COMFORT
Hot Tubs

The Comfort 834

User's Manual

Installation & Operation

Dear Customer,

Congratulations on your purchase of a brand new hot tub! We are thrilled that you have chosen our product to bring relaxation and enjoyment into your life. We believe that owning a hot tub is one of life's great pleasures, and we are confident that you will love yours just as much as we do.

In this manual, you will find all the information you need to set up, operate, and maintain your hot tub for many years of worry-free enjoyment. We have included detailed instructions and helpful tips to guide you through every step of the process, from installation to regular maintenance.

We want you to get the most out of your hot tub experience, so please don't hesitate to reach out to us if you ever have any questions or concerns. Our team of experts is always here to help you with anything you need, whether it's troubleshooting a problem or simply offering advice on how to get the most out of your hot tub.

Once again, congratulations on your purchase, and we hope you enjoy many great times in your new hot tub!

Sincerely,

The Comfort Hot Tubs Team

RECORD OF OWNERSHIP

PURCHASE DATE: _____

INSTALLATION DATE: _____

NAME: _____

ADDRESS: _____

PHONE: _____

MODEL NUMBER: _____

SERIAL NUMBER: _____

The serial number for your hot tub can be found on the bottom right cabinet of the unit. This number is important for identifying your hot tub in case you ever need to order replacement parts or receive customer service. We also want you to know that our hot tubs are designed with standardized parts, which means that they can be serviced by most local spa technicians. So, in the unlikely event that you encounter any issues with your hot tub, rest assured that there are most likely qualified professionals in your area who can help you get it back up and running in no time.

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Section 1: Safety Guidelines

SAFETY PRECAUTIONS: IMPORTANT INFORMATION

(READ AND FOLLOW ALL INSTRUCTIONS)

AVOIDING THE RISK TO CHILDREN

DANGER - RISK OF CHILD DROWNING

Preventing unauthorized access by children is of utmost importance. Children must always be supervised when using the hot tub to avoid accidents.

WARNING

- Lower water temperatures are recommended for young children to minimize the risk of injury, as children are especially sensitive to hot water.
- It is essential to prevent unauthorized access by children. Always ensure that children cannot use the hot tub unless supervised at all times.

DO:

- Always lock the child-resistant locks after using the hot tub to ensure your children's safety. The locking cover complies with the ASTM F1346-91 Standard for Safety Covers.
- Before allowing children to enter the hot tub, test the water temperature with your hand to ensure it is comfortable.
- Remind children that wet surfaces can be very slippery and to be careful when entering or exiting the hot tub.

DON'T:

- Allow children to climb onto the hot tub cover.
- Allow unsupervised access to the hot tub for children.

AVOIDING THE RISK OF ELECTROCUTION

DANGER – RISK OF ELECTROCUTION

To ensure your safety when using your hot tub, please follow these guidelines:

- Always connect your hot tub to a grounded source.
- Do not bury the power cord as this may result in electrocution if direct burial-type cable is not used or if improper digging occurs.
- The control box inside the unit has a ground terminal that allows for the connection of a minimum No. 8 AWG (8.4 mm^2) solid copper bonding conductor between this point and any metal equipment, metal water pipe, metal enclosures of electrical equipment, or conduit within five feet (1.5 m) of the unit, as needed to comply with local requirements.
- Please note that these guidelines are for your safety and to ensure that you are protected from any risks of injury or electrocution while using your hot tub.

WARNING

Electrical safety is of utmost importance when using your hot tub. To reduce the risk of electrocution, please follow the guidelines outlined below:

- If the power cord is damaged, replace it immediately. Failure to do so could result in serious injury or even death.
- Your hot tub is equipped with a Ground Fault Circuit Interrupter (GFCI) for your protection. Before each use, test the GFCI according to the instructions for your specific electrical configuration:
    - For 230-volt permanently installed or converted models, connect the ground terminal on the terminal block (TB-1) inside the control box to the grounding terminal of your electrical service panel with a continuous green, insulated copper wire. Use a bonding terminal on the outside of the control box to connect to local ground points with a No. 8 AWG solid copper wire. The means of disconnection must be easily accessible and installed at least 5 feet (1.5 meters) from the hot tub. Your hot tub is equipped with a suitably rated circuit breaker to open all ungrounded supply conductors. Test each GFCI breaker on the electrical subpanel before each use of the hot tub while the unit is operating. Press the TEST button on each breaker; it should click over to the "Trip" position. Wait 30 seconds and then reset each GFCI breaker by switching it completely off and then completely on. If either of the interrupters does not perform as described, disconnect the power until the problem is identified and corrected.
- IMPORTANT: Always wait 30 seconds before resetting the GFCI. Failure to do so may cause the spa's Power Indicator to blink. If this occurs, repeat the GFCI test procedure.

DANGER – RISK OF ELECTRICAL SHOCK

To ensure your safety and the safe operation of your hot tub, please read and follow the instructions below carefully:

- Keep your hot tub at least 5 feet (1.5m) away from any metal surfaces, unless those surfaces are permanently connected to the wire ground connector on the terminal box using a minimum No. 8 AWG (8.4 mm^2) solid copper conductor in accordance with National Electrical Code ANSI/NMFPA70-1993.
- Do not allow any electrical appliances, such as lights, telephones, radios, or televisions, within 5 feet (1.5m) of your hot tub. This may result in death or serious injury due to electrocution if an appliance falls into the spa.
- Make sure your hot tub is installed with proper drainage away from the electrical compartment and all electrical components.

DO:

- Hire a licensed electrical contractor to connect your hot tub to the power supply.
- Disconnect the hot tub from the power supply before draining the spa or servicing any electrical components.
- Test the Ground Fault Circuit Interrupter(s) before each use.

DON'T:

- Use the hot tub with the equipment compartment door removed.
- Place electrical appliances within 5 feet (1.5m) of the spa.
- Use an extension cord to connect the hot tub to the power source. An extension cord may not be properly grounded and can be a shock hazard, or cause overheating of the jet pump motor and motor damage.
- Attempt to open the electrical control box, as there are no user-serviceable parts inside.

RISKS TO AVOID

DANGER – RISK OF INJURY

- DO NOT remove suction fittings (filter standpipes) located in the filter compartment to reduce the risk of injury to persons.
- The suction fittings in the spa are sized to match the specific water flow created by the pump. Never replace a suction fitting with one rated less than the flow rate marked on the original suction fitting.
- Wet surfaces can be very slippery, so take care when entering or exiting the spa to avoid slipping and falling.
- Do not operate the spa if the suction fittings are broken or missing.
- People with infectious diseases should not use the spa.
- Keep any loose articles of clothing, long hair, or hanging jewelry away from rotating jets or other moving components.

INCREASED SIDE EFFECTS OF MEDICATION

- The use of drugs and alcohol may cause unconsciousness with the possibility of drowning.
- Persons using medications should consult a physician before using a spa.
- Some medications may cause a user to become drowsy, while others may affect heart rate, blood pressure, and circulation.
- Persons taking medications which induce drowsiness, such as tranquilizers, antihistamines, or anticoagulants should not use the spa.

HEALTH PROBLEMS AFFECTED BY SPA USE

- Consult with a physician if you are pregnant before using the spa.
- If you have a medical history of heart disease, low or high blood pressure, circulatory system problems, diabetes, or are suffering from obesity, it is recommended that you consult with a physician before using the spa.

UNCLEAN WATER

- Keep the water clean and sanitized with correct chemical care. The recommended levels for your Comfort Hot Tub spa are:

Free Available Chlorine: 1.0-5.0ppm	Total Alkalinity: 40-120ppm
Water pH: 7.2-7.8	Calcium Hardness: Standard 75-150ppm

- Refer to Water Quality and Maintenance section for complete instructions.
- After adding any spa water chemicals into the filter compartment, it's important to turn on the jet pump for at least ten minutes.
- To maintain the performance of the hydromassage jets and prevent issues like limited flow or tripped high limit thermostats, clean the filter cartridges monthly to remove debris and mineral buildup. If the high limit thermostat trips, the entire spa will turn off.

AVOIDING THE RISK OF HYPERTHERMIA

- It is important to be aware of the risk of hyperthermia, a condition that occurs when the body's internal temperature rises above normal (98.6°F or 37°C). This can happen with prolonged immersion in hot water. Symptoms of hyperthermia include unawareness of danger, inability to feel heat, failure to recognize the need to exit the spa, physical incapacity to exit the spa, fetal damage in pregnant women, and unconsciousness that can lead to drowning.

WARNING

- To reduce the risk of hyperthermia, avoid using the spa for an extended period, and take frequent breaks to cool down. It is also important to avoid using the spa while under the influence of drugs, alcohol, or medication, as this can increase the risk of hyperthermia.

TO REDUCE THE RISK OF INJURY

- The maximum water temperature in the spa should not exceed 104°F (40°C). Water temperatures ranging from 100°F to 104°F (38°C and 40°C) are safe for healthy adults, while lower temperatures are recommended for prolonged use exceeding ten minutes or for young children, as extended exposure can cause hyperthermia.
- Pregnant women or those who are possibly pregnant are advised to limit the spa water temperature to 100°F (38°C). Failing to do so may result in permanent harm to the unborn baby.
- Refrain from using the spa immediately after a strenuous exercise routine.

AVOIDING THE RISK OF SKIN BURNS

- To minimize the risk of injury, always use an accurate thermometer to measure the water temperature before entering the spa.
- Before entering the spa, test the water with your hand to ensure that it's comfortable.

SAFETY SIGN

- Every Comfort Hot Tub hot tub comes with a SAFETY SIGN included in the owner's package. This sign is mandatory for Product Listing and must be installed permanently where it is visible to spa users. To obtain more SAFETY SIGNS, please contact Comfort Hot Tubs and request the safety sign.

OTHER IMPORTANT SPA INSTRUCTIONS

Please read and apply the following important spa instructions to reduce the risk of injury:

DO:

- Always use and lock the cover when the spa is not in use, whether it is empty or full.
- Follow the Spa Care and Maintenance recommendations in the manual.
- Only use approved accessories and recommended spa chemicals and cleaners.

DON'T:

- Leave the Comfort Hot Tub spa exposed to the sun without water or the cover in place, as it can cause solar distress of the shell material.
- Roll or slide the spa on its side, as it will damage the siding.

- Lift or drag the vinyl cover by using the cover lock straps; always lift or carry the cover by using the handles.
- Attempt to open the electrical control box, as it will void the warranty. If you have an operational problem, follow the Troubleshooting section. If you are unable to resolve the problem, contact your authorized Comfort Hot Tub dealer. Many issues can be diagnosed over the phone by an Authorized Service Technician.

SPA SHELL:

- Your COMFORT HOT TUBS spa has an acrylic shell. Stains and dirt generally will not adhere to your spa's surface. A soft rag should remove most dirt. Always rinse off any spa shell cleaning agent with fresh water. Please note the following:
- Use only the approved cleaning agents for your COMFORT HOT TUBS spa shell: plain water, or Soft Scrub®. Do not use any other household cleaner other than those listed. Do not use cleaning products containing abrasives or solvents as they may damage the shell surface. Never use harsh chemicals, as damage to the shell is not covered under the warranty.
- Iron and copper in the water can stain the spa shell if unchecked. Consult your COMFORT HOT TUBS dealer about using a Stain and Scale Inhibitor if your spa has a high concentration of dissolved minerals.
- Keep all cleaners out of the reach of children and use care when applying them.
- Please note the safety information and save these instructions.

WE RECOMMEND SAVING THESE INSTRUCTIONS.

Section 2: Pre-Delivery Preparation

We would like to draw your attention to this user manual, as it contains essential information on how to ensure the safe, secure, and timely installation of your new hot tub. The following sections provide guidelines on how to prepare for delivery and set-up, including site selection, delivery access, ground preparation, and electrical requirements.

Please note that in most cities and counties, permits will be required for the installation of electrical circuits or the construction of exterior surfaces such as decks and gazebos. Furthermore, some communities have adopted residential barrier codes that may require fencing and/or self-closing gates on the property to prevent unsupervised access to a hot tub by children under 5 years of age.

However, your Comfort Hot Tubs hot tub is equipped with a locking cover that meets the ASTM F1346-91 Standard for Safety Covers, and therefore is typically exempt from most barrier requirements. As a general practice, your local Building Department will inform you of any applicable barrier requirements at the time a permit is obtained for the installation of an electrical circuit. Your Comfort Hot Tub dealer can provide information on which permits may be required.

Please be aware that this information is provided for guidance purposes only, and it is essential to comply with all applicable laws and regulations regarding the installation of a hot tub. Failure to comply with these laws and regulations may result in damage to your hot tub, and this may not be covered under warranty.

We strongly advise you to read this manual carefully and consult with your authorized Comfort Hot Tubs dealer if you have any questions or concerns regarding the installation of your hot tub.

Site Selection

It is important to note that site selection and preparation are the responsibility of the owner. It is essential to carefully read the instructions provided in this manual and consult with your authorized dealer if you have any questions. Please note that the following key considerations should be taken into account when selecting the ideal location for your hot tub:

- Ensure that your hot tub is placed on a structurally sound and level surface. The weight of a filled hot tub is significant, so it is crucial to ensure that the location you choose can withstand this weight.
- Avoid placing your hot tub near any reflective surfaces or glass. The heat generated by some types of double-pane windows and reflective surfaces can cause damage to the exterior of your hot tub, including the siding and cover.
- Locate your equipment compartment, which houses all of the electrical components, in a place where water can easily drain away from it. It is crucial to prevent water from entering the equipment compartment as this can damage the electronics, or result in tripping your house's circuit breaker.
- Ensure that you have easy access to the circuit breakers in the subpanel.
- It is vital to prevent water from entering the subpanel (220 volt models). The subpanel of your 220-volt hot tub is raintight when installed correctly with the door closed.
- It is essential to ensure that there is adequate access to the equipment compartment for periodic maintenance and spa care.

Please note that the above instructions are provided for guidance purposes only, and it is essential to consult with an authorized dealer if you have any questions or concerns. Failure to comply with these instructions may result in damage to your hot tub, and this may not be covered under warranty.

OUTDOOR AND PATIO INSTALLATION

When installing your new hot tub outdoors or on a patio, it's important to ensure that you have a solid foundation to support it. The spa's limited warranty does not cover structural damage resulting from incorrect installation or placement on an inadequate foundation.

For all Comfort Hot Tubs, we recommend a concrete pad of at least four inches thick. The reinforcing rod or mesh in the pad should be attached to a bond wire.

Comfort Hot Tubs spas may be installed onto a deck, provided that the load capacity of the deck is greater than the dead weight of the spa. If you place the spa on the ground, even temporarily, it's important to place stepping stones under the leveling areas. The stones should be at least two inches thick and twelve inches square.

DECK INSTALLATION

If you're planning to install your hot tub on an elevated deck or indoors, it's important to consult a qualified building contractor or structural engineer to ensure that the deck can support the weight of the spa, its contents, and occupants. To find the weight of your spa, refer to the specs chart in this manual. The weight per square foot must not exceed the structure's rated capacity, or serious structural damage could result.

INDOOR INSTALLATION

If you're planning to install your hot tub indoors, be aware of some special requirements. Water will accumulate around the spa, so flooring materials must provide a good grip when wet. Proper drainage is essential to prevent a build-up of water around the spa. When building a new room for the spa, it's recommended that a floor drain be installed.

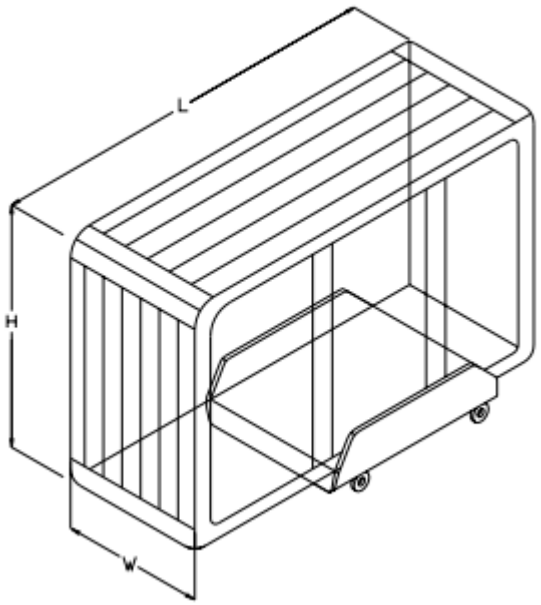
The humidity will naturally increase with the spa installed, and water may get into woodwork and produce dry rot, mildew, or other problems. Check for airborne moisture's effects on exposed wood, paper, etc. in the room. To minimize these effects, it's best to provide plenty of ventilation to the spa area. An architect can help to determine if more ventilation must be installed.

Delivery Access

Please note that all of our hot tubs are delivered curbside. It is highly recommended that you hire a professional spa mover to transport your hot tub from the curb to your backyard. This will help avoid any potential damage and ensure that your hot tub is properly placed in its desired location.

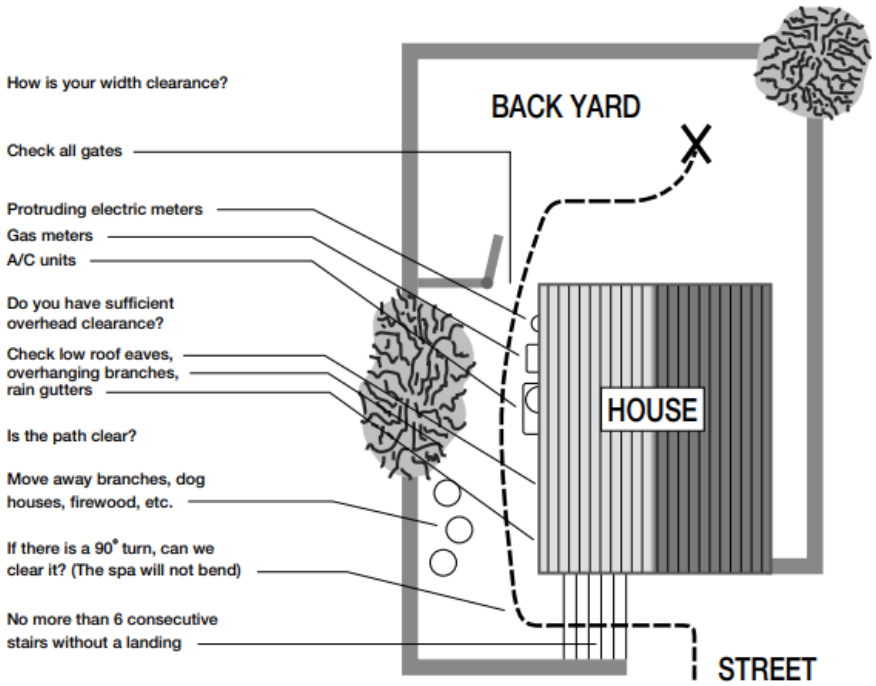
To determine the clearance requirements for delivering your new spa, follow these steps:

- Find the dimensions of your spa on the provided chart. The dimensions shown are the measurements of the spa in the vertical position, laid on its side.
- Contact your dealer to obtain the height and width added by the delivery cart. Add the height of the cart to the dimension shown as H to determine the required vertical clearance for passing the spa and cart. Use the width of the cart, or dimension W, whichever is greater, to determine the maximum width of clearance necessary. Use the length dimension L to determine the maximum clearance required for making sharp turns.
- Note that additional overhead clearance may be required if the spa needs to be moved up or down an incline or a short flight of stairs.



