SOS MOBILE WATER PLANT™

Operation Manual
Combo Water Plant – Model #MWP-500C
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2 INTRODUCTION

2.1 General Information

The SOS Mobile Water Purification System™ is a self-contained water purification system designed to deliver safe and good tasting drinking water to the most remote areas. The Combo Plant is suitable to treat both brackish water and surface water sources. Source water for the system can be a river, lake, pond, well, cistern or a similar surface water source. It is constructed as a “turn-key” operation which can almost immediately operational with minimal installation required.

2.2 The Manual

This manual is prepared to provide the operator with information on the installation, operation, maintenance and trouble shooting of the Mobile Surface Water Purification System.

READ THE COMPLETE MANUAL BEFORE ATTEMPTING INSTALLATION AND OPERATION OF THE SYSTEM. THE MANUAL IS DIVIDED INTO SECTIONS FOR EASY REFERENCE. PLEASE REFER TO THE APPENDIX FOR SPECIFIC DETAILS FOR VARIOUS KEY COMPONENTS OF THE SYSTEM.

THIS MANUAL MUST BE KEPT WITH THE SYSTEM AT ALL TIMES.

2.3 System Function

The SOS Mobile Water Purifier™ provides safe, clean, good tasting water for human consumption free of microbial contaminants (bacteria, viruses and protozoa), filtered for clarity, bad taste and odor and further treated with UV sterilization and final filtration to provide a complete micro water purification plant. Water can be produced immediately upon installation of the mobile plant. The plant is installed in a convenient portable trailer to provide complete mobility and convenience. It includes an electrical generator, necessary pump(s), hoses to draw water from the source, a Reverse Osmosis (RO) water purifier to be used in brackish water conditions, the proprietary water purification media and the various filters and UV light sterilizer to provide safe water quality to a portable collapsible storage tank to supply the particular community.

2.4 System Components Functions

Refer to the Process & Instrumentation Diagram (P&ID) and the system photos in this manual to identify the system components.

A. Electrical generator – Heavy duty 7KW electrical generator provides electrical power to operate the system components and lighting.

B. Forwarding Pump – Self priming pump draws water from source to the system at a rate of 20 gal/min (75 lit/min).

C. Sediment Pre-Filter – Cartridge type pleated cellulose sediment filter removes sediments, 50-microns nominal rating.
D. DE Filter – Diatomaceous Earth is a high performance filter most efficient for dirt and sediment removal.

E. Reverse Osmosis (RO) – Brackish water RO plant for the removal of excessive dissolved solids and other impurities if feed water is high on TDS (greater than 500 mg/l). The RO plan treats at a flow rate of 5-6 GPM (18-22 lpm).

F. Purification Media – This proprietary water purification media kills bacteria and virus immediately upon contact. There are five (5) purification canisters in a parallel connection to accommodate the design flow rate up to 20 GPM (75 lpm). When system is used with the brackish water RO option only the two (2) media canisters are used.

G. Carbon Filters – Removes organic contaminants and bad taste and odors from the water.

H. UV Sterilizer – Final protection against microbial contamination.

I. Final Filter – High capacity activate carbon filter, 5-micron provides final polishing.

J. Water Meter – Totalizes purified water production to monitor purification capacity and system maintenance.

K. Accessories – Various accessories are included like two hose reels each with 50 ft (15 m) of food grade braided high pressure flexible hose, one for the inlet one for the outlet. A tool box contains miscellaneous tools and test kits required for the operation of the system.

L. Storage Tank – A collapsible flexible portable storage tank is included to store product water for proper distribution. Various sizes are available

2.5 IMPORTANT SAFETY WARNINGS

⚠️ WARNING: To guard against injury, basic safety precautions should be observed, including:

1. **DO NOT USE** the water purifier with sea water source or water with salinity of greater than 1,000mg/l. The system does not reduce Total Dissolved Solids or is not intended to be used for desalination of water.

2. **WARNING:** Intended use of the system is to provide potable water from a questionable surface water source by removing pathogens, low molecular weight organics and bad taste and odor, thus making the water suitable for human consumption for emergency and humanitarian applications.

3. **WARNING: DO NOT USE WITH HEAVILY POLLUTED, BRACKISH OR SALT WATER.**

4. **PRECAUTIONARY STATEMENT HUMAN EFFECTS:**
The possibility exists that small amount of Iodine may be present in the treated water. Persons with thyroid problems, pregnant women and children should consult a doctor before extended use of the water produced by this system.

5. **WARNING:** Do not operate the system while the electrical generator is turned on with the doors closed. Keep the doors open to allow proper ventilation in the trailer. Refer to the instruction section for the electrical generation for proper safety warnings and instructions.

6. **DANGER: Carbon Monoxide** – Operating the electrical generator without proper ventilation will create dangerous levels of carbon monoxide that can result in severe injury or death.
7. **WARNING! IMPROPER OPERATION OR MAINTENANCE OF THIS PRODUCT COULD RESULT IN SERIOUS INJURY. MAKE SURE YOU ARE USING THIS PRODUCT ACCORDING TO THE INSTRUCTIONS SPECIFIED IN THIS MANUAL.**

3 SPECIFICATIONS

3.1 General System Specifications

The following general specifications are provided as the average system performance. Refer to the Notes below for more details.

<table>
<thead>
<tr>
<th>Model No.</th>
<th>MWP-500S</th>
<th>MWP-500C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Source</td>
<td>Surface Water</td>
<td>Surface &amp; Brackish</td>
</tr>
<tr>
<td>Trailer size</td>
<td>5’x8’ (1.5m x 2.5m)</td>
<td>6’x12’ (1.8m x 3.7m)</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>7500 Watt gasoline electrical generator, 13-Hp, 120/240V &amp; 12V outlets</td>
<td></td>
</tr>
<tr>
<td>Forwarding Pump</td>
<td>Self Priming Centrifugal Pump, ¾ HP, 3500 RPM, 20 GPM @ 40 psi boost, 25’ max. vertical lift @ 20 GPM</td>
<td></td>
</tr>
<tr>
<td>Pre-Filter - #1</td>
<td>30 µm pleated cellulose sediment filter cartridge</td>
<td></td>
</tr>
<tr>
<td>Pre-Filter - #2</td>
<td>Diatomaceous Earth (DE) backwashable filter</td>
<td></td>
</tr>
<tr>
<td>RO system</td>
<td>NO</td>
<td>YES (6 GPM max flow)</td>
</tr>
<tr>
<td>Purification Media*</td>
<td>2.5 Ft³ (5x0.5 Ft³)</td>
<td>2.5 Ft³ (5x0.5 Ft³)</td>
</tr>
<tr>
<td>Carbon Filtration*</td>
<td>7.5 Ft³ (5x1.5 Ft³)</td>
<td>7.5 Ft³ (5x1.5 Ft³)</td>
</tr>
<tr>
<td>UV sterilizer</td>
<td>S-50C UV sterilizer, SS construction controls microbiological purity</td>
<td></td>
</tr>
<tr>
<td>Final Filter</td>
<td>Large cartridge type, 5 µm pulverized activated carbon</td>
<td></td>
</tr>
<tr>
<td>Flow Rate</td>
<td>20 GPM (75 lpm)</td>
<td>20 GPM (75 lpm) for surface water 5-6 GPM (19-22 lpm) for brackish water RO</td>
</tr>
<tr>
<td>Treatment Capacity</td>
<td>500,000 Gal (1,890 M³) total purification media capacity**</td>
<td></td>
</tr>
<tr>
<td>Media Tanks</td>
<td>Non-corrosive FRP wound pressure vessels, 150 psi max work pressure</td>
<td></td>
</tr>
<tr>
<td>Storage Tank</td>
<td>Flexible Collapsible tank, FDA grade material. 130 gal min capacity</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**
- Purification media and carbon filtration is distributed in a parallel 5x1 flow array.
- The capacity of the system is rated by the estimated capacity of the Purification Media. The Purification media must be replaced before its rated “kill” capacity is exhausted. Media kills bacteria and virus on demand only if such pathogens are present, rendering water safe to drink.
- Activated carbon media is used to remove turbidity, organic chemicals and taste and odor.
- Min. storage tank with the system is 130 gal (500 lit). Other storage tank sizes are available, specify when ordering.
- The filter replacement and DE backwash is dependent directly on the feed water quality and source. Filters may need to be replaced accordingly as specified further in this manual.
4 INSTALLATION & SET-UP INSTRUCTIONS
The system is factory pre assembled and pre-plumbed ready to be used. Limited installation is required. See Figure 1 and Table 1 below to identify all the components of the system.

4.1 Components Identification

4.2 Precaution before Installation
A. Feed water source should be surface water (lake, river, pond, well, cistern, etc).
B. Do not use with heavily polluted or salt water.
C. Capacity of the water filters is strictly dependent on the quality of the feed water. Filters may be clogged pre-maturely if the water source is heavily polluted or contains high sediments.

4.3 System Location
Position the trailer near the water source in a flat area. The trailer must be leveled as much as possible. Trailer should be at a maximum distance 50 feet (15 meter) or less from the water source. Maximum vertical lift must not exceed 20 feet (6 meters) or less for the pump to create suction. Once you position the trailer on location drop the extra security legs in the bag and front of the trailer and lock in place.

4.4 Plumbing Connections
1. Unwind the feed water hose from its reel (bottom) inside the trailer door. Thread the proper feed strainer/foot valve at the end of the hose with the valve. The valve should be turned off.
Connect the quick connect fitting on the other end of the hose to the INLET water quick connect fitting. The INLET is located at the right back side of the trailer and marked INLET.

2. Unwind the outlet hose from the top reel. Connect the one quick connect fitting to the OUTLET quick connect fitting of the trailer located on the left back side of the trailer and marked OUTLET.

3. If the system is being used with a flexible collapsible storage tank provided, lay a protective plastic liner on a flat surface and then open up on it the storage tank flat. Connect the output hose to the storage tank fill fitting.

4.5 Initial Set-Up of System for operation
Follow the following steps to make sure that the system is set-up properly before setting it in operation.

1. Check and start-up the electrical generator. Refer to the generator manual in Appendix 1 for the complete electrical generator manual. Read and understand the manual thoroughly before operating the generator.

Starting the generator:
- Check that the engine power switch is in its “OFF” position.
- Make sure that the proper cables are connected to the electric battery poles and that the battery is fully charged. If battery is not charged you will not be able to use the electric start.
- Make sure the fuel tank is filled with gasoline. Fill with gasoline if necessary.
  THE GENERATOR MUST BE TURNED OFF AND COOLED DOWN BEFORE REFILLING TANK
- Check the engine oil level and make sure that it is in the proper level. Change oil every 20 hours of operation.
- Make sure the air filter is in place
- Disconnect all electrical power devices, and turn the AC circuit breakers (switches) OFF.
- Turn the fuel valve to the “ON” position.
- Close the choke.
- Turn the key to the “START” position and allow the engine to crank. When engine starts, release the key back to the “RUN” position.

2. Priming the Pump
The forwarding pump needs to be primed first at start up. Refer to Appendix 2 to view the complete pump manual. To initially prime the pump follow the steps below:

- Insert the suction end of the hose with the foot valve/strainer in the source water. Make sure that it is submersed in the water body permanently and there is no chance for it coming out of the water body. This avoids the suction of air during normal operation.
- To avoid air pockets, no part of the piping should be above the pump suction connection and the hose should slope upward from the water body. Make sure that there is a straight run as much as possible and that there are any unnecessary loops and no kinks and obstructions.
- It is advisable especially with long suction tubing, to fill the suction tubing before connecting to the inlet fitting. Use the funnel provided for convenience.
- Open the prime valve and install the funnel on the priming fitting. Fill the pump with water until water overflows, turn the prime valve off.

