

\$3.00



Cal Clarity™ Owner's Manual

Owner's Manual for the Cal Clarity™ Automatic Bromine and Mineral Generator for Residential Spas



www.calspas.com

Due to continuous improvement programs, all models, operation, and / or specifications are subject to change without prior notice.

LTR20051027, Rev. A
4/6/2005



CONTACT INFORMATION

For customer service, please contact your authorized dealer immediately. If you need additional information and/or assistance, please contact:

C.A.I. Customer Service Department
1462 East Ninth Street
Pomona, CA 91766

Toll Free: 1-800-CAL-SPAS
Fax: 1-909-629-3890

www.calspas.com

Copyright 2005 California Acrylic Industries, Inc. All rights reserved. Duplication without written consent is strictly prohibited.

Cal Spas™ and Cal Clarity™ are registered trademarks.



**Cal Clarity™ is tested and listed to:
ANSI/UL - Std. 1081 5th e.
CAN/CSA Std. C22.2 No .0**

Due to continuous improvement programs, all models, operation, and/or specifications are subject to change without prior notice.

Table of Contents

Read This First!

Installing Your New Bromine Generator

Electrical Connections and Load Side Plug-ins 4

Plumbing and Placement Installation..... 4

Operating Your Bromine Generator

Water Chemistry for Start-up 5

Starting Up Cal Clarity™ 5

Water Quality Maintenance

Proper Pool Water Chemistry 8

Adjusting pH 9

Adjusting Bromine Level 9

Appendix

Commonly Asked Questions..... 11

Warranty Information..... 12

Cal Spas™ Chemicals 13

Read This First!

Important Safeguards

When installing and using this electrical appliance, basic safety precautions must always be adhered to. We strongly advise that a qualified electrical technician perform installation of this device.

- Read and follow all instructions contained in this manual and on the equipment itself.
- To reduce the risk of injury, do not permit children to use the appliance unless they are closely supervised at all times.
- **Warning -- risk of electrical shock!** Connect only to a grounding type receptacle protected by a ground-fault circuit interrupter (GFCI) or a dedicated circuit. Contact a certified electrician if you cannot verify that the receptacle is protected by a GFCI.
- Replace any damaged electrical cord immediately.
- Should this appliance become inoperative, do not try to correct the problem by yourself. There are no user-serviceable parts inside. Turn off, unplug the power cord, and contact your dealer.

General Information

Congratulations on your purchase of the **Cal Clarity™ System**! You have found the smart, easy, cost-effective way to keep your spa sparkling and always inviting.

There is nothing more relaxing or enjoyable than the soothing environment that only a spa can provide – especially when it has the added benefit of a state-of-the-art, automatic bromine generator. So, you will be able to spend more time enjoying your spa and less time maintaining it!

Hot tubs maintained by the Cal Clarity™ system are virtually maintenance free. The Cal Clarity™ system greatly reduces cost and aggravation by eliminating the purchasing, transporting, storing and handling of bromine tablets, shock treatments, and other chemicals.

Cal Clarity™, while taking years to develop, is easy to understand and easy to use -- the spa owner's friend!

How It Works

First sodium bromide (*sodium bromide – “NaBr” - is closely related to sodium chloride – “NaCl” – otherwise known as table salt*) is added to your spa's water. Then the dissolved bromide ions are circulated through the bromine and copper ion generating contact cell located in your spa's filtration system. This converts the bromide ions into free bromine -- *the recommended sanitizer for hot tubs and spas* -- before reverting back to sodium bromide, thus completing the perpetual cycle. Additional sodium bromide is only added when your water level declines due to splash out or when you drain and refill the tub.

The system's electrodes are comprised of high density, ultra-porous graphite. The controller operates at extremely low DC voltages, resulting in a cost of operation at just pennies per day.

Synthetic graphite, impregnated with trace levels of ultra pure copper, is used in our revolutionary electrode cell, providing a surface area far greater than with metal only electrodes. The Cal Clarity™ electrode is made up of these unique and powerful plates. The plates measure 1" wide by 8" long and 1/2" in thickness. And they fit neatly in a standard 2-inch tee fitting.

The electrodes are virtually impervious to harsh chemicals and the oxidation process. Still, over time, the flow of water will erode the cell. We warranty the cell for 2 full years (and 1 year of copper life as the copper is sacrificial).

