# CLEARWATER™ POOL SYSTEMS

*The Healthy Alternative to Chlorine*

# MineralPURE®

*Mineral Ionization*

## Installation & Pool Care Manual

## Model R-40


## Residential Pools

NASA
Licensed technology

NSF
Certified to NSF/ANSI Standard 50

# $O_3$zoneMAX™

*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 pool.
Contact your dealer for more information.

## Model OZ-50


- **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 combing the new **OzoneMAX** 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 levels along with this ionizer.

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

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MineralPURE®

# Model R-40



Thank you for purchasing the **MineralPURE R-40** for your swimming pool. You will be able to dramatically lower chlorine use in the pool unlike any other system in the world. We also strongly recommend you add the **Clearwater Ozone Max** system for additional benefits.

You can now truly enjoy your swimming pool – the way it was meant to be. You will be swimming 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!

CLEAR WATER
ENVIRO TECHNOLOGIES

# 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: **R-40**

**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 **R-40** 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.

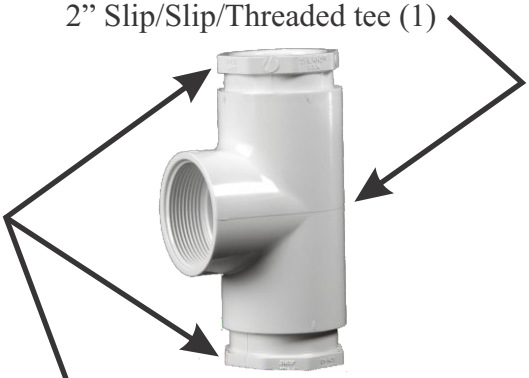
**10.** The **R-40** must be installed and operated as specified in this manual.

This unit has not demonstrated an ability to provide three log reduction of Pseudomonas aeruginosa. This unit has not demonstrated an ability to provide three log reduction of Enterococcus faecium. This product is designed to be operated with no less than 0.4 ppm free chlorine or 0.8 ppm free bromine. Additional residual levels of EPA registered disinfecting chemicals may be required by the regulatory agency having authority.

# B.) Identifying the R-40 Components

**What comes in the R-40 box, all the components listed below.**


**R-40** Control Box (1)
connected Electrode
Wire Assembly (1)



2" Slip/Slip/Threaded tee (1)

