

POOL FROG® Mineral HyBrid

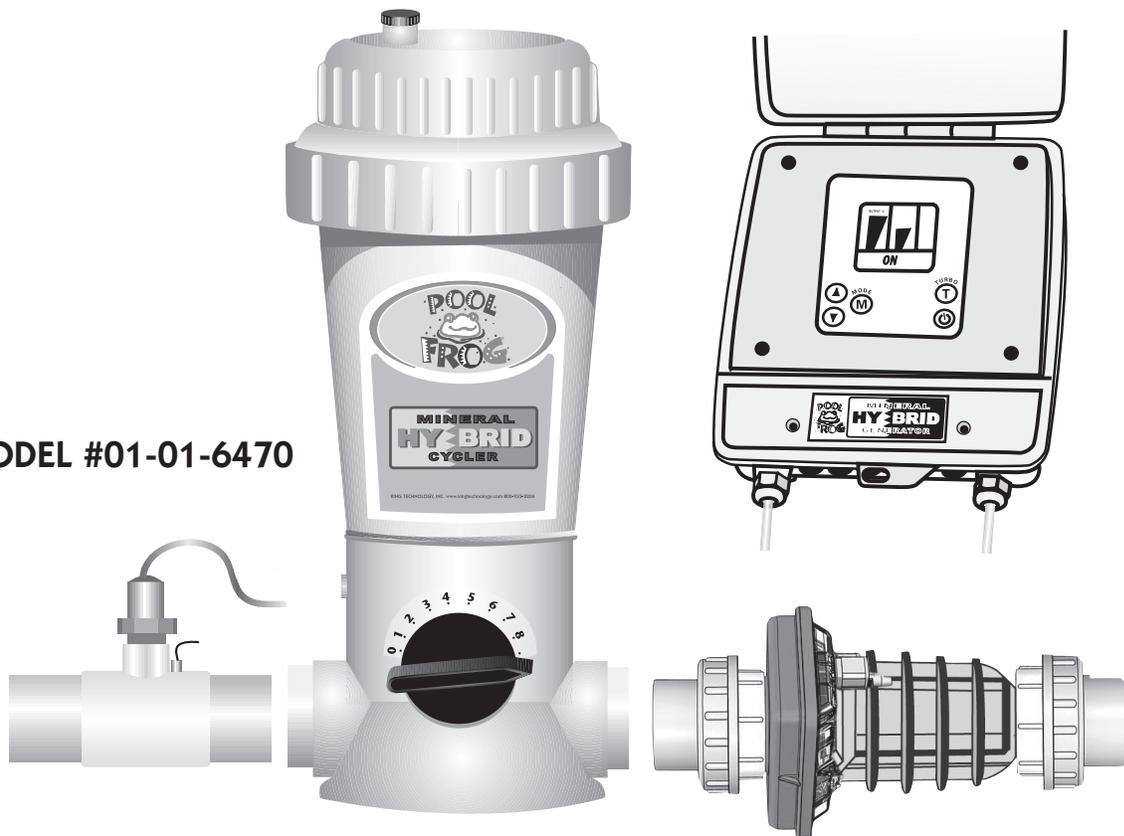
Operations Manual for Pool Owner

IMPORTANT:

Register your warranty NOW.

See back page or visit www.kingtechnology.com

MODEL #01-01-6470



This manual is for the home owner. A separate installation manual for qualified installers is included.



Customer Service 800-222-0169
www.kingtechnology.com

This system is designed to work effectively with a variety of pool equipment as long as the following basic procedures are followed.

IMPORTANT:

Pump run times of at least 6 hours per day at high speed are recommended for proper performance. If running on low speed only (24 hours per day) or less than 6 hours per day on high speed, bleed the air while the pump is running by unscrewing the cap knob on the Mineral Hybrid Cyclor until water appears, then screw the knob back on. Repeat this process each time the cap is removed for any reason.

Important Safety Instructions

Read and Follow All Instructions All electrical work must be performed by a licensed electrician and conform to all national, state, and local codes. Improper use or installation can badly harm the unit and its surroundings. When installing and using this electrical equipment, basic safety precautions should always be followed, including the following:

DO NOT OPEN THE DISPLAY COVER OF THE BOX – NOT A SERVICABLE UNIT

- Disconnect all AC power before installation.
- **WARNING** – To reduce the risk of injury, do not permit children to use this product.
- The Control Box must be mounted **vertically** on a flat surface and at a minimum horizontal distance of 5 ft (1.5m) (or more, if local codes so require) from the pool/spa.
- **WARNING** – Risk of electric shock. Connect only to a grounding type circuit protected by a ground fault circuit-interrupter (GFCI) outlet. The installer should provide this GFCI requirement. The GFCI should be rated for minimum 6 Amps and tested on a regular basis by pushing the test button. If the GFCI fails to operate correctly, there is ground current flowing indicating the possibility of electric shock. Do not use this unit. Disconnect unit and have a qualified professional correct the problem before using.
- The Input circuit (LN1 & N/LN1) must be connected only after **OVERCURRENT DEVICES**, such as fuse or circuit breaker to limit the amperage in the input wire to the maximum that is permitted by the National Electrical Code.
- The Unit must be permanent connected, with copper wire, not less than 1.5 mm (14 Awg).
- The wiring of the unit must be performed according to the wiring instructions in the Installation Manual or on the front box cover.
- A build-up of flammable fumes can result in a hazardous condition if the cell is allowed to operate without flow. This device must be operated only with an approved in-line flow sensor.
- The flow sensor must be installed immediately before the POOL FROG® Mineral Hybrid Cyclor followed by the POOL FROG® Mineral Hybrid Cell.
- Ensure that equipment and materials used in or around the pool and spa are compatible with salt based sanitation systems. Certain materials may be susceptible to salt and chlorine damage.
- **ALWAYS ADD ACID TO WATER, NEVER WATER TO ACID.**
- **SAVE THESE INSTRUCTIONS.**

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For information on King Technology's entire product line,
visit our website at www.kingtechnology.com

POOL FROG®

Welcome to easier pool care courtesy of POOL FROG® . With POOL FROG® Mineral Hybrid, your pool water will look and feel better without a lot of work or a lot of chlorine. This system controls bacteria using a combination of minerals and reduced chlorine levels—up to 50%* less. There are 4 parts to the POOL FROG® Mineral Hybrid: The POOL FROG® Mineral Hybrid Cyclor, the POOL FROG® Mineral Reservoir, the POOL FROG® Mineral Hybrid Generator Control Panel and the POOL FROG® Mineral Hybrid Generator Cell.

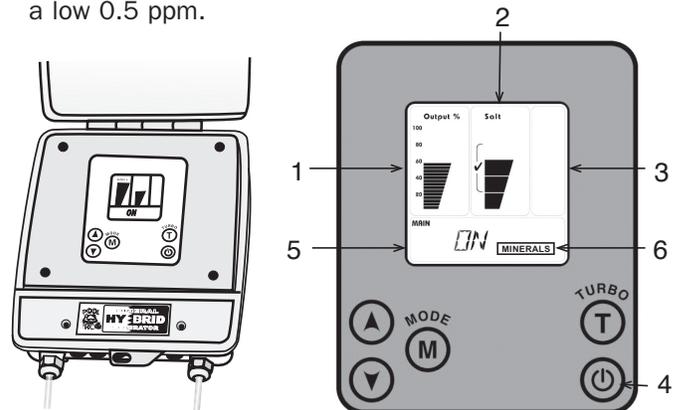
Part 1 POOL FROG® Mineral Hybrid Cyclor

Holds the POOL FROG® Mineral Reservoir that delivers all the FROG® benefits.



