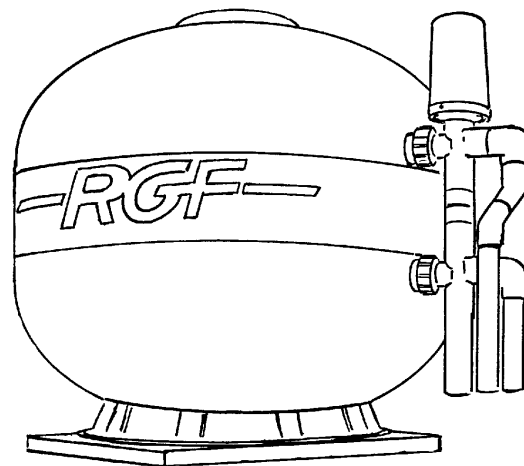
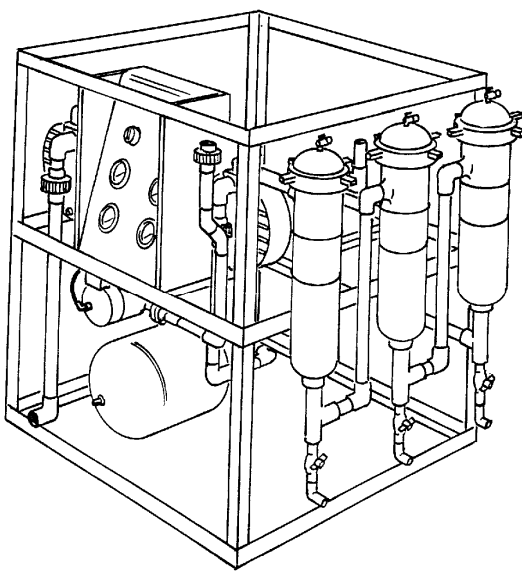
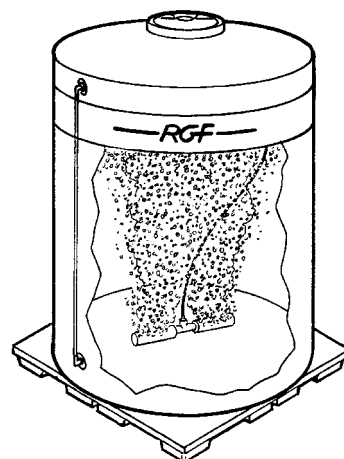
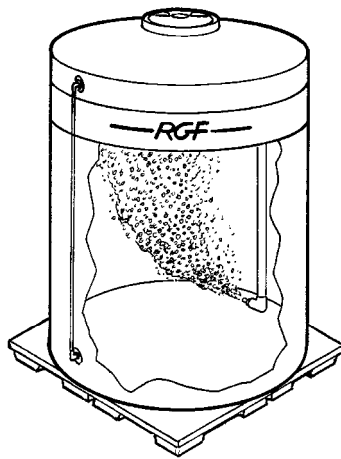


Operations Manual for

## Model CW-MOD

By RGF Environmental Systems, Inc.





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# Contents

<b>Overview</b>	<b>4</b>
Introduction.....	4
How To Use This Manual.....	4
How This Manual Is Organized.....	5
Sources of Help.....	6
<b>Shipment Inspection</b>	<b>7</b>
Shipment Inspection.....	7
Pre-Installation Checklist.....	7
<b>Safety</b>	<b>9</b>
Labeling Conventions In This Manual.....	9
General Safety Issues.....	10
<b>Chapter 1: The Ultrasorb® System</b>	<b>11</b>
The Vision 2000 Concept.....	11
The Ultrasorb® System.....	12
Unit Familiarization / Flow Diagram.....	12
<b>Chapter 2: Installation</b>	<b>14</b>
Installation Requirements.....	14
Installation Procedure.....	14
Equipment Placement.....	15
Main Drain Return Line.....	15
Main Electrical Connection.....	15
Hydrocarbon Accumulator (Optional).....	15
Coalescing Centrifugal Separator.....	16
Series II Equipment Skid.....	16
Series III Storage Tank.....	18
<b>Chapter 3: System Startup and Operation</b>	<b>20</b>
System Startup.....	20
Coalescing Centrifugal Separator.....	20
Series III Storage Tank / Optional Process Tank.....	20
Series II Equipment Skid.....	21
Start-Up.....	22
System Operation.....	23
Coalescing Centrifugal Separator.....	23
Series II Equipment Skid.....	23

Series III Storage Tank .....	24
Operational Notes .....	25
<b>Chapter 4: Preventative Maintenance Schedule</b>	<b>27</b>
Overview.....	27
Required Tools and Supplies .....	27
Daily Maintenance .....	28
Coalescing Centrifugal Separator .....	28
The Series II Equipment Skid .....	28
Peristaltic Chemical Injection Pump.....	28
UV/O <sup>3</sup> Catalytic Chambers.....	29
Weekly Maintenance.....	29
Trenches, Sumps, Pits, and Clarifiers .....	29
Y-Strainer .....	29
Multi-Media Filter .....	29
Polishing Filters.....	30
Storage Tank.....	31
Monthly Maintenance .....	31
UV/O <sup>3</sup> Catalytic Chamber .....	31
As Required Maintenance .....	32
Multi-Media Filter .....	32
Programmable Auto Back Flush (Polishing Filters) .....	32
Winterizing The System.....	34
<b>Chapter 5: General Theory</b>	<b>35</b>
Overview.....	35
Coalescing Centrifugal Separator.....	35
Series II Equipment Skid .....	36
Process System .....	36
Continuous Flow Control System (CFC System).....	36
Catalytic Oxidation Process (CO <sup>3</sup> P System).....	36
Chemical Injection Pumps .....	37
UV/O <sup>3</sup> Catalytic Chamber.....	37
Delivery Pump .....	37
<b>Chapter 6: Controlling Water Quality</b>	<b>38</b>
Overview.....	38
pH / Alkalinity .....	39
pH .....	39
Total Alkalinity.....	39
Oxidizers.....	40
Hydrogen Peroxide .....	40
Ozone.....	40
UltraViolet Light .....	40
Cleaning Agents .....	40
Enviro-Control.....	41
Water Conditioner-1 (WC-1).....	41
Dissolved and Suspended Solids.....	41
Total Dissolved Solids (T.D.S.).....	41
Total Suspended Solids (T.S.S.).....	42
<b>Chapter 7: Engineering Drawings</b>	<b>43</b>

Outline .....	43
Process Tank .....	44
Series II Equipment Skid .....	45
Series III Storage Tank .....	46
Piping & Instrumentation Diagram .....	47
Electrical Diagram .....	48
<b>Chapter 8: Troubleshooting</b>	<b>50</b>
Flow .....	50
Electrical .....	52
Chemistry .....	53
<b>Chapter 9: Replacement Parts</b>	<b>54</b>
General Ordering Information .....	54
Replacement Parts List .....	54
Filters And Parts .....	54
Chemicals .....	54
Pumps And Parts .....	55
Valves And Unions .....	55
Misc. Parts .....	55
<b>Chapter 10: Sub-Component Manuals</b>	<b>56</b>
GFI Reset .....	57
Process Pump .....	59
CFC System Pump .....	66
Peristaltic Chemical Injection Pump .....	70
<b>System Warranty</b>	<b>78</b>
Limited Warranty .....	78
Limited Warranty Policy .....	80
<b>Product Registration and Return Forms</b>	<b>83</b>
Warranty Request Form .....	84
Warranty Validation Forms .....	85
Installation / Startup Record .....	86
Client Questionnaire .....	88
<b>Addendum A: Training Bulletins</b>	<b>89</b>
<b>Glossary of Terms</b>	<b>91</b>



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# Overview

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## Introduction

### About *RGF*

Congratulations on the purchase of your new *RGF* Ultrasorb® water treatment system. For over 10 years *RGF* Environmental Systems Inc. has been the industry leader in industrial wash water treatment systems with over 6,000 installations worldwide.

*RGF* Environmental Systems is part of the *RGF* Environmental Group, a group of six companies 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.

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## 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 Ultrasorb<sup>®</sup> System**

Unit familiarization, basic system information and system flow diagrams. Covers the overall concepts of the Vision 2000 Ultrasorb<sup>®</sup> 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 periodicity's 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 Ultrasorb<sup>®</sup> 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: Engineering Drawings**

Reference drawings and schematics of the system.

## **Chapter 8: Troubleshooting**

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

## **Chapter 9: Replacement Parts List**

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

## **Chapter 10: 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.

---

## **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 service support staff who are 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.

**<http://www.rgf.com>**

- 3) If you still have questions or have comments, the **RGF Service Department** can be contacted by **e-mail** at:

**e-mail: [service@rgf.com](mailto:service@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 **Ultrasonb® 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 (800)-842-7771, (561)-848-1826 (FL), 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 (800)-842-7771, (561)-848-1826 (FL), 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.

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## General Safety Issues

- All operating procedures, cautions, and warnings **MUST** be adhered to when operating the Ultrasorb<sup>®</sup> 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 section 6.0, controlling water quality)

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**Note:**

Additional safety precautions are listed throughout the manual.

---

## Chapter 1: The Ultrasorb<sup>®</sup> System

### The Vision 2000 Concept

The Vision 2000 line of Ultrasorb<sup>®</sup> 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

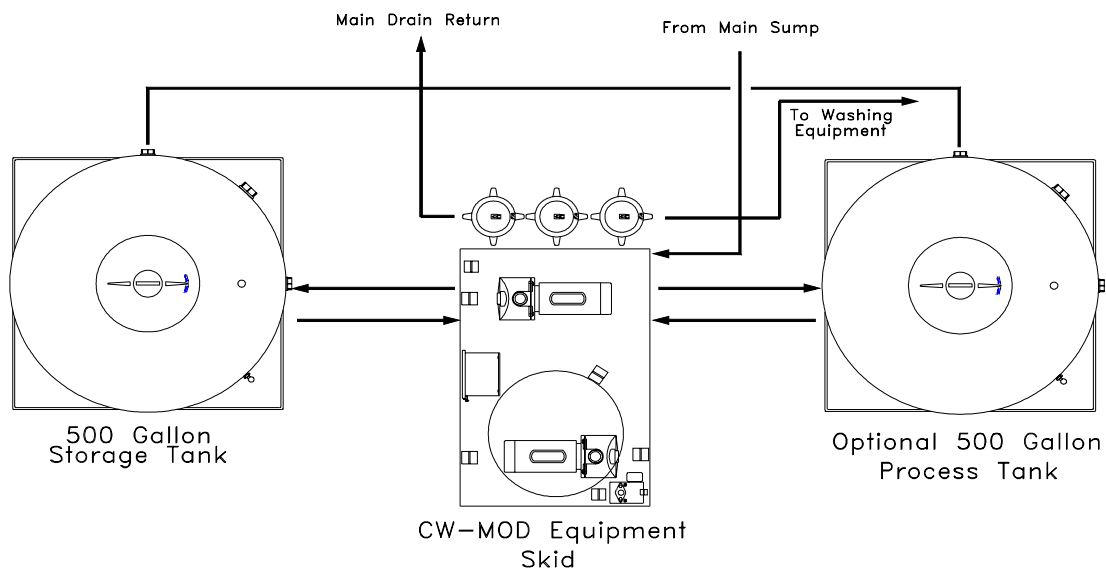
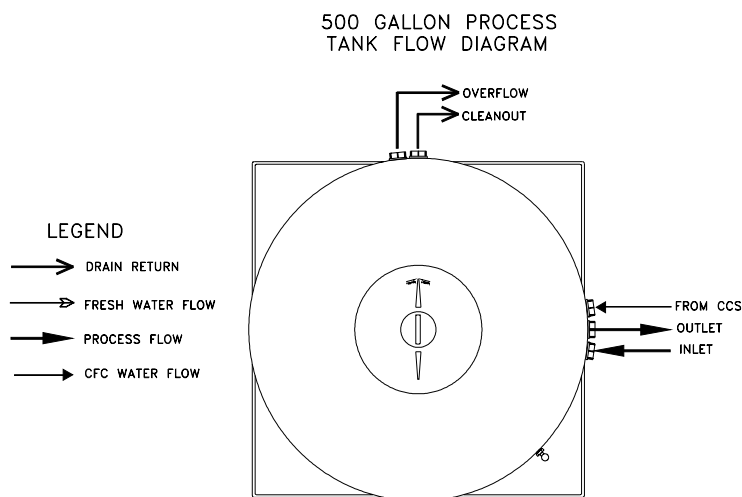


Figure 1.1

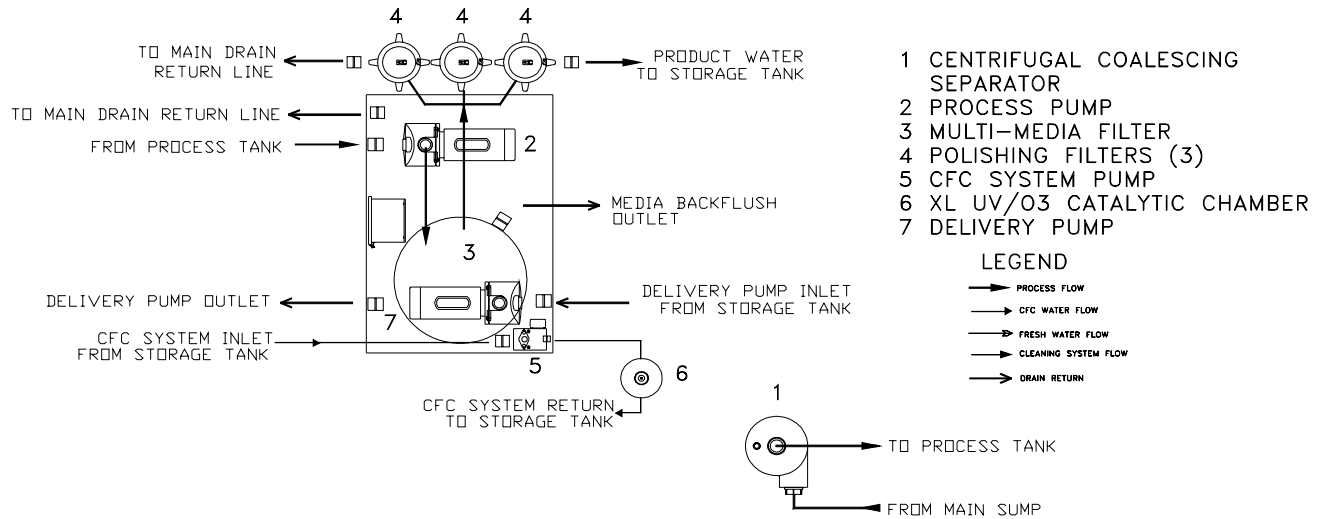
## The Ultrasorb® System

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 Ultrasorb® 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. Section 1.0 is designed for just that purpose.

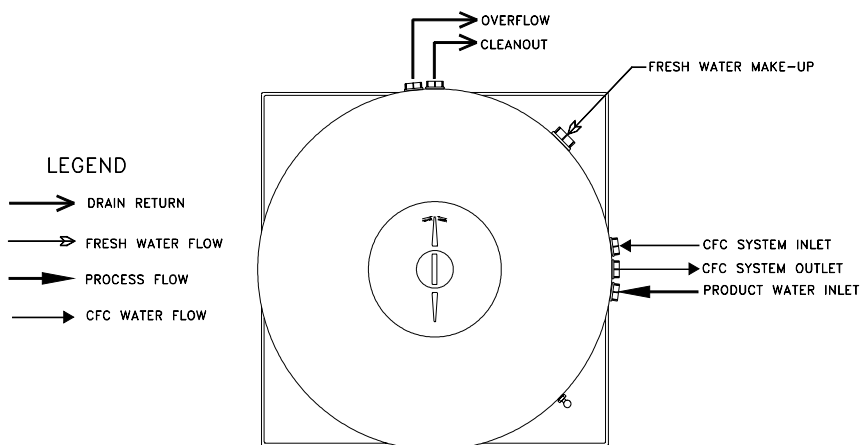
### Unit Familiarization / Flow Diagram



## SERIES II EQUIPMENT SKID FLOW DIAGRAM



## 500 GALLON STORAGE TANK FLOW DIAGRAM



# Chapter 2: Installation

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## Installation Requirements

The **ULTRASORB® 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 Section 1.0 to help to become familiar with all of the components and equipment names of your particular system for 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. Mount the UV/O3 Catalytic Chamber and HECS (Coalescing Centrifugal Separator) on a vertical surface near the equipment as desired. The Catalytic 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").

