

MINERAL SPRINGS™

BASIC POOL MAINTENANCE REQUIREMENTS

	TEST	IDEAL RANGE	ADJUSTMENT REQUIRED
WEEKLY	Sanitizer	1.0 - 3.0 ppm	Turn output dial up to increase, down to decrease -OR- increase or decrease pump filtration time.
	pH	7.2 - 7.8	Too high - add BioGuard® Lo'N'Slo® Too low - add BioGuard Balance Pak® 200
MONTHLY	Alkalinity	80 - 150 ppm	Add BioGuard Balance Pak® 100 to increase Add BioGuard Lo'N'Slo® to decrease
	Minerals	2700 - 3200 ppm	Add Beginnings™ to increase
MONTHLY	Stabilizer	50 - 80 ppm	Add BioGuard Stabilizer 100™ to increase
	Calcium	200 - 400 ppm	Add BioGuard Balance Pak® 300 to increase Drain and add water to decrease
	Electrolytic Cell	inspect & clean	Refer to section in manual



OPERATION AND INSTALLATION MANUAL

For Models MS-20, MS-21, MS-22, and MS-23

For questions concerning water chemistry or product information:

www.bioguard.com

BioGuard Mineral Springs dealer

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IMPORTANT SAFETY INSTRUCTIONS

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

- **READ AND FOLLOW ALL INSTRUCTIONS**
- Disconnect all AC power during installation.
- Warning - To reduce the risk of injury, do not permit children to use this product unless they are closely supervised at all times.
- A green colored terminal marked "Earth Ground" is located inside the wiring compartment. To reduce the risk of electric shock, this terminal must be connected to the grounding means provided in the electric supply service panel with a continuous copper wire equivalent in size to the circuit conductors supplying the equipment.
- One bonding lug for US models (two for Canadian models) is provided on the external surface. To reduce the risk of electric shock, connect the local common bonding grid in the area of the swimming pool, spa, or hot tub to these terminals with an insulated or bare copper conductor not smaller than 8 AWG US / 6 AWG Canada.
- All field installed metal components such as rails, ladders, drains, or other similar hardware within 3 meters of the pool, spa or hot tub shall be bonded to the equipment grounding bus with copper conductors not smaller than 8 AWG US / 6 AWG Canada.
- **SAVE THESE INSTRUCTIONS**

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OPERATION

The Mineral Springs™ System

Mineral Springs is an automatic sanitizer generation system with a built in filter timer specifically designed for pools up to 18,000 gallons. The operation requires a low concentration of minerals (*Beginnings*™) in the pool water. Mineral Springs automatically sanitizes your pool by converting the minerals into free chlorine which kills bacteria and algae in the pool. This process is called electrolysis.

The System consists of three basic parts: The Mineral Springs Unit, Mineral Springs *Beginnings*™, and Mineral Springs *Renewal*™. These components are an essential part of the Mineral Springs System.

The Mineral Springs Unit

The Mineral Springs Unit contains three parts, the electronic controller, the electrolytic cell and flow detection switch. A temperature sensor and mineral level sensor are built into the electrolytic cell. The cell and flow switch are plumbed into the pool return piping. The flow switch informs the controller that water is flowing and the generation process can start. The temperature and mineral level sensors keep the Mineral Springs controller calibrated regardless of pool temperature. The cell contains a series of specially coated electrode plates and is where the sanitizer generation occurs. The amount of sanitizer generated by Mineral Springs is a function of filter time, pool mineral level, water temperature, and the setting on the "Sanitizer Output Control %".

Mineral Springs incorporates a built in timer to control the pool filter. This timer insures that the proper daily filtration and sanitization occurs. Mineral Springs is designed to handle the sanitization needs of the average residential swimming pool of up to 18,000 gallons (67,500 liters). The actual amount of chlorination required to properly sanitize a pool varies depending upon bather load, rainfall, temperature, and the cleanliness of the pool.

This model, designed for above ground pools, is available with several different options to allow for easy installation. The cell may be connected with 1 ½" - 1 ¼" flexible hose or to 2" rigid PVC pipe when the MS-20 and MS-21 options are ordered, or the cell may be mounted directly to the pool return jet when the MS-22 option is ordered. Similarly, the electrical connections may be made via 120V/15A straight blade linecord and receptacle (standard) or via a 120V/15A twist lock linecord and receptacle when the MS-21 is ordered.

