



**INSTALLATION  
&  
SPA CARE MANUAL**

**MODEL  
SPA-1R  
- Outdoor Unit -**

**FOR ALL SPAS  
UP TO 2,000 GALLONS**

## FIRST, BALANCE THE SPA'S WATER

Before installing the **SPA-1R Clearwater Spa Purifier**, the spas water must be clear and balanced properly. It is extremely important that the following guidelines are implemented - so please read thoroughly.

## PREVIOUS SANITIZER USE

If the previous sanitizer used was Baquacil, you will need to remove every drop of it, as Baquacil is not compatible with any other sanitizer including the Clearwater Spa Purifier. The best way to remove it is to drain the spa completely and refill with fresh water. You should also change the sand in the filter, acid wash the cartridges, or change the DE in a DE filter. Consult a professional first if draining the spa. Please contact your dealer or **Clearwater Enviro Tech** directly for further help on a spa with Baquacil. There is also a product that removes it, but sometimes this process needs to be repeated over and over. If the spa was using an automatic chlorine generator (where salt is added to make chlorine at the site), the water should be drained at least halfway and refilled with new water. Usually the TDS level is very high and should be lowered. If the spa was using chlorine or bromine, it is all right to go ahead and install the ionizer, as the two work together fine.

## CIRCULATION

Before testing the spa water chemistry, make sure the filtration system and circulation is good. Check the filter to make sure it is cleaned. The filter pressure gauge should give you an indication right away. If the customer has been using a sand filter, and the sand is several years old, you may want to change the sand for best results. If it is a cartridge filter, check the canister inside to make sure the polyester fabric or corrugated paper is in good shape.

If the customer has a DE filter, change the DE.

Good circulation is important because you will no longer be dumping chlorine or bromine in the spa to "cover-up" a bad filtering system.

## CHLORINE OR BROMINE

Always make sure there is some chlorine or bromine in the spa when first starting up the system, as it may take several hours to fully "ionize" a spa. Never add granular chlorine (like HTH) directly into the spa's water with the ionizer on. It **MUST** be dissolved first, or poured directly into the skimmer with the pump on. Always make sure the water is clear before installing the ionizer by using chlorine or bromine. **THE IONIZER BY ITSELF WILL NOT CLEAR UP CLOUDY WATER.**

## pH READING

TEST WEEKLY AND MAINTAIN BETWEEN 7.2 - 7.8. VERY IMPORTANT!

IT IS VERY IMPORTANT THAT THE pH OF THE WATER IS BETWEEN 7.2 - 7.8. This is standard spa chemistry. If the pH is over 8.0, the **Clearwater Spa Purifier** will not work properly as the ions become ineffective. If the spa's pH tends to go up, balance the spa so that the pH is on the LOWER side - 7.2 If the spa's pH tends to go down, balance the spa so that the pH is on the HIGHER side - 7.8

## IF THE pH IS ABOVE 7.8

Using an acid demand test with your regular test kit, determine the amount of dry or muriatic acid needed to lower the pH to 7.2 Add the acid and check a few minutes later to make sure it is in the correct range.

## IF THE pH IS UNDER 7.2

Using a base demand test with your regular test kit, determine the amount of soda ash needed to raise the pH to at least 7.2. If the pH tends to go down, add enough soda ash to raise the pH to 7.8

## TIPS ON BALANCING pH

When adjusting the pH, don't wait for the pH to reach 8.0 before adding acid. Go ahead and add a little acid if the pH is over 7.6.

For best results, keep the pH 7.2 - 7.4

If you use the non-chlorine shock as an oxidizer, this will lower the pH. and may eliminate acid use completely.

## OPTIONAL EQUIPMENT

**Clearwater Enviro Tech** sells a product called the "**ScaleBlaster**", a electronic descaler. This unit is installed similar to the ionizer and has a signal cable that is wrapped around the pipe. No plumbing is required. This device helps stabilize the pH over a period of time, removes scale build up in pipes, spa walls and tile, and in spa equipment. It will also help remove calcium and other stains in the spa over a period of time.

**THIS PRODUCT IS STRONGLY RECOMMENDED ON GUNITE OR MARCITE TYPE SPA'S.**

## TOTAL ALKALINITY

### **TEST MONTHLY AND MAINTAIN BETWEEN 80-120 PPM**

Using a normal Total Alkalinity test kit, determine the reading and adjust.

#### **IF THE TOTAL ALKALINITY IS UNDER 80 PPM**

Raise the Total Alkalinity to about 100 ppm by adding sodium bicarbonate (baking soda). Consult chart on amount needed.

