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BIO2

Domestic Spa Bromine Generator

READ THE LABEL AND OPERATOR'S MANUAL BEFORE USING

Over Bromination (greater than 10 PPM) may cause corrosion to some spa components.

Check the spa water bromine level on a regular basis (weekly) to ensure the bromine level is between 3-5 PPM.

Heavy use of the spa (excessive contamination) may require longer recovery times. (A return to minimum of 3 ppm bromine). Recovery time may be reduced by adding a shock compound to the water.

CERTIFIED TO COMPLY WITH THE LIMITS FOR A
CLASS B COMPUTING DEVICE PURSUANT TO
SUBPART J OF PART 15 OF THE FCC RULES.

MODEL 101-PS-C
INPUT: 120 VAC .7 Amps, 60 Hz
OUTPUT: 20 VDC 3.5 Amps
EPA Est. NO. 69439-NV-001 (US)

REG. NO. 24694
PEST CONTROL PRODUCTS ACT

PATENT No. 5,545,310 OTHER PATENTS PENDING

BioQuest
4750 Longley Lane #202
Reno. NV 89502

CUSTOMER HELP DESK 1-800-516-4028

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CERTIFIED TO COMPLY WITH THE LIMITS FOR A CLASS B COMPUTING DEVICE PURSUANT TO SUBPART J OF PART 15 OF THE FCC RULES.

MODEL 201-PS-C
INPUT: 240 VAC .3 Amps, 50/60 Hz
OUTPUT: 20 VDC 3.5 Amps
EPA Est. NO. 69439-NV-001 (US)

REG. NO. 24694
PEST CONTROL PRODUCTS ACT

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BIO2
DOMESTIC SPA BROMINE GENERATOR
OPERATOR'S MANUAL

BioQuest

INTRODUCTION

Be sure to read this manual in its entirety since it will clearly explain how to get the greatest benefit from your BiO2 system.

If you require additional explanations or need information not contained in this manual, please contact your spa retailer or

contact BioQuest directly at 1-800-516-4028.

Right now would be the best time to fill out your warranty card, to register your system. Registration will facilitate the management of your warranty and alert you to future upgrades and discounts.

With this manual you should have received the BiO2 Start Up Kit.

If you do not receive it with your system, call your spa dealer so they may be provided.

FCC INSTRUCTION TO THE USER

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected .

Consult the dealer or an experienced radio/TV technician for help.

This equipment has been certified to comply with the limits for a class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's

authority to operate this equipment.

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Disclaimer

BioQuest Inc. has reviewed this manual thoroughly in order that it be an easy guide to your BiO2 sanitizing system. All statements, technical information and recommendations in this manual and in any guides or related documents are believed reliable, but the accuracy and completeness thereof are not guaranteed or warranted and they are not intended to be nor should they be understood to be representations or warranties concerning the products described.

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BioQuest
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Reno, Nevada. 89502

SYSTEM COMPONENTS

The following drawings will help you become familiar with the components that comprise BiO2 as well as how they function.

Wall Fitting: A specially designed fitting that allows BiO2 to draw water into the system, sanitize it and return it to the spa.

Touch Control: This allows you to program BiO2 to the proper level of sanitizing. See page 2 for detail.

Cell: This part of BiO2 draws water from the spa through the specially designed Wall Fitting (see figure above) you can see in your spa. The water passes over an electrode (contained in the Cell), that electrolyzes the sodium bromide and non-iodized table salt (sodium chloride) you will add to your spa water. This electrolysis generates the powerful sanitizing agents, oxygen and bromine. The water with sanitizers re-enters the spa from the cell at about 3.7 litres per minute through the wall fitting.

Power supply: This unit contains the BiO2 "brain", the microprocessor that you set to work as hard as your spa usage requires. It has no serviceable parts.

SYSTEM COMPONENTS

TOUCH PAD CONTROLS

TOUCH CONTROL BUTTONS

SET LEVEL:

Powers the unit on and permits you to set a maintenance level of sanitizing. Press to adjust from levels 1-9. 0 is off.