The system fits neatly inside any spa skirt and takes a qualified technician just minutes to install. The electrode cell is mated to a simple 2" slip X slip X threaded tee fitting and is then connected to the DC-out wires of the controller. Less than 30 watts of DC power is digitally pulsed across the electrode cell producing bromine from bromide salt (NaBr).

Unit Features

- Automatic control center
- Fully automatic bromine and copper ion generation
- Digital design and reliability
- Automatic polarity reversal (every 4 minutes)
- Adjustable bromine output control (10 settings)
- Maintenance free graphitic electrode cell (patent pending)

- 110 / 220 volts switchable (50-60 Hz)
- 28 watts total power consumption

Complete System Includes:

- 1 - Electronic controller; NEMA 4X enclosure, 10 different power settings, duty cycle control to 97% accuracy, 110/220 switched, automatic polarity reversal for maintenance free electrode cell.
- 1 - Bromine / Copper Ion I+ generating electrode cell
- 1 - 2" extended tee fitting and reducer bushings
- 1 - Technical grade bromide salt (NaBr – 99% pharmaceutical grade)

Installing Your New Bromine Generator

Electrical Connections and Load Side Plug-ins

Never attempt to make wired electrical connections yourself. Always have a licensed professional provide this service. See "Important Safeguards" at the beginning of this manual.

1. Determine input voltage: 120 or 240 VAC. Set the switch located on the back of the circuit board to the proper input position. (NOTE: All units are shipped with a factory preset of 240 VAC). **CAUTION:** *Improper voltage will damage the controller!*
2. Securely mount the controller to a vertical surface. Make sure there is sufficient cable to accommodate wire connections between the controller, the bromine production cell, and the AC power source.
3. The controller must be wired to the load side of the pump or pump timer. This is extremely IMPORTANT! The Cal Clarity™ system was designed to operate and produce bromine only while your pump is circulating water.

Failure to observe usage directions may result in equipment damage.

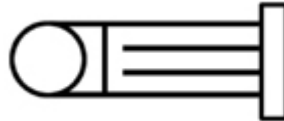
4. Use liquid tight flexible conduit between the AC power source and the controller.

Plumbing and Placement Installation

NOTE: The tee fitting must be glued at the connection prior to installation to avoid leakage. Teflon tape should be wrapped on the threads of the electrode cap for the same preventative measure.

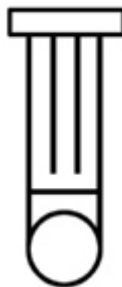
Install the chamber horizontal to the floor. Installation of the contact cell must be horizontal at 180 degrees (i.e., pointing to either 3:00 or 9:00 on a clock):

Correct



DANGER: NEVER INSTALL IN AN UPRIGHT POSITION!

Incorrect



CAUTION: The bromine production cell produces concentrated bromine. To avoid damage, the cell should always be installed after the heater.

DANGER: The Cal Clarity™ device should never run or provide power to the production cell unless the pump is running this can create a build up of dangerous gases and may cause damage to heaters.

Operating Your Bromine Generator

Water Chemistry for Start-up

Attention installer: Prior to activation of the system on a spa, it is essential that the following water chemistry parameters have been established and verified!

TDS (total dissolved solids):	Must be less than 500 ppm (ideal range 50-300 PPM) prior to adding the Tru-Blu sodium bromide bank to the spa's water. NOTE: Addition of Tru-Blu at a rate of 2 pounds for every 100 US gallons (370 liters). TDS will be approximately 2,500 ppm. TDS should not exceed 3,500 ppm.
pH:	Must be between 7.2 and 7.8 with 7.4 to 7.6 being optimum
Total Alkalinity:	Should be between 80 and 120 ppm
Chlorine Stabilizer:	0 ppm

Starting Up Cal Clarity™

It is important that you follow the hot tub manufacturer's instructions on start-up preparations and initial start-up of the hot tub itself. Then you can proceed to the step-by-step instructions below:

1. Fill your tub with water up to the level recommended by the hot tub manufacturer.
2. Make sure the "DECREASE/INCREASE" dial on the face of the system control unit is turned to the "OFF" position.
3. Balance both your pH and alkalinity to the levels recommended by the hot tub manufacturer.
4. Make sure that the spa pump is set to high speed.
5. Sprinkle one 2-pound bottle of Tru-Blu sodium bromide per 100 US gallons (370 liters) of water evenly over the surface of the water, shaking each bottle well first to break up any lumps. See the table on page 7 for the amount to use for your spa model. NOTE: Allow 60 minutes for the Tru-Blu to **dissolve completely** before proceeding to the next step.
6. Turn the "DECREASE/INCREASE" dial to the right until the LED display (to the left of the dial) reads "10". This will initiate the buildup of a bromine bank.
7. Monitor the bromine level until it is within the range recommended by the manufacturer (this may take a 1-2 days, depending on the quality of water used on the initial fill – see *NOTE below). Once the desired level has been achieved, turn the "INCREASE/DECREASE" dial down, one setting at a time, until a maintenance setting is achieved.

Finding your maintenance setting may also take a few days. Test your water daily in conjunction with using your spa. With monitoring of your spa use, and adjustment of the output level of your system, you will be able to determine your maintenance setting. (You will have arrived at your maintenance setting when, after a period of normal use of your spa, you no longer have to adjust the output level on your Cal Clarity™ to keep your bromine level within the range recommended by the manufacturer).

The appropriate setting for your system will depend on how often you use your tub. A tub with a higher-than-average bather load will require a higher setting on the control unit. This simply means that the system needs to produce more bromine to maintain the level recommended by the manufacturer. If the tub does not have a circulation pump that runs continuously then ensure that your spa's filtration cycle is programmed so that water

Operating Your Bromine Generator

is circulated at least 8 hours per day to ensure adequate bromine production. (Tubs with higher than average bather loads may require a longer filtration cycle. See your spa owner's manual for instructions on programming the filtration cycle.)

***NOTE:** It can take several days for the bromine level to stabilize because the water that you put into your spa contains impurities that need to be neutralized, thereby using up the initial bromine that is generated. You can expedite this process by "shocking" the water with a non-chlorine product.

Use only Tru-Blu sodium bromide!



Tru-Blu sodium bromide is 98.9% pure.

There is a very good chance that your dealer will offer you a sodium bromide (NaBr) product other than Tru-Blu. Sodium bromide comes under many different labels and brand names and it is sold for many different uses.

If this sounds like your store, make sure you read the label. You will likely find that the majority of NaBr products on the market today are not 98.9% pure like Tru-Blu. In fact, most are loaded with fillers that provide no benefit at all. After all, one of the reasons you purchased **Cal Clarity™** was to eliminate the fillers and other superfluous matter that is found in most spa chemicals, right?

Tru-Blu is sold in two-pound bottles and is packaged with a unique 2-oz measuring lid.

Ask your dealer for Tru-Blu brand sodium bromide, or order direct from Cal Spas™. See contact information on the back page of this manual.

Sodium Bromine per Spa Model

Spa Model	J-503	J-504	J-505	J-506	J-507	J-508
Gallons	425 gall.	440 gall.	425 gall.	425 gall.	450 gall.	450 gall.
Sodium Bromide	5 bottles	5 bottles	5 bottles	5 bottles	5 bottles	5 bottles

Spa Model	S-704	S-705	S-706	S-707	S-708	S-709
Gallons	300 gall.	450 gall.	450 gall.	500 gall.	500 gall.	800 gall.
Sodium Bromide	3 bottles	5 bottles	5 bottles	5 bottles	5 bottles	8 bottles

Spa Model	H-902	H-903	H-904	H-905	H-906	H-907	H-908
Gallons	355 gall.	500 gall.	500 gall.	500 gall.	500 gall.	500 gall.	500 gall.
Sodium Bromide	4 bottles	5 bottles	5 bottles	5 bottles	5 bottles	5 bottles	5 bottles

Spa Model	Classic J	Classic P	Classic T	Classic A	Classic	Classic D
Gallons	205 gall.	425 gall.	425 gall.	450 gall.	450 gall.	450 gall.
Sodium Bromide	2 bottles	5 bottles	5 bottles	5 bottles	5 bottles	5 bottles

Spa Model	Classic L	Classic M	Classic S	Classic R	Classic N	Classic E
Gallons	450 gall.	450 gall.	500 gall.	500 gall.	800 gall.	900 gall.
Sodium Bromide	5 bottles	5 bottles	5 bottles	5 bottles	8 bottles	9 bottles