#### **IF THE TOTAL ALKALINITY IS OVER 120 PPM**

Lower the Total Alkalinity to about 100 ppm by adding muriatic acid or dry acid. Consult chart on amount needed.

## TIPS ON BALANCING THE TOTAL ALKALINITY

Never add acid or dry acid to the spa when the pH is 7.2 or below, regardless of what the Total Alkalinity reading is. Acid will lower both Total Alkalinity and pH at the same time.

With a high Total Alkalinity, the pH will bounce up the next day. Continue the addition of acid until the Total Alkalinity drops to the 80-120 ppm range. It may take several hours of repeating this process before the Total Alkalinity reaches the proper range.

NEVER ADD ACID DIRECTLY INTO THE SPA. IT IS BEST TO USE DRY ACID. IF ONLY MURIATIC ACID IS AVAILABLE, DILUTE IT FIRST.

## CALCIUM HARDNESS

### **TEST YEARLY AND MAINTAIN BETWEEN 150-350 PPM**

We recommend that the Calcium hardness reading should be between 150 and 350 ppm. If the reading is below 150 ppm, the chances are the spa was filled with softened water. The water may also be cloudy often.

#### **IF THE CALCIUM HARDNESS IS UNDER 150 PPM**

If the calcium hardness is under 150, add calcium chloride, available in any spa/pool store. Follow instructions on container if needed.

#### **IF THE CALCIUM HARDNESS IS OVER 350 PPM**

If the calcium hardness is over 350 ppm, the water should be partially drained and refilled with fresh water, unless you are adding the "**ScaleBlaster**" to the system.

#### **CYANURIC ACID**

Cyanuric acid is not required with the **Clearwater Spa Purifier**. If the cyanuric acid level is over 150 ppm, the spa should be partially drained and refilled with fresh water.

## TOTAL DISSOLVED SOLIDS

The **Clearwater Spa Purifier** requires some conductivity in the water for ionization to take place. For the system to perform on maximum capabilities, the TDS needs to be at least 500 PPM. Most spas already have this level because the TDS always goes up every time something is added to the spa. Only when new fresh water is added to the spa is when the TDS may be below 300 ppm.

If a TDS meter is not available, all spa/pool stores can do this test for free.

You can very easily raise the TDS level - IF YOU NEED TO. Remember, the TDS level always goes up whenever anything is added to the spa, and a reading at least 500 ppm may be obtained over a short period of time. The TDS level never goes down, so if you have to raise the TDS, it would be only for this one time or whenever you change the water in the spa. You may not have to raise the TDS because of the size of your spa. The unit is designed to handle 2,000 gallons of water easily. You would really only need to raise the TDS level if the spa was a large one and the purifier was unable to put the proper amount of copper-ions in the water.

To raise the TDS, you would need to add 1 ounce of regular salt to raise the TDS by 10 ppm per 500 gallons. Do not worry about turning the spa into salt water - the TDS of that is 33,000 ppm! Only add salt if necessary when you cannot obtain the desired copper-ion level. Low TDS levels is actually desirable.

The **Clearwater Spa Purifier** will work on any TDS level, however, a reading over 2,000 ppm should be lowered because more of an oxidizer will be required. To lower the TDS, partially drain the water and add fresh water. Chances are that if your TDS was over 2,000 ppm your water was cloudy often, or required a lot of chlorine or bromine.

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## COPPER LEVEL

Before installing the **Clearwater Spa Purifier**, you should test the copper level. There may be a level of copper sulfate in the water from leached copper piping, or from a copper based algaecide. If the reading is over .10 ppm, corrections may have to be made. You want to have a proper balance of copper and silver ions in the water, so you need to find the source of the copper already in the water. Remember, this is not the same copper that is produced by the purifier. If it is from copper pipe, the copper was leached from a low pH of 7.0 or less. Make sure the pH is maintained over 7.0 to prevent further copper leaching from the pipes. You will only find copper piping near a heater or on very old houses. If the source is from a copper-based algaecide, you can try shocking the spa with a lot of liquid chlorine to "burn" it out, or simply start the ionizer up very low and do not allow the level to go over .40 ppm. Eventually the copper algaecide will dissipate.

## SEQUESTERING AGENTS

Sometimes spa owners will add a flocking or sequestering agent to the water to remove stains or scaling in a spa or remove undesired minerals that are in the source water. **Clearwater Enviro Tech** sells a "Sequestering Agent" test kit that can test for stain, scale and mineral removers. Sometimes, some of these products can remove the copper-ions that you are about to introduce to the water.