BLAST:

Increases the production of sanitizers for heavy bather loads and/or frequent spa use. Press **BLAST** to activate (turns off after 6-12 hours) or press again to deactivate. **BLAST** must be deactivated to adjust the Maintenance Level.

TOUCH CONTROL LOCKOUT:

Press and hold both **SET LEVEL** and **BLAST** buttons simultaneously to lock or unlock the touch control. When an L appears in the

LED window release the buttons.

TOUCH CONTROL INDICATOR LIGHTS

LED WINDOW:

Shows the level of maintenance sanitizing. A service code will be displayed in case of a problem. The letter **U** will appear to indicate Usage Sense (activation of BiO2 when the jet pump is on) if so equipped.

READY: When light is on: BiO2 has power.

CELL ON: When light is on: BiO2 is producing sanitizers.

CHECK SALT:

Flashing light: Salt level is high, test salt level and adjust.

Steady light: Salt level is too low: add sodium bromide and non-iodized table salt (sodium chloride). Please refer to page (11) of this manual.

SERVICE: When light is on: check the LED window for a service code. Contact dealer or BiO2 Help Desk 1-800-516-4028. Please refer to page (8) of this manual.

OPERATING BiO2

With this basic understanding of the BiO2 Components and their function, let's discuss how to operate the unit.

STEP 1. GETTING STARTED

- 1. Drain your spa and start with fresh water.** Follow your dealer's recommendations for start up. Adjust the pH to between 7.2 and 7.8.
- 2. Add sodium bromide and non-iodized table salt (sodium chloride) to your spa water as follows.** Add 58 grams of sodium bromide (scheduled or registered, for use in spas, under the Pest Control Products Act) and 454 grams of non-iodized table salt (sodium chloride) for every 378.5 litres (83.3 imp gal) of water in your spa. This special combination of sodium bromide and sodium chloride will dissolve rapidly. Turning on the spa's jets will help dissolve the sodium bromide and sodium chloride.

STEP 2.

ESTABLISHING AND TESTING THE BROMINE LEVEL

1. **Add 58 grams of potassium monopersulphate (scheduled or registered, for use in spas, under the Pest Control Products Act).** Turn on the spa jets to help dissolve the potassium monopersulphate. After 10 minutes, test the bromine level with the test kit provided in the Start Kit. If the reading is 3 ppm or more, proceed to Step 3. If not, add 58 grams of potassium monopersulphate. Take another reading after 10 minutes.

If the bromine level is still below 3 ppm, simply press the **BLAST** button. This will activate BiO₂ for a period of 6 to 12 hours. Test for bromine again at completion. In some extreme situations, you may need to press **BLAST** a second time to achieve a minimum of 3 ppm bromine. You should achieve a 3-5 PPM bromine residual, which will put it in the range recommended by NSPI (National Spa and Pool Institute) for safe water.

During the **BLAST** cycle, a rotating bar will appear on the LED display, and the "CELL ON" LED will be lit.

The **BLAST** cycle may be deactivated at any time by pressing the **BLAST** button again.

Please note: It is common for the bromine level demand to be high, initially. Test your bromine level daily for the first week and adjust the maintenance level as required and/or press the **BLAST button.**

OPERATING BiO₂ (cont'd)

You may notice that the bromine level will fluctuate based on the number of persons using the spa and how often the spa is used. Check the bromine level weekly, to ensure the proper level of 3-5 ppm. If it is low (less than 3 ppm), set a higher Maintenance Level. If it is high (greater than 6 ppm), set a lower Maintenance Level. Keep pH in range of 7.2 to 7.8. To maintain an adequate bromine level (3-5 ppm), BiO₂ must be activated while you are in the spa. This can be done in one of two ways. BiO₂ units with Usage Sense (does not come on all

spas) will automatically start sanitizing when the spa jets are turned on. The letter "U" will appear in the LED display. BiO2 will continue to operate for 2 hours after the spa jets have been turned off. This helps BiO2 recover from bather usage. For units without Usage Sense, you simply press the **BLAST** button as you enter the spa. It will activate BiO2 for a 6 to 12 hour period. In both cases, BiO2 will return to the maintenance mode after operation is complete. It is not recommended that your water's bromine level exceed 6 PPM.

