

CLEARWATER™

POOL SYSTEMS

The Healthy Alternative to Chlorine

MineralPURE®

Mineral Ionization

Installation & Spa/Hot Tub Care Manual

Model SPA-1R



Residential Spas/Hot Tubs

OzoneMAX™

Vacuum-ultraviolet Ozone Systems

Add ozone to your system - By adding a ozone generator to your system, you can virtually eliminate adding any oxidizers to your spa/hot tub. Contact your dealer for more information.

Model OZ-SPA



- Complements the MineralPURE ionizer
- Excellent oxidizer
- Greatly improves water clarity
- Helps kill bacteria & viruses
- Minimal maintenance required
- 55 times more powerful than chlorine
- Reacts 3,000 times faster than chlorine
- Effective at controlling cryptosporidium & E. coli
- Helps protect the environment
- Heavy-duty aluminum enclosure
- Amazing valve for the money
- One of nature's strongest oxidizers

Ozone is one of the most powerful oxidizers on Earth. It is *55 times more powerful* than chlorine and reacts *3,000 times faster*. It greatly improves water clarity and is effective in controlling *cryptosporidium* and *E. coli* while eliminating harmful chloramines. It will not irritate eyes or dry out your skin.

When combining this with mineral ionization, you have the most effective system at reducing chlorine use while helping kill harmful microorganisms.

The Perfect Complement to MineralPURE

When combining the new **OzoneMAX (OZ-SPA)** system with the **MineralPURE** ionization system, you will have the most advanced alternative sanitizing system available. The ionization system will help control algae, bacteria, and viruses, while the ozone provides the oxidation needed. This will allow you to further reduce chlorine/bromine levels along with this ionizer.

Phone: 727-562-5186 • Toll Free: 800-756-7946 • Fax: 727-562-5187
ClearwaterPoolSystems.com

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Thank you for purchasing the **MineralPURE SPA-1R** for your spa/hot tub. You will be able to dramatically lower chlorine/bromine use in the spa/hot tub unlike any other system in the world. We also strongly recommend you add the **Clearwater Ozone Max (OZ-SPA)** system for additional benefits.

You can now truly enjoy your spa/hot tub – the way it was meant to be. You will be relaxing in natural "mineral spring" like water. No more red eyes, bleached out swimsuits, and dry itchy skin!

Please follow all instructions and keep the "**Quick Chart**" handy for quick reference!



A.) Important Safety Instructions

When installing and using this electrical equipment, basic safety precautions should always be followed, including the following:

1. READ AND FOLLOW ALL INSTRUCTIONS.

2. For Model: SPA-1R

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

3. For all permanently installed units intended for use on 15 or 20 ampere, 110 through 240 volts, single phase branch circuits.

WARNING - RISK OF ELECTRIC SHOCK. Connect only to a branch circuit protected by a ground-fault circuit interrupter (GFCI). Contact a qualified electrician if you cannot verify that the circuit is protected by a GFCI.

4. For all permanently installed units intended for use on 15 or 20 ampere, 110 through 240 volts, single phase branch circuits.

The unit must be connected only to a supply circuit that is protected by a ground-fault circuit interrupter (GFCI). Such a GFCI should be provided by the installer and should be tested on a routine basis. To test the GFCI, push the test button. The GFCI should interrupt power. Push the reset button. Power should be restored. If the GFCI fails to operate in this manner, the GFCI is defective. If the GFCI interrupts power to the unit without the test button being pushed, a ground current is flowing, indicating the possibility of an electric shock. Do not use this unit. Disconnect the unit and have the problem corrected by a qualified service representative before using.

5. READ AND SAVE THIS INSTRUCTION MANUAL.

6. Turn off the power to the SPA-1R before detaching the electrode connectors.

7. Disconnect the pump from the main power (or control unit) before inspecting or working on the pump.

8. Keep all cables visible and do not bury them. Also, position them so that they do not get damaged by lawn mowers, hedge trimmers and other like equipment.

9. **WARNING** - To prevent electrical shock, replace damaged cords immediately.

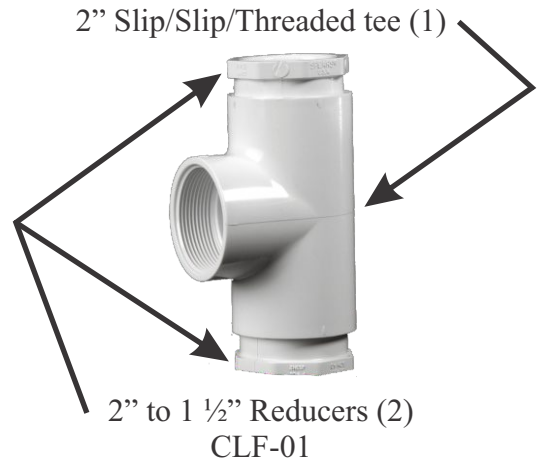
10. The SPA-1R must be installed and operated as specified in this manual.

B.) Identifying the SPA-1R Components

What comes in the SPA-1R box, all the components listed below.



SPA-1R Control Box (1)
connected Electrode
Wire Assembly (1)



2" Slip/Slip/Threaded tee (1)

2" to 1 1/2" Reducers (2)
CLF-01



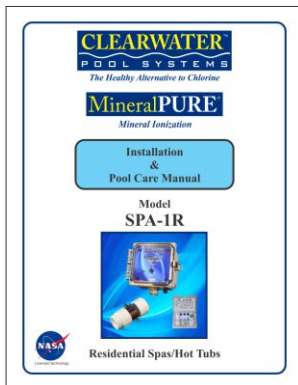
1 1/2" Long set of electrodes
in clear capsule (1)
CLE-01



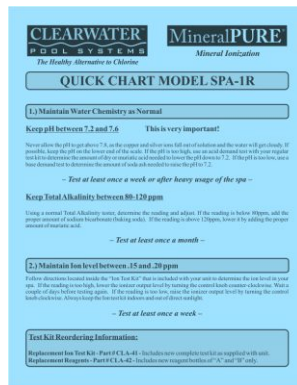
SPA-1R Control Box
Mounting Brackets (4)
Mounting Bracket
Screws (4)



Copper Test Kit (1)
CLA-41



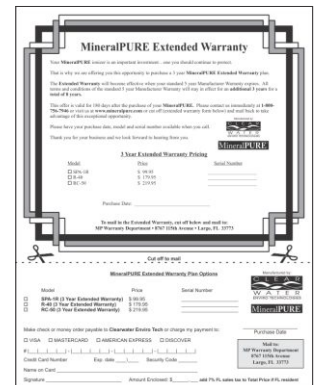
SPA-1R Users
Manual (1)



SPA-1R Quick
Chart (1)



SPA-1R Warranty
Card (1)



