SHIPPING?

- Immediately upon receipt of the system, the purchaser is responsible to take the shipping containers off of the truck and inspect the equipment and parts for damage.
- If there is any visible damage to the equipment:
 1. Notify the driver of the courier company immediately and write on the Bill of Lading what is damaged or missing.
 2. Call **RGF** immediately at **1 - (800) - 842 - 7771** outside of Florida, **1 - (561) - 848- 1826** in Florida, or **FAX 1- (561) - 848 - 9454**.

WHAT IF DAMAGE IS FOUND ON THE EQUIPMENT AFTER THE COURIER HAS LEFT?

- Claims for concealed shipping damage must be reported to the courier and a copy sent to RGF in writing via **FAX 1 - (561) 848 - 9454** or certified U.S. mail within fifteen (15) days from the date of delivery.

NOTE:

The courier company will not cover the damages if the foregoing steps are not adhered to.

STEPS THAT SHOULD BE TAKEN IF WARRANTY WORK OR REPLACEMENT IS NEEDED.

- Call your local distributor or RGF Warranty Department and notify them of the problem or malfunction. Be prepared to be very descriptive with the problem.
- If it is determined that a part has malfunctioned due to defect, a **Warranty Authorization Number** will be given for tracking the part. Fill out the **Warranty Request Form** along with the Warranty Authorization number and return it along with the defective part prepaid to:

**RGF Environmental Group Inc.
C/o Warranty Department
3875 Fiscal Court
West Palm Beach, Florida 33404**

THINGS THAT SHOULD BE DONE TO HELP KEEP THE ULTRASORB SYSTEM RUNNING EFFICIENTLY.

- Read the Operations Manual thoroughly.
- Make sure all of the employees who operate the system are fully trained on the procedures for operating the system and follow preventive maintenance routines strictly.
- Do not run water that has contaminants through the system that it is not designed to remove.
- Make sure the system is operated in accordance with the Manufacturer's suggested instructions.
- Replace filters as recommended in the Operations Manual.
- Control the water quality in accordance with RGF's suggested guidelines.
- Keep sump pits, trenches, and weirs cleared of heavy sediment build up. Heavy solids build up will cause the sump pump to overheat and fail to operate properly. Failure to prevent this will void the sump pumps warranty.

- Lack of a water clarifier (such as hydrogen peroxide, chlorine, WC-1, Ozone, etc.) will cause algae to grow resulting in plugged filters and foul smell.

WHAT SERVICE IS EXPECTED FROM THE DISTRIBUTOR?

- The Distributor will install, perform the initial startup, and train your personnel.

Should there be any questions relating to this warranty policy information, please feel free to contact our customer service representative at:

RGF Customer Service

Outside of Florida (800) - 842 - 7771

In Florida (561) - 848 - 1826

FAX (561) - 848 - 9454

Or Write

RGF Environmental Group, Inc.

C/o Customer Service Dept.

3875 Fiscal Ct.

West Palm Beach, FL 33404

Product Registration and Return Forms



**ULTRASORB® System
Warranty Request Form**

NOTE: THIS FORM MUST BE COMPLETED AND ACCOMPANY ALL RETURNED ITEMS

Warranty Authorization Number: **W-**_____

CUSTOMER: NAME _____
 ADDRESS _____
 PHONE _____ FAX _____

DISTRIBUTOR: NAME _____
 ADDRESS _____
 CONTACT _____

UNIT: MODEL _____
 SERIAL # _____
 DATE OF PURCHASE _____

ITEMS BEING SUBMITTED FOR WARRANTY:

PLEASE LIST THE PARTS AND GIVE A BRIEF DESCRIPTION OF THE PROBLEM.