3. **Precoating the Diatomaceous Earth Filter (Pre-Filter #2)**

   The filter needs to be coated with a uniform coat of 1/16” – 1/8” thick diatomaceous earth (D.E.) also called “diatomite”. Follow the following steps:

   - Remove the 20” filter housing sump from Pre-Filter 1 and remove the filter cartridge.
   - Add diatomaceous earth (DE) about 4 lbs (1.8 kgr) or about 1/3 of the housing sump.
   - Add water to the sump and mix well to make thin slurry. You may use a separate bucket to make the slurry and transfer the slurry to the housing sump if this is more convenient.
   - Place the sump with the slurry back on the housing head (make sure the O-ring seal is in place)
   - Set the filter control valve or effluent valve to “recirculate” or “rinse”. Turn the pump on and transfer the slurry into the DE filter. Note and record the pressure gauge reading after the diatomite has been added. This is the “precoat” pressure.
   - Stop the pump and “regenerate” the filter by moving the bump handle down slowly, and then up briskly. Repeat 3 – 4 times.

   Refer to Appendix 3 to view the complete manual for the D.E filter.

4. Re-install the filter cartridge in the housing of Pre-Filter #1, make sure the O-ring seal is in place.

Now you are ready to start producing safe, clean water.
5 OPERATING INSTRUCTIONS
System is very simple to operate. Follow the following steps itemized for your convenience.

- Make sure the feed water hose is full with water and that the pump is primed.
- Make sure the pump and the UV sterilizer are plugged in to the generator outlets. You can turn the power to the units ON or OFF with the switches in the front of the generator.
- Turn the UV switch ON and make the UV lamp turns ON. You will observe a blue color light in the sight port. Refer to Appendix 5 for complete UV manual.
- Turn inlet valves ON and turn the pump ON. Water should start flowing through the system. Crack open the various bleed valves to relief any air entrapment.
- Open the OUTPUT valve and wait until water is flowing out freely.
- Make sure the product is flowing out clear before you start collecting in containers or connect to the storage tank.
- Record the meter reading before and after every use in the attached Water Meter Log.
- Test water for Total Dissolve Solids and pH with meters provided and record in your log sheet.
- Keep observing the various pressure gauges. If you will observe excessive pressure drops and will notice diminishing production flow, you may need to stop the system and bump (backwash) the DE filter and/or replace the prefilter cartridge. This will vary with the quality of the source water.
- Once the storage tank is filled or you are done with the usage turn the pump and UV breakers (switches) OFF at the generator.
- Turn the generator OFF.
- If the system will be used again in the same location in the repeated basis let the system idle.

Turning System Off and preparing to move

- If you are complete with this location and you will be moving the trailer to another location you will need to drain the water from the system and prepare the trailer to be moved.
- To drain the system, turn the drain valves for the various components ON. Run the pump on for a short time to pump all the water out as much as possible. Turn pump OFF if it cavitates. When there is no flow out of the drain valves, turn them off.
- Unplug the pump and UV sterilizer; make sure that the breaker switches are OFF and the generator in the OFF position.
- Drain the hoses and recoil in the corresponding hose reels.
5.1 REVERSE OSMOSIS (RO) SYSTEM OPERATING INSTRUCTIONS:
The RO system shall operate ONLY under brackish water conditions. Brackish water is considered a water supply with medium salinity level of 500 up to 2,500 mg/l in total dissolved solids. The RO plant is designed to provide product flow of approximately 4.0 – 6.0 GPM (15 – 22 lit/min). Follow the instructions below to operate the RO system.

![RO System Layout](image1)

**Figure 2: RO System Layout**

On the purification media plumbing manifold turn OFF the Surface Water feed valve (Valve A) and turn ON the RO feed water valve (Valve B). See Figure 3 below for details. Typically when you operate the system as a brackish water system you only need to flow through the last two (2) banks of purification media and carbon and you can isolate the first three (3) banks. However, all five banks can remain on if so desired.

![Purification Media Plumbing Manifold](image2)

**Figure 3: Purification Media Plumbing Manifold**

Open the FEED throttling valve on the outlet of the RO pump all the way.

Open the REJECT control valve on the RO membranes all the way. Valve is located on the top membrane in the back of the trailer (red handle).

On the purification media and carbon filters plumbing manifolds make sure that all the proper valves are open.

Plug the RO pump on the electrical generator.

Turn the main feed water pump ON and observe the feed water pressure at the RO pump feed.

Turn the RO pump ON. Observe the pressure gauge on the outlet of the pump. If there no flow of water to the RO pump it will not turn on. Make sure that the proper valves are turned on.

Throttle down the two valves of the RO feed and Reject valves until the RO pump pressure is between 180-220 psi. WARNING: DO NOT CLOSE THESE VALVES COMPLETELY OFF WHEN THE SYSTEM IS IN OPERATION.

Observe the pressure at the REJECT side should be between 140 – 150 psi.

Observe the product water flow meter, it should read between 4 – 6 gal/min.

Observe the quality monitor to make sure that the product water quality is suitable. The RO system shall provide at least 90% rejection of the feed water dissolved solids. The product water Total Dissolved Solids should be less than 250 mg/l at the worst scenario.

Follow all the directions indicated above for the operation of the overall system.

Turning System Off

Turn OFF the RO pump.

Shut OFF the necessary valves

For prolonged shut down system must be drained and be filled with a membrane preservative. Ask factory for instructions.

Follow all the shutdown instructions listed on the previous section of this manual.

WARNINGS:

If the RO pump pressure is above 220 psi and the product flow cannot get over 2 GPM then the RO membranes may be severely fouled and need to be replaced or cleaned.

If the RO product quality is higher than 250 mg/l do not operate the system. The membranes may need to be replaced.
6 MAINTENANCE

Preventative maintenance is important for proper operation of the system. Due to the nature of the system usage and applications certain maintenance tasks and procedures are critical to the proper operation and performance of the system. The following maintenance tasks are itemized and explained in this section. Also please refer to the Appendixes with the various components manuals for more details for individual system components.

6.1 Pre-Filter #1 Cartridge Replacement

This is the first treatment step, and it sees the worse scenario of water quality. Monitor the inlet and outlet pressure across the filter. If the pressure differential is greater than 15% - 20% then remove the filter cartridge and either rinse it with fresh water under pressure (if available) or replace with a new cartridge.

6.2 D.E. Filter Maintenance

Filters utilizing diatomite filter powder (commonly called D.E. filters) are known to be very efficient dirt filters. The filter can be regenerated and cleaned in-line. When the pressure rises 7 – 10 psi (0.5 – 0.7 Bar) above the precoat pressure, regenerate (or “bump”) the filter. Stop the pump; move the “bump” handle down slowly. Then up briskly. Repeat 3 – 4 times. Restart the pump and filtration will resume at near the original flow and pressure.

Cleaning of the filter is required when the gauge pressure rises more than 10 psi (0.7 Bar) in less than 24 hours of operation or when cloudy water is produced from the filter. To clean, first stop the pump; then move the bump handle down slowly, and then up briskly. Repeat 8 times. Open the vent valve (under bump cover), open the filter drain and allow water and dirt to empty completely. Close the drain and the vent valves; open the suction and return valves. Start pump and let the filter fill with water and repeat the CLEANING procedure once more. The filter is now ready for recharging. Proceed with the start-up and PRECOATING procedure as specified on page 7 above.

6.3 Purification Media & Carbon Filters

He estimated capacity of the purification and carbon media is 500,000 gal (1,890 m³) of treated water. Every 500,000 gallons registered in the totalizing water meter both the purification media and the activated carbon tanks need to be re-bedded with new media. Contact factory to obtain the media.

6.4 Final Filter Maintenance

This filter contains a high capacity, high flow pulverized carbon filter cartridge. Typically when the system is in operation you may not be able to see any significant pressure reading on the pressure gauge on top of the filter housing if you are flowing to atmospheric pressure. If you notice after replacement and maintenance of the two pre-filters that the product flow is significant you should take out the final filter cartridge and scrape the outer layer and flush with fresh water. It is recommended to do this after every use. Replace the cartridge if necessary or at least every 500,000 gallons of product water when the purification and carbon media are replaced.
6.5 UV Light sterilizer Maintenance
Minimal maintenance is required. Clean the quartz sleeve with the build in wiper assembly by pumping the wiper in and out 3-4 times before and after every use. Replace the lamp and the quartz sleeve every 10,000 hours of operation (12-months) or every 500,000 gallons of treated water whatever occurs first. Refer to the UV manual (Appendix 4) for details on the UV sterilizer system.

6.6 General Maintenance
Always drain the system completely between every use and before the trailer is transported from one location to another. Do not transport with system full of water. Always drain thoroughly and clean the system up if it will be subject to extreme conditions of high temperature or freezing for a prolong period of time. The system shall be stored and kept ideally at ambient temperatures.

Please see the manuals in the Appendix section of this manual for specific operating & maintenance details and spare parts for the various components.

7 SPARE PARTS & CONSUMABLE ITEMS
The following spare parts and consumables are recommended for proper operation of the system.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Qty.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R30-20BB</td>
<td>1 ea</td>
<td>Pleated Polyester filter cartridge – Reusable, 30-micron</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recommend to keep a case of 8 ea in the trailer</td>
</tr>
<tr>
<td>0248</td>
<td>1 bag</td>
<td>Diatomaceous earth media, 25 lbs bag</td>
</tr>
<tr>
<td>590-IPR-1/2</td>
<td>2.5 Ft³</td>
<td>Purification Media, in ½ Ft³ poly sealed bags</td>
</tr>
<tr>
<td>993065</td>
<td>8 Ft³</td>
<td>Activated Carbon Media, 12x40 Mesh, in 1 Ft³ paper bags</td>
</tr>
<tr>
<td>BBC-150AC</td>
<td>1 ea</td>
<td>Hi-Capacity Carbon Block Cartridge, Big Bubba filter</td>
</tr>
<tr>
<td>BB-ORING</td>
<td>1 ea</td>
<td>O-Ring seal, Big Bubba housing, EPDM</td>
</tr>
<tr>
<td>05-1334</td>
<td>1 ea</td>
<td>UV Lamp, for SS0C</td>
</tr>
<tr>
<td>15-1051A5</td>
<td>1 ea</td>
<td>UV Quartz Sleeve, for S50C</td>
</tr>
<tr>
<td>DGD-2501BB</td>
<td>1 ea</td>
<td>RO Pre-filter, 1-micron spun polypro, 10” BB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recommend to keep a case of 8 in the trailer</td>
</tr>
<tr>
<td>1276761</td>
<td>8 ea</td>
<td>RO membranes, brackish water, TFC</td>
</tr>
</tbody>
</table>
P&ID SYSTEM DRAWING

Diagram of the Mobile Water Purification Plant Combo Plant Manual – Version 1
Effective: 16-Apr-09
9 APPENDIX

This section includes the pertinent information, instructions and parts lists for the various system components, system drawings and other useful information. The listed of Appendix is tabulated below:

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<table>
<thead>
<tr>
<th>Section</th>
<th>Appendix No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1</td>
<td>Appendix 1</td>
<td>7500 W Electrical Generator, Model # APG3075</td>
</tr>
<tr>
<td>8.2</td>
<td>Appendix 2</td>
<td>IRRI-GATOR Forwarding Pump, Model #GT07</td>
</tr>
<tr>
<td>8.3</td>
<td>Appendix 3</td>
<td>Diatomaceous Earth (D.E.) Filter, Model #EC40</td>
</tr>
<tr>
<td>8.4</td>
<td>Appendix 4</td>
<td>Sanitron UV Water Purifier, Model S50C</td>
</tr>
<tr>
<td>8.5</td>
<td>Appendix 5</td>
<td>RO Pump Manual, Model #18GBC30</td>
</tr>
<tr>
<td>8.6</td>
<td>Appendix 6</td>
<td>RO Membrane Pressure Vessel Instructions</td>
</tr>
<tr>
<td>8.7</td>
<td>Appendix 7</td>
<td>Collapsible portable Drinking water Storage Tanks</td>
</tr>
</tbody>
</table>
9.1 Appendix 1: 7500 Watt Electrical Generator, Model #APG3075
9.2 Appendix 2: IRRI-GATOR Forwarding Pump, Model #GT07

Installation, Operation and Maintenance Instructions

IRRI-GATOR™
Self Priming Model
GT
Safety Instructions

TO AVOID SERIOUS OR FATAL PERSONAL INJURY OR MAJOR PROPERTY DAMAGE, READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN MANUAL AND ON PUMP.