- MS-20 (25192BIO) Straight blade 120V/15A linecord/receptacle (standard); adapters for 1 ½" - 1 ¼" flexible hose or 2" rigid PVC piping
- MS-21 (25194BIO) Twist lock 120V/20A linecord/receptacle; adapters for 1 ½" - 1 ¼" flexible hose or 2" rigid PVC piping
- MS-22 (25195BIO) Straight blade 120V/15A linecord/receptacle (standard); adapters for return jet mounting

LIMITED WARRANTY Goldline warrants its Aqua Rite, Aqua Rite Pro, Aqua Trol, Aqua Logic and Pro Logic products (products with Goldline part numbers starting with AQ-RITE-, AQ-RT-PRO, AQ-TROL-, AQ-LOGIC-, AQL-P-, AQL-PS-, AQL-CL-, PL-P-, PL-PS-, and HPC-2) to be free from defects in material or workmanship, under normal use and service:

For **three years** from the date of the initial system installation on private, residential swimming pools within the USA or Canada and **one year** from the date of initial system installation on commercial installations, installations outside of the USA or Canada and for any replacement parts or accessory products, provided they are installed in accordance with the Goldline installation instructions and specifications provided with the product. If written proof of the date of the initial system installation is not provided to Goldline, the manufacturing datecode on the Aqua Rite, Aqua Rite Pro, Aqua Trol, Aqua Logic and Pro Logic electronics unit will be the sole determinant of the date of the initial system installation.

For residential installations in USA or Canada: If a product is defective in workmanship or materials and is removed and returned freight prepaid within three (3) years after the date of the initial system installation, Goldline will, at its option, either repair or replace the defective product and return it freight prepaid.

For commercial installations, installations outside the USA and Canada, and accessory products and replacement parts: If a product is defective in workmanship or materials and is removed and returned freight prepaid within one (1) year after the date of the initial system installation, Goldline will, at its option, either repair or replace the defective product and return it freight prepaid.

Contact any Goldline dealer or contact Goldline at 61 Whitecap Drive, North Kingstown, RI 02852 for warranty service. The costs incurred in removal and/or reinstallation of the product are NOT covered under this warranty. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

WARRANTY EXCLUSIONS:

1. Material supplied or workmanship performed by others in process of installation.
2. Damage resulting from improper installation including installation on pools larger than the product rating.
3. Problems resulting from failure to operate the product(s) in accordance with the recommended instructions contained in product's owners manual(s).
4. Problems resulting from failure to maintain pool water chemistry in accordance with the recommendations in the owners manual(s).
5. Problems resulting from tampering, accident, abuse, negligence, unauthorized repairs or alterations, fire, flood, lightning, freezing, external water, degradation of natural stone used in or immediately adjacent to a pool or spa, war or acts of God.

DISCLAIMER. THE EXPRESS LIMITED WARRANTY ABOVE CONSTITUTES THE ENTIRE WARRANTY OF GOLDLINE WITH RESPECT TO ITS POOL AUTOMATION AND CHLORINATION PRODUCTS AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE. IN NO EVENT SHALL GOLDLINE BE RESPONSIBLE FOR ANY CONSEQUENTIAL, SPECIAL OR INCIDENTAL DAMAGES OF ANY NATURE WHATSOEVER, INCLUDING, BUT NOT LIMITED TO, PERSONAL INJURY, PROPERTY DAMAGE, DAMAGE TO OR LOSS OF EQUIPMENT, LOST PROFITS OR REVENUE, COSTS OF RENTING REPLACEMENTS, AND OTHER ADDITIONAL EXPENSES, EVEN IF THE SELLER HAD BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. SOME STATES DO NOT ALLOW THE EXCLUSION OF LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

NO WHOLESALE, AGENT, DEALER, CONTRACTOR OR OTHER PERSON IS AUTHORIZED TO GIVE ANY WARRANTY ON BEHALF OF GOLDLINE.

THIS WARRANTY IS VOID IF THE PRODUCT HAS BEEN ALTERED IN ANY WAY AFTER LEAVING THE FACTORY.