Part 3 POOL FROG® Mineral Hybrid Generator Control Panel

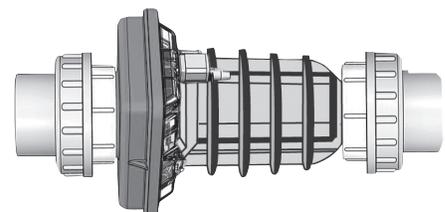
Controls the generation of chlorine to maintain a low 0.5 ppm.



1. Chlorine output level (production level)
2. Salinity level (salt concentration in the water)
3. Special icons
4. ON / OFF
5. General display
6. Mineral Replacement Indicator

Part 4 POOL FROG® Mineral Hybrid Generator Cell

Innovative technology with “Shake Plates” to prevent calcium build up while being super charged with power direct to every other plate. The result is fewer cell cleanings are required than other products.



Part 2 POOL FROG® Mineral Reservoir

Holds the minerals and fits inside the POOL FROG® Mineral Hybrid Cyclor, allowing you to reduce your chlorine generated by up to 50%*

REMEMBER TO REPLACE POOL FROG® MINERAL RESERVOIR EVERY 6 MONTHS OR AFTER ONE POOL SEASON, WHICHEVER IS SHORTER.

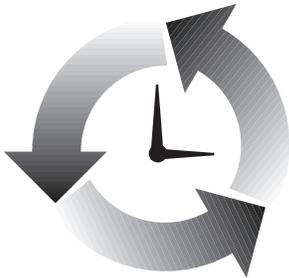


*Compared to the minimum EPA recommended chlorine level of 1.0 ppm for a stabilized swimming pool.

Start-up

Do not turn generator power on until start-up is complete and the proper amount of salt has been added to the pool (see page 6).

1.



IMPORTANT: Pump run times of at least 6 hours at high speed are recommended for proper performance. If running on low speed only (24 hours) or less than 6 hours on high speed, bleed the air while the pump is running by unscrewing the cap knob on the cyclor until water appears then screw the knob back on. Repeat this process each time the cap is removed for any reason.

2.

Before beginning with any pool care program, you must first balance your pool water. Take a water sample to your local pool professional or use a complete test kit that will test for the below important elements.

New pools especially may contain undesirable matter. These pools need extra care to properly balance before using POOL FROG® Mineral Hybrid.

3.

Cu
Mg **Fe**

If your fill water is high in metals, use a sequestering agent or metal out product at start-up only before using the POOL FROG® Mineral Reservoir. See your local dealer for details on using these products and always follow manufacturers directions carefully.

4.



Add a stabilizer or conditioner to the pool at the beginning of the season if the stabilizer level is below 40 ppm. This will prevent chlorine burn off. Follow manufacturer's directions carefully.



Shock the pool with chlorine to rid the water of all contaminants before beginning with POOL FROG® Mineral Hybrid. Follow manufacturer's directions carefully.

THIS STEP IS VERY IMPORTANT TO START-UP. USE CHLORINE SHOCK ONLY.

WATER BALANCE GUIDELINES			
	Minimum	Ideal	Maximum
pH:	7.2	7.4 – 7.6	7.8
Total Alkalinity:	60 ppm	80 – 100 ppm	120 ppm
Calcium Hardness:	150	200 – 300	400
Total Dissolved Solids:		<1500	
Stabilizer:	20 ppm	40 – 60 ppm	80 ppm
Free Chlorine:	0.5 ppm	0.5 – 1.0 ppm	1.0 ppm

Use the Saturation Index on page 15 to ensure proper water balance.

Adding Salt to the Pool

1. BEFORE ADDING THE SALT

- **Measure existing salt in your pool:** Previous use of liquid chlorine may cause the salt reading to be higher due to residual salt.
- **New cement or gunite pools:** Wait at least 10-14 days or follow your builder's instructions for plaster to cure

before adding salt or operating the POOL FROG® Mineral Hybrid Generator.

- **Biguanide Pools:** Before installing POOL FROG® Mineral Hybrid on a pool using Biguanide sanitizers, all Biguanides must be removed (see dealer for details).

2. ACCEPTABLE SALTS

GOOD	BAD do NOT use:
The best salt is an evaporated, granulated, food quality salt.	Iodized salt.
Water softener salt pellets may be used but will take longer to dissolve.	Salts with anti-caking agents of more than .1% (i.e. yellow prussiate of soda or sodium ferrocyanide) because they contain iron and will yellow the fittings.
"99.9%" pure salt.	Rock salt because of the dirt mixed with the rock salt.
"Solar" salt.	Calcium chloride; it is not a salt. Use only sodium chloride.

3. CALCULATE THE SIZE OF THE POOL

Gallons (dimensions are in feet)	Liters (dimensions are in meters)
Rectangular Length x Width x Average Depth x 7.5	Length x Width x Average Depth x 1000
Round Diameter x Diameter x Average Depth x 5.9	Diameter x Diameter x Average Depth x 785
Oval Length x Width x Average Depth x 6.7	Length x Width x Average Depth x 893

Example: 15' X 30' Rectangle Pool 3' shallow end, 6' deep end.

$$15 \text{ wide} \times 30 \text{ long} = 450 \text{ sq ft} \times 4.5 \text{ avg depth} \times 7.5 \text{ gal per cubic ft} = 15,147$$

4. DETERMINE SALT AMOUNT

The table below is based on a salt concentration of 3500 ppm (approximately 1/3 of 1%). Locate the pool's current salt concentration at the top of the chart. Then locate the size of your pool on the left. Run these figures down and across until they meet. That number is the pounds of salt required for your pool.

SALINITY DEMAND TABLE (in lbs.)

Salt level before addition in PPM

0	500	1000	1500	2000	2500	3000	3500	4500
---	-----	------	------	------	------	------	------	------

How much salt to add – in pounds

Water volume in thousands of gallons	Salt level before addition in PPM								
	0	500	1000	1500	2000	2500	3000	3500	4500
4	117	100	83	67	50	33	27	0	OK
6	175	150	125	100	75	50	25	0	OK
8	234	200	167	133	100	67	33	0	OK
10	292	250	209	167	125	83	42	0	OK
12	350	300	250	200	150	100	50	0	OK
14	409	350	292	234	175	117	58	0	OK
16	467	400	334	267	200	133	67	0	OK
18	525	450	375	300	225	150	75	0	OK
20	584	500	417	334	250	167	83	0	OK
22	642	550	459	367	275	183	92	0	OK
24	701	600	500	400	300	200	100	0	OK
26	759	651	542	434	325	217	108	0	OK
28	817	701	584	467	350	234	117	0	OK
30	876	751	626	500	375	250	125	0	OK
32	934	801	667	534	400	267	133	0	OK
34	992	851	709	567	425	284	142	0	OK
36	1051	901	751	600	450	300	150	0	OK
38	1109	951	792	634	475	317	158	0	OK
40	1168	1001	834	667	500	334	167	0	OK
42	1226	1051	876	701	525	350	175	0	OK
44	1284	1101	917	734	550	367	183	0	OK
46	1343	1151	959	767	575	384	192	0	OK
48	1401	1201	1001	801	600	400	200	0	OK
50	1460	1251	1043	834	626	417	209	0	OK

5. ADDING THE SALT

A. Distribute the determined amount of salt evenly around the pool. To avoid clogging the filter or damaging the control panel and pump, **do not add salt through the skimmer or surge tank**. Brushing the bottom helps dissolve the salt.