This is a SAFETY ALERT SYMBOL. When you see this symbol on the pump or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.

DANGER: Warns of hazards that WILL cause serious personal injury, death or major property damage.

WARNING: Warns of hazards that CAN cause serious personal injury, death or major property damage.

CAUTION: Warns of hazards that CAN cause personal injury or property damage.

NOTICE: Indicates special instructions which are very important and must be followed.

THIS MANUAL IS INTENDED TO ASSIST IN THE INSTALLATION AND OPERATION OF THIS UNIT AND MUST BE KEPT WITH THE PUMP.

THOROUGHLY REVIEW ALL INSTRUCTIONS AND WARNINGS PRIOR TO PERFORMING ANY WORK ON THIS PUMP.

MAINTAIN ALL SAFETY DECALS.

NOTICE: INSPECT UNIT FOR DAMAGE AND REPORT ALL DAMAGE TO THE CARRIER OR DEALER IMMEDIATELY. DO NOT USE PUMP IF DAMAGE IS SUSPECTED.

WARNING: UNITS NOT DESIGNED FOR USE WITH HAZARDOUS LIQUIDS OR FLAMMABLE GASES.

Description and Specifications

- The Model GT embraces a line of end suction, single stage, self-priming centrifugal pumps for lawn sprinkling, HVAC systems, and general water transfer.
- Casing is cast iron construction with tapped openings provided for vacuum gauge and casing drain.
- Impellers are enclosed design, glass filled Noryl™, threaded directly on motor shaft.
- Standard motors are NEMA standard, 3500 RPM, open drip proof enclosure.

Engineering Data

<table>
<thead>
<tr>
<th>Model</th>
<th>HP</th>
<th>PS/Hr</th>
<th>Suction</th>
<th>Discharge</th>
<th>Wt. lbs.</th>
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</thead>
<tbody>
<tr>
<td>G720</td>
<td>2</td>
<td>150</td>
<td>1 1/4 NPI</td>
<td>1 1/4 NPI</td>
<td>49</td>
</tr>
<tr>
<td>G730</td>
<td>3</td>
<td>150</td>
<td>1 3/4 NPI</td>
<td>1 3/4 NPI</td>
<td>52</td>
</tr>
<tr>
<td>G740</td>
<td>4</td>
<td>150</td>
<td>2 1/2 NPI</td>
<td>2 1/2 NPI</td>
<td>55</td>
</tr>
</tbody>
</table>

- Maximum Liquid Temperature: 160°F (71°C)
- Maximum Starts per Hour: 20 – evenly distributed

Piping

- Pump MUST be installed horizontally on a solid flat surface, with discharge on top.
- Allow adequate space for servicing and ventilation. Protect the unit from weather and water damage due to rain or flooding or freezing temperatures.
- Piping should be no smaller than the suction and discharge connections and kept short as possible, avoiding unnecessary fittings to minimize friction losses.
- All piping MUST be independently supported and MUST NOT place any piping loads on the pump.

NOTICE: DO NOT FORCE PIPING INTO PLACE AT PUMP SUCTION AND DISCHARGE CONNECTIONS.

- All pipe joints MUST be airtight.
- The use of Teflon™ tape, or equivalent, is recommended for ALL pipe joints.

SUCTION

- Total suction lift, including elevation and pipe friction loss, should not exceed 25 feet of head.
- Install an airtight union in the suction line close to the pump. See Figure 1.
- Installation of a foot valve at liquid source is recommended.

NOTICE: FOR INSTALLATIONS WITH LONG SUCTION PIPING, BOTH A FOOT VALVE AND A CHECK VALVE ARE RECOMMENDED.

- To avoid air pockets, no part of the piping should be above the pump suction connection and piping should slope upward from liquid source.
- For installations with long suction piping, fill the suction pipe with water before connecting to pump.
DISCHARGE

- Install a tee at the discharge connection of the pump. The top opening of the tee is required for initial priming. See Figure 1.

![Figure 1](image)

Wiring and Grounding

**WARNING**

- Install, ground and wire according to local and National Electrical Code requirements.
- Install an all leg electrical power disconnect switch near the pump.
- Disconnect electrical power before installing or servicing pump.

Electrical supply MUST match pump’s nameplate specification. Incorrect voltage can cause fire or damage to the motor and voids warranty.

Motors without built-in protection MUST be provided with contactors and thermal overloads for single phase motors, or starters with heaters for three phase motors. See motor nameplate.

- Follow motor manufacturer’s wiring diagram on the motor nameplate or terminal cover carefully.
- Use only copper wire to motor and ground. The ground wire MUST be at least as large as the wire to the motor. Wires should be color coded for ease of maintenance.

**RECOMMENDED MINIMUM WIRE SIZE**

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
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<tr>
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<td>6</td>
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<td>14</td>
<td>14</td>
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<td>12</td>
<td>–</td>
<td>10</td>
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<td>2</td>
<td>10</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>–</td>
<td>12</td>
<td>–</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>–</td>
<td>12</td>
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<td>14</td>
<td>–</td>
<td>12</td>
<td>–</td>
<td>10</td>
</tr>
</tbody>
</table>

**NOTICE:** INCORRECT ROTATION MAY CAUSE DAMAGE TO THE PUMP AND voids the WARRANTY.

- Correct rotation is right hand, CLOCKWISE when viewed from the motor end.
- Three phase unit rotation may be checked by removing motor end cap or plug and observing rotation of motor shaft. To reverse rotation, reverse any two of the three motor leads.

Rotation

**OPERATION WITHOUT PRIME, OR AGAINST A CLOSED DISCHARGE VALVE, CAN GENERATE HOT WATER OR STEAM CAUSING INJURY OR PROPERTY DAMAGE.**

**NOTICE:** DO NOT OPERATE PUMP WITHOUT PRIME OR SEAL DAMAGE WILL RESULT.

- Prime pump by filling pump and piping through opening in top of tee with clean water. See Figure 1.
- Install pipe plug in top of tee using Teflon™ tape or equivalent.

**NOTICE:** IF PUMP IS DRAINED OR SHUT OFF DURING PRIMING PERIOD, CASING MUST BE REFLILLED BEFORE RESTARTING PUMP.

- Start the pump and partially open discharge valve and wait for system pressure to stabilize. If system pressure is surging, or prolonged pressure drop is experienced, the system may not be completely primed.

Maintenance

**WARNING**

FAILURE TO DISCONNECT ELECTRICAL POWER BEFORE ATTEMPTING ANY MAINTENANCE CAN CAUSE SHOCK, BURNS OR DEATH.

- No lubrication is required on pump. For motor lubrication, refer to and follow manufacturer’s instructions.

**SEASONAL SERVICE**

- To REMOVE pump from service, remove all drain plugs and drain all piping.
- To RETURN pump to service, replace all drain plugs using Teflon™ tape or equivalent.
- Reconnect suction line if removed, examine union and repair if necessary.
- Reprime and operate pump following all instructions and warnings in the “OPERATION” section of manual.
Disassembly

**WARNING**
FAILURE TO DISCONNECT ELECTRICAL POWER BEFORE ATTEMPTING ANY MAINTENANCE CAN CAUSE SHOCK, BURNS OR DEATH.

1. Remove foot bolt (10).
2. Remove casing bolts (12).
3. Remove back pull-out assembly from casing (2).
4. Remove diffuser seal ring (3) and diaphragm (4).
5. Remove diffuser screws (5) from adapter (11).
6. Remove motor end plug or cover.
7. Restrained motor shaft from rotation by utilization of the screwdriver slot, or ½" shaft flats, accessible at the motor shaft end.
8. Remove impeller (7), turning COUNTERCLOCKWISE.
9. Using two screwdrivers, pry off rotary section of mechanical seal (8). Discard. See Figure 2.
10. Remove motor adapter bolts (12) and remove motor adapter from motor.

Trouble Shooting

**WARNING**
FAILURE TO DISCONNECT ELECTRICAL POWER BEFORE ATTEMPTING ANY MAINTENANCE CAN CAUSE SHOCK, BURNS OR DEATH.

**SYMPTOM**
Motor Not Running:
See Probable Causes 1 through 5.

Little or No Water Delivered:
See Probable Causes 3, 4, 6 through 12, 15.

Excessive Noise and Vibration:
See Probable Causes 3, 6, 7, 10, 12, 13, 14.

**PROBABLE CAUSES**
1. Motor thermal protector tripped.
2. Open circuit breaker or blown fuse.
3. Impeller binding.
4. Motor improperly wired.
5. Defective motor.
6. Pump is not primed, air or gases in pumpage.
7. Discharge, suction plugged or valve closed.
8. Incorrect rotation. (3 phase only)
9. Low voltage or phase loss.
10. Impeller worn or plugged.
11. System head too high.
12. NPSHr too low – excessive suction lift or loss.
14. Pump, motor or piping loose.
15. End of suction piping not submerged.

Reassembly

- Clean and inspect all parts before reassembly.
- Inspect seal seat bore for wear and debris, clean and replace as necessary.

**NOTICE:** MECHANICAL SEAL MUST BE REPLACED WHENEVER SEAL HAS BEEN REMOVED. FOLLOW SEAL MANUFACTURER’S INSTRUCTIONS CAREFULLY.

2. If necessary, seat ring may be lubricated with water or glycerin to aid in installation. DO NOT contaminate the seal face. Fully and squarely install the stationary seat into the adapter. With a clean, lint free cloth, CAREFULLY wipe the seat face clean of debris. DO NOT damage the seal seat face.

3. Reinstall the motor adapter on the motor, making sure that the motor shaft does not dislocate or damage the stationary seal seat.

4. Fully and squarely install the seal rotary assembly against the stationary seat. Be sure rotating seal face does not drop out of holding collar and DO NOT damage seal face.

5. On three phase units, impeller MUST be installed with LOCTITE® “Purple”. Hold shaft from rotating, as explained in the “DISASSEMBLY” section of the manual, and install impeller by turning CLOCKWISE until tight against motor shaft shoulder.

6. Replace diffuser. Align to prevent impeller rub.

7. Install new diaphragm and new diffuser seal ring.

8. Install motor and liquid end into casing.

9. Check impeller for binding by rotating the motor shaft. If binding occurs, loosen casing bolts, readjust diffuser until impeller hub turns freely. Retighten casing bolts in a crossing pattern.

