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Lifeguard Purification water treatment system-copper
generating device for algae control.
Model 411 MAXIMUM OUTPUT 4.0 CU/24 HR-

REGISTRATION NO. 23009
PEST CONTROL PRODUCTS ACT

WARNING: STAINING OF POOL SURFACES MAY OCCUR DUE TO
DEPOSIT OF COPPER SALTS. EXCESSIVE LEVELS OF COPPER
WILL INCREASE THE PROBABILITY OF THIS OCCURRENCE.

READ THE LABEL AND OWNERS MANUAL BEFORE USING.

Lifeguard Purification Systems Inc.
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Tampa, Florida 33614
U.S.A.

Canadian agent: Swimguard Products Inc.
4470 Tucana Court Ste. 1706
Mississauga, Ontario
L5R 3K8

INSTALLATION AND OPERATING INSTRUCTIONS

MINERALIZER

Please before calling for service, read this manual!!!

Experience shows at least 75% of all service calls are
unnecessary and the expense and frustration to clients could
have been avoided.

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MINERALIZER SPA- MINERALIZER FEATURES

1. Red LED On Indicator
2. Variable output ion potentiometer
3. Easy servicing and access to electrodes and control head (screw on style)
4. See thru ion chamber assembly for instant field inspection of electrodes
5. Simple "cross" PVC construction for easy installation
6. 5.08 cm body with 3.08 cm adapters for almost all plumbing applications
7. Separate power supply standard 1.83M cord.

GENERAL UNIT SPECIFICATIONS:

Model 401 -Treating capacity: 40,000 G. (152,000L)

Input: 120 VAC 60 HZ 15W

Output: 12/18 VDC 600 M

Dimension: 3 ½" (8.89 cm)H , 3" (7.62 cm)D, 3 1/4" (8.26 cm)W

Weight: 1 lb. (0.45 kg.)

Class 2 transformer, Power Supply UL Listed

Model 411-Spa, Treating capacity: 5,000 G (19,000L)

Input: 120 VAC 60 HZ 15W

Output: 9/12 VDC 300 MA

Dimension: same as Model 401

Weight: 1 lb. (0.45 kg.)

Class 2 transformer, Power Supply UL Listed

Model 402-Treating capacity: 90,000 G (341,000L)

Input: 120 VAC 60 HZ 22W

Output: 12/18 VDC 1 A

Dimension: Same as Model 401

Weight: 1 lb. (0.45 kg.)

Class 2 transformer, Power Supply UL Listed

IMPORTANT

Model 411 has to have a transformer between 9 and 12 volt DC and 300 ma. Model 401 has to have a transformer between 12 and 24 volt DC and 600 ma. Model 402 has to have a transformer between 12 and 24 volt DC and 1 amp

See diagram

This pin connector is wired into the electrodes. The pin connection polarity at the control head is very important, however, since polarity changes automatically the connectors need only to be connected at the electrode chamber.

#1 FUNCTIONS OF THE MINERALIZER

Basic MINERALIZER Unit includes Control unit, ion chamber and Copper Test Kit. (US & Canadian kits include plug in 110 volt power supply)

The control unit controls the voltage to the ion chamber which houses two copper electrodes which are mounted in the pipe line, preferable after filter-downstream.

The surface of these plates breaks down, through electrolysis and emit copper ions into the water which are natural toxins to algae. The control unit has a knob which, when turned, will increase or decrease the voltage to the electrodes, increasing or decreasing the amount of ions emitted into the water.

The copper test kit works very similarly to a chlorine test kit in that when colors are matched, a PPM level is established, a very, simple procedure.

#2 INCLUDED WITH THE MINERALIZER

1. CONTROL UNIT
2. PLUG-IN TRANSFORMER POWER SUPPLY
3. ELECTRODE CHAMBER
4. COPPER TEST KIT

OPTIONAL: * Weatherproof 11 OVAC outlet enclosure
* Flow sensing switch-turns power on-off by water pressure
* Solar photo voltaic power cell-for power supply instead of transformer

#3 INSTALLATION INSTRUCTIONS

MINERALIZER

Tools Needed:

Volt Meter (digital preferred)
Hack Saw
PVC pipe primer and glue
PVC reamer to clean pipe rough edges
Measuring tape
Flat head screwdriver

Electrical conduit and connectors

Turn off all power to pump circulation system. Check electrical codes. You may need "Seal Tight", electrical conduit to run between control unit and power transformer, as per local electrical code.