ITEMS

- 1) _____
2) _____

DESCRIPTION (COMMENTS)

- 1) _____
2) _____
3) _____

SHIP TO: ***RGF ENVIRONMENTAL GROUP, INC.***
 C/o WARRANTY DEPTMENT
 3875 FISCAL COURT
 WEST PALM BEACH, FLORIDA 33404
 FAX 561-848-9454

(FOR RGF USE ONLY)

DATE ITEMS RECV'D _____
RECEIVED BY _____
REPLACEMENT PART SENT/WARRANTY APPROVED ☐ WARRANTY DENIED ☐



**ULTRASORB[®] System
Warranty Validation Form**

To validate the Warranty for the system, this form must be read, signed and returned to:

*RGF Environmental Group, Inc.
C/o Warranty Department
3875 Fiscal Court
West Palm Beach, Florida 33404
FAX 561-848-9454*

1. I have inspected the system upon arrival for shipping damage and have reported any problems to the local distributor, the Courier Company, or *RGF* within the required time period.
2. I have been provided with training on the operation and procedures for the system by the distributor or *RGF* representative, during the installation and startup of the system.
3. I understand it is the customer's responsibility to:
 - Regularly monitor and maintain the water chemistry of the system and to utilize properly only any chemicals or cleaning agents that are compatible with the equipment.
 - To regularly clean out the sump pit and perform suggested preventive maintenance on the system in order to keep the system in good working order. I understand that failing to do so will adversely affect the efficiency of the system. I also understand that it is my responsibility to properly dispose of the used filters, pit sediment, and any other by-products accordingly.
 - Protect the system from extreme (high/low) temperatures to prevent damage to the components and piping of the system.
 - Notify the local distributor or *RGF* Warranty Dept. immediately upon any malfunction of the system in order to receive warranted work or parts.
4. I understand that any controversy or claim arising out of or relating to the **ULTRASORB[®] System Warranty** herein or the alleged breach thereof, shall be settled by arbitration in accordance with the rules of the Arbitration Association of America, Palm Beach County, Florida, and judgment upon the award rendered by the arbitrator(s) may be entered in any court baring jurisdiction thereof.

I hereby acknowledge the above.

Customers Name _____

Address _____

Signature _____ **Date** _____



ULTRASORB[®] System Installation / Startup Record

Model Number _____ Installation Date _____
Serial Number _____ Start-Up Tech. _____
Distributor _____
Customer _____
Address _____
Phone () _____ FAX () _____ Contact _____

Names of Trainees	Position	Initials
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

What is Being Cleaned _____ Hr's. Per Day _____

Washpad Design & Const. By? _____

Is the Washpad Satisfactory? Yes ____ No ____ If No, Explain _____

Was the Unit Missing Parts? Yes ____ No ____ If Yes, Explain _____

Did the Unit Have Shipping or Hidden Damage? Yes ____ No ____ If Yes, Explain _____

List Any Options/Modifications with this Unit. _____



ULTRASORB[®] System Installation / Startup Checklist

MAINTENANCE PROCEDURES, CHECK IF COVERED & APPLICABLE

<input type="checkbox"/> Overall System Description	<input type="checkbox"/> Sump Pump & Maintenance
<input type="checkbox"/> EPA & Sewer Rules	<input type="checkbox"/> Electrical, Shutoffs, Etc.
<input type="checkbox"/> Wash Pad Maintenance	<input type="checkbox"/> Centrifugal Separator
<input type="checkbox"/> Solids Cleaning Procedure	<input type="checkbox"/> Oil Accumulator
<input type="checkbox"/> Bleed Lines	<input type="checkbox"/> Coalescing Tubes
<input type="checkbox"/> Solids Grid	<input type="checkbox"/> Hydrocarbon Absorber II
<input type="checkbox"/> Filter Media	<input type="checkbox"/> Centrifugal Pump
<input type="checkbox"/> Hydrocarbon Absorber III	<input type="checkbox"/> Chlorinator
<input type="checkbox"/> Jet Pump and Switch	<input type="checkbox"/> Fresh Water Make-up
<input type="checkbox"/> TurboHydrozone	<input type="checkbox"/> Air Compressor
<input type="checkbox"/> Polishing Filters	<input type="checkbox"/> Pressure Gauges
<input type="checkbox"/> Pressure Tank	<input type="checkbox"/> 3 Way Control Valve
<input type="checkbox"/> Options: _____	<input type="checkbox"/> Options: _____
<input type="checkbox"/> Options: _____	<input type="checkbox"/> Options: _____