Mineral Springs Beginnings

(Required number of bags to raise mineral level to 3000 ppm)

Current Mineral Level (ppm)	Pool Size -- Gallons						
	6000	8,000	10,000	12,000	14,000	16,000	18,000
0	6	8	10	12	14	16	18
200	6	7	9	11	13	15	17
400	5	7	9	10	12	14	16
600	5	6	8	10	11	13	14
800	4	6	7	9	10	12	13
1000	4	5	7	8	9	11	12
1200	4	5	6	7	8	10	11
1400	3	4	5	6	7	9	10
1600	3	4	5	6	7	7	8
1800	2	3	4	5	6	6	7
2000	2	3	3	4	5	5	6
2200	2	2	3	3	4	4	5
2400	1	2	2	2	3	3	4
2600	1	1	1	2	2	2	2
2800	.5	1	1	1	1	1	1
3000	ideal	ideal	ideal	ideal	ideal	ideal	ideal
3200	ok	ok	ok	ok	ok	ok	ok
3400	ok	ok	ok	ok	ok	ok	ok
3600+	dilute	dilute	dilute	dilute	dilute	dilute	dilute

5. "High Minerals" LED illuminated

Check mineral level in pool/spa. If the mineral level is too high, lower the mineral level by draining some of the pool water out of the pool and replacing it with fresh water. Continue until the mineral concentration is at recommended levels.

6. "Inspect Cell" LED flashing

Inspect and clean cell according to directions on page 6. When done, press the "diagnostic" button for 3 seconds to stop the "Inspect Cell" LED flashing.

7. "Inspect Cell" LED illuminated

Remove and inspect the cell for scale. If the cell is scaled, follow the directions on page 6 for cell cleaning. If the pool has the proper amount of minerals and the "Inspect Cell" LED is still illuminated, the cell may be worn and need replacement.

8. Possible causes of little or no free chlorine residual

- Mineral Springs switch in OFF position.
- Sanitizer Output Control % adjustment setting is too low.
- Low stabilizer (Cyanuric Acid).
- Filter pump time too short (10-12 hours for average size pools, more for large pools).
- Mineral level too low (below 2500 ppm, Low Salt LED on).
- Mineral level too high (High Salt LED on).
- Very warm pools increase sanitizer demand--increase Output %, or filter run time.
- Cold water (below 50°F) causes Mineral Springs to stop generating (Generating LED flashing).
- Excessive scaling on cell.
- High level of Nitrogen in pool water.
- Mustard Buster, "Yellow Out", or similar treatment recently used. Some yellow algae treatments will use sanitizer at a very high rate and deplete the residual free chlorine. Manually shock the pool if indicated in the directions on the algae treatment. It still may be a matter of days before the pool returns to "normal" and chlorine tests will show the desired 1-3ppm free chlorine reading.

9. "-Pcb-" displayed and all 4 red/yellow LEDs are illuminated.

A possible Printed Circuit Board fault has been detected. Call for service.

Mineral Springs Beginnings

Beginnings is the first step in creating a mineral water bathing system in your pool. The essential elements of *Beginnings* make it possible to fully enjoy the Mineral Springs System. The ideal mineral level is between 2700-3200 ppm (parts per million) with 3000 ppm being optimal. A low mineral level will reduce the efficiency of the Mineral Springs System and result in low sanitizer production. Mineral Springs will operate properly with mineral levels up to 3500 ppm. The chart above will help you determine how much *Beginnings* is needed to reach recommended levels. Use the equations below if pool size is unknown.

	Gallons (pool size in feet)	Liters (pool size 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

For Initial Application:

Backwash and clean filter with BioGuard® Strip Kwik® per label directions. Balance your pool water and adjust pH between 7.4-7.6. Add 1 bag of *Beginnings*™ per 1,000 gallons. Apply evenly at deep end of pool with pump operating. Brush any undissolved product from the bottom of the pool. *Beginnings* may cause temporary clouding of the water. This temporary clouding should clear within 24 hours with proper water circulation.

For Spring Start-Up:

To determine proper application for spring start-up, have your pool water tested by your BioGuard Mineral Springs™ dealer.

Mineral Springs™ *Renewal*™

The weekly application of *Renewal* is all you need to rejuvenate your Mineral Springs System and maintain soft, gentle, sparkling pool water. Replacing lost minerals and restoring pool water's sparkle couldn't be more simple.

- **TEST** for free chlorine and pH.
- **ADJUST** pH to maintain a 7.4-7.6 level.
- **REGULATE** Sanitizer Output Control % to maintain 1-3 ppm free chlorine
- **ADD** Mineral Springs *Renewal* on a weekly basis.

For Maintenance Application:

1. To maintain soft, gentle, sparkling pool water, add one pound (approximately 1 ½ cups) of *Renewal* per 5,000 gallons of water per week.
2. Broadcast evenly around the edges in the deep end of the pool when the pool is not in use.
3. Add when pump and filter are operating. Allow pool water to circulate for 15 minutes after application.
4. Reapply after heavy rain showers (2 inches of rain with 24 hours).
5. Have your pool water tested monthly by your BioGuard Mineral Springs dealer.