B. Keep the pump on to circulate the water.

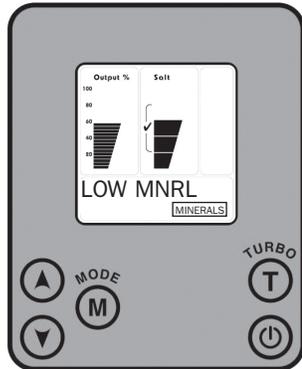
C. The readout on the chlorine generator may fluctuate until the salt is fully dissolved.

6. Maintain salt level of 3000 - 4500 ppm at all times. Check salt level regularly. It is also recommended to periodically test the salt level by a professional.

Replacing a POOL FROG® Mineral Reservoir

Once wetted, the time-released mineral coating of the POOL FROG® Mineral Reservoir is effective up to 6 consecutive months or one pool season whichever is shorter. After that time, even if you hear the spent media inside, it is no longer effective and must be replaced.

NOTE: When starting unit for the very first time, the Mineral Replacement Indicator will automatically be set at 6 months (180 days). You will not need to reset for 6 months or until the next season, whichever is shorter.



1. LOW MNRL will appear in the general display 30 days before the 6 month replacement of the POOL FROG® Mineral Reservoir is due. LOW MNRL will continue to flash every 2 seconds for the next 30 days or until the Mineral Reservoir is replaced and the 6 month timer is reset.



2. NEED MNRL will appear in the general display when 6 months is up. It will flash every 1/2 second until the Mineral Reservoir is replaced and the 6 month timer is reset. Before resetting the timer, replace the POOL FROG® Mineral Reservoir using the following directions.

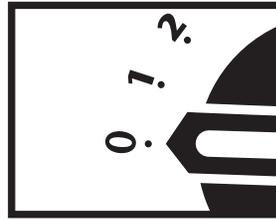
IN GROUND SERIES 5400 (Order #01-12-5462)
NOW FITS THE FOLLOWING CYCLERS:
 POOL FROG Series 5400 or 5600
 Prevail Series 5790

3. Check the front of the box and back label of the product to make sure you have the correct POOL FROG® Mineral Reservoir to fit your POOL FROG® Mineral Hybrid Cyclor.

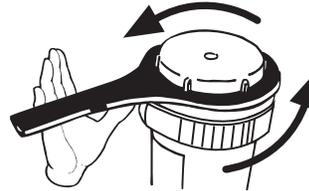


WARNING! Read Carefully

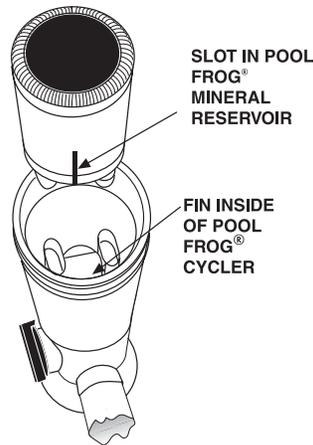
Use only the factory recommended replacement POOL FROG® Mineral Reservoir or POOL FROG® Bac Pac if needed. DO NOT USE any other pac or bulk chemical tablets in the cyclor. (See Troubleshooting.) Use of any other product could result in damage to pool equipment or surface, unsafe pool conditions, fire or explosion. Warranty will be void if the correct POOL FROG® Mineral Reservoir is not used.



4. Turn off pump. Turn dial to setting 0. This reduces the flow of water into the unit when the cap is open.



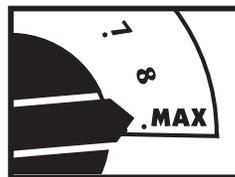
5. Use the cap tool included with the POOL FROG® Mineral Hybrid Cyclor to loosen cap by hitting the handle with the flat of your hand counter clockwise. Discard old mineral reservoir.



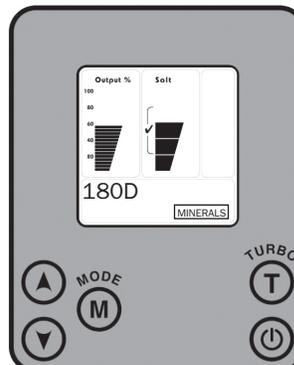
6. Find slot on side of POOL FROG® Mineral Reservoir and line up with fin inside the cyclor. Lower mineral reservoir into cyclor until secure.



7. Replace cap by hand only. Do Not Over Tighten.



8. Turn control dial on POOL FROG® Mineral Hybrid Cyclor to Maximum.



9. Set the Mineral Replacement Timer by pressing when NEED MNRL is displayed until NEW and then 180D is displayed. Press to set the timer.

NOTE: To see how many days remain before the Minerals need to be replaced, simply press twice.

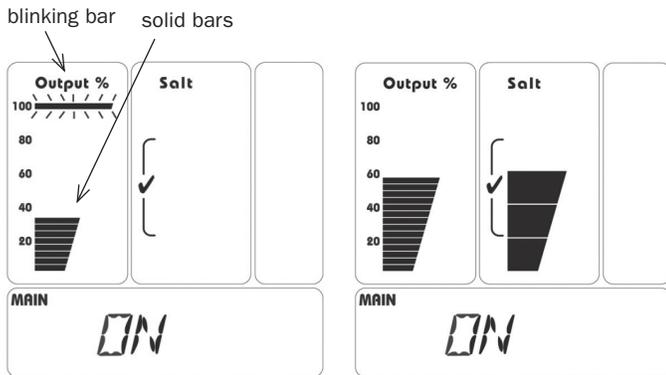
Basic Operation

This system is designed to work effectively with a variety of pool equipment as long as the following basic procedures are followed.

1. Set POOL FROG® Mineral Hybrid Cyclers to MAX.
2. Set the generator to maintain at least a 0.5 ppm Free chlorine level. Without a working mineral reservoir inside the cyclers, higher chlorine levels of 1-3 ppm are required. Chlorine levels can be tested using a standard test kit or by your local pool store.

Follow the steps to setting the chlorine output.

- A. Ensure the main circulation pump is ON.
- B. Press  to turn the generator on.
- C. Adjust the chlorine level using the  or  buttons for more or less production.



NOTE: “Wait” up to 1 minute for the system to test and display the Output % and Salinity readings. A blinking bar in the “Output %” area shows the amount of chlorine the system is trying to produce, while the solid bars show the amount of chlorine the system is actually producing.

3. Periodically test your water and always maintain the following readings.
(Use Saturation Index on page 15 to ensure proper balance.)