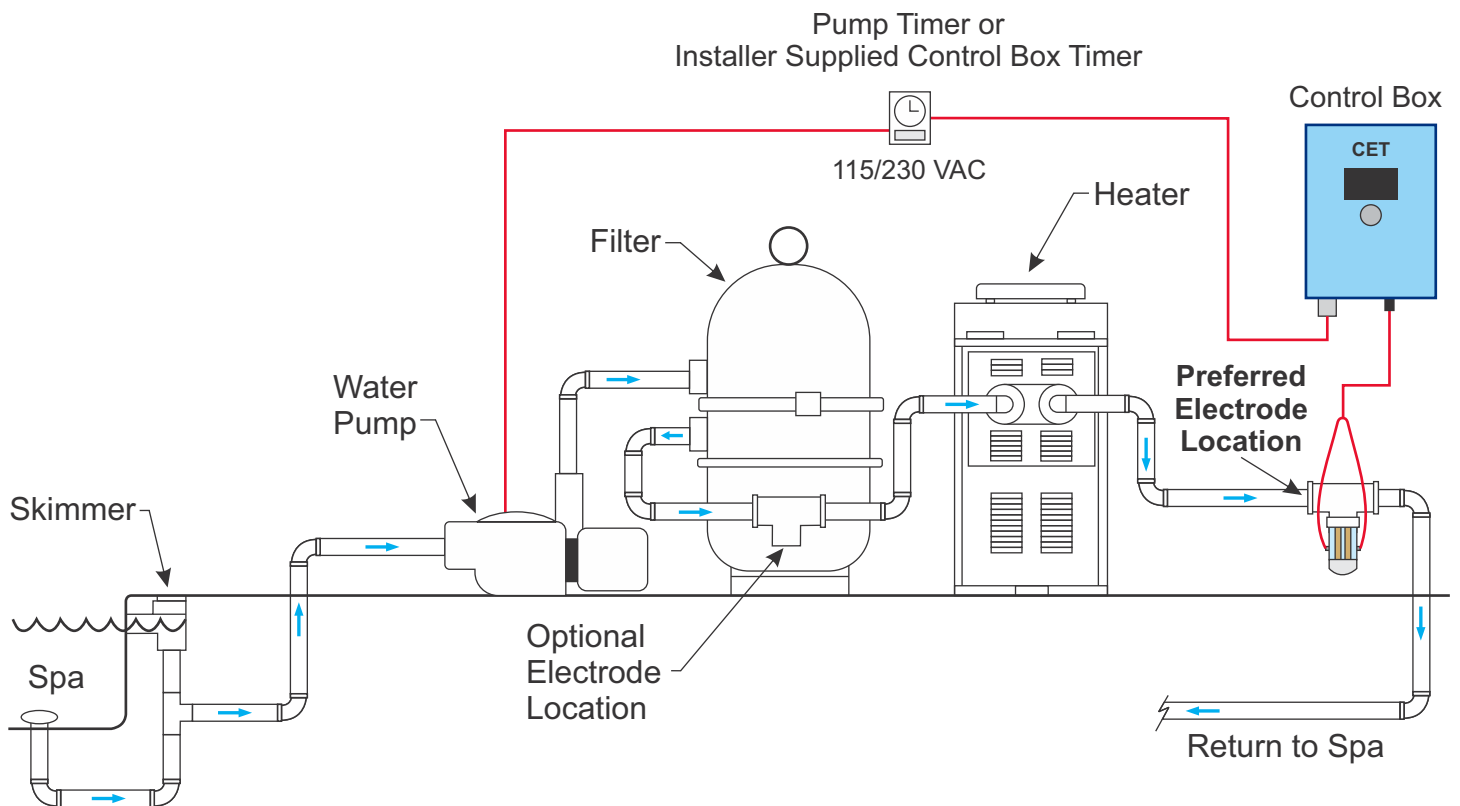
SPA-1R Extended
Warranty Application (1)

C.) Tools and Materials Required



- Bullet Level
- Conduit Connector, ½" Straight
- Crescent Wrench
- Hacksaw or Pipe Cutter
- PVC Cement
- Screwdrivers, Flat & Phillips
- Teflon Tape or Liquid Teflon
- Voltage Meter
- Channel Lock Wrench
- Conduit, Flexible/Electric hookup cable
- Drill & Drill Bits
- Hammer
- PVC Cleaner/Primer
- Screws & Anchors
- Utility Knife
- Wire Stripper
- Other tools may be required

D.) Site Survey



The MineralPURE SPA-1R should be installed at the spa/hot tub's pump and filter area. The preferable location to mount the electrode chamber is after the spa/hot tub's pump and filter, but it can be installed before the spa/hot tub's pump and filter if needed. The electrode chamber will need to be within 10 feet of the control box for an electrical connection. The control box will need to be within 7 feet of an electrical source.

NOTE: The MineralPURE SPA-1R should only receive power when the pump does.

E.) Installing the SPA-1R

First - Mount the Flow Cell Tee

Read All Instructions First



2.

1.) Turn off the pump and close all valves. Disconnect all sources of power going to the timer or pump.

2.) Locate a space for the electrode flow cell tee (the 2" slip/slip/threaded tee). 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. **NEVER INSTALL THE TEE NEXT TO THE SPA'S HEATER.**



2.



3.

3.) Using a hacksaw or backsaw, cut a 3" gap in the section of pipe if 2" pipe exists, or cut out a 4" gap if a 1½" pipe exists.

4.) Sand the burrs off the pipe. Dry the pipe and clean the ends with PVC primer/cleaner.



5.

5.) If 1½" pipe exists, cement the 2" to 1½" reducer bushings into the tee (included with the SPA-1R).



4.

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 (below a horizontal position). THIS IS EXTREMELY IMPORTANT.** If there is not enough "give" to allow insertion of the tee, install unions. Generously wrap teflon tape around the threaded part of the electrode assembly several times before installing to prevent leaks.



6.



7.

7.) Screw the electrode into the downward facing tee. Tighten only by hand, do not use any tools to perform this step.

MAKE SURE THERE IS ENOUGH ELECTRODE WIRE COMING FROM THE CONTROL BOX LOCATION TO REACH THE ELECTRODES WHEN INSTALLED ON THE RETURN LINE.

E.) Installing the SPA-1R (continued)

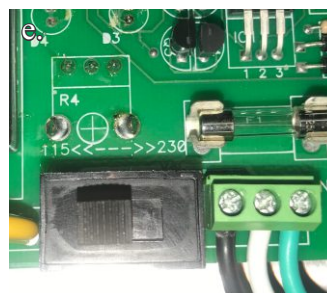
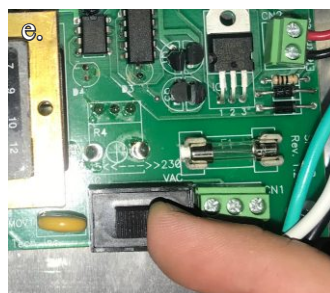
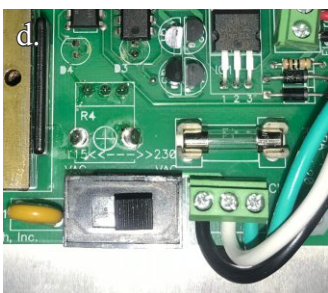
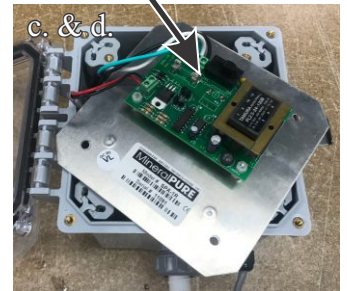
Mounting the Control Box

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

**ALL SPA-1R CONTROL BOXES ARE FACTORY SET AT 230 VAC.
IF THE INSTALLATION CALLS FOR A 115 VAC SETTING,
YOU WILL NEED TO MAKE AN ADJUSTMENT TO THE SPA-1R CONTROL BOX.**

Changing Voltage from 230VAC to 115VAC

- a.) Open up the clear control box panel.
- b.) Unscrew the four (4) screws holding the faceplate assembly in place.
- c.) Lift the face plate out of the enclosure and turn over. Do not disconnect any wires!
- d.) Locate switch on circuit board (between fuse and transformer) where 230V - 115V wording is located. (see page 20)
- e.) Slide switch from 230VAC to 115VAC.
- f.) Place the faceplate assembly back in its place.
- g.) Retighten four (4) screws to hold in place.