10. Replace all drain plugs and motor end components.

11. Reprime and operate according to instructions in the “OPERATION” section of this manual.
## Electrical Data

<table>
<thead>
<tr>
<th>Model</th>
<th>HP</th>
<th>Voltage</th>
<th>Full Load Amps</th>
<th>Fuse</th>
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<th>Ph/Hz</th>
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<td>115/230</td>
<td>13.8/6.9</td>
<td>450/5</td>
<td>45/25</td>
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<td>15/6</td>
<td>50/25</td>
<td>50/25</td>
<td>30/15</td>
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<td>115/230</td>
<td>20/10</td>
<td>60/30</td>
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<td>GTD73</td>
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## Repair Parts List

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<th>Item No.</th>
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<th>Material</th>
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<th>GT30/ GT30/</th>
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<td>3</td>
<td>Gudgeon Seal Ring</td>
<td>Buna</td>
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<td>5</td>
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<td>Mechanical Seal</td>
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<td>11</td>
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<td>Cast Iron</td>
<td>16X30</td>
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<td>Deflector</td>
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## Motor Codes

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<tr>
<td>.75</td>
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<td>C0873</td>
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<td>1.0</td>
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<td>C0873</td>
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<td>1.5</td>
<td>J0853R</td>
<td>C0873</td>
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<td>J0854R</td>
<td>C0874</td>
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<tr>
<td>3.0</td>
<td>J0954</td>
<td>C0874</td>
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Mobile Water Purification Plant
Combo Plant Manual – Version 1
Effective: 16-Apr-09
9.3 Appendix 3: Diatomaceous Earth (D.E.) Filter (Model #EC40)

Perflex Extended Cycle Filtration System
EC40C90 Series

The Hayward® Perflex™ Filtration System is specifically designed for the demanding requirements of today’s above-ground swimming pools. The advanced design reduces maintenance requirements while providing superior performance.

To prevent potential injury and to avoid unnecessary service calls, read this manual carefully and completely.

⚠️ CAUTION – We highly recommend a qualified professional install and service this product.

⚠️ WARNING – This manual contains important safety information that must be furnished to the end user of this product. FAILURE TO READ AND FOLLOW ALL INSTRUCTIONS COULD RESULT IN SERIOUS INJURY.
General Information

Introduction

This manual contains information for the proper installation and operation of the Hayward® Perflex™ Filtration System. All Perflex™ Filtration models are high performance, above-ground swimming pool filters. Instructions in this manual MUST be followed precisely.

The Hayward Perflex System is a high performance swimming pool filter system having an output rating of 2,400 gallons (9.1 KL) per hour. Manufactured from durable, corrosion-proof materials, the filter and pump are combined on a strong, molded mounting base. The system is designed for continuous operation and for installation below the pool water line. It may be used on fresh or salt-water swimming pools.

The Perflex Filter System uses diatomite filter powder (commonly called D.E.). D.E. is the most efficient dirt remover known for swimming pool filtration. It is normally fed into the system through the skimmer when the filter is initially started, then drained from the filter when it can no longer efficiently remove dirt from the water.

The Hayward Perflex D.E. filter provides the deepest, most comprehensive clean, removing microscopic dust and pollen as small as one micron - 100 times smaller than a grain of salt. It takes care of debris the first time through, so you can run it fewer hours per day.

Patented Flex-Tubes™ make the Hayward Perflex D.E. filter unique. D.E. filter powder coats the tubes and traps dirt and impurities as they pass through the filter. When the accumulated dirt builds up pressure and decreases the flow, conventional filters require backwashing. But with the Hayward Perflex D.E. filter, simply move the unique "Bump" handle up and down a few times to automatically activate the Flex-Tubes, repositioning the dirt and D.E. within the filter and extending the filter cycle. Through Perflex's exclusive "Bump" action, the D.E. is periodically regenerated and the filter cycle extended without changing the powder. When the filter powder is totally used, the "Bump" action makes it possible to drain the used diatomite without backwashing or dismantling the filter.

The Power-Flo Matrix™ Pump Series has been engineered as a uniquely superior above-ground pool pump. With the simple push of a button, this truly versatile pump changes from a vertical to a horizontal discharge and back again. It's large profile and integrated styling makes the Power-Flo Matrix a swimming pool pump like no other. It is driven by a heavy duty motor, which is electrically isolated and insulated from the pool water. Output pressure and flow are tuned to the filter, resulting in a perfectly balanced, non-corrosive system.

Product Features

- Designed for large above-ground pools
- Clamp for the EC40AC model requires only two (2) nuts and bolts
- Power-Flo Matrix™ Series high-performance pump
- Quick-connect union
- Modular platform base

Perflex™ Filtration Performance Data

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<thead>
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<th>Model No.</th>
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<th>EC40C</th>
<th>EC50C</th>
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<tbody>
<tr>
<td>Effective Filtration Area</td>
<td>15 FT²</td>
<td>20 FT²</td>
<td>25 FT²</td>
</tr>
<tr>
<td>Design Flow Rate</td>
<td>30 GPM</td>
<td>40 GPM</td>
<td>50 GPM</td>
</tr>
<tr>
<td>Turnover</td>
<td>8 hours</td>
<td>14,400 GAL</td>
<td>19,200 GAL</td>
</tr>
<tr>
<td>12 hours</td>
<td>21,600 GAL</td>
<td>28,800 GAL</td>
<td>36,000 GAL</td>
</tr>
</tbody>
</table>
Prior to Start-Up

Before Starting the Filter System

1. Obtain a supply of operating chemicals, D.E., and a pool test kit. Use only the swimming pool grades of D.E., such as:

   CELATOM (Eagle-Picher Industries, Inc.)
   AQUA-CEL (Johns-Manville Products Corporation)
   DICALITE 4200 (Greco, Inc.)
   WITCO (Witco Corporation)

2. Superchlorinate the pool water by adding unstabilized granular or liquid chlorine. Stabilized forms of chlorine are recommended for normal daily use after the initial clean up of the water. Follow chemical manufacturer’s recommendations for superchlorination and daily use.

Important Safety Instructions - Read and follow all instructions

When installing and using this equipment, basic safety precautions MUST always be followed.

⚠️ WARNING – Pump and Filter System Operates Under High Pressure. Failure to follow instructions may result in serious injury.

1. Always turn OFF pump and relieve tank pressure by opening Air Relief Valve before loosening Center Clamp or servicing filter.

2. To re-assemble Clamp on filter, make sure Clamp is located and centered properly over the filter flange. If Clamp is tight, tap Clamp with rubber mallet or block of wood to help seat it.

   Slide a Washer over each Bolt followed by a Spacer Tube. Insert Bolt assembly through both Clamp Halves. Slide on a Washer, secure with Hex Nut and hand tighten. Repeat on other side of Clamp.

   Alternately tighten both Bolt assemblies using a wrench and socket (1/2" drive). Alternately tighten until Spacer Tube is engaged (approx. 100 in-lbs.). Finally, tighten ¾ to ¾ turn to secure (approx. 100 in-lbs.).

3. To re-start system, open all in-line valves. Open Air Relief Valve before starting pump. Stand clear of filter and prime and start the pump per the manufacturer’s instructions. When a steady stream of water emerges from the Air Relief Valve, close Air Relief Valve.
Perflex™ Extended Cycle Filtration System

Start-Up & Operation

Starting the Filter

Close the filter drain and the vent valve.

⚠️ CAUTION – All suction and outlet valves MUST be OPEN before operating the filter system. Failure to do so could cause severe personal injury and/or property damage.

1. Prime and start the pump following the manufacturer’s instructions.
2. Air trapped in the system will automatically vent to the pool. Once air has escaped the filter and a steady stream of water is returning to the pool, the filter is ready for pre-coating. DO NOT operate the filter for more than one (1) minute without the pre-coat charge.

Pre-Coating

Scoop 4 lbs. (1.8 kgs.) or 6 No. 1 coffee cans of diatomite (D.E.) into the system through the skimmer as fast as the plumbing will take it. Note and record the pressure gauge reading after the diatomite (D.E.) has been added. This is the "Pre-Coat Pressure".

Filtering

Filtration starts as soon as the filter has been pre-coated. As the filter removes dirt from the pool water, the accumulated dirt causes a resistance to flow. As a result, the gauge pressure will rise and the flow will decrease. When the pressure rises 7-10 psi (.49-.70 Bar) above the pre-coat pressure, regenerate the filter.

Regeneration (Extending the Cycle)

Stop the pump. Move the bump handle down slowly, then up briskly. Repeat 3 times. Restart the pump and filtration will resume at near the original flow and pressure.

After each regeneration, and until the filter is cleaned, there may be a slight increase in the starting pressure. This is the result of dirt accumulating within the filter and is completely normal.

Cleaning

Cleaning is recommended when the pressure gauge rises more than 10 psi (.70 Bar) in less than a 24 hour period or when cloudy water returns to the pool for more than 30 seconds after regeneration. To clean, first stop the pump; then move the bump handle down slowly, then up briskly. Repeat 8 times. Open the vent valve (under bump cover), open the filter drain plug (Note: If the filter is installed below the pool water line, close the suction and outlet valves) and allow water and dirt to empty completely.

After the filter has drained, and with the drain still open, run the pump for a few seconds to flush out any dirt remaining in the bottom of the filter. (Note: If the filter is installed below the pool water line, opening the suction valve for a few seconds with the pump off will adequately flush the unit.)

Close the filter drain plug and the vent valve. Open the suction and outlet valves (when used). Start the pump and let the filter fill with water and repeat the "Cleaning" procedure. This completes the cleaning phase. The filter is now ready for re-charging. Proceed as in "Starting the Filter" and "Pre-Coating".
**To Change Bump Handle Position**

1. **Remove the bump handle grip.** Push in tab at base of handle. Carefully pry the bump cover from the retaining groove and slide the cover off the handle.

2. **Using a drift (or 10 penny nail), tap the pivot pin out of the filter head anchor point,** freeing the end of the handle.

3. **Rotate the bump handle to the alternate position** and align the handle and the head anchor holes. Tap the pivot pin in place.