Refer to the information below to determine the access requirements for your desired installation location.

Model	Width W	Length L	Height H
Comfort 834	83”	83”	34”
Comfort 816	78.5”	78.5”	34”



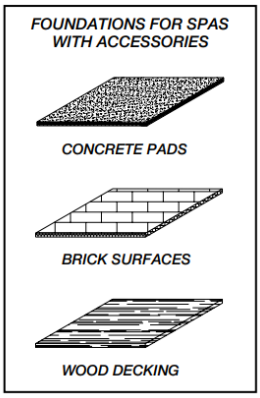
In some cases, it may be necessary to remove obstacles such as gates, fences or other movable items to move the spa to its installation site. In about 10% of cases, a crane may be required to lift the spa to its final destination. Don't worry if this happens! The crane, operated by a licensed and insured operator, has a truck-mounted boom that can easily fit into your driveway. The crane operator will lift your spa over walls, buildings, or any other obstructions and place it as close to the installation site as possible. Please note that if a crane is required for delivery, there may be an additional charge for the service from your local hot tub mover.

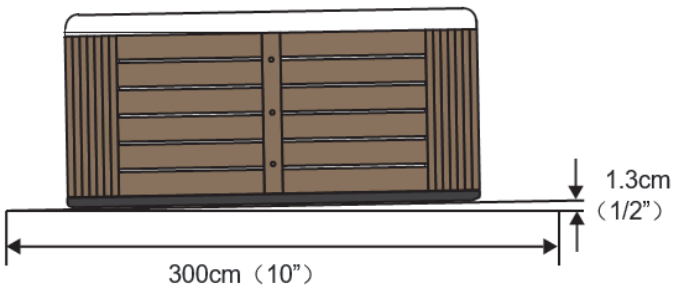
Ground Preparation

To ensure proper performance of your Comfort Hot Tub spa, it's crucial to prepare a level base on your chosen yard surface before delivery. Although a concrete slab is recommended, other foundations, as shown in the illustration below, are acceptable as long as they can handle the weight of the spa and are level.

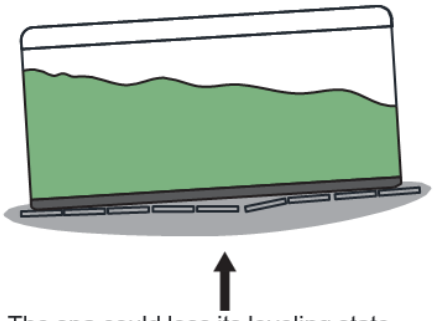
INSTALLATION NOTES:

- Concrete sloped at 1/2 inch per 10 feet (1 cm per 3 m) is preferred so that rainwater and water spillover will not puddle under the spa.
- If brick or wood decking is used, it should be placed and leveled below the entire spa to distribute weight evenly.
- Keep in mind that installing the spa on grass or dirt can increase the amount of debris brought into the spa water.
- If you plan to install your spa on a deck or gazebo, a solid foundation becomes mandatory, and the recommended surfaces are pictured on the right.





For correct water drainage, the inclination should be 1.3 cm (1/2 inch) / 305 cm (10 inches)


The spa could loss its leveling state because of the sinking of the stones or bricks

As the homeowner, you are responsible for providing a level foundation for your spa. Delivery crews are usually not equipped to level and prepare spa sites, but your Comfort Hot Tubs dealer should be able to recommend a licensed contractor to install a concrete slab, brick surface, or wood deck.

Note that to ensure proper spa operation and drainage, the spa surface must be leveled before installation, and shimming or point leveling is not supported or recommended by the manufacturer.

Electrical Requirements

It is essential to have the necessary electrical service installed to use your spa immediately after delivery. It is your responsibility to ensure this is done. All electrical circuits must be installed by a licensed electrician and wired in accordance with applicable local and national electrical codes. A 50 amp, single phase, 220 volt circuit breaker in the main electrical service panel is required for all models.

Comfort Hot Tubs requires the use of a subpanel to supply power and protect the spa. A licensed electrician should install a four-wire electrical service from the main electrical service panel to the subpanel and from the sub-panel to the spa.

After the spa has been moved to the correct location, your electrician can connect the conduit from the subpanel to the spa's control box and then complete the wiring connections in the control box.

It is important to note that removing or bypassing the GFCI breakers in the subpanel at any time will result in an unsafe spa and void the warranty. Long electrical runs may require a larger gauge feed wire than stated, and a maximum voltage drop of 3% should be used when calculating the larger wire size. The electrical requirements for the 220 volt models are provided in other sections, and recommended connectors should be used when connecting the supply conduit to the bottom of the control box inside the spa.

Please refer to the electrical section later in this manual for further guidance on set-up.

Section 3: Getting Started

Welcome to the Quick Guide To Getting Started with your hot tub! Whether you are a first-time hot tub owner or just need a refresher on how to properly maintain and use your spa, this guide is here to provide you with essential information and tips. From setting up your hot tub and adjusting the water temperature to maintaining proper water chemistry and cleaning the spa shell, we have got you covered. So, let's dive in and get started on your hot tub journey!

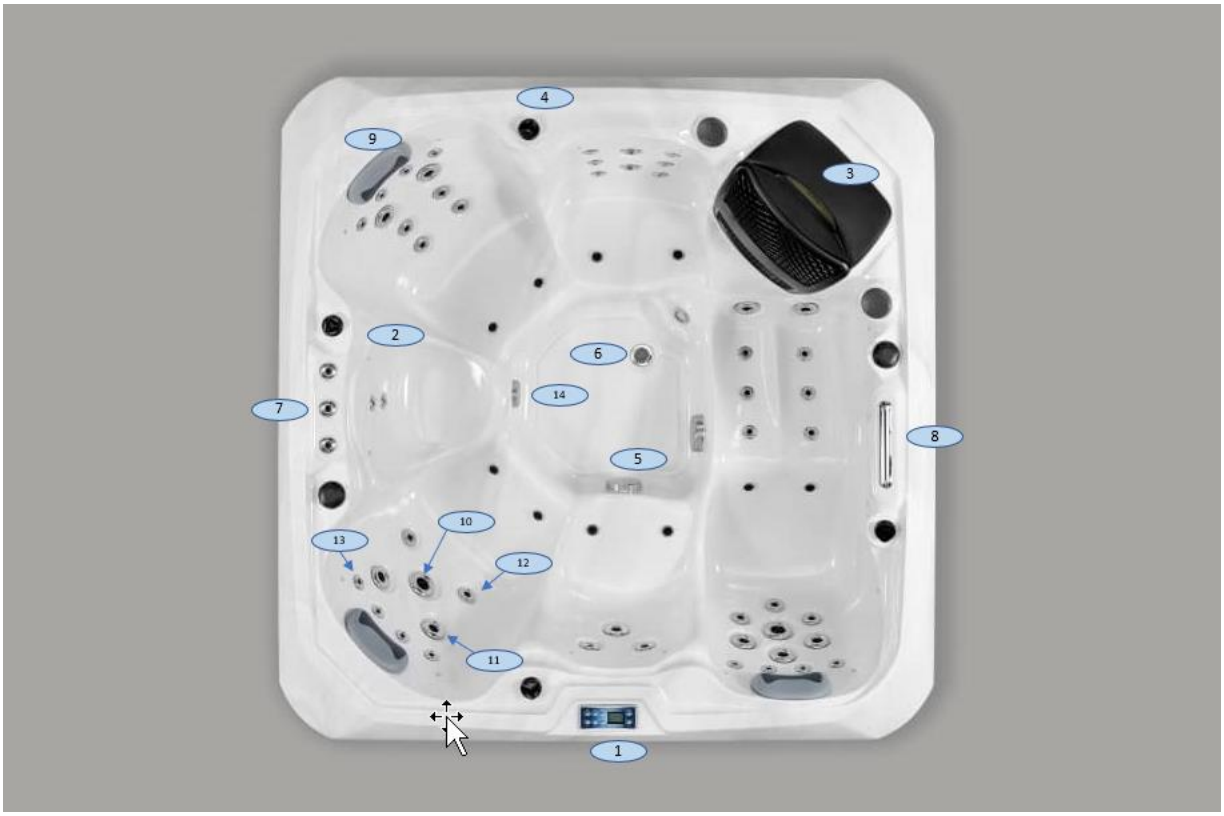
Model 834 Specs:

Dimensions and Capacity	
Dimensions (inches)	83”*83”*35”
Water Capacity	370 Gallons
Capacity (person)	6 people (5 seats + 1 lounge)

Electrical	
Voltage	220V, 60hz
Control System (USA Balboa)	VS523
Energy Saving Circulation Pump	1
Massage Pump	2 pumps, 3 horsepower each

Jet Configurations	
Total Quantity of Jets	51 stainless steel jets
4" jets	2 jets
3" rotation jets	10 jets
2" hydrotherapy jets	13 jets
1" hydrotherapy jets	26 jets

Structure & Plumbing	
Shell	Acrylic
Insulation Foam On Shell	30mm
Skirt	PS Paneling
Supporting Frame	Stainless Steel
Filter	1 filter
Ozonator	1 ozonator
Headrest	3 headrests
3" Underwater Lights	1 light
Air Valve	4 valves
Water Segregator	1 segregator
Waterfall	Yes
Fountain	Yes



1.) **Balboa Control Panel** controls temperature, jets, lights, etc.	2.) **LED Lights** – changing colors
3.) **Spa Filters** provide water filtration for the spa (under filter lid)	4.) The **Diverter** lets you divert water to different combinations of jets simply by turning the lever.
5.) This is the **Suction Fitting**.	6.) The **Spa Drain** is used to remove water from the hot tub.
7.) **Fountain**	8.) **Waterfall**
9.) **Pillows** – comes with three pillows	10.) **Large Jets** (4 inches)
11.) **Rotation Jets** (3 inches)	12.) **Hydrotherapy Jets** (2 inches)
13.) **Hydrotherapy Jets** (1 inch)	**14.) Underwater light**

A Few Tips Before You Fill Up Your Spa

Ensure that your spa has been installed and placed correctly in accordance with all local codes. Here are a few things to keep in mind before you fill up your spa:

DO:

- Decide on a water treatment system and make sure you have the necessary chemicals available. Read all of the instructions that come with the system.
- Have 5-way Test Strips available.
- Have pH/Alkalinity Up & Down available.
- Know the "Hardness" of your water by contacting your dealer for help. See Water Quality and Maintenance for more information.
- IMPORTANT: You can fill the spa with “softened” water as long as the calcium hardness parameters are maintained.

DON'T:

- Power up the spa until it has been filled with water! The controls, heater, circulation pump, and other systems will be damaged if power is supplied to these components prior to filling the spa with water. This may result in a non-warranty component failure.
- Fill the spa with hot water or cold water with a temperature below 50º F (10º C)! Tripping of the high-limit thermostat may result in your spa stopping functioning.
- Use your spa after filling until all of the steps listed in START-UP are completed!
- Add chlorine if treating your spa with polyhexamethylene biguanide (Biguanide, PHMB) sanitizer.

Getting Started

To ensure reliable and satisfactory performance, your Comfort Hot Tub spa has been rigorously tested during the manufacturing process. However, a small amount of water may remain in the plumbing after testing, which may cause water spots on the spa shell or siding before delivery. Therefore, before filling the spa, clean the spa shell with a soft cloth.

To achieve a successful start-up or refill, follow the instructions below exactly:

1.) **CLOSE THE DRAIN AND FILL THE SPA** through the filter compartment. Ensure the water level in your Comfort Hot Tub spa is maintained just below the bottom of the pillow.

2.) **AFTER FILLING THE SPA WITH WATER** and securing the equipment compartment door, connect power to the spa. Open the electrical subpanel door, reset the 30-amp GFCI breaker first, verify that the system is primed, then reset the 20-amp breaker. Finally, close and secure the subpanel door.

3.) **CHECK THE OPERATION OF THE JET SYSTEM** and purge any remaining air from the heating system by pressing the Jets button for one minute. Then press the same button to shut off all jets.

Please note that weak or surging jets may indicate low water levels or clogged filter cartridges.

4.) **USING A TEST STRIP AND APPLICABLE CHEMICALS:** To properly maintain your spa, use a test strip and appropriate chemicals to adjust the Total Alkalinity (TA) to 80 ppm, Calcium Hardness (CH) between 75-150ppm (or 25-75ppm if using Salt System), and the spa water pH to 7.4-7.8. These instructions can be found in the "Water Quality and Maintenance" section. It is crucial to add spa water chemicals directly into the filter compartment with the jet pump on high speed for at least ten minutes. Adjusting the Total Alkalinity (TA) first is necessary because an unbalanced TA will interfere with adjusting the pH accurately and prevent the sanitizer from functioning effectively.

5.) **SUPERCHLORINATE THE SPA WATER:** To superchlorinate the spa water, add 1½ teaspoons of sodium dichlor per 250 gallons (950 liters) of spa water. During the super-chlorination period, make sure to rotate the diverter lever(s) through both operating positions to allow the spa water to circulate with the jets on for equal periods of time. Comfort Hot Tubs spa's diverter levers are designed to operate different jets in two different positions.

6.) **SET THE TEMPERATURE CONTROL:** To adjust the spa's water temperature, you can follow these steps:
   a. To increase the temperature, press the hot button, and to decrease it, press the snowflake button.
   b. After adjusting the temperature, place the vinyl cover on the spa and secure it in place using the cover locks. Wait for the water temperature to stabilize and periodically check the temperature.
   c. If you want to prevent tampering, you can lock your desired temperature setting. Refer to the Operating section for details. It's recommended to lock the temperature setting after making any adjustments.

d. Once the water temperature climbs above 90°F (32°C), you can proceed to the next step.

7.) **ROTATE THE DIVERTER LEVER TO OPPOSITE POSITIONS:** Rotate the diverter lever(s) to the opposite position as instructed. Check the spa water for Free Available Chlorine (FAC) residual using the test strips. If the residual falls between 3 and 5ppm on the test strips (1 - 5ppm when using the Salt system), proceed to the next step. If the residual is less than 3 ppm, add 1½ teaspoons of chlorine (sodium dichlor) per 250 gallons (950 liters) of spa water to superchlorinate the water. Then, activate the clean cycle again to circulate the spa water for another ten-minute period. Repeat this process until you have tested both operating positions of the diverter lever(s).

8.) **RECHECK:** After completing the cleaning cycle, it's important to recheck the Total Alkalinity (TA) at 80ppm, Calcium Hardness (CH) between 75-150ppm, and spa water pH between 7.2 and 7.8 using a 5-way test strip. Remember to adjust your Total Alkalinity first, as an out-of-balance condition can affect your ability to adjust the pH correctly and prevent the sanitizer from working effectively. Once these levels are adjusted, your spa is ready for use. Remember to test the water weekly or before each use to ensure optimal conditions. **The spa is ready for use when the spa water has circulated through each diverter lever operating position and the chlorine level remains between 3ppm and 5ppm.**

9.) **Weekly Checks:** It is recommended to test the spa water weekly or before each use to ensure it is safe and properly balanced for use. This will help to maintain the clarity, cleanliness, and effectiveness of the water treatment system, as well as provide a comfortable and enjoyable spa experience.

Equipment Compartment

The equipment compartment in your spa is situated behind the front panel and below the control panel, but it's important to note that the appearance of your spa may differ from the illustration provided.

1. **Ozone Generator** turns O2 into O3 which is more resistant to bacteria growth	2. The **Balboa Control System** regulates and manages various functions such as

	temperature, jet pumps, lights, and water sanitation
3. **Circulation Pump** in a hot tub circulates water continuously to maintain filtration and chemical balance even when the main pumps are not running..	4. The 3-**5kw Heater** maintains the desired temperature of the spa.
5. The **3 Horsepower Pump** powers the jets in the hot tub.	6. The **Drain** allows for the water to be drained out when needed for maintenance or cleaning purposes.

Section 4: Water Quality And Maintenance

Basic Information

As a spa owner, it's crucial to maintain clean water to ensure a safe and enjoyable experience. However, water maintenance can be complex and challenging. To help you achieve and maintain clean water in your spa, consult your dealer who can provide guidance based on your local conditions. The following tips are also recommended:

- Refer to the owner's manual for complete information.
- Test your water weekly or after each spa use with a test strip.
- Add chemicals in small amounts frequently to avoid overdosing the spa.
- Ensure the chlorine level is between 1-5 ppm when using chlorine and manually add it as needed.
- Prevent under or over-chlorination.
- Drain and refill the water 3-4 times per year, depending on usage and the number of users.
- Consult your Comfort Hot Tubs dealer to determine if the water in your region has unique qualities that require attention, such as high mineral content.

The water maintenance program will depend on the mineral content of your water, frequency of use, and the number of users.

Parameter	Target	Minimum	Maximum
pH	7.4	7.2	7.8
Alkalinity	80 ppm	40 ppm	120 ppm
Calcium Hardness	100 ppm	75 ppm	150 ppm
Chlorine	3 ppm	1 ppm	5 ppm

As a spa owner, it's your responsibility to maintain water quality and cleanliness by regularly cleaning the filters. Balanced spa water can help extend the life of the spa components and make the water more comfortable. Your dealer can assist you in achieving and maintaining perfect water based on your local conditions.

Chemical Safety

When using chemicals for your spa, carefully read the labels and follow the instructions precisely. Although chemicals can protect you and your spa when used correctly, they can be hazardous in concentrated form. To ensure your safety, here are some guidelines to follow:

- Only a responsible person should handle spa chemicals and they should be kept out of reach of children.
- Measure the exact quantities specified and never overdose your spa.
- Handle all containers with care and store them in a cool, dry, well-ventilated place.
- Keep chemical containers closed when not in use and replace caps on their proper containers.
- Do not inhale fumes or allow chemicals to come in contact with your eyes, nose, or mouth. Wash your hands immediately after use.
- In case of accidental contact or ingestion, follow the emergency advice on the product label and call a doctor or the local Poison Control Center. If a doctor is needed, take the product container along for identification.
- Do not let chemicals spill on surrounding surfaces or landscaping and do not use a vacuum cleaner to clean up spills.
- Never smoke around chemicals as some fumes can be highly flammable.
- Do not store any chemicals in the spa equipment compartment.