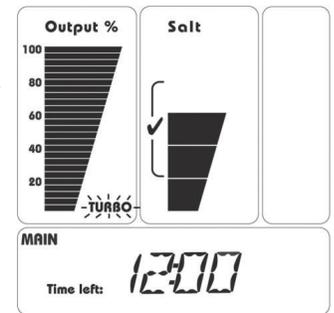
Ideal Salt Level: 3000 - 4500 ppm
Chlorine Level: 0.5 - 1.0 ppm
pH: 7.2 - 7.8

IMPORTANT: At least once a month have a professional test your water. Make sure there are no Nitrates or Phosphates in the water as they will deplete chlorine levels.

4. Shock the pool with a chlorine shock product as needed to maintain water clarity. Always follow shock manufacturer’s directions.
5. Use Turbo Setting if additional chlorine is required (unusual bather load or heavy rain).

• Press:  (Turbo): this action increases chlorine Output to 100% for a preset period of time. Default is 12 hours.

• Because the default time is 12 hours, there are two options for adjusting this time. With each press , the time will be increased by 12 hours, up to a maximum of 72 hours. For a specific time, hold down either the up  or down  until the desired time in hours and/or minutes is displayed.



NOTE: If the salinity level is too low, the solid bars will not reach 100% output.

To turn off Turbo wait 5 seconds then press  again.

Summer weather increases demand for chlorine which may require the use of the Turbo setting or shocking more often.

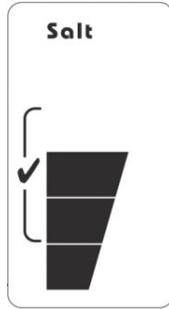
Reading the Control Panel

Salt Readouts

Normal salt level:

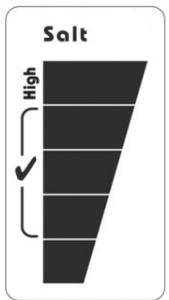
Normal salt level: Salt level is normal when the salt level bar is in the “ ” area.

Note: The salt readout takes up to one minute to test and display the salt level.

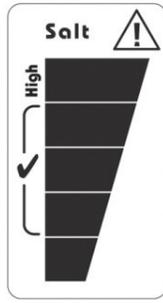


High Salinity Indication

The system safely operates up to 5,500 ppm of salt. The “High” salt indicators illuminate to warn against adding more salt. If the High salt indicators stay on, a pool professional should test the water and dilute it as necessary.



High Salt

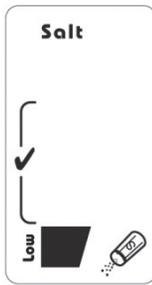


Very High Salt

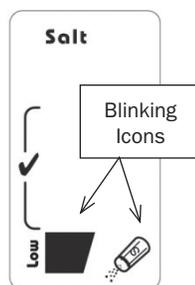
CAUTION: Check with your local pool professional prior to draining or diluting the pool.

Low Salinity Indication

Scaling or coating of the cell blades affects the salinity reading. Ensure the cell is clean, then have the pool water tested by a pool professional and adjust the salt level to 3,000-4,500 ppm. See “**Adding the Salt**” on page 6.



Low Salt



Very Low Salt

NOTE: The system safely operates in low levels of salt, but its ability to produce chlorine decreases as the level drops below 3000 ppm. A blinking bar in the “Output %” area shows the amount of chlorine the system is trying to produce, while the solid bars show the amount of chlorine the system is actually producing.

Mode (M)

There are 3 options that will appear when pressing the Mode button (M).

Push Once: pH Reducing NEED PUMP

- This can be ignored as it does not apply to this system.

Push Twice: Mineral Out Indicator

- To see how many days are left or to reset the time.

Push Three Times: Winter Setting

- To reset Mineral Out Indicator for next spring.

Standby Mode

When the main circulation pump turns off, the system automatically goes into standby mode. This is a safety action that prevents chlorine production without flow to the cell.



Pool Cover Function/AUX Mode (for use with automated retractable covers)

The unique pool cover function enables the chlorinator to reduce the chlorine output while the pool is covered.

When the pool cover is closed, the chlorinator will automatically reduce its chlorine output to 20% from the maximum level and “AUX” will appear on the display.



Pressing (▲) or (▼) buttons while the system is in “AUX” mode permanently sets new output values to the unit for operation when the pool is covered. For example, the default setting is 20%, but when the pool is covered you may change the default setting to 40%. The setting will return to 40% the next time the pool is covered. In order to activate this function, make sure that the chlorinator unit is getting a “closed” contact from the pool cover control when the pool is covered.

Cleaning POOL FROG® Mineral Hybrid Cell

Our clear cell allows for easy regular inspections for calcium build up. Visually check the cell periodically, and clean it as necessary (1 to 2 times per year).



WARNING!

Do Not use metal or other hard objects to clean the cell.

Do Not insert anything into the cell. These actions could scratch the precious coating on the plates and void the warranty.



WARNING!

Always add acid to water, NOT water to acid. Diluted muriatic acid solution = 10 parts water to 1 part acid.

Note: Follow the instructions of the acid manufacturer.



WARNING!

Always use protective eyewear and protective clothing.

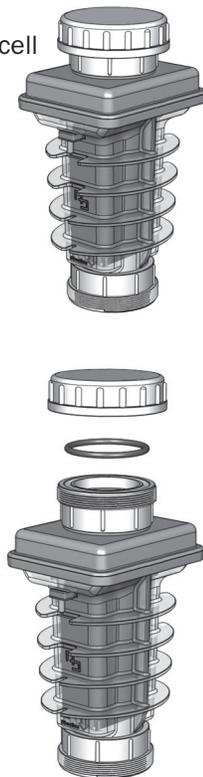
1. Before removing cell, turn off power to pump and control panel of generator. Make sure to note in which direction the cell was installed so it can be replaced correctly.

2. Remove the cell from the line by unthreading the barrel unions from the cell ends. There is no need to remove the electrical wire connections.

3. Remove the black o-ring on one end of the cell.

4. Attach the cell Cleaning Cap to the other end of cell.

5. Put on rubber gloves and goggles.



6. Pour into cell, either undiluted white distilled vinegar, or a solution of diluted muriatic acid (10 parts water to 1 part muriatic acid).

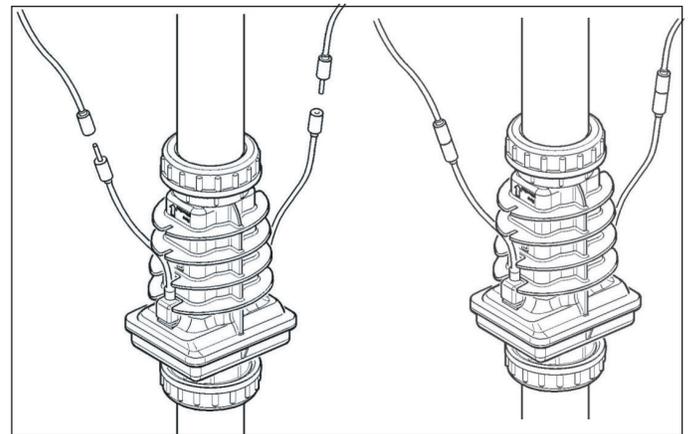
7. Wait for foaming to stop (5-10 minutes when using muriatic acid – vinegar takes longer).