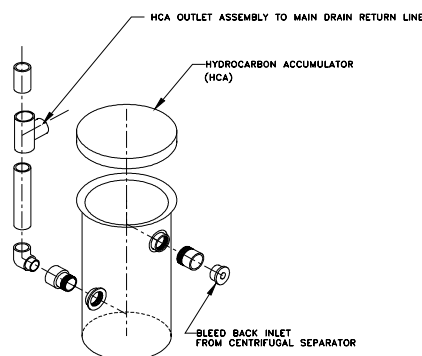
## Main Electrical Connection

- A. **MAIN ELECTRICAL JUNCTION** for the particular system components should be planned into the equipment pad prior to system installation. Refer to Section 8.3 for exact power requirements. Most installations will require 220 VAC, 30 amps, 1 phase, 60 Hz with a neutral and a ground as a minimum.

## Hydrocarbon Accumulator (Optional)

- A. Assemble the Inlet and Outlet **HYDROCARBON ACCUMULATOR ASSEMBLIES** as shown in Fig. HCA.1.
- B. Plumb the **ACCUMULATOR OUTLET ASSEMBLY** to the **MAIN DRAIN RETURN LINE**.
- C. Attach the 3/4" **ACCUMULATOR DRAIN** to the 3/4" fitting on the bottom of the Accumulator. Do not plumb this line to the main drain return line.

*Oil Skimmer / HCA Inlet Assy.*



*Figure HCA.1*

## Coalescing Centrifugal Separator

### ➤ *Inlet Connection*

- A. Plumb from the Sump Pit Outlet to the **RGF LAMINAR INJECTOR INLET** on the side of the Separator.

### ➤ *Outlet Connection*

- A. Plumb from the **OUTLET** of the Separator to the inlet of the optional **PROCESS TANK** or underground sump. This line requires a throttle ball valve.

### ➤ *Oil Purge Connection*

- A. Plumb the **OIL PURGE VALVE** on the top of the Separator using part of the supplied 3/8" poly hose and lead to the **MAIN DRAIN RETURN LINE** or the **BLEED BACK INLET** on the optional Hydrocarbon Accumulator.

### ➤ *Drain Connection*

- A. Plumb from the **SEPARATOR CLEANOUT Drain (CCS-1)** on the bottom of the Separator to the **MAIN DRAIN RETURN LINE**.

## Series II Equipment Skid

### ➤ *Inlet Connection*

- A. Plumb from the Optional Process Tank or underground sump to the Series II Process Pump Inlet. This line should include the supplied Y-Strainer and ball valve.
- B. The Y-Strainer should be connected as indicated below or can be located between the Process Tank and Series II as desired.
  - Attach the supplied 6" x 1 1/2" threaded nipple into the female adapter on the inlet of the Series II.
  - Attach the Y-Strainer onto the nipple with the indicator arrow facing towards the Series II. The ideal position for the Y-Strainer is in the straight down position or at a 45° from the ground.
  - Connect the supplied male adapter into the remaining end of the Y-strainer, then continue plumbing to the Series I.

### ➤ *Polish Filter Product Connection*

- A. Plumb the **PRODUCT OUTLET** to the **SERIES III STORAGE TANK PRODUCT INLET** (1 1/2" Product Inlet hole on top of Storage Tank).

### ➤ *Polish Filter Backflush Connection*

- A. Plumb the **BACKFLUSH OUTLET** to the **MAIN DRAIN RETURN LINE**.

## ➤ **CFC System Inlet / Outlet Connection**

- A. Plumb from the **CFC SYSTEM INLET** to the **SERIES III STORAGE TANK OUTLET**. This line requires the use of an isolation ball valve.
- B. Plumb from the **CFC SYSTEM OUTLET** to the 3/4" fitting on the bottom of the UV/O<sup>3</sup> Catalytic Chamber. The plumb from the 3/4" fitting on the top of the UV/O<sup>3</sup> Catalytic Chamber to the **SERIES III STORAGE TANK CFC SYSTEM RETURN INLET**.
- C. Plumb the **CFC BLEED BACK** from the 1/4" fitting on top of the UV/O<sup>3</sup> Catalytic Chamber using part of the supplied 1/4" poly hose and lead into the **MAIN DRAIN RETURN LINE**.
- D. Plumb a fresh water source to the **CFC FRESH WATER INLET** on the back of the CFC Pump.

## ➤ **Delivery System Inlet / Outlet Connection**

- A. Plumb the **DELIVERY SYSTEM INLET** to the **STORAGE TANK DELIVERY OUTLET**. This line requires the use of an isolation ball valve.
- B. Plumb the **DELIVERY SYSTEM OUTLET** to the desired wash equipment.

## ➤ **Drain Return / Bleed Line Connections**

- A. Plumb the 3/4" **POLISHING FILTER DRAIN** to the **MAIN DRAIN RETURN LINE**.
- B. Plumb the **POLISHING FILTER BLEED LINES** (petcock valves on the sides and tops of the filters) to the **MAIN DRAIN RETURN LINE**.
- E. Plumb the 1 1/2" **MULTI-MEDIA FILTER DRAIN** to the **MAIN DRAIN RETURN LINE**.

## ➤ **Peristaltic Chemical Injection Pump**

- A. Use the supplied 1/4" **POLYETHYLENE HOSE** for chemical suction from the chemical tank. Attach the chemical hose to the surgical hose connection on the bottom rear of the chemical injection pump.
- B. The hydrogen peroxide container should be located as close to the equipment skid as possible. It is recommended to use a container no larger than 5 gallons in order to prevent accidental over injection. Place the suction line of the chemical pump down into the chemical container.

## ➤ **Multi-Media Filter**

- A. The supplied media for the Multi-Media Filter needs to be installed by removing the head assembly of the filter by unscrewing the lid from the top of the vessel. Remove the head from the body assembly being careful not to lose the o-ring.
- B. Tape over the stand pipe with duct tape inside of the body of the filter to prevent media from falling inside during installation. Ensure the

stand pipe is properly installed on top of the alignment pin located at the bottom of the filter.

- C. Fill the media filter with water to just above the laterals to prevent damage during media installation.
- D. Make a funnel out of card board to help install the media. First install all of the rock media in the bottom of the housing. Ensure the stand pipe remains centered firm on the bottom of the housing. 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. Remove the duct tape from the stand pipe, reinstall the filter head and reconnect the unions to the head, ensuring the o-rings to the unions are intact.

### ➤ **Electrical Connections**

- A. The 220 volt Electrical Connections to the **SERIES II ELECTRICAL JUNCTION BOX** should be connected by a certified electrician, according to local and national codes (refer to Section 7.3, Electrical Diagram).

---

#### **IMPORTANT:**

Do not turn on the power to the unit until all connections are made and the system is prepared for startup. Damage to the system pumps will result otherwise.

---

## **Series III Storage Tank**

### ➤ **Overflow / Drain Connection**

- A. Plumb from the **STORAGE TANK OVERFLOW** to the nearest overflow / storm water containment, sanitary sewer or secondary storage tank according to local and national code or plumb to the Main Drain Return Line.

---

#### **NOTE:**

Check with local authorities as to local codes for overflow water.

---

- B. Plumb from the **STORAGE TANK DRAIN**, to the **MAIN DRAIN RETURN LINE**. This line requires the use of an isolation ball valve.

### ➤ **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.

## ➤ **Float Switch Connections**

- A. Attach all of the **TANK FLOAT SWITCHES** according to Section 7.3 Electrical Diagram. These connections should be connected by a certified electrician according to local codes.

## 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. Remember:



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

### Coalescing Centrifugal Separator

- A. Crack the Separator **DRAIN VALVE** (CCS-1) 1/4 turn to allow a drain return during operation, fully open the **OIL PURGE VALVE**, throttle the **OUTLET BALL VALVE** a 1/4 turn to allow a slight back pressure on the separator during operation (Do not exceed 15 psi).

### Series III Storage Tank / Optional Process Tank

- A. Close the Tanks **DRAIN VALVE** and **ISOLATION VALVES**.

---

#### NOTE:

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

---

- B. Turn on the Fresh Water Supply to the Storage Tank. 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 Tanks are free to swing.
- D. Fill the optional process tank or below grade tank 3/4 full with fresh water.

## Series II Equipment Skid

### ➤ *Filling The System*

- A. Close all **DRAIN VALVES** (e.g. valves PF-1 and PD-2).
- B. Recheck all unions to ensure they are not missing o-rings and are all hand tightened.
- C. Open all of the **ISOLATION VALVES** between the components of the system.
- D. Prime the Process Pump by removing the square priming plug from the Process Pump housing until water starts streaming from the priming hole, then replace the plug. If the process tank is located below ground the pump will need to be primed by un-doing the top union of the pump and filling the casing with water.
- F. Prime the CFC System Pump by removing the gauge fitting on the top of the CFC Pump piping assembly. Water should start emitting from the gauge fitting. Continue until a steady stream emits, then replace the gauge fitting.

---

### 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.

---

- H. Prime the Delivery Pump by removing the square priming plug from the Delivery Pump housing until water starts streaming from the priming hole, then replace the plug.

### ➤ *Polishing Filter System*

- A. Prepare the Polishing Filter System valve positions for normal operation by opening PF-3 and PP-1 and closing PB-1 and PD-2. For **AUTOMATIC SYSTEMS** these valves are electric solenoid valves and will open and close automatically. However, ensure the valves are prepared for automatic operation by making sure the thumb screws of the valves are all the way open and the manual operate knob is in the "ON" position.

### ➤ *Peristaltic Chemical Injection Pump*

- A. Ensure the chemical pump suction line has been placed into a full Hydrogen Peroxide chemical container. Adjust the **CHEMICAL**

**METERING KNOB** for the maximum setting. After start-up, reduce the pump setting to achieve the proper hydrogen peroxide levels.

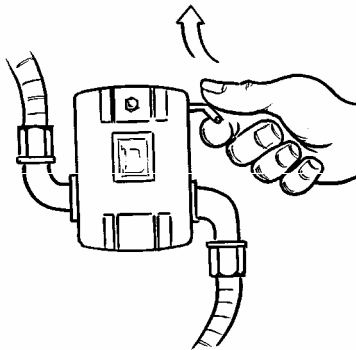
## Start-Up

- 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/O<sup>3</sup> 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, and the Chemical Injector Pump will pump periodically. If in the event the CFC system loses prime, the lever will shut down to prevent equipment damage.

*CFC System Prime Lever*



*Figure CFC-1*

### ***DELIVERY SYSTEM START-UP***

The **DELIVERY PUMP** (left pump) will run until a maintained pressure of approximately 45 psi is reached then the pump will shut-down.

### ***PROCESS SYSTEM START-UP***

The Process System is controlled by the **PROCESS SWITCH** located on the Control Panel and the float switches located in the Process and Storage tanks. The Process Switch can be turned to the Process



position for automatic operation of the system or to the Backflush position for manual backflushing of the Multi-media and Polishing Filters. Turn the **PROCESS SWITCH** to the Process Position. The Process Pump (right 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

### Coalescing Centrifugal Separator

#### ➤ *Operation*

Water enters the Coalescing Centrifugal Separator from the sump or feed source into the *RGF* Laminar Injector which imparts a centrifugal action on the water forcing solids to separate and settle to the bottom and oils to float to the top. The solids are flushed out of the bottom of the separator through routine maintenance, and the oils are purged during operation. The separated water then leaves the vortex discharge pipe and into the optional Process Tank or other tank.

#### *Controlling Flow*

The flow through the separator is controlled by the outlet flow control valve. The rate of flow into the separator is determined from the flow of the feed source component, which in turn affects the vortex discharge flow. To adjust flow into the separator, throttle the feed source component throttle valve. This feed pump should be adjusted to achieve no greater than a 15 psi inlet pressure.

### Series II Equipment Skid

#### ➤ *Process System*

Water enters the Process System from the optional process tank or other process water source by the suction of the Process Pump and is passed through the Multi-Media Filter and then through the Polishing Filters where it ends up in the Storage Tank.

**For Manual Systems**, the Multi-Media Filter is manually back flushed by using the 6-way flow control valve on the top of filter and the Polishing Filters are manually backflushed by the PB-1, PF-3, PP-1 and PD-2 valves.

**For Automatic Systems**, the Multi-Media Filter is automatically controlled and back flushed by the Multi-Media Filter Controller and the Polishing Filters are automatically backflushed by the PB-1, PF-3, PP-1 and PD-2 valves which are electric solenoid valves controlled by the Back Flush Timer located in the main electrical junction box.

#### *Controlling Flow*

Flow through the Process System is controlled by 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 Pump and is supplied to the CO<sup>3</sup>P Process. The flow through the CO<sup>3</sup>P Process passes recycled water through the Ozone and Chemical Venturi and the UV/O<sup>3</sup> Catalytic Chamber, and is returned to the Storage Tank. Flow rate through the CO<sup>3</sup>P system is controlled by the venturi.

---

### **NOTE:**

In order for the catalytic oxidation process (CO<sup>3</sup>P) to operate correctly, it is necessary to keep the hydrogen peroxide level in the Storage Tank above 10 ppm. For the first several weeks of operation of the system, monitor the level very closely. If the residual hydrogen peroxide level falls below the 10 ppm range, then it will be necessary to increase the injection rate accordingly. The chemical output of the pump ranges from .96 GPD at the minimum setting to 16.2 GPD at the maximum setting.

---

## ➤ **WATER SUPPLY**

The water supply to the washing equipment is supplied by the Delivery Pump. This pump maintains pressurized feed to the washing equipment. If in-sufficient pressure is achieved, the delivery pump pressure can be increased by changing the pressure switch to a maximum of 45 psi.

## **Series III Storage Tank**

### ➤ **Operation**

Water enters the Tank from either the Process System or fresh water make-up. The water inside the tank is continuously pumped by the CFC System, through the CO<sup>3</sup>P Process, and returned. When wash water supply is needed, wash water flow is pumped by the Delivery Pump to the Supply Outlet Header. Float switches inside of the tank control the operation of the system.

## Operational Notes



### • *UV/O<sup>3</sup> 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 humans reaction to this level is the same as the reaction to a strong bleach or ammonia odor. Usually, the nose will indicate discomfort.



### • *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.



• **DELIVERY PUMP:**

- 1) TO PREVENT DAMAGE TO THE DELIVERY 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

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### Overview

The following section is developed to keep the **ULTRASORB® 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 <sup>3</sup> 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

### Coalescing Centrifugal Separator

#### ➤ *Daily*

- A. Fully open the Separator **DRAIN VALVE** (CCS-1) during operation of the sump pump to flush solids from the drain of the separator, then reset to the cracked open position.

### The Series II Equipment Skid

#### ➤ *Daily System Check*

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

Use the following as a general rule:

#### **Multi-Media Filter**

If the pressure difference across the Multi-Media Filter is greater than 20 psi, the filter will need to be backwashed according to the Multi-Media Filter Procedure.

#### **Polish Filter Gauges**

If the pressure difference across the Polishing Filters is greater than 20 psi, the filters will need to be backwashed or manually cleaned according to the Polishing Filters Procedures.

#### **CFC Pump Discharge Gauge**

This gauge indicates the pressure in the CFC System. The system should operate at approximately 11 psi.

### Peristaltic Chemical Injection Pump

#### ➤ *Daily Maintenance*

- A. Check the pump on a daily basis in order to ensure that it is working properly.
- B. Note the setting of the Output Adjustment knob to see that it is set correctly. Adjust as needed.
- C. Check the level in the chemical container and note the amount used in a 24 hour period. Fill the container as needed.

- D. Check the hydrogen peroxide residual level in the Storage Tank using the supplied Test Strips. If the level is less than 10 ppm, then the chemical injection rate will need to be increased.