How to Add Chemicals to the Spa

Adding chemicals to your spa water is an important part of maintenance, but it must be done carefully to ensure safety and effectiveness. Follow these steps to add chemicals to your spa water safely and effectively:

1.) Roll back the cover and carefully remove and set aside the filter compartment cover.
2.) On your Control Panel, push the jet pump.
3.) Carefully measure the recommended amount of chemical and slowly pour it into the filter compartment. Use care not to splash chemicals on your hands, in your eyes, on the spa shell surface, or on the spa cabinet.
4.) Replace the filter compartment cover. After ten minutes, turn off the jet pump. Close and secure the cover.

It is important to note that all spa water chemicals, including granulated dichlor, MPS, granulated pH increaser or decreaser, granulated total alkalinity increaser, liquid stain and scale inhibitor, and liquid defoamer must always be added directly into the filter compartment while the jet pump is running, and it must run for a minimum of ten minutes.

Additionally, after administering a super chlorination treatment or non-chlorine shock to your spa, leave the cover open for a minimum of 20 minutes to allow the oxidizer gas to vent. A high concentration of trapped oxidizer gas which may exist as a result of the shock treatment (not daily sanitation) may eventually cause discoloration or vinyl degradation to the bottom of the cover. This type of damage is considered chemical abuse and is not covered under the terms of the limited warranty. Finally, never leave an open spa unattended as there is a risk of drowning.

The Basics of Water Maintenance

- **Testing:** Test the water with 5-way Test Strips or a liquid/tablet reagent test kit each time you use the spa or at least once a week, following the instructions provided by your test kit. Pay attention to the sanitizer level, pH, Calcium Hardness (CH), and Total Alkalinity (TA). Store your test equipment in a cool, dry, and dark place to maintain its potency.

- **Water Filtration:** The filtration system in Comfort Hot Tubs spas helps keep the water clean by circulating sanitizer and removing debris from the spa. Inspect and clean the filters regularly to ensure optimal performance.

- **Chemical Balance/pH Control:** It's essential to balance the primary water parameters, including Total Alkalinity, Calcium hardness, and pH, to their recommended ranges to stabilize the water. Balance the

water chemistry every time you refill the spa with new water and periodically during its lifespan. Balanced water prevents damage by keeping the pH in a safe range and avoiding calcium scale buildup on spa equipment. A low pH can corrode metal components, while a high pH can cause excess calcium to form scale.

- The following three water components must be kept in balance to prevent spa damage. Balance these components in the following order as each will help you balance the next, using minimal chemicals.

    - *Calcium Hardness (CH):* This measures the amount of dissolved calcium in the water. Too low levels can make the water corrosive, while high levels cause scale formation on spa components. The ideal CH reading is between 75-150 ppm. If the CH level is too high, use calcium remover to lower it, following the instructions carefully. Be sure to fill the spa with care when using a water softener to avoid damaging the spa.

    - *Total Alkalinity (TA):* TA measures the water's ability to resist changes in pH or buffer capacity. Low TA can cause pH to fluctuate easily. The recommended TA reading is between 40-120 ppm. To raise the TA, use pH/Alkalinity Up (sodium hydrogen carbonate). To lower the TA, use pH/Alkalinity Down (sodium bisulfate). Once TA is balanced, it typically remains stable until the next drain/refill. Check the TA reading once a month, and be aware that raising or lowering TA may cause pH readings to fluctuate widely. Ignore pH readings on the test strip while balancing the TA.

    - *pH:* This measures the acidity and alkalinity of the water. Maintaining proper pH levels optimizes sanitizer effectiveness, prevents damage to the spa, and minimizes discomfort for users. Low pH dissipates sanitizer, corrodes components, and irritates spa users, while high pH neutralizes sanitizer, promotes scaling, and clouds the water. The ideal pH reading is between 7.2-7.8. Use pH/Alkalinity Down (sodium bisulfate) to lower pH, and pH/Alkalinity Up (sodium carbonate) to raise it.

- In addition to these fundamentals, your spa may require additional water conditioners based on your location and usage. Consult with your dealer for a personalized program.
    - In addition to these fundamentals, your spa may require additional water conditioners based on your location and usage.

        - Stain and Scale Control - For water high in calcium and minerals, it may be necessary to use an anti-scalant like Stain and Scale control. As water evaporates from your spa and new water is added, the amount of dissolved minerals like calcium, copper, iron, and manganese will increase. High iron or copper content in the water may produce green or brown stains on the spa. This product helps in preventing stains and scales.

        - Foam Inhibitors - The use of soap by spa users can cause the spa water to foam when the jets are used. Low levels of calcium hardness can also increase foaming. Although ozone and salt systems can oxidize soap residual, it may become necessary to add foam inhibitors to suppress the foam. Excessive soap in the water may require a water change to resolve.

    - **Oxidizers:** To maintain optimal water quality in your spa, it's important to use oxidizers such as Ozone and Monopersulfate (MPS) in combination with EPA registered sanitizers. These oxidizers work to prevent the buildup of contaminants, enhance sanitizer efficiency, reduce combined chlorine, and improve water clarity. The high output ozone system utilizes Corona Discharge technology to generate a concentrated amount of ozone that is continuously infused into the spa water. In addition, the Chlorine-Free Oxidizer, Monopersulfate (MPS) is a granular oxidizing chemical that can be used.

    - **Sanitizers:** Sanitizers play a crucial role in ensuring the safety and cleanliness of your spa water. Maintaining the recommended level of an EPA registered sanitizer is vital in reducing the growth

of harmful bacteria and viruses. The recommended Free Available Chlorine (FAC) level for an effective sanitizer is between 3.0-5.0 ppm. A low FAC level can result in the rapid proliferation of bacteria and viruses in warm water, while a high level can cause discomfort to users' eyes, lungs, and skin. Each sanitizer comes with its own set of instructions regarding the appropriate amount to use and when to add it to the spa water. For personalized recommendations, it's always best to consult with your dealer.

IMPORTANT: It is crucial to avoid using tri-chlor chlorine, bromo-chloro-dimethylhydantoin (BCDMH), or any compressed bromine or chlorine, acid, or other sanitizers that are not recommended by Comfort Hot Tubs. Using such products can lead to adverse effects on the spa water, equipment, and the health of the spa users. To ensure optimal performance and safety, it is recommended to only use the sanitizers and water conditioners approved and recommended by Comfort Hot Tubs.

The Comfort Hot Tubs Water Maintenance Program

ADDING CHEMICALS TO THE WATER

All spa water chemicals must be added directly into the filter compartment while the jet pump is running.These chemicals include:

- Granulated dichlor
- MPS
- Granulated pH increaser or decreaser
- Granulated total alkalinity increaser
- Liquid stain and scale inhibitor
- Liquid defoamer

Make sure to run the jet pump for at least ten minutes with the cover off to ensure proper mixing of the chemicals. Use the Clean button/feature to aid in the mixing process.

BUILDING A SANITIZER ROUTINE

To establish a baseline of sanitizer needed vs. spa usage, measure the sanitizer residual daily during the first month of ownership. The amount of Free Available Chlorine needed to accommodate the number of users and their combined usage time is the sanitizer needed. Regular demand on the sanitizer can be determined by the usage pattern. For example, two spa users for twenty minutes every day create regular demand on the sanitizer that is used to determine how much sanitizer to add in order to maintain the proper residual. If the usage pattern increases dramatically with invited guests, the amount and frequency of sanitizer required increases dramatically.

PERFORMING SUPER CHLORINATION/NON-CHLORINE SHOCK TREATMENT

Your chosen sanitation program may require a weekly or monthly super chlorination (1.5 tsp dichlor/250 gal) or shock (4 tbsp mps/250 gal). Increasing chlorine to 5 ppm for 24-48 hours removes excess waste and chloramines from the water. Sodium dichlor is 6x stronger than MPS and may be more appropriate for those users that experience heavy bather load conditions. After administering a super chlorination or shock to your spa, operate all jets and leave the cover open for a minimum of 20 minutes to allow the oxidizer gas to vent to prevent damage and discoloration to the cover and pillows. This type of damage is considered chemical abuse and is not covered under the terms of the limited warranty.

IMPORTANT: Always allow the Free Available Chlorine to fall below 5 ppm before using your spa.

DANGER: Never leave an open spa unattended, especially if there are children present!

Ozone Maintenance (optional)

In case of reduced or no ozone bubbles coming from the heater return, indicating a clogged ozone injector, or no ozone at all, follow these steps to clean the injector:

1.) Fill a cup or bucket with 16 ounces of white vinegar.
2.) Carefully loosen the long tubing connected to the bottom of the ozonator, located in the equipment compartment.
DANGER: Ensure that the end of the tubing sits at the bottom of the container before placing it into the vinegar.
3.) Run the spa until all 16 ounces of vinegar have been used. This should allow enough vinegar to flow through the injector and clear the blockage.
4.) Reinstall the tubing to the bottom of the ozonator.

Please note that water chemistry damage is not covered by the warranty, and the chemical levels and water quality in the spa are under your direct control. Proper basic care is necessary to ensure many years of hot water relaxation. If you are unsure about any chemical or its usage in the spa, contact your Authorized Dealer.

DO:

- Add all chemicals slowly into the filter compartment while the jet pump is operating for ten minutes.
- Use granular (dichlor) or liquid (sodium hypochlorite) chlorine.
- Use special care if using baking soda to clean either the interior or exterior plastic surfaces.

IMPORTANT: Comfort Hot Tubs DOES NOT recommend the use of any floating chemical dispenser. The limited warranty does not cover damage to the spa shell or components caused by a floating chemical dispenser. Floating dispensers can get trapped in one area and cause over-sanitization or release large chunks of sanitizer that quickly chemically burn the shell and cover.

DON'T:

- Use compressed sanitizers.
- Use a floater type sanitization system as a low or no maintenance solution to your spa maintenance program.
- Use a sanitizer that is not designed for spas.
- Use swimming pool (muriatic) acid to lower pH.
- Broadcast or sprinkle the chemicals onto the water surface. This method may cause chemically-induced spa surface blistering (chemical abuse).

Instructions for Maintaining Water Quality in Your Spa During Vacation

SHORT TIME PERIODS (3-5 DAYS)

1.) Adjust pH levels: Before leaving for a short period of 3-5 days, adjust the pH levels of the water by following the instructions provided in the Water Quality and Maintenance section.
2.) Sanitize the water: Use shock procedures to sanitize the water before leaving. The details for the same are provided in the Water Quality and Maintenance section.

3.) Lock the spa cover: Secure your spa cover with cover locks to prevent any foreign objects or people from entering.
4.) On return, sanitize the water: Upon your return, sanitize the water using shock procedures again and balance the pH levels.

LONG TIME PERIODS (5-14 DAYS)

Prior to leaving:

1.) Lower the temperature: At least one day before leaving, lower the temperature to approximately 80°F (27°C), which is a more effective temperature for water oxidizers such as sodium dichlor (chlorine).
2.) Adjust pH and sanitize: Before leaving, adjust the pH levels as required and sanitize the water using the shock procedures provided in the Water Quality and Maintenance section.

Upon your return:

1.) Sanitize the water: Sanitize the water by following the shock procedures provided in the Water Quality and Maintenance section.
2.) Return to original temperature: Return the set temperature to its original setting, and wait for the Free Available Chlorine residual level to drop below 5.0 ppm before using the spa.

IMPORTANT:

If you will not be using your spa for an extended period exceeding 14 days, it is recommended to drain or winterize the spa unless an outside maintenance service or neighbor is available to assist with water maintenance.

Supplemental Water Maintenance

Proper maintenance of your spa water includes maintaining its cleanliness and pH balance. In addition to these essentials, there are two other popular water additives you may consider using.

Mineral Deposit Inhibitors

As water evaporates from your spa and new water is added, the amount of dissolved minerals can increase, causing the water to become "hard" and potentially damaging the heater. Proper pH control can minimize this, but occasionally high levels of iron or copper can produce stains on the spa. Using a stain and scale inhibitor may help to reduce these metals. Well water may contain high concentrations of minerals, so using a low water volume, extra-fine pore water filter during the filling of the spa can remove many of the larger particles.

Foam Inhibitors

As soap builds up in the water over time, the spa water may start to foam when the jets are used. This is due to soap residues on users' bodies and clothing. Foam inhibitors can suppress foam, but cannot remove soap from the water. Only ozone can oxidize soap, and it is difficult to remove from the water. Therefore, soap buildup will require regular water replacement.

Over time, soap build-up in the spa water can become concentrated and make the bather's skin feel unclean, which cannot be resolved. In this case, it is necessary to drain and refill the spa. The water typically lasts about four months before needing to be drained, depending on the amount of soap introduced.

Water Terminology

To help you better understand the water maintenance process, here are some key chemical terms used in this Water Quality and Maintenance section:

Bromamines: These are compounds that form when bromine combines with nitrogen from body oils, urine, perspiration, and other sources. Unlike chloramines, bromamines have no pungent odor and are effective sanitizers.

Bromine: This is a halogen sanitizer that belongs to the same chemical family as chlorine. It is commonly used in stick, tablet, or granular form.

Calcium Hardness: This refers to the amount of dissolved calcium in the spa water. The recommended range is approximately 75-150 ppm (25-75 ppm for Salt Systems). High levels of calcium can cause cloudy water and scaling, while low levels can harm the spa equipment.

Chloramines: These are compounds that form when chlorine combines with nitrogen from body oils, urine, perspiration, and other sources. Chloramines can cause eye irritation and have a strong odor. Unlike bromamines, they are weaker and slower sanitizers.

Chlorine: This is an efficient sanitizing chemical for spas. Comfort Hot Tubs recommends using sodium dichlor-type granulated chlorine, as it is totally soluble and nearly pH neutral.

Chlorine (or Bromine) Residual: This refers to the amount of chlorine or bromine remaining in the water after chlorine or bromine demand has been satisfied. The residual is the amount of sanitizer that is chemically available to kill bacteria, viruses, and algae.

Corrosion: This refers to the gradual wearing away of metal and plastic spa parts, usually caused by chemical action. Generally, corrosion is caused by low pH or water with levels of TA, CH, pH, or sanitizer that are outside the recommended ranges.

Halogen: This is any one of five elements: fluorine, chlorine, bromine, iodine, and astatine.

Nitric Acid: Nitric acid is a highly corrosive chemical that is produced as a byproduct of the ozone generating process in small quantities. It easily dissolves in the water stream with ozone.

Oxidizer: Oxidizing chemicals are used to prevent the buildup of contaminants, improve sanitizer efficiency, minimize combined chlorine, and enhance water clarity. For more information, see MPS and Ozone.

Ozone: Ozone is a potent oxidizing agent produced naturally and artificially. It does not form any byproducts, oxidizes chloramines, and does not affect water pH.

pH: pH is the measure of the spa water's acidity and alkalinity. The recommended pH range for spa water is 7.2 to 7.8. Water with pH below 7.0 (neutral) can damage the heating system, while pH above 7.8 can lead to cloudy water and scale formation on the shell and heater.

ppm: ppm stands for "parts per million," and it is the standard unit for measuring chemical concentration in water. It is equivalent to mg/L (milligrams per liter).

Reagent: A reagent is a chemical substance in liquid, powder, or tablet form that is used for chemical testing.

Sanitizer: Sanitizers are added and maintained at recommended levels to protect bathers from pathogenic organisms that can cause diseases and infections in spa water.

Scale: Scale refers to rough calcium-bearing deposits that can coat spa surfaces, heaters, plumbing lines, and clog filters. Scaling is generally caused by mineral content combined with high pH, and it forms more easily at higher water temperatures.

Super-Chlorination: Super-chlorination, also known as "shock treatment," involves adding significant amounts of a quick-dissolving sanitizer (such as dichlor) to oxidize non-filterable organic waste and remove chloramines and bromamines.

Total Alkalinity (TA): TA refers to the amount of bicarbonates, carbonates, and hydroxides present in spa water. Proper TA is important for pH control. If TA is too high, adjusting pH becomes difficult. If TA is too low, it becomes difficult to maintain the proper pH level. The recommended TA range for spa water is 40 to 120 ppm.

Section 5: Operating Instructions

Control Panel Instructions

INITIAL START-UP

When your Spa is first activated (Powered up) it will go into Priming Mode indicated by “Pr” on the LCD readout. The Priming Mode will last for up to 4 minutes and then the Spa will run in Standard Mode.

Temperature Adjustment

The last measured temperature is consistently displayed on the LCD. Press either button once to display the set temperature. Each time either button is pressed again, the set temperature will increase or decrease depending on which button is pressed. After three seconds, the LCD will automatically display the last measured temperature. Temperature adjustments can only be made from the Main Touch Panel.

Setting the time of day

When the Spa is first powered up, the words SET TIME will flash on the display. Press “Time,” then “Mode/Prog,” them “Warm” or “Cool.” The time will begin changing in one-minute increments. Press “Warm” or “Cool” to stop the time from changing. Press “Time” to confirm.

Jets 1

Press “Jets 1” to turn Pump1 on and off. If left on, Pump 1 will turn off after 15 minutes. If a 2 Speed Pump (option) is utilized in your Spa, low speed automatically turns on during filter cycles. It cannot be de-activated during filter cycle but high speed may be activated.

Jets 2/Jets 3

Press “Jets 2/3” to turn pump 2 on/off. If left on, Pump 2/3 will turn off after 15 minutes.

Light

Press the Light button to turn the Spa Light on/off. If left on, the Light automatically turns off after 4 hours.
TOMMY – WE NEED SOMETHING ABOUT HOW TO CONTROL LED LIGHTS?

SETTING STANDARD/ECONOMY & SLEEP MODE

Mode/Prog

Mode is changed by pressing “Warm” or “Cool,” then pressing “Mode/Prog” button. Standard Mode maintains set temperature and the Standard icon will be displayed. Ecomony Mode heats the spa to set temperature only during filter cycle. ECN will display when water temp is not current, and will alternate

with water temp when the pump is running. The Economy icon will be displayed. Sleep Mode heats the spa to within 20 °F/10°C of the set temperature only during filter cycles. SLP will display when water temp is not current, and will alternate with current water temp when the pump is running.

OPTIONAL FILTER CYCLE PROGRAMMING

You are not required to change the filter cycles, but if you wish to, press “Time,” “Mode/Prog,” “Mode/Prog” within 3 seconds. Set Start filter 1 (AM) will appear. Press “Warm” or “Cool” to resent the filter start time. Press “Mode/Prog” to see SET STOP FILTER 1 and adjust the time with “Warm” or “Cool” as done above. Press “Mode/Prog” to see SET START FILTER 2 (PM) and proceed as above. Press “Mode/Prog” to see SET STOP FILTER 2 and proceed as above. Press “Mode/Prog” to confirm.

Preset Filter Cycles

The first preset filter cycle starts at 8.00am and ends at 10.00am. The second preset filter cycle starts at 8.00pm and ends at 10.00pm. For non-circ systems, ow-speed pump 1 and the ozone generator (if installed) run during filtration.

For 24 hour circulation systems, the circ pump and the ozone generator (if installed) run24 hours. In hot environments, the circ pump may turn off for 30 minute periods, except during filter cycles.For non-24 hour circulation systems, the circ pump and ozone generator (if installed) run during filtration (and may also run automatically at other times).At the beginning of each filter cycle all other equipment will run briefly to purge the plumbing.