8. Safely dispose of muriatic acid by pouring it into your pool only. If using vinegar dispose of by pouring down your kitchen drain.

9. Rinse cell with water hose. Avoid contact with skin or clothes.

10. Put the o-ring back in place and re-install the cell in the line making sure the water flows into the square end of the cell first.

11. If the wire connections were removed, make sure they are clean and free of debris before reconnecting them (see cell wiring diagram below).

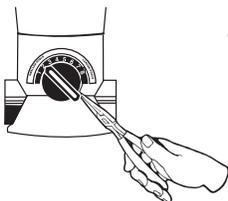


CELL WIRING DIAGRAM

NOTE: Lubricating the o-rings with the silicone lubricant that came with your POOL FROG® Mineral Hybrid helps improve the seal of the fittings, but be sure not to use silicone glue, petroleum jelly (such as Vaseline), or other agents that could deteriorate the o-rings.

POOL FROG® Mineral Hybrid Cyler Maintenance

Replacing the Control Dial O-Rings

1.  Using a needle nose pliers, find the snap ring tail located at approximately the five o'clock position under the control dial.

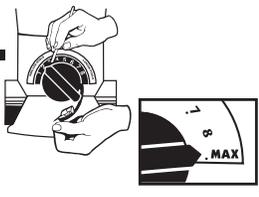
2.  Pull down and out of the groove.

3.  Using a large screwdriver, loosen the control dial. Carefully pry the dial until it pulls out.

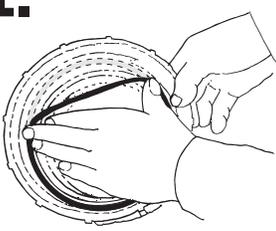
4.  Carefully replace the rubber oring without stretching it. Apply silicone lubricant, that came with your POOL FROG® Mineral Hybrid Cyler, on o-ring. DO NOT USE petroleum based lubricants.

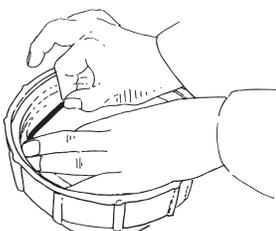
5.  Push control dial completely into the housing and turn the dial to setting 2.

6.  Insert the non-lipped end of snap ring into the groove opening beginning at the 5 o'clock position and push it up so that it threads itself around the control dial.

7.  Using a small screwdriver or pointed tool to help guide it, make sure the snap ring stays in the groove as it is inserted. Turn the dial back to MAX.

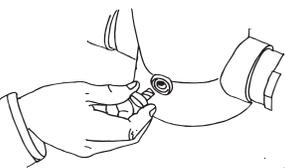
Replacing Cap O-Ring

1.  Hold cap in front of you upside down with the o-ring groove facing up. Place one end of o-ring into cap groove at the point closest to you. Hold o-ring down with the thumb and index finger of one hand.

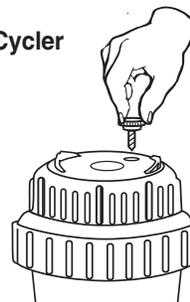
2.  Take hold of the far end of the o-ring with the thumb and index finger of the other hand. Roll o-ring slightly back towards you as you stretch the o-ring into the remainder of the cap groove.

3.  Lubricate o-ring often with silicone lubricant that came with your POOL FROG® Mineral Hybrid. DO NOT USE petroleum based lubricants.

Replacing Knob

 Replace knob in back or on cap of POOL FROG® Mineral Hybrid Cyler by unscrewing old one and screwing in new one.

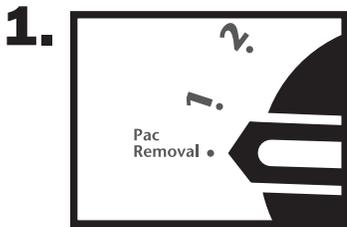
Back of Cyler



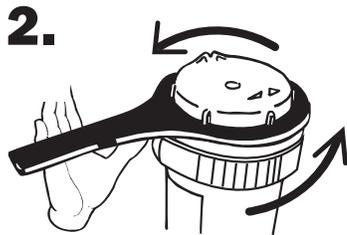
Or top of cap

Winterizing

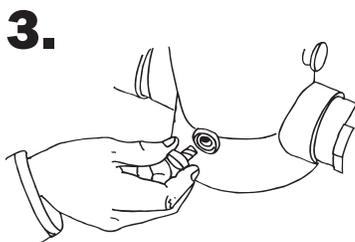
Just like the pool plumbing, freezing may damage the system's cell and flow sensor. If severe or extended periods of freezing temperatures are possible, drain all water from the pump, filter, and supply and return lines before any freezing conditions occur. Remove the cell and store indoors. Then winterize the POOL FROG® Mineral Hybrid Cyclizer as follows:



1. Turn pump off and turn dial to 0.



2. Remove cap.



3. Unscrew knob in the back of POOL FROG® Mineral Hybrid Cyclizer. Allow all water to drain.



4. Remove the POOL FROG® Mineral Reservoir and discard in trash. Even if you hear spent minerals inside, it is no longer effective. Replace with a new POOL FROG® Mineral Reservoir in the spring.



5. Lubricate o-ring with the silicone lubricant that came with your POOL FROG® Mineral Hybrid. DO NOT USE petroleum based lubricants. Replace the cap loosely.



6. Before turning the power off on the POOL FROG® Mineral Hybrid Generator Control Panel, press **M** until WNTR appears.



Press **▲** to select YES. The Mineral Replacement Indicator timer will be set to 0.

When the pool is reopened and the system is turned back on, NEED MNRL will appear indicating it is time to replace the mineral reservoir.

TROUBLESHOOTING

Note: evaluating the possible causes for each problem from top to bottom (first to last) will avoid extra labor.