Mineral Springs Renewal Needed for Weekly Application	
Pool volume in gallons	Pounds of Renewal
5,000	1
7,500	1.5
10,000	2
12,500	2.5
15,000	3
17,500	3.5

Pool Water Testing

When your Mineral Springs™ unit is first installed, you should test the chemistry of your pool water daily to determine the proper "Sanitizer Output Control %" setting. A water sample bag is provided for this purpose. Monthly, you should have your BioGuard® Mineral Springs dealer check all seven of the pool water and water balance values listed in the chart below. Any time the pool water appears cloudy, forms algae or shows signs of a problem, have all these pool water values tested immediately. If this is a fresh fill, balance your pool water according to the recommended parameters.

Test The Pool Water For:	Chemical Ranges	Comments
Total Available Chlorine	1.0 - 3.0 ppm	Formula: TAC = Total Available Chlorine FAC = Free Available Chlorine (TAC) - (FAC) = Combined Chlorine
Combined Chlorine	- Zero -	
Free Available Chlorine	1.0 - 3.0 ppm	
pH	7.4 - 7.6	
Total Alkalinity	80 - 150 ppm	150 ppm Max
Calcium Hardness	200 - 400 ppm	200 - 275 ppm is ideal in plaster pools
Metals	- Zero -	

Troubleshooting

Visit www.bioguard.com for helpful information on operation, maintenance and troubleshooting your Mineral Springs™ Electronic Sanitizer.

Diagnostic Displays

Sequential pushes of the small "diagnostic" button next to the LCD display will cause the Mineral Springs to display the following information:

1. Pool temperature (xx degrees Fahrenheit or Celsius)
2. Cell voltage (typically 22.0 to 25.0 volts when sanitizer is being generated, otherwise 30-35V)
3. Cell current (typically 4.50 to 7.80 amps when sanitizer is being generated, otherwise 0 amps)
4. Sanitizer Output Control % ("0P" -- "100P" depending on knob position.
5. Instant mineral level (-xxxx ppm or -x.xx grams/Liter)
6. AL-0, AL-1, AL-2 will display (not applicable for MS-20/21/22/23 models)
7. Software revision level (r1.xx)

On the 8th push of the button the display will revert back to the default mineral display. Also, if the button is not pushed for 30 seconds, the display will revert back to the standard mineral display.

Common Problems and Solutions

1. "Power" LED not on

Check to make sure either 120VAC or 240VAC input power is connected to the proper screw terminals at the Mineral Springs control. Verify input voltage with a voltmeter. If there is input power, the fuse may have blown. The Mineral Springs is protected by a 20 amp mini ATO fuse located on the circuit board above the cell connector.

2. "Generating" LED flashing

The temperature of the pool water is too high or low to operate. You can override this by switching the main switch to SANITIZER BOOST. The Mineral Springs will run at maximum output for the remainder of the current pump cycle or 24 hours, whichever comes first.

3. "No Flow" LED illuminated (MS-20/21 only)

The Mineral Springs has sensed a no flow condition and has stopped generating sanitizer. Check that the flow switch is plugged into the connector on the bottom of the control unit and that the wire is not cut or damaged. Make sure you have at least 12" of straight pipe before the flow switch. If there is adequate flow and the LED is still on, check that the arrows on the flow switch (on top of hex) are pointing in the direction of flow. The Mineral Springs MS-22/23 does not use a flow switch and consequently this LED should never be illuminated.

4. "Low Minerals" LED illuminated or flashing

Check mineral level in pool/spa. If the mineral level is low, add Mineral Springs™ Beginnings according to chart on page 2. Before adding large quantities of minerals, it is advisable to have your mineral level professionally checked at your BioGuard Mineral Springs dealer.

Bonding

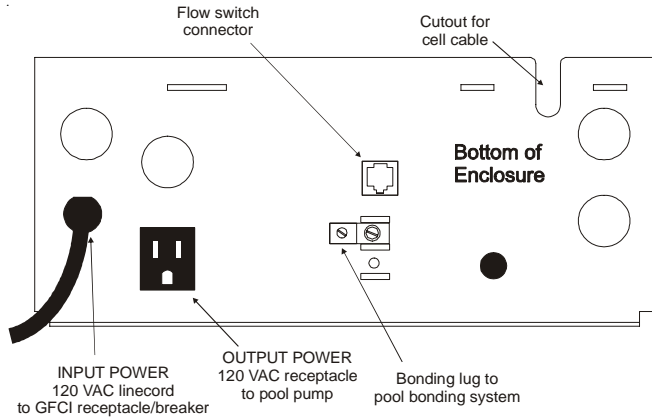
A lug used for bonding is attached to the bottom of Mineral Springs™ enclosure (see diagram below). Mineral Springs must be bonded with an 8 AWG copper wire to the pool bonding system.