CRITICAL FUNCTIONS AND PROCEDURE DISCUSSIONS

<input type="checkbox"/> Basic Water Chemistry; PH, Alkalinity, TDS	<input type="checkbox"/> Operator Safety; Clothing, Ventilation, Etc.
<input type="checkbox"/> Algae/Bacteria Control; Chlorine, Hydrogen Peroxide	<input type="checkbox"/> Cleaning Agents; Enviro- Control, Ultra-Safe
<input type="checkbox"/> Water Cycling, WC1	<input type="checkbox"/> Water Management
<input type="checkbox"/> Water Testing; ETS Kit, PH Paper, TDS Meter	<input type="checkbox"/> Recycled / Fresh Water
	<input type="checkbox"/> Where to Get Help; Manuals, Distributor, RGF

CUSTOMER HANDOUTS AND SUPPORT MATERIAL

<input type="checkbox"/> Operating Manuals	<input type="checkbox"/> Water Test Kit
<input type="checkbox"/> Maintenance Video	<input type="checkbox"/> Spare Parts List

CUSTOMER EVALUATION OF START-UP TRAINING:

How Would You Rate Your Training? Good ____ Fair ____ Poor ____

General Comments _____

RGF Tech. Rep. Signature _____

Trainees Signature _____



**ULTRASORB[®] System
Client Questionnaire**

Company Name _____

Contact Person _____

Location _____

Phone () _____

RGF Dealer/Salesman _____

Purchase Date (approx.) _____

Model _____ Serial Number _____

HOW WOULD YOU RATE THE FOLLOWING?

	GOOD	FAIR	POOR
General Operation	_____	_____	_____
Recycled Water Quality	_____	_____	_____
Quality of System	_____	_____	_____
Service & Support	_____	_____	_____
Warranty	_____	_____	_____
Installation / Training	_____	_____	_____
Safety	_____	_____	_____
RGF Dealer / Salesman	_____	_____	_____
Value	_____	_____	_____

Would you purchase another RGF System? Yes ____ No ____

Comments _____

Completed By: _____ Date _____

Please return this form to:

RGF Environmental Group, Inc.
C/o Customer Service Dept.
3875 Fiscal Court
West Palm Beach, FL 33404
Fax: 516-848-9454

Glossary of Terms

Aeration Tower

Tall 2" dia. PVC pipe on the Series I Tank used to mix air into the waste stream to enhance oil separation and remove V.O.C.'s (volatile organic compounds).

Back Flush Cartridge Filter

A small cartridge filter used to remove any solids from the back flush water which may clog the MS³ Membranes or Polishing Filters during back flushing.

Back Up H.I.P. Absorber Filter

This filter is an auxiliary H.I.P. Absorber that is activated when water usage rate exceeds product water rate produced by the MS³ Membranes.

CFC System Pump

A continuous flow control centrifugal pump used to circulate the recycled water through the CO³P System (Chemical Injection, Ozone Venturi and UV/O³ Catalytic Chamber) and supplies the water to the cleaning equipment.

CO³P system

(Catalytic Oxidation Process) System of low cost oxidant production is designed to provide a hydroxyl radical for contaminated water treatment. This system utilizes ozone, UV and OxyPuck to create a hydroxyl radical ion for maximum oxidation and biodegradation.

Control Panel

The Control Panel contains all of the equipment and electrical components used to control the system: flow control valves, pressure gauges, indicator lights, switches and the hour meter.

Grass Catcher

A poly cart designed to remove large solids and grass from the waste stream before it enters the system.

H.I.P. Absorber

An absorption media filter designed to remove herbicides, insecticides and pesticides from the recycled water stream.

HCA-3 Absorber

Housed in a polyethylene vessel, is a hydrocarbon absorber used as a final measure of removing oils before the water is processed through the Polishing Filters or MS³ Membranes. The Absorber consists of two highly absorbent medium, polyisocyanurate and fibrous polypropylene, to absorb low micron particles of oil, fuels, solvents, and hydrocarbons.

Main Drain Return Line

A recommended method for returning the system drains to the front end of the trench system. This line should be sized accordingly to accommodate the system drains.

Ozone and Chemical Venturi

A venturi used in the CO³P system, which draws ozone produced by the UV/O³ Catalytic Chamber and mixes it with the OxyPuck before it enters the chamber.

Polishing Filter

The polishing filter is a polypropylene vessel, housed in a filter canister that is used to remove small to microscopic particles from the process water and the supply water streams.

Process Pump

A centrifugal pump located on the equipment rack of the Series II Equipment Skid, pumps the process water through the specific filters of the system.

Series III Storage Tank

A 500 (or 800) gallon cylindrical polyethylene tank used to store the recycled water for later use.