## UV/O<sup>3</sup> Catalytic Chambers

### ➤ *Daily Maintenance*

- A. Ensure the UV/O<sup>3</sup> Catalytic Chamber indicator light on the side of the chamber (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.

---

### Y-Strainer

#### ➤ *Weekly Maintenance*

- A. Turn the Process Control Switch to **OFF**.
- B. Close the isolation valve to the Process Tank and the Series II.
- C. Unscrew bottom of the Y-strainer and completely clean screen basket.
- D. Reassemble Y-strainer bottom with o-ring in place.
- E. Open isolation valves and reapply power.
- F. Check for leaks.

### Multi-Media Filter

#### ➤ *Weekly Maintenance*

Weekly, or if the pressure difference across the Multi-Media Filter is greater than 20 psi, then the filter will need to be manually backwashed by the following procedure.

## MANUAL MULTI-MEDIA FILTERS

### **Manually Backwashing the Multi-Media Filter**

- A. Turn the Process Control Switch to **OFF**.
- B. Ensure there is sufficient water in the Process Tank to perform a sufficient backwash. Turn the 6-way control valve on the head of the filter to the **BACKWASH** position.
- C. Turn the Process Control Switch to **CLEAN**. Allow to flush the filter, until the sight glass on the side of the filter is clear.
- D. Turn the 6-way valve to **RINSE**. Allow to flush for several minutes to resettle the media bed.
- E. Return the valve to **FILTER**. Turn the Process Control Switch to **PROCESS**.

## AUTOMATIC MULTI-MEDIA FILTERS

### **Manually Backwashing the Multi-Media Filter**

- A. The Process Control Switch must remain in the **PROCESS** position for this operation.
- B. Ensure there is sufficient water in the Process Tank to perform a sufficient backwash.
- C. Open the Multi-Media Filter Controller. Place the controller in the Manual Mode by pressing and releasing the **BACKWASH MODE** switch. The **MANUAL** light should now be blinking and the pump will continue to process water.
- D. 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.
  - 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 3 minutes.
  - The process Pump will turn off.
  - The Backwash valve will move back to the filter position.
  - The sandbed will be allowed to settle for 1 minute.
  - The Process Pump will turn back on and normal filtering will proceed.
- E. Return the controller to the Automatic Mode by pressing and releasing the **BACKWASH MODE** switch. The **AUTOMATIC** light should now be blinking and the pump will continue to process water.

## **Polishing Filters**

### **➤ Weekly Maintenance**

Weekly, or if the pressure difference across the Polishing Filters is greater than 20 psi, then the filters will need to be manually backwashed by the following procedure.



## Manually Backwashing the Multi-Media Filter

- A. Turn the Process Control Switch to **OFF**.
- B. Ensure there is sufficient water in the Process Tank to perform a sufficient backwash. **MANUAL SYSTEMS:** Open valves **PB-1** and **PD-2** and close valves **PF-3** and **PP-1**. **AUTOMATIC SYSTEMS:** These valves are electric solenoids and will open automatically when the system switch is turned to clean.
- C. Turn the Process Control Switch to **CLEAN**. Allow sufficient time to flush the filters.
- D. Return the valves to the normal operating position. Turn the Process Control Switch to **PROCESS**.
- E. Check the pressure differential across of the filters. If the pressure difference is still greater than 20 psi, then the filters should be removed from the filter housings and flushed with a hose by hand to restore flow through the filters. If this still does not prove to restore the filters then the filters need to be replaced with RGF Filter Part #FL-086.

## Storage Tank

### ➤ *Weekly Maintenance*

- A. Open the drain valve to the Storage Tank and allow to drain 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

### UV/O<sup>3</sup> Catalytic Chamber

#### ➤ *Monthly Maintenance*

Once a month, or as required, the UV/O<sup>3</sup> 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/O<sup>3</sup> 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/O<sup>3</sup> chamber. It may be necessary to disconnect the bottom union to thoroughly clean the lower portion of the tube.

---

**NOTE:**

Use caution in handling the UV/O<sup>3</sup> Catalytic Chamber. The quartz glass tube 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** and re-prime the CFC System according to the start-up procedure.

---

## 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). Loosen the unions of the Multi-Media Filter and remove the head. 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 Back Flush (Polishing Filters)

Change the Programmable Auto-Backflush sequence if the Polishing Filters need to be back flushed more frequently. The Auto Back Flush Timer is factory pre-set to 4 hours between back flushes (T OFF dial) and two minutes of back flush (T On dial).

- A. Turn the main power to the system **OFF**.
- B. Open the Electrical Junction Box and remove the ODR relay (orange timer with two dials).
- C. The dials on the face of the relay control the amount of time between back flushes (T OFF dial) and the amount of time the back flush is performed (T ON dial).

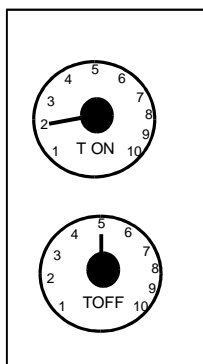
To change the amount of time between back flushes, turn the **T OFF** dial to the desired amount of time (scale is in hours). To change the amount of time the back flush is performed, turn the **T ON** dial to the desired amount of time (scale is in minutes). An example of a setting is illustrated:

### Timer Setting Example:

Time between back flush cycles = 5 hours

Length of time of back flush = 2 minutes

### Dial settings:



If more than 10 minutes of back flushing is preferred, it will be necessary to change the time scales of the relay. On the side of the relay is the Repeat Cycle switch settings which control the scale of the time OFF and time ON functions of the relay. They are factory set so the relay time OFF dial is in hours and the time ON dial is in minutes. To change them, refer to Chapter 10; Auto Back Flush Timer.

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### NOTE:

If the power to the system is turned OFF, the timer restarts it's cycle from zero. The timer relay does not retain it's 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/O<sup>3</sup> Chamber)

## Chapter 5: General Theory

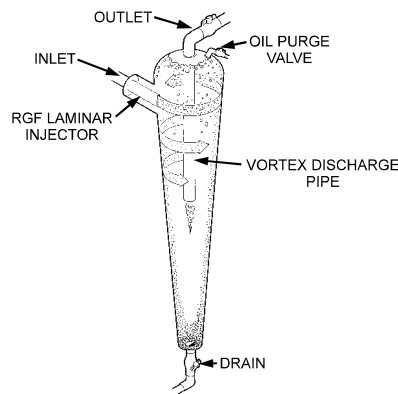
### Overview

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

### Coalescing Centrifugal Separator

From the main sump, the waste stream enters the Coalescing Centrifugal Separator where a centrifugal circular motion forces the solids to separate to the sides of the separator where they eventually fall to the bottom and are flushed during routine maintenance. Also, the separator aids in coalescing free oils to rise to the top where they are skimmed by the oil purge valve. The remaining waste stream exits the separator through the vortex discharge pipe and passes to the next process of the system.

#### *Coalescing Centrifugal Separator*



*Figure CCS.1*

## Series II Equipment Skid

### Process System

The process water enters the Process System of the Series II 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 Polishing Filters for final polishing of the water. The Multi-Media and Polishing Filters are periodically backwashed to remove accumulated particulate. From the Process System, the water then enters into the MS<sup>3</sup> Membrane System.

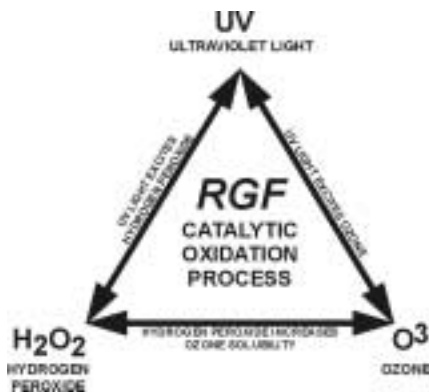
### Continuous Flow Control System (CFC System)

The CFC system consists of the CFC Pump, the UV/O<sup>3</sup> Chamber, venturi injection, and hydrogen peroxide injection. The purpose of the system is to continuously circulate water through the Catalytic Oxidation Process (CO<sup>3</sup>P).

### Catalytic Oxidation Process (CO<sup>3</sup>P 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 hydrogen peroxide, ozone and ultraviolet light. The tri-reaction is completed when the ultraviolet light (catalyst and oxidizer) in the chamber excites the ozone (oxidizer) and hydrogen peroxide (oxidizer) to cause them to react faster in the aqueous solution (refer to Figure TRI-1). Ultraviolet light is also a remarkable sterilizer of living organics such as bacteria and algae. In turn, the three work 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 hydrogen peroxide injection and ozone injection and through the UV/O<sup>3</sup> Catalytic Chamber and returning it back to the tank.

#### *RGF Catalytic Oxidation Process*



*Figure TRI-1*

## Chemical Injection Pumps

Located within the control panel, adds hydrogen peroxide to help control algae, bacteria, and odor. Hydrogen peroxide is an oxidant in the Catalytic Oxidation Process (CO<sup>3</sup>P) that also increases ozone solubility.

## UV/O<sub>3</sub> Catalytic Chamber

A cylindrical vessel used to produce Ozone (O<sub>3</sub>) 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 and hydrogen peroxide in the Catalytic Oxidation Process (CO<sup>3</sup>P) as the water passes through the chamber (refer to figure UV/O<sub>3</sub>-1).

*UV/O<sub>3</sub> Catalytic Chamber*

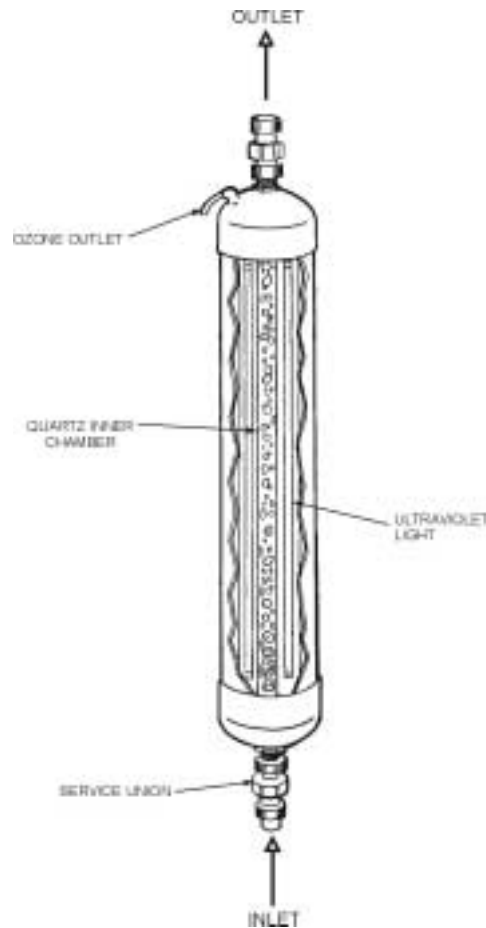


Figure UV/O<sub>3</sub>-1

## Delivery Pump

The Delivery 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

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## Overview

Controlling the waste water quality on the **ULTRASORB® 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**

Hydrogen Peroxide

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.)



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## 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's tend 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 degrees 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 are 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

### Hydrogen Peroxide

Hydrogen peroxide 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 hydrogen peroxide level does not need to be closely controlled. It can have levels ranging from 1 - 10 ppm. 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 hydrogen peroxide 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 CO<sup>3</sup>P 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 (CO<sup>3</sup>P). 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 hydrogen peroxide 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.

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## Dissolved and Suspended Solids

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

T.D.S. represents the total conductive material actually dissolved in the water (refer to Section 11.0 Addendums / Training Bulletin - TB 001). 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 hydrogen peroxide). Water treatment chemicals often solve one problem but create another problem. While an addition of a floccing 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 microsiemens - a unit of low electrical current.

## **Total Suspended Solids (T.S.S.)**

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 (refer to Section 11.0 Addendums / Training Bulletins - TB 002). 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  $\mu\text{m}$  (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: Engineering Drawings

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## Outline

### **Process Tank (Optional)**

An engineered diagram of the optional Process Tank which indicates all of the inlet and outlet connections and dimensions of the tank, as well as location of major components.

### **Series II Equipment Skid**

An engineered diagram of the Series II Equipment Skid which indicates all of the inlet and outlet connections and dimensions of the skid, as well as location of major components.

### **Series III Storage Tank**

An engineered diagram of the Series III Storage Tank which indicates all of the inlet and outlet connections and dimensions associated with the tank.

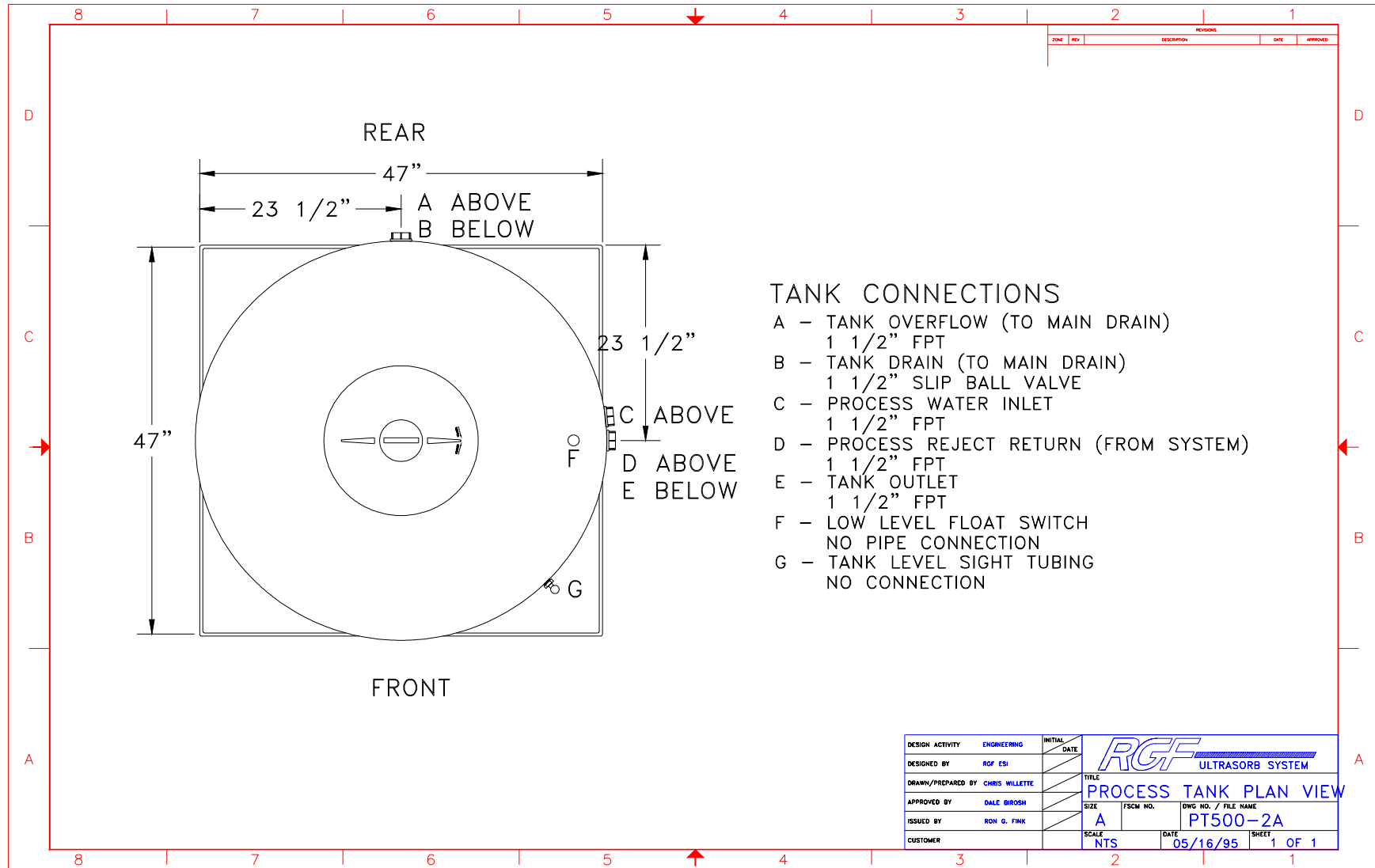
### **Plumbing & Instrumentation Diagram (P&ID)**