Locking the Panel

Press “Time,” “Blower,” and “Warm” within 3 seconds. The Panel is now locked. To unlock the panel, press the “Time, “ “Blower,” and “Cool” within 2 seconds.

Locking the Set Temperature

Press “Warm,” “Time,” “Blower,” and “Warm” within 3 seconds. The “Warm” and “Cool” buttons are now disabled. To unlock the temperature, press “Time,” “Blower,” and “Cool” within 2 seconds. Note: On some systems, “Jets 1,” instead of “Blower” is used in Lock/Unlock sequences.

Freeze Protection

If the temperature sensors inside the heater detect a drop of water temp to approx 6.7°C, then the pumps will automatically activate to provide freeze protection. The equipment will remain on for 4 minutes after the sensors detect the water temperature at approx 7.2°C. In colder climates, an optional freeze sensor may be added to protect against freeze conditions. See your Dealer for details.

DIAGNOSTIC MESSAGES

Message	Meaning	Action Required
	No message on display. Power has been cut off to the Spa.	The Control Panel will be disabled until power returns. Time of day will be preserved for 30 days with a battery backup.
OHH	'Overheat' - The Spa has shut down. One of the sensors has detected (approximately 47.8°C) at the Heater.	DO NOT ENTER THE WATER. Remove the Spa Cover and allow water to cool. Once the Heater has cooled, reset by pushing any button. If Spa does not reset, shut off the power to the Spa and call your Dealer or Service Organization.
OHS	'Overheat' - The Spa has shut down. One of the sensors has detected that the Spa water is (approximately 43.3°C).	DO NOT ENTER THE WATER. Remove the Spa cover and allow water to cool. At 43°C, the Spa should automatically reset. If Spa does not reset, shut off power to the Spa and call your Dealer or Service Organization.
ICE	'Ice' - Potential freeze condition detected.	No action required. The pump and Blower will automatically activate regardless of Spa status.
SNR SNB	Spa is shut down. The sensor that is plugged into the Sensor 'A' jack is not working. Spa is shut down. The sensor that is plugged into the Sensor 'B' jack is not working.	If the problem persists, contact your Dealer or Service Organization (May appear temporarily in an overheat situation and disappear when the heater cools). If the problem persists, contact your Dealer or Service Organization. (May appear temporarily in an overheat situation and disappear when the heater cools).
SNS	Sensors are out of balance. If this is alternating with the temperature, it may just be a temporary condition. If the display shows only this message (periodically blinking), the Spa is shut down.	If the problem persists, contact your Dealer or Service Organization.
HFL	A substantial difference between the temperature sensors was detected. This could indicate a flow problem.	Check water level in Spa. Refill if necessary. If the water level is correct, make sure the pumps have been primed. If problem persists, contact your Dealer or Service Organization.
LF	Persistent low flow problems. (Displays on the fifth occurance of the 'HFL' message within 24 hours.) Heater is shut down, but other Spa functions continue to run normally.	Follow action required for 'HFL' message. Heating capacity of the Spa will not reset automatically; you may press any button to reset. Remove filters if clears, dirty filters. Potential airlock, pumps may need to be purged.
DR	Inadequate water detected in Heater.	Check water level in Spa. Refill if necessary. If the water level is correct, make sure the pumps have been primed. Press any button to reset.
DRY	Inadequate water detected in heater (Displays on third occurance of 'DR' message.) Spa is shut down.	Follow action required for 'DR' message. Spa will automatically reset; you may press any button to reset. Potential airlock, pumps may need to be purged.
PR	When the Spa is first activated it will go into Priming Mode.	Priming Mode will last for up to 4 minutes and then the Spa will begin to heat and maintain the water temperature in the Standard Mode.

Section 6: Spa Care and Maintenance

The Comfort Hot Tubs spa is crafted from top-quality, highly durable materials that guarantee its longevity. Nonetheless, the longevity of your spa and its various components is heavily reliant on the spa care and maintenance program you put in place. To safeguard your investment, it is crucial to carry out regular maintenance and adhere to the guidelines outlined in this section.

Drain & Refill Instructions

The following are the instructions for draining and refilling your spa. It is essential to note that it is not recommended to refill your spa when the temperature is below 50°F (10°C).

1.) Turn off power to the spa by tripping both GFCI breakers in the subpanel.
2.) Locate the drain valve, which is situated below the front panel, and remove the drain cap. To avoid flooding the foundation surrounding the spa, attach the inlet of a garden hose to the drain valve and route the outlet to an appropriate draining area. Ensure that the spa water with a high sanitizer level does not harm plants and grass.
3.) Open the valve by turning the knob, allowing the spa to drain via gravitational flow.
4.) Allow all the water to drain through the drain.
5.) Inspect the spa shell and clean as required when empty.
6.) Close the drain valve and reinstall the drain cap.
7.) Always clean and rotate the filter cartridges each time the spa is drained for cleaning. Install new filters or clean the existing ones with filter cleaner.
8.) Refill the spa through the filter compartment using pre-filter. Refill water temperature must be between 50°F - 70°F to avoid high-limit tripping.
9.) Follow the Quick Start-Up instructions in the Getting Started section.

Cold Water Refill

If the tap water is below 50°F (10°C) when refilling your spa, it may trigger the spa to go into a High Limit Protection mode, which would cause it to stop functioning. In the event of high limit tripping, the quickest way to reactivate the spa control system is to disconnect power to the spa completely, then use a hairdryer to warm the two sensors on top of the heater and the vinyl tubing in the equipment compartment for about 10 minutes. After you believe the sensors and heater tubing have been adequately warmed, reconnect power to the spa.

Another way to prevent the spa from going into High Limit Protection mode is by blending warm water with the cold tap water during the refilling process so that the water temperature exceeds 50°F (10°C). This approach can be used if it is feasible for you.

Preventing Freezing

Your spa is designed to be used year-round in any climate. However, in areas with extremely cold temperatures below 10°F (-12°C) combined with strong winds, the jet pump may experience partial freezing, even if the water inside the spa remains at the selected temperature. During these cold periods, the spa's energy efficiency may also decrease as the heater will cycle more frequently. To prevent partial freezing of some components, you can insulate the equipment compartment with an insulating kit, which is available from your local dealer. This insulating kit will also help maximize the spa's energy efficiency.

It is important to note that when warmer weather returns with temperatures of approximately 60°F-70°F (15°C-21°C), the insulating kit must be removed to prevent overheating of the jet pump.

Winterizing Your Hot Tub

It is important to properly winterize your spa if it will be left unused for an extended period of time in severely cold weather to avoid accidental freezing due to power or equipment failure. Follow these steps to winterize your spa:

1.) Drain the spa following the Drain & Refill instructions. Open the waterfall valve.
2.) Remove the filter cartridges, clean them, and store them in a dry place.
3.) Rotate diverter levers to middle position and Water Feature lever to open position.
4.) If the temperature falls below 32°F (0°C), use a five (5) gallon combination (vacuum/blower) wet/dry shop vac to effectively remove water that is trapped inside the plumbing lines. Attach the vacuum's hose to the blower side of the shop vac, place the end of the vacuum hose down the filter opening, turn on the blower function, and allow it to blow out any water remaining in the plumbing lines (approximately 3 to 5 minutes). Turn the jet lever and allow that system to purge. If your spa is equipped with more than two jet systems, then each jet system will also need to be blown out. Attach the vacuum hose to the vacuum side of the shop vac and vacuum all openings and orifices, starting with the jets at the top and moving downward. When vacuuming the drain outlets, cover the drain grate tightly with a rag to ensure water is drawn completely from the internal plumbing system.
5.) Thoroughly dry the spa shell with a clean towel.
6.) Replace the drain cap.
7.) Using a long-extension funnel, pour Propylene Glycol anti-freeze into all standpipes, filter suction fittings, jet orifices, and water feature orifices. Add enough anti-freeze to ensure adequate protection – in many cases, you will see the liquid in the orifice, or coming out of another location. Never use automobile anti-freeze (Ethylene Glycol) as it is toxic.
8.) Close the spa cover and fasten the cover tie downs. Cover the spa cover with two pieces of plywood to evenly distribute the weight of snow and ice. Secure a plastic sheet or tarp over the spa cover and plywood.
9.) Replace the equipment access door, if removed.

It is strongly recommended that you contact your local dealer to perform this service to prevent freeze damage not covered by warranty.

RE-OPENING INSTRUCTIONS AFTER WINTERIZING

These are the opening instructions for a spa after winterizing it:

1.) Remove the plywood and plastic sheet covering the spa and open the spa cover by unfastening the cover tie downs.
2.) Follow the Start-up and Refill Procedures in the Operating Instructions section of the Owner's Manual. Do not install filters to prevent them from exposure to the anti-freeze.
3.) Superchlorinate the spa water by adding three teaspoons of chlorine (sodium dichlor) per 250 gallons of spa water into the filter compartment. This is twice the normal amount of chlorine needed for superclorination. This extra amount of chlorine is needed to destroy the anti-freeze.

    Note: A defoamer may be needed to decrease the amount of foam caused by the anti-freeze.
4.) Drain your spa to ensure removal of anti-freeze. Do not drain water on grass or plants due to excessive chlorine level.
5.) After the spa has completely drained, re-install your filter and follow the Start-up and Refill Procedures in the Operating Instructions section of the Owner's Manual.

Remember to always keep the spa covered when not in use, whether it is empty or full.

Filter System

The filter system in a spa is an important component that requires regular maintenance to ensure proper functioning. It is important to note that the filter lid is not designed to support heavy weight loads and should not be used as a seat. This could cause the lid to crack or break, which is considered abuse and is not covered under the warranty.

Comfort Hot Tubs spas come equipped with two filter cartridges that are sized to meet the needs of the jet pump system. Over time, the filter cartridges may become clogged, which can result in reduced water flow. It is crucial to maintain a clean and unobstructed filtering system. This not only ensures maximum performance from the jets but also allows the 24-hour filtration system to function effectively. Comfort Hot Tubs recommends that the filter cartridges be cleaned at least once every month by soaking them in a filter cleaner to dissolve minerals.

The frequency and duration of use, as well as the number of occupants, all contribute to determining the appropriate time between filter cleanings. More use means that more frequent filter cleanings are required. Failure to maintain the cartridges in a clean and unobstructed manner can result in reduced water flow through the heater assembly. This can cause heating system to trip. If this occurs during sub-freezing temperatures and goes unnoticed, the spa water may freeze. Any damage to the spa caused as a result of poor maintenance is not covered by the spa warranty.

WARNING: To reduce the risk of injury to persons using the spa, do not remove the suction fittings (filter standpipes) located in the filter compartment and do not sit on the filter lid. In extreme cases, the lid could crack and break, which could lead to injury.

Filter Cartridge Removal & Cleaning

It is important to properly maintain and clean the filter cartridges in your spa to ensure optimal performance and to prevent dirt and debris from circulating through the system. Before removing the filter cartridge, it is crucial to disconnect the spa from the power supply by tripping the GFCI breakers located in the subpanel.

Once the power is disconnected, remove the filter compartment cover and any floating items from within the filter compartment. Then, turn the filter retainer handle counterclockwise until the retainer can be removed from the filter standpipe, and remove the filter retainer and cartridge. It is important to never remove the filter standpipes when debris is present in the filter compartment, as debris may find its way into the internal plumbing, resulting in blockage.

To clean the filter cartridge, use a filter degreaser to remove mineral and oil buildup. Soak the filter in the degreaser according to the package directions, then place the filter on a clean surface and spray until clean using a garden hose. It may be necessary to rotate the filter while spraying to remove any debris lodged between the filter pleats.

When reinstalling the filter cartridge, reverse the order of steps in which it was removed. Be careful not to overtighten the cartridge, as this can cause damage to the filter and the spa. It is important to never use the spa with the filter cartridges, or filter standpipe(s) removed.

Caring for the Spa Pillows

Taking good care of your spa pillows is essential for ensuring their longevity and your continued comfort. These pillows have been strategically positioned above the water level to minimize the effects of chlorinated water and other spa chemicals. To extend their lifespan, it is recommended to remove and clean them whenever the spa shell is being cleaned. Use a mild soap and water solution to remove body oils, and always rinse the pillows thoroughly to eliminate any soap residue. If you're not going to use the spa for an extended period, such as during a vacation or when winterizing the spa, or when the water is being super-chlorinated, remove the spa pillows until the next use. Here's how to remove and replace the spa pillows:

1.) Carefully pull and lift on one end of the pillow to stretch it out until it's released from the plastic retainer. Push the pillow in the opposite direction to remove it from the other retainer.
2.) Align the pillow.
3.) Slide one end of the pillow onto the spa retainer.
4.) Using both hands, lift the pillow above the retainer and stretch it out while sliding the pillow recess onto the retainer.

Spa Shell Exterior Care

To maintain your Comfort Hot Tubs spa's acrylic shell, it's essential to treat it with care. Fortunately, most dirt and stains won't stick to the surface, and they can be easily removed using a soft rag or nylon scrubber. However, it's important to note that most household cleaning agents are harmful to the spa's shell and should not be used.

ONLY use the following cleaning agents to clean your Comfort Hot Tub spa shell: plain water, or Soft Scrub®. Avoid using alcohol or any other household cleaner not listed above. Also, avoid cleaning products containing abrasives or solvents that can damage the shell surface. NEVER use harsh chemicals, as they can void your warranty. Always rinse the spa shell thoroughly with fresh water after cleaning.

If your spa has a high concentration of dissolved minerals like iron and copper, they can stain the spa shell if left unchecked. Consult with your Comfort Hot Tubs dealer about a Stain and Scale Inhibitor.

Remember to keep all cleaners out of reach of children and handle them with care during application.

Section 7: Electrical Requirements

It is important to follow the electrical installation requirements and instructions for your specific Comfort Hot Tub spa model completely to ensure maximum safety against electrical shock. Improper wiring may cause electrocution, risk of fire, and other risks of injuries.

All Comfort Hot Tubs spa models are equipped with a power indicator which also has a diagnostic function. It will begin blinking if the heater high-limit thermostat has tripped. If the power indicator light is blinking, follow the instructions in the Troubleshooting section to identify and correct the cause.

Since this is a 220V hot tub, it is recommended to use an experienced, licensed electrician to wire the spa in accordance with all applicable local electrical codes. The spa must be wired with a 50 amp, single phase, 220 volt, four-wire service (two line, one neutral, one ground). The grounding conductor must not be less than #10 AWG.

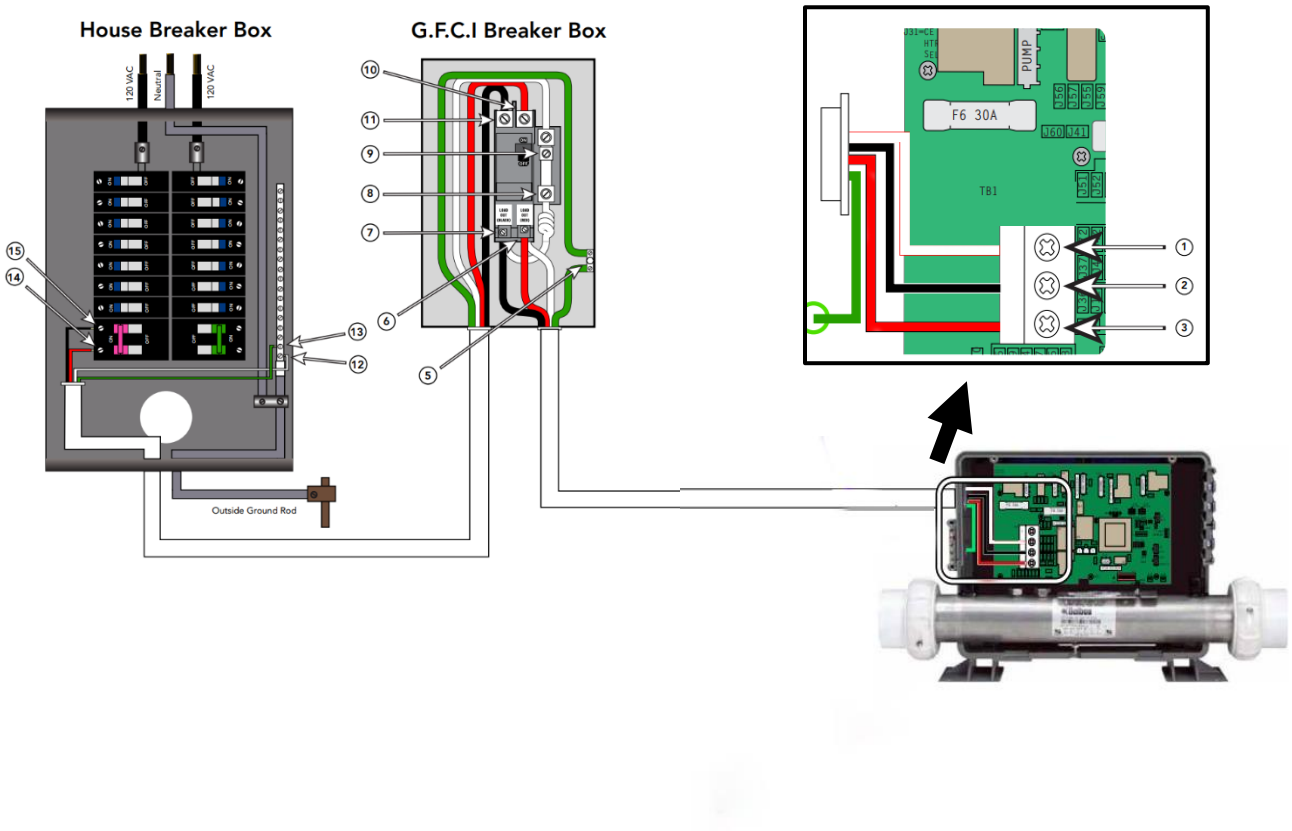
Once the spa has been filled with water, it is important to test all of the circuit breakers. Push the “TEST” button on each GFCI breaker and observe it click OFF. Wait for 30 seconds, then push the breaker switch

to the OFF (down) position and then to the ON (up) position. If any of the GFCI breakers fail to operate in this manner, there may be an electrical malfunction, and it is important to turn off all circuits and not use the spa until the problem has been corrected by an authorized service agent.

It is also important to note that removing or bypassing any GFCI breaker will result in an unsafe spa and will void the spa's warranty.

Your spa runs on 220v electricity. It does not plug into a standard wall outlet and will need a licensed electrician to hook it up. Please only use a qualified technician for service and installation of your hot tub.

- Use minimum 8awg copper conductors only
- 50 Amp Breakers
- Connect only to a circuit protected by a Class A Ground Fault Circuit Interrupter (GFCI) or Residual Current Device (RCD) mounted at least 5' (1.52M) from the inside walls of the spa/hot tub and in line of sight from the equipment compartment.
- A wiring diagram is provided on the back side of the spa control panel for your technician to reference.