UV/O³ Catalytic Chamber

The new UV/O³ combination chamber produces over three times the ozone and approximately twice the ultraviolet radiation as our initial design. When these two components of the CO³P process are combined into one unit, they become more effective, efficient and compact.

Vision 2000

The Vision 2000 line was designed as modular units, to suit various treatment technologies. RGF has several individual components that may be integrated together to suit your environmental needs.

Engineering Drawings

General System Layout

Piping & Instrumentation Diagram (P&ID)

An engineered diagram which indicates the flow path of the system outlining placement and nomenclature of valves, pressure gauges and unions.

ELECTRICAL LADDER DRAWING

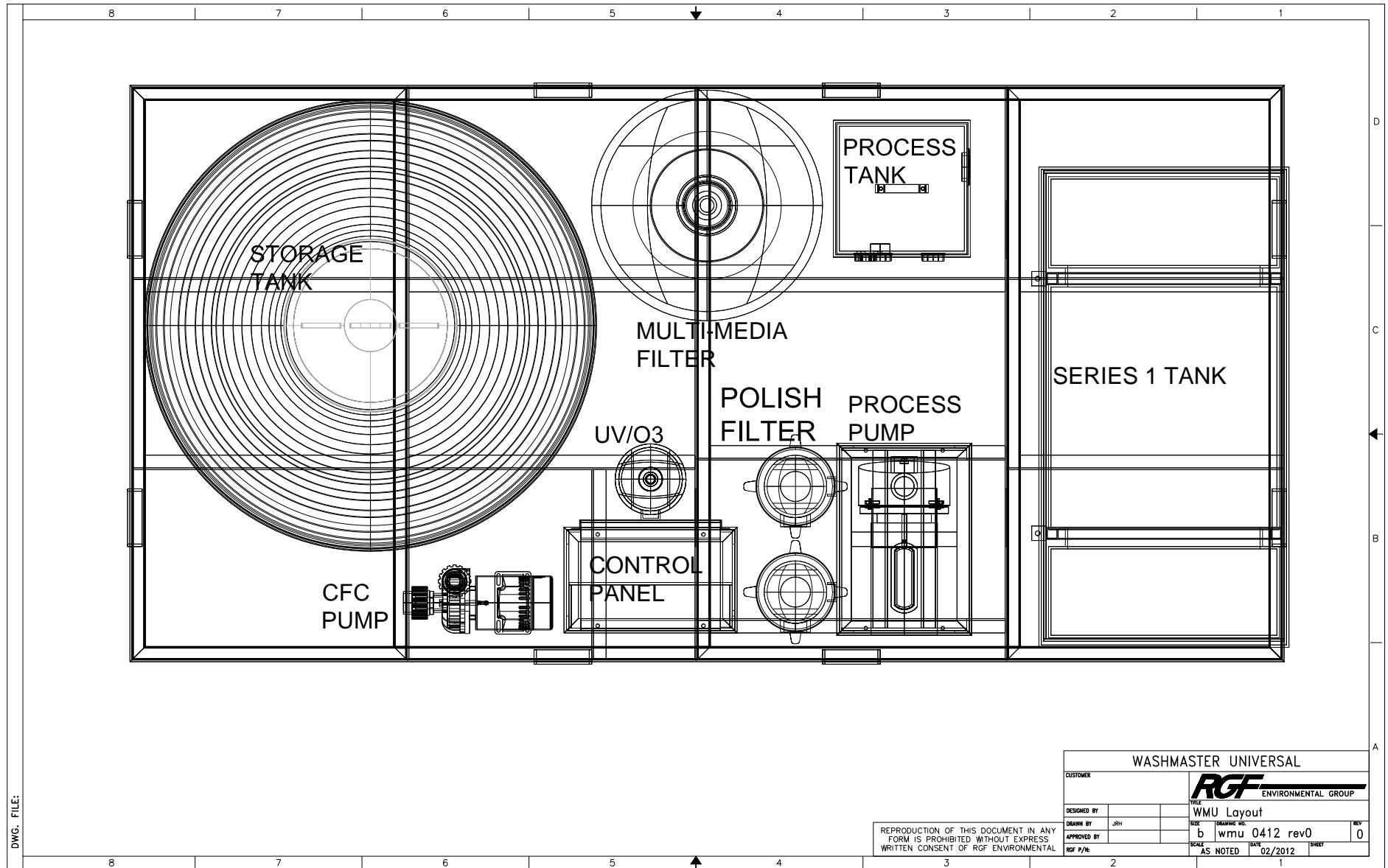
An engineered diagram of the control panel logic, showing ladder logic and general control of the system.