FAILURE TO SET THE SPA-1R ON THE PROPER VOLTAGE CAN CAUSE PROBLEMS:
If the actual voltage was 230VAC, and the SPA-1R was set on 115VAC, the internal fuse will blow.
If the actual voltage was 115VAC, and the SPA-1R was set on 230VAC, the SPA-1R will not work at 100% efficiency.

E.) Installing the SPA-1R (continued)

Mounting the Control Box (continued)

- 2.) Mount the brackets to the back of the **SPA-1R** control box. Use enclosed screws.



- 3.) Mount the control box to the wall allowing for the power cable to reach the source of power and the electrode wire to reach the electrode chamber. Use proper anchors and screws to mount. (Not provided)

- 4.) Make sure the surface is flat, firm, and as close to the power source as possible.



Connecting the Electrode Cable

- 5.) Connect the two electrode wires coming from the **MineralPURE SPA-1R** (inside the gray colored jacket) to the two electrode terminals. It does not matter which (red or black) wire is connected to the electrode terminals. Make sure they do not touch each other. These connectors are weatherproof and there is no need to cover them.



E.) Installing the SPA-1R (continued)

Choosing the Power Source

When locating the power source, the **SPA-1R** should turn on and off when the pump and motor does. The best location is the spa/hot tub's timer box. If no timer box exists, you can use the pump motor as its power source by removing the back plate.

Connecting the control box to the timer box

6.) Connecting the control box to a power source.

If the spa/hot tub's pump stays on 24 hours a day, then connect to the circuit that supplies power to the spa/hot tub's pump motor. This may change the size of the circuit breaker required, a certified electrician may be required.

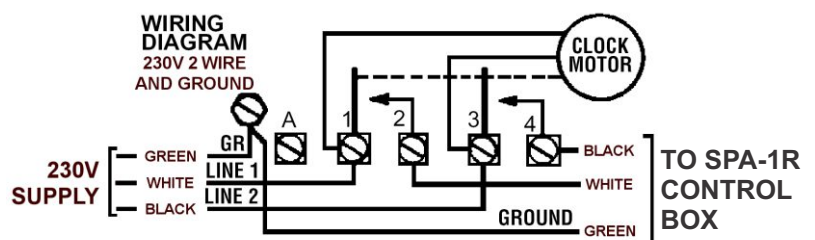
We recommend adding a timer box if the spa/hot tub's pump is on 24 hours a day. The control box would be wired directly into this timer. This will help prolong the life expectancy of the control box. Also by having control of how long the control box is on allows the user to regulate the copper ion production more precisely.



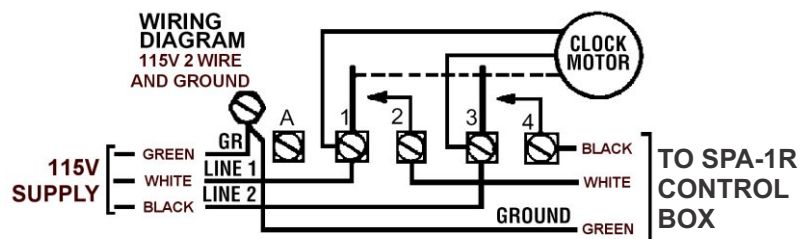
YOU MUST FOLLOW ALL LOCAL, STATE, NATIONAL OR INTERNATIONAL CODES WHEN INSTALLING. A CERTIFIED ELECTRICIAN MAY BE REQUIRED.

When Connecting to the Timer Box

230 VAC - Connect the black (3 stranded) wire cable to the 230 VAC timer box by stripping 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 **SPA-1R** should come on and off when the power comes on and off. If this fails to happen, you have installed the unit improperly.



115 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 **SPA-1R** should come on and off when the power comes on and off. If this fails to happen, you have installed the unit improperly.



E.) Installing the SPA-1R (continued)

When Connecting to Pump Motor

Ensure power to the pump is disconnected!

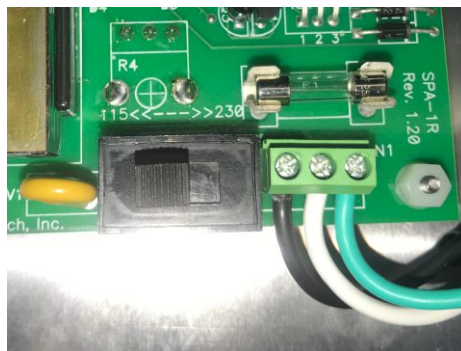
Disconnect the back plate to the motor where the electrical connections are. You will notice two connections where the power source is connected to. Connect the **MineralPURE SPA-1R** black, white and green wires to the same as the motor. If connected properly, the unit should come on and off with the motor.

When Connecting to a Regular Outlet or Electrical Junction Box

It is possible to connect the control box to a regular outlet or junction box. **Although this is not recommended because the control box should shut off whenever the spa/hot tub's pump motor is off. If the SPA-1R control box is left running when there is no water flowing past the electrodes, damage to the electrode or electrode cell chamber could result.**

The control box has a ½" flexible conduit connector on it, so provisions will have to be made for the outlet or the junction box to be similarly equipped. The wiring color codes scheme is the same as the North American Standard.

- Black is line
- White is neutral
- Green is ground



MineralPURE®

Mineral Ionization

F.) Balancing the Spa/Hot Tub's Water

Before turning on the system, it is imperative that the spa/hot tub's water be clear and balanced properly. Without proper balancing, the SPA-1R may not perform properly.

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 **MineralPURE**. The best way to remove it is to drain the spa/hot tub 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/hot tub. Contact your dealer or Clearwater Enviro Technologies, Inc. for more assistance.



If the spa/hot tub was using chlorine/bromine, it is all right to go ahead and install the **MineralPURE**, as the two work together fine. In fact, some chlorine/bromine should be in the spa/hot tub until the system takes over.

Proper Circulation

Make sure the filtration system and circulation is good. Check the filter to make sure it is cleaned or back-washed properly. The filter pressure gauge should give you an indication right away. If the sand in a sand filter is several years old, you may want to change it. For cartridge filters, check the canister inside to make sure the polyester fabric or corrugated paper is in good shape. If you have a DE filter, change the DE.