Section 8: Service & Trouble Shooting Information

General Information

The Comfort Hot Tub spa is designed to be trouble-free and long-lasting. However, issues may arise that require the assistance of a qualified service person. It is recommended to refer to this trouble shooting guide before calling for service. Keep the original sales receipt for future reference.

GFCI and High Limit Thermostat

To troubleshoot a spa that is not operating, check the power supply to the spa first. Check each GFCI breaker in the subpanel and reset any that have tripped. If a GFCI will not reset, it may be a sign of a ground fault in the electrical components, and an Authorized Service Technician should be contacted.

If the GFCI breakers have not tripped, check the main breaker in the house breaker panel to ensure that the electrical circuit supplying the spa has not tripped. If it has, it may indicate that the circuit was overloaded or a ground fault exists between the breaker panel and the spa receptacle or subpanel, and a qualified electrician should be contacted.

If the main house breaker and spa GFCI breakers have not tripped, check the high limit thermostat. Turn off power to the spa for 30 seconds, and then turn it back on to reset the high limit thermostat. If the spa energizes, it may indicate reduced water flow through the heating system, which could be due to a clogged filter cartridge(s), blockage within the system plumbing, a non-functioning heater circulation pump, power not being disconnected from the spa before it was drained, or an air lock in the plumbing lines. The Power Indicator on the front of the spa's control panel will also blink if the high limit thermostat circuit has tripped.

If the spa still does not function after resetting the GFCI breakers or high limit thermostat, it is recommended to contact an Authorized Service Technician. For additional service information, refer to the Troubleshooting Guide or the Heater section if the spa operates but does not heat.

Heater

It's important to note that the heater is protected by both the heater high limit thermostat circuit and the integrated pressure switch. If the spa is not heating, and the red and green lights are blinking while the pump and light are operational, it may be due to an open pressure switch. This issue can be caused by a clogged filter cartridge, blockage within the system plumbing, power being not disconnected before draining the spa, or an air lock in the plumbing lines. Correcting the identified problem should lead to the pressure switch closing, which will then energize the heater.

Circulation Pump

The Comfort Hot Tubs circulation pump is a specialized, energy-efficient, and noiseless water-cooled pump that constantly filters the spa water. To prevent damage to the pump caused by running hot without water, it is fitted with a thermal cut-off. To reset the cut-off, turn off the spa's power and wait for the pump to cool down.

The thermal cut-off usually trips due to one or more of the following issues: 1) clogged filter cartridge(s), 2) blockage in the plumbing system, 3) failure to disconnect the spa from the power source before

draining, or 4) airlock in the plumbing lines. Once the root of the problem has been identified and fixed, the pump's thermal cut-off can be reset, enabling it to work properly again.

Miscellaneous

The electronic sensors of the control and high-limit thermostats are connected to the plumbing, so avoid cutting or kinking the wires that link them to the thermostats in the control box.

The jet pump has a thermal overload cutoff switch that prevents it from overheating. If the pump turns off by itself in an old spa, it may signal that the pump motor bearings are failing. In a new spa, several factors can cause the pump to shut down, such as thermal overload, high temperature, friction from tight moving parts, or improper wiring. Thermal overload cutoffs have varying sensitivities, and some may shut off the pump at lower temperatures.

All Comfort Hot Tub spa models feature a jet pump shroud that releases the heat from the pump motor outside the equipment compartment and back into the spa water. If the shroud's vent is obstructed by masonry, grass, or debris, the pump may overheat. After the motor has cooled down and the vent cleared, you can restart the jet pump.

If the house wiring is inadequate, the pump may not receive enough voltage, leading to excessive heat generation and higher amperage draw. If the pump is shutting down due to overheating, make sure the equipment compartment has proper ventilation, and the air gap at the bottom is unobstructed. If your jet pump keeps shutting off after short periods, contact a certified service technician.

Acts Invalidating Warranty

The warranty for the Comfort Hot Tub spa is no longer valid if the spa has been improperly installed, altered, misused, or abused. Any repairs attempted by someone who is not an authorized representative of Comfort Hot Tubs will also void the warranty. Alteration includes any changes to components or plumbing, electrical conversion, or adding non-approved sanitation or water purification devices, or heating systems that may cause component or unit failure or an unsafe operating system. Misuse and abuse include any operation of the spa that is not in accordance with Comfort Hot Tubs printed instructions, or using the spa for an application for which it is not designed, specifically using the spa for non-residential applications, or operating the spa at water temperatures outside the range of 35°F (1.7°C) and 120°F (49°C). Damage caused by a dirty, clogged or calcified filter cartridge, use of tri-chloro chlorine, BCDMH, chemical tablets in a floater, acid, or any other spa chemicals or spa surface cleaners that are not recommended by Comfort Hot Tubs, allowing undissolved spa sanitizing chemicals to lie on the spa surface, improper water chemistry maintenance, and leaving the spa uncovered while empty of water and in direct exposure to sunlight are also considered abuses that can invalidate the warranty. These abuses are not covered under this warranty. Acts of nature, and damage caused by animals, rodents, and insects are also not covered under this warranty. Note that operation of the spa does not mean "use" of the spa. Comfort Hot Tubs does not recommend using the spa if the water temperature is above or below the spa’s control panel temperature range.

Disclaimers

Comfort Hot Tubs will not be responsible for any costs, expenses, damages, or loss of use of the Comfort Hot Tubs spa, including incidental, consequential, special, indirect, or punitive damages. These costs

may include, but are not limited to, the removal of a permanent deck or other custom fixture or the need for crane removal. The duration of any implied warranty will be the same as the duration of the applicable limited warranty mentioned above. Some states do not permit restrictions on the length of an implied warranty. Under no circumstances will Comfort Hot Tubs or any of its representatives be held liable for any personal injury or damage to property arising from the use of the spa.

Note that in some states, incidental or consequential damages cannot be excluded or limited, so the above limitations may not apply to you.

Comfort Hot Tubs Customer Service

If you have any queries or concerns regarding the installation, usage or upkeep of your Comfort Hot Tubs spa that have not been addressed in this manual, please contact your Comfort Hot Tubs dealer.

You can also reach out to Comfort Hot Tubs at 617-468-8827 from Monday to Friday, 10 am to 2 pm Pacific Standard Time (PST), or send an email to support@comforthottubs.com.

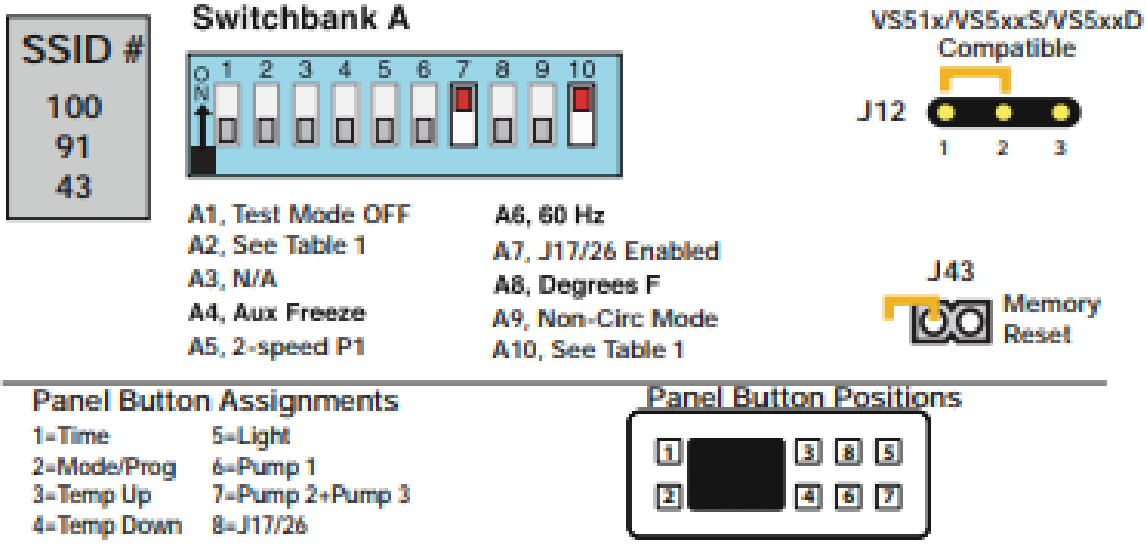
More Trouble Shooting

If you encounter any issues with your Comfort Hot Tubs spa, please contact your authorized dealer immediately. The following information provides some helpful tips to diagnose and potentially solve some common issues, but we recommend contacting your dealer for assistance.

GENERAL OPERATION TROUBLESHOOTING GUIDE		
Problem	**Probable causes**	**Solutions**
Entire spa is inoperative	• Power failure • GFCI tripped • Heater high-limit thermostat tripped • Spa lock activated	• Check power source • Reset GFCI; call for service if it will not reset • Disconnect power for at least thirty seconds to reset heater high limit. If it will not reset, check for clogged filters. If tripping continues, call for service. • Deactivate spa lock
Spa does not heat; jets and light operate	• Integrated pressure switch open • Circulation pump thermal cut-off tripped	• Check for clogged filters. Integrated pressure switch will reset when the flow of water through the heater has been restored. Call for service if the heater trips frequently. • Check for clogged filters or air locks in plumbing. Disconnect power to the spa, allow circulation pump to cool. Circulation pump thermal cut-off will reset when pump has cooled and power is reapplied. Call for service if circulation pump thermal cut-off trips frequently.
Jets weak or surging	• Spa water level too low • Filters clogged • **COMFORT CONTROL** lever closed	• Add water • Clean filters • Open **COMFORT CONTROL** lever
Light inoperative	• Spa lock activated • Light wiring or assembly is faulty	• Deactivate spa lock • Replace light assembly
Ready indicator icon is flashing	• Temperature sensor problem	• Disconnect power for at least thirty seconds. If blinking continues, call for service.

SPA WATER MAINTENANCE TROUBLESHOOTING GUIDE		
Problem	**Probable causes**	**Solutions**
Cloudy Water	• Dirty filters • Excessive oils / organic matter • Improper sanitization • Suspended particles / organic matter • Overused or old water	• Clean filters • Shock spa with sanitizer • Add sanitizer • Adjust pH and/or alkalinity to recommended range • Run jet pump(s) and clean filters • Drain and refill the spa
Water Odor	• Excessive organics in water • Improper sanitization • Low pH	• Shock spa with sanitizer • Add sanitizer • Adjust pH to recommended range
Chlorine Odor	• Chloramine level too high • Low pH	• Shock spa with sanitizer • Adjust pH to recommended range
Musty Odor	• Bacteria or algae growth	• Shock spa with sanitizer–if problem is visible or persistent, drain, clean and refill the spa
Organic buildup / scum ring around spa	• Build-up of oils and dirt	• Wipe off scum with clean rag – if severe, drain the spa, use a spa surface and tile cleaner to remove the scum, and refill the spa
Algae Growth	• High pH • Low sanitizer level	• Shock spa with sanitizer and adjust pH • Shock spa with sanitizer and maintain sanitizer level
Eye Irritation	• Low pH • Low sanitizer level	• Adjust pH • Shock spa with sanitizer and maintain sanitizer level
Skin Irritation / Rash	• Unsanitary water • Free chlorine level above 5 ppm	• Shock spa with sanitizer and maintain sanitizer level • Allow free chlorine level to drop below 5 ppm before spa use
Stains	• Total alkalinity and/or pH too low • High iron or copper in source water	• Adjust total alkalinity and/or pH • Use a metal deposit inhibitor
Scale	• High calcium content in water – total alkalinity and pH too high	• Adjust total alkalinity and pH – if scale requires removal, drain the spa, scrub off the scale, refill the spa and balance the water

Section 9: Topside Panel & Control System



DIP Switch Key

A1 Test Mode (normally OFF)

A2+A10 Control amp draw requirements (See Table 1)

A3 N/A (must be OFF)

A4 Aux Freeze (must be OFF)

A5+A9 Pump 1 speeds and Circ Modes:

A5	A9	Circ Mode	Pump 1 Speed
OFF	OFF	Non-circ	2-speed
ON	OFF	Circ "acts like Pump 1 low" (filters/polls/ect)	1-speed
OFF	ON	24 hours with 3°F shut-off	1-speed
ON	ON	24 hours with 3°F shut-off	2-speed

A6 "ON" position: 50Hz operation
"OFF" position: 60Hz operation

A7 "ON" position: J17/26 Enabled for Blower or 1-speed Pump 4.
"OFF" position: J17/26 Disabled.

A8 "ON" position: temperature is displayed in degrees Celsius
"OFF" position: temperature is displayed in degrees Fahrenheit

Table 1 — # of Hi-Speed Pumps/Blower Before Heat Disabled

A2	A10	
OFF	OFF	0
ON	OFF	1
OFF	ON	2
ON	ON	3

Alert:
Pump 2 and Pump 3 are required, use X-P332 expander board with PS-23 splitter cable.
To add Blower or 1-speed Pump 4, use J17/26.

Jumper Key

J12 **Factory set. DO NOT MOVE.**
Jumper must be on Pins 1 and 2 for VS51xZ/VS52xZ/VS5xxSZ/VS5xxDZ software.
Jumper must be on Pins 2 and 3 for VS50xZ software.

J43 When jumper is placed on 2 pins during power-up, system will reset persistent memory.
Leave on 1 pin only to enable persistent memory feature.

WARNING:
- Setting DIP switches incorrectly may cause abnormal system behavior and/or damage to system components.
- Refer to Switchbank illustration on Wiring Configuration page for correct settings for this system.
- Contact Balboa if you require additional configuration pages added to this tech sheet.

Panel Button Positions

Panel Button Assignments

1=Time
2=Mode/Prog
3=Temp Up
4=Temp Down
5=Light
6=Pump 1
7=Pump 2+Pump 3
8=J17/26 (when A7 is ON)

Aux Panel Information

Supports 2-button aux panel

VX20 [6] [7]

Supports 4-button aux panel

VX40D [6] [7] [8] [5]

Any time you change a DIP Switch, other than A1, you must reset Persistent Memory for your new DIP Switch Settings changes to take effect. If you do not reset Persistent Memory, your system may function improperly.

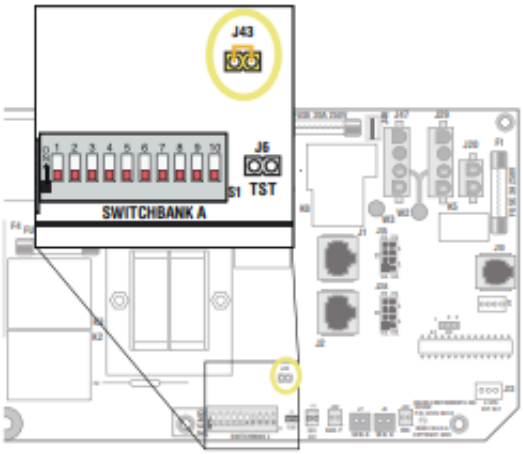
To reset Persistent Memory:

- Power down by disconnecting power source from spa.
- Put a jumper across J43, covering both pins. (See illustration below)
- Power up by connecting power source to spa.
- Wait until "Pr" is displayed on your panel.
- Power down again.
- Remove jumper from J43 (May also move to cover 1 pin only)
- Power up again.

About Persistent Memory and Time of Day Retention:

This system uses memory that doesn't require a battery to store a variety of settings. What we refer to as Persistent Memory stores the filter settings, the set temperature, and the heat mode.

Persistent Memory is not used for Time of Day. Only models with a Serial Deluxe panel installed (VS5xxDZ and GS5xxDZ) can display the time. However, during power loss to the spa, the system will lose the correct time, and reset to 12:00 PM when power is restored.



J43 on VS5xxZ and VS300 Series Main Board Shown.

Power Up Display Sequence

Upon power up, you should see the following on the display:

- Three numbers in a row, which are the SSID (the System Software ID). The third display of these numbers is the Software Version, which should match the version of your system. For example, if these three numbers are 100 67 38, that is a VS511SZ at version 38.
- Displayed next is: "24" (indicating the system is configured for a heater between 3 and 6 kW) or "12" (indicating the system is configured for a heater effectively* between 1 and 3 kW). "24" should appear for all VS models running at 240VAC. "12" should appear for all VS models running at 120VAC, as well as all GS models. (*A heater which is rated at 4 kW at 240VAC will function as a 1 kW heater at 120VAC.)
- "Pr" will appear to signal the start of Priming Mode.

At this point, the power up sequence is complete. Refer to the Reference Card for the VS or GS System model of your spa for information about how the spa operates from this point on, including how to adjust the Time of Day if using a Serial Deluxe style panel.

Comfort Topside Panel and Control Pack

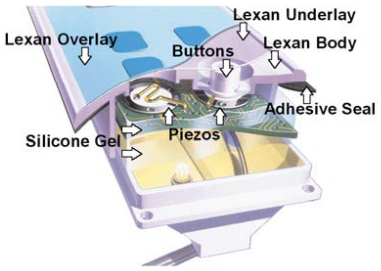
TOPSIDE CONTROL PANEL

The control panel activates functions at the touch of a button. Each function will echo from the circuit board to the LCD in a corresponding manner. The panel will also display diagnostic messages that enable the service technician to easily troubleshoot the system.

M7 TECHNOLOGY

M7 is a patented Balboa technology that uses two sensors inserted at the opposite ends of the heater element to determine flow, dry fire conditions, etc. The two sensors located within the heater housing compare the inlet water temperature with the outlet water temperature. It works no matter which direction the water flows through the heater.

The sensors in combination with specific software allow the spa to be controlled without the use of external pressure switches, flow switches, or temperature sensors.