ELECTRICAL DISTRIBUTION DRAWING

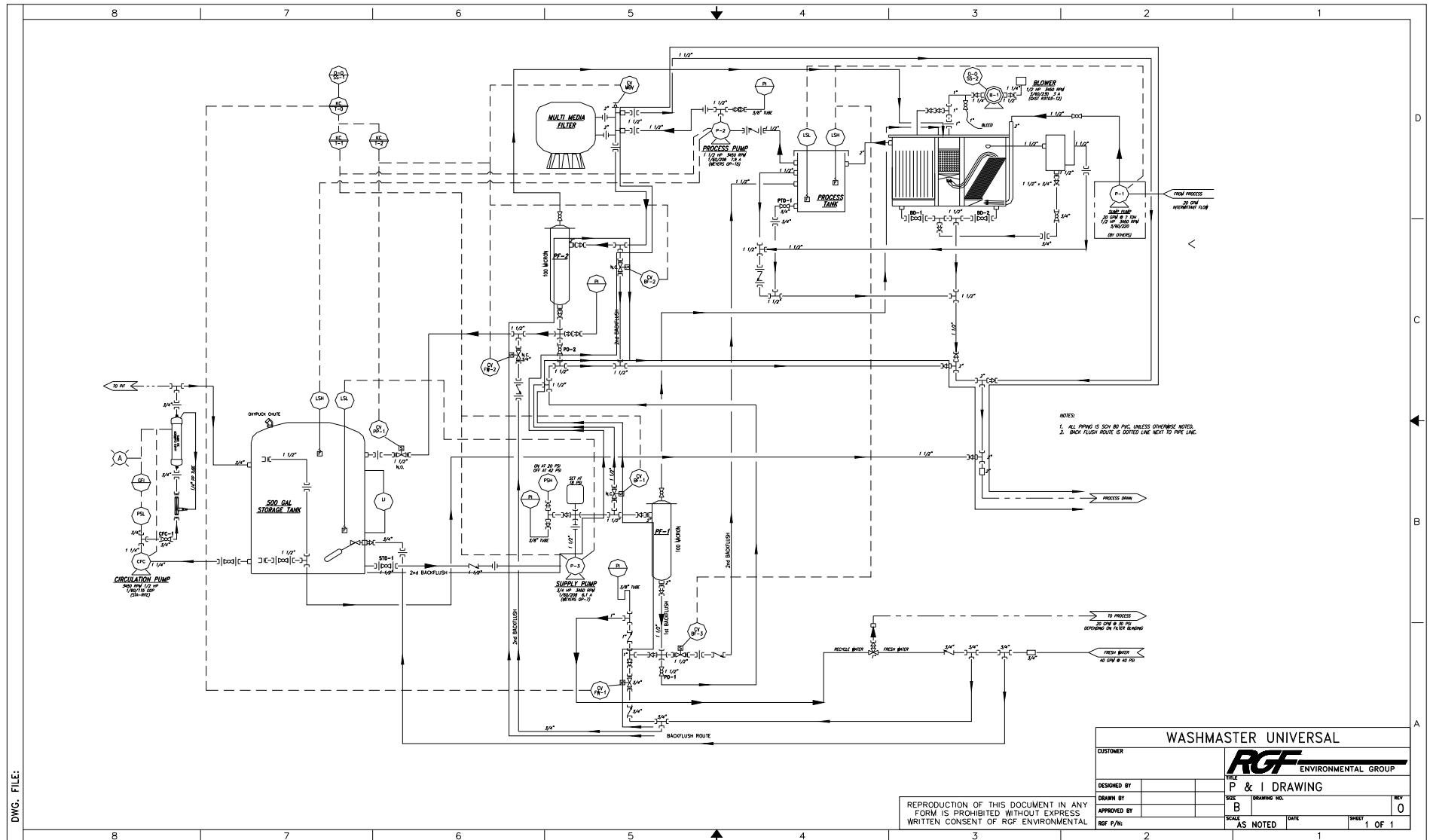
DISTRIBUTION AND CONTROL PANEL LAYOUT

An engineered drawing of the control panel internal components, showing identification and location.