Please note: Excessive bromine levels (over 10 PPM) can cause corrosion of metals within a spa, test your bromine level regularly.

STEP 3. CHOOSING THE MAINTENANCE LEVEL

The maintenance sanitizing level you set depends upon two primary factors:

- 1) How much water the spa contains. The more water, the harder BiO2 has to work.
- 2) The amount of use your spa will get. The more the spa is used, the greater the number of contaminants enter the water and the harder BiO2 has to work.

If your spa use is occasional or infrequent, you will find a lower maintenance level to be adequate to maintain water purity. We suggest starting with level 1.

***It is also recommended that you lower the maintenance level if you will not be using your spa for two weeks or more.** It may take a few days to find the proper level of sanitation for your spa and spa bathing habits. Be sure to test the water with the bromine test kit. Remember, if you need any assistance with this process call the BioQuest Help Desk at **1-800-516-4028.**

- 3) With the "BLAST" cycle off, push the button marked **SET LEVEL** to set the maintenance sanitation level. The "CELL ON" LED should be illuminated and the level display should read "1". This starts BiO2 at its lowest level. (A "0" is the "power off" position. This indicates that the BiO2 maintenance cycle has been deactivated).

OPERATING BiO2 (cont'd)

- 4) Continue to push the SET LEVEL button to program BiO2 to the desired maintenance level. Sanitizing levels for BiO2 range from 1 (the lowest setting) to 9 (the highest setting). We recommend starting with level 1. After the 9 the display loops back to 0, the Off position.

Please note: There is no need for the spa's system to be on while you are adjusting BiO2. BiO2 works independently of the spa's pump and jet system.

USAGE SENSE

Some models of BiO2 automatically activate when the spa's high speed jet pump is on to sanitize the water while the spa is being used. That is the time when water sanitation is most needed. A letter **U** will appear in the LED window to indicate that BiO2 has sensed spa usage and is activated. BiO2 will remain in Usage Sense mode for 2 hours after spa use and then will return to the Maintenance Mode.

If your BiO2 system is not equipped with "Usage Sense" simply push the BLAST button as you enter the spa. This effectively simulates Usage Sense.

OPERATING BiO2 (cont'd)

STEP 4.

PROTECTING YOUR TOUCH CONTROL SETTINGS

LOCKOUT FEATURE

LOCK Your BiO2 touch control pad can be locked to prevent accidental tampering with the SET LEVEL or BLAST buttons. To activate the Lock Out feature, press and hold both the **SET LEVEL** and **BLAST** buttons simultaneously until an **L** appears in the LED window. Release both buttons while the **L** is displayed. The **L** indicates that the Lock Out feature is now active.

UNLOCK To **Unlock**: the touch control pad, follow the same procedure. Press and hold both the **SET LEVEL** and **BLAST** buttons simultaneously until the **L** reappears in the LED window. Release both buttons while the **L** is displayed. The Lock Out feature is now deactivated.

REGULAR MAINTENANCE

TEST BROMINE WEEKLY

We recommend that you test the level of bromine in your water at least weekly to ensure that you have an adequate residual of bromine (3-5 PPM). Excessive levels of bromine (over 10 PPM) can cause corrosion.

BiO2 also produces oxygen as a powerful oxidizer to destroy organics in the water. There is no test required for oxygen.

TEST pH WEEKLY

The pH (relative alkalinity or acidity) will tend to rise over time and should be adjusted if pH climbs over 7.8. Any pH lowering product may be used. High levels of bromine may affect the pH indicator. If your test turns the water test sample a purplish colour, check the bromine level and take a water sample to your dealer.

TEST TOTAL ALKALINITY MONTHLY

Test strip kits are available that will indicate the alkalinity of your spa water. Ask your spa dealer.