Good circulation is important because you will no longer be dumping a lot of chlorine/bromine in the spa/hot tub to "cover-up" a bad filtering system. Make sure the skimmer basket and the strainer basket at the pump are empty. This is very important.

Chlorine/Bromine

Always make sure there is some chlorine/bromine in the spa/hot tub when first starting up the system, as it may take a few hours to fully "ionize" a spa/hot tub. **Never add granular chlorine (like HTH) directly to the spa/hot tub with a MineralPURE.** Always make sure the water is clear before installing the **SPA-1R** by using chlorine/bromine. The **SPA-1R** itself will not clear up cloudy water.

Copper Level (see next chapter, "G. Starting up the System", page 15)

Before starting up the **MineralPURE SPA-1R**, the copper level should be tested. There may be readings of copper sulfate in the water from leached copper piping or from a copper based algaecide. Correct the problem by either locating the copper pipe (usually next to a water heater) and balancing the pH, or eliminating any algaecides completely. Shock the spa/hot tub with an extra heavy dose of chlorine/bromine to get rid of the algaecides.

F.) Balancing the Spa/Hot Tub's Water (continued)

Before starting up the **MineralPURE SPA-1R**, the spa/hot tub's water must be clear and balanced properly. It is extremely important that the following guidelines are implemented - so please read thoroughly.

pH Reading (Must be Between 7.2 and 7.6)

The most important factor in the spa/hot tub's water chemistry is the pH reading. It should be kept between 7.2 and 7.6 at all times. If the pH gets too high, the SPA-1R's ions lose their effectiveness and can fall out of solution. Always get the pH on the lower side - 7.2 to 7.4 for best results.

If the pH is above 7.6 - Using an acid demand test with your regular test kit, determine the amount of muriatic acid needed to lower the pH down to 7.2. Add the acid and check a few hours 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 all the time, add enough soda ash to raise the pH to 7.6

Tips on balancing the pH - Test the pH at least once a week or after a heavy rainstorm. When adjusting the pH, don't wait for the pH to reach 8.0 before adding acid. Proceed to add a minimum amount of acid if the pH is over 7.6. If you use the non-chlorine shock as an oxidizer, this will lower the pH and may eliminate acid use completely.

Total Alkalinity (80 - 120 ppm)

Maintain the total alkalinity between 80-120 ppm. This should be tested at least once a month.

If the total alkalinity is under 80 ppm - Raise the total alkalinity by adding sodium bicarbonate (baking soda). Consult chart with your test kit for the amount needed (based on spa/hot tub size).

If the total alkalinity is over 120 ppm - Lower the total alkalinity by adding muriatic acid. Consult chart with your test kit for the amount to add.

Calcium Hardness (150 - 350 ppm)

The calcium hardness level should be between 150-350 ppm. If the reading is well over 350 ppm, the spa/hot tub should be partially drained and refilled with fresh water. If the reading is under 150 ppm, chances are the spa/hot tub was filled with softened water. Add calcium chloride, available in any spa/pool store. Follow instructions on container if needed.

Cyanuric Acid

Cyanuric acid is not required with the **MineralPURE SPA-1R**. If the reading is over 150 ppm, the spa/hot tub should be partially drained and refilled with fresh water.

Total Dissolved Solids (500 - 2000 ppm)

The **MineralPURE SPA-1R** requires some conductivity in the water for ionization to take place. A high TDS level can cause cloudiness and the SPA-1R not to work efficiently. The TDS level should be between 500 and 2000 ppm. The TDS reading can be obtained at any spa/pool store.

If the reading is below 500 ppm - To raise the TDS level, you would need to add one ounce of regular salt to raise the TDS by 10 ppm per 500 gallons. ***You should only do this if you are unable to obtain the desired ion level in the spa/hot tub because of a low TDS*** (see chapter J on Page 19, #12). Always consult your dealer or **Clearwater** with help in this matter.

If the reading is over 2000 ppm - To lower the TDS level, you should drain the spa/hot tub and refill with fresh water. This is standard spa/pool water chemistry. If the SPA-1R is being installed on a saltwater spa/hot tub, the SPA-1R will work without any adjustments and there is no need to lower the TDS level.

G.) Starting Up the System

When all of the previous steps have been completed, it is time to start up the system. Open all valves and turn the power on. Check for water leaks and all electrical connections for proper and firm connections. Remove the clear protective sheet from the SPA-1R control unit window.

Setting the Control Knob to the Desired Level

Once you have obtained the desired reading, the setting will most likely remain at that value the entire season, or close to it. The trick is getting the desired reading quickly.

SETTING THE CONTROL BOX

To get the spa/hot tub “ionized”, turn the control knob on the **MineralPURE SPA-1R** to one of the 11 settings. When initially starting, set the unit on MAX to reach desired level quickly. With the pH in the proper range and all other factors ideal, it should take a few hours to get the spa/hot tub fully ionized. This also depends on the size of the spa/hot tub.

THE DESIRED ION LEVEL IN THE SPA/HOT TUB IS 0.15 – 0.20 ppm

There are a lot of factors that can effect the rate the **MineralPURE SPA-1R** will produce the ions (see section in Troubleshooting). In order to get the desired reading of 0.15 - 0.20 quickly, you will need to set the **SPA-1R** to its maximum current output. Turn the knob clockwise to MAX to reach this setting.

Other factors that effect the level of ions are produced are keeping the pH under 7.6; the number of hours the filter runs, and the setting of the **SPA-1R**. Other factors include water temperature and the amount of algae/bacteria already in the water.

As a rule of thumb, it will take about 2-3 hours of run time to get a spa/hot tub of 400 gallons fully "ionized" and to the desired level of 0.15 - 0.20. Double that for an 800 gallon spa/hot tub.

Using the MineralPURE Ion Test Kit

Included with every **MineralPURE SPA-1R** is an Ion Test Kit. The easy-to-use instructions are located on the inside cover of the lid. Please follow those instructions carefully, as the reading you get is most important in how you set the **MineralPURE** control knob. When using this test kit, make sure you wait 3 minutes for the test to develop and look **down** into the tube, not from the **side**. There is a reading or color match for 0.15 and one for 0.20 on the enclosed chart. **We recommend a copper-ion level 0.15 - 0.20 ppm. In very hot, humid areas, stay closer to 0.20 ppm.**



Testing for Copper-Ions

Keep the **SPA-1R** on its highest setting (MAX) if you want to reach these levels the fastest when first starting up the system. Once the ideal copper-ion level has been reached, turn down the control knob one setting and test a few hours later. If the reading is too high, lower the control knob another setting again and test a few hours later. Once you obtain a steady copper-ion level in the proper range, keep the control knob on that setting. **ALWAYS KEEP THE TEST KIT OUT OF DIRECT SUNLIGHT AND STORE IN ROOM TEMPERATURE. TEST THE COPPER LEVEL ON A WEEKLY BASIS.**

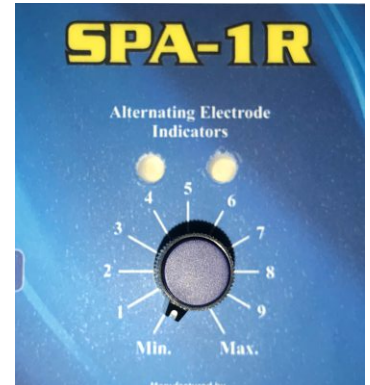
- The copper-ion level is too low, turn the control knob up to the next setting and retest a few hours later.
- If the copper-ion level is too high, turn the control knob down to the next setting and retest a few hours later.