Spa Model	I-600	I-601	I-602	I-603	I-604
Gallons	300 gall.	425 gall.	425 gall.	450 gall.	450 gall.
Sodium Bromide	3 bottles	5 bottles	5 bottles	5 bottles	5 bottles

Spa Model	SQ-43	SQ-63	SQ-92	SQ-88	GX-49
Gallons	800 gall.	800 gall.	450 gall.	450 gall.	450 gall.
Sodium Bromide	8 bottles	8 bottles	5 bottles	5 bottles	5 bottles

Water Quality Maintenance

Proper Pool Water Chemistry

Ideal pH Range

The ideal range for pH is 7.2 – 7.6.

pH stands for potential hydrogen. This test determines the acid content of your spa water. As the pH rises above 7.6, there is a reduction in the effectiveness of bromines ability to sanitize. Test pH weekly and adjust accordingly.

Remember: Always add chemicals to water, never water to chemicals.

- If pH is above 7.6, lower it using muriatic acid* or sodium bisulfate*.
- If pH is below 7.2, raise it by using a base (baking soda or soda ash*).

*Visit your Cal Spas™ dealer to purchase these products.

Complications which may occur from high pH:

- Sanitizer unable to kill algae and bacteria
- Solids and minerals may come out of solution
- Water may get cloudy
- Calcium may come out of solution and cause scale

Complications which may occur from low ph:

- Water becomes acidic; eye irritation
- Damage to spa surface and spa equipment

Rain or addition of fresh water may cause a change in pH.

Ideal Total Alkalinity

The ideal range for total alkalinity is 80- 120 ppm.

Total alkalinity is a test done monthly to determine the amount of alkaline material in the water. It also measures the water's ability to neutralize acid and acts as a buffer against sudden pH changes.

- If total alkalinity is high, add small amounts of sodium bisulfate* or muriatic acid* over a period of three days. Follow the label instructions based on your tub size.
- If total alkalinity is low, add bicarbonate (baking soda).

*Visit your Cal Spas™ dealer to purchase these products.

Ideal Total Dissolved Solids

The ideal range for total dissolved solids:

- Prior to adding **Tru-Blu**: 50-300 ppm
- After adding **Tru-Blu** at a rate of 2 lbs of **Tru-Blu** for every 100 gallons: 2200-2500 ppm

NaBr test strips should indicate a NaBr level of 7.8-8.2 when at proper levels.

Adjusting pH

Adjusting Ph To 7.2 with Sodium Bisulfate

pH reading prior to chemical addition:	Sodium Bisulfate to add (500 gal–1850 liter spa):
7.8- 8.0 ppm	1.0 OZ.
8.0- 8.2 ppm	1.5 OZ.
8.4 + ppm	2.0 OZ.

Retest spa's pH value after allowing two hours to pass and repeat above steps if required. pH is closely affected by your spa's total alkalinity. Test your spa's pH value at least twice every month. The correct range for pH is 7.2 -7.8 ppm. The lower the pH value, the more effective bromine is in spa water sanitation.

CAUTION: if the water becomes acidic (pH below 7.2) damage to spa surfaces and equipment may occur.

pH HAS A DIRECT EFFECT ON BROMINE'S EFFECTIVENESS IN SANITIZING YOUR SPA'S WATER!!

Adjusting Bromine Level

As discussed earlier in this manual, desired bromine levels vary between spas, mainly due to different bather loads. You will quickly determine the right level for your particular hot tub. Of course we know that if we have bromine readings that are lower than desired, we can just turn up the "DECREASE/INCREASE" dial on the face of the **control** unit. Likewise, if you find that the bromine level is higher than you want, you can simply turn down the same dial. The bromine level will then gradually reduce to the production rate required to suit your needs.

Determining Sodium Bromide Level

It is important to be able to maintain the appropriate amount of Tru-Blu sodium bromide in your spa's water. By following the step-by-step instructions found earlier in this manual, you will be off to a good start. There are several other factors to consider, though. You will normally find that over the weeks and months that you are enjoying the use of your tub, the water level will decrease for several reasons. One is evaporation. The other is a result of water "removal" (splashing, exiting bathers, etc). The first cause of water loss – evaporation – will not reduce the sodium bromide that is available in your tub, because it does not evaporate. The second cause – water removal – will, however, result in loss of some sodium bromide.