HARD WATER

If the water in your area is hard (high levels of calcium) BiO2 may deposit some white flakes on the floor of the spa. This is normal. BiO2 is actually removing hardness from the spa water. This process can continue for a period of weeks or months depending on the hardness level. An optional strainer (calcium trap) will be available which attaches onto the wall fitting. It will capture the scale which you can then conveniently dispose of. If the water in your area is soft, (below 120 PPM hardness as calcium carbonate) you will need to add calcium to your water. Call your dealer or the BiO2 Consumer Help Desk for information.

REMOVING BiO2 FOR SERVICE

If you need to remove your BiO2 unit, Cover the BiO2 wall fitting with plastic wrap and stretch a rubber band around the wall fitting edge as shown by illustration. This is for TEMPORARY USE ONLY. Remove the BiO2 unit from the wall fitting tubing and apply the drain plugs to the tubing. Once the servicing has been completed and the tubing reconnected to the cell, the plastic wrap may be removed.

WINTERIZING

If you drain your spa for the winter, you should disconnect the tubing from the cell, empty the cell of water completely and store it indoors. The power to the spa (and BiO2) should be shut off. **Your spa should not be filled with water without the heater set above freezing.**

TROUBLESHOOTING

DIAGNOSTIC FEATURE

The BiO2 touch control pad will help troubleshoot the system without the need to open the spa's equipment compartment. The troubleshooting guide will ask you to check the diagnostics for certain conditions as follows:

Press both the **SET LEVEL** and **BLAST** buttons simultaneously. Keep both buttons pressed until a "t" appears, (see illustration below) then release the buttons. A sequence of letters and numbers will be displayed, one digit at a time, that will indicate how the system is operating and the potential trouble. The sequence will stop automatically after 2 cycles. For troubleshooting purposes, please write this sequence down in order. You may be asked for them by your dealer or the BioQuest Help Desk Technician.

DIAGNOSTIC READOUT SEQUENCE		
CODE	DESCRIPTION	VALUE RANGE
Pc	Motor current	0.4 to 0.7
Cc	Cell current	0.9 to 3.0
Cu	Cell voltage	13.0 TO 17.0

Read outs in these ranges indicate proper functioning.

TROUBLESHOOTING

CONDITIONS

My BiO2 unit is not working.....

1.) What does the water look like?

a. Cloudy: Possible low or no Bromine, or filtration

problem.

b. Green: Low Bromine (may also be extremely high bromine)

- 2.) Has 58 grams sodium bromide and 454 grams non-iodized table salt (sodium chloride) been added for every 378.5 litres (83.3 imp gal) of water in your spa?
- 3.) Have the two (58 grams) bags of potassium monopersulphate been added to the spa?
- 4.) When you look at the BiO2 touch pad, what do you see?
 - a. **A,C,F,J,P,=, /** are fault codes. Consult the Fault Code Guide for further instruction.

5.) What is the Bromine Level?

- a. The bromine level should be between 3 and 5 ppm.
- b. Press the **BLAST** button if the bromine level is below 2.

6.) Check the diagnostics "**t**".

- a. Press both buttons (**SET LEVEL** & **BLAST**) simultaneously until a "**t**" is seen in the display window and immediately release the buttons. The following sequence will appear:

"Pc (Motor Current) 0.4 to 0.7
"Cc (Cell Current) 0.9 to 3.0
"Cu (Cell Voltage) 13.0 to 17.0

This cycle will repeat 2 times.

- b. If the current and voltages are half of what they should be, and you have a 240 VAC BiO2 unit (201-XX-XX), check the input power, it may be wired for 120 VAC instead of 240 VAC.

7.) Is the BiO2 touch pad functioning when the spa jets are in operation?

- a. If not, it is possible that BiO2 is not wired for 24 hours continuous power.

- b. Contact your dealer for proper wiring information.
- c. Shut off the main breaker to the spa, wait for 30 seconds before resetting.

9.) Refer to No or Low Bromine residual. (See page 10)

The cell seems to be noisy....