4. **Reinstall the bump cover and grip.**

---

**Perflex™ Extended Cycle Filtration System**

**Troubleshooting**

<table>
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<tr>
<th>Problem</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running at high pressures.</td>
<td>D.E. coated with normal accumulation of pool dirt, algae, etc.</td>
<td><strong>Bump</strong></td>
</tr>
<tr>
<td></td>
<td>Overcharge of D.E.</td>
<td><strong>Bump-Drain-Recharge.</strong></td>
</tr>
<tr>
<td></td>
<td>Restriction in return line caused by small eyeball fitting.</td>
<td><strong>Change to larger size fitting.</strong></td>
</tr>
<tr>
<td></td>
<td>Partially closed valve on return line.</td>
<td><strong>Open valve.</strong></td>
</tr>
<tr>
<td>Drop off of flow.</td>
<td>D.E. coated with normal accumulation of pool dirt, algae, etc.</td>
<td><strong>Bump.</strong></td>
</tr>
<tr>
<td>Short cycles.</td>
<td>D.E. loaded to capacity with dirt, algae, etc.</td>
<td><strong>Bump-Drain-Recharge.</strong></td>
</tr>
<tr>
<td></td>
<td>Bumping incorrectly.</td>
<td><strong>Slow down stroke - brisk up stroke. Repeat 6 times.</strong></td>
</tr>
<tr>
<td></td>
<td>Bump handle bent.</td>
<td><strong>Check and straighten or replace.</strong></td>
</tr>
<tr>
<td>Short cycles - even after proper Bump-Drain-Recharge.</td>
<td>Contaminated (clogged) Flex-Tube braids caused by: 1. Natural accumulation of chemical deposits (accelerated if chemicals are fed through skimmer). 2. Running D.E. charge too long with excessive amount of live algae present in pool. 3. Operating filter without D.E. 4. Operating too long without D.E. after starting pump. D.E. must be added as soon as filter is full of water and pump is putting out a steady stream.</td>
<td><strong>Clean tube nest (2 methods) 1. Detergent Cleaning: Remove tube nest and hose down with forceful stream of clean water. Soak tube nest in strong solution of laundry detergent (such as Cheer) and warm water. Hose down again. 2. Chemical Cleaning: This requires use of water and muriatic acid solution (or filter cleaner-type preparations) to chemically dissolve contaminates.</strong></td>
</tr>
</tbody>
</table>
Perflex™ Extended Cycle Filtration System

Replacement Parts

Parts Diagram

Parts Listing

<table>
<thead>
<tr>
<th>No.</th>
<th>Part No.</th>
<th>Description</th>
<th>No. Req'd</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ECX10066</td>
<td>Bump Mechanism Cover</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>ECX900BP</td>
<td>Filter Head with Vent Valve</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>ECX014</td>
<td>Filter Body with Flow Diffuser</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>ECX000C</td>
<td>Clamp Assembly with Hardware</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>ECX400CHK</td>
<td>Hardware Kit for Clamp Assembly</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>ECX1014A</td>
<td>Shaft Kit</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>ECX1007B</td>
<td>Bump Handle Grip-Nort®</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>ECX025A</td>
<td>Bump Handle Screw Kit</td>
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<td>9</td>
<td>ECX000F</td>
<td>Bump Shaft, 1 7/8&quot;</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>ECX1004</td>
<td>Tube Sheet (Top/Bottom)</td>
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</tr>
<tr>
<td>11</td>
<td>ECX000G</td>
<td>Diaphragm Gasket</td>
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<td>12</td>
<td>ECX1031</td>
<td>Flex-Tube Assembly (EC40)</td>
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<td>13</td>
<td>SPX1500YA</td>
<td>Tube Sheet Bolt Set</td>
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<td>14</td>
<td>SP1022C</td>
<td>Flange with Gasket</td>
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<td></td>
<td>SP0723</td>
<td>Ball-Type Drain Valve with Nipple</td>
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<td>15</td>
<td>ECX27081</td>
<td>Pressure Gauge</td>
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<td>16</td>
<td>ECX1256</td>
<td>Flow Diffuser with Check Valve</td>
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</tr>
<tr>
<td>17</td>
<td>ECX007B1</td>
<td>Check Valve</td>
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<tr>
<td>18</td>
<td>SPX3055</td>
<td>Floor Controller</td>
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</tr>
<tr>
<td></td>
<td>ECX0015</td>
<td>Flex-Tube Nest (Includes 6, 9, 10, 11, 12, 13)</td>
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</tr>
<tr>
<td>19</td>
<td>SP1480</td>
<td>1 1/2 Male Union</td>
<td>1</td>
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<tr>
<td>20</td>
<td>SPX142576</td>
<td>O-Ring</td>
<td>1</td>
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<td>21</td>
<td>SPX1235WA</td>
<td>Power Flo Matrix Pump</td>
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<td>22</td>
<td></td>
<td>6 ft. Cool Set</td>
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<td>23</td>
<td>ECX1108</td>
<td>Pump Mounting Screw</td>
<td>1</td>
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<td>24</td>
<td>ECX1109</td>
<td>Washer</td>
<td>1</td>
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<tr>
<td>25</td>
<td>EC1161</td>
<td>Platform Base</td>
<td>1</td>
</tr>
</tbody>
</table>
9.4 Appendix 4: Sanitron UV Water Sterilizer, Model #S50C

Sanitron®
Ultraviolet Water Purifiers

Models S17A, S23A, S37C & S50C

Installation, Operation & Maintenance
SAFETY WARNINGS

- All personnel should be alerted to the potential hazards indicated by the product safety labeling on this unit.
- The following conventions are used to indicate and classify precautions in this manual and on product safety labeling. Failure to observe precautions could result in injury to people or damage to property.

⚠️ This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠️ DANGER
Danger indicates an IMMINENTLY hazardous situation, which, if not avoided, WILL result in death or serious injury.

⚠️ WARNING
Warning indicates a POTENTIALLY hazardous situation, which, if not avoided, COULD result in death or serious injury.

⚠️ CAUTION
Caution indicates a POTENTIALLY hazardous situation, which, if not avoided, MAY result in minor or moderate injury.

⚠️ CAUTION
Caution used without the safety alert symbol indicates a potentially hazardous situation, which, if not avoided, may result in property damage.

⚠️ This symbol/pictorial is used to identify an ELECTRICAL SHOCK or ELECTROCUTION hazard.

⚠️ This symbol/pictorial is used to identify an ULTRAVIOLET LIGHT hazard.

- Product safety labels should be periodically inspected and cleaned, as necessary, to maintain good legibility. Always replace illegible safety labels. Contact factory to obtain replacement safety labels.

SAFETY INSTRUCTIONS

⚠️ WARNING: To guard against injury, basic safety precautions should be observed, including the following:
1. Read and follow ALL safety instructions.
2. Do not use this water purifier for other than its intended purpose as described in this manual.
3. Do not alter design or construction.
4. ⚠️ DANGER: To prevent the risk of severe or fatal electrical shock, special precautions must be taken since water is present near electrical equipment. Always disconnect power before performing any maintenance.
5. ⚠️ WARNING: Avoid exposure to direct or strongly reflected germicidal ultraviolet rays. Germicidal ultraviolet rays are harmful to the eyes and skin.
6. Intended for indoor use only. The water purifier should be protected from the elements and from temperatures below freezing.
7. Do not operate water purifier if power cord or plug is damaged.
8. Electrical power supplied, to the water purifier, MUST match power requirements listed on the water purifier.
9. Plug the water purifier into an approved ground fault circuit interrupt (GFCI) receptacle.
10. ⚠️ CAUTION: Do not operate without proper electrical ground.
11. Do not exceed water purifier’s maximum rated flow capacity.
12. Do not exceed maximum operating pressure of 100 PSI.
13. Read and follow all notices and warnings on the water purifier.
14. SAVE THESE INSTRUCTIONS.
PRODUCT APPLICATION

CONSTRUCTION

- The water purifier is designed to mount horizontally.
- The water purifier’s removable chamber head design allows for easy maintenance. A drain port on the chamber aids in draining of the purifier.
- The water purifier’s chamber and chamber head are passivated and electropolished type 316 Stainless Steel.
- The ballast housing is a combination of Stainless Steel Type 304 and Aluminum Alloy.
- Coated chambers are available for uses with special applications, consult Factory.
- The dual action wiper mechanism allows for quick and easy quartz sleeve cleaning, without interrupting service.
- Easy-off™ end caps allow for quick and easy lamp change, without disconnecting from the water supply or draining the purifier. No tools are required.

PRINCIPLE OF OPERATION

The SANITRON® design has been carefully conceived to provide adequate germicidal dosage throughout the disinfection chamber. The dosage, as it applies to ultraviolet disinfection, is a function of time and the intensity of ultraviolet radiation to which the water is exposed. The exposure time, in seconds, is the total time it takes the water to flow through the disinfection chamber exposing it to the germicidal lamp. Exposure time is related to the flow rate; the higher the flow rate, the lower the exposure time or the lower the flow rate, the higher the exposure time. The ultraviolet intensity is the amount of energy, per unit time, emitted by the germicidal lamp. The dosage is the product of ultraviolet intensity and the exposure time. The operation of the SANITRON® is as follows:

1. Water enters the purifier and flows into the annular space between the quartz sleeve and the chamber wall.
2. Suspended microorganisms are exposed to the ultraviolet rays emitted by the germicidal lamp.
3. The translucent sight port, or optional ultraviolet monitor, provides visual indication of germicidal lamp operation.
4. The dual action wiper mechanism facilitates periodic cleaning of the quartz sleeve without disassembly or interruption of purifier operation.
5. Water leaving the purifier is instantly ready for use, no further contact time is required.

LIMITATION OF USE

The water purifier is intended for the use with visually clear water, not colored, cloudy or turbid. See “Water Quality” section below. The water purifier is NOT intended for the treatment of water that has an obvious contamination or intentional source, such as raw sewage; nor is the unit intended to convert wastewater to microbiologically safe drinking water.

WATER QUALITY

Water quality plays a major role in the transmission of germicidal ultraviolet rays. It is recommended that the water does not exceed the following maximum concentration levels:

Effectively treating water with higher concentration levels than listed above can be accomplished, but may require added measures to improve water quality to treatable levels. If, for any reason, it is believed the ultraviolet transmission is not satisfactory, contact the factory.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity:</td>
<td>5 NTU</td>
</tr>
<tr>
<td>Manganese:</td>
<td>0.05mg/l</td>
</tr>
<tr>
<td>Total Suspended Solids:</td>
<td>10 mg/l</td>
</tr>
<tr>
<td>pH:</td>
<td>6.5 - 9.5</td>
</tr>
<tr>
<td>Color:</td>
<td>None</td>
</tr>
<tr>
<td>Hardness:</td>
<td>6 GPG or 102.6 PPM</td>
</tr>
<tr>
<td>Iron:</td>
<td>0.3 mg/l</td>
</tr>
</tbody>
</table>
1. **Disconnect power to water purifier.**
2. Remove both easy-off end caps by pulling each cap off static gland nut. Slide each end cap along the wire away from the socket.
3. Carefully withdraw lamp approximately 2 inches from chamber while feeding lamp socket and lead wire on opposite end of chamber.
4. While holding lamp end, carefully remove lamp socket on end now exposed.
5. Next, carefully slide lamp back into chamber, until approximately 2 inches of the lamp is exposed on the opposite end. Hold lamp and remove lamp socket.
6. Lamp should now be disconnected on both ends. Carefully remove lamp from chamber. Be sure to withdraw lamp straight out without angling until completely clear of quartz sleeve.

**CAUTION:** Lamp and quartz sleeve are easily damaged. Exercise care when removing or replacing lamp.

7. Reinstall lamp in reverse order.

**WARNING:** Germicidal ultraviolet rays are harmful to eyes and skin. Do not restore power to water purifier until lamp and both easy-off end caps have been properly reinstalled.
Routine cleaning of the quartz sleeve is easily accomplished, using the dual action wiper mechanism.

1. Lift wiper clip up and away from wiper rod.
2. Grasp wiper knob and gently pull out away from the purifier until it reaches its stop.
3. Push wiper back in toward the purifier until it reaches its second stop.
4. Repeat steps 2 and 3 as necessary.
5. Holding wiper in place, return wiper clip and snap over wiper rod, in front of the wiper lock spacer.
QUartz SLEEVe REMOVAL, CLeANING OR REPLACEMENT

1. **Disconnect power to water purifier.**
2. Shut off water supply to water purifier via inlet and outlet shut off valves. Drain chamber by removing drain plug. Once the chamber is completely drained, remove any old sealing tape from the threads of the drain plug, rewrap with 1/2" wide Teflon® thread sealing tape, reinstall and tighten the drain plug.
3. Follow the steps in “Lamp Installation or Replacement” to remove lamp.