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

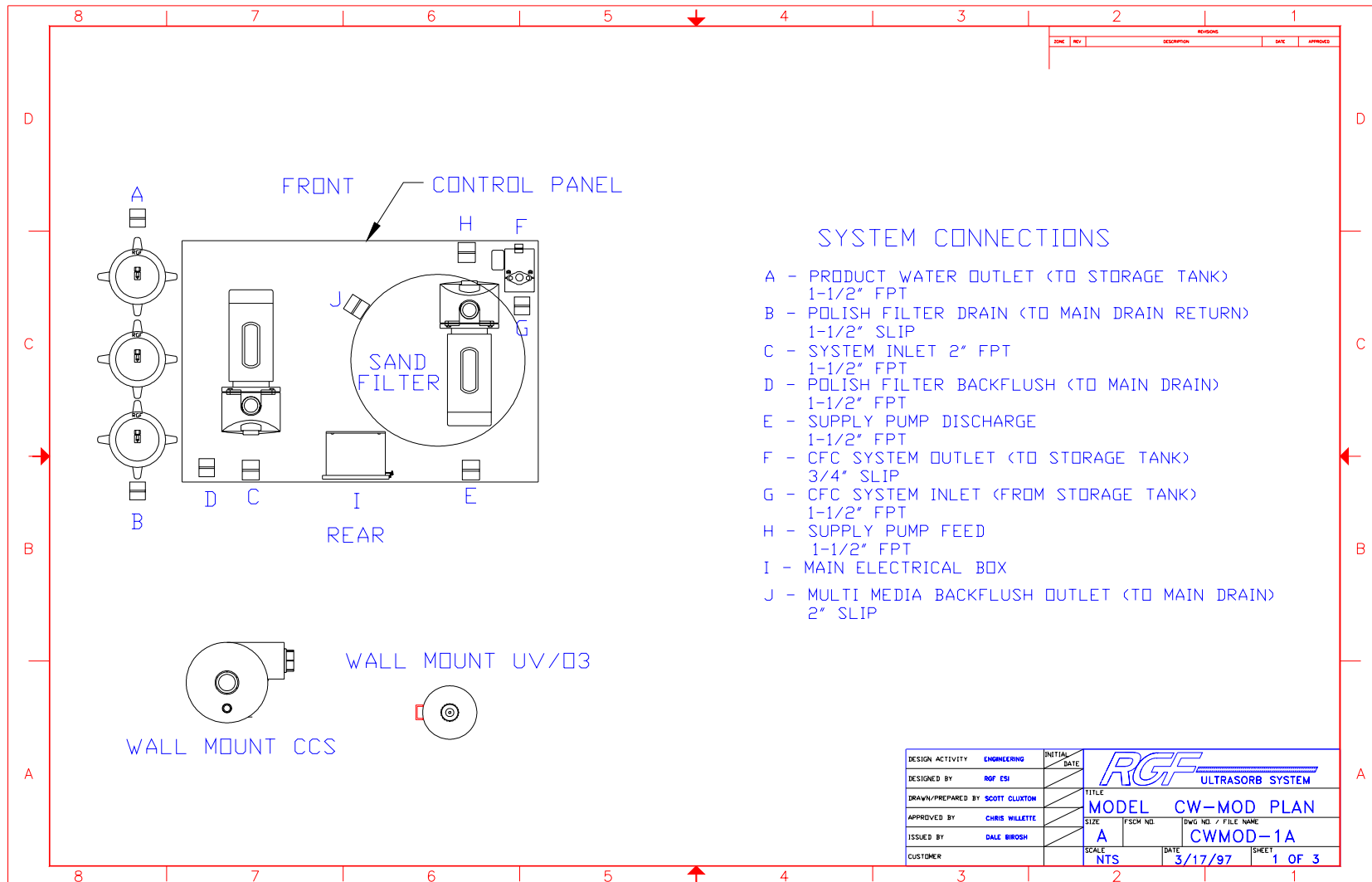
### **Electrical Diagram**

An engineered diagram of the electrical connections and components associated with the system. This diagram is a very useful tool for the electrician when the installation is performed.

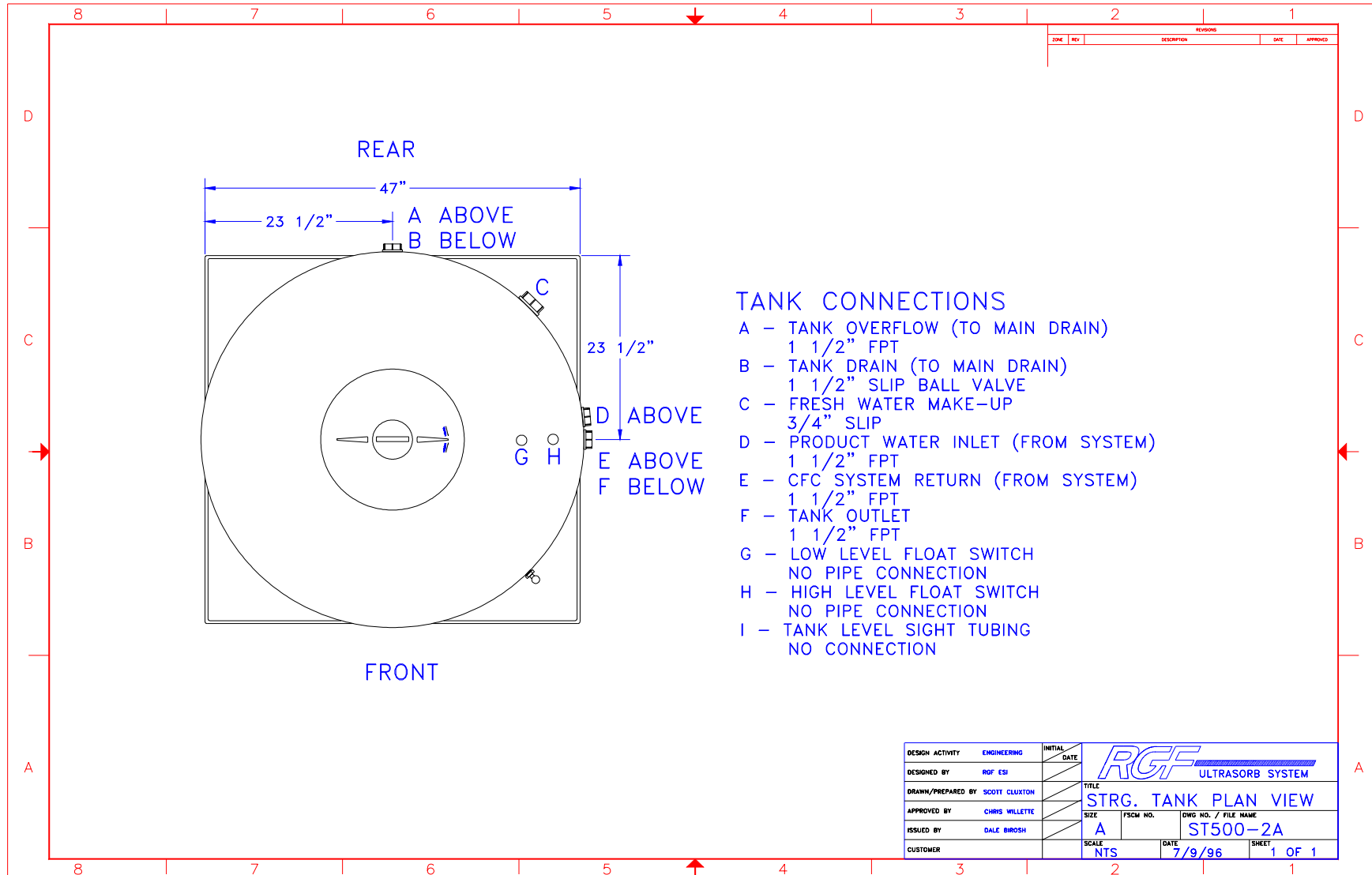
## Process Tank



## Series II Equipment Skid

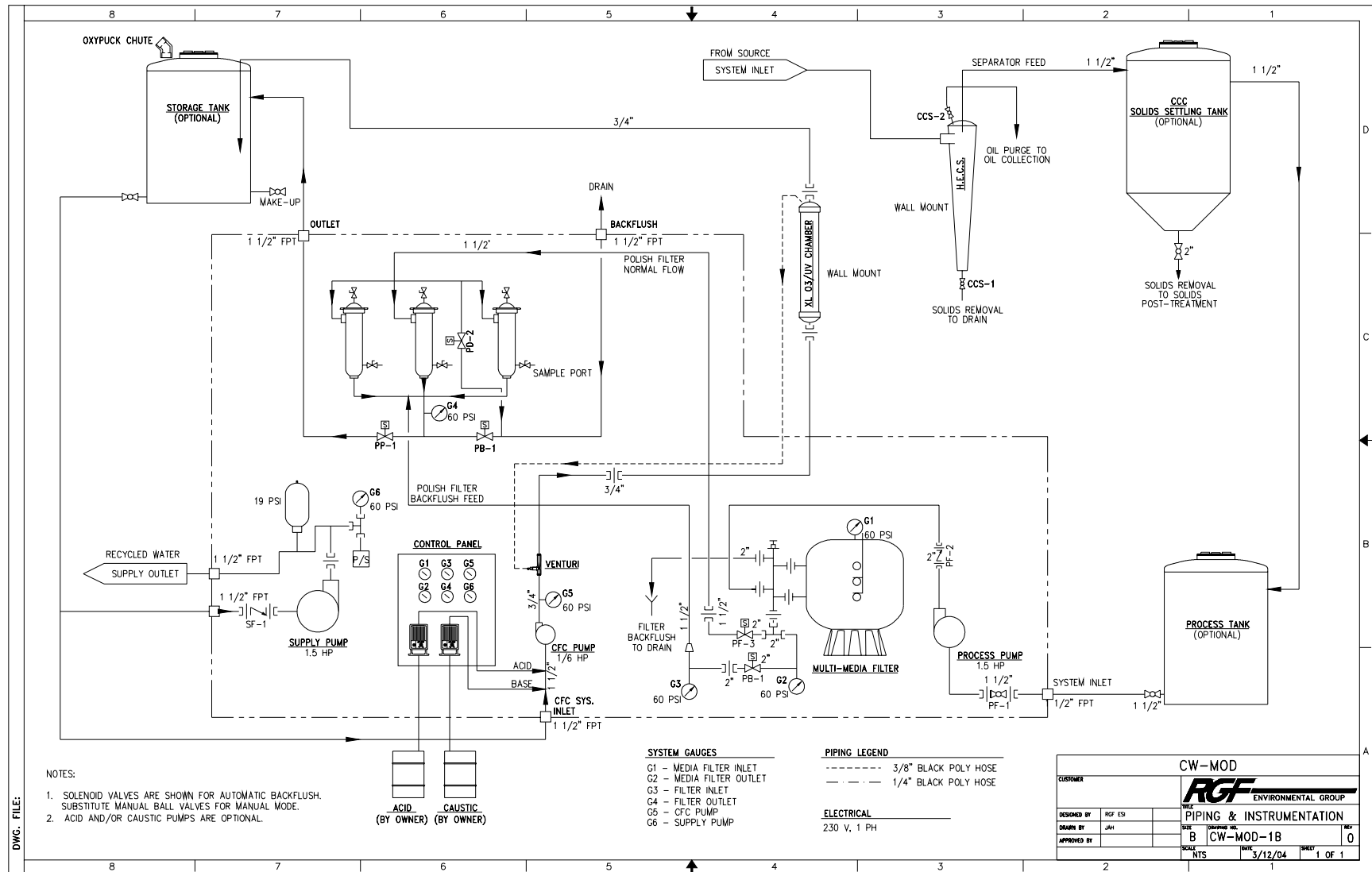


## Series III Storage Tank

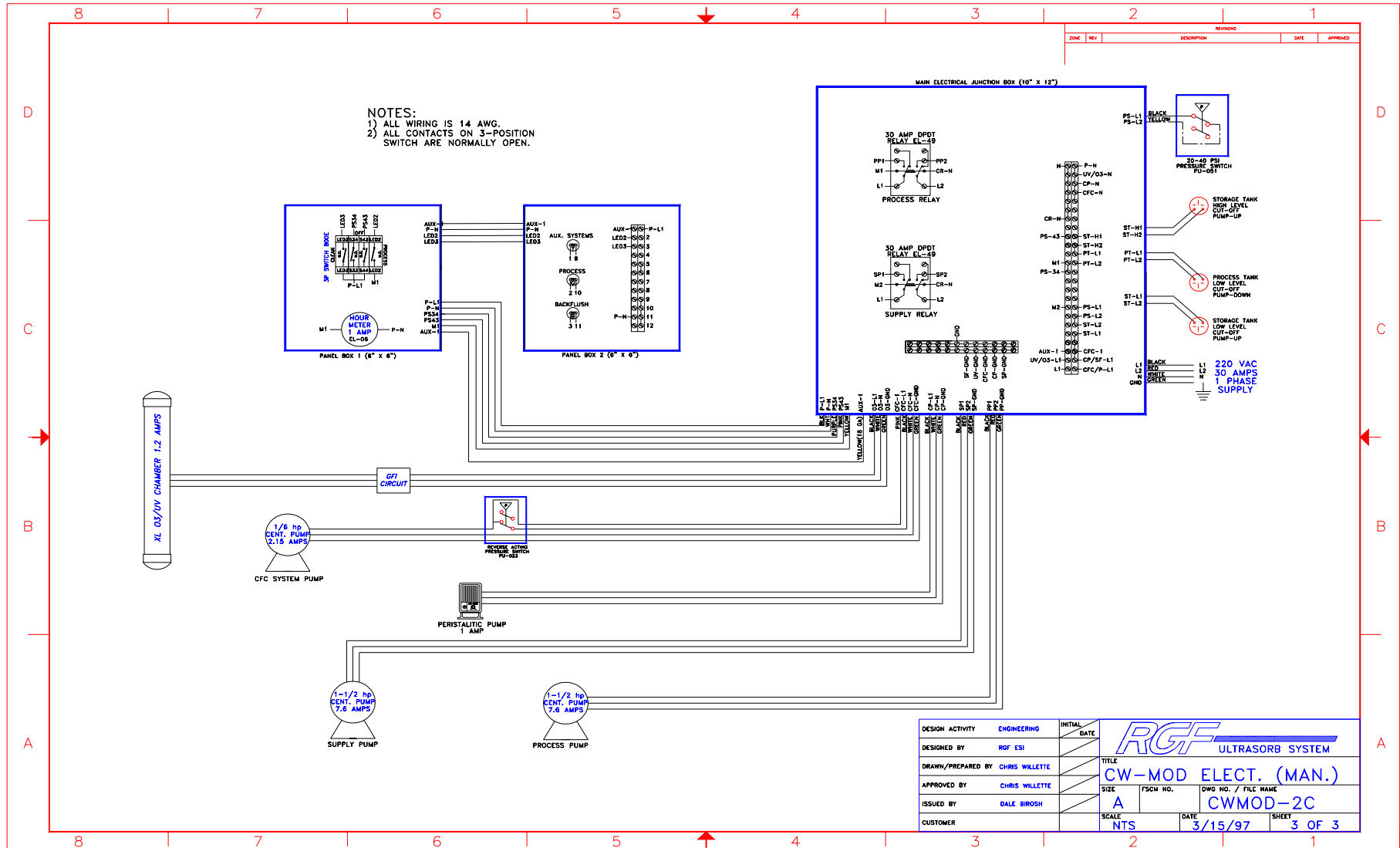




## Piping & Instrumentation Diagram



## Electrical Diagram





## Chapter 8: Troubleshooting

### Flow

SYMPTOM	PROBABLE CAUSE	SOLUTION
<b>PROCESS SYSTEM</b>		
1. PROCESS PUMP NOT OPERATING	A) POWER IS NOT APPLIED TO PUMP	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.
	B) PUMP HAS LOST PRIME	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.
	C) SYSTEM VALVES ARE IMPROPERLY ALIGNED	C) CONDUCT VALVE LINEUP WITH P&ID.