Panel Construction

VS501 with a Cut-a-way View of the Heater

Service Tools and Parts Checklist

Service Tools Required

- Ammeter (50A)
- Balboa Six-in-one Screwdriver
- Digital Multi-meter
- Padlock (to lock electrical disconnect during service)
- Pliers: Slip Joint & Needle nose
- Precision Thermometer - Digital Fever Type
- Quick CheckTM Test Kit
- Silicone Tube
- Small Wire Cutters
- Two 3/8" Open End Wrenches (one wrench should be ground down to 5/32" [0.156"] thickness in order to access the nut between the heater strap and heater element connector)

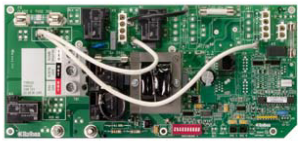
20618
JUMPER LOGIC

COMMON FUSES USED

30074	FUSE 1 AMP FAST BLOW GLASS
30075	FUSE 5 AMP FAST BLOW GLASS
30122	FUSE 10A BLOWER
30595	FUSE 10A POWER INPUT
30076	FUSE 15 AMP FAST BLOW CERAMIC
30596	FUSE 15A POWER INPUT
30142	FUSE 20A POWER INPUT
30123	FUSE 20A PUMP
30137	FUSE 25A POWER INPUT
21447	FUSE 25A POWER INPUT HIGH SURGE
30136	FUSE 30A POWER INPUT

Recommended Parts For Service Calls

- Extra Board(s)
- Extra Panel(s)
- Fuses
- Jumpers
- Heater Assembly



MORE COMMON BOARDS:
22972 BOARD BARE VS500 (shown)
21998 BOARD BARE GL2000
27116 BOARD BARE EL5000

Heater Assembly

Important Information -- Product Identification

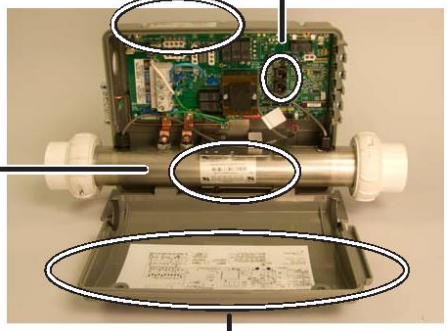
On Every System, an Identification Label Is Placed on top of the Casing

Two Types of Plug-in Connectors:

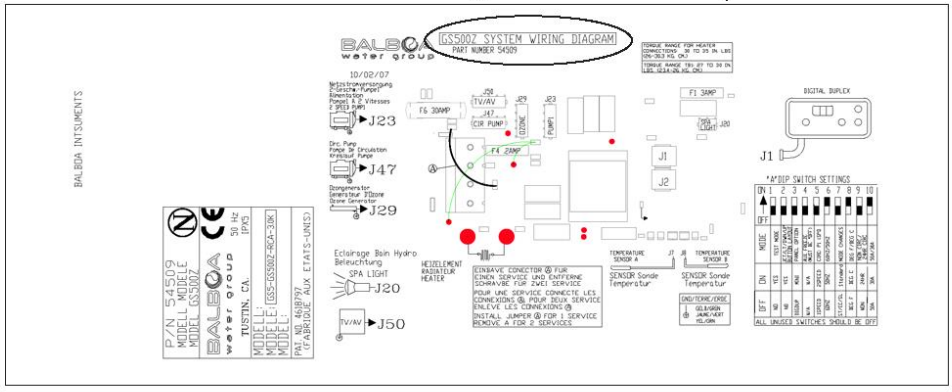
"Molex" Type, ML/GL Connector

"Phone Plug" RJ Type, VL/GS Connector

Heater Element Specifications Are Shown on the Heater Tube Label



On Every System, a Wiring Diagram Is Placed Inside the Door



HIGH VOLTAGE CAN SERIOUSLY INJURE OR KILL!

ONLY EXPERIENCED TECHNICIANS SHOULD SERVICE THIS EQUIPMENT.

DO NOT remove the protective covers from any electrical enclosure, or attempt to service any related electrical device, unless you are a qualified electrician or service professional.

DANGER

Risk of electric shock. Before working with any electrical connections, make certain that the Main Power breaker from the house breaker box has been turned off.

WARNING

All electrical work must be performed by a qualified electrician and must conform to all local codes.

IMPORTANT

Due to the danger of severe electrical shock, locate all power disconnects before servicing a spa. Precautions must be taken whenever working with breaker boxes, G.F.C.I.'s, or service disconnects.

- Always refer to the wiring diagram which is included with each system on the inside of the system box cover. Use this diagram for voltage measurement points, and for proper reconnection of wires.

A terminal marked "GROUND" is provided within the System Control Center enclosure. To reduce the risk of electrical shock, connect this terminal to the grounding terminal of the electric supply panel with a continuous green insulated copper wire equivalent in size to the circuit conductors supplying this equipment, but no smaller than #12 AWG.

Ground in System Enclosure

Safety Tips

- Keep children and pets away.
- Be aware of your surroundings. Standing in water while repairing a spa puts you at serious risk.
- Avoid working in cramped or crowded conditions.
- Consider placing a padlock on the service panel to lock out anyone who might power up the system.

G.F.C.I. Troubleshooting

Keep in mind that a majority of G.F.C.I. tripping problems can be attributed to incorrect wiring. G.F.C.I. troubleshooting usually finds the problem.

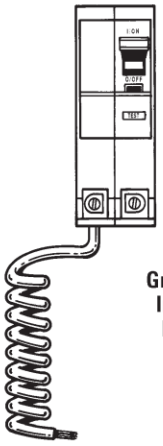
IF CORRECT WIRING IS VERIFIED

- Check to see if the proper G.F.C.I. is installed.
- Check the label in the system box near TB1 to determine the maximum amperage draw for the system.
- Be sure the G.F.C.I. is rated for more amperage than the system will draw.
- For a 240 V dedicated system, a 2-pole G.F.C.I. with no load neutral is acceptable.
- For a 120/240 V system, the G.F.C.I. must include a load neutral out.
- If the white load neutral wire is routed from the G.F.C.I. neutral bar directly to TB1 in the system box, then the G.F.C.I. will trip when a 120 V device is activated.
- For a detailed wiring checklist, please review the previous segment of this manual on proper G.F.C.I. wiring or the G.F.C.I. manufacturer's instructions.
- If the wiring is correct and the G.F.C.I. will not reset, then unplug the pump and try to reset the G.F.C.I.
- If the G.F.C.I. trips again, then unplug the blower and reset the G.F.C.I.. If the G.F.C.I. continues to trip, then do the same procedure for the ozone generator.
- If the G.F.C.I. stops tripping after you unplugged one of the spa's components, turn off the power to the spa then plug in each component except the one that tripped the G.F.C.I.
- Power up the system. If the G.F.C.I. no longer trips, then you have correctly identified the problem. Repair or replace the component as instructed by the spa manufacturer.
- If you have unplugged all of the spa's components and the G.F.C.I. still doesn't reset, then the problem is most likely a ground fault in the heater.

WARNING: THE OWNER SHOULD TEST AND RESET THE G.F.C.I. ON A REGULAR BASIS TO VERIFY ITS FUNCTION.

TO DISCONNECT THE HEATER

- First, turn off the main circuit breaker, then remove both heater straps or wires from the system heater output, not the heater itself.
- After restoring the power, try to reset the G.F.C.I. again. If it no longer trips after the system calls for heat, then replace the heater.
- If the G.F.C.I. still trips, look for pinched or shorted wires at the transformer. Make sure that the screws that attach the transformer to the system box have not pinched or damaged the insulation of the transformer wires.
- If the transformer wires are undamaged, check for any other pinched wires. Refer to the wiring diagram to verify the correct wiring of the control system.
- If everything looks to be in perfect working order, then the G.F.C.I. may be defective.



Ground-Fault Circuit Interrupter/Circuit Breaker (G.F.C.I.)

Voltage Checks: Breaker Box, G.F.C.I. & System Box

When checking for proper voltage, keep in mind that the acceptable voltage range is ± 10% of the recommended voltage.
Acceptable voltage when 120 V is specified is between 108 and 132 V.
Acceptable voltage when 240 V is specified is between 216 and 264 V.
Diagrams are on the following pages.

Voltage Verification - Most G.F.C.I. Problems Are Due To Low Voltage

IMPORTANT:
IF THE VOLTAGE IS NOT WITHIN THE ACCEPTABLE RANGE, CALL AN ELECTRICIAN OR THE LOCAL ELECTRIC COMPANY TO DIAGNOSE THE PROBLEM.

CHECK THE VOLTAGES AT:
1. **Breaker Box Voltage Check**
2. **G.F.C.I. Line-In Voltage Check.**
3. **G.F.C.I. Load Out Voltage Check**
4. **System Box Check At Tb1**

120 VOLT SYSTEMS - 120V ± 10% - 108V - 132V
240 VOLT SYSTEMS - 240V ± 10% - 216V - 264V

No More Than 2% (5 Volt AC) Difference Between Voltage at the Breaker Panel And Voltage at the System.

- **CHECK UNDER PEAK LOADS -- TWO TYPES OF PEAK LOADS**

  1. Spa System Peak Loads - Pumps, Heater, Blower & Light On
  2. Household Peak Loads - May Be In Afternoon On Hot Day
     Use Recording Meter If Possible - Records Max & Min Volts

- **MIDSTREAM CONTROL SYSTEM RELATED ISSUES**

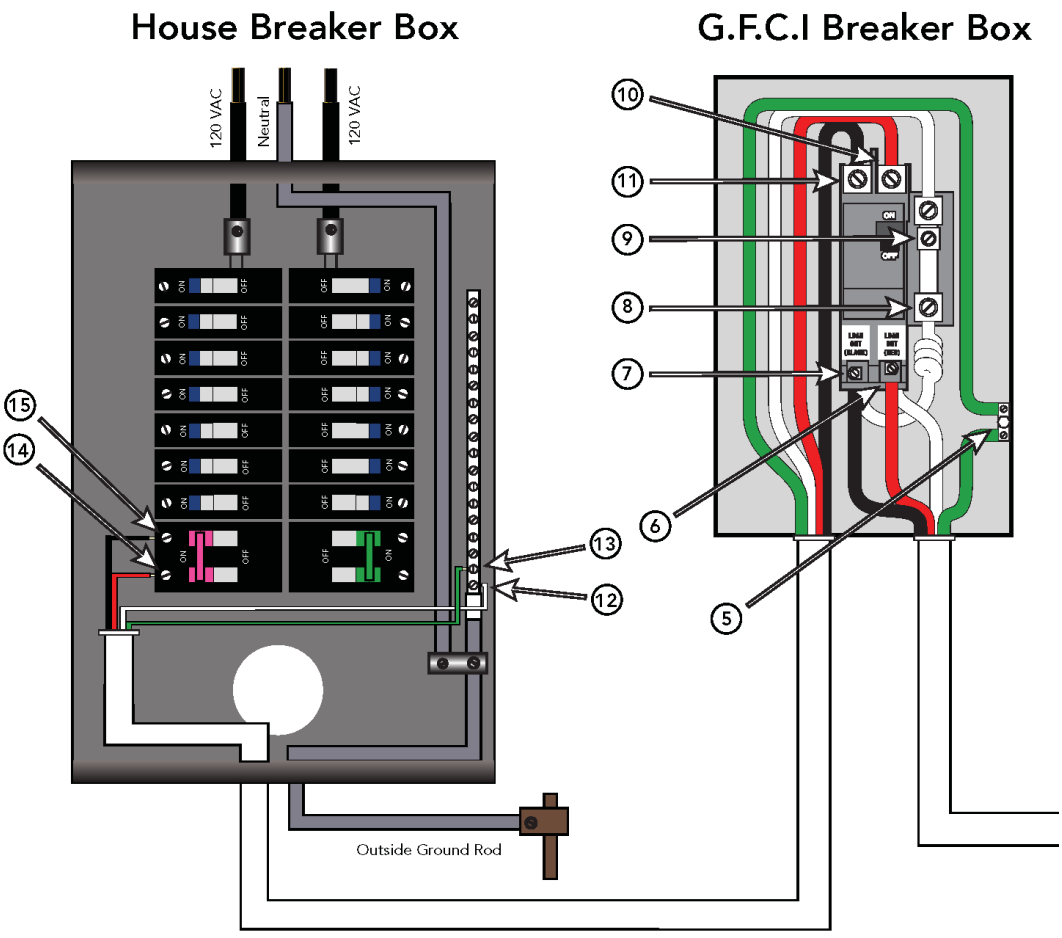
  Communication Between Topside & System Board In Most Systems
  Press Button - Message Sent To System Board
  System Board Performs - Message Sent Back To Topside & Relay Opens Or Closes
  LED or Icon Is Turned On or Off - Hear Or See Relay Open Or Close
  In Most Cases, If This Happens, There Is No Problem With The Topside Panel Or System Board

- **EXAMPLE - SPA LIGHT IS NOT WORKING - 2 OR 3 EASY STEPS !**

  1. Press Light Button
     Light LED or Icon Turns ON, But Spa Light Is NOT ON
     Topside & Board Are Good, Check Downstream
     Light LED or Icon Is NOT ON
     Topside Or System Board May Be Bad, Continue
  2. Plug In Spare Topside Panel - Easier To Check For Bad Topside
     Light LED or Icon Now Turns ON
     Original Topside Is Bad - R&R Topside Panel
     Light LED or Icon Is NOT ON
     Original Topside Is Good, Do Not Replace
     System Board Is Bad - R&R System Board
  3. Spa Light Is Still NOT ON - Check Downstream
     Same Procedure For Other Functions
     Jets, Blower, Heater, Time, Program, Mode, Etc.

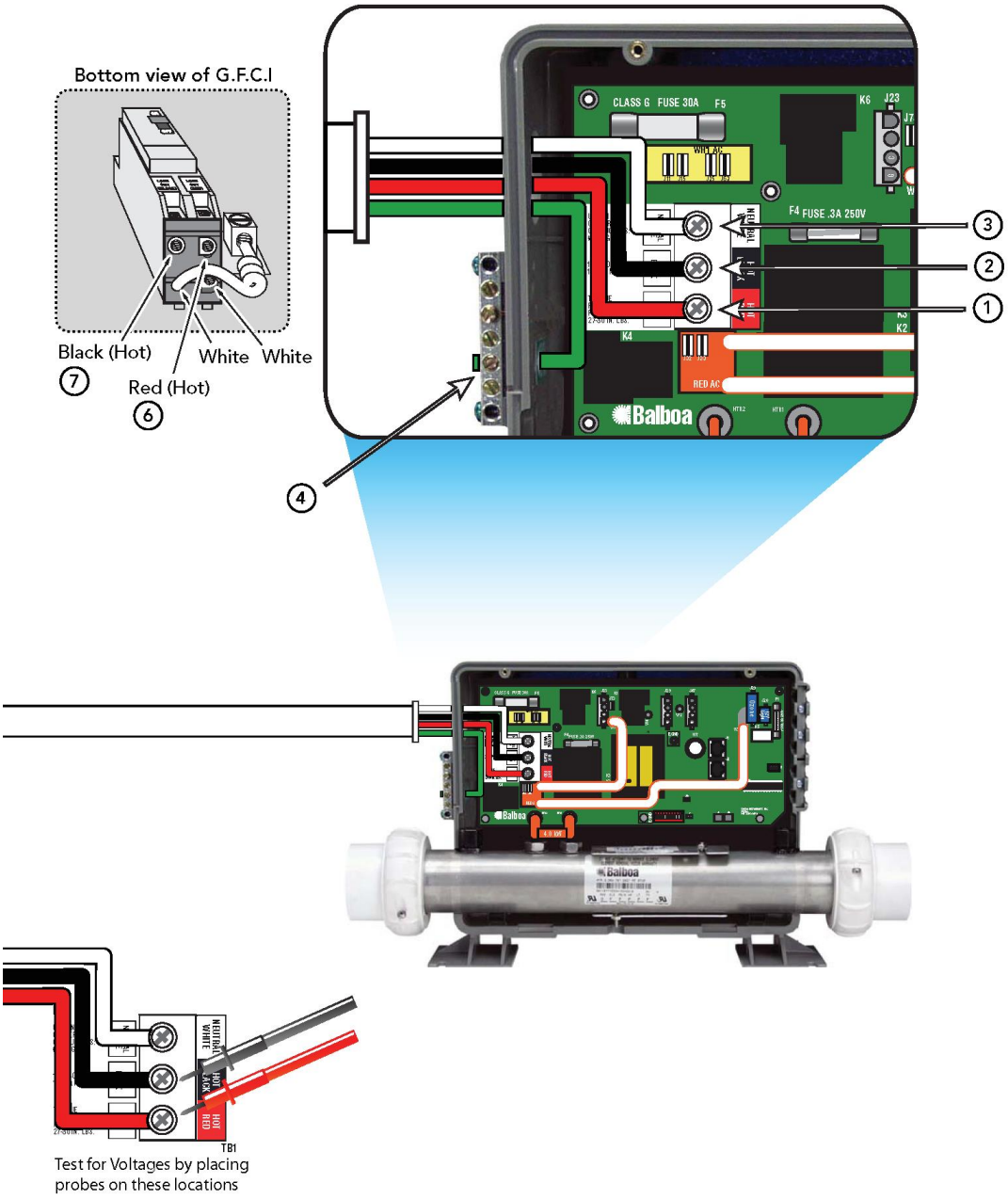
Diagrams Are On The Following Pages.

240 Volt Residential Wiring Schematic with G.F.C.I.



Correct Voltage	When Probes Are Placed Across				
0v	[3 - 4]	[5 - 8]	[5 - 9]	[12 - 13]	
108V - 132V	[1 - 3] [2 - 3]	[5 - 6] [5 - 7]	[5 - 10] [5 - 11]	[12 - 14] [12 - 15]	[13 - 14] [13 - 15]
216V - 264V	[1 - 2]	[6 - 7]	[10 - 11]	[14 - 15]	

Spa System Box 240VAC Service



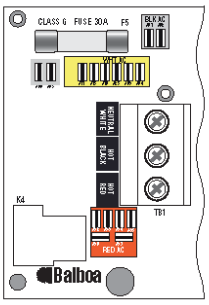
Wiring Checks

WIRING CHECK PRECAUTIONS

- When working in a system box always be aware that it may contain high voltage.
- Always keep your fingers and hand tools away from any wiring or circuit board when the power is on. Touching anything in these areas can result in serious injury.
- All service calls, no matter how minor, should include a complete wiring check, beginning with the house breaker.

CHECK FOR LOOSE CONNECTIONS OR DAMAGED WIRES

- Make sure the power is off before you touch any wiring.
- Once the power is off, carefully examine all wires for cuts or defects.



TB1

SYSTEM BOX WIRE GAUGE CHECK

When inspecting the wiring for any control system, note that connections for the incoming wires are clearly labeled at the main terminal block.

- 30A service – minimum ten gauge copper wire.
- 40A service – minimum eight gauge copper wire.
- 50A service – minimum six gauge copper wire.

These wires must connect the house breaker box, through the local disconnect, to the main terminal block. The wiring diagram inside the system box shows the main terminal block as TB1.

IMPORTANT

Using non-copper wire can be dangerous, and also can be the cause of a spa's malfunction. If non-copper wire is used at any point, we do not recommend servicing the spa until an electrician replaces it with the proper gauge copper wire.

IMPORTANT

This service must be single phase. Any abnormal voltage reading requires an electrician. Do not attempt to fix these types of problems yourself. ***High voltage can seriously injure or kill.***

Total Ampere Rating of Power System	**Minimum wire size Use Copper ONLY, with 90° C insulation**	**Ampere Rating of G.F.C.I. Circuit-breaker**
0 A to 16 A	#12 AWG	20
16 A to 20 A	#10 AWG	25
20 A to 24 A	#10 AWG	30
24 A to 28 A	#8 AWG	35
28 A to 32 A	#8 AWG	40
32 A to 36 A	#6 AWG	45
36 A to 40 A	#6 AWG	50

Spa Behavior -- Start-up Information

See manufacturer's owners manual or reference card for general information on operating the spa, including programming filters and other settings that are changed from the topside control panel.