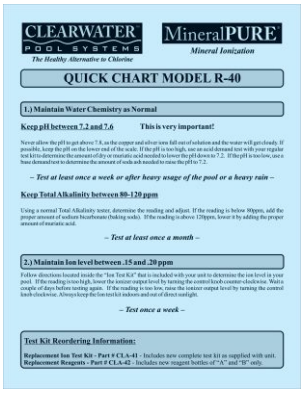
2" to 1 ½" Reducers (2)
CLF-01

3" Long set of electrodes
in clear capsule (1)
CLE-02

**R-40** Control Box
Mounting Brackets (4)
Mounting Bracket
Screws (4)

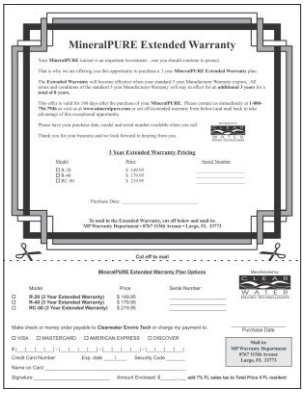

Copper Test Kit (1)
CLA-41


**R-40** Users
Manual (1)



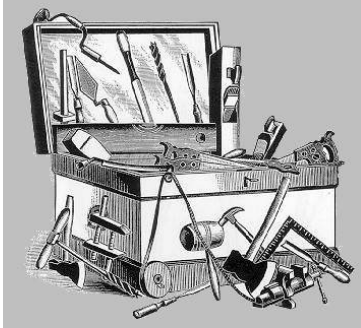

**R-40** Quick
Chart (1)

**R-40** Warranty
Card (1)



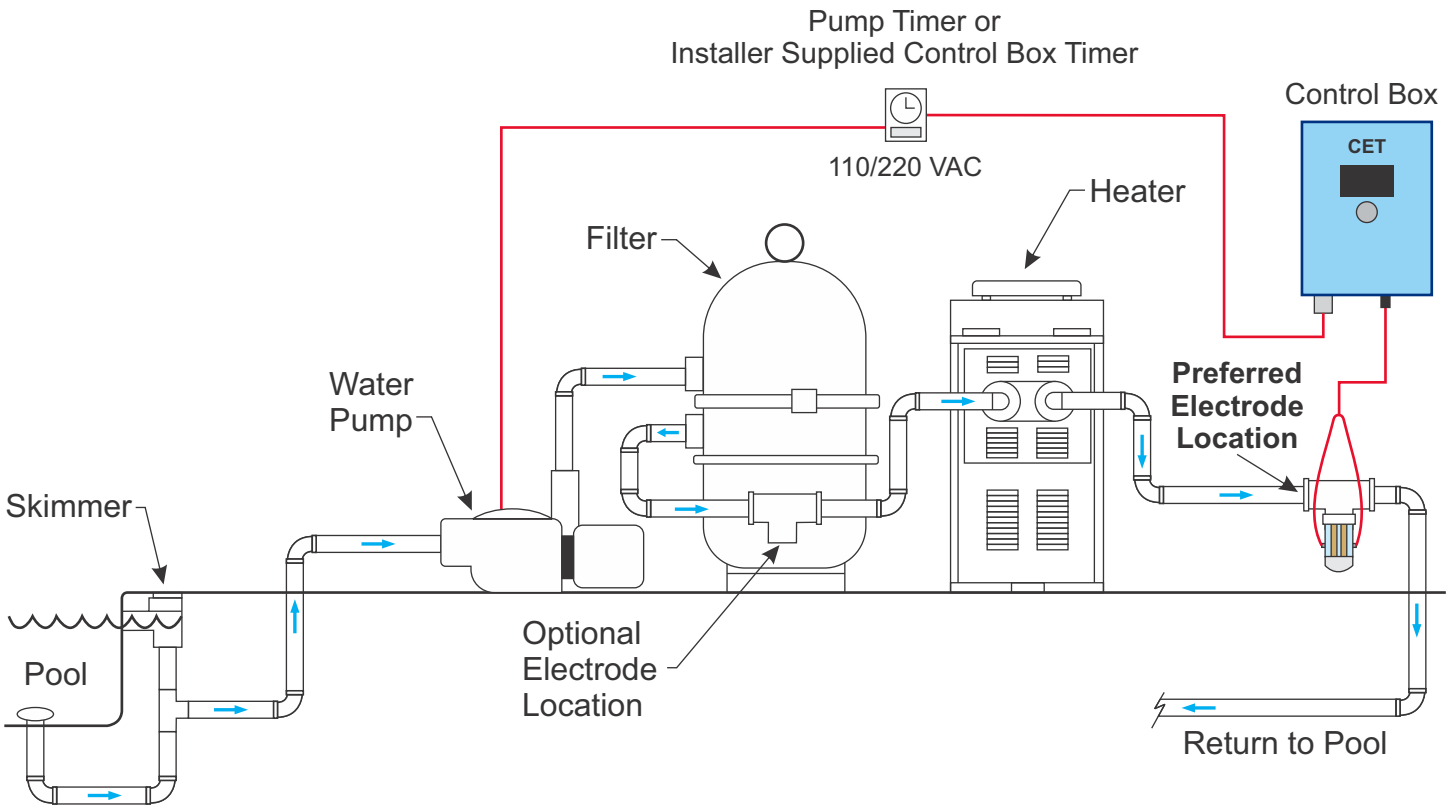

**R-40** Extended
Warranty Application (1)

## 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 <u>MineralPURE R-40</u> should be installed at the pool's pump and filter area. The preferable location to mount the electrode chamber(s) is <u>after</u> the pool's pump and filter, but it can be installed before the pool's pump and filter if needed. The electrode chamber(s) 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 R-40 should only receive power when the pump does.**

# E.) Installing the R-40

## First - Mount the Flow Cell Tee

**Read All Instructions First**


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 POOL'S HEATER**.


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.) If 1½" pipe exists, cement the 2" to 1½" reducer bushings into the tee (included with the R-40).


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.