PROBLEM	POSSIBLE CAUSES	WHAT TO DO
1. Low Chlorine Residual in Pool	System is turned off.	Turn system on. Check fuse and breaker.
	Output level is set too low in relation to chlorination demand (e.g. higher number of bathers, warmer weather, increased debris in pool).	Increase output setting and/or increase pump operation time.
	Low salt.	Check the salt level: If low, see "Adding Salt To The Pool" on page 6.
	Pump operation time too short.	Run pump at least 6 hours per day or enough time to turn over all pool water 1.5 times per day.
	Low stabilizer (Cyanuric Acid).	Check water chemistry; stabilizer should be between 40-80 ppm. If low, add stabilizer. See "Start-up" page 5.
	Chemical imbalance - could be Nitrates or Phosphates are present in the pool.	Make sure water is balanced according to the chart on page 5. Take your water to a dealer to check for Nitrates and Phosphates and follow dealer directions for removal.
2. Blinking output bar - Output is not matching the setting.	Dirty cell.	Check the cell to ensure the plates are in good condition and not coated with calcium buildup. Cleaning the cell is recommended if it is calcified or if the readout seems questionable. See "Cell Cleaning" page 10.
	Loose wire connection on cell.	Ensure the connectors are clean & connected properly. See cell wiring diagram on page 10.
	Not enough salt due to heavy rain, splash out, initial miscalculation, etc.	Add salt into the pool. See "Adding Salt" on page 6. It is also recommended to periodically test the salt level by a professional and adjust according to the "Salinity Demand Table" on page 6.
	Worn cell.	If none of the above resolutions worked, the cell may be worn out and must be replaced.
	Low pool water temperature.	Water below 80 may result in a lower salt reading than actually exists. If in doubt, have water tested for salt level.
3. No LCD display	System is turned off.	Turn system on, adjust output level.
	Breaker tripped.	Check the breaker leading to the pool control.
	Power wires cut, disconnected, or incorrectly wired.	Check for correct wiring.
	Other malfunction in control panel.	Contact installer or customer service.
4. Flow icon blinking	This is normal at initial start-up or if air bubbles are in pipes.	Wait a few minutes for air to clear. If continuous, see "Flow Icon Solid On".
5. Flow icon solid on and No Flow message appears in display	Insufficient water flow from pump to flow sensor and cell.	Clean filters and strainers. Check for closed valves, faulty pump, clogged line etc.
	Obstruction or scale buildup in cell.	Clean cell according to instructions on page 10.
	Defective flow sensor.	Check wire to flow sensor. It may be cut. Contact Customer Service.
6. High Salt - Above the check mark area	Excessive salt has been added to the pool.	Salt level will come down on its own over time. Or you may have salt level tested and if over 5500 ppm you can drain some water out of pool and dilute with fresh water. Consult your pool professional.

PROBLEM	POSSIBLE CAUSES	WHAT TO DO
7. High Salt Icon On 	Salt level is very high. The generator could completely turn off and no longer produce chlorine until the situation is rectified.	Drain part of the water and refill the pool. It is also recommended to periodically test the salt level by a professional. If above 5500 ppm, check with your dealer about draining the pool water and refilling with fresh water.
8. “Shrt Cell” Message	Salt far too high causing “shrt cell” message.	Drain part of the water and refill the pool. It is also recommended to periodically test the salt level by a professional. If above 5500 ppm, check with your dealer about draining the pool water and refilling with fresh water.
9. “No Cell” Message	Short circuit in cell wires or disconnection in cell cable.	Check cell wires, connections and inspect cell for damages. See “Cell Wiring” on page 10.
10. Green pool	May be due to chemical imbalance, low water flow or a dirty filter.	<ol style="list-style-type: none"> 1. Make sure your filtration system is working properly (i.e. clean filter and/or skimmer). 2. Make sure circulation time is adequate – increase pump time if not. 3. Make sure total alkalinity is within 60-120 ppm. Adjust with acid if needed. 4. Shock the water to eliminate build up of any organic matter. 5. Make sure pool has a free chlorine reading of 0.5 to 1.0 ppm. 6. Have water tested by a pool professional.
11. Colored Water	<ul style="list-style-type: none"> • Metals in the fill water may have been oxidized. • Algae may be trying to form. • Chlorine level may be low. 	<ol style="list-style-type: none"> 1. Have dealer test the pool water. If high in metals use a Metal Out or Sequestering product at start-up only. 2. Increase circulation time if needed and clean the filter. 3. See “Chlorine Level Low” on page 15. 4. Check with your dealer for more information.
12. Algae	May be due to low chlorine levels or a chemical imbalance.	<ol style="list-style-type: none"> 1. Have your water tested for chlorine levels, pH, phosphates and nitrates. 2. Use a nonmetallic (polyquat) algaecide per the directions on the bottle and brush the sides of the pool often. 3. Clean the filter and shock the pool with chlorine daily until water clarity returns. 4. See “Chlorine Level Low” on page 15. 5. Check with your dealer for more information.
13. Power Outage For More Than 1 Day	• If power is out for more than one day, the mineral replacement indicator will not reflect the lost day(s).	Press  three times to get to Mineral Replacement Indicator. Adjust  by how many days the system was without power and  again to reset the timer.
14. System Down For Maintenance	New gunite pool that cannot add salt for 30 days. Down for service.	Put a POOL FROG® Bac Pac inside the POOL FROG® Mineral Hybrid Cycler to dispense a low level of chlorine. A replacement pipe must be installed in place of the the cell. See your dealer or contact King Technology for more information. 

Our Customer Service Department is open from 8:00 AM to 5:00 PM Central Standard Time, Monday through Friday. Call 800-222-0169.

Please have the following information ready:

1. Model and serial # of all components.
2. Date of installation.
3. Installing company or dealer.
4. Current salt level, chlorine level and water balance data.

Saturation Index

Test the water for pH, Alkalinity, Calcium Hardness and Temperature, then follow the simple steps below:

1. Write your pool's pH level here: pH: _____

2. Find your Alkalinity level in the chart below, and write the corresponding Alkalinity Factor here: Alkalinity Factor: _____

Pool Alkalinity	5	25	50	75	100	150	200	300	400
Factor	0.7	1.4	1.7	1.9	2.0	2.2	2.3	2.5	2.6

3. Find your Calcium level in the chart below, and write the corresponding Calcium Factor here: Calcium Factor: _____

Pool Calcium (CaCO ₃)	5	25	50	75	100	150	200	300	400
Factor	0.3	1.0	1.3	1.5	1.6	1.8	1.9	2.1	2.2

4. Find your pool water temperature in the chart below, and write the corresponding Temperature Factor here: Temperature Factor: _____

Pool Temp F	32	37	46	53	60	66	76	84	94	105
Factor	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9

5. Add the results from steps 1 through 4 above and write the result here: Total of above: _____
-12.2

6. Subtract 12.2 from step 5 and write the result here: Saturation Index = _____

- If the Saturation Index above is between -0.3 and +0.3, the water is well balanced.
- If the Index is more than 0.3, the water will tend to cause scaling or get cloudy. Alkalinity and pH should be reduced accordingly, but maintained within recommended levels.
- If the Index is less than -0.3, the water will tend to be aggressive toward the pool surface, equipment and bathers. Alkalinity and pH should be increased accordingly, but maintained within recommended levels.

Glossary

Salt: To ensure maximum benefits with the use of the system, the ideal salt level is 4000 ppm (parts per million). A low concentration of salt can hinder the generator's effectiveness. A concentration of salt above 5500 ppm may cause corrosion damage to the pool fixtures. See Adding Salt on page 6.

Total Dissolved Solids (TDS) are different from the salt level of the pool, although TDS levels rise with the addition of salt. This does not harm the pool water chemistry or clarity. To determine an accurate TDS, subtract the salt level from the TDS reading.

Free Chlorine v. Combined Chlorine: The unpleasant smells and side effects often associated with chlorine are actually caused by combined chlorine (i.e. chloramines). Combined chlorine is a chlorine molecule that has combined with a contaminant and needs to be burned off with a shock treatment to free up the chlorine again. With the POOL FROG® Mineral Hybrid depending on pump-run time per day, the combined chlorine is burned off at the point of the cell which reduces the need to shock. The free chlorine level in the pool should be maintained at 0.5 to 1.0 ppm.

pH is a measure of how acidic or basic a solution is. A scale of 0 to 14 is used to measure pH. Pure water has a pH of 7 (neutral), acid solutions have a pH of less than 7, and basic (alkali) solutions have a pH of more than 7. The recommended range is 7.2 to 7.8; chlorine is more effective within this range and the water is most comfortable for bathers. Water with very high pH levels can cause scaling in the pool, on the walls and in pipes. Low pH levels cause the water to be aggressive to the pool walls, equipment and bathers. To lower pH, add muriatic acid or dry acid, and to raise pH, add soda ash (sodium carbonate). Be sure to read and follow the respective manufacturer's instructions.