PRIMING MODE

In Priming Mode, the "Mode" button toggles the ozone on/off (with a 15-second time-out). This can be useful if you want to verify ozone generator operation without waiting for a filter cycle. This feature is not available on smaller panels where Mode is a multi-button sequence, since such a sequence exits Priming Mode.

GENERAL FILTER INFORMATION

- On any system with a Deluxe panel, the filter times and durations are completely programmable from the topside control panel, and the first filter may not run for many hours after power-up. If you want the filter to run sooner, you have to either reprogram the filter or advance the time to just before the filter start.
- On all other systems, the first filter starts 6 minutes after power-up and the duration can be chosen (either using button sequences on the topside control panel or via a DIP switch) between several preset choices. Note that if you let Priming Mode exit automatically after 4 minutes, you have 2 more minutes before the first filter runs after power-up. Exiting Priming Mode by pressing the "Temp," Warm," or "Cool" buttons, allows up to 6 minutes available before the first filter runs.

IMPORTANT INFORMATION: If the filter settings have just been changed, it may take up to 24 hours for the filter cycle to reflect the changes. This is especially likely when changing from a very long filter duration (such as Continuous), to a short one, or vice versa.

- The low-speed pump (on non-circ) and ozone generator (if installed) will run during the filter cycles.
- The blower runs for 30 seconds at the start of each filter cycle. This will maintain water quality in the air channel.
- The pumps (other than pump 1 in non-circ, including pump 1 in circ) will run for 5 minutes at the start of each filter cycle.

HEATER START UP INFORMATION

On M-7 systems, the heater goes through a testing phase every time it starts up to assure that there is adequate water flow. This provides sophisticated dry fire and low flow protection. It can be confusing if you don't know what to expect. Step by step, here is what happens. (Note that the timing/temperature details may be slightly different on some older M7 systems.)

- Prior to heating, the pump is run for at least two minutes, and then the temperature difference between the sensors is assessed. It must be 2°F/1.0°C or less for heating to proceed, otherwise an error is issued.
- The heater turns on for 6.5 to 18 seconds (depending on heater voltage and wattage). At this point, the heat indicator on the panel is "solid." During this time the panel is not immediately responsive.
- The heater turns off for 90 seconds, making sure that the water flow keeps the temperature rise small and short. (Abnormal water flows, or lack of water, will produce a large and/or long temperature rise, and the system faults in that situation.) At this point, the heat indicator on the panel may appear to "shimmer" or "dim" (on some panels this may be less obvious from certain angles and more obvious from other angles, or in different lighting).
- If the dry fire test has passed, heating turns back on to heat the spa. The heat indicator on the panel returns to "solid".
- During spa heating, a difference between the sensors of 2°F/1.0°C, or perhaps 3°F/1.5°C (at least with 4-6kW 240V heaters), is considered normal. A significantly higher difference, however, is usually indicative of a flow problem, and will cause a fault which disables the heating for at least a minute (and then restarts the whole above process).

Panel messages are a quick clue toward solving a variety of problems. Here are the most common messages and what they mean.

PRELIMINARY PANEL CHECK

- If the problem is not obvious, look on the topside control panel for diagnostic messages.
  If no messages are seen, run through all spa functions and note any inconsistent operation.
- Most error messages are stored in the fault log. To view the fault log, the spa must be in test mode and the spa light must be turned on.

Once you have determined that proper voltage is running through the circuit board and transformer, continue to the topside control panel. A panel that is not functioning properly may include the following symptoms: low voltage such as missing or scrambled segments, missing icons on the LCD, non-functional LED's, or nonfunctional buttons. If any of these symptoms are present, perform the following:

- Turn the power off and unplug the panel from the circuit board.
- Then, plug in your test panel and restore power. If everything functions normally, replace the topside panel.
- Disconnect ozone generator (if applicable).
- If you still see symptoms of low voltage, such as a sluggish, blank or partially blank panel, or if the display or the LED's do not function at all, turn the power off; unplug the ozone generator (if equipped); then restore power to the system. If the problem persists, turn off the power and replace the circuit board.

PANEL DISPLAY MESSAGES

THE PANEL DISPLAYS:

HH, OHH, or HTR TEMP LMT

At least one of the sensors has detected water temperatures of 118ºF inside the heater. Or,

THE PANEL DISPLAYS:

OH, OHS, or SPA TEMP LMT

One of the sensors has detected the temperature of the water coming into the heater to be 110ºF, and so the water in the spa is likely to be that hot. These indicate that the spa has shut down due to an overheat situation.

NOTE: Overheating may occur if the low-speed pump is set to operate for extended periods of time, or if the incorrect pump is installed. In rare cases (usually warmer climates), the circulation pump may also cause overheating.

MOST PROBABLE OVERHEATING CAUSES, INSPECT THESE FIRST

- Check slice or ball valves. Make sure that they are open.
- Make sure the correct pump is installed.
- Clean the filter/skimmer if there is any blockage.
- Check heater element alignment.
- Check for debris on the heater element.
- In extremely hot weather, check for proper cabinet ventilation.
- Make sure the temperature sensor is fully inserted into the sensor fitting on the heater.
- Check for excessive filter duration.

NOTE: A common programming mistake is overlapping filter times that may cause the spa to filter continuously.

- Check the water level.
- Check the water temperature with an accurate temperature thermometer. Remove the spa cover and allow the water to cool to below 108° F. Adding cool water may be necessary. Touch any button to reset the system. If the water is still hotter than the set temperature, press the blower button (if applicable) to cool the spa.

If the Problem Recurs, test the Sensor Set.

THE PANEL DISPLAYS:

5A, SnA, SnH, or SENSOR A
or SERVICE ROD

THE PANEL DISPLAYS:

Sb, Snb, Snt, or SENSOR B
or SERVICE ROD

This indicates that the spa has shut down due to an open or faulty sensor. If the problem recurs, test the sensor set. (See Testing the Sensor Set.)

NOTE: In rare cases, rapid system overheat causes sensor error messages. Be sure to rule out possible situations like no flow or no water.

THE PANEL DISPLAYS:

Sn, SnS, or SENSOR SYNC

This indicates that the sensors are out of balance.

If alternating with temperature, it may just be a temporary condition. If flashing by itself, spa is shut down.
If the panel also displays "Service Req'," spa is shut down.
If the spa shuts down due to this error, one (or both) of the sensors are probably reading several degrees off. If the problem recurs, test the sensor set.

THE PANEL DISPLAYS:

cd, CLd, or COLD WATER

Indicates the sensor detects a possible freeze condition.

This Freeze Condition message does not appear on M-7 software showing a Software Version ID of 01 or greater. This is a normal spa function; no further action is necessary.

When either sensor reads below 40° F, the system provides freeze protection. It automatically activates the pump (and the heater if necessary) to circulate the water and warm the plumbing. The equipment stays on until the sensors detect that the spa temperature has risen to within 15ºF of the set temperature. The other pumps and the blower will purge for 30 seconds to 2 minutes at the end of the freeze condition. If pump 1 was turned on due to this reason alone, this message will appear for up to two minutes right after very cold water is detected.

NOTE: Internal freeze protection only functions when there is proper power running to the spa, and the control system is operational. Using an optional freeze sensor may be necessary in extreme climates to prevent plumbing damage, but will only work properly if placed inside the spa skirt in the coldest area.

All spa models are different in shape and size and have different thermal characteristics; therefore, Balboa Water Group cannot be held responsible for freeze damage to the spa's plumbing. Testing is the responsibility of the spa manufacturer and must be done to determine the best location for the freeze sensor.

THE PANEL DISPLAYS:

IC, ICE, or FREEZE COND

This indicates that the auxiliary sensor detects a possible freeze condition. This is a normal spa function; no further action is necessary.

When the auxiliary sensor reads around 40°F (actual temperature dependent on specific auxiliary sensor used), the system provides freeze protection. It automatically activates all of the pumps and the blower to circulate water and warm the plumbing.

NOTE: This auxiliary freeze protection functions at all times, even when another fault condition has occurred and has otherwise shut the spa down.

Any time the lower of the two temperature sensors goes below 45°F, all pumps/blowers turn on. They continue to run for 4 minutes after the temperature reaches 45°F or above. As soon as the temperature falls below 45°F again, this process restarts. This "simplified" sensor freeze protection functions at all times, even when another fault condition (other than total sensor failure) has occurred and has otherwise shut the spa down.

THE PANEL DISPLAYS:

HL, HFL, or HTR FLOW LOW

This indicates that a substantial difference in temperature between sensors has been detected during heating.

This could indicate a flow problem. Check water level in spa. Refill, if necessary. If the water level is okay, make sure the pumps have been primed. *On the **fifth occurrence** of the above message the panel will display:*

LF, or LOW FLOW

This indicates a persistent flow problem. The heater is shut down while all other spa functions continue to run normally. Power on the spa must be cycled before the heater will function again.

THE PANEL DISPLAYS:

dr, dr4, or HEATER MAY BE DRY-- WILL RETEST SHORTLY

This indicates that there is not enough water in the heater. Spa shuts down for 15 minutes.

This could indicate poor flow or air bubbles in the heater.

On the third consecutive occurrence of the above message (without a successful heating cycle in between) the panel will display:

dY, dr4, or HEATER DRY SERVICE ROD

Spa is shut down and will not reset in 15 minutes. Press any button to reset manually.

THE PANEL DISPLAYS:

--F, --C, ---C or --

This indicates that the temperature is completely unknown because the pump has not yet run for 2 minutes after Priming Mode was exited. This is only displayed for 2 minutes at power-up.

SOME TROUBLESHOOTING SCENARIOS

You find out the system is in "OHH." This alone doesn't explain a lot. What led up to the "OHH" is much more important. If it's a Prestige, review the fault log carefully. Otherwise, see if the user has any additional information (for example, how long before the "OHH" was the spa panel last checked, and how hot was the water then). If the spa has cooled, see whether the problem can happen again, this time watching carefully to see if there are additional clues leading to the "OHH" (for example, other messages that appear shortly before the "OHH" happens).

You find out the system keeps showing "HFL," or is now in "LF," or is shut down due to a "dry" fault. Put the spa in test mode with the light on, so that you see the two sensor temperatures. Are they normal (within 1°F/0.5°C) when not heating? How far apart are they when heating? "HFL" happens when they are 6°F/3°C apart (4°F/2°C on 120V and other low-heater-wattage systems), see how quickly that happens after heating starts. If it's getting close to that right away, it's probably a consistent flow problem, but if it's nowhere close to the "HFL"-causing temperature difference, the flow problem may be intermittent or only occur in certain specific situations.

LOW VOLTAGE

At Balboa, it's been our experience that the majority of the problems associated with electronic control systems are due to low voltage.

BROWN OUTS

"Brown outs" can have an effect on the spa's operation in a variety of ways. The control panel may go blank, have scrambled messages on the LCD, or only a few features will function.

If the system is getting the proper voltage at TB1, but still doesn't operate, then test for a blown power input fuse.

CHECKING THE SYSTEM POWER INPUT FUSE

Warning

These procedures are performed while the system is powered up and running under peak loads. **Be careful.**

If your system uses 120V peripheral devices (below):

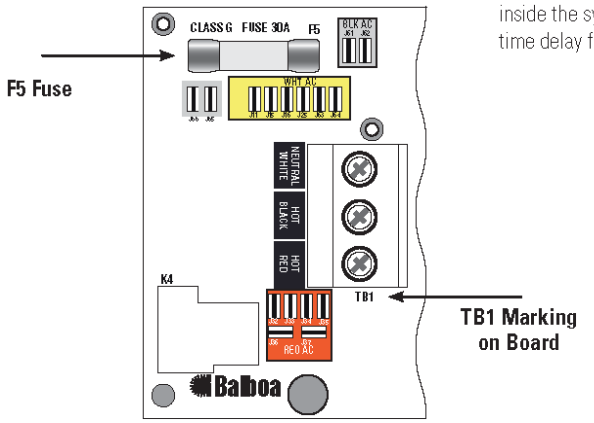
- Measure between the white TB1 terminal and F5 power input fuse on the side farthest away from the circuit board edge (opposite the F5 silk screen). You should see 120 volts.
- If the system is equipped with the additional F6 power input fuse, measure F6 in the same manner. You should also see 120 volts.

If your system uses 240V peripheral devices (below):

- Measure between the red TB1 terminal and F5 power input fuse on the side farthest away from the circuit board edge (opposite the F5 silk screen). You should see 240 volts.
- If the system is equipped with the additional F6 power input fuse, measure F6 in the same manner. You should also see 240 volts.
- If you determine that there is no voltage at one or both locations, then the system power input fuse(s) need to be replaced. Only use a fuse of the same type and amp rating when you replace any of these fuses.

Elite System

- Measure fingers 5 and 6 of the circuit board. You should see either 120V or 240V, depending upon the system configuration.
- If you determine that there is no voltage at fingers 5 and 6, then the system power input fuse needs to be replaced. This fuse is located in the large fuse block inside the system box. This configuration utilizes a 30A time delay fuse.



Terminal Block 1 & F5 Fuse on a VS500Z Board

- ***NOTE FOR ALL SYSTEMS*** In each situation, the most likely reason for the system power input fuse to blow is a pump problem. However, on occasion, a blower problem may also cause this fuse to blow if a 10A blower fuse is not built in.

Once the power input fuse has been changed

- Probe the red wire and the white neutral wire. Again, voltage must be between 108 and 132 V.
- Check the voltage between the black and red wires again. Acceptable voltage range is between 216 and 264 V.

THESE READINGS SHOULD BE TAKEN UNDER PEAK LOAD CONDITIONS.

Important

If the voltage is not in the acceptable range, call an electrician or the local electric company to diagnose the problem.

TO DETERMINE THE CAUSE OF A BLOWN POWER INPUT FUSE

Perform the following ***sequence of tests***.

Test the System

- Turn the power off.
- Be sure to replace the system power input fuse with the same type.
- Unplug the blower and all pumps.
- Restore the power and verify system operation.
- If the fuse blows, then re-check the internal system wires and connector for burns, cracks or cuts in insulation.
- If the fuse does not blow, turn the power off and plug in the pump.

NOTE: Be sure to test each device individually.

Test the Pump

- Restore the power and activate the pump.
- If the fuse blows, there is a pump problem.
- If the fuse does not blow, turn off the power.

Test the Blower

- Plug in the blower.
- Power up the system and activate the blower.
- If the fuse blows, then there is a blower problem.
- If the fuse does not blow, the combined pump and blower amperage may be excessive. To verify this, first check with your spa manufacturer for amperage draw limits on each device.
- Since the blower should now be running, you can check the amperage draw with an ammeter by measuring around the black blower wire and compare with manufacturer's specifications.

TEST THE AMPERAGE DRAW

- Turn off the power, disconnect the blower, make sure the pump is plugged in, and restore power.
- Start the pump and switch to high speed (if available), this should draw the most current.
- Make sure all jets and valves are open.
- Check the amperage at the red pump wire. Compare your reading with manufacturer specifications. (If the other plug-in devices exist, they should be tested in the same way.)
- If the amperage draw for each device is within manufacturer's specifications, the problem could be a nuisance spike in the pump, or water in the blower.

NOTE: These slow-blow fuses are not always discolored when blown. Always test continuity of a fuse with an ohmmeter.

NOTE: Miswiring of the spa is the most common reason for this fuse to blow. However, a lightning strike in the area is a possible, though less likely, cause of the failure.

Testing the Circuit Board Output

BALBOA'S QUICK TEST™ TEST KIT

If your topside control panel is working properly, but a pump, blower, or other device does not activate when its panel button is pressed, further diagnosis is easily accomplished with the Balboa Quick Check, which is designed to test output voltage on a variety of Balboa systems. The following system outputs can be tested using the Balboa Quick Check:

120 VAC or 240 VAC -- 2-speed pump
120 VAC or 240 VAC -- 1-speed pump
120 VAC or 240 VAC -- blower (with or w/o variable speed)
120 VAC or 240 VAC -- ozone generators
12 VAC -- spa light
120 VAC -- spa light (with Spa Light Adapter)
12 VAC -- perimeter light (with Perimeter Light Adapter)

The Balboa Quick Check Test Kit is especially useful for testing variable speed blowers and dimmable spa lights. Because these outputs use a device on the circuit board called a triac, no voltage can be measured unless a load exists. The Quick Check not only supplies a small load, but also indicates if voltage is present.

The 4-prong connector is used to test pumps, blowers, ozone generators, and by using the Spa Light Adapter, 120 VAC spa light output. The 2-prong connector is used to test the output for the 12 VAC spa light. Also included in the kit is a Perimeter Light Adapter, which can be used to test the 12 VAC perimeter light output.

Balboa QuickCheck™
Part No. 70002

TO USE THE BALBOA QUICK CHECK

- Turn off the power at the house breaker box.
- Unplug the device in question, and plug the Quick Check in its place.
- Restore power to the spa and press the appropriate panel button again. If the Quick Check's light appears, the device in question is receiving voltage.
- An ordinary multi-meter can also be used to check for proper output voltage, except when working with a variable-speed blower or a dimmable spa light. In these cases, a component on the circuit board called a "triac" needs to be under a small load to test output voltage.

NOTE: If a small load is not applied to these systems, voltage indications of up to 240 volts AC can be seen when measuring output voltage, even if the component is not activated.

- Even if the system is not equipped with a blower triac, the best way to verify voltage output is with the Balboa Quick Check.
- If the Quick Check light does not appear after pressing the appropriate panel button, trace the wires from the corresponding connector in the system box back to the circuit board.
- Probe these connections at the circuit board after activating the function with the topside control panel.
- If you do not have correct voltage, double check the input voltage before you replace the circuit board.
- If you do have correct voltage at the circuit board, turn off the system power and check for a blown in-line fuse. Blowing the in-line fuse or the power input fuse is usually a symptom of a faulty pump, blower, or a short in the wiring to one of those devices.
- If the fuse is good, then replace the output connector.
- If the high-speed pump comes on when the system calls for heat or when the system goes into a filter cycle, the pump is most likely wired backwards. Verify that the black (low speed) & red (high speed) wires are not switched in the amp connector or the pump itself.
- Always check to make sure all devices are plugged into the proper location.

NOTE: If the spa light output is not detected with the Balboa Quick Check, be sure to check continuity of the light fuse on the circuit board.

Testing the Sensor Set

1. Check sensor wires for cracks or damage that may indicate the presence of a rodent.

2. Inspect the connections of both sensors on the circuit board. The plugs must be clean.

3. If the sensors are not totally failing but are showing excessive (2° F/1.0 °C or more) difference between the two sensors when not heating (a possible cause of Sn/SnS/SENSOR SYNC, HL/HFL/HTR FLOW LOW, and LF/LOW/FLOW/messages), do the following:
- Note which sensor is reading consistently higher (A vs B or t vs H).