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 R-40 (continued)

## Mounting the Control Box

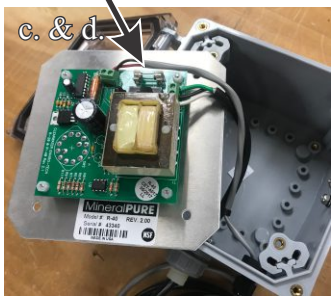
**1.)** Before mounting the **R-40** control box, you must determine the voltage at the installation site. By using your voltage meter, determine if the voltage is 110VAC or 220VAC.

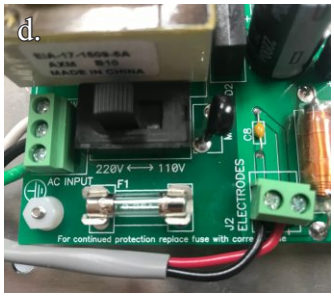
**ALL R-40 CONTROL BOXES ARE FACTORY SET AT 220 VAC.**
**IF THE INSTALLATION CALLS FOR A 110 VAC SETTING,**
**YOU WILL NEED TO MAKE AN ADJUSTMENT TO THE R-40 CONTROL BOX.**

## Changing Voltage from 220VAC to 110VAC

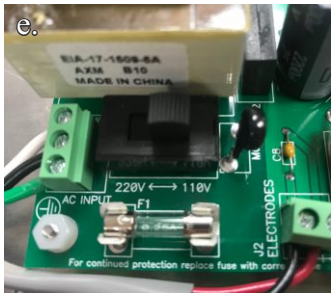
a.) Open up the clear control box panel.
b.) Unscrew the four (4) screws holding the faceplate assembly in place.
c.) Lift the face plate out of the enclosure and turn over. Do not disconnect any wires!
d.) Locate switch on circuit board (between fuse and transformer) where 220V - 110V wording is located. (see page 20)
e.) Slide switch from 220VAC to 110VAC.
f.) Place the faceplate assembly back in its place.
g.) Retighten four (4) screws to hold in place.







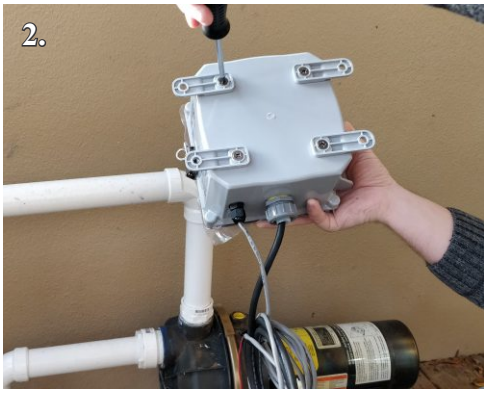


**FAILURE TO SET THE R-40 ON THE PROPER VOLTAGE CAN CAUSE PROBLEMS:**
If the actual voltage was 220VAC, and the **R-40** was set on 110VAC, the internal fuse will blow.
If the actual voltage was 110VAC, and the **R-40** was set on 220VAC, the **R-40** will not work at 100% efficiency.

# E.) Installing the R-40 (continued)

## Mounting the Control Box (continued)

**2.)** Mount the brackets to the back of the **R-40** 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 R-40** (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 R-40 (continued)

## Choosing the Power Source

When locating the power source, the **R-40** should turn on and off when the pump and motor does. The best location is the pool'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 swimming pools pump stays on 24 hours a day, then connect to the circuit that supplies power to the pool's pump motor. This may change the size of the circuit breaker required, a certified electrician may be required.

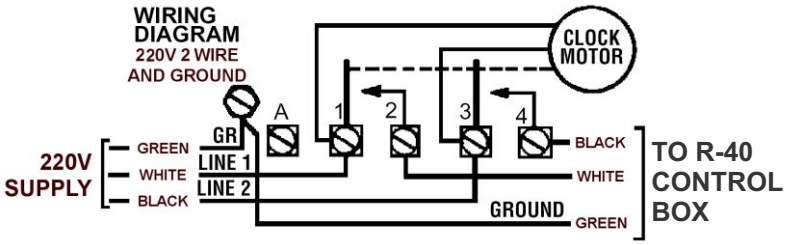
We recommend adding a timer box if the swimming pools pump is on 24 hours a day. The control box would be wired directly into this timer. This will help prolong the life expectancy of the control box. Also by having control of how long the control box is on allows the user to regulate the copper ion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