Total Alkalinity mitigates changes in pH. It is often referred to as the "big brother of pH." Keeping proper levels of total alkalinity will help reduce unwanted fluctuations in pH levels. Total alkalinity is also used to offset high or low levels of calcium hardness (see Saturation Index on previous page). Add muriatic acid or dry acid to lower total alkalinity and add baking soda (sodium bicarbonate) to raise total alkalinity. Be sure to read and follow the respective manufacturer's instructions.

Stabilizer (cyanuric acid) is necessary in most outdoor pools to prevent chlorine reduction from the sun's ultraviolet rays. Chlorine stabilizer should be maintained at 40 ppm to offset the harmful effect of the sun while maintaining the effectiveness of the chlorine.

Nitrates and Phosphates, generally associated with fertilizer thrown or sprayed on nearby grass, can put very high demands on chlorine; most often nitrates and phosphates will bring the chlorine level down to zero (0). You can have your water tested for nitrates and phosphates by the local pool professional. **No nitrates or phosphates should be in your pool.** To reduce phosphate levels, use a phosphate remover from your local pool professional. To reduce nitrate levels, the pool must be partially or fully drained, but be sure to consult your local professional before draining your pool.

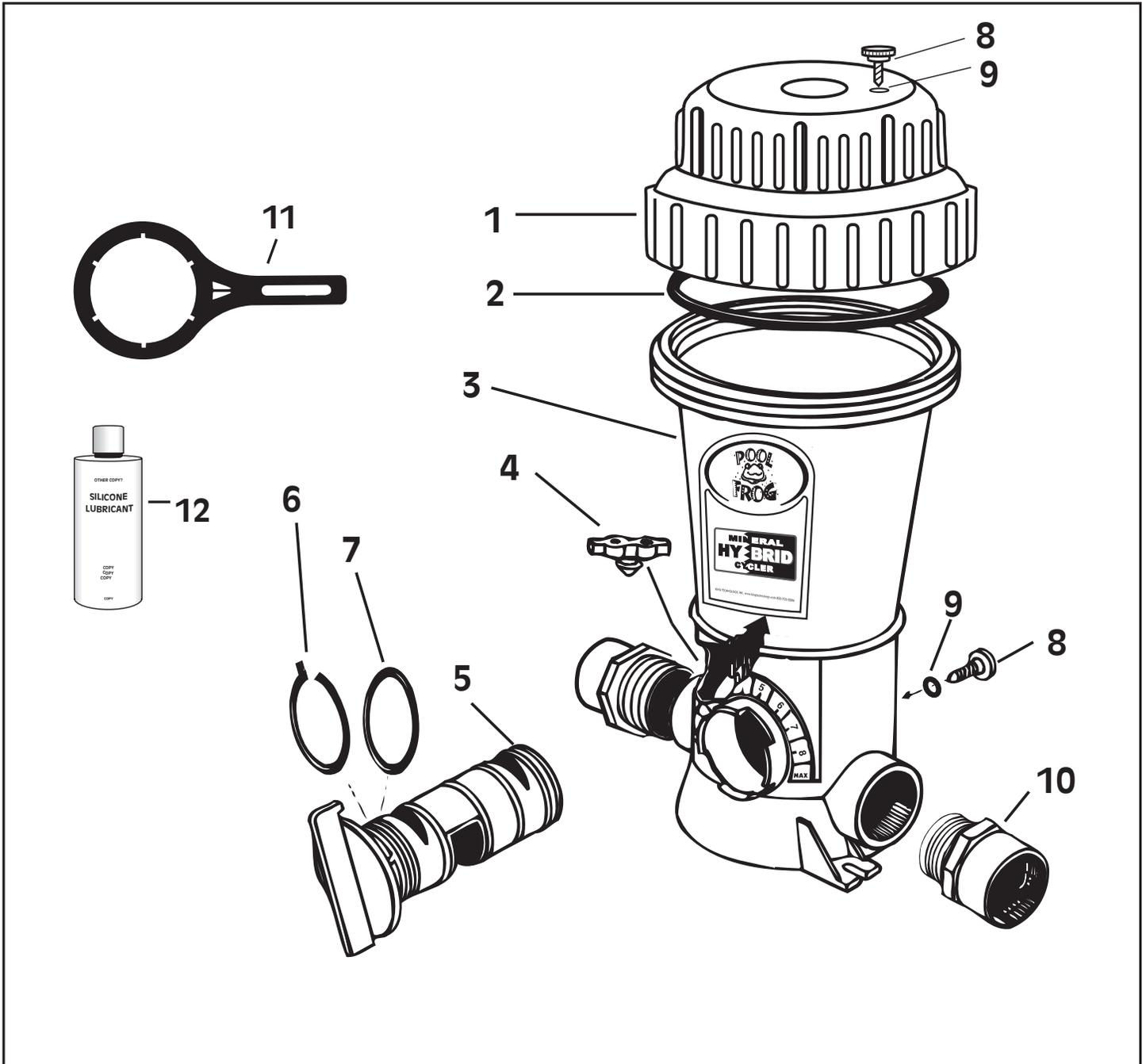
Metals (certain metals) can cause loss of chlorine and can stain your pool. If a water test reveals the presence of metals, refer to your local pool professional for recommended methods of removal prior to using the POOL FROG® Mineral Reservoir.

New Pool Water in recently filled or newly refinished pools may contain undesirable matter. The ability of the POOL FROG® Mineral Hybrid Generator to maintain your pool sanitation could be hindered by this matter so it is best to balance the pool water first.

Calcium Hardness, like pH and alkalinity, affects the water's tendency to be aggressive or scale forming. Lower levels of calcium hardness improve the chlorine generator's performance and provide softer silkier water for the swimmers.

Saturation Index determines whether the pool water is balanced, aggressive or scale forming by comprehensively taking into account all the relevant factors, including pH level, alkalinity level, calcium hardness and temperature. These factors should be tested then plugged into the worksheet on the previous page to verify the proper balance of the pool and make adjustments as necessary.

POOL FROG® Mineral Hybrid Cyclers Parts List



DIAGRAM/PARTS LIST

REF. #	PART No.	DESCRIPTION	QTY. REQ.
1 & 2	01-22-9417	Cap w/O-Ring	1
	01-22-9920	Cap O-Ring	1
3	N/A	Body	1
4	01-22-9480	Pressure Relief Valve	1
5, 6, 7	01-22-9440	Control Dial with Assembly Kit	1
6 & 7	01-22-9450	Control Dial O-Ring Kit	1
8 & 9	01-22-9940	Knob with O-Ring	2
10	01-22-9490	2" Male Adapter	2
11	01-22-8870	Cap/Control Dial Tool	1
12	01-22-9971	Silicone Lubricant	1

Parts for the POOL FROG® Mineral Hybrid Generator will be provided as needed by our warranty stations after a conversation with our customer service department.