<p>2. NO OR LOW FLOW THROUGH PROCESS SYSTEM</p>	<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>
---	--	--

CFC SYSTEM		
<p>1. CFC PUMP NOT OPERATING</p>	<p>A) CFC SYSTEM HAS LOST PRIME AND TRIPPED THE PRIME LEVER</p> <p>B) SYSTEM VALVE IS IMPROPERLY ALIGNED</p>	<p>A) CHECK WATER LEVEL IN STORAGE TANK. ENSURE UNOBSTRUCTED FLOW TO PUMP SUCTION. REPRIME AND START PUMP ACCORDING TO START-UP PROCEDURE. CONDUCT VALVE LINEUP WITH P&amp;ID.</p> <p>B) CONDUCT VALVE LINEUP WITH P&amp;ID.</p>
<p>2. UV/O3 CHAMBER ON HOUSING IS OFF</p>	<p>A) CFC SYSTEM HAS LOST PRIME AND TRIPPED THE PRIME LEVER</p> <p>B) OZONE GENERATOR IS DEFECTIVE</p>	<p>A) REFER TO #1</p> <p>B) CALL YOUR DISTRIBUTOR OR RGF FOR FURTHER TROUBLESHOOTING ADVICE.</p>
<p>3. UV/O3 CHAMBER LEAKS</p>	<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&amp;ID.</p> <p>C) INNER CHAMBER MUST BE REPLACED.</p>
<p>4. CHEMICAL INJECTION PUMP NOT OPERATING CORRECTLY.</p>	<p>A) CFC SYSTEM HAS LOST PRIME AND TRIPPED THE PRIME LEVER</p> <p>B) LOW OR EMPTY CHEMICAL CONTAINER.</p> <p>C) SUCTION AND DISCHARGE HOSES ARE KINKED.</p> <p>D) PUMP IS NOT RUNNING.</p>	<p>A) REFER TO #1</p> <p>B) FILL CHEMICAL CONTAINER WITH APPROPRIATE MIXTURE.</p> <p>C) CHECK HOSES FOR KINKS. REMOVE PUMP FLEXIBLE HOSE REALIGN AND REPLACE.</p> <p>D) CHECK CHEMICAL METERING KNOB FOR SETTING. IF NOT OFF, AND PUMP STILL NOT RUNNING, THEN PUMP IS DEFECTIVE.</p>

## Electrical

The Ultrasorb® system should be installed by a licensed electrician and should have a properly sized overcurrent 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 drawing in Section 8.3. All indications should be considered: LED illumination, pump rotation and fluid flow.

SYMPTOM	PROBABLE CAUSE	SOLUTION
<b>PROCESS SYSTEM</b>		
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
<b>CHEMICAL</b>		
1. EFFLUENT RECYCLED WATER SMELLS	A) HYDROGEN PEROXIDE FEED SYSTEM SOLUTION IS LOW OR EMPTY. B) HYDROGEN PEROXIDE FEED SYSTEM IS NOT WORKING PROPERLY. C) UV/O3 CHAMBER NOT OPERATING.	A) REFILL HYDROGEN PEROXIDE 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) HYDROGEN PEROXIDE FEED SYSTEM SOLUTION IS LOW OR EMPTY. B) HYDROGEN PEROXIDE 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 HYDROGEN PEROXIDE 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 9: Replacement Parts

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### General Ordering Information

When preparing to order replacement parts for your system:

- Have the **Model #** and **Serial #** of the unit ready when trying to 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
--------	-------------

#### Filters And Parts

FL-078	FILTER MEDIA FOR MULTI-MEDIA FILTER
FP-073	MULTI-MEDIA FILTER VALVE ASSEMBLY
FP-086	POLISHING FILTER CARTRIDGE (ONE)

#### Chemicals

HY-01	HYDROGEN PEROXIDE 35% SOLUTION
MP-1-5	MEMBRANE PRESERVATIVE
CA-01	CITRIC ACID FINE GRAIN (LB.)
SO-01	SODIUM TRIPOLYPHOSPHATE (LB.)
CH-06	ENZYME CLEANER #95
EC-1-5	ENVIRO-CONTROL - 55 GALLONS
WC-1-5	WC-1 WATER CONDITIONER - 5 GALLONS



## Pumps And Parts

PU-86	1/6 Hp. CFC SYSTEM PUMP
PU-64	1-1/2 Hp. CENTRIFUGAL PROCESS PUMP
PU-52	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)
PU-29Y	PERISTALTIC CHEMICAL INJECTION PUMP

## Valves And Unions

VA-06-1	3/4" PVC BALL VALVE
VA-06-4	1 1/2" PVC BALL VALVE
VA-37	3/4" SOLENOID VALVE ASSEMBLY (NORMALLY CLOSED)
VA-38	3/4" ELECTRIC SOLENOID COIL ONLY (120 VAC)
VA-XX	1 1/2" SOLENOID COIL ONLY (120 VAC)
VA-22	1/2" BRASS FLOAT VALVE WITH FLOAT
VA-56	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-144 THRU 147	PANEL INDICATOR LIGHTS (SPECIFY COLOR)
EL-158 THRU 162	CONTROL SWITCH (SPECIFY 3-POS. OR 2-POS)
PT-04	H <sub>2</sub> O <sub>2</sub> AQUACHECK TEST STRIPS (BOTTLE OF 50)
PT-21Z	pH PEN
PT-22Z	H <sub>2</sub> O <sub>2</sub> TEST KIT
PT-12	RGF GRAY TOUCH-UP PAINT
HF-23	1/4" O.D. POLYETHYLENE TUBING

# Chapter 10: Sub-Component Manuals

## GFI Reset



### How To Install & Test Your GFCI Outlet

Ground Fault Circuit Interrupter Duplex Receptacle

**TO BE INSTALLED AND/OR USED IN ACCORDANCE WITH  
APPROPRIATE ELECTRICAL CODES AND REGULATIONS**

ALL MODELS 125V AC 60Hz ONLY

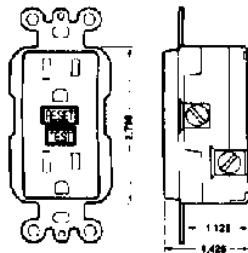
20A Feed-Through Rating, 15A Outlet Rating

Cat. No. 6490, -I, -W Feed-Through without Indicator Light

Cat. No. 6598, -I, -W with Indicator Light

Cat. No. 6599, -I, -W without Indicator Light

Catalog Number indicates Brown Color, -I Ivory, -W White



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LEVITON

Mfg. Co., Inc.

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GFCI: Standard 943

Class A

Receptacle (Outlet)

Standard 498

**UL LISTED**

#### **GENERAL CAUTIONS AND WARNINGS - READ THIS FIRST!**

Carefully read the instructions appropriate to your needs. IF YOU DO NOT UNDERSTAND ANY PART OF THEM, CONSULT A QUALIFIED ELECTRICIAN.

- Install only on a GROUND<sup>ED</sup> 120-Volt AC circuit protected by a fuse or circuit-breaker. **EXCEPTION:** Where a grounding means does not exist in the receptacle enclosure, either a non-grounding or ground-fault circuit-interrupter-type receptacle shall be used. [See NEC210-7(d) Exception 1993] In this application, DO NOT connect a grounding conductor from the GFCI to any outlet supplied from the GFCI receptacle.
- Do NOT install to replace a duplex outlet in which the two halves of the duplex are controlled by different fuses or circuit breakers.
- If the circuit you wish to protect is controlled by a double pole circuit breaker or by two fuses, see APPENDIX.
- For testing procedure refer to Step A-10.

**WARNING:** This device is not to be used directly or indirectly, with life support apparatus or associated circuitry.

**CAUTION:** Do not paint this device, it may not work properly!

1.

+

## GROUND FAULT CIRCUIT INTERRUPTER DUPLEX RECEPTACLE HOMEOWNERS TEST RECORD

### TEST REMINDER

FOR MAXIMUM PROTECTION AGAINST ELECTRICAL SHOCK  
HAZARD OPERATE TEST SWITCH ON GROUND FAULT CIR-  
CUIT INTERRUPTER AT LEAST ONCE A MONTH.

### RECORD DATE

PLACE THIS TEST RECORD IN A CONSPICUOUS PLACE AS  
A REMINDER TO TEST REGULARLY.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
19												
19												
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20												
20												

SEE TEST PROCEDURE ABOVE



LEVITON MANUFACTURING CO., INC.

59-25 Little Neck Pkwy., Little Neck, NY 11362-2591

### TEST PROCEDURE

Like a fire extinguisher or other safety device your GFCI outlet should be checked every month to make sure it is operating properly to protect you. Just follow the simple instructions below and then enter the date of the test on the reverse side of this card.

1. Push black TEST button. Red RESET button should pop out from inner surface. This should result in power being OFF at all outlets protected by the GFCI. Verify by plugging test lamp into every such outlet. If your GFCI has an indicator Light, this light should be ON when circuit is complete. Test with test lamp to determine condition of circuit and proper operation of indicator Light.

**CAUTION:** If RESET button does not pop out or if test lamp or indicator light remains lit when RESET button **does not** pop out **DO NOT USE ANY OUTLETS ON THE CIRCUIT CALL A QUALIFIED ELECTRICIAN.**

2. If the GFCI tests okay, restore power by pushing the RESET button back in **THE RESET BUTTON MUST BE PUSHED FIRMLY AND FULLY INTO PLACE UNTIL IT LOCKS AND REMAINS DEPRESSED AFTER PRESSURE HAS BEEN REMOVED IF THE GFCI FAILS RESET PROPERLY DO NOT USE — CALL A QUALIFIED ELECTRICIAN.** Test lamp and/or Indicator Light should again light.

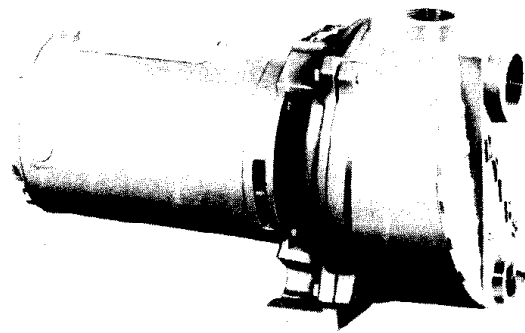
3. IF GFCI TRIPS BY ITSELF at any time during or after installation reset and perform test procedures 1 and 2 above. IF RESET BUTTON DOES NOT POP OUT WHEN TEST BUTTON IS DEPRESSED, **DO NOT USE GFCI. CALL A QUALIFIED ELECTRICIAN.**

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10.

## Process Pump

# Quick Prime Installation, Maintenance & Operating Instructions



INDEX	
Installation Instructions	page 2-3
Service Guide	page 4
Disassembly Instruction	page 5
Assembly Instruction	page 6
Performance Data	page 7

# Myers®

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## GENERAL INSTALLATION INSTRUCTIONS

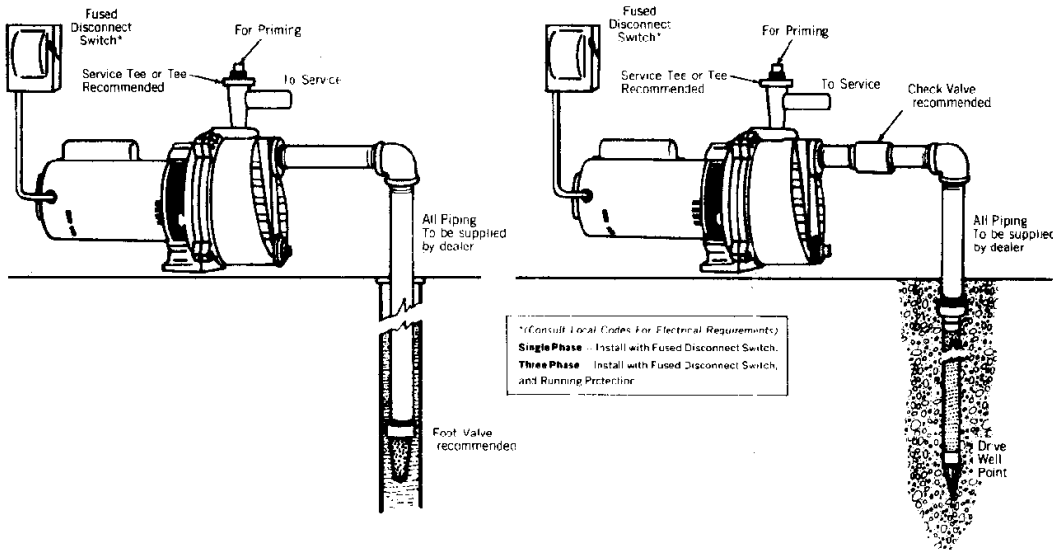
(Read Complete Instructions Carefully Before Starting Installation.)

The pump is designed to operate at total suction lifts not exceeding 25 feet.  
(See selection chart.)

Keep these instructions for future service and operation reference.

**SHIPPING DAMAGE:** The pump carries a one-year warranty against defects in materials and workmanship. This warranty, however, does not apply to parts damaged in transit. Check the shipment carefully and report damage or shortages to the transportation company or your supplier immediately.

**LOCATION:** The pump should be located in an easily accessible place as close to the liquid source as possible. It should be installed in a clean, dry, and well ventilated place allowing room to inspect and service the unit. If located in a pit, the pit should be protected against flooding.



### SUCTION PIPING

Do not exceed 25' total suction lift. If on an installation, excessive total suction lifts are encountered, do one or more of the following to correct this condition:

1. Locate pump nearer to liquid source.
2. Increase pump suction pipe size.
3. Simplify suction piping by elimination of valves and fittings where possible.
4. Decrease pump capacity by means dictated by the type of installation involved.

The pump case is tapped for 1 1/2" pipe. Smaller pipe can be used but at a reduction in the capacity indicated in the performance table. If the suction piping on the 3 HP unit is enlarged to 2" pipe at the elbow, the capacity will increase. On all units, the suction inlet should be at least 3' below the liquid surface at all times.

### DISCHARGE PIPING

The pump case is tapped for 1 1/2" pipe. Larger or smaller pipe may be used depending upon the installation.

### VOLTAGE DATA

Single phase motors as received will be wired for 230V operation. (If 115V operation is desired, alter motor connections per instructions as found on motor.) Note: The 2 and 3 HP single phase motors may be 230V only.

All three phase motors are 230/460V units. Insure that the motor connections are correct for the voltage available. (Instructions will be found on motor.)

The voltage available at the motor must be within 10% of the rated voltage. For offset installations be sure that adequate wire size is used for the size motor involved.

### MOTOR GROUNDING INSTRUCTIONS

**WARNING** Reduced risk of electric shock during operation of this pump requires the provision of acceptable grounding. **Caution: Failure to ground this unit properly may result in severe electrical shock.** If the means of connection to the supply-connection box is other than grounded metal conduit, ground the pump back to the service by connecting a copper conductor, at least the size of the circuit conductors supplying the pump, to the grounding screw provided within the wiring compartment. **NOTE:** National Electric Code requires pumps be grounded at installation.

## MOTOR PROTECTION

All single phase motors have built-in thermal protection, for all voltages.

Three phase motors do not have built-in thermal protection. It is highly recommended that a properly sized magnetic starter be used with all three phase motors.

All motors (single and three phase) should be equipped with a correctly fused disconnect switch to provide protection. Consult local or national electric codes for proper fuse protection based on motor data chart below.

**QP MOTOR DATA**

HP	PHASE	VOLTS	CODE LETTER	MAX. AMPS	LOCKED ROTOR AMPS
3/4	1	115	K	13.40	52.0
	1	230	K	6.70	2.6
	3	200	M	4.00	21.8
	3	230	M	3.50	19.0
	3	460	M	1.75	9.5
1	1	115	J	15.80	68.0
	1	230	J	7.90	34.0
	3	200	L	4.60	28.8
	3	230	L	4.00	25.0
	3	460	L	2.00	12.5
1 1/2	1	115	M	20.20	96.0
	1	230	M	10.10	48.0
	3	200	H	6.60	31.0
	3	230	H	6.00	27.0
	3	460	H	3.00	13.5
2	1	115	J	25.20	126.0
	1	230	J	12.60	63.0
	3	200	H	7.70	39.1
	3	230	H	7.00	34.0
	3	460	H	3.50	17.0
3	1	115	G	33.20	159.0
	1	230	G	16.60	79.0
	3	200	H	10.10	60.9
	3	230	H	9.60	53.0
	3	460	H	4.80	26.5

## ROTATION DATA

The pump must run in the direction of the arrow on the pump bracket — clockwise when facing the end opposite the motor shaft extension. All single phase motors are single rotation and leave the factory with the proper rotation. Three phase motors can run in either direction. At the time of installation, momentarily close the entrance switch to determine rotation; if rotation is not correct, interchange any two of the three motor leads which will reverse the rotation.