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

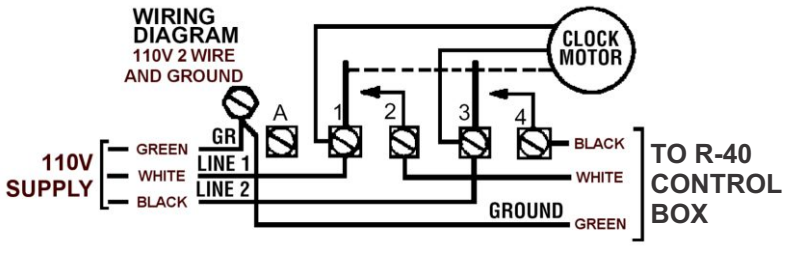
**It is the installer's responsibility to ensure any city, state or national health code/ swimming pool regulations be followed in accordance for installation of this equipment.**

## When Connecting to the Timer Box

**220 VAC** - Connect the black (3 stranded) wire cable to the 220 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 **R-40** 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 **R-40** 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 R-40 (continued)

## When Connecting to Pump Motor

***Ensure power to the pump is disconnected!***

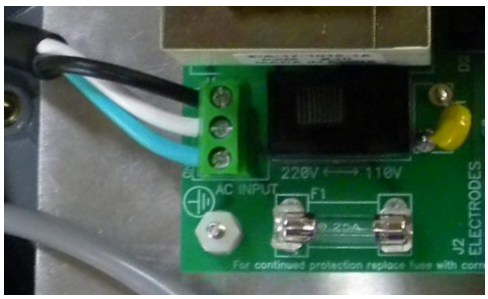
Disconnect the back plate to the motor where the electrical connections are. You will notice two connections where the power source is connected to. Connect the **MineralPURE R-40** black, white and green wires to the same as the motor. If connected properly, the unit should come on and off with the 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 swimming pools pump motor is off. If the R-40 control box is left running when there is no water flowing past the electrodes, damage to the electrode(s) or electrode cell chamber(s) 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

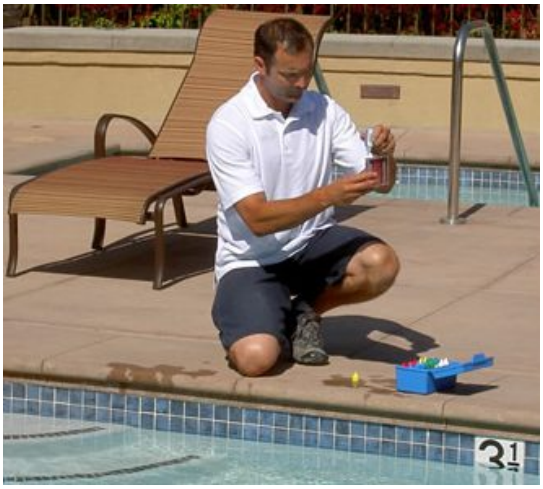



MineralPURE®

*Mineral Ionization*

# F.) Balancing the Pool's Water

**Before turning on the system, it is imperative that the pool's water be clear and balanced properly. Without proper balancing, the R-40 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 pool 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 pool. Contact your dealer or Clearwater Enviro Technologies, Inc. for more assistance.

If the pool was using an **automatic chlorine generator** (where salt is added to make chlorine at the site), the water should be drained at least 3/4 of the way and refilled with new water. Usually the TDS level is very high and should be lowered.

If the pool was using chlorine, it is all right to go ahead and install the **MineralPURE**, as the two work together fine. In fact, some chlorine should be in the pool 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 in the pool 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.

If you have a pool sweep or vacuum, continue using it as this helps on circulation.

## Chlorine

Always make sure there is some chlorine in the pool when first starting up the system, as it may take a few days to fully "ionize" a pool. **Never add granular chlorine (like HTH) directly to the pool with a MineralPURE.** Always make sure the water is clear before installing the **R-40** by using chlorine. The **R-40** itself will not clear up cloudy water.

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

Before starting up the **MineralPURE R-40**, 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 pool with an extra heavy dose of chlorine to get rid of the algaecides.