For best results, you should test the Sequestering Agent Level before installing the Unit. **Clearwater Enviro Tech** dealers are recommended to get a test kit to test the Sequestering Agent Level in the water. Some products that will cause a problem include *Sequasol*, *Cop-Out*, *Metal Magnet*, *Aluminum Sulfate* or *ALUM*. Products that do not cause problems include *Pool Stain Treat* by **United Chemical**, and *Jack's Magic Products*. All polymer based products like *Super Blue* and *Sea-Klear* do not cause problems either.

If you do not have a test kit for Sequestering Agents, you should only worry about this if you are UNABLE TO GET THE REQUIRED COPPER-ION LEVEL in the water. You can send a water sample to **Clearwater Enviro Tech** for a free analysis. Please call the offices first. If the spa does have one of the products above that removes the copper-ions, simply shock the spa with a large amount of liquid chlorine to "burn" it out. Make sure the customer no longer uses this product. Without "burning" these Sequestering Agents out of the water, they may last several months in the water after the customer added it. Sometimes the customer forgets they added it in the first place.

# INSTALLATION PROCEDURES

## TOOLS AND MATERIALS REQUIRED

Channel lock wrench	Hacksaw or backsaw	Screws & anchors	Utility knife
Crescent Wrench	Teflon tape	Flexible conduit	Hammer
Screwdriver	PVC cleaner/primer	1/2" straight conduit connector	Voltage Meter
Drill & Drill Bit	PVC cement	wire stripper	

## COMPONENTS OF THE SPA-1R IONIZER

Spa Unit Control Box  
1 1/2" long set of electrodes mounted in a 2" PVC threaded plug.  
2 - 2" x 1 1/2" PVC reducer bushings  
2" tee, slip/slip/threaded  
Set of Mounting Flanges & screws  
Copper-Ion Test Kit  
Warranty Card  
Quick Chart (blue sheet)  
Installation & Spa Care Manual

## MOUNTING THE FLOW CELL TEE

- 1.) Locate a space for the electrode chamber (2" tee, slip/slip/threaded). The tee should be installed after the pump and either before or after the filter. After the filter is preferred, but it will work fine if installed before the filter.
- 2.) Turn off the pump and close all valves. Disconnect all sources of power going to the timer or pump.
- 3.) Using a hacksaw or backsaw, cut a 4-inch gap in the section of pipe if 1 1/2" pipe exists, or cut out a 3" gap if a 2-inch pipe exists.
- 4.) Sand the burrs off the pipe. Dry the pipe and clean the ends with PVC primer/cleaner.
- 5.) If 1 1/2" pipe exists, cement the 2" to 1 1/2" reducer bushings into the tee (included with the purifier).
- 6.) The tee should be mounted on the return line after the pump and mounted slightly downward so that no air-pocket can form in the electrode chamber. If there is not enough "give" to allow insertion of the tee, install unions.
- 7.) Screw the electrodes into the tee. Generously wrap teflon tape around the electrodes several times before installing to prevent leaks.

## INSTALLING THE SPA CONTROL BOX - VOLTAGE SETTING

- 1.) Before mounting the spa control box, you must determine the voltage at the installation site. By using your voltage meter, determine if the voltage is 115 V or 230 V.

### **ALL UNITS ARE FACTORY SET AT 230 V. IF THE INSTALLATION CALLS FOR A 115 V SETTING YOU WILL NEED TO MAKE AN ADJUSTMENT TO THE UNIT.**

- A.) Unscrew the two (2) screws holding the clear cover.
- B.) Lift up the clear cover.
- C.) There is no need to disconnect the cover.
- D.) Lift printed circuit board up and turn over. Do not disconnect any wires. Very important!
- E.) Locate switch on printed circuit board (below transformer) where 230-115 VAC is printed.
- F.) Flip switch to 115 V AC location.
- G.) Place printed circuit board in place again.
- H.) Close clear cover.
- I.) Tighten in the two (2) screws to hold collar in place.

TO KEEP THE CLEAR LID FROM SCRATCHING, KEEP PLASTIC SHEET ON TILL INSTALLED.

- 2.) Mount the brackets to the back of the spa control box. Use enclosed screws.
- 3.) Mount the spa control box to the wall allowing for the power cable wire to reach the source of power, and the electrode wire to reach the electrode chamber. Use proper anchors and screws to mount.
- 4.) Make sure the surface is flat, firm and as close to the power source as possible.
- 5.) Connect the two-conductor gray wire coming from the purifier to the electrode's two terminals. It does not matter which wire is connected to the terminals.