Pump Output

Mineral Springs filter pump output is rated at 120 VAC, 15 A max. Check the electrical rating marked on the pump motor. Connecting a pump with a higher amperage rating may result in permanent damage to the Mineral Springs. The 120 VAC standard or twist lock pump receptacle is located outside, on the bottom of the enclosure.

Electrolytic Cell and Flow Switch

The electrolytic cell and flow switch are terminated with connectors which plug into the Mineral Springs, for easy attachment and removal. The door of the Mineral Springs must be open to access the cell cable connector. The flow switch (for models MS-20 and MS21 only) plugs into a connector (similar to a telephone jack) located outside, on the bottom of the enclosure. Refer to the diagram below for the location of these connections.



- **DO ADD** Mineral Springs *Renewal*™ weekly to maintain sparkling clear water and mineral balance. Minerals can be lost through backwashing, dilution, splash-out, etc. and are replenished with Mineral Springs *Renewal*.
- **DO** operate pool pump a minimum of 10-12 hours per day.
- **DO** test pool water parameters weekly.
- **DO** keep pool water balanced.
- **DO** change Sanitizer Output Control % for varying sanitizer consumption to prevent over or under chlorination of water. We recommend 1-3 ppm (parts per million) of free available chlorine.
- **DO NOT** use copper based algicides other than BioGuard *Banish*™ to prevent potential staining.
- **DO NOT** operate unit if pool water temperature is at or below 50°F.
- **DO NOT** attempt to perform repairs yourself.
- **DO** contact your BioGuard Mineral Springs dealer if you have any questions regarding proper water maintenance for your Mineral Springs System.

Mineral Springs Controls

Timer

The pool filter pump should run 10-12 hours per day. Set the Mineral Springs timer by rotating the clock hands in a clockwise direction. The arrow (approximately 2 o'clock on dial) points to the current time. The internal "hands" show time at a glance. On the outside of the timer, there are a series of small slide trippers. Each tripper controls a 15 minute interval. Set trippers for the desired run time.

- OFF** - Push trippers IN (toward center)
- ON** - Pull trippers OUT (away from center)

Manual Control

The manual control can override the timer and is located at approximately the 4 o'clock position.

- "1" (up)** - pump ON
- " " (center)** - timer controls pump
- "0" (down)** - pump OFF

The Main Switch

Auto: For normal operation, the Main Switch should be left in the AUTO position. In this position Mineral Springs™ will produce sanitizer according to the "Sanitizer Output Control %" setting for the entire filtering/pumping cycle.

Sanitizer Boost: When you have an abnormally high bather load, a large amount of rain, a cloudy water condition, or any other condition which needs a large amount of sanitizer to be introduced, put the Main Switch in the SANITIZER BOOST position. This electronically "super sanitizes" the water for 24 hours (filter pump must be on during this time) or until the power has been turned off, whichever comes first. At the end of the sanitizer boost cycle, be sure to put the switch back into the AUTO position.

Off: The OFF position prevents Mineral Springs from energizing the electrolytic cell. In this position there is no sanitizer generation. NOTE: To service any of the pool equipment or the Mineral Springs unit, turn the power off at the circuit breaker.

The Sanitizer Output Control %

The “Sanitizer Output Control %” is located in the lower center of the Mineral Springs control panel. This setting is used to control the amount of sanitizer Mineral Springs generates. Raise this setting to increase sanitizer level and lower it to decrease sanitizer level.

Indicator LED's

POWER When illuminated, the Mineral Springs has input power.

GENERATING This LED is on steady during normal operation. When flashing, the pool water is too hot or cold to operate.

SANITIZER BOOST Illuminates during the Sanitizer Boost cycle. See description above.

NO FLOW When illuminated, the flow switch has detected no flow and Mineral Springs has stopped generating sanitizer. A flashing LED indicates a 15-60 second time delay period.