Water Quality Maintenance

Since it is impossible to know how much water loss results from evaporation, and how much from removal, it is necessary to determine your sodium bromide level when adding water to the tub. There are available, through your dealer, sodium bromide test strips. Use of these strips will help you determine how much, if any, Tru-Blue to add. Consult with your dealer for instructions on their use.

Appendix

Commonly Asked Questions

- Q:** Why do pool and spa professionals warn consumers against using chlorine in hot tubs and spas?
- A:** Chlorine is an extremely corrosive chemical and may cause damage to equipment; moreover, most spas maintain temperatures over 100 degrees and chlorine readily evaporates at about 97 degrees, potentially leaving the spa's water untreated.
- Q:** Is ozone effective as a spa sanitizer and do I still need a bromine presence if my tub has an ozone machine?
- A:** Ozone, depending on its output strength, injector placement and hours per day of filtration, can be an effective oxidizer, but is not recognized as a "sanitizer". All hot tubs and spas are required to use bromine, with or without ozone. The Cal Clarity™ system should not be used with a ozone system.
- Q:** My pool man looked at some damage to my spa cover and told me it was caused by the ozone system. Is this possible?
- A:** Yes, and it's highly likely. Ozone is a corrosive gas and, as a gas, lighter than water. It is injected into your tub, gases off the water's surface and gets trapped between the surface of the spa's water and the underside of the spa's cover, where the damage takes place. The problem, known as "off-gassing" may also damage entertainment devices that are available on newer spas; such as CD player's, speakers, LCD screens, etc.
- Q:** Sometimes my spa has a fishy or musty smell. What causes this?
- A:** Low bromine or no bromine, which is usually caused by the spa owner forgetting to fill up the floating bromine feeder or forgetting to put it back into the spa after bathing.
- Q:** Now that I have a Cal Clarity™, my dealer told me that I don't have to drain my spa every three months like I've done in the past. Why is that possible?
- A:** Because there is no more buildup of tablet by-products (like the glues and binders used to hold bromine tablets together). Cal Clarity™ converts salt into bromine and then back into salt again, leaving your spa free of the cloudy, flat water usually attributed to the buildup of the these chemical by-products. With the Cal Clarity™, your water change interval can be extended up to a full year.
- Q:** How many hours per day will I have to operate my spa's pump once I install a Cal Clarity™ system?
- A:** Most spas equipped with a Cal Clarity™ system operate at eight hours of water circulation per day, but if you find that your "INCREASE/DECREASE" dial is at a high setting, but your bromine level is lower than desired you might want to run the pump for up to 12 hours per day. Remember that all spas are unique (different bather loads, etc). Within a short time, you will be able to determine the right circulation cycle for your particular spa. (Also note that in the event of a power outage, the filtration cycle may revert back to the factory default setting.)
- Q:** How long has the Cal Clarity™ been available?
- A:** The Cal Clarity™ became available to the public in 2004. The technology was several years in R&D prior to its release.
- Q:** After my Cal Clarity™ is installed, do I still have to check my hot tub's chemistry?
- A:** Yes. When it comes to water quality, maintaining proper chemistry is essential. Maintain proper pH and total alkalinity at all times (pH has a direct relationship to the effectiveness of bromine to sanitize water.)

Appendix

Q: How can I be absolutely sure that the Cal Clarity™ system is working?

A: Bromine test strips or a standard liquid reagent (liquid reagent is recommended) will show the actual bromine level in your spa's water, assuring you of a safe, clean and inviting recreational environment. Bromine and chlorine are recognized by industry professionals and government regulators as chemical sanitation agents. Cal Clarity™ produces bromine through a bromide salt conversion process, and you can be assured that the bromine created by the system is just as effective as the bromine introduced via tablets – *and* it is free of the impurities found in the tablets.

Q: Why do spa professionals say that there is less or no bromine odor with the Cal Clarity™ system?

A: This is due to the unique electrolytic bromine generation process. The electronic field around the bromine-generating cell destroys “bromamines”. Bromamines are the culprits when it comes to the strong objectionable odor, not the bromine itself. The system, in fact, manufactures 100% pure bromine, while tablets have fillers, etc.