- 1.) It is normal to be a bit noisy during the cleaning cycle. If it is constant or persistent, the cell may need to be replaced.
- 2.) Check diagnostics "t" to ensure motor current is between 0.4 to 0.7 Amps.

TROUBLESHOOTING

CONDITIONS (cont'd)

No or Low Bromine Residual.....

- 1.) Ensure that the Bromine test has been performed properly.
 - a. Test strips require a 1 second dip to read the pH and Alkalinity levels, and then a second dip for 30 second to read the Bromine level.
 - b. Liquid Test Kits (OTO, DPD) require a certain amount of drops into their measuring vial.
 - c. It is possible that DPD may become bleached out if the bromine level is extremely high.
- 2.) Check the Diagnostics "t".
 - a. Press both buttons (**SET LEVEL** & **BLAST**) simultaneously until a "t" is seen in the display window and immediately release buttons. You will see:
 - "Pc" (Motor Current) should be 0.4 to 0.7
 - "Cc" (Cell Current) should be 0.9 to 3.0
 - "Cu" (Cell Voltage) should be 13.0 to 17.0

This cycle will continue for 2 times.

- 3.) What is the Maintenance Level set at?

- a. If less than 9, increase to the next Maintenance Level.
 - b. If the Maintenance Level is set at 9 and BiO2 is operating properly, call the BiO2 Help Desk to reprogram your unit.
- 4.) Have the two 58 grams bags of potassium monopersulphate been added to the spa?
 - 5.) If the unit is not equipped with Usage Sense, is the **BLAST** Button pressed upon entering the spa?
 - 6.) Is the filtration cycle adequate?
 - a. Filtration Cycle should be at least 8 hours in a 24 hour period to ensure proper sanitation levels.
 - b. Is the spa filter clean?
 - 7.) If BiO2 unit is equipped with Usage Sense, press the **BLAST** button for a boost in the sanitizer level.

I can't adjust the display...

- 1.) Lockout function may be enabled.
 - a. To disable, press the SET LEVEL & BLAST buttons simultaneously until an **AL** is seen in the display window. Release the buttons, while the "**L**" is still displayed.
- 2.) Shut down power to the spa. Wait 30 seconds before resetting.
- 3.) Touch pad may need to be replaced. Call BioQuest help desk for further assistance.

TROUBLESHOOTING

CONDITIONS (cont'd)

All lights or no lights lit on the touch pad...

- 1.) Shut down main power to the spa. Wait 30 seconds before resetting.
- 2.) Touch pad may be faulty. Call BioQuest help desk for

further assistance.

Water is leaking from the cell....

- 1.) Check connections for intake and outflow tubing. Reposition over barbs. Tighten clamps on the barbs of the wall fitting.
- 2.) If water is definitely coming from the cell itself, it may need to be replaced.

There seems to be white flakes all over my spa....

- 1.) This is normal in hard water situations.
- 2.) BiO2 actually works to soften the spa water.
- 3.) Water should eventually become soft and this will stop.
- 4.) Due to the self cleaning feature of BiO2, during the cleaning cycle (comes on for every 3 hours of operating time) scale may be deposited into the spa water. Stain and scale inhibitor may be used.

The Check Salt Light is on.....

- 1.) If it is steady -
 - a. The salt level is low, check with Salt Test Strips.
 - b. Sodium chloride level should be 1,200-1,500 ppm.
 - c. Add number of units where 1 unit equals 1 packet (58 grams) of sodium bromide (scheduled or registered, for use in spas, under the Pest Control Products Act) and 454 grams of non-iodized table salt (sodium chloride) according to chart below.

Starting Salt Concentration	Spa Capacity in Litres (Imp Gal)						
	756 L (166)	945 L (207)	1134 L (249)	1323 L (290)	1512 L (332)	1701 L (373)	1890 L (415)
300-	2	2	2	3	3	4	4

350							
450-600	1	2	2	2	3	3	3
600-750	1	1	2	2	2	2	3
750-900	1	1	1	1	2	2	2
900-1,100	1	1	1	1	1	1	2

2.) If it is flashing -

- a. The salt level is high, check with Salt Test Strips.
- b. Sodium chloride level should be 1,200-1,500 ppm.
- c. Drain partially and refill with fresh water.
- d. Recheck the sodium chloride level.