## **CHOOSING THE POWER SOURCE**

When locating the power source, it should be one that turns on and off as the pump and motor does. The best location is the spa's timer box. If no timer box exists, you unit can use the pump motor as its power source by removing the back plate.

### **CONNECTING TO THE TIMER BOX**

**220 VAC** - Connect the black (3 stranded) wire cable to the 220 VAC timer box by splicing the 3 wires and connecting the black and white wires to the LOAD side on the timer box. It makes no difference which colored wire goes to the two load screws. Connect the green wire to GROUND. When installed correctly, the unit should come on and off when the power comes on and off. If this fails to happen, you have installed the unit improperly.

**110 VAC** - Connect either the white wire or the black wire to the LOAD side on the timer box. It makes no difference which colored wire goes to the two load screws. Connect the green wire to ground. When installed properly, the unit should come on and off when the power comes on and off. If this fails to happen, you have installed the unit improperly.

## **CONNECTING TO PUMP MOTOR**

Disconnect the back plate to the motor where the electrical connections are. You will notice two connections where the power source is connected to. Connect the ionizers black, white and green wires to the same as the motor. If connected properly, the ionizer will come on and off with the motor.

**YOU MUST FOLLOW ALL LOCAL, STATE, NATIONAL OR INTERNATIONAL CODES WHEN INSTALLING. A CERTIFIED ELECTRICIAN MAY BE REQUIRED.**

**You should use a flexible conduit from connection to connection on the power cable. The size of the connector already on the control box is 1/2". There is no need to cover up the electrode wire.**

Once this is all complete, open up all valves and turn the power on. Check for water leaks and all electrical connections for proper and firm connections.

## **SETTING THE CONTROL BOX**

Turn the control knob in a clockwise direction to turn the unit on.

To get the spa "ionized" as quickly as possible, turn the control knob to Max so that you obtain the highest output. **With the proper pH readings, the spa should be fully "ionized" in 2-8 hours. However, this figure may vary.**

## **OBTAINING THE PROPER COPPER-ION LEVEL**

All units include a Copper-Ion Test Kit. Follow directions on the inside label of the test kit. When testing, **YOU MUST ALWAYS LOOK DOWN FROM THE TOP THROUGH THE TEST TUBES - NOT FROM THE SIDE.**

**WE RECOMMEND A COPPER-ION LEVEL 0.2 - 0.3 PPM. IN VERY HOT, HUMID AREAS, YOU MAY GO SLIGHTLY HIGHER. FOR BEST RESULTS, MAINTAIN .3 PPM.**

**ALWAYS MAKE SURE THE pH IS BETWEEN 7.2 - 7.8.**

When starting up the system, test the copper ion level every hour or so till you have obtained .2 - .3 PPM.

Once that reading is obtained, turn the control knob **DOWN OR COUNTER CLOCKWISE.**

The actual setting is determined by many factors including water temperature, weather conditions and chemistry and amount of water.

**If you are unable to test the Copper-Ion level every hour or so when first installing the unit, or will be gone for a couple of days, set the unit from the very beginning to slightly below the half way mark. YOU NEVER WANT TO OVER "IONIZE" THE SPA.**

Once the desired Copper-Ion level is obtained, monitor the setting on the control box. Keep it at this setting until the Copper-Ion is either too high or too low.

## **IF THE COPPER-ION LEVEL IS TOO HIGH**

Turn the control knob down (or counterclock-wise) a notch Test the following day. Continue this procedure till the Copper-Ion level stabilizes. Once you obtain the proper setting, this usually stays the same all season long. If the water gets warmer, the chance of algae and bacteria increases, thus a higher Copper-Ion level may be required. Be sure to test the Copper-Ion level weekly in case adjustments are needed.

## IF THE COPPER-ION LEVEL IS TOO LOW

Turn the control knob up (or clockwise) a notch. Test the following day. Continue this procedure till the Copper-Ion level stabilizes. Once you obtain the proper setting, this usually stays the same all season long. If the water gets colder, the chance of algae and bacteria decrease, thus a lower Copper-Ion level may be required. Be sure to test the Copper-Ion level weekly in case adjustments are needed.

## FOLLOW DIRECTIONS AT THIS POINT FROM THE QUICK CHART (BLUE SHEET) INCLUDED WITH THE PURIFIER.

## TROUBLE SHOOTING

### CLOUDY WATER OR ALGAE

Brush the algae with a brush. Add chlorine or bromine to the spa. Check filtering system and backwash or clean two times a day till the water clears up. Check the water chemistry - especially pH and Total Alkalinity. Check the Copper-Ion level. The amount of chlorine or bromine needed depends on how cloudy the water is and how much algae there is in the spa.