⚠️ **CAUTION:** Lamp and quartz sleeve are easily damaged. Exercise care when removing or replacing lamp.
4. Unscrew static gland nuts from each end of the chamber. Avoid striking quartz sleeve with static gland nut.
5. Remove Teflon® washer and o-ring from both ends of quartz sleeve. Teflon® washer will sometimes remain within the static gland nut. If so, remove Teflon® washer from static gland nut before proceeding.
6. Carefully remove quartz sleeve from chamber. **NOTE:** It is advisable to support the quartz sleeve on the opposite end with your finger so that it does not drop to the bottom of the chamber as it slides into the chamber.
7. Once the quartz sleeve is removed, clean with alcohol or a mild, non-abrasive detergent. Stubborn stains usually can be removed with a dilute hydrochloric acid. **NOTE:** Follow all manufacturer’s instructions and precautions when handling chemicals.
8. Reassemble in reverse order. Make sure the quartz sleeve protrudes an equal distance past each threaded nipple. Be sure o-rings are placed on quartz sleeve before Teflon® washer.
9. Tighten static gland nuts firmly by hand only, **DO NOT USE HAND TOOLS.** Tightening with hand tools is likely to cause quartz sleeve to break.
10. **Slowly** restore water supply to water purifier and check for leaks.
11. If no leaks occur, reinstall lamp, following the steps in “Lamp Installation or Replacement” section.
1. Follow the steps in “Quartz Sleeve Removal” to remove lamp and quartz sleeve.
2. To prevent damage to the electrical components, it is necessary to separate the ballast housing from the purifier chamber.
   - On SANITRON® Models S17A, and S23A, the ballast housing is mounted to the purifier chamber using four (4) No. 8 x 3/8” long screws. Using a Phillips cross point screwdriver, carefully remove the four (4) screws, from along the sides of the ballast housing, and set aside. Separate the housing from the chamber.
   - On SANITRON® Models S37C and 550C, the ballast housing is mounted to the purifier chamber using four (4) 1/4-20 x 3/8” long hex head bolts. Using a 7/16” wrench or an adjustable wrench, carefully remove the four (4) bolts with the lock and flat washers, from along the top of the ballast housing, and set aside. Separate the housing from the chamber.
   - Keep ballast housing and mounting hardware in a clean, dry area.
3. Carefully remove as much of the broken quartz sleeve as possible, from each end of the chamber.
4. Remove chamber head clamp, by using a 7/16” wrench to loosen and remove the 1/4” nut from the head clamp.
5. Withdraw chamber head and wiper assembly, from the chamber.
6. Any broken pieces of the quartz sleeve can now be removed through the open end of the purifier chamber. Flush water through chamber being careful to remove all quartz fragments from the interior of the chamber.
7. Carefully discard all pieces of the broken quartz sleeve.
8. Inspect the large O-ring used to seal the chamber and the chamber head. Make sure the O-ring is seated properly between the chamber head ring and the flange of the chamber head.
9. Insert replacement quartz sleeve through each Teflon® wiper segment, starting from the farthest segment working towards the chamber head. Twisting the quartz sleeve will help work the quartz sleeve through the Teflon segments. Align the end of the quartz sleeve with the threaded gland nipple of the chamber head, and pass the quartz sleeve through the chamber head.
10. To re-install, carefully slide the chamber head and wiper rod assembly, into the chamber, with drain port pointing down, using your fingers, support the far end of the quartz sleeve when passing it through the gland fitting of the chamber. Push chamber head flange into the chamber until both flared ends of the chamber and the head, mate against the O-ring.
11. Replace the head clamp around the flared end of the head and chamber. Install the 1/4” nut and tighten, using a 7/16” wrench, until approximately 3/4” to 7/8” of the bolt protrudes past the nut.
12. Center the quartz sleeve in the chamber, making sure the quartz sleeve protrudes an equal distance past each threaded gland fitting, of the chamber.
13. Re-install O-rings, Teflon® washers, and static gland nuts. Be sure O-rings are placed on quartz sleeve before Teflon® washer. Tighten static gland nut firmly by hand only. **DO NOT USE HAND TOOLS.** Tightening with hand tools is likely to cause quartz sleeve to break.
14. Re-assemble ballast housing to purifier chamber, using hardware removed in Step 2.
**NOTE:** When re-assembling ballast housing to purifier chamber, electrical power cord should exit ballast housing from the end mounted opposite the drain plug.
15. When all connections are complete, allow water to enter the water purifier at a low flow rate until the purifier is pressurized. With the purifier pressurized, it should be checked for leaks.
16. See “Lamp Installation or Replacement” section to properly re-install the lamp into the water purifier.
### TROUBLESHOOTING

⚠️ **CAUTION:** Always disconnect power to the water purifier, before performing any service.

**IMPORTANT:** This unit is to be serviced **ONLY** by qualified, and appropriately licensed, personnel.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purifier not operating.</td>
<td>No electrical power…</td>
<td>Verify that the purifier is connected to a live power source.</td>
</tr>
<tr>
<td></td>
<td>Cracked or broken quartz sleeve…</td>
<td>Shut down purifier, drain, and replace quartz sleeve. See “Quartz Sleeve Cleaning or Replacement” in the “Maintenance” section.</td>
</tr>
<tr>
<td>Water leaking into/from purifier.</td>
<td>Quartz sleeve sealing o-ring (s) worn, damaged…</td>
<td>Shut down purifier, drain, and remove static gland nut, replace sealing o-ring. See “Quartz Sleeve Cleaning or Replacement” in the “Maintenance” section.</td>
</tr>
<tr>
<td></td>
<td>Poor, or loose, connections or fittings…</td>
<td>Tighten suspect connection or fitting; or shut down purifier, drain, and remove fitting or connection. Clean threads; reapply thread sealing tape and reinstall.</td>
</tr>
<tr>
<td></td>
<td>Quartz sleeve fouled…</td>
<td>Clean quartz sleeve, see “Quartz Sleeve Cleaning or Replacement” in the “Maintenance” section.</td>
</tr>
<tr>
<td>Poor purifier performance AND/OR Low UV intensity</td>
<td>Sensor Probe, if equipped, lens fouled…</td>
<td>Clean lens or Quartz Rod, see “Optional Ultraviolet Monitor Sensor Probe Cleaning” in the “Maintenance” section.</td>
</tr>
<tr>
<td>(As indicated on Optional Guardian™)</td>
<td>Germicidal lamp output depreciating…</td>
<td>Replace lamp, as it nears its end of life (EOL). See “Lamp Replacement” in the “Maintenance” section.</td>
</tr>
<tr>
<td>Ultraviolet Monitor).</td>
<td>Germicidal lamp not functioning…</td>
<td>Replace lamp. See “Lamp Replacement” in the “Maintenance” section.</td>
</tr>
<tr>
<td></td>
<td>Low input voltage…</td>
<td>Verify input voltage to purifier.</td>
</tr>
<tr>
<td></td>
<td>Change in water quality…</td>
<td>Have water tested to confirm that it does not exceed maximum recommended concentration levels for use with this purifier.</td>
</tr>
</tbody>
</table>

**CAUTION:** Always disconnect power to the water purifier, before performing any service. **IMPORTANT:** This unit is to be serviced **ONLY** by qualified, and appropriately licensed, personnel.
## TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model:</th>
<th>S17A</th>
<th>S23A</th>
<th>S37C</th>
<th>S50C</th>
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<tbody>
<tr>
<td>Flow Rate (GPM):</td>
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<td>6</td>
<td>12</td>
<td>20</td>
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<tr>
<td>Inlet/Outlet Size:</td>
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<td>(\frac{3}{4})&quot; NPT</td>
<td>1&quot;m NPT</td>
<td>1(-\frac{1}{2})&quot;m NPT</td>
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<td>Number of Lamps:</td>
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<tr>
<td>Lamp Model No.:</td>
<td>GPH287T5L</td>
<td>GPH436T5L</td>
<td>G36T6L</td>
<td>G48T6L</td>
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<td>Amps:</td>
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<td>50 Watts</td>
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<td>Max Operating Pressure:</td>
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<td>100 PSI</td>
<td>100 PSI</td>
</tr>
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<td>33° F - 100° F</td>
<td>33° F - 100° F</td>
<td>33° F - 100° F</td>
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<tr>
<td>Quartz Sleeve:</td>
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<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Drain Plug:</td>
<td>(\frac{1}{4})&quot; NPT</td>
<td>(\frac{1}{4})&quot; NPT</td>
<td>(\frac{1}{4})&quot; NPT</td>
<td>(\frac{1}{4})&quot; NPT</td>
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<td>Lamp Out Indicator:</td>
<td>Translucent Sight Port</td>
<td>Translucent Sight Port</td>
<td>Translucent Sight Port</td>
<td>Translucent Sight Port</td>
</tr>
<tr>
<td>Ultraviolet Monitor:</td>
<td>Optional</td>
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<td>Optional</td>
</tr>
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<td>Audio Alarm:</td>
<td>Optional</td>
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<td>Optional</td>
<td>Optional</td>
</tr>
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<td>Solenoid Valve:</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
</tr>
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<td>Time Delay Mechanism:</td>
<td>Optional</td>
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<td>Optional</td>
<td>Optional</td>
</tr>
<tr>
<td>Elapsed Time Indicator:</td>
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<td>Optional</td>
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## Replacement Parts S50C UV sterilizer

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<tr>
<td>3</td>
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<tr>
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<td>Static Gland Nut</td>
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<td>Teflon® Washer</td>
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<td>Rubber O-ring, Quartz Sleeve</td>
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<td>13</td>
<td>Wiper Rod Assembly</td>
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<td>Sight Port Plug</td>
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<td>22</td>
<td>Lock Washer, 1/4&quot;</td>
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<tr>
<td>23</td>
<td>Flat Washer 1/4&quot;</td>
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<td>24</td>
<td>Ballast Housing Cover</td>
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<td>Screw, No. 8 x 3/8&quot; long</td>
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<td>26</td>
<td>Speed Nut, 6-32</td>
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<tr>
<td>27A</td>
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<td>27B</td>
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<td>30</td>
<td>Pushnut</td>
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<td>34</td>
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<td>Power Cord 6' (120v 60Hz)</td>
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<td>Standoff, Mounting</td>
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</tbody>
</table>
Appendix 5: RO Pump Manual Model #18GBC30

Goulds Pumps
G&L SERIES
MODEL GB
Installation, Operation and Maintainence Instructions

Goulds Pumps is a brand of ITT Water Technology, Inc.
- a subsidiary of ITT Industries, Inc.
www.goulds.com

Engineered for life
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</thead>
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<td>21</td>
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</table>

---

**Owner’s Information**

Pump Model Number:  

Pump Serial Number:  

Dealer:  

Dealer Phone No.:  

Date of Purchase:  

Date of Installation:  

Current Readings at Startup:

<table>
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<tr>
<th>1 Ø</th>
<th>3 Ø</th>
<th>L1-2</th>
<th>L2-3</th>
<th>L3-1</th>
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<tr>
<td>Volts:</td>
<td>Volts:</td>
<td></td>
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</table>
SAFETY INSTRUCTIONS

TO AVOID SERIOUS OR FATAL PERSONAL INJURY OR MAJOR PROPERTY DAMAGE, READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN MANU-AL AND ON PUMP.

THIS MANUAL IS INTENDED TO ASSIST IN THE INSTALLATION AND OPERATION OF THIS UNIT AND MUST BE KEPT WITH THE PUMP.

This is a SAFETY ALERT SYMBOL. When you see this symbol on the pump or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.

WARNING Warns of hazards that WILL cause serious personal injury, death or major property damage.

WARNING Warns of hazards that CAN cause serious personal injury, death or major property damage.

CAUTION Warns of hazards that CAN cause personal injury or property damage.

NOTICE: INDICATES SPECIAL INSTRUCTIONS WHICH ARE VERY IMPORTANT AND MUST BE FOLLOWED.