## BEARING LUBRICATION DATA

If required, the instructions for maintenance lubricating of the motor bearings will be found on the individual motors.

## INITIAL PRIMING

### Do Not Run Pump Dry

The pump must be filled with water for the initial start. Failure to do so will result in damage to the mechanical shaft seal.

The unit is so designed that after the initial fill, the unit will automatically reprime with or without a check or foot valve in the suction line.

Fill the pump with liquid for the initial start

through the discharge opening in the top of the case. This can be done either before the discharge piping is installed or it is recommended to install

a tee above the pump and using the top of the tee for priming. Pour in approximately 3 1/2 quarts of water. Note: It is not necessary to completely fill the pump case; in fact, if no check or foot valve is used in the suction line, it is impossible to do so. Install the discharge piping or pipe plug, if a tee is used. It is suggested that a good grade of pipe thread compound be used to eliminate the possibility of air or water leaks in the piping. The unit can now be started.

## CHECK OR FOOT VALVE

It is recommended that either a check or foot valve be used in the suction line on permanent installations. This will result in instant water delivery upon starting, therefore eliminating the priming cycle time.

If the pump is to be used in conjunction with a pressure tank then a check or foot valve must be used.

## FLUSHING

The unit can be back flushed periodically to remove any sand or debris that may have been pulled into the pump from the liquid source. It is not necessary to remove any piping if a tee is installed above the pump.

To back flush the unit, remove the plug in the tee (or the discharge piping if a tee is not used) and the 1" pipe plug from the lower front face of the case. Pour water into the top opening until the liquid coming from the lower front opening is clean. It is possible to scrape out any debris from the bottom of the case by reaching a wire or narrow scraper in the lower tapping in the pump case. Reinstall all pipe plugs or piping. Before returning the pump to service, it will be necessary to reprime the pump.— See Initial Priming.

## DRAINING PUMP

To drain the pump, remove the plug from the discharge tee and the 1" pipe plug from the lower front face of the case. If the unit is to be inoperative for an extended period of time it is suggested that the unit be drained. Suction line should also be drained to prevent freezing.

Remove the fuses from the entrance switch to insure that the unit is not inadvertently started while drained, as damage to the shaft seal would occur.

## SUCTION SCREEN

The liquid being pumped should be screened properly to prevent debris from being taken into the system.

## SERVICE GUIDE

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### NO WATER DELIVERED

- a. Pump not properly primed. (See Priming Instructions.)
- b. Discharge system head too great; in this case, a pressure gauge at the pump discharge will show shut off pressure. (See Rating Table.)
- c. Suction lift too great; check with vacuum gauge. (See Suction Piping.) Check or foot valve, if used, may be completely plugged or suction piping may be completely plugged.
- d. Air leak in suction piping.
- e. Wrong motor rotation. (See Motor Rotation.)
- f. Shaft seal leaking under priming conditions.
- g. Motor not up to speed; check for incorrect voltage. (See Motor Voltage.)
- h. Plugged impeller.

### NOT ENOUGH WATER OR PRESSURE

- a. Air leak in suction piping.
- b. Motor not up to speed; check for incorrect voltage or low voltage. (See Motor Voltage.)
- c. Discharge system head too great.
- d. Impeller, suction pipe, check or foot valve partially plugged.
- e. Wrong motor rotation. (See Motor Rotation.)
- f. Suction lift too great. (See Suction Piping.)
- g. Insufficient submergence of suction pipe. (Suction pipe inlet should be at least 3 feet below the liquid surface at all times.)
- h. Pump too small for installation involved. (Check Rating Table.)
- i. Suction piping too small causing excessive total suction lift.
- j. Air or gas entrained in liquid.
- k. Worn impeller or diffuser.

### PUMP LOSES PRIME AFTER STARTING

- a. Air leak in suction piping.
- b. Total suction lift too great. (See Suction Piping.)
- c. Insufficient submergence of suction pipe; check pumping water level. (The suction pipe inlet should be at least 3 feet below the liquid surface at all times.)

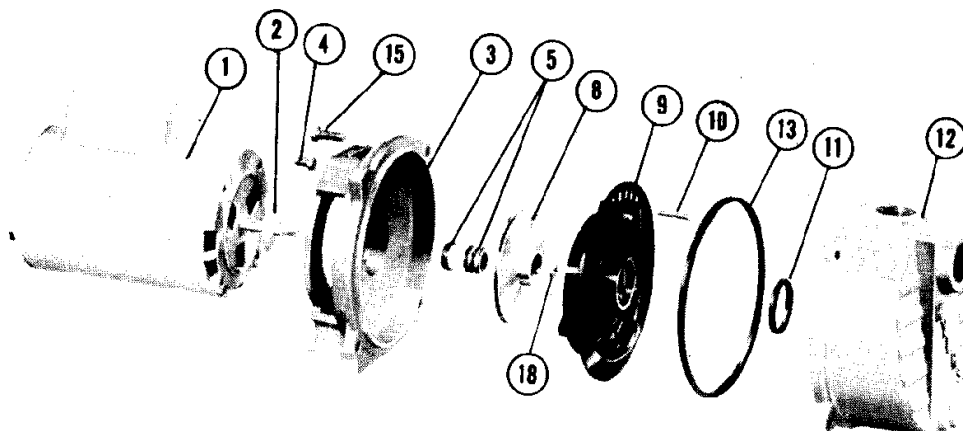
### MOTOR OVERHEATS

- a. Check rotating element to insure that it turns freely.
- b. Low voltage at the motor. (See Motor Voltage and Motor Wiring.) Check electrical connections to insure tight contact.
- c. Poor ventilation. (See Location.)

### PUMP VIBRATES OR IS NOISY

- a. Insufficient pump foundation.
- b. Excessive total suction lift.
- c. Bent shaft or worn motor bearings.
- d. Impeller partially clogged.





(THREE PHASE UNIT AS SHOWN)

The complete disassembly and reassembly instructions have been itemized for simplicity's sake.

At the discretion of the mechanic servicing the unit only those steps required to reinstate the unit to original performance need be done.

The "exploded" view above indicates all items referred to in these instructions.

Should repair parts be ordered, please furnish:

1. The part name (as indicated on the accompanying drawing).
2. The quantity required and the item part number.
3. The unit catalog and serial numbers as shown on the pump name plate.
4. The motor horsepower and phase as indicated on the motor name plate.

## PUMP DISASSEMBLY INSTRUCTIONS

It is not necessary to remove the suction and discharge piping as the pump case (12) is designed so that no wear would occur which would necessitate replacing this part.

1. Drain the pump of its liquid charge. (See Draining Pump Instructions.)
2. Open the power supply switch contacts and remove fuses.
3. Disconnect the electrical wiring from the motor (1).
4. Remove the four cap screws (15) which secure the pump bracket (3) to the pump case (12).
5. The motor and bracket assembly can now be removed from the pump case by pulling horizontally away from the case. It may be necessary to use two screwdrivers — opposite each other — in the provided openings between the bracket and case bosses; pry the components apart. The motor and bracket assembly can now be taken to a more convenient location for disassembly if desired.
6. Remove the square rubber ring gasket (11) from the case inner neck.
7. Remove the three cap screws (10) that hold the diffuser in place and lift off diffuser (9).

8. If unit is three phase — hold impeller or hold the motor shaft with water pump pliers through a bracket window, and remove hex nut (18) located in the impeller eye.
9. Holding the motor shaft with pliers, through one of the bracket windows, unscrew (counter-clockwise) the impeller (8) (right hand threads).
10. The mechanical shaft seal components (5) can now be removed from the motor shaft and bracket respectively.
11. Remove the four cap screws (4) which secure the bracket to the motor; remove the bracket.
12. The deflector (2) can now be removed from the motor shaft.
13. Remove the square rubber ring gasket (13) from the bracket neck.

The pump is now completely dismantled into its component parts. Inspect pump parts and, if required, replace.

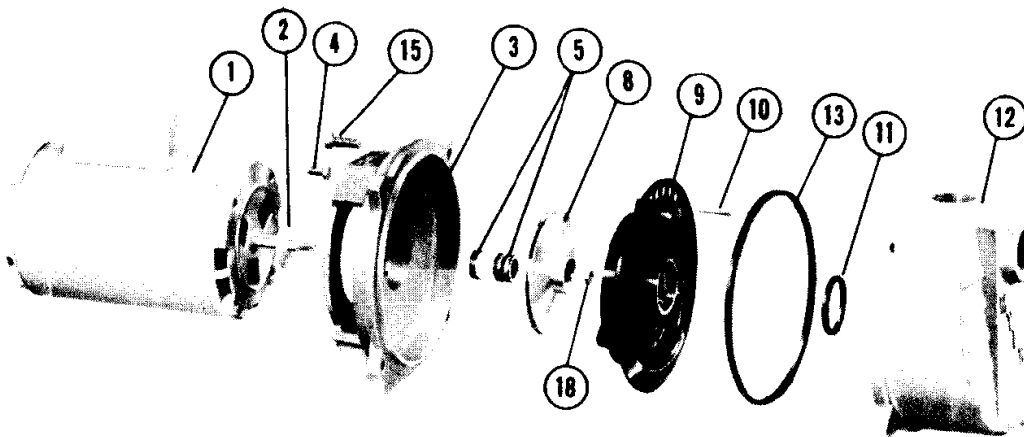
A new shaft seal should always be used when rebuilding a pump. All pump parts should be cleaned thoroughly before being reassembled.

## PUMP ASSEMBLY INSTRUCTIONS

1. Slip deflector (2) onto the motor (1) shaft extension.
2. With motor in vertical position (shaft extension end up) place bracket onto motor face register.
3. Secure bracket to motor with four cap screws (4). Insure that the motor, when in operating position, has the shell air slots in the down position.
4. Place stationary shaft seal component (5) over pump shaft extension and seat into provided bracket bore. (Use finger pressure to press this seal component firmly and squarely until it bottoms.) Follow with the rotating seal component onto the motor shaft. Be sure the lapped sealing surface is toward the seal seat. The use of a light oil (SAE 10) on the rubber elements will facilitate assembly.  
It should be emphasized that extreme cleanliness and care are required for proper seal assembly. Should the seal faces be damaged during assembly (cracked, scratched or chipped) the seal will surely leak during operation.
5. Screw the impeller (8) (right hand thread) onto the pump shaft extension until the impeller back hub butts the shaft shoulder. (The motor shaft can be held with pliers to prevent turning.)
6. If unit is three phase – install a  $\frac{3}{4}$ -20 UNF Hex Jam Nut (18), 18-8 Stainless Steel (Myers Part No. 19109A70), onto the motor shaft after the impeller. Nut to be torqued

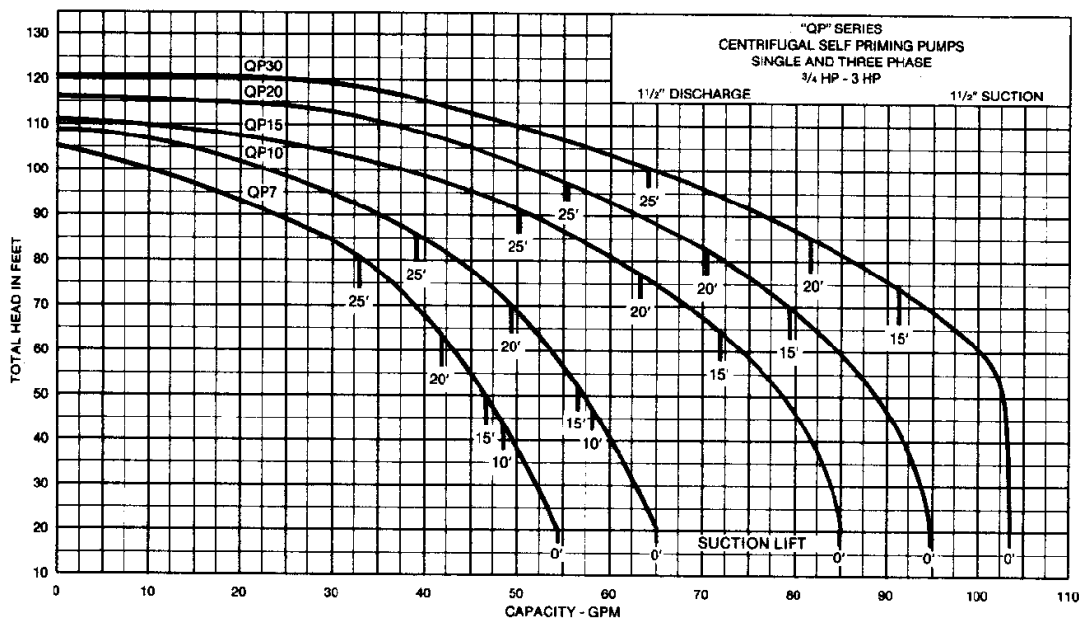
to 17 ft. lbs., if wrench is available. It is recommended that a locking type sealant be applied to the threads prior to assembly.

7. Place the diffuser (9) over the impeller with the diffuser volute face against the bracket, be sure the word "top" on the diffuser is in the proper position. Equally space three-.005 shims between the impeller hub and the diffuser I.D. (This will center the diffuser in relation to the impeller.) Assemble the three- $\frac{1}{4}$ " cap screws (10) and tighten alternately, so the diffuser is not pulled to one side. Snug up screws securely – do not overtighten. Remove the three shims and as the impeller is revolved it should turn freely. (Be sure the drain hole in the bottom of the diffuser is open and not plugged.)
8. Place gasket (13) over the bracket register diameter and position against the provided face.
9. Place gasket (11) over the inner neck in the pump case and place against the provided shoulder.
10. The assembly can now be re-assembled to the pump case.
11. Using four cap screws (15) secure bracket to case.
12. The motor wiring can now be connected and the unit reprimed. (See Priming Instructions.)
13. Install the previously removed fuses from the entrance switch and close the switch; the unit is now in operation again.



Catalog Numbers		H.P.	Discharge Pressure PSI	Capacity in G.P.H. for Discharge Pressure & Total Suction Lift Indicated				Pipe Sizes		Maximum Total Shut-off Head		1 & 3 Phase Approx. Wt. Lbs.
1 Phase	3 Phase			10 Ft.	15 Ft.	20 Ft.	25 Ft.	Suction	Disch.	Feet	PSI	
QP7	QP7-3	¾	20	2445	2290	2170	1995	1½"	1½"	105	45.5	58
			25	2145	2010	1855	1650					
			30	1845	1635	1390	1080					
			35	1295	905	510						
			40	390								
QP10	QP10-3	1	20	3075	2935	2785	2355	1½"	1½"	108	47	61
			25	2775	2610	2440	2245					
			30	2430	2250	2020	1755					
			35	1980	1660	1240	600					
			40	1145	300							
QP15	QP15-3	1½	20	4300	4165	3805	3015	1½"	1½"	111	48	68
			25	3990	3750	3525	3015					
			30	3575	3300	3035	2700					
			35	3030	2620	2220	1495					
			40	2210	1555							
QP20	QP20-3	2	20	4735	4600	4230	3330	1½"	1½"	116	50	74
			25	4480	4290	4020	3330					
			30	4110	3815	3505	3180					
			35	3510	3175	2820	2400					
			40	2850	2430	1950						
QP30	QP30-3	3	20	5580	5460	4920	3840	1½"	1½"	121	52	87
			25	5575	5460	4920	3840					
			30	5390	5135	4720	3840					
			35	4865	4400	3940	3420					
			40	4075	3550	2910	2250					
			45	2875	1800							

Single phase units are dual voltage (115/230-v.) (2 & 3 hp. are 230-v. only)  
 All units are loaded within the motor service factor.  
 Suction check or foot valve recommended but not required.  
 Discharge pressures as shown are at the pump discharge.  
 The maximum total head is at zero capacity.  
 Charted capacities are based on pumping 60° F. water at sea level.