# F.) Balancing the Pool's Water (continued)

**Before starting up the MineralPURE R-40, the pool'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 pool'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 **R-40'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 pool 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 that, the pool should be partially drained and refilled with fresh water. If the reading is under that, chances are the pool was filled with softened water. Calcium chloride should be added to the pool. 1 1/4 lbs will raise the calcium hardness by 10 ppm per 10,000 gallons.

## Cyanuric Acid

Cyanuric acid is not required with the **MineralPURE R-40**. If the reading is over 150 ppm, the pool should be partially drained and refilled with fresh water.

## Total Dissolved Solids (500 - 2000 ppm)

The **MineralPURE R-40** requires some conductivity in the water for ionization to take place. A high TDS level can cause cloudiness and the **R-40** not to work efficiently. **The TDS level should be between 500 and 2000 ppm.** The TDS reading can be obtained at any pool store.

**If the reading is below 500 ppm -** To raise the TDS level, you would need to add one pound of regular salt to raise the TDS by 12 ppm per 10,000 gallons. ***You should only do this if you are unable to obtain the desired ion level in the pool 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 partially drain and refill with fresh water. This is standard pool water chemistry. If the **R-40** is being installed on a saltwater pool, the **R-40** 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 R-40 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 pool "ionized", turn the control knob on the **MineralPURE R-40** to one of the 5 settings. When initially starting, set the unit on 5 to reach desired level quickly. With the pH in the proper range and all other factors ideal, it should take a few days to get the pool fully ionized. This also depends on the size of the pool and the number of hours the filter is running.

**THE DESIRED ION LEVEL IN THE POOL IS 0.15 – 0.20 ppm**

There are a lot of factors that can effect the rate the **MineralPURE R-40** 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 **R-40** to its maximum current output. Turn the knob clockwise to 5 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 **R-40**. Other factors include water temperature and the amount of algae/bacteria already in the water.

As a rule of thumb, it will take about 24 hours of run time to get a pool of 10,000 gallons fully "ionized" and to the desired level of 0.15 - 0.20. So if your pool is 20,000 gallons, it may take two full days of running "around the clock" to reach this level. If you run the pool 8 hours a day (the normal time) it would take six days to reach the desired level.

## Using the MineralPURE Ion Test Kit


Included with every **MineralPURE R-40** 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.**

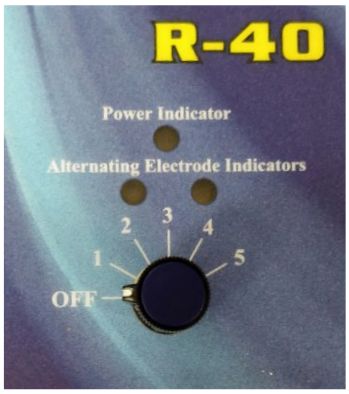
## Testing for Copper-Ions

Keep the **R-40** on its highest setting (5) 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 notch and test a couple of days later. If the reading is too high, lower the control knob another notch again and test a few days 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 a notch and retest a couple of days later.**
**- If the copper-ion level is too high, turn the control knob down a notch and retest a couple of days 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 pool is open year round, like in Florida, you will have a lower setting in the winter and a higher setting in the summer. **Example: If 2 is too low and 3 is too high, pump run time should be increased with the MineralPURE R-40 set on 2.** *Maybe make some notes of your seasonal setting on page 23 (notes) to make season changes quick and easy.*

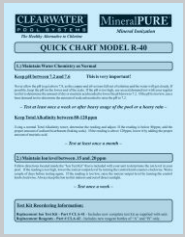
## Indicator Lights

On the face plate of the **R-40** control box are three indicator lights. The top light - **Power indicator** -lets you know that power is going to the control box. **This light should stay on all the time as long as the power source is on.** The bottom two 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 3 minutes and 30 seconds or so, the polarity will alternate - and the other light will come on.

**NOTE: With the control knob set to the "OFF" position, the "Power indicator" light will be ON but the "Alternating Electrode Indicators" lights will be OFF (both of them).**

# H.) Proper Procedures of Maintaining a Healthy Pool

**INCLUDED WITH THIS PACKAGE IS A "QUICK CHART" THAT GIVES YOU THE BASICS OF MAINTAINING A PROPER POOL. 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 pool 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) pound of potassium monopersulfate (non-chlorine shock) per 10,000 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 pool was left uncovered. These are available in most 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 Pool (continued)

**Household bleach** - Add two (2) quarts of regular household bleach per 10,000 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.