Q: Why does the display go to a minus (-) every few minutes?

A: This indicator informs you that the polarity of the electrodes is changing every two minutes. This process is for the cleaning of the electrode cell to prevent any scale buildup.

Q: The system lights up but I can't get a bromine reading...

A: There are several reasons why you might not get a reading:

- As discussed in the “Starting Up section” earlier in this manual, it can take several days for the bromine level to stabilize because the water you put into your spa contains impurities that need to be neutralized, thereby using up the initial bromine that is generated. Refer to that section for how to handle this situation.
- The TDS (total dissolved solids) count might be too high – bromine production will be impaired when the TDS count exceeds 3500 ppm.
- The phosphate level might be too high - bromine production can be impaired when the when the phosphate level exceeds 125 ppb. Talk to your dealer about products that reduce phosphates.

Q: The system is wired in but it does not light up.

A: Ensure that the voltage you have wired the unit to matches the setting on the internal switch. **Turn off the breaker to the spa**, and then open the controllers power supply and adjust the internal switch to match the required voltage. **NOTE: YOU MUST BE SURE OF VOLTAGE BEFORE CHANGING THIS SETTING BECAUSE INCORRECT VOLTAGE WILL SHORT OUT THE CAL CLARITY™ AND VOID YOUR WARRANTY. WHEN IN DOUBT, CALL CUSTOMER SERVICE AT 1-800-CAL SPAS.**

Warranty Information

The Cal Clarity system has a two year warranty, provided it is installed at the factory or by an authorized service technician. See your Cal Spas owner’s manual for additional details on your spa warranty.

Cal Spas™ Chemicals



Bromine/Chlorine Starter Kit

#CHE07000290/#CHE07000295

When used as directed, this product is effective as a spa and hot tub sanitizer/disinfectant. Treats 250 gallons for up to three weeks.



Vinyl & Leather Cleaner

#CHE07000620

Specifically designed to protect spa covers and pillows from chemical and ultraviolet damage.



Fast Sheen

#CHE07000610

Unique water-based, chemically reactive silicone sealant and polish. Seals, shines, and protects spa surfaces.



Brominating Tablets

#CHE07000760/#CHE07000770

Sanitizer, disinfectant for spas and hot tubs.



Chlorinating Granules

#CHE07000865/#CHE07000880

When used as directed, this product is effective as a spa and hot tub water disinfecting agent.



Go Brom

#CHE07000830

Establishes a bromide bank in spas and hot tubs.



Filter Cartridge Cleaner

#CHE07000690

Breaks down organic and inorganic material. Removes calcium scale and mineral deposits.



Liquid Hardness Increaser

#CHE07000250

Increases water hardness to reduce corrosion. Helps reduce foaming.



Spa Brite

#CHE07000580/#CHE07000590

Clears up cloudy water in spas and hot tubs. Effective at all spa and hot tub temperatures.



Foam Gone

#CHE07000800/#CHE07000810

Breaks up existing foam in spa water. Effective at all spa and hot tub temperatures.



pH-Alkalinity Up

#CHE07000720/#CHE07000730

Helps maintain pH in spas and hot tubs.



pH-Alkalinity Down

#CHE07000750

Lowers pH in spas and hot tubs.



Enzyme Formula

#CHE07000600/#CHE07000605

Emulsifies and biodegrades bodily oils, suntan lotion, and other contaminants in spas and hot tubs.



Metal Protector

#CHE07000630/#CHE07000640

Controls water discoloration caused by minerals. Special Extra Strength formula for spas and hot tubs.



Stain & Scale Prevention

#CHE07000650/#CHE07000660

Prevents minerals from damaging spa components and affecting performance.



Oxidizer Shock

#CHE07000680/#CHE07000710

Destroys organic contaminants and odor-causing wastes.

**Please make a record of the following.
It will be valuable if service is required.**

Cal Spa Model:

Cal Spa Serial Number:

Date Purchased:

Date Installed:

Cal Spa Dealer's Phone Number:

Cal Spa Dealer's Address:

C.A.I. Customer Service Department
1462 East Ninth Street
Pomona, CA 91766

Toll Free: 1-800-CAL-SPAS
Fax: 1-909-629-3890

www.calspas.com