1. Find open space on wall to hang controller assembly. Mark holes and screw assembly into place on wall. Note: Be sure wires are long enough to reach from controller and plug and from controller to electrode chamber, add as required.
2. Determine pipe size and whether downsize adapters are required. (Controller is 5.08 cm standard and unit includes 3.81 cm adapters to use if required.) Note: Adapters if used must also be glued into controller assembly.
3. Find clear 20.32 cm run of pipe either before or after filter (preferable after filter - downstream) running either horizontally or vertically for installation of unit.
4. Measure space inside electrode chamber to lip seal on each side and cut as required (usually 7.62 cm to 10.16 cm.)
5. Cut this 7.62-10.16 cm section and seam, file rough edges, prepare with primer. Now slip electrode chamber assembly into place (unglued) to check for proper fit and clearance.
6. Glue pipe and assembly into place. BE SURE assembly is perfectly parallel (flat) to ground surface when mounted in horizontal pipe run, or unit can be mounted in vertical pipe run. Failure to mount properly can cause ion chamber to fill up with air eliminating or reducing ion output.
7. Your new MINERALIZER is supplied with a plug-in transformer power supply designed for indoor use. Plug in transformer into 110 volt outlet protected by Ground Fault Interrupt Circuit. If the outlet is not protected by GFCI you can purchase a portable GFCI assembly from LIFEGUARD. Note: If 110 volt outlet is not indoors, you must protect the outlet and transformer from the weather with a watertight plastic box, also available as an option. GFCI 110 VAC outlet must be wired directly into timer assembly so that power to the outlet is only supplied when the pump is on. A flow sensing switch screwed into electrode chamber may also be used for this purpose (see flow sensor options). Plug transformer plug into controller. Connect wires from controller to electrode terminals.
8. Check voltage at electrode terminals. Voltage should

increase/decrease as ion output dial is turned higher/lower.

9. Check to see that polarity changes approximately every 2 minutes.
10. Set pump cycle to approximately 8-12 hours in Summer in peak sunlight period, and 5-7 hours in Winter (if open). LEDs on controller face will light only when pump starts.
11. Flow Sensor Option- MINERALIZER may be wired direct into GFCI outlet connected to timer or a flow sensing switch may be used instead. The flow sensor is activated and deactivated by water pressure assuming also that the MINERALIZER is operating only when water is circulating.

FLOW SENSOR OPTION

If a flow switch is required, one wire (either wire) on the top of the flow switch is connected to the +positive wire from the power supply, the remaining flow switch wire is connected to the + positive wire on the controller pin at the control head. The remaining - negative wire from the transformer is connected to the - negative wire on the control head DC input connector.

The arrow on the flow sensor has to be in the direction of the water flow. If necessary, turn the flow sensor 180 degrees.

To test it, you can push the paddle in the direction of the arrow, and you will hear a little click, that is when the unit is in the ON position.

The diameter for the water flow tube is 5.08 cm with adapters to 3.81 cm.

#4 WATER BALANCE

CAUTION: Before start-up be SURE to bring water into these ranges:

Test Frequency:

Weekly(after start up)	pH 7.2 - 7.8 PPM
Weekly(after start up)	Copper 0.2-0.4 PPM
Monthly(after start up)	Check Electrodes, clean with no scale
Twice/Season(4x/year)	Calcium Hardness, 150-250 (vny/fbrgls), 200-350 (mar/gunite)
Twice/Season(4x/year)	Cyanuric Acid, less than 50 PPM

Twice/Season(4x/year) Dissolved Solids(TDS), less than 1000 PPM

After backwashing Add Clarifier as required

WATER CHEMISTRY

pH - Your MINERALIZER system recommends a high pH of 7.2 - 7.8 PPM since low pH conditions are more conducive to pH bounce and staining. In addition, low pH conditions are more corrosive and can etch or eat away the plaster wall.

Change pH slowly over many days. DO NOT shock the pH system when adjusting. DO NOT USE SULFURIC ACID.

pH is a measure of acidity of water. The pH scale goes 0-14 with 7 being neutral. Water above 7 is alkaline and under 7 is acidic. To reduce pH, add diluted Muratic Acid always to the DEEP end of the pool away from the skimmer and away from the pool walls. To increase pH, add soda ash (sodium carbonate).