LOW MINERALS When flashing, the mineral level is low (below 2700ppm) and Mineral Springs™ is generating at low efficiency. When illuminated steady, the mineral level is too low and Mineral Springs has shut down. Before adding large quantities of *Beginnings*™, it is advisable to have your mineral level checked by your BioGuard Mineral Springs dealer.

HIGH MINERALS The mineral level is too high and Mineral Springs has shut down.

INSPECT CELL A flashing indicator signifies that either the cell efficiency is reduced or that it is time for regularly scheduled cell inspection. In either case, inspect cell and clean if necessary. When illuminated steady, cell efficiency is greatly reduced and the Mineral Springs™ has stopped producing sanitizer. Inspect, clean or replace if necessary.

Mineral Display

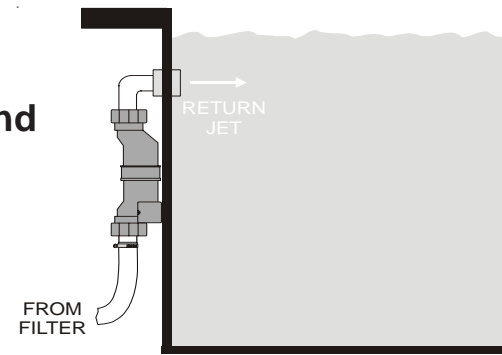
The Mineral Display shows the current mineral concentration of the pool water. Readings are in ppm (parts per million). Refer to the section on Mineral Springs *Beginnings*™ for recommended mineral levels as well as how to add/remove minerals.

The factory default display is in English units (ppm). If Metric units (grams per liter) are preferred, push the small button next the display once. The display will now show the pool temperature. With the temperature displayed, move the main switch from AUTO to SANITIZER BOOST and back to AUTO. The temperature display will instantly switch to Celsius and the mineral display will switch to grams/liter. Repeat this process to switch back to English units (ppm and Fahrenheit).

Operation

By understanding how Mineral Springs operates, you'll be sure to use it more effectively for maximum convenience and performance. Assuming that the water chemical levels are in the recommended range, there are three factors that you can control which directly contribute to the amount of sanitizer Mineral Springs will generate:

MS-22 and MS-23

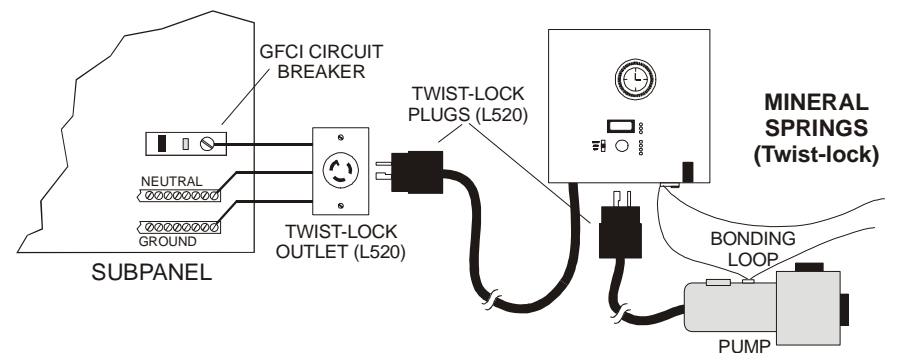
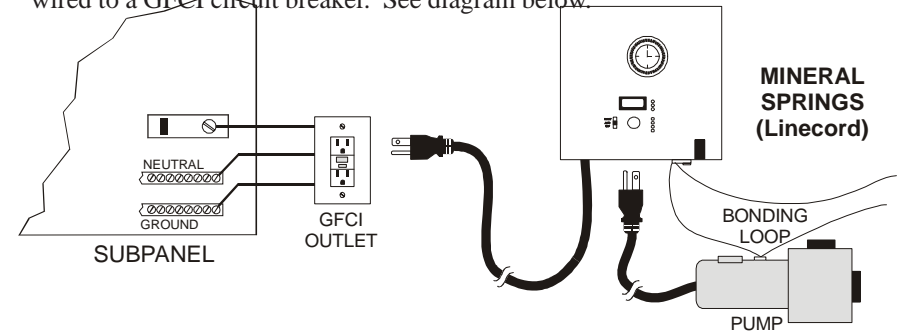


Wiring

Power must be shut off at the circuit breaker before performing any wiring. Be sure to follow Local and NEC electrical codes. Mineral Springs™ has been designed to easily wire into typical above ground pool systems. To provide safe operation, Mineral Springs must be properly grounded and bonded.