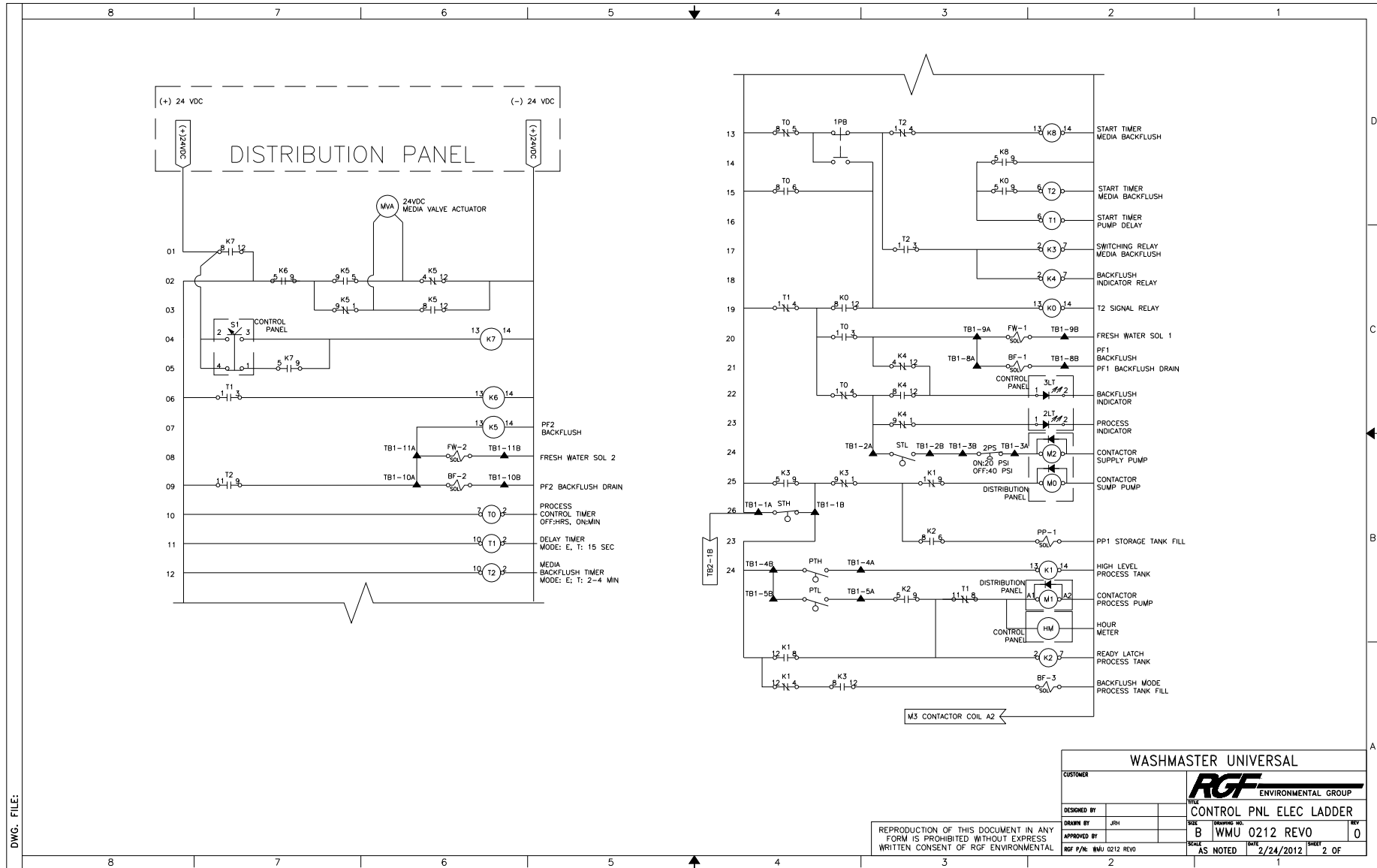
GENERAL LAYOUT



P&ID



ELECTRICAL LADDER DRAWING



DISTRIBUTION AND CONTROL PANEL LAYOUT