**Tablet in skimmer** - Add a 3" Trichlor tablet in the skimmer for continuous oxidizing. The reading will be so low that it won't be detectable. This is ideal for pools with heavy swimmer use or if the homeowner is away often.

**Add ozone to your system** - By adding the **Ozone MAX** model **OZ-50** to this system you will have the complete system and be able to lower your chlorine 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.

**Ionizers are designed for supplementary disinfection and therefore are intended for use with appropriate residual levels of EPA registered disinfecting chemicals. Specific residual levels of EPA registered disinfecting chemicals may be required by the regulatory agency having authority.**

**WARNING: Excessive amounts of Copper may cause staining of pool and spa surfaces**

## Add a Sequestering Agent for Marcite / Gunite Pool

If your pool 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 pool. 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 pool stores worldwide. <u>If using another brand, ensure it does not work by removing copper from the water!</u>**

# I.) Cleaning and/or Replacing the Electrodes

The only part of the **MineralPURE R-40** Ionizer that will need maintenance or replacement is the electrodes. They should last about 1-5 years depending on your pool 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 ***<u>www.ElectrodeWarehouse.com</u>*** 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-02 - residential copper electrode for the R-40 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 R-40**) or replace the reagents.



**Replacement Ion Test Kit - Part # CLA-41 -** Includes new complete test kit as supplied with the **R-40**.
**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 to the pool 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 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 **R-40** can produce. This would result in a low ion level. Make sure the pool water is balanced (see the rest of this section) and turn up the control knob to a higher reading. Oxidize the water with chlorine.

2.) **Correct sizing of the pool.** If the pool is larger than 40,000 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 R-40 is set on the correct voltage.** A **R-40** set on 220VAC with the power source at 110VAC will cut the power output in half. An **R-40** set on 110VAC with the power source at 220VAC 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 **R-40** 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 in the pool** If the pool was just shocked with a lot of chlorine, this can give you an improper test kit reading on the Ion Test Kit. The high chlorine 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 pool owners will add a flocking or sequestering agent to the water to remove stains or scaling in a pool 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 to shock it out of the pool 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 pool's water. Make sure the **R-40** 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 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 Disolved Solids (TDS) is too low.** If your pool 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 pool with very warm water or a pool 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 pool, 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 pound of regular table salt to increase the TDS by 12 ppm per 10,000 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 partially drain and refill with fresh water. This is standard pool water chemistry. If the unit is being installed on a salt-water pool, the unit will work fine without any adjustments.

# J.) Troubleshooting (continued)

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

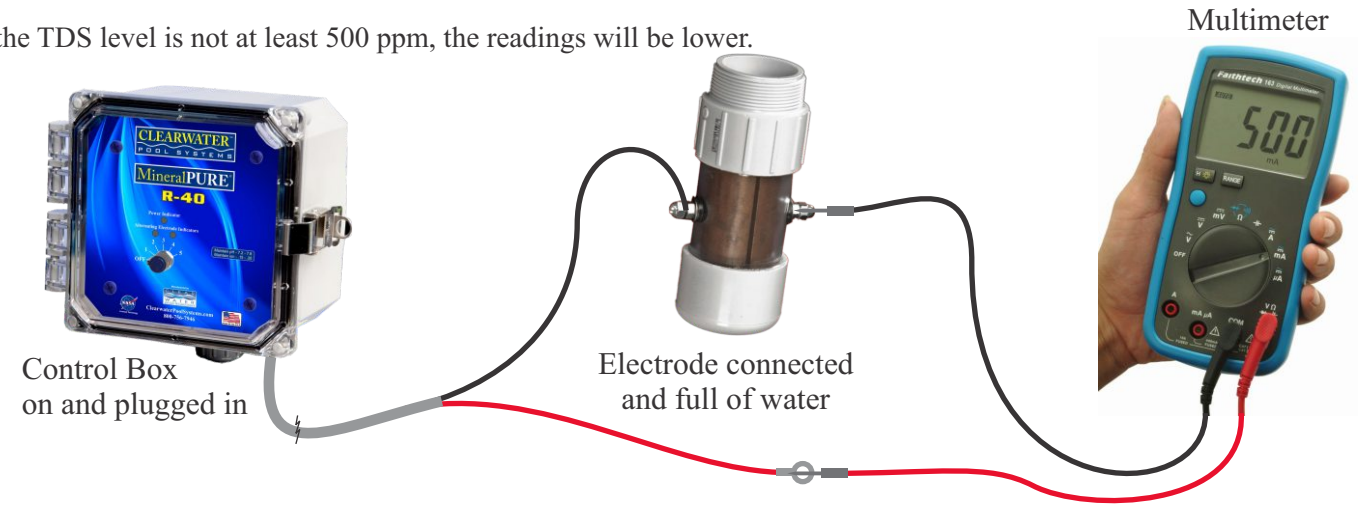
**13.) To Determine Actual Output of the R-40**