ALKALINITY- Alkalinity is a measure of the alkaline materials dissolved in the water which serves as "buffering" agents. It refers to the degree of resistance of pH range of pool water or its "buffering" capacity or resistance to pH change. When alkalinity is in proper balance your pH will not "bounce" or make large fluctuations. It will remain more stable. Alkalinity out of balance with your MINERALIZER is dangerous to your pool and can lead to staining. Too low alkalinity will cause "leaching" of

the marcite/gunite walls and the water is corrosive. Too high alkalinity can cause the formation of scale, most noticeable as white deposits at the water line. High alkalinity is one of the greatest causes of pool problems. It is also extremely important to the MINERALIZER system. KEEP IT BALANCED! The easiest way to keep the pH balanced is to keep the alkalinity at the proper level - they are closely interfaced. Keep the total alkalinity range between 80-100 (plaster) and 90-110 (vinyl). Total alkalinity should never exceed 120 PPM. When alkalinity is too low, pH bounce is likely and very undesirable. It is hard to get an accurate pH reading when alkalinity is too low. Alkalinity too low? Add regular baking soda (bi-carb) to raise the pH. How much? 3 pounds of bi-carb in a 80,000L pool raises alkalinity 10 PPM. Alkalinity too high? Add acid (dry acid-sodium bi-sulfate or muratic acid) DO NOT USE SULFURIC ACID! How much? A small amount at a time. Don't try to fix your alkalinity problem by dumping a ton of acid in the pool all at once. Always add acid to the DEEP end of the pool away from the skimmer and pool walls. Dilute in a bucket for best results. Always add acid into water in the bucket. It is best to lower alkalinity with FREQUENT

adjustment of accompanying high pH with dry acid.

Reasons for high pH (7.2-7.8) -Low Alkalinity 70-110

1. Reduces staining.
2. Stops corrosion.
3. Improves shock effect with non-chlorine oxidizers.
4. Improves buffer in soft water.
5. Saves acid.
6. Improves Clarity.

Water hardness: This refers to the quantity of calcium and magnesium in the water. Water is "Hard" when it contains large amounts of these two minerals. The term was derived because with such water it is "hard" to obtain lather with soap.

As water evaporates, calcium is left behind and increases the hardness of the water. High water hardness can lead to scale deposits forming in the filter, heater or on the pool or spa walls. High calcium hardness will also increase the scaling on the plates in your MINERALIZER ion chamber.

Low levels can lead to equipment corrosion and etching of the plaster. If hardness is low, add calcium elevator at a rate of 0.45 kg per 38,000L to increase 11 PPM or as advised by the manufacturer. A stain and scale control agent can keep a high calcium hardness in check by tying up excess calcium to prevent scale from forming. Dilution will also help to reduce the water's calcium hardness.

#5 START UP PROCEDURE

START UP

Set Mineralizer at START UP position and ion output at High.
POOL: Let run 24 hours. SPA: Run at normal operating pump cycle. Initially test copper level daily until it reaches 0.2-0.4 PPM. Once the copper level 0.2-0.4 PPM has been established, set ion output at 50%. Retest copper level in 2 days, a positive or negative variance in the test will require adjustment of the ion output knob higher or lower. Once the "personality" of the pool has been established, copper level will stabilize when output knob is set properly. After start up, the average backyard pool usually needs only about a 30-50% output setting.

#6 COPPER TESTING

(Kit style may change so refer to kit instructions also) Fill tube to 10 ML line. To one tube add 5 drops of Copper reagent - cap and shake. (If copper is present, this tube will show yellow color). Add standard Copper reagent to second tube one drop at a

time while mixing. Count the number of drops until the two colors match. COPPER PPM $= 0.05 \times \# \text{ of drops of standard Copper reagent}$. (example: $0.05 \times 8 \text{ drops} = 0.4 \text{ PPM}$)

#7 FACTORS WHICH AFFECT WATER'S COPPER CONTENT

The setting of the "ion output" knob.
The number of hours that the pump is on, since the MINERALIZER is only on when the pump is on.
The quantity of the water in the pool or spa.
The TDS of the water.
The amount of activity (bather usage) the pool or spa has.
The temperature of the water.
The BALANCE of pH, alkalinity, and calcium hardness.
The amount of organic material entering the water from trees, air, rain, etc. If electrode plates are scaled, they must be cleaned.