### CAN'T OBTAIN PROPER COPPER-ION LEVEL

- 1.) High algae growth and cloudy water may be using up all available copper-ions the unit can produce. Balance spa water and turn control knob up. See above.
- 2.) Correct sizing of spa. Is the spa more than 2,000 gallons? Is there a leak in the spa?
- 3.) Correct input voltage. Is the unit set to 115 VAC or 230 VAC - the same as the power source?
- 4.) Scaled, dirty or worn electrodes. Check electrodes for cleaning or replacing. Consult the owners manual for more details.
- 5.) TDS level too low. See beginning chapter of this manual under "Total Dissolved Solids" on how to increase the water's TDS level.
- 6.) Improper test kit readings. Make sure you are following the proper Copper-Ion test kit procedures. Many people look at the side of the test tubes when testing instead of looking down from the top.
- 7.) Improper pH reading. The main problem of low or no copper-ion reading. Make sure the pH is under 8.0 and over 7.0 . When the pH is over 7.8, the copper ions fall out of solution.
- 8.) Too much chlorine or bromine in the spa. If the spa was just shocked with a lot of chlorine or bromine, this can give you an improper test kit reading. Always test the copper-ion level before adding anything to the spa.
- 9.) Metal out removers. As mentioned in the Sequestering Agent Level section in this booklet, there are a few metal out removers or stain removers that can "tie-up" the copper-ion levels. Test with a Sequestering Agent test kit, or send water sample to **Clearwater Enviro Tech** to confirm. If the spa does have a metal out remover that is affecting the system, simply shock the spa with a lot of chlorine or bleach to "burn it out".
- 10.) Steel plumbing. Never install the electrodes, pH probe or the Ion-Mate on steel piping. Cut out of section of this and replace with PVC pipe.
- 11.) Improper installation. Sometimes people install the electrodes on a return line, or bypass line that actually has no water flow going to it. Also check all wires for proper connections.
- 12.) Alternating lights do not come on the control box. See next section.

### ALTERNATING LIGHTS DO NOT APPEAR ON THE CONTROL BOX

If for any reason you do not get a reading on the control box, and assuming all connections are correct, you should check the fuse.

- A.) Remove control knob using very small screw driver by loosening screw on side of knob.
- B.) Carefully lift each corner of the face plate (colored decal) and disconnect the four (4) screws
- C.) When all four (4) screws are removed, lift up the face plate and set aside.
- D.) Disconnect the four (4) screws holding the printed circuit board in place.
- E.) Lift printed circuit board up and turn over. Do not disconnect any wires. Very important.
- F.) Locate fuse on back of circuit board.
- G.) Check fuse to see if blown.
- H.) If blown, replace fuse with a replacement (Radio Shack Part # 270-1249).
- I.) Place printed circuit board in place again.
- J.) Place collar in original location.
- K.) Tighten in the four (4) screws to hold circuit board in place.
- L.) Screw face plate back on.
- M.) Replace control knob in correct position and tighten screw to secure knob in place.

If the fuse was blown, try to determine what happened. If this repeats again, replace the fuse(s) again with a 250 mA, 5 X 20 mm fast acting type (acceptable replacement Radio Shack stock number 270-1249). You may need to install a surge protector before the power source if this repeats again.

If the fuse was NOT BLOWN, and you get no output at all, check back of circuit board for anything unusual - loose parts, burn marks, etc. If this is the case, return the CIRCUIT BOARD ONLY to your dealer or return to **Clearwater Enviro Tech**, prepaid postage.

**Clearwater Enviro Tech** will repair the unit at no charge if it is inside the 5 year warranty period (sales slip required or returned warranty card on our file) and assuming all conditions were following as noted on the 5-Year Warranty Card. If the unit is not covered under warranty, the customer will be notified by phone or writing as to what the charge will be to repair.

### REMOVING THE CIRCUIT BOARD

If the control box needs to be replaced for any reason, the unit was designed so that only the circuit board needs to be checked out. This allows for all external electrical connections and the enclosure to remain at the same location during repair.

To remove the circuit board, follow these steps:

- A.) Unscrew the two (2) screws holding the clear cover.
- B.) Lift clear cover.
- C.) Lift up circuit board - under the decal.
- D.) Unplug connector going to circuit board.
- E.) Remove circuit board and return to dealer or to **Clearwater Enviro Tech**.

## HOW SPA 1-R UNITS ARE INSTALLED