Input Power

Models with the standard 120 VAC line cord should be plugged into a GFCI receptacle. Twist lock models should be plugged into a twist lock receptacle wired to a GFCI circuit breaker. See diagram below.

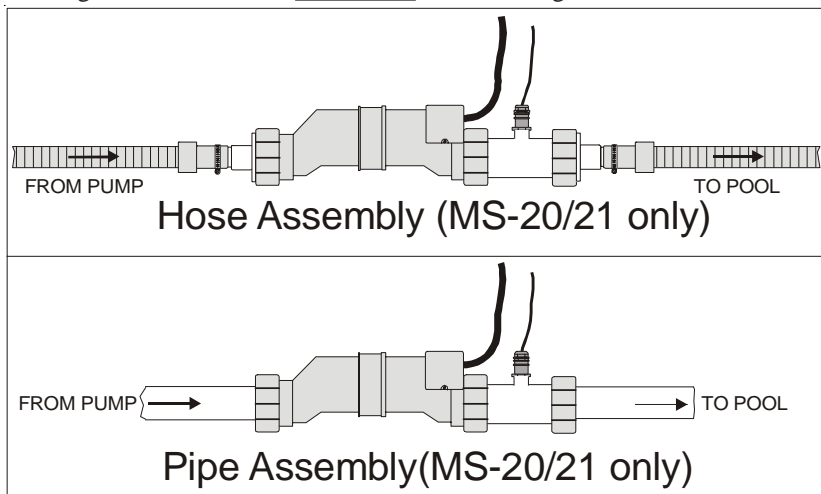


Plumbing

The flow switch and cell are plumbed in the return line to the pool. Install after (downstream) all the pool equipment (filter, heater, solar, etc.). The kit included in Mineral Springs™ provides the necessary plumbing components for both 2" rigid PVC piping installation or 1½ - 1¼" flexible hose installation. An overview of Mineral Springs system is shown on the previous page.

Hose systems (MS-20/21): Two tailpiece ends are provided for installation with 1.5" or 1.25" hose. Before installing tailpieces, remove the O-rings from the pipe unions (not used) and insert into hose tailpiece ends. Attach one tailpiece to the upstream end of the Cell using one of the included union nuts. Attach the other tailpiece to the threaded end of the flow switch using the other union nut. Now attach the flow switch to the cell. This assembly is now ready to be plumbed into the return line of the pool. Position the assembly with the flow switch downstream from the cell (see diagram below) and plumb the assembly into 1¼" or 1½" flexible hose pipe using the supplied hose clamps. Tighten all union nuts **BY HAND** for a watertight seal.

Pipe systems (MS-20/21): Attach the union nut end of the flow switch to the downstream end of the cell. The assembly is now ready to be plumbed into the return line of the pool. Cut a section of return line to the dimensions of the assembly. Slip a supplied union nut over each open return line end, being sure to position the threaded side toward the open end. Glue a pipe union onto each return line end, being sure to position the O-ring side toward the open end. Position the cell/flow switch assembly with the flow switch downstream from the cell (see diagram below) and fasten by tightening union nuts on return line ends. Tighten all union nuts **BY HAND** for a watertight seal.



Return Jet installation (MS-22/23): Unscrew the hose adaptor from the pool return jet fitting and in its place screw in the right-angle cell mounting adaptor. Note that this installation does NOT require a flow switch; however it is very important that the cell be mounted vertically directly below the return jet in order to allow the gases produced in the cell to naturally dissipate in the pool. Attach the cell to the union and then use the fittings supplied to attach the lower end of the cell to either the hose or rigid PVC pipe coming from the pools filtration system. Tighten all union nuts **BY HAND** for a watertight seal. See diagram on the top of page 10.

1. filter time each day (hours)
2. the amount of mineral in the pool
3. the "Sanitizer Output Control %" setting

A variance in any one of these factors from day to day will affect the amount of sanitizer produced by Mineral Springs. Out of these three, two factors will remain relatively constant. The filter timer will power Mineral Springs for the same amount of time (cycle time) everyday and the mineral level should be fairly constant. Therefore, you should only need to change the "Sanitizer Output Control %" setting to increase or decrease the amount of sanitizer generation. Also, it is important to be aware that a change in filtering time or mineral concentration will require some readjustments to the "Sanitizer Output Control %" setting to achieve the same sanitizer generation level.