Once the personality of the water has been established and the "ion output" knob has been set properly, the copper content should stay within this range unless any of the above factors change. If pump time is increased during the Summer, adjust "ion output" knob to a lower setting. If pump time in the Winter is decreased, the knob setting should be set lower since generally it is acceptable to allow the copper content to be lower during the cooler temperatures of Winter when algae growth is slower. It is recommended you run the pump long enough to recycle your water once a day in the Summer. CAUTION: Do not over ionize. Remember: More is not better. Ions stay in the pool even when the pump is off. If it is found that the "ion output" knob must be kept (after break-in period) at the high position to maintain the proper copper setting, it is advisable to set the pump for a longer run cycle.

#8 OXIDATION (SHOCKING)

POOL: The MINERALIZER is not intended to be a 100% substitute for chlorine, pH chemicals, other appropriate chemical treatment. Algae and bacteria develop resistance to any chemical or mineral method of killing them or prohibiting their growth. Consequently, it is recommended to "oxidize" or shock treat the pool at the beginning of the swimming season and during the peak summer heat period, after large parties with excessive bather load, after excessive rainfall, or any time your pool has lost the crystal clear look and appears cloudy. This oxidation will remove dead particles and return water to its normal clarity.

#9 FILTRATION AND BACKWASHING

The MINERALIZER is only a water treatment product. Any dead

contaminants in the water MUST be removed efficiently. A good filter system, when using a MINERALIZER is very important. Unlike the MINERALIZER, chlorine is an oxidizer which "burns up" algae, bacteria, suntan oils and other organic waste.

Now, more than ever, your filter system is important to the proper operation of the MINERALIZER. Of course, the more efficient a filter is (that is, the smaller particles it can take out of suspension), the cleaner and clearer your water will be.

Filters need to be replaced or recharged occasionally, depending on age, climate and usage. All filters should be checked at least once per year. Water contaminants are microscopic in size. An inefficient, undersized filter or one that is not backwashed enough will create water conditions that are milky or cloudy. The answer to the problem of continuous cloudy or milky water is any one or combination of the following:

1. Backwash or dump filter and add DE powder or change sand as manufacturers recommendations.
2. Clean or replace cartridge filter.
3. Upgrade filter system to proper size (DE works by far the best and sand is sufficient. Cartridge systems many times work only marginally well if they are undersized).
4. Add Clarifier.
5. Add Oxidizer.
6. Be sure copper level is not too high or too low

It is recommended that you backwash a sand filter whenever the back pressure increases 4 to 6 pounds. Clarifier (with sand and cartridge filters) should be added after each backwashing.

A Clarifier works by "flocculating" or Coagulating" contaminants together into particles enough to be filtered out.

#10 TROUBLESHOOTING

Clear green tinted water suggests copper is coming out of solution or the copper level is too high. Check copper level and reduce as necessary. Remember, pH or alkalinity out of range and/or too high copper content may/can lead to wall staining.

Murky, cloudy, green/brownish tinted water usually is the beginning of an algae bloom. If let go unchecked, the algae will multiply at a tremendously fast rate and will quickly get a pea soup appearance. If your copper level is kept in range and the filter and pump works properly and you oxidize as required, this should never be a problem. Remember, as the water warms, you need to increase your ion output setting or pump cycle time or both to keep adequate copper in the water to compensate for

accelerated growth of algae and bacteria. Heavy algae growth should be chemically treated.

In the event of a power failure or any pool equipment failure and your MINERALIZER is out of action for some time and your copper level falls below the recommended range, the pool should not be used by swimmers as bacteria growth will be accelerated. At this point, a chemical alternative method of treatment is advisable until repairs are made.

11 MAINTAINING CRYSTAL CLEAR WATER :

Under conditions where pool circulation or filtration systems have failed, remember that your MINERALIZER leaves a residual or treating copper ions in the water which, unlike chlorine, do not burn off by sunlight or evaporation. These ions are only consumed by killing algae and form a dead contaminant which is filtered out in the usual manner.

Other contaminants, like silt dust that does not dissolve, may remain suspended and cause water to have a cloudy appearance. Other possible causes are:

1. Poor circulation - check on pump/motor condition to be sure pressure is high enough for good circulation and replace as necessary.
2. Pool Filtration System- Check on filter and clean cartridge filter or replace sand in sand filter as necessary. In general, sand filters are more efficient and compatible with this system.
3. Oxidize - Most common request.