There is a way to determine the actual milliamp charge going to the electrodes while the electrodes are in the water and the **R-40** 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 **R-40** should read about 500 mA on max (setting number 5).

NOTE: These actual readouts will vary slightly, so do not be alarmed if you get a reading of 530 mA on the **R-40**. 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 **R-40** has been installed properly to the correct voltage. Make sure power is going to the main source. Check fuse inside the **R-40** control box.

To check the fuse, first open up the **R-40** 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.**

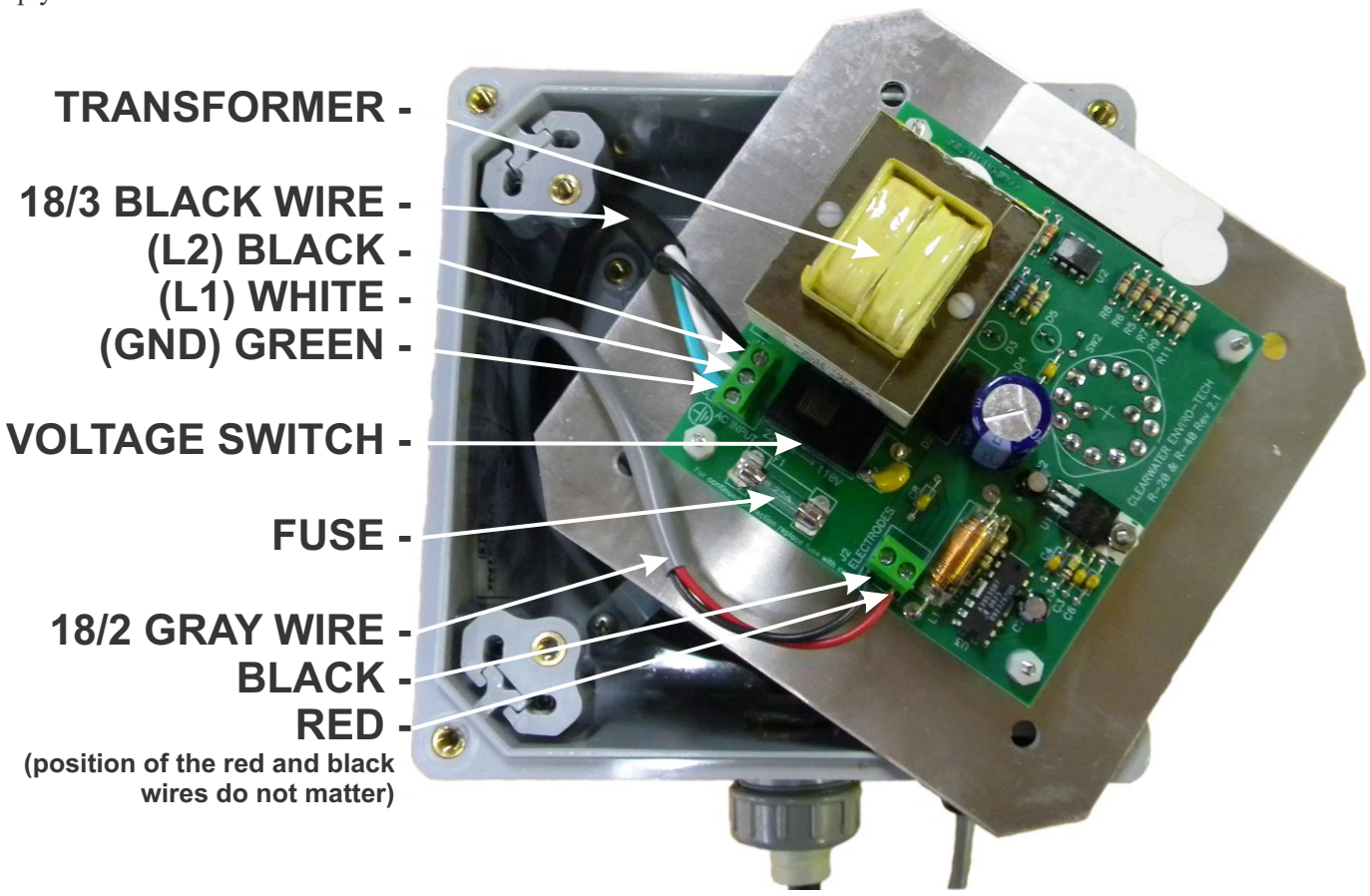
This **R-40** was designed for easy removal of the circuit board. See next section for directions to remove circuit board. **THERE IS NO NEED TO RETURN THE ENTIRE CONTROL BOX. THIS WILL SAVE TIME AND SHIPPING COSTS AT BOTH ENDS.**