G.) Starting Up the System

Once the Desired Level is Obtained

Once the desired level is obtained, you will need to find a setting point on the control box where the ion readings will remain in that range of 0.15 and 0.20. The biggest factor is water temperature.

When you lower your setting, it is best to test on a daily basis. If the readings continue to go up, lower the setting and retest the following day at about the same time. If the reading goes down, turn the control knob up, and test again the next day. Eventually you will find the proper setting. Once you do, the setting will stay near that the entire season. If your spa/hot tub is open year round, like in Florida, you will have a lower setting in the winter and a higher setting in the summer. *Maybe make some notes of your seasonal setting on page 23 (notes) to make season changes quick and easy.*



Indicator Lights

On the face plate of the SPA-1R control box are two indicator lights.

- **Alternating Electrode Indicators** - lets you know a charge is going to the electrodes. One light should come on at a time, meaning a charge is going to one of the electrodes. Every 65 seconds or so, the polarity will alternate - and the other light will come on.

H.) Proper Procedures of Maintaining a Healthy Spa/Hot Tub

INCLUDED WITH THIS PACKAGE IS A "QUICK CHART" THAT GIVES YOU THE BASICS OF MAINTAINING A PROPER SPA/HOT TUB. PLEASE REFER TO THAT SHEET WHENEVER POSSIBLE. IF YOU EVER HAVE ANY QUESTIONS, CONTACT YOUR DEALER OR CLEARWATER ENVIRO FOR ANY ASSISTANCE.



- Keep the pH between 7.2 and 7.6
- Keep total alkalinity between 80-120ppm
- Maintain Ion level between 0.15 and 0.20 ppm
- Maintain normal spa/hot tub maintenance – keep filter cleaned, empty baskets, etc.
- Add an occasional oxidizer

Adding an Occasional Oxidizer

An occasional oxidizer is necessary to burn off body oils, suntan lotions, and particles that get into the water and can cause cloudiness. Always add an oxidizer whenever the water loses its "sparkle". Don't wait for the water to get cloudy, or an extra dose will be required.

There are several oxidizer options:

Non-chlorine shock - Add one (1) ounce of potassium monopersulfate (non-chlorine shock) per 300 gallons once a week during the warm weather season, less frequently during the cooler weather, or when the water loses its "sparkle". You may also want to add some non-chlorine shock after a rainstorm if the spa/hot tub was left uncovered. These are available in most spa/pool stores, or at *Leslie's Swimming Pool Supplies* (1-800-537-5437) ask for "*Fresh 'N Clear*".

H.) Proper Procedures of Maintaining a Healthy Healthy Spa/Hot Tub (continued)

Household bleach - Add two (2) ounces of regular household bleach per 300 gallons once a week. You may also use liquid chlorine – but only ½ the amount. This small amount will dissolve rapidly and you will have chlorine-free water in a few minutes.

Add ozone to your system - By adding the **Ozone MAX** model **OZ-SPA** to this system you will have the complete system and be able to lower your chlorine/bromine use even more! You may still need to use a little bit of another oxidizer, but very little would be required and much less frequently.

Add a Sequestering Agent for Marcite / Gunite Spa/Hot Tub

If your spa/hot tub is made of a white marcite or gunite finish, we strongly recommend you add a sequestering agent to prevent any type of staining in the spa/hot tub. There are two types we recommend:

- **Pool Stain Treat** by **United Chemical** (800) 524-5550
- **The Ionizer Stuff** by **Jacks Magic** (800) 348-1656

These products or ones similar are available in all spa/pool stores worldwide. If using another brand, ensure it does not work by removing copper from the water!

I.) Cleaning and/or Replacing the Electrodes

The only part of the **MineralPURE SPA-1R** Ionizer that will need maintenance or replacement is the electrodes. They should last about 10 years depending on your spa/hot tub size, length of swimming season, water temperature and how well the water was balanced (ion level, pH, etc.)

If you are unable to maintain a normal copper-ion level it may be time to clean or replace the electrodes. To inspect the electrodes, simply unscrew the electrode chamber with your hands and visually inspect the electrode bars. A blue greenish coating is *normal*, however, if there is a heavy buildup, you may need to clean the electrode. Using an old toothbrush and lemon juice or a 50/50 muriatic acid/water solution, scrub the buildup off the electrode.

If the electrodes are worn out, they need to be replaced. Contact your dealer or visit www.ElectrodeWarehouse.com or call **Clearwater Enviro Tech** for a replacement set. The entire chamber is replaced and a new set is screwed into the tee. Always use plenty of teflon tape around the threads to prevent leaking.



Electrode Reordering Information:

Replacement Electrode - Part # CLE-01 - residential copper electrode for the SPA-1R Model.

I.) Cleaning and/or Replacing the Electrodes (continued)

Ion – Test Kit Replacement

You should replace the reagents at least once a year. You can either replace the entire test kit (exactly as supplied in the box when you received the **MineralPURE SPA-1R**) or replace the reagents.



Replacement Ion Test Kit - Part # CLA-41 - Includes new complete test kit as supplied with the SPA-1R.
Replacement Reagents - Part # CLA-42 - Includes new reagent bottles of "A" and "B" only.

Contact your dealer or Clearwater Enviro Technologies, Inc. for more ordering information or visit www.ElectrodeWarehouse.com

J.) Troubleshooting

Cloudy Water or Algae Present

If algae is present, you must take steps to solve the reason it formed. First, brush the algae. Add chlorine/bromine to the spa/hot tub to oxidize. Check filtering system and backwash or clean filter. Check the water chemistry - especially pH and total alkalinity. Make sure copper-ion level is in range. You may need to oxidize more frequently if problems persist. Contact your **dealer** or **Clearwater Enviro Tech** for help.

If cloudy water is a problem, add chlorine/bromine to clear it up. Again, make sure all chemistry readings are in the proper range, and filter is clean. Usually, cloudy water is from a poor filtering system. Make sure you oxidize on a timely basis. Never use granular chlorine without dissolving it first or pouring it directly into the skimmer.

Can't Obtain the Proper Copper-Ion Level

If you are unable to obtain the proper ion level, check all of the following factors to solve the problem:

- 1.) High algae growth and cloudy water / Ion level too low.** A high algae growth or cloudy water will use up all available copper ions in the water that the **SPA-1R** can produce. This would result in a low ion level. Make sure the spa/hot tub water is balanced (see the rest of this section) and turn up the control knob to a higher reading. Oxidize the water with chlorine/bromine.
- 2.) Correct sizing of the spa/hot tub.** If the spa/hot tub is larger than 3,000 gallons, you may need a stronger system. Never undersize an ionizer unit, especially in warm water areas.