THOROUGHLY REVIEW ALL INSTRUCTIONS AND WARNINGS PRIOR TO PERFORMING ANY WORK ON THIS PUMP.

MAINTAIN ALL SAFETY DECALS.

UNIT NOT DESIGNED FOR USE WITH HAZARDOUS LIQUIDS OR FLAMMABLE CASES. THESE FLUIDS MAY BE PRESENT IN CONTAINMENT AREAS.

PIPING

• Piping should be no smaller than the pump discharge and/or suction connections. Piping should be kept as short as possible, avoiding unnecessary fittings to minimize friction losses.

• All piping MUST be independently supported and MUST NOT place any piping loads on the pump.

• All joints MUST be airtight. Use 3 – 4 wraps of Teflon™ tape to seal threaded connections.

WIRING AND GROUNDING

WARNING Install ground and wire according to local and National Electrical Code requirements.

WARNING Install an all leg disconnect switch near the pump.

WARNING Disconnect and lockout electrical supply before installing or servicing pump.

Electrical supply MUST match pump’s name plate specifications. Incorrect voltage can cause fire and/ or damage to the motor and voids warranty.

Motors not protected MUST be provided with contactors and thermal overload devices. In three phase motors, or starters with heaters on three phase motors. See motor nameplate.

• Use only stranded copper wire to motor and ground. The ground wire MUST be at least as large as the wire to the motor. Wires should be color coded for ease of maintenance.

WARNING Pumps with open spray application must be plugged into electrical service which is protected by a Ground Fault Service Interrupter. Failure to do so may result in serious personal injury or death and property damage.

WARNING Follow motor manufacturer’s wiring diagram on the motor nameplate or terminal cover carefully.

WARNING FAILURE TO PERMANENTLY GROUND THE PUMP, MOTOR AND CONTROLS BEFORE CONNECTING TO ELECTRICAL POWER CAN CAUSE SHOCK, BURNS OR DEATH.

DESCRIPTION and SPECIFICATIONS:

The GB Series pump is a portable horizontal multi-stage pump designed for residential and agricultural washdown, misting and general boosting services.

The 304 stainless steel version of the GB is used for HVAC, general commercial, reverse osmosis and filtration applications.

ENGINEERING DATA

• Maximum Liquid Temperatures: 160°F (72°C).

• Maximum Suction Pressure 75 psi.

• Pipe connections are 1” NPT suction and discharge.

• ¾” Hose Adapters are available.

• Capacities to 33 GPM.

• Heads to 600 Feet (260) psi.

• Rotation: Right hand, i.e. clockwise when viewed from motor end.
OPERATION

**WARNING**

**Hazardous voltage**

SPLASHING OR IMMERGING OPEN Drip Proof Motors In Fluids CAN SHORT OUT MOTOR AND CAUSE FIRE, SHOCK, BURNS OR DEATH.

**NOTICE:** PUMP MUST BE FULLY PRIMED BEFORE OPERATION. DO NOT RUN PUMP DRY.

- After stabilizing the system at normal operating conditions, check the piping. If necessary, adjust the pipe supports.

**CAUTION**

Do not run pump dry, damage to mechanical seal will result. Do not run against closed nozzle for prolonged periods or damage to pump and piping will result.

HANDLE ASSEMBLY

Remove two top bolts from motor adapter. Insert them through handle back into the motor adapter and tighten securely.

NOZZLING

It is important to choose the right nozzle for proper pump performance. The faucet supplying the water to the pump should be checked to see what rate of flow it will furnish. If the one min. flow with the faucet open is:

- 7 gals. — Use 6 gpm nozzle V2005 (which is included with each AM2)
- 6 gals. — Use 5 gpm nozzle V1502
- 5 gals. — Use 4 gpm nozzle SN0045
- 4 gals. — Use 3 gpm nozzle V10152

AM 7 Kit

By using this method of choosing nozzles we can keep a positive pressure at the pump intake. This will keep the pump from "robbing" water from other faucets.

DAIRY FARM USE

We recommend that all WaterGuns® used on farms producing Grade ‘A’ milk be equipped with a Vacuum Breaker, installed according to instructions supplied with Vacuum Breaker. This prevents sub-atmospheric pressure in the supply line even if the water supply should diminish. We suggest the WaterGun be hung on a wall at least 18" off the floor and that a hose rack be provided to store the discharge hose off the floor.

MAINTENANCE

**WARNING**

**Hazardous voltage**

FAILURE TO DISCONNECT AND LOCKOUT ELECTRICAL POWER BEFORE ATTEMPTING ANY MAINTENANCE CAN CAUSE SHOCK, BURNS OR DEATH.

- Motors have permanently lubricated bearings. No lubrication is possible or necessary. Follow the motor manufacturer’s recommendations for maintenance.

- To REMOVE pump from service drain all pumpage from pump and piping.

- To RETURN pump to service replace all plugs and piping using Teflon™ tape or equivalent on male threads.

- Refer to "OPERATION" section of manual.

DISASSEMBLY

- Place wrenches on adapter (13) and discharge head (1), and unscrew discharge head and casing (3).

**NOTE:** CASING HAS A LEFT HAND THREAD ON BOTH ENDS AND IS SEALED WITH O-RINGS (2).

- Remove klip ring (6) from end of shaft (11). The stages, each comprising a bowl (9), impeller (8) and diffuser (7) may now be removed. If pump has been clogged by foreign matter, but otherwise undamaged, further dismantling may be unnecessary. If shaft assembly (11), shaft seal (12) or motor are to be replaced, proceed as follows:

  - Remove plug (18) from rear of motor and hold motor shaft with screwdriver. Unscrew pump shaft coupling assembly (11) from motor shaft. Remove four motor mounting bolts (14), separate the motor from frame by withdrawing it straight back.

  - Motor may have to be pried with two screwdrivers if the shaft seal sticks. The shaft seal stationary seat may be pushed out of adapter from the motor side. There is a rubber coupling o-ring (19) between motor shaft and coupling which will usually remain on the motor shaft as the seal is pulled over it.

REASSEMBLY

Check that the rubber deflector (20) and the coupling o-ring (19) are on the motor shaft. If they are worn or damaged, replace. Install stationary seal seat in frame (13) and mount frame (13) and handle (15) to motor. Install seal rotating element, making sure faces are clean and that the last rubber member goes over the coupling o-ring and onto the motor shaft. Screw the pump shaft and coupling assembly (11) on until it seats up against the motor shaft. With a straight edge across the face of the frame check the location of the outboard end of the coupling. Due to variations in motor shaft length, etc., it will be from .030" short to flush. Add .010" shims 7K155 until they flush or higher, i.e., the last shim interferes with the straight edge. Put the required stages on checking each stage for additional shim requirements by putting the straight edge across the bowl and checking the location of the impeller hub. After all the stages are on the shaft replace klip ring (6).

Check o-ring on both frame and discharge head and replace if damaged. Install casing (3) and bearing spider (4). Thread on discharge head (1) (Notice: left hand threads) and tighten.
With screwdriver in the slotted end of the pump shaft,
turn the unit over (clockwise) before replacing plug (18).
It should turn with no resistance except that of the shaft
seal.

TROUBLESHOOTING

WARNING
FAILURE TO DISCONNECT AND
LOCKOUT ELECTRICAL POWER
BEFORE ATTEMPTING ANY
MAINTENANCE CAN CAUSE
SHOCK, BURNS OR DEATH.

SYMPTOM

MOTOR NOT RUNNING
See Probable Causes 1 thru 5

LITTLE OR NO LIQUID DELIVERED
See Probable Causes 6 thru 12

EXCESSIVE POWER CONSUMPTION
See Probable Causes 3, 12, 13 & 14

EXCESSIVE NOISE & VIBRATION
See Probable Causes 3, 6, 7, 10, 13, 15 & 16

PROBABLE CAUSES

1. Motor thermal protector tripped
2. Open circuit breaker or blown fuse
3. Impeller binding
4. Motor improperly wired
5. Defective motor
6. Pump is not primed, air or gases in pumpage
7. Discharge, suction plugged or valve closed
8. Incorrect rotation (3 phase only)
9. Low voltage or phase loss
10. Impeller worn or plugged with debris
11. System head too high
12. Incorrect impeller diameter
13. Discharge head too low — excessive flow rate
14. Fluid viscosity and/or specific gravity too high
15. Worn bearing
16. Pump, motor or piping loose
<table>
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<tr>
<th>Item No.</th>
<th>Description</th>
<th>Materials</th>
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<td>Cast Iron</td>
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<tr>
<td>2</td>
<td>O-ring, Casing</td>
<td>BUNA</td>
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<tr>
<td>3</td>
<td>Casing</td>
<td>304SS</td>
</tr>
<tr>
<td>4</td>
<td>Bearing Spider</td>
<td>Glass Filled Poly carbonate</td>
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<td>5</td>
<td>Bearing</td>
<td>Urethane</td>
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<td>6</td>
<td>Klip Ring</td>
<td>301SS</td>
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<tr>
<td>7</td>
<td>Diffuser</td>
<td>Glass Filled Poly carbonate</td>
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<tr>
<td>8</td>
<td>Impeller</td>
<td>Glass Filled Poly carbonate</td>
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<td>12</td>
<td>Mechanical Seal</td>
<td>Varies</td>
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<tr>
<td>13</td>
<td>Motor Adapter</td>
<td>Cast Iron</td>
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<td>14</td>
<td>Screw, Motor Adapter to Motor</td>
<td>Steel</td>
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<tr>
<td>15</td>
<td>Handle – optional</td>
<td>Steel</td>
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<tr>
<td>16</td>
<td>Screw, Base to Motor Adapter</td>
<td>Steel</td>
</tr>
<tr>
<td>17</td>
<td>Base</td>
<td>Steel</td>
</tr>
<tr>
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<td>Pipe Plug</td>
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<td>Motor Shaft 304SS</td>
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9.6 Appendix 6: RO Membranes Pressure Vessel Instructions

**CodeLine™ 40E30N Series**
**RO Pressure Vessels**
——User's Guide——

**DANGER - HIGH PRESSURE DEVICE**

This vessel may cause loss of life, severe bodily harm, or property damage if not correctly installed, operated and maintained. Read and understand all guidelines given in this bulletin before attempting to open, operate or service this vessel. Failure to follow these guidelines and observe every precaution will result in malfunction and could result in catastrophic failure. Misuse, incorrect assembly, or use of damaged or corroded components can result in high-velocity release of the end closure. We recommend that only a qualified technician experienced in servicing high-pressure hydraulic systems open, close and service this vessel.

---

**Important Safety Precautions**

**Do...** read, understand, and follow every guideline in this bulletin. Failure to take every precaution may void warranty and could result in catastrophic failure.

**Do...** install in an area where a vessel or piping malfunction that results in water leakage would not damage sensitive or expensive equipment, such as electronic components.

**Do...** verify that head locking components are properly placed and secured.

**Do...** inspect end closures regularly, replace deteriorated components, and correct causes of corrosion.

**Do...** follow membrane element manufacturer's recommendations for loading elements into vessel (see Replacing Elements).

**Do not...** operate vessel at pressures in excess of their specific pressure rating.

**Do not...** service any component until you verify that pressure is fully relieved from the vessel.

**Do not...** use corroded components. Use of such components may result in catastrophic failure.

**Do not...** pressurize vessel until after visually inspecting to ensure that both retaining rings are correctly installed and seated in their grooves.