# K.) Removing the Circuit Board

If the **R-40** control box needs to be replaced for any reason, the R-40 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.) R-40 Ionizer Specification Sheet

**Water Specifications**
**Pool Size:** up to 40,000 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 ½" PVC pipe
**Electrode:** one set 3" long, comprised of copper (CLE-02)
or optionally available 90/10 copper/silver alloy (CLE-51)


| **Head Loss:** | Flow Rate | Total Head Loss (psi) |
|---|---|---|
| | 25 gpm | 0.06 psi |
| | 50 gpm | 0.21 psi |

**Hydrostatic Pressure:** Maximum Recommended Pressure: 50PSI
**Ion Production:** With the output set to:
250mA this ionizer produces 179mg of copper ions per hour
500mA this ionizer produces 358mg of copper ions per hour

These measurements were made with the following conditions:
Electrode Used: CLE-02
Water Temperature: 72.7 °F
Total Chlorine: 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 switch from inside of control box
**Input Current:** 220 mA rms at 115 VAC
110 mA rms at 230 VAC
**Input Power:** 13 Watts

**Output Voltage:** < 20 VDC
**Output Current:** Adjustable in 6 increments from 0 TO 500mA 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 270-0133

**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:** 10 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 R-40

**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 pool 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 **R-40** to determine the ion level in your pool. If the reading is too high, lower the **R-40** ionizer output level by turning the control knob counter-clockwise. Wait a couple of days before testing again. If the reading is too low, raise the **R-40** 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 **R-40**.
**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) pound of potassium monopersulfate (non-chlorine shock) per 10,000 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 pool was left uncovered. These are available in most pool stores, or at *Leslie's Swimming Pool Supplies* (1-800-537-5437) and ask for "*Fresh 'N Clear*".

**Household bleach** - Add two (2) quarts of regular household bleach per 10,000 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.

**Tablet in skimmer** - Add a 3" Trichlor tablet in the skimmer for continuous oxidizing. The reading will be so low that it won't be detectable. This is ideal for pools with heavy swimmer use or if the homeowner is away often.

**Add ozone to your system** - By adding the **Clearwater Pool Systems' OZ-50**, you will be able to lower your chlorine use even more dramatically! You still may need to add an occasional oxidizer, but with a less amount and frequency.

**4.) Maintain Normal Pool Maintenance** Always maintain the pool 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 pool vacuumed. Good circulation is extremely important especially since you are no longer using a lot of chlorine to keep the water clear.

**5.) Add a Sequestering Agent for Marcite/Gunite Pool** If your pool 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 pool. 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 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 R-40** that will need maintenance or replacement is the electrodes. They should last several years depending on your pool 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-02 -** residential electrodes for the **R-40** Models.

## N.) Notes

MineralPURE®

*Mineral Ionization*

# CLEARWATER™ POOL SYSTEMS

*The Healthy Alternative to Chlorine*

# MineralPURE®

*Mineral Ionization*

**Manufactured by**

CLEAR WATER ENVIRO TECHNOLOGIES

*Sustainable Solutions for Our Future*

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**01/19**