J.) Troubleshooting (continued)

Can't Obtain the Proper Copper-Ion Level (continued)

- 3.) **Make sure the SPA-1R is set on the correct voltage.** A SPA-1R set on 230VAC with the power source at 115VAC will cut the power output in half. A SPA-1R set on 115VAC with the power source at 230VAC will blow the internal fuse.
- 4.) **Scaled, dirty or worn electrodes / check electrode scroll comes on.** A blue-greenish coating around the electrodes is normal. However, a build up of scale, dirt or debris around the electrodes can prevent the SPA-1R from producing ions. Simply unscrew the electrode and clean the buildup using an old toothbrush and use a lemon juice or a 50/50 muriatic acid/water solution. Re-apply teflon tape when screwing the electrode back in place. (See details at the bottom of page 16, Chapter I)
- 5.) **Improper test kit readings.** Make sure you follow the proper Ion-Test kit procedures. Many people look at the side of the test tubes instead of looking down from the top. Also, be sure to wait three minutes for the reagents to develop. These reagents should be replaced yearly and kept out of direct sunlight and stored at normal room temperature. Failure to do so will cause faulty readings. Never let the reagents freeze or be exposed to extreme heat.
- 6.) **Improper pH readings.** This is usually the main reason for a low copper-ion level. Make sure the pH is maintained between 7.2 - 7.6, with the lower end preferred. When the pH goes over 7.6, the ions fall out of solution. Make sure your pH test kit is updated with fresh reagents and kept out of direct sunlight and in normal room temperatures. Never mix different manufacturer's reagents with the test kit.
- 7.) **Too much chlorine/bromine in the spa/hot tub** If the spa/hot tub was just shocked with a lot of chlorine/bromine, this can give you an improper test kit reading on the Ion Test Kit. The high chlorine/bromine level will "bleach" out the reading and appear to read zero.
- 8.) **Steel plumbing** Never install the electrodes on steel piping. Cut out a section of this and replace with PVC pipe.
- 9.) **Sequestering Agents or Metal Out Removers in the water** Sometimes spa/hot tub owners will add a flocking or sequestering agent to the water to remove stains or scaling in a spa/hot tub or remove undesired minerals that are in the source water. Some of these will interfere with the MineralPURE's ions such as Sequasol, Cop-Out, Metal Magnet, Aluminum Sulfate or Alum. Products that won't cause problems and that are actually recommended to use with MineralPURE include *Pool Stain Treat* by United Chemical or *The Ionizer Stuff* by Jack's Magic. Polymer based products like Super Blue and Sea-Klear do not cause problems either. If you are unsure if a sequestering agent is causing a low ion level, send *Clearwater Enviro Technologies* a water sample to test. If it is a problem (these agents can stay in the water for up to a year) add a lot of chlorine/bromine to shock it out of the spa/hot tub water.
- 10.) **Improper installation** Sometimes installers will mount the electrodes on a bypass line and not on the actual return line that goes back to the spa/hot tub's water. Make sure the SPA-1R is on properly with correct connections.
- 11.) **High Phosphate level** A high phosphate level will be a feeding ground for algae. If you have a lot of algae growing and can't keep the ion level up, you may have a high phosphate level. Any reading over 125 ppb can cause problems. Have your spa/pool store test for phosphates or contact your dealer or *Clearwater* for more information. There are products available that will remove phosphates from the water quickly and will eliminate algae and low ion readings.
- 12.) **Total Dissolved Solids (TDS) is too low.** If your spa/hot tub has brand new water in it, and you are unable to obtain a desirable reading on the control unit, chances are the TDS level is too low. Usually, the total dissolved solids should be **between 500-2000 ppm.**, and tested once a year. For the system to perform on maximum capabilities (a spa/hot tub with very warm water or a spa/hot tub that is close to the maximum number of gallons rated for the system), the TDS needs to be at least 500 ppm. If installing the unit on a brand new spa/hot tub, you may need to have to raise the total dissolved solids level. **THIS IS ONLY NECESSARY IF YOU ARE UNABLE TO OBTAIN THE DESIRED COPPER-ION LEVEL.** First, determine the TDS level. To raise the TDS level, you need to add 1 ounce of regular table salt to increase the TDS by 10 ppm per 500 gallons. Once the TDS level has reached 500 ppm you will be all set, because the TDS level always raises. See the CET Chemistry Service Manual.

If the TDS is over 2,000, you should drain and refill with fresh water. This is standard spa/pool water chemistry. If the unit is being installed on a salt-water spa/hot tub, the unit will work fine without any adjustments.

J.) Troubleshooting (continued)

Can't Obtain the Proper Copper-Ion Level (Continued)

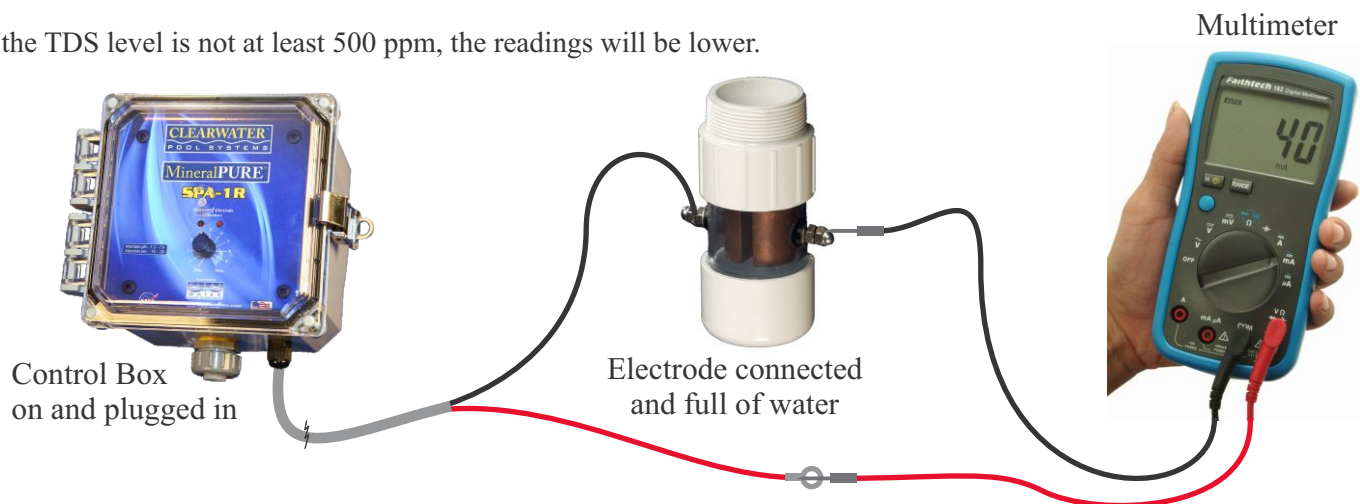
13.) To Determine Actual Output of the SPA-1R

There is a way to determine the actual milliamp charge going to the electrodes while the electrodes are in the water and the SPA-1R turned on.