TROUBLESHOOTING

FAULT CODES (Flashing service light)

FAULT CODE	DESCRIPTION/RECOMMENDATIONS
J	<p>Low Cell Current</p> <ol style="list-style-type: none"> 1. Check Cu (Cell Voltage) and Cc (Cell Current) value in Diagnostics, "t" 2. If Cu is below 13 call for service. If Cu is 13 to 17 then check Cc. 3. If Cc is below 0.9... <ol style="list-style-type: none"> a. Test salt level with Salt Test Strips. If salt is below 1200 ppm... b. Add sodium bromide and non-iodized table salt

	<p>(sodium chloride). See page 11.</p> <p>c. Press BLAST and see if BiO2 remains on without the service code reappearing .</p> <p>d. 240 VAC BiO2 unit may be wired on a 120 VAC circuit.</p> <p>e. If J code reappears there is a possible electrode failure. Call for service.</p>
<p>C</p>	<p>Low Motor Current</p> <p>1. Check for loose motor wire connections (red or black) at the Cell.</p> <p>a. Inspect and reconnect</p> <p>b. Inspect connection at Power Supply and reconnect.</p> <p>c. Press BLAST. If "C" reappears.</p> <p>2. Possible Air Lock in the Cell.</p> <p>a. Use a garden hose to fill the cell at the wall fitting discharge outlet to push air out of the cell (Let water run at medium pressure for 30 seconds)</p> <p>b. Press BLAST. If AC reappears call for service.</p> <p>3. Cell cable may not be connected at the BiO2 Power Supply.</p>
<p>F</p>	<p>Very Low Cell Current</p> <p>1. Has sodium bromide and non-iodized table salt (sodium chloride) been added to the water? If yes</p> <p>2. Cell may not be receiving water. Make sure water level covers the BiO2 wall fitting. If OK then</p> <p>3. Possible air lock in the Cell.</p> <p>a. Use a garden hose to fill the Cell at the wall fitting discharge outlet to push air out of the Cell. Let water run at medium pressure for 30</p>

	<p>seconds.</p> <p>4. A Cell wire may be disconnected.</p> <p>a. Inspect the white and green Cell wire connections and reconnect if needed.</p> <p>5. Cell cable may not be connected at the BiO2 Power Supply.</p>
A	<p>High Motor Current</p> <p>Debris in cell or motor failure</p> <p>a. Replace cell.</p>
P	<p>Low Cell and Motor current</p> <p>1. Priming problem</p> <p>a. Use a garden hose to fill the Cell at the wall fitting discharge outlet to push air out of the Cell. Let water run at medium pressure for 30 seconds.</p> <p>2. Cell wire disconnected</p> <p>a. Check all wire connections to ensure that all are tightly connected.</p>
=	<p>4 hour limit for Usage Sense</p> <p>1.) Denoted by two horizontal bars.</p> <p>2.) The Usage Sense signal has been active for more than 4 hours due to the booster being left on.</p> <p>3.) Reset BiO2 by pressing the SET LEVEL and BLAST buttons simultaneously until an "r" is seen in the LED display window, release buttons.</p> <p>4.) Usage Sense is improperly wired (Call Dealer).</p> <p>a. 120 VAC power supply connected to 240 VAC high speed pump</p> <p>b. Replace 120 VAC with a 240 VAC BiO2 Control Box.</p>

/	<p>Touch pad disconnected</p> <p>1.) Denoted by 3 horizontal bars.</p> <p>2.) Shut off main power to spa and wait 30 seconds before restarting.</p> <p>a. Power up spa.</p> <p>b. You may need to shut off power to the spa, unplug and then reinsert touch pad to power supply. reset power to the spa.</p> <p>3.) Touch pad may need to be replaced. Call BioQuest help desk for further assistance.</p>
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