**Do not...** tolerate leaks or allow end closures to be routinely wetted in any way.

**Do not...** use excessive silicone lubricant.

**Do not...** pressurize vessel without element in place unless permeate ports are plugged internally.

**Do not...** overtighten fittings in ports.

---

**General Information**

The 40E30N RO/UF Pressure Vessel is designed for continuous, long-term use as a housing for reverse osmosis and ultrafiltration elements in typical commercial water treatment systems. Models are available for 300 psi.

The 40E Series vessels are designed to accommodate any make of 4-inch nominal diameter 40" long spiral-wound element with a .75“ diameter product water tube and a 38” long outer shell design.

The fiberglass shell can be damaged by rigid clamping, impact, scratches or abrasion. Metal parts must be maintained free of corrosion to eliminate potentially unsafe conditions due to corrosion.

The information and guidelines incorporated in this User's Guide are intended only as a supplement to good industrial practice. Full responsibility for correct operation and maintenance of vessel remains with the user.

This guide should be used in conjunction with drawing number 518016.

When properly installed and maintained, Model 40E30N vessels can be expected to provide safe operation over a long service life.
**Section Through End Closure**

**Figure 1A**

<table>
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<th>Qty Per</th>
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<td>Shell</td>
<td>Filament Wound epoxy/glass composite. Head locking grooves internally wound in place. Shell exterior coated with high gloss polyurethane paint.</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Shell</td>
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<td>2</td>
<td>2</td>
<td>51675</td>
<td>Plug Seal</td>
<td>Ethylene Polypropylene - O-ring</td>
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<td>Adapter Seal</td>
<td>Ethylene Propylene - O-ring</td>
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<td>Retaining Ring</td>
<td>316L SST</td>
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<td>5</td>
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<td>45260</td>
<td>Retaining Ring</td>
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</table>
Installation

Regardless of when or by whom your vessel may have been installed, there are a few quick checks you should make before use. Check that each vessel is:

- Mounted with compliant material (cork or rubber) between the fiberglass shell and any rigid frame.
- Free to expand under pressure - shell not clamped rigidly in place, no rigid piping connections to port fittings.
- Not used in any way to support other components, such as piping manifolds hanging from ports.

Opening The Vessel

WARNING
Relieve pressure from vessel before beginning this procedure.

Contamination Removal

Metals oxidation products and mineral deposits can interfere with vessel disassembly. Remove all foreign matter from both ends of vessel as follows.

1. Remove contaminants using a small wire brush or suitable abrasive (such as medium-grade ScotchBrite™).

2. Flush away loosened deposits with clean water.

Removing the Head

40E30N head assembly is shown in Figure 1A.

Remove head as follows:

1. Disconnect permeate piping as required at nearest convenient joint, being careful not to place undue stress on the threaded connections in the plastic permeate port.

   CAUTION
   DO NOT tap on fittings as this could damage ports.

2. Remove the retaining ring from the groove.

   Lift the end of the 4" retaining ring up and out of the stainless groove in the shell. This can be accomplished with a pair of pliers and a screwdriver or by using CodeLine Removal Tool part number 5030, available from your supplier.

   To use the removal tool, the retaining ring can be lifted upward by simply rotating the tool counterclockwise after inserting it over tab on the retaining ring. (User the smaller hole.) Hold the tool flat against the end margin and parallel to the vessel bore. It is then possible to pull the end of the retainer ring straight out. The retaining ring may snap back into the groove if this alignment is not closely adhered to.

   If the retaining ring is difficult to remove, try soaking with a release agent such as LPSTM or WD40TM, being careful to avoid any contamination of a membrane element. Take care to avoid hitting or levering against the vessel, as this could result in delamination.

3. Remove the 4" retaining ring from the stainless groove in the shell by rotating your finger behind the ring as it continues to exit the groove.

4. Once the retaining ring has been removed, examine the groove area for burrs or dings which could damage the head or membrane. If necessary, use ScotchBrite™ or 600 grade sandpaper to smooth the area.
5. Install a 1/2" NPT x 6" long nipple into the product port of the head on the concentrate end.

6. Grasp the nipple and pull the head straight out. A small amount of side-to-side movement may be necessary to start the bearing/sealing plate moving. Care should be taken to avoid placing too much stress on the product port threads.

7. Pull the opposite head out of the vessel.

---

## Replacing Elements

The following procedures are provided for information only. Elements should be installed in accordance with the element manufacturer's recommendations. Where conflicts exist, contact the element manufacturer or Codeline® for clarification. To replace elements, proceed as follows.

### Removing Elements

1. Remove heads from both ends of vessels as described in Opening the Vessel.

2. Push element out of vessel from the upstream end.

### Inserting Elements

1. Ensure that element exterior and shell bore are in clean, as-new condition before proceeding. (See Refurbishing Shell, page 6)

2. Reinstall head assembly at the downstream end as described in Closing the Vessel.

3. Lubricate element seal sparingly with the manufacturer's recommended lubricant or with glycerine (a commercially available lubricant that will not foul elements).

**CAUTION**

**DO NOT** lubricate element seals with a silicone-based material (such as Parker Super O-Lube™, the recommended lubricant for head seals).

4. Insert the element with the brine seal (typically a U-cup seal) installed on the upstream end with its lip facing upstream.

**CAUTION**

System malfunctions and element damage may result if elements are installed in the wrong direction.

5. Push the element downstream into shell until the elements fully engage with the downstream head. If element is hard to push, make sure the brine seal is properly installed and you are pushing from the upstream end.

6. When the element is installed, close the vessel as described in the following section.
Closing the Vessel

Prepare and install head assemblies as described below.

1. Refurbish or replace head components as required to ensure as-new condition. (See Refurbishing Parts.) The PWT O-ring should be replaced each time.

2. Cover O-rings with a thin, even layer of Parker Super O-Lube™ silicone lubricant or the lubricant recommended by your element supplier.

   **Note**
   
   Glycerine is a commercially available lubricant that will not foul elements. However, silicone lubricant is recommended for this application.

3. Install the smaller PWT seal into the groove inside the end of the permeate port.

4. Remove any residual lubricant.

   A. **40E30N.** Remove any residual lubricant from the head seal.

5. Install head seal.

   A. **40E30N Only.** Install the head seal on to the endplug.

   **Note**
   
   On some systems it may be easier to install the piping connections before the head is installed. If so, please proceed to Steps 10 & 11

6. Insert head, that has threaded permeate port, into downstream end of vessel. Using both thumbs, apply equal pressure on opposite sides of the bearing/sealing plate to force head into vessel so that the head clears the retaining ring groove.

7. Carefully insert retaining ring into its groove. This is done by inserting the lead end of the spiral retaining ring (end without bent tab) on 40E30 into the stainless steel retaining ring groove, located in the shell, and slowly pushing the remaining turns into the shell.

8. Check that the spiral retaining ring is fully seated in groove. If it is not, remove and check for foreign materials causing the spiral ring not to fully seat.

   **CAUTION**
   
   DO NOT pressurize vessel without element(s) properly installed.

9. Insert element if not already installed, and place permeate cap over product water tube in upstream end of vessel. Then install upstream head using technique given in steps 6 and 7.

10. Remaking Pipe Connections to Permeate Port

    A. Use a wire brush to remove all foreign matter from threads on pipe fittings.

    B. Apply non-hardening thread sealant or Teflon™ tape to fitting and install in permeate port. Tighten fitting a maximum one quarter-turn past hand tight the component could be damaged if fittings are overtightened.

11. To reconnect the feed/concentrate port, follow steps A & B above, being careful to hold the bearing/sealing plate securely to prevent damage.

12. Pressurize vessel. Inspect for leaks at connections to the vessel and all around the vessel itself. If any leaks occur, release pressure from vessel and tighten fittings as necessary. Then pressurize vessel and check for leaks again.

   **CAUTION**
   
   DO NOT tolerate any leaks. Leaks can result in corrosion and eventual catastrophic vessel failure.
Refurbishing Parts

Inspecting Parts

**Plastic parts:** examine for cracking, softening, or discoloring. This may indicate chemical attack of the material. Defective parts must be replaced. Alternate materials may be required. Contact your supplier or CodeLine™ for assistance.

**Metal parts:** check for corrosion, scratches, dents, cracks or other damage to insert ring and spiral retaining ring.

**Other parts:** examine for any damage, such as gouges, chips or cracks, that could affect structural strength or sealing characteristics. The following are some examples of defects that may require replacement of the affected part.

- **Bearing/Sealing Plate and Permeate Port:** cracked, discolored, sealing areas damaged (chipped or gouged), port threads stripped or cross-threaded.
- **Spiral Retaining rings:** are the sole means of end plug retention. Parts bent, corroded, cracked or damaged in any way must not be used. Carefully check for hairline cracks.

Refurbishing Other Parts

1. Remove any large deposits from metal parts using a wire brush.
2. Scrub the entire surface with medium grade ScotchBrite™ until all contaminants are removed.
3. Rinse parts clean with fresh water and dry.
4. Inspect all parts for serviceability as specified above.

Part Replacement

Replace all parts that cannot be restored to as-new condition.
Replace any parts showing signs of structural damage or corrosion.

**CAUTION**

Use of components damaged by corrosion can result in catastrophic failure.

Seals should be replaced as necessary each time the vessel is serviced. Any parts that need to be replaced are available from your supplier or from CodeLine™.

Refurbishing Shell

1. Using a fine wire brush, remove any large deposits from locking ring groove in the shell.
2. Using a medium or finer grade of ScotchBrite™ and mild soap solution, clean the inside of the vessel at least 4 inches in from each end. Take care not to damage feed/concentrate port and its respective seal.
3. Use clean water to rinse away all loosened deposits and soap residue.
4. Examine inside of vessel for scratches, gouges, or other imperfections that could prevent proper sealing. If such areas exist and leaks are observed when the vessel is placed back in service, the shell may need to be replaced.
9.7 Appendix 7: Collapsible Portable Drinking water storage Tanks

Our drinking water holding tanks for **potable water use** range from personal sized 25 gallon to 250,000 gallons (bulk liquid storage) and are well suited for demanding climates. Our most popular portable tanks are our commercial grade portable pillow style tanks and offer 5 years contact time for drinking water storage. Pillow tanks are manufactured durable coated membrane which are **NSF 61 and FDA compliant**.

Our flexible water tanks are used to economically provide clean, clear, safe and great tasting water. Often used by the **DOD for military operations, first responders for emergency relief efforts (FEMA) and to provide drinking water to remote drought stricken areas globally and** for numerous private applications like **replacement tanks for water cisterns, under home rain water collection and storage for villages, spring water storage for cabins and guest homes.**

**Typical Specifications for Drinking Water Pillow Tanks**

**FABRIC** - NSF 61 and FDA Compliant

**CONTACT TIME** - 1 year, 5 year and 7 Years.

**FITTINGS** - POLYPROPYLENE, aluminum, stainless steel 3/4” to 4” Camlock, threaded or Storz, BALL VALVE, CENTER VENT, all with dust caps.

**BERM LINER or Rub Pad** - We recommend the use of berm liners, rub pads or ground cloths to improve product longevity.

**OPTIONAL** - Wash Port for periodic cleaning, clearview windows, water testing, repair kits and spare parts, pressure relief valves.
PACKAGING - (Optional) Coated fabric carry bags, totes, wooden crates, aluminum rapid deployment and recovery reels or as specified (additional costs may apply for packaging)

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Flexible tanks with price in this background denote that an Embankment support is advised.

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**NOTE:** The information contained herein is considered accurate. However, no warranty is expressed or implied regarding the accuracy of the data, the results obtained from use thereof, or that any such use will not infringe upon any patent. This information is furnished upon condition that the person receiving it shall assume its suitability for the specific application.