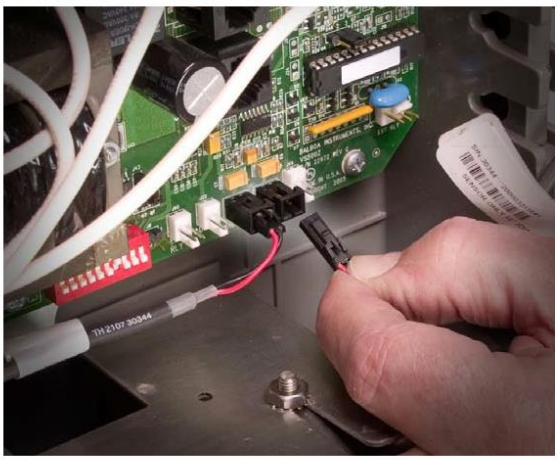
4. Unplug the two sensors from the circuit board and exchange their positions (i.e., plug the one that was in the "Sen. A" jack into the "Sen. B" jack and vice versa).

5. Press a panel button if any "stray" faults appeared during the process. (Stray faults are normal when sensors are unplugged then plugged back in while the system is running.)

6. Within a minute or so, see if the same or other sensor is now reading consistently higher:
- If the same sensor (A vs B or t vs H) is reading higher after the sensor interchange, the problem is on the circuit board. Replace the circuit board.
- If the opposite sensor is now reading higher, the problem is with the sensor(s). Replace the sensor set.

**If you wait more than 2 minutes after plugging the sensors back in, heating may start (even outside a filter in Economy or Sleep mode) due to a stray Cd/CLd/COLD WATER condition usually detected when sensors are being plugged in while the system is running.*

7. If there is a message indicating an open or faulty sensor:
- Unplug the sensor set (but leave the original sensors in the heater) and plug in the test sensor set. Put both sensors into the same cup of warm water (ideally above the set temperature, so the spa won't try to heat during this test, as there is no heater protection during this test) and verify that they read the same temperature (within 1°F/0.5°C).
- If the problem is solved, replace the sensor set. If the problem is not solved, do not replace the sensor set.
- Plug in the original sensor set to verify that there is not a connection problem.
- If the problem continues after following the above steps, then replace the circuit board.



Changing a System Circuit Board

Important!

Be sure to turn the power off before replacing any component, ***especially a circuit board.***

Important!

DO NOT REMOVE AND REPLACE THE CIRCUIT BOARD UNLESS THE FAULT HAS POSITIVELY BEEN DETERMINED TO BE THE CIRCUIT BOARD.

HOW TO REMOVE A SYSTEM CIRCUIT BOARD

NOTE: Before you begin, labeling all wires to be removed may help speed up reinstallation. The wiring diagram should always be used to ensure proper wire placement.

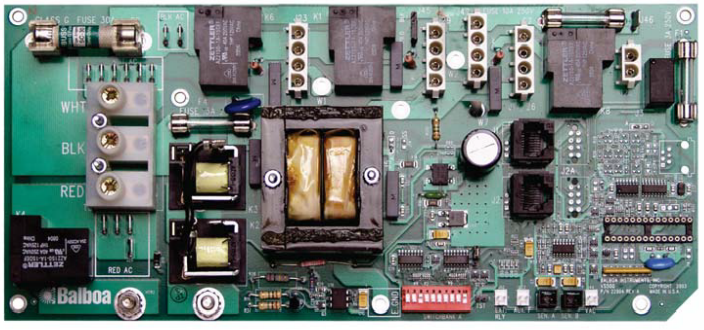
- Shut OFF line power to the spa at the main circuit breaker panel. Do not attempt to service a spa without shutting off the power. Serious injury or damage may result.
- Disconnect all wires and slip-on connectors as necessary to remove the board.
- Remove all the screws which mount the board to the system enclosure.
- Remove the board from the plastic stand-offs by gently squeezing the locking flange on each stand-off with a pair of pliers. The board should now be free and can be removed from the system box.

HOW TO REPLACE A SYSTEM CIRCUIT BOARD

- Check all jumpers and dip switch positions on the new board. Make sure they are in the same position as the old board.
- Make sure the new board snaps in place on the plastic stand-offs. Use care to be sure the connectors on the right side of the board clear the enclosure openings as the board is installed.
  Caution: Do Not Overtighten this screw.
- Install all screws which mount the board to the system enclosure.
- Reconnect all wires and slip-on connectors.
- Restore power to the spa at the main breaker.
- Test to make sure all functions work correctly.

Important

DO NOT REMOVE AND REPLACE THE CIRCUIT BOARD UNLESS YOU HAVE TESTED ALL OTHER COMPONENTS AND PROVEN THAT THE CIRCUIT BOARD IS ACTUALLY CAUSING THE PROBLEM.



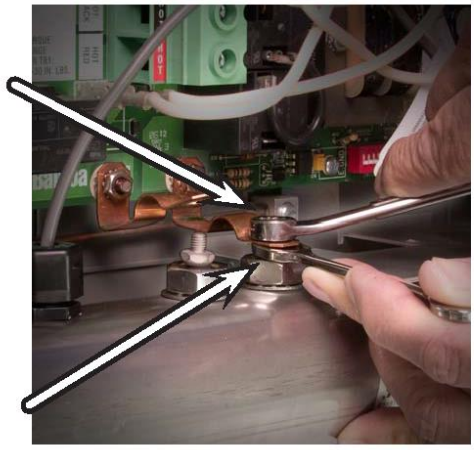
VS500 Board

Removing the Heater Assembly from a Spa System

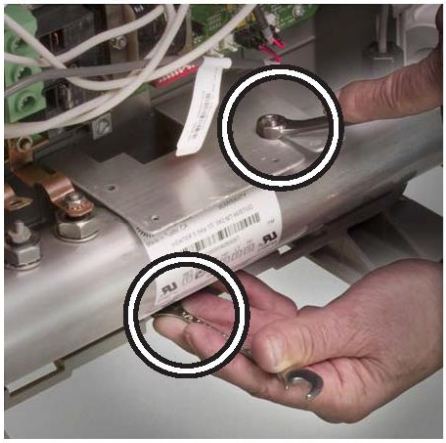
Note: Be careful when removing a heater assembly from a spa plumbing system. Water may splash out under pressure.

Water under pressure in the plumbing may splash out, and onto the system's electronic board. Do not remove the system door until the water has been drained from the heater assembly housed in the system.

1. Turn off the main power.
2. Close off the slice valves (or, ball valves) adjacent to the heater assembly.
3. Once the valves are closed, slowly crack the heater assembly end tubes until water flows out. If the connectors are on too tight, it may be necessary to loosen the Phillips screws that hold the connectors together. Once the water has been drained, continue.



Keep the lower nut from turning by supporting it with another end-wrench



Remove both nuts that secure the element in place.

4. Remove the system door cover.
5. Remove the nuts securing the copper straps to the heater assembly's terminal connectors. **Be sure to use a supporting end wrench on the lower nut.** Otherwise, excessive torque may be occur on the straps and put undue stress on the PCB.
6. Remove the heating assembly sensor wires and replace if necessary.
7. Remove both nuts that secure the element in place.
8. Remove the heater assembly

Panel Message Reference Guide

Message	Meaning / Frequency	Action Required
-- --- --F or --C	Temperature not current in Economy or Sleep mode.	In Economy or Sleep mode, the pump may be off for hours outside a filter cycle. If you wish to see the current spa temperature, either switch to Standard mode or turn Jets 1 on for 2 minutes. Please see "Diagnosing Topside Control Panels". (Page 16)
CFE	Configuration error. Spa cannot start up.	Please see "Diagnosing Topside Control Panels". (Page 16)
CHANGE MINERAL CARTRIDGE	As needed [3]	Install new Mineral cartridge. Reminder, Suppress in User Preferences. [2]
CHECK PH	Every 7 days [3]	Test and adjust pH chemical levels per manufacturer's instructions. Reminder, Suppress in User Preferences. [2]
CK SANITIZER	Every 7 days [3]	Test and adjust sanitizer chemical levels per manufacturer's instructions. Reminder, Suppress in User Preferences. [2]
CHKSUM FAIL	Firmware install problem.	Contact Balboa if message appears on more than one power up.
CLEAN COVER	Every 180 days [3]	Clean and condition cover per manufacturer's instructions. Reminder, Suppress in User Preferences. [2]
CLEAN FILTER	Every 30 days [3]	Remove, clean, and reinstall filter per manufacturer's instructions. Reminder, Suppress in User Preferences. [2]
CONFIG ERROR	System configured incorrectly. Menu panel displays errors.	Contact Balboa. Please see "Diagnosing Topside Control Panels". (Page 16)
CrC	Firmware install problem.	Contact Balboa if message appears on more than one power up. Please see "Diagnosing Topside Control Panels". (Page 16)
dr (ML Panels)	Inadequate water detected in heater.	Check water level in spa. Refill if necessary. If the water level is okay, make sure the pumps have been primed. Press any button to reset.
dr (VL panels)	Possible inadequate water, poor flow, or air bubbles in detected in the heater. Spa is shut down for 15 minutes.	If water level is normal, make sure all pumps have been primed. Press any button to reset. This message will reset within 15 minutes.
DRAIN WATER	Every 90 days [3]	Drain and refill spa per manufacturer's instructions. Reminder, Suppress in User Preferences. [2]

[1] On some systems even when spa is shut down, some equipment may occasionally turn on to continue monitoring temperature or if freeze protection is needed.
[2] Please see the User Manual of the specific panel that the Reminders need to be suppressed.
[3] This is a Reminder Message.
Note: All Messages may not appear on your panel.

DRAINING drn	The pump is on during Standby Mode to assist in draining the spa.	Press "Jets 1" to turn off the pump when water has drained (or power off the spa.)
dry dY	Inadequate water detected in heater. (Displays on third occurrence of "dr" message.) Spa is shut down. [1]	Follow action required for dr message. Spa will not automatically reset. Press any button to reset manually.
Ec Ecn Economy	The spa is operating in Economy Mode.	"Ecn" will appear solid on the display when the temperature is not current. "Ecn" will alternate with the temperature when the temperature is current.
FC	As needed.	Continuous Filtration is on.
FREEZE COND	"Ice" - Potential freeze condition detected.	No action required. The pumps and the blower will automatically activate regardless of spa status.
GF I GFCI FAILURE	Spa could not trip GFCI.	Continued operation may be unsafe.
HEATER DRY SERVICE ROD	Inadequate water detected in heater. (Displays on third occurrence of the above message.) Spa is shut down. [1]	Follow action required for the above message. Spa will not automatically reset. Highlight and press to reset.
HEATER MAY BE DRY- WILL RETEST SHORTLY	Inadequate water detected in heater.	Check water level in spa. Refill if necessary. If the water level is okay, make sure the pumps have been primed. Press any button to reset.
HL HFL HTR FLOW LOW	A substantial difference between the temperature sensors was detected. This could indicate a flow problem.	Check water level in spa. Refill if necessary. If the water level is okay, make sure the pumps have been primed. Press any button to reset.
HH	"Overheat" - The spa has shut down. [1] One of the sensors has detected 118°F/47.8°C at the heater.	DO NOT ENTER THE WATER. Remove the spa cover and allow water to cool. Once the heater has cooled, reset by pushing any button.
HOt HOT-CALL SVC	A pump appears to have been stuck on the last time spa was powered down.	POWER DOWN SPA IMMEDIATELY. DO NOT ENTER THE WATER.
HTR TEMP LMT	"Overheat" - The spa has shut down. [1] On some systems, an alarm may sound. One of the sensors has detected 118°F (approx. 47.8°C) at the heater.	DO NOT ENTER THE WATER. Remove the spa cover and allow water to cool. Once the heater has cooled, reset by pushing any button. If spa does not reset, test sensors.

[1] On some systems even when spa is shut down, some equipment may occasionally turn on to continue monitoring temperature or if freeze protection is needed.
[2] Please see the User Manual of the specific panel that the Reminders need to be suppressed.
[3] This is a Reminder Message.
Note: All Messages may not appear on your panel.

Panel Message Reference Guide (cont.)

IC ICE	"Ice" - Potential freeze condition detected.	No action required. The pumps and the blower will automatically activate regardless of spa status.
LF LOW FLOW	Persistent low flow problems. (Displays on the fifth occurrence of the "Heater Flow Low" message within 24 hours.) Heater is shut down, but other spa functions continue to run normally.	Follow action required for "HFL" or "HL" message. Heating capacity of the spa will not reset automatically; you may press any button to reset.
NEW FILTER	Every 365 days [3]	Install new filter. Reminder, Suppress in User Preferences. [2]
OH OHS	"Overheat" - The spa has shut down. [1] One of the sensors has detected that the spa water is 110°F/43.5°C.	DO NOT ENTER THE WATER. Remove the spa cover and allow water to cool. At 107°F/41.7°C, the spa should automatically reset. If spa does not reset, test sensors.
OHH	"Overheat" - The spa has shut down. On some systems, an alarm may sound. One of the sensors has detected 118°F (approx. 47.8°C) at the heater.	DO NOT ENTER THE WATER. Remove the spa cover and allow water to cool. Once the heater has cooled, reset by pushing any button. Test sensors.
PERSIST FAIL	Hardware failure.	Contact Balboa if message appears on more than one power up.
PH IS HIGH LOWER PH PHH	pH is high.	Add pH reducer according to manufacturer's instructions.
PH IS LOW RAISE PH PHL	pH is low.	Add pH increaser according to manufacturer's instructions.
Pr PRIMING MODE TAKES 4 MIN	When your spa is first actuated, it will go into Priming mode.	See the M-7 Installation Instruction Manual for complete instructions on Power-up and Pump Priming. The Priming mode will last for up to 4 minutes and then the spa will begin to heat and maintain the water temperature in the Standard mode.
PSt	Hardware failure.	Contact Balboa if message appears on more than one power up.
rCA	As needed [3]	Install new Mineral cartridge. Reminder, Suppress in User Preferences. [2]
rCH	Every 365 days [3]	Install new filter. Reminder, Suppress in User Preferences. [2]
rCL	Every 30 days [3]	Remove, clean, & reinstall filter per manufacturer's instructions. Reminder, Suppress in User Preferences. [2]

[1] On some systems even when spa is shut down, some equipment may occasionally turn on to continue monitoring temperature or if freeze protection is needed.
[2] Please see the User Manual of the specific panel that the Reminders need to be suppressed.
[3] This is a Reminder Message.
Note: All Messages may not appear on your panel.

rCO	Every 180 days [3]	Clean & condition cover per manufacturer's instructions. Reminder, Suppress in User Preferences. [2]
rdr	Every 90 days [3]	Drain and refill spa per manufacturer's instructions. Reminder, Suppress in User Preferences. [2]
rPH	Every 7 days [3]	Test and adjust pH chemical levels per manuf. instructions. Reminder, Suppress in User Preferences. [2]
rSA	Every 7 days [3]	Test and adjust sanitizer chemical levels per manufacturer's instructions. Reminder, Suppress in User Preferences. [2]
rtC RTC FAILURE	Hardware failure.	Contact Balboa.
rt9	Every 30 days [3]	Test & reset RCD per manufacturer's instructions. [2]
rtr	Every 180 days [3]	Clean and condition wood per manufacturer's instructions. [2]
SA	Spa is shut down. [1] The sensor that is plugged into the Sensor "A" jack is not working.	If the problem persists, contact Balboa. (May appear temporarily in an overheat condition.) See "Testing the Sensor Set". (Page 41)
Sb	Spa is shut down. [1] The sensor that is plugged into the Sensor "B" jack is not working.	If the problem persists, contact Balboa. (May appear temporarily in an overheat condition.) See "Testing the Sensor Set". (Page 41)
SAH SANITIZER HIGH	Sanitizer is high.	Remove spa cover and allow sanitizer to dissipate.
SAL SANITIZER LOW	Sanitizer is low.	Add sanitizer according to manufacturer's instructions.
Sby	Standby Mode has been activated by pressing a button combination on the user panel.	Press any button, except "Jets 1", to leave Standby Mode and return to normal operation.
SE	The spa is operating in Standard-in-Economy Mode.	Operates the same as Standard mode, then reverts to Economy mode after 1 hour. Press "Mode" to switch directly to Economy mode.
SENSOR A SERVICE REQ	Spa is shut down. [1] The sensor that is plugged into the Sensor "A" jack is not working.	Test sensor, and replace if bad. Please see Testing the Sensor Set. (Page 41)

[1] On some systems even when spa is shut down, some equipment may occasionally turn on to continue monitoring temperature or if freeze protection is needed.
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[3] This is a Reminder Message.
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Panel Message Reference Guide (cont.)

SENSOR B SERVICE ROD	Spa is shut down. [1] The sensor that is plugged into the Sensor "B" jack is not working.	Test sensor, and replace if bad. Please see Testing the Sensor Set. (Page 41)
SENSOR SYNC Sn SnS	Sensors are out of balance. If this is alternating with the temperature, it may just be a temporary condition. If the display shows only this message (periodically blinking), the spa is shut down. [1]	Test sensor, and replace if bad. Please see Testing the Sensor Set. (Page 41)
SLP	Sleep Mode has been activated by pressing a button combination on the user panel.	"SLP" will appear solid on the display when the temperature is not current. "SLP" will alternate with the temperature when the temperature is current.
SnA	Spa is shut down. The sensor that is plugged into the Sensor "A" jack is not working.	Test sensor, and replace if bad. Please see Testing the Sensor Set. (Page 41)
Snb	Spa is shut down. The sensor that is plugged into the Sensor "B" jack is not working.	Test sensor, and replace if bad. Please see Testing the Sensor Set. (Page 41)
SPA TEMP LMT	"Overheat" - The spa has shut down. [1] One of the sensors has detected that the spa water is 110°F (approx. 43.3°C).	DO NOT ENTER THE WATER. Remove the spa cover and allow water to cool. At 107°F (approximately 41.7°C), the spa should automatically reset. If spa does not reset, shut off the power to the spa.
STANDBY MODE	Standby Mode has been activated by pressing a button combination on the user panel.	Press any button to leave Standby Mode and return to normal operation.
Std	The spa is operating in Standard Mode.	Temperature display is current after pump has been running for at least 2 minutes.
StU STUCK ON	A pump appears to be stuck on, causing the water temperature to creep up, possibly to hazardous levels.	POWER DOWN SPA IMMEDIATELY. DO NOT ENTER THE WATER.
TEST GFCI	Every 30 days [3]	Test & reset per manufacturer's instructions. Reminder, Suppress in User Preferences. [2]
TREAT WOOD	Every 180 days [3]	Clean and condition wood per manufacturer's instructions. Reminder, Suppress in User Preferences. [2]

[1] On some systems even when spa is shut down, some equipment may occasionally turn on to continue monitoring temperature or if freeze protection is needed.
[2] Please see the User Manual of the specific panel that the Reminders need to be suppressed.
[3] This is a Reminder Message.
Note: All Messages may not appear on your panel.

We hope that this manual has provided you with all the information necessary to set up, operate, and maintain your Comfort Hot Tub spa. Enjoy your spa experience and the benefits it brings. If you have any questions or concerns that are not covered in this manual, please do not hesitate to contact your authorized Comfort Hot Tubs customer service representative.

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