#12 MINERALIZER AND OTHER CHEMICALS

Salt converters (Hypocell, Lectranator): The bathing water will have a high degree of salinity. As a result, the water is more conductive to electrical current and the voltage/amp draw at your ion chamber can significantly increase causing possible damage to your transformer. The maximum current output can be achieved at a much lower setting due to the increased conductivity of the water. The water should be drained and the pool/spa refilled.

#13 CLOSING OR WINTERIZING YOUR POOL

You should otherwise use normal chemical winterizing methods when your pool and circulation system is out of operation. Your pool service supplier will advise the most suitable chemicals for your application. When your pool is put back into seasonal operation,

be sure to follow start-up procedures and BALANCE the water before turning on your MINERALIZER.

Remove Mineralizer control head and transformer and keep inside for the Winter.

#14 ON VACATION

Once your pools personality is determined and your "ion output" knob is keeping your copper content within range, leaving for a 1 or 2 week vacation should be ok-providing the pH is also in high adjustment to prevent pH "bounce". It may be advisable to have a friend perform the weekly copper and pH test and adjust as necessary. A heavy oxidation procedure before leaving is also advisable.

#15 TO CLEAN ELECTRODES (Ion Chamber Copper)

1. Turn off all power to pool/spa and timer.
2. Remove 2 terminal wires at ion chamber.
3. Unscrew head and remove corrosion and scale with knife. Flush until clean.
4. Re-install head and hand tighten.
5. Turn power on and check for leaks.

#16 TO REPLACE ELECTRODES

Simply follow the same steps as above except #3. Unscrew old depleted electrodes and replace with new (new screws and gaskets included). You may need some silicon gel around screw holes if leaks occur.

In an effort to constantly improve our products, the company reserves the right to change a procedure and specification due to advancements through further research and development

#17 STAIN PREVENTION

TO PREVENT BLUEING:

Slight aquamarine blueing is common with ionizers. To prevent dark blueing, be sure to keep copper level in range 0.2-0.4 PPM. The higher the concentration of minerals in the water will cause them to com~solution easier. Abrupt pH changes will cause water chemistry to change which also will increase the likelihood of staining.

Because your MINERALIZER is so automatic in treating your water and needs infrequent pH and oxidizing chemicals, many pool owners ignore balancing the pH, alkalinity, harness and copper level. DO

NOT MAKE THIS MISTAKE! Keep water in balance . Remember to maintain a chlorine or bromine residual.

Staining can occur from chemical or mineral treatment systems when pH, alkalinity, calcium hardness, or mineral content (copper) is let go beyond recommended ranges. This situation is exacerbated with ionization and the addition of minerals into the water.

Fiberglass, vinyl, and acrylic lined walls are the most resistant to staining. Because of the "mineral" nature of plaster (marsite/gunite) walls, they will stain easier when water is kept out of balance for extended periods.

Because your MINERALIZER is so automatic in treating your water, many pool/spa owners disregard pH, alkalinity, and calcium hardness balance. DO NOT MAKE THIS MISTAKE!!! In addition, to be treated, all water (including drinking) must also be balanced to insure the system performs properly. Keeping your water balanced properly will prevent staining (see water balance).

It is also very important to keep the total dissolved solid count low. Think of your water as a sponge. A sponge can only hold so much until any extra will drain away. The same is true of your pools water. It can only hold so much in solution before any extra falls out of solution causing slight staining conditions. Resultingly, keep your copper content low and your total dissolved solids and calcium hardness in range (see water balance).

You will notice the MINERALIZER system recommends a higher pH (7.2-7.8). This high range will reduce the likelihood of pH bounce, particularly in acid rain areas. Low pH and pH bounce can create staining conditions. This high pH will have no adverse effects on the waters feel or the pleasure of bathing.

CONTROL HEAD

The LED power output indicates the percentage of the power put out by the transformer. The higher the output setting, the higher the voltage which in turn increases copper output.

There are 2 modes. The 2 modes simply indicate the automatic polarity change. This should change about every 2 to 3 minutes.

In the event of a malfunction, first check all electrical connections, then with a voltmeter check to see proper power is coming from the power supply and replace as necessary. Eventually return the control head only, to the factory if you cannot locate the problem.

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