**Myers®**

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## CFC System Pump

### 8. Limited Warranty

Products manufactured by GRUNDFOS PUMPS CORPORATION (GRUNDFOS) are warranted to the original user only to be free of defects in material and workmanship for a period of 18 months from date of installation, but not more than 24 months from date of manufacture. GRUNDFOS' liability under this warranty shall be limited to repairing or replacing at GRUNDFOS' option, without charge, F.O.B. GRUNDFOS' factory or authorized service station, any product of GRUNDFOS manufacture. GRUNDFOS will not be liable for any costs of removal, installation, transportation, or any other charges which may arise in connection with a warranty claim. Products which are sold but not manufactured by GRUNDFOS are subject to the warranty provided by the manufacturer of said products and not by GRUNDFOS' warranty. GRUNDFOS will not be liable for damage or wear to products caused by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair, or if the product was not installed in accordance with GRUNDFOS' printed installation and operation instructions.

To obtain service under this warranty, the defective product must be returned to the distributor or dealer of GRUNDFOS products from which it was purchased together with proof of purchase and installation date, failure date, and supporting installation data. Unless otherwise provided, the distributor or dealer will contact the GRUNDFOS factory or authorized service station for instructions. Any defective product to be returned to the factory or service station must be sent freight prepaid; documentation supporting the warranty claim and/or a Return Authorization must be included if so instructed.

GRUNDFOS WILL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES, OR EXPENSES ARISING FROM INSTALLATION, USE, OR ANY OTHER CAUSES. THERE ARE NO EXPRESS OR IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH EXTEND BEYOND THOSE WARRANTIES DESCRIBED OR REFERRED TO ABOVE.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages and some jurisdictions do not allow limitations on how long implied warranties may last. Therefore, the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction. GRUNDFOS PUMPS CORPORATION, 2555 Clovis Avenue, Clovis, CA 93612, telephone number (209) 292-8000.

## GRUNDFOS

**Grundfos Pumps Corp.**  
2555 Clovis Ave. / Clovis, CA 93612  
**Support Centers:**  
Allentown, PA • Atlanta, GA •  
Mississauga, Ontario, Canada

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## Installation Instructions Maintenance-Free Circulators



**1. Shipment inspection**  
Page 1

**5. Start-Up**  
Page 5

**2. Pre-Installation Checklist**  
Page 1

**6. Operation**  
Page 5

**3. Installation**  
Page 2

**7. Failure to Operate**  
Page 6

**4. Electrical**  
Page 4

**8. Warranty**  
Page 7

## 1. Shipment Inspection

Examine the components carefully to make sure no damage has occurred to the pump during shipment. Care should be taken to ensure the pump is NOT dropped or mishandled; dropping will damage the pump.

## 2. Pre-Installation Checklist

*Before beginning installation procedures, the following checks should be made. They are all important for proper installation of the circulation pump.*

### 1. Uses:

Model UPS 15, and UP 15, 25, 26 and 43 series pumps are designed to circulate water from 50°F to 230°F up to a maximum pressure of 145 psi. If required, a 50% by volume solution of ethylene or propylene glycol and water can be used, however, a decrease in pump performance may result due to an increase in the viscosity of the solution. Check with manufacturer for information regarding suitability of pumping other fluids.

**Closed Systems:** UPS 15 and UP 26 and 43 series pumps with cast iron volutes are recommended for closed hydronic systems (i.e. airless, non-potable water).

**Open Systems:** UP 15, 25, 26 and 43 series pumps with stainless steel or bronze volutes can be used in both open and closed systems.

### 2. Maximum Water Temperature

The maximum allowable water temperature is determined by the ambient or surrounding air temperature as shown in Table 2A.

**Table 2A — Maximum Water Temperature**

Ambient (°F)	104	120	140	160	175
Water (°F)	230	220	210	190	175

## 3. Inlet Pressure Requirements

The amount of pressure required at the inlet of the pump is a function of the temperature of the water as shown in Table 2B.

**Table 2B — Inlet Pressure Requirements**

Water (°F)	190	165	140
Required Inlet Pressure (ft)	5	4.5	3
(psi)	2.2	1.9	1.3

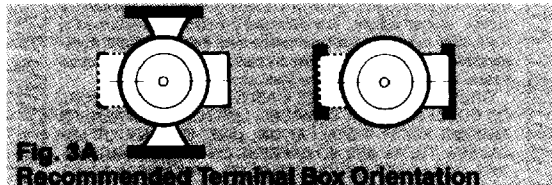
In a pressurized system, the required inlet pressure is the *minimum* allowable system pressure.

In a system open to the atmosphere, the required inlet pressure is the *minimum* distance the pump must be located below the lowest possible water level of the water source (tank, pool, etc.).

## 3. Installation

### Position of terminal box:

Proper installation of the pump will have the terminal box located to one side of the pump or the other, with the conduit entry down. See Figure 3A.



If the terminal box position needs to be changed, it is best to do so before installation. However, if the pump is already installed, insure that the electrical supply is turned off and close the isolation valves before removing the Allen screws.

### To change terminal box position:

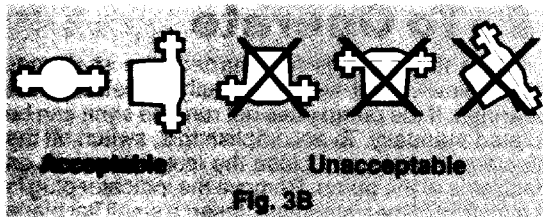
1. Remove the four (4) Allen screws (4 or 5mm wrench) while supporting the stator (motor).
2. Carefully separate the stator from the pump chamber and rotate it to the correct terminal box orientation.
3. Replace the Allen screws and tighten diagonally and evenly (7 ft-lb torque).
4. Check that the motor shaft turns freely. Remove the large screw in the middle of the nameplate, insert a small flat blade screwdriver into the end of the shaft, and turn gently.



If the shaft does not turn easily, repeat the disassembly/reassembly process.

## Pump Mounting: For Indoor Use

Arrows on the side or bottom of the pump chamber indicate direction of flow through the pump. GRUNDFOS circulators can be installed in both vertical and horizontal lines. The pump must be installed with the motor shaft positioned horizontally. *Under no circumstances should the pump be installed with the shaft vertical or where the shaft falls below the horizontal plane.* See Fig. 3B.



It is recommended that isolation valves be installed on each side of the pump. If possible, do not install elbows, branch tees, and similar fittings just before or after the pump. Provide support to the pump or adjacent plumbing to reduce thermal and mechanical stress on the pump.

### Installation Requirements

1. Thoroughly clean and flush the system prior to pump installation.
2. Do not install the pump at the lowest point of the system where dirt and sediment naturally collect.
3. Install an air vent at the high point(s) of the system to remove accumulated air.
4. Insure that water does not enter the terminal box during the installation process.
5. (Open System) Install the pump in the supply line; the suction side of the pump should be flooded with water. Insure that the static head requirement from Table 2B is achieved.
6. (Closed System) Install a safety relief valve to protect against temperature and pressure build-up.
7. If there are excessive suspended particles in the water, it is recommended that a strainer and/or filter be installed and cleaned regularly.
8. **DO NOT START THE PUMP UNTIL THE SYSTEM HAS BEEN FILLED.**

## 4. Electrical

**All electrical work should be performed by a qualified electrician in accordance with the latest edition of the National Electrical Code, local codes and regulations.**

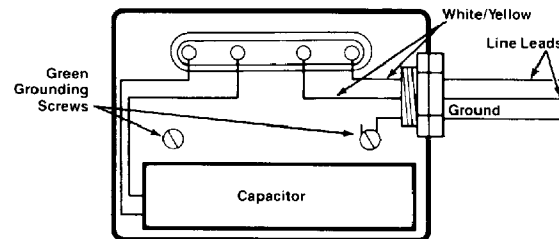
### Warning:

The safe operation of this pump requires that it be grounded in accordance with the National Electric Code and local governing codes or regulations. The ground wires should be copper conductor of at least the size of the circuit conductor supplying power to the pump. Minimum ground wire size is 14 AWG. Connect the ground wire to the grounding point in the terminal box and then to an acceptable ground. Do not ground to a gas supply line.

The proper operating voltage and other electrical information can be found on the nameplate attached to the top of the motor. Depending on pump model, the motor has either built-in, automatic resetting thermal protection or is impedance protected and in either case does not require additional external protection. The temperature of the windings will never exceed allowable limits, even if the rotor is locked.

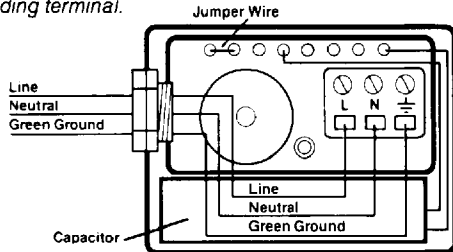
Wire sizes should be based on the ampacity (current carrying properties of a conductor) as required by the latest edition of the National Electric Code or local regulations. Both the power and grounding wires must be suitable for at least 194°F (90°C).

*For all 115V and 230V models: Connect the white/yellow electrical leads from the circulator to the incoming power leads with wire nuts or other approved connectors. Attach incoming grounding wire to either of the green grounding screws.*



Wiring diagram for all 115V and 230V models (except UPS15-42F).

Wire the hot lead to terminal "L", neutral wire to terminal "N", and ground to the grounding terminal. For 230 volt pumps, the two hot leads should be to "L" and "N" and the ground to the grounding terminal.



Wiring diagram for UPS 15 - 42F model multi-speed pumps

## 5. Start-Up

**Do not use the pump to vent the system. Do not start the pump before filling the system. Never operate the pump dry.**

The pump should be manually vented as follows to prevent the possibility of any bearing damage at start-up. The pump will continue to automatically vent air once manually vented.

1. Once the system has been filled and vented, open the isolation valves and slowly remove the indicator plug in the middle of the nameplate.
2. Allow the air to purge from the pump until water appears. While air is venting, gently turn shaft and move it in and out, with a small flat blade screwdriver. Protect the terminal box from getting wet. After air has been vented, install and retighten the plug. The pump can now be started.

## 6. Operation

GRUNDFOS domestic circulating pumps, installed properly and sized for correct performance, will operate quietly and efficiently and provide years of service.

Under no circumstances should the pump be

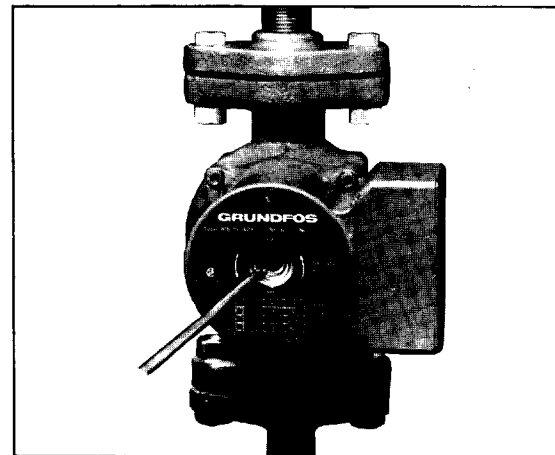
operated without water circulation or without the minimum required inlet pressure for prolonged periods of time. This could result in motor and pump damage.

UPS model pumps are multispeed, and the speed can be changed by a speed selector switch located on the front of the terminal box. UP models are single speed.

## 7. Failure To Operate

When the pump is first started, the shaft may rotate slowly until water has fully penetrated the bearings. If the pump does not run, the shaft can be rotated manually. To accomplish this, switch off the electrical supply, and close the isolation valves on each side of the pump. Remove the indicator plug in the middle of the nameplate. Insert a small flat blade screwdriver into the end of the shaft, and gently turn until the shaft moves freely. See Fig. 7. Replace and tighten the plug. Open the isolation valves and wait 2 to 3 minutes for the system pressure to equalize before starting the pump.

Note: After a long shut down multi-speed pumps should be started on speed 3 and then adjusted to the regular setting. If the pump does not start, follow the instructions in the paragraph above.



## Peristaltic Chemical Injection Pump

### Uni-Dose™ Series R PERISTALTIC PUMP

#### INSTALLATION INSTRUCTIONS PARTS LIST

Please record the following data:  
(Information on pump box and pump data plate)

Model Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Installation Date: \_\_\_\_\_

Installation Location: \_\_\_\_\_

When ordering replacement parts for your **Uni-Dose**  
Peristaltic Pump, please include the complete model number  
and serial number.

**Uni-Dose™**

MANUFACTURED BY LIQUID METRONICS  
DIVISION MILTON ROY

ISO9001 Certified • a unit of Sundstrand Corporation

8 Post Office Square  
Acton, MA 01720 USA  
TEL: (508) 263-9800  
FAX: (800) UNI-DOSE  
OR (800) 864-3673

Replaces same of 3/94  
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## ⚠ CAUTION ⚠

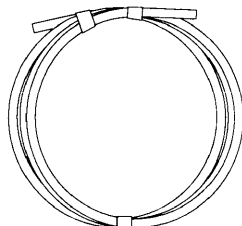
ALWAYS wear protective clothing, face shield, safety glasses and gloves when working near or performing any maintenance on your pump. See MSDS Sheet from solution supplier for additional precautions.

**Read all steps below before proceeding.**

The following accessories are included with your Uni-Dose™ Series R Pump:



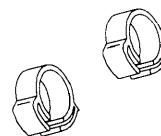
Injection  
Check Valve  
(P/N 34051)



Suction/Discharge  
Tubing, 16ft  
(P/N 28636-16)



Foot Valve  
(P/N 30921)



Tubing  
Clamps  
(P/N 32135)

**NOTE:** Please notify the carrier immediately if there are any signs of damage to the pump or its parts. If any parts are missing, please notify the pump supplier.

## SOLUTION COMPATABILITY

Uni-Dose™ Series R Pumps are designed for swimming pool and spa water conditioning. The materials of construction are suitable for pumping muriatic acid (15% hydrochloric acid). Other applications may require the use of solutions not compatible with the Uni-Dose™ Series R Pump.

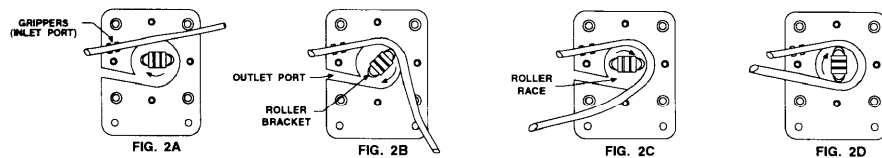
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## INSTALLATION

- ⚠ **PLUMBING**--Always adhere to local plumbing codes and requirements. Be sure installation does not constitute a cross connection.
- ⚠ **ELECTRICAL**--To reduce the risk of electric shock, the pump must be plugged into a grounded outlet with rating conforming to the information on the pump dataplate. **Do not use adaptors.** All wiring must conform to local electrical codes.
- ⚠ **CAUTION:** *DO NOT RUN MOTOR WHILE CHANGING TUBING. SEVERE PINCHING OF FINGERS CAN OCCUR.*

1. Locate the Uni-Dose™ pump in an area convenient to solution tank and electrical supply. The pump should be accessible for routine maintenance and should not be subjected to temperatures over 122°F (50°C).
2. *Disconnect power to the pump.*
3. Clean roller race, removing any particles that could damage tubing.
4. Position roller bracket assembly as shown in Fig. 2A. Turn slowly by hand into position.
5. Push the pump tubing into the inlet port, anchoring tubing in grippers (Fig. 2A) while rotating roller bracket assembly by hand, clockwise (Fig. 2B).



6. Continue to rotate roller bracket assembly, pushing pump tubing into roller race (Fig. 2C).
7. Finally, insert tubing into outlet port (Fig. 2D) and attach pump head cover, using the 4 thumb screws.