By using a standard multimeter to read out DC current (an LCD Digital is preferred), take one of the connectors either the red (positive) or the black (negative) and connect it to one of the electrode terminals. Take the other connector and hook it up with one of the electrode wires (black or red) coming from the control box. The other wire from the control box should remain hooked up to the electrode terminal. This hookup, while running in series, will give you the actual milliamp output of the ionizer at the given moment. The SPA-1R should read about 40 mA on max (setting MAX).

NOTE: These actual readouts will vary slightly, so do not be alarmed if you get a reading over 40 mA on the SPA-1R. The readings should lower as the control knob is turned to a lower setting.

If the TDS level is not at least 500 ppm, the readings will be lower.



The electrode chamber must be full of water with the filtering system on for this to give you an accurate readout.

14.) Indicator lights do not come on. Make sure the SPA-1R has been installed properly to the correct voltage. Make sure power is going to the main source. Check fuse inside the SPA-1R control box.

To check the fuse, first open up the SPA-1R control box: **TURN OFF ALL POWER FIRST!!!!**

- 1.) Open up the clear lid. *(see page 8 on photos of how to open and close up control box)
- 2.) Unscrew the four (4) screws holding the faceplate assembly in place.
- 3.) Lift up faceplate assembly and flip over.
- 4.) Locate fuse and check. (see page 20 for photo)
- 5.) Replace fuse if blown (5mm x 20mm 20V, 1/4A, fast acting)
- 6.) Mount faceplate assembly back in place
- 7.) Tighten four (4) screws to secure.

If the fuse was blown, try to determine what happened. If this repeats again, you may need to install a surge protector before the power source.

If the fuse was not blown, and you get no output at all, check the back of the circuit board for anything unusual - loose parts, burn marks, etc. If this is the case, call your **dealer** or **Clearwater Enviro Tech** direct to return the circuit board. **YOU MUST OBTAIN AN "RMA" NUMBER BEFORE RETURNING ANY EQUIPMENT FOR REPAIR.**

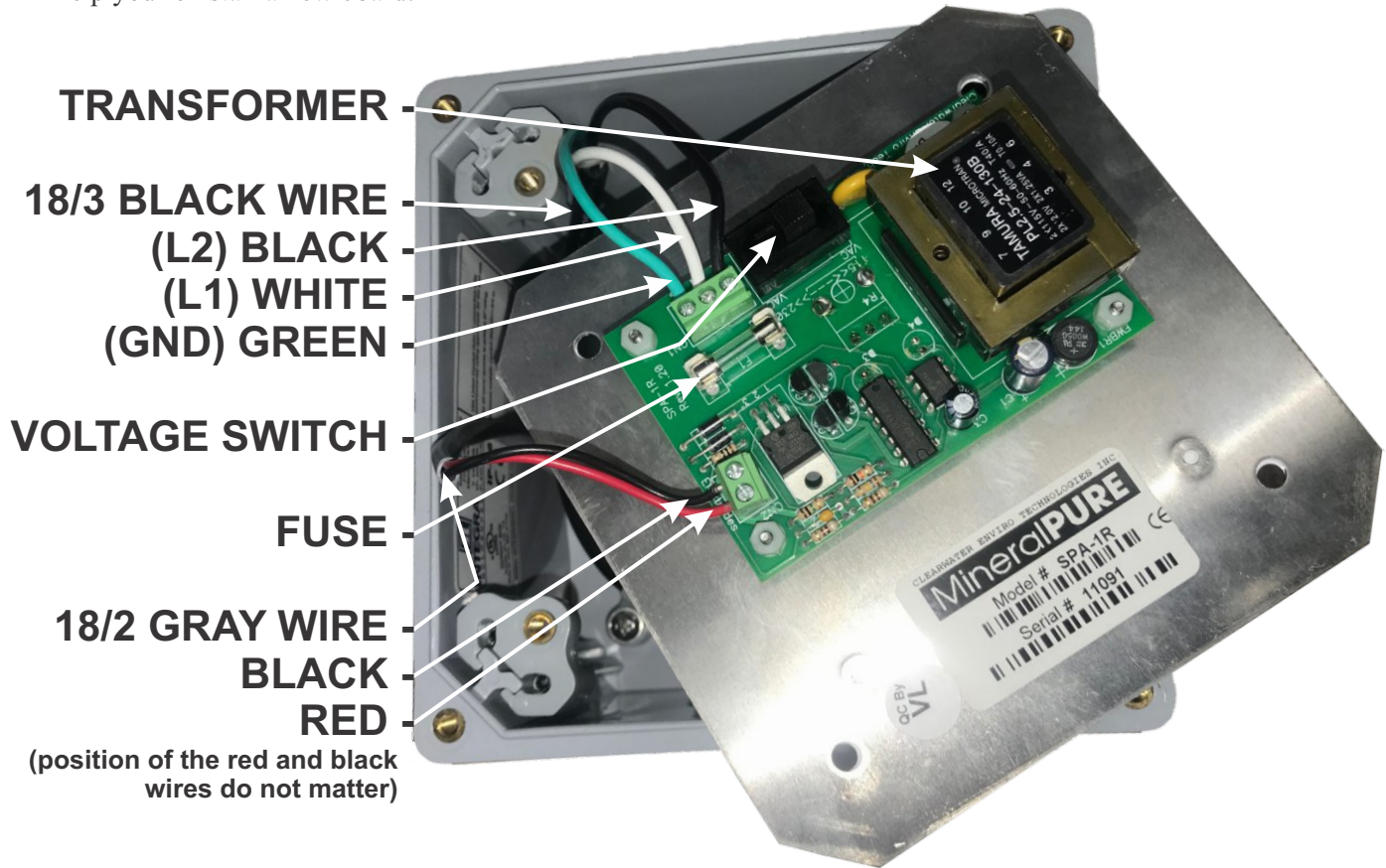
This SPA-1R was designed for easy removal of the circuit board. See next section for directions to remove circuit board. **THERE IS NO NEED TO RETURN THE ENTIRE CONTROL BOX. THIS WILL SAVE TIME AND SHIPPING COSTS AT BOTH ENDS.**

K.) Removing the Circuit Board

If the **SPA-1R** control box needs to be replaced for any reason, the **SPA-1R** 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: **FIRST DISCONNECT ALL POWER!!!**

- 1.) Open up clear lid
- 2.) Unscrew four (4) screws holding faceplate assembly in place.
- 3.) Lift up faceplate assembly and turn over.
- 4.) Note the two sets of wires going to the circuit board. Using a small screwdriver, unscrew them. A diagram follows to help you reinstall a new board.



a.) The thick black power cord has three wires coming out of it - black, white and green. A green terminal with three screws (next to AC Input-printed on circuit board) houses these three wires. The far left terminal, **L2** should have a black wire going to it. The middle terminal, **L1** should have a white wire coming from it. The right terminal, **GND** should have a green wire coming from it (ground).

b.) The gray electrode wire set has two wires coming out of it - black and red. A green terminal with two screws (next to Electrodes printed on circuit board). *It does not matter which wire goes to each of the terminals, just as long as the red is connected to one of them, and the black to the other.*

- 5.) Once the wires are disconnected, remove the faceplate assembly, with circuit board attached.
- 6.) Obtain an **RMA** number from **Clearwater Enviro Tech** before returning the faceplate assembly, with circuit board attached.
- 7.) When reinstalling the circuit board, use the following chart to reconnect. Improper connections may void the warranty. See warranty card for full details.