To find the optimum "Sanitizer Output Control %" setting, start at a fairly high setting and work downward. It will take a few days of adjustments to find the ideal setting for your pool. Once determined, it should only take minor adjustments, if at all, to compensate for differing mineral levels due to splash-out, backwashing, rain, etc. Because the production of sanitizer is affected by water temperature, it is important to check sanitizer levels during periods of unusually high or low pool water temperatures. The Mineral Springs™ control is designed to turn OFF at pool water temperatures below 50° F. If your pool will be below this temperature for any length of time, you must sanitize manually.

NOTE: The Mineral Springs control enclosure will become warm to the touch. Mineral Springs dissipates heat whenever the electrolytic cell is energized. The amount of heat dissipated is directly related to the amount of sanitizer being generated.

Maintaining the Mineral Springs System

The Mineral Springs electronic control, temperature sensor, mineral sensor and flow detection switch are virtually maintenance free and should give you years of troublefree use. To maintain maximum performance, it is recommended that you open and visually inspect the cell every 3 months or after cleaning the filter.

The Mineral Springs electrolytic cell has a self cleaning feature incorporated into the electronic control's logic. In most cases this self cleaning action will keep the cell working at optimum efficiency. In areas where water is hard (high mineral content) and in pools where the water chemistry has been allowed to get "out of balance", the cell may require periodic cleaning. The INSPECT CELL LED will indicate if cell efficiency is decreased and servicing is necessary. If the INSPECT CELL LED remains on after a thorough cleaning, the cell may be worn and require replacement.

Servicing and Cleaning the Mineral Springs cell

Turn off power to Mineral Springs before removing the electrolytic cell. Once removed, look inside the cell and inspect for scale formation (light colored crusty or flaky deposits) on the plates and for any debris which has passed through the filter and caught on the plates. If no deposits are visible, reinstall. If deposits are seen, use a high pressure garden hose and try to flush the scale off. If this is not successful, use a plastic or wood tool (do not use metal as this will scratch the coating off the plates) and scrape deposits off plates. A buildup on the cell indicates that there is an unusually high calcium level in the pool. If this is not corrected, you can expect to have to periodically clean the cell. If calcium levels are unusually high, use BioGuard® Scale Inhibitor™ on a regular basis.

Mild Acid Washing: Use only in severe cases where flushing and scraping will not remove the majority of deposits. To acid wash, turn off power to Mineral Springs. Remove cell from piping. In a clean plastic container, mix a 4:1 solution of water to muriatic acid (one gallon of water to one quart of muriatic acid). ALWAYS ADD ACID TO WATER - NEVER ADD WATER TO ACID. Be sure to wear rubber gloves and appropriate eye protection. The level of the solution in the container should just reach the top of the cell so that the wire harness compartment is NOT submerged. It may be helpful to coil the wiring before immersing the cell. The cell should soak for a few minutes and then rinse with a high pressure garden hose. If any deposits are still visible, repeat soaking and rinsing. Replace cell and inspect again periodically.

Winterizing

The Mineral Springs™ electrolytic cell and flow detection switch will be damaged by freezing water just as your pool plumbing would. In areas of the country which experience severe or extended periods of freezing temperatures, be sure to drain all water from the pump, filter, and supply and return lines before any freezing conditions occur. The electronic control is capable of withstanding any winter weather and should not be removed.

Winter Operation

In areas of the country where pools are operated throughout the winter season, some minor adjustments are necessary. The “Sanitizer Output Control %” will need to be turned down due to the cooler water temperatures. With cooler temperatures, less sanitizer is required. At a temperature of 50°F, Mineral Springs will automatically shut down. During winter operation, Mineral Springs *Renewal* should be added monthly at a rate of 1 pound (1½ cups) per 5,000 gallons.

Spring Start-up

DO NOT turn Mineral Springs on, until the pool water chemistry has been brought to the proper levels. This information can be found on page 3. Have your water tested by your BioGuard® Mineral Springs dealer to determine proper application of *Beginnings*™.

INSTALLATION

Installation must be performed in accordance with Local and NEC codes.

Preparing Pool Water

Refer to page 3 for recommended chemical levels. The pool's chemistry must be balanced BEFORE activating Mineral Springs™.

Mounting the Mineral Springs Control

Mineral Springs is contained in a raintight enclosure that is suitable for outdoor mounting. The control must be mounted a minimum of 5 ft horizontal distance (or more if local codes require) from the pool.

The control is designed to mount vertically on a flat surface. Because the enclosure also acts as a heat sink (disperses heat from inside the box), it is important not to block the four sides of the control. Do not mount Mineral Springs in a panel or tight enclosed area.