## INSTALLATION (cont.)

8. Cut suction/discharge tubing to a length adequate for both the suction and discharge tubing runs.

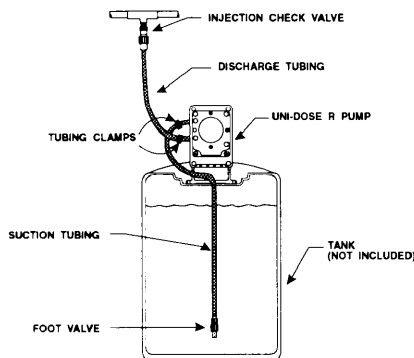


Fig. 3

9. Connect the foot valve to the suction tubing.

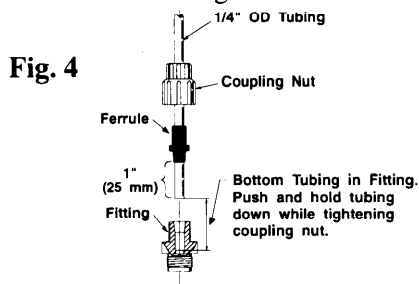


Fig. 4

10. Place the foot valve and the suction tubing in the solution tank or container.

11. Insert the suction tubing into the inlet pump tubing a minimum of 3/8". Secure with tubing clamp (see Fig. 5).

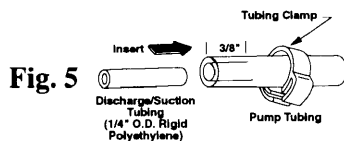


Fig. 5

12. Insert the discharge tubing into the outlet pump tubing a minimum of 3/8". Secure with tubing clamp (see Fig. 5).

13. Install the injection check valve into a pipe tee. Any size NPTF fitting or pipe tee with a reducing bushing to 1/2" NPTF will accept the injection check valve. Use Teflon tape or pipe dope to seal the pipe threads only.

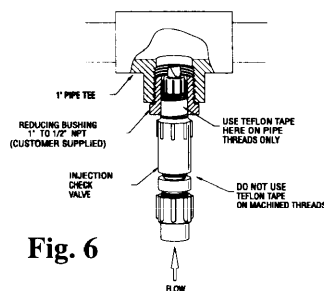


Fig. 6

**NOTE:** Do not install in "dead end" pipes.

14. Connect the discharge tubing to the injection check valve. (see Fig. 4)

15. Plug in pump. The Uni-Dose™ Series R pump is self-priming.

**NOTE:** The pump may be mounted at the base of a solution tank to provide **flooded suction**. This type of installation ensures that the suction tubing is always filled with solution, which may help to prime the pump and may reduce the chance of losing prime.

---

## OPERATION

1. After filling your solution tank, connect power to your pump. The pump is self-priming and will begin to inject the solution into your system once the suction and discharge tubing are filled.
2. Output Adjustment (R1 models only)--The interval percentage timer provides output adjustment by means of a 20 second on/off cycling timer. The graduations on the dial refer to the percentage of maximum rated output found on the dataplate. Adjust the knob to achieve the desired output.

Calculate the total output of the pump as follows:

$$\text{MAX. PUMP OUTPUT} \times \% \text{ ON TIME} = \text{PUMP OUTPUT}$$

**Example:** R121-250

Use MAX Output (from dataplate) = 30 GPD (Gallons per Day).

If the pump is set at 50% on-time (10 seconds ON/10 seconds OFF), the approximate pump output is:  $30.0 \times 0.5 = 15 \text{ GPD}$  (divide by 24 to calculate gallons per hour)

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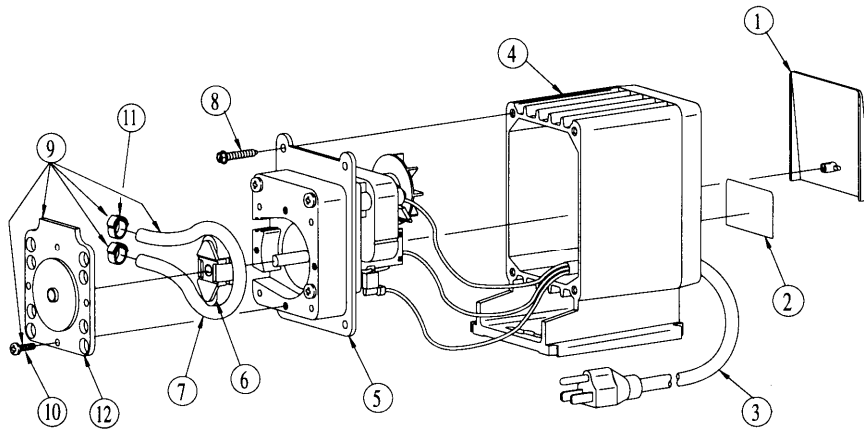
## MAINTENANCE

1. Keep the solution tank filled with solution. Inspect the foot valve strainer and clean with fresh water when necessary.
2. Inspect all suction and discharge tubing for cracking/deterioration. Replace as necessary.
3. Tubing element in pump head should be inspected regularly for wear. To replace, use the following instructions:

**⚠ CAUTION:** *DISCONNECT POWER FROM PUMP WHILE CHANGING TUBING ELEMENT. SEVERE PINCHING OF FINGERS CAN OCCUR.*

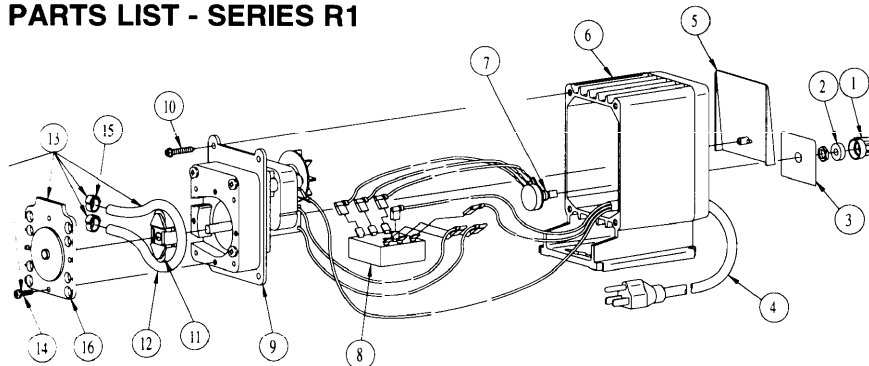
- a. Disconnect the suction and discharge tubing from the pump tubing element.
- b. Remove the four (4) thumb screws and the pump head cover.
- c. Remove old tubing element and discard.
- d. Follow installation steps three (3) through seven (7) to position new tubing element in the pump.
- e. Follow installation steps eleven (11) and twelve (12) to reconnect suction and discharge tubing.

## PARTS LIST - SERIES R0



KEY NO.	MODEL	PART NO.	DESCRIPTION	QTY
1	R0	33167	Cover, Front	1
2	R0	32130	Nameplate	1
3	R0X1	32132	Power Cord, 115V	1
	R0X2	32133	Power Cord, 230 V	1
4	R0	32128R	Housing "R"	1
5	R021	33168	Motor Asm, 115V, 23 RPM	1
	R041	33169	Motor Asm, 115V, 49 RPM	1
	R022	33170	Motor Asm, 230V, 23 RPM	1
	R042	33171	Motor Asm, 230V, 49 RPM	1
6	R0	33172	Roller Asm	1
7	R0XX-187	32137	Tubing, .187	1
	R0XX-250	32139	Tubing, .250	1
8	R0	30306	Screw, Self Tapping	4
9	R0XX-187	187	Tubing Kit, .187 O.D.	1
	R0XX-250	250	Tubing Kit, .250 O.D.	1
10	R0	33174	Screw	4
11	R0	32135	Clamp, Tubing	2
12	R0	33173	Cover	1

## PARTS LIST - SERIES R1



KEY NO.	MODEL	PART NO.	DESCRIPTION	QTY
1	R1	30709B	Knob, Speed	1
2	R1	30803	Gasket	1
3	R1	32129	Nameplate	1
4	R1X1	32132	Power Cord, 120V	1
5	R1	33167	Cover, Front	1
6	R1	32128R	Housing, "R"	1
7	R1	32050	Pot. Asm	1
8	R1	31033	Timer	1
9	R121	33176	Motor Asm, 115V, 23 RPM	1
	R141	33177	Motor Asm, 115V, 49 RPM	1
10	R1	30306	Screw, Self Tapping	4
11	R1	33172	Roller Asm	1
12	R1X1-187	32137	Tubing, .187	1
	R1X1-250	32139	Tubing, .250	1
13	R1X1-187	187	Tubing Kit, .187 O.D.	1
	R1X1-250	250	Tubing Kit, .250 O.D.	1
14	R1	33174	Screw	4
15	R1	32135	Clamp, Tubing	2
16	R1	33173	Cover	1

### LIMITED WARRANTY

Liquid Metronics Incorporated warrants equipment of its manufacture and bearing its identification to be free from defects in workmanship and material. LMI's liability under this warranty extends for a period of one year from the date of delivery from our factory or authorized distributor. It is limited to repairing or replacing any device or part which is returned, transportation prepaid, to the factory within one year of delivery to the original purchaser, and which is proven defective upon examination.

LMI disclaims all liability for damage during transportation, for consequential damage of whatever nature, for damage due to handling, installation or improper operation, and for determining suitability for the use intended by the purchaser. Replaceable elastometric parts are expendable and are not covered by any warranties either express or implied. LMI makes no warranties either express or implied, including the implied warranty of merchantability, other than those stated above. No representative has authority to change or modify this warranty in any respect. Specifications subject to change without notice.

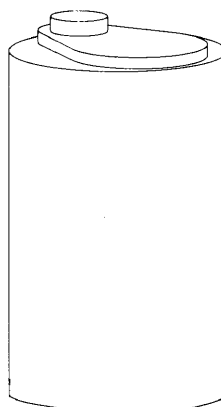
## OPTIONAL ACCESSORIES

To complete your installation, the following accessories are available:

### SOLUTION TANKS

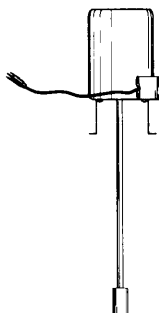


Model 34054  
15 Gallon White  
Polyethylene Tank



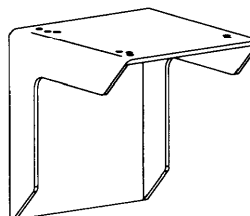
Model 34055  
35 Gallon White  
Polyethylene Tank

### AGITATORS



Model 27591  
Agitator, 115V  
For use with Model 34055 tank

### WALL MOUNT BRACKET



Model 34643  
Wall Mount Bracket

**Uni-Dose™**

MANUFACTURED BY LIQUID METRONICS  
DIVISION MILTON ROY

ISO9001 Certified • a unit of Sundstrand Corporation

8 Post Office Square  
Acton, MA 01720 USA  
TEL: (508) 263-9800  
FAX: (800) UNI-DOSE  
OR (800) 864-3673

## System Warranty

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### Limited 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. Labor costs for replacement or repair of said parts will be free of charge for a period of sixty (60) days from the time of initial startup, not to exceed one hundred and twenty (120) days from the date of shipment, in the contiguous forty eight (48) states.

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 are 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*

*or 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 an brief explanation of the problem or defect, and return it and the part(s) to:

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



## Limited Warranty Policy

### **ULTRASORB® System Limited Warranty Policy**

**RGF ENVIRONMENTAL SYSTEMS, 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.
- The Labor required by the manufacturer in order to replace or repair the **ULTRASORB® System** is free of charge for a period of sixty (60) days from the initial startup not to exceed one hundred and twenty (120) days from the date of delivery, in the contiguous forty-eight (48) states.

#### **HOW DO I CONTACT *RGF ENVIRONMENTAL SYSTEMS* 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  
**or 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) - 8484-1826** 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 Systems, 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 CAN BE EXPECTED FROM THE DISTRIBUTOR?**

- The Distributor will install, perform the initial startup, and train your personnel.
- The Distributor will replace any defective parts for the first sixty (60) days, labor included, in the forty eight (48) contiguous states.

**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 System, Inc.**  
**c/o Customer Service Dept.**  
**3875 Fiscal Ct.**  
**West Palm Beach, FL 33404**

# Product Registration and Return Forms



## Warranty Request Form

### 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 SYSTEMS, INC.**  
**c/o WARRANTY DEPARTMENT**  
**3875 FISCAL COURT**  
**WEST PALM BEACH, FLORIDA 33404**  
**FAX 561-848-9454**

##### **(FOR RGF USE ONLY)**

DATE ITEMS REC'D \_\_\_\_\_  
RECEIVED BY \_\_\_\_\_  
REPLACEMENT PART SENT/WARRANTY APPROVED ☐ WARRANTY DENIED ☐



## Warranty Validation Forms

### ULTRASORB® System Warranty Validation Form

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

***RGF Environmental Systems, 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 effect 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** \_\_\_\_\_



## Installation / Startup Record

### 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 \_\_\_\_\_

Wash pad Design & Const. By? \_\_\_\_\_

Is the Wash pad 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, WC-1	<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, <i>RGF</i>

### 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 \_\_\_\_\_

Trainee's Signature \_\_\_\_\_



## Client Questionnaire

### 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 Systems**  
c/o Customer Service Dept.  
3875 Fiscal Court  
West Palm Beach, FL 33404  
Fax: 561-848-9454

# **Addendum A: Training Bulletins**



# Glossary of Terms

## **CFC System Pump**

A continuous flow control centrifugal pump used to circulate the recycled water through the CO<sup>3</sup>P System (Chemical Injection, Ozone Venturi and UV/O<sup>3</sup> Catalytic Chamber) and supplies the water to the cleaning equipment.

## **CO<sup>3</sup>P 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 hydrogen peroxide to create a hydroxyl radical ion for maximum oxidation and biodegradation.

## **Coalescing Centrifugal Separator**

A tall, conically shaped poly vessel used to invoke G-forces on the dirt laden water stream to separate solids and oils from the water.

## **Control Panel**

Contains all the controls for the system: flow control valves, pressure gauges, indicator lights, and the hour meter.

## **Delivery System**

A centrifugal pump, pressure switch and bladder tank located on the equipment rack of the Series II Equipment Skid, utilized to supply pressurized recycled water to the washing equipment.

## **Hydrocarbon Accumulator (Optional)**

Collects skimmings from the Auto Oil Purge Valve and removes excess water from the accumulated oil and stores the waste oil for future disposal.

## **Main Drain Return Line**

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

## **Multi-Media Filter**

The primary particulate filter of the system, designed to pre-filter the process water prior to entering the MS3 Membrane System. The filter consists of several layers of carbon, silica filtering sand and small filtering rocks, which are used to filter particulate, absorb heavy metals or oils, and organics.

## **Oil Purge Valve**

A 1/4" petcock valve skims oil off the top of the Coalescing Centrifugal Separator and is collected in the optional Hydrocarbon Accumulator.

## **Ozone and Chemical Venturi**

A venturi used in the CO<sup>3</sup>P system, which draws ozone produced by the UV/O<sup>3</sup> Catalytic Chamber and mixes it with the hydrogen peroxide before it enters the chamber.

## **Peristaltic Chemical Injection Pump**

A peristaltic chemical pump that adds hydrogen peroxide or other chemicals to the recycled water to help control algae, bacteria, odor and pH. Hydrogen peroxide is an oxidant in the Catalytic Oxidation Process (CO<sup>3</sup>P) that also increases ozone solubility.

## **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 II Electrical Junction Box**

Contains all the electrical relays, timers and terminals for the system and connects them to the motors, lights, switch and UV chambers of the system.

## **Series II Equipment Skid**

Contains all of the components of the system for processing the water.

## **Series III Storage Tank**

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

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## **UV/O<sup>3</sup> Catalytic Chamber**

The new UV/O<sup>3</sup> combination chamber produces over three times the ozone and approximately twice the ultraviolet radiation as our initial design. When these two components of the CO<sup>3</sup>P process are combined into one unit, they become more effective, efficient and compact.

## **Vision 2000**

The Vision 2000 line of Ultrasorb<sup>®</sup> systems were designed as modular units, to suit various treatment technologies. RGF has several individual components that may be integrated together to suit your environmental needs.