POOL FROG® Mineral Hybrid Cycler Two-Year Limited Warranty

King Technology, Inc. warrants to the original purchaser this cycler unit will be free from any defects in workmanship and/or material, for a period of two (2) years from the date of original purchase. This warranty covers cycler body, cap and control dial, but specifically excludes o-rings. King Technology at its option may replace any defective parts or the entire unit without charge after it is determined what is needed to correct any deficiency. Replacement parts with the exception of o-rings are warranted for the remainder of the original warranty. To extend the limited warranty from two years to ten years, simply complete the warranty card that came with your unit and return it to King Technology within 30 days of purchase and installation.

1. To obtain warranty service, you must deliver the unit to King Technology or its nearest authorized dealer. Shipping expenses are the purchaser's responsibility. The name of the nearest authorized dealer can be obtained by writing or calling King Technology at the address and telephone number provided on back page. Proof of purchase is required when requesting warranty service. Purchaser must present the sales receipt or other documentation verifying proof of purchase.

2. This warranty does not cover defects caused by: Modification, alteration, repair or service of the unit contrary to the accompanying instructions; physical abuse to or misuse of the product or operation or installation in a manner contrary to the accompanying instructions. This warranty also excludes all costs arising from the installation, adjustment, removal or replacement of defective units or parts. This warranty also excludes any and all claims arising out of the chemicals used in the product or their characteristics.

3. CAUTION - Read carefully – Failure to follow these instructions will void the warranty. Do not add shock in or near skimmer.

A. This unit is not designed for shock treatment of pools. See your pool dealer or distributor for further information concerning shock treatments.

B. Misuse or failure to use the proper POOL FROG® Mineral Reservoir may cause damage to equipment or personal injury. This warranty will be null and void, if this unit is not used with the recommended POOL FROG® Mineral Reservoir.

4. This warranty is the exclusive warranty for the POOL FROG® Mineral Hybrid Cycler. This warranty is not transferable. **KING TECHNOLOGY MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER MATTER CONCERNING THE POOL FROG® MINERAL HYBRID CYCLER.** Any express warranty not provided herein, and any remedy for breach of contract but which for this provision might arise by implication or operation of law is hereby excluded and disclaimed. THE EXCLUSIVE REMEDY FOR ANY CUSTOMER IS THE REPAIR OR REPLACEMENT OF THE UNIT, AND THE RECOVERY OF DAMAGES WILL NOT EXCEED THE PURCHASE PRICE OF THE UNIT. IN NO EVENT WILL KING TECHNOLOGY BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL OR PUNITIVE DAMAGES FROM ANY CAUSE.

5. Under no circumstance shall King Technology be liable to purchaser or any other person for any damage or loss incurred because of any chemicals used in the product or their physical characteristics, or interruption of service of the product, or any resulting special, incidental or consequential damages or losses. Some states do not allow the exclusion or limitation of incidental consequential damages, so the above limitation or exclusion may not apply to you.

POOL FROG® Mineral Hybrid Generator Three-Year Limited Warranty

This warranty applies to the chlorine generator and their factory-supplied components (the generator) when purchased from an authorized dealer and used for residential swimming pools or spas. King Technology, Inc. warrant the generator to be free from defects in materials and workmanship in the manufacturing process for a period of three (3) years from the purchase date, when properly installed and operated in accordance with the relevant manuals. For one (1) year after the generator's original purchase date, should the generator exhibit a manufacturing defect, King Technology, Inc. will install comparable replacement parts **without charge for parts or labor**. For the subsequent 2 years, if a part has a manufacturing defect, King Technology, Inc. will replace it with a comparable part and charge 60% of the latest list price plus the cost of shipping.

EXCEPTIONS & LIABILITY LIMITATIONS

This warranty is the exclusive warranty for the generator. This warranty is not transferable. **KING TECHNOLOGY MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER MATTER CONCERNING THE GENERATOR.** Any express warranty not provided herein, and any remedy for breach of contract but which for this provision might arise by implication or operation of law is hereby excluded and disclaimed. YOUR EXCLUSIVE REMEDY IS THE REPAIR OR REPLACEMENT OF THE UNIT, AND IN NO EVENT SHALL IT EXCEED THE PURCHASE PRICE OF THE UNIT. IN NO EVENT WILL KING TECHNOLOGY BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL OR PUNITIVE DAMAGES FROM ANY CAUSE. Labor cover-

age is applicable only for installations within a 50-mile radius of an authorized dealer. King Technology, Inc., and their suppliers, dealers, and distributors SHALL NOT BE LIABLE FOR DAMAGE OF ANY SORT OR NATURE RESULTING FROM ABUSE, MISUSE, NEGLIGENCE, LIGHTNING, ABNORMAL WEATHER CONDITIONS, OR ACT OF GOD; OR DAMAGE CAUSED BY IMPROPER OR UNAUTHORIZED INSTALLATION OR REPAIR. This warranty applies only to components supplied by the factory and only where such components have been installed and maintained in compliance with the respective installation and operation manuals and instructions and applicable ordinances and codes. In no event shall the liability exceed the purchase price of the product. THE CONSUMER SHALL BE LIABLE AT STANDARD RATES FOR ANY SERVICE VISIT WHERE NO MANUFACTURING DEFECT WAS PRESENT AND FOR ALL SERVICE VISITS REQUESTED AFTER THE THIRD YEAR FOLLOWING THE ORIGINAL PURCHASE DATE.

PROOF OF PURCHASE

The consumer is responsible for establishing the original purchase date and the purchaser's identity for warranty purposes. We recommend that a bill of sale, canceled check, or some other appropriate payment record be kept for that purpose. The express warranty above constitutes the sole and complete warranty and takes precedence over all other warranties, whether expressed or implied, including a warranty for fitness for a particular purpose. No sales representative, dealer, distributor, or other person is authorized to give any warranty on behalf of King Technology, Inc.



Manufactured by: KING TECHNOLOGY, INC.
530 11th Avenue South, Hopkins, MN 55343 U.S.A.
952-933-6118 . 800-222-0169 . FAX 952-933-2206
www.kingtechnology.com

Assembled from components made in the U.S.A. and Israel.
Covered by one or more of the following U.S. Patent Numbers: 4,662,387; 5,076,315; 5,218,983; 6,210,566; 6,217,892; 6,383,507; 6,544,415; 6,551,609; 6,652,871 and other U.S. and Foreign Patents Pending.

PN #20-48-0162
553011043R6N

Owner's Registration Form

Owner's Name _____ Signature _____

Street Address _____

City _____ State _____ Zip _____

Phone # _____ E-Mail _____

Authorized Dealer _____ Sales Rep _____

City _____ State _____ Zip _____

Cell Serial #: (on colored end of cell) _____

Control Panel Serial # _____ (8 digit number on bar code label on side of control panel)

Cycler Serial # _____ (Located on side of cycler above port opening.) Date Installed _____

Comments _____

IN ORDER TO ACTIVATE YOUR WARRANTY PLEASE RETURN THIS PORTION TO:

KING TECHNOLOGY, INC., 530 11th Avenue South, Hopkins, MN 55343
or fax to 952-646-4300 or register online at www.kingtechnology.com

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