L.) SPA-1R Ionizer Specification Sheet

Water Specifications

Spa/Hot Tub Size: up to 1,000 U.S. gallons

Ionization Method: electrolysis of copper or copper/silver alloy electrodes

Electrode Chamber: 2" schedule 40 tee with bushings for 2" or 1 1/2" PVC pipe

Electrode: one set 1.5" long, comprised of copper (CLE-01)
or 90/10 copper/silver alloy (CLE-50)

Head Loss:	<u>Flow Rate</u>	<u>Total Head Loss (psi)</u>
	25 gpm	0.06 psi
	50 gpm	0.21 psi

Hydrostatic Pressure: Maximum Recommended Pressure: 50PSI

Ion Production: With the output set to:

25mA this ionizer produces 18mg of copper ions per hour

50mA this ionizer produces 36mg of copper ions per hour

These measurements were made with the following conditions:

Electrode Used: CLE-01

Water Temperature: 72.7 °F

Total Chlorine/Bromine: 0

pH: 7.45

TDS: 347 mg/L

Hardness: 215 mg/L

Total Alkalinity: 85 mg/L



Electrical Specifications

Input Voltage: 115 VAC or 230 VAC, manually switched from inside control box

Input Current: 100 mA rms at 115 VAC
50 mA rms at 230 VAC

Input power: 5 Watts

Output Voltage: 18 VDC

Output Current: Adjustable from 0 TO 50mA DC

Circuit Protection: internal fuse and input MOV line surge protection

Fuses: 1 ea .25 Amp Fast Acting, Cartridge Style, 250VAC, 5x20mm
Radio Shack Part Number 270-1046 (use 270-1061 if other is unavailable)

Mechanical Specifications

Enclosure: weather resistant NEMA 4 rated high impact corrosion resistant thermoplastic with hinged polycarbonate cover, includes mounting brackets

Enclosure Dimensions: 6.54" x 6.54" x 4.82"

Shipping Weight: 8 lbs

Carton Dimensions: 13" x 11" x 7"

Other Specifications

Operating Temperature Range: 32 to 110 degrees Fahrenheit

Warranty: 5 years, parts and labor - excluding electrodes

MineralPURE®
Mineral Ionization

M.) Quick Chart Model SPA-1R

1.) Maintain Water Chemistry as Normal

Keep pH between 7.2 and 7.6 This is very important! Never allow the pH to get above 7.8, as the copper and silver ions fall out of solution and the water will get cloudy. If possible, keep the pH on the lower end of the scale. If the pH is too high, use an acid demand test with your regular test kit to determine the amount of dry or muriatic acid needed to lower the pH down to 7.2. If the pH is too low, use a base demand test to determine the amount of soda ash needed to raise the pH to 7.2. – *Test at least once a week or after heavy usage of the spa/hot tub or a heavy rain* –

Keep Total Alkalinity between 80-120 ppm Using a normal Total Alkalinity tester, determine the reading and adjust. If the reading is below 80ppm, add the proper amount of sodium bicarbonate (baking soda). If the reading is above 120ppm, lower it by adding the proper amount of muriatic acid. – *Test at least once a month* –

2.) Maintain Ion level between .15 and .20 ppm

Follow directions located inside the “Ion Test Kit” that is included with the SPA-1R to determine the ion level in your spa/hot tub. If the reading is too high, lower the SPA-1R ionizer output level by turning the control knob counter-clockwise. Wait a few hours before testing again. If the reading is too low, raise the SPA-1R ionizer output level by turning the control knob clockwise. Always keep the Ion Test Kit indoors and out of direct sunlight. – *Test once a week* –

Test Kit Reordering Information:

Replacement Ion Test Kit - Part # CLA-41 - Includes new complete test kit as supplied with SPA-1R.

Replacement Reagents - Part # CLA-42 - Includes new reagent bottles of “A” and “B” only.

3.) Add an Occasional Oxidizer

An occasional oxidizer is necessary to burn off body oils, suntan lotions, and particles that get into the water and can cause cloudiness. Always add an oxidizer whenever the water loses its “sparkle”. Don't wait for the water to get cloudy, or an extra dose will be required.

There are several oxidizer options:

Non-chlorine shock - Add one (1) ounce of potassium monopersulfate (non-chlorine shock) per 300 gallons once a week during the warm weather season, less frequently during the cooler weather, or when the water loses its “sparkle”. You may also want to add some non-chlorine shock after a rainstorm if the spa/hot tub was left uncovered. These are available in most spa/pool stores, or at *Leslie's Swimming Pool Supplies* (1-800-537-5437) and ask for “*Fresh 'N Clear*”.

Household bleach - Add two (2) ounces of regular household bleach per 300 gallons once a week. You may also use liquid chlorine – but only ½ the amount. This small amount will dissolve rapidly and you will have chlorine-free water in a few minutes.

Add ozone to your system - By adding the **Clearwater Pool Systems' OZ-SPA**, you will be able to lower your chlorine/bromine use even more dramatically! You still may need to add an occasional oxidizer, but with a less amount and frequency.

4.) Maintain Normal Spa/Hot Tub Maintenance

Always maintain the spa/hot tub like you normally would. Keep the filter cleaned and backwash on a regular basis. Empty the skimmer and strainer baskets as needed and keep the spa/hot tub vacuumed. Good circulation is extremely important especially since you are no longer using a lot of chlorine/bromine to keep the water clear.

5.) Add a Sequestering Agent for Marcite/Gunite Spa/Hot Tub

If your spa/hot tub is made of a white marcite or gunite finish, we strongly recommend you add a sequestering agent to prevent any type of staining in the spa/hot tub. There are two types we recommend: - *Pool Stain Treat* by *United Chemical* (800) 524-5550 - *The Ionizer Stuff* by *Jacks Magic* (800) 348-1656 **These products or ones similar are available in all spa/pool stores worldwide. If using another brand, ensure it does not work by removing copper from the water!**

6.) Cleaning and/or Replacing the Electrodes

The only part of the **MineralPURE SPA-1R** that will need maintenance or replacement is the electrodes. They should last 10 years depending on your spa/hot tub size, length of swimming season, water temperature and how well the water was balanced (ion level, pH, etc.). To inspect the electrodes, simply unscrew the electrode chamber with your hands and visually inspect the electrode bars. A blue greenish coating is normal, however, if there is a heavy build-up, you may need to clean the electrode. Using an old toothbrush and lemon juice or a muriatic acid/water solution, scrub the build-up off the electrode. If the electrodes are thin and worn out, they will need to be replaced.

Electrode Reordering Information:

Replacement Electrode – Part # CLE-01 - residential electrodes for the SPA-1R Models.

N.) Notes

MineralPURE[®]

Mineral Ionization

CLEARWATER™

P O O L S Y S T E M S

The Healthy Alternative to Chlorine

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Mineral Ionization

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03/19