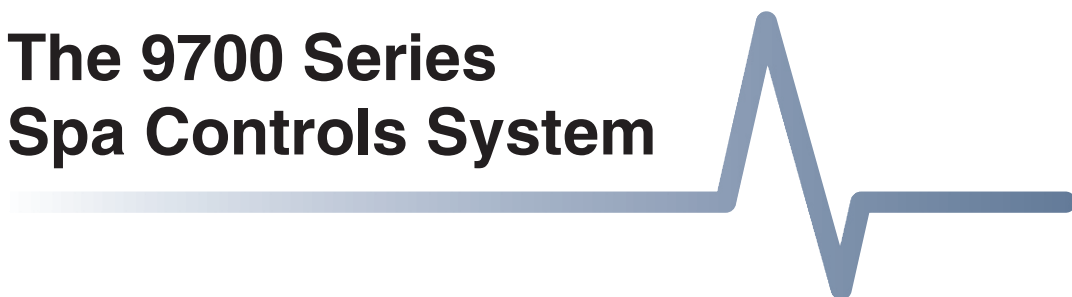




# Troubleshooting

The 9700 Series  
Spa Controls System



**HYDROQUIP**<sup>™</sup>

THE **SMART** CHOICE<sup>™</sup>



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# Preparing for the Job

This Troubleshooting Manual has been designed for easy simple step-by-step problem solving and fault isolation.

It is important to identify all of the possible causes of the problem before making a final diagnosis. What you see at first is usually a symptom of the problem, not necessarily the problem itself.

Read the entire troubleshooting procedure related to what you are testing for prior to performing the test. This will give you a clearer overall view and help to avoid a mis-diagnosis.

Prepare for the service call. Make sure you have the right tools.

## Tools for the Job:

- Multi-Meter and Clamp-On Ammeter
- Jumper Cable
- Accurate Thermometer
- Standard & Philips Screwdrivers
- 1/4 in. & 3/8 in. Open-End Wrench
- 11/32 in. Nut Driver
- GFCI Tester (optional)



## Spare Parts to Bring:

- Spaside Control
- Temperature Sensor
- High-Limit Sensor
- Fuses
- Printed Circuit Board

## Prior to the service call, have the homeowner check the following:

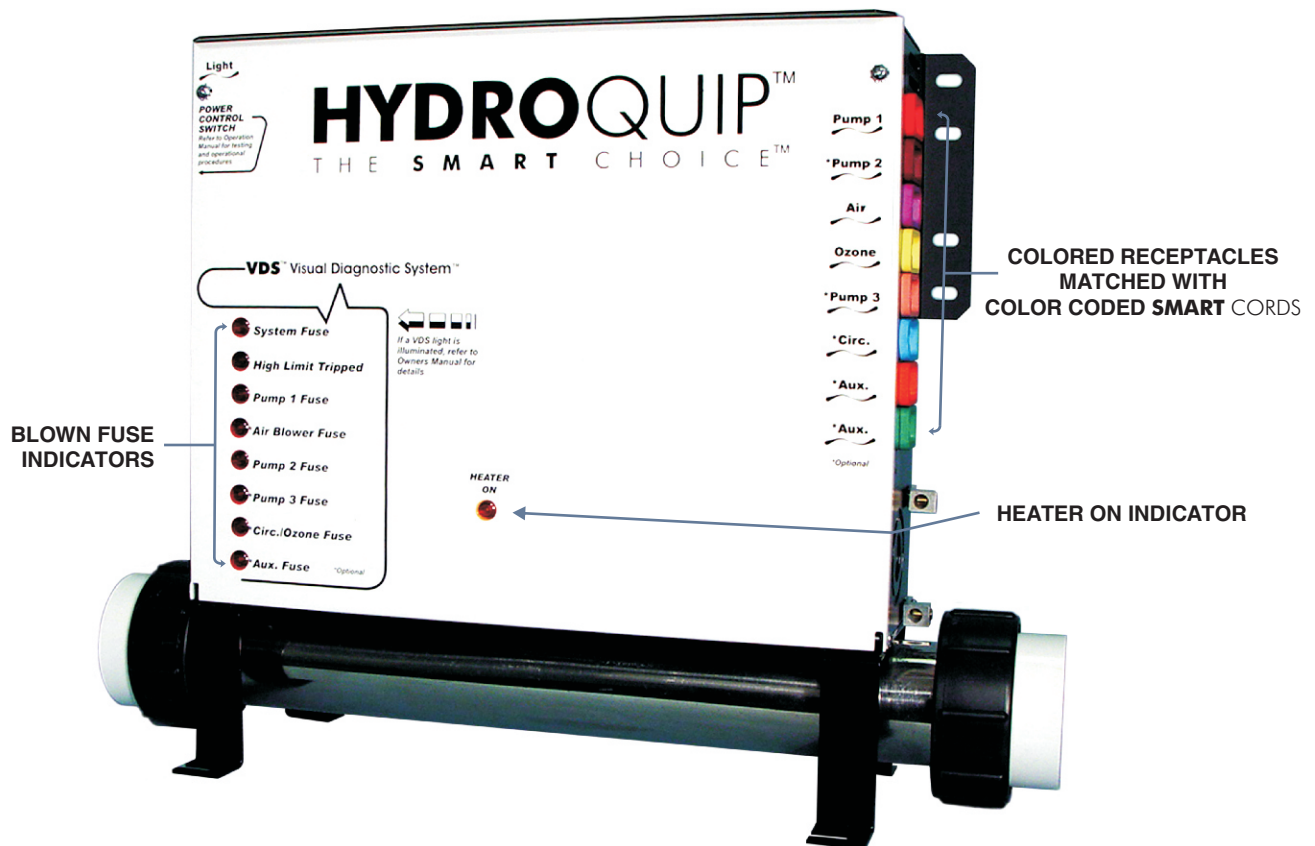
- Make sure spa has been filled to the water level suggested by the spa manufacturer.
- Insure that all water shutoff valves are open and are not vibrating closed.
- Adjust diverter valves and/or jets to allow adequate back pressure to heater assembly.
- **If “FLO” appears on the spaside control display:**
- Have the homeowner remove the filter and operate system. If the error goes away, a filter cleaning is required. The filter may not look dirty, we are dealing with oils, lotions etc... Use an appropriate filter-cleaning agent.
- Get data label information off of the spa control.

# Getting Started - VDS (Visual Diagnostic System)

Equipped with exclusive VDSf (Visual Diagnostic System) by Hydro-Quip, Troubleshooting can be done at glance. Once the spas equipment compartment has been accessed, check to see if a VDS indicator has been illuminated. The description of that indicators function is printed on the faceplate. Simply go to that section and start from there.

With VDS you can see if a fuse has blown, and verify that the heater has been activated. If equipped with our exclusive line of **Smart** Cords you can verify component power supply (single or dual speed). Other optional features include externally mounted fuses.

System circuitry may vary and some options may not have been included with the particular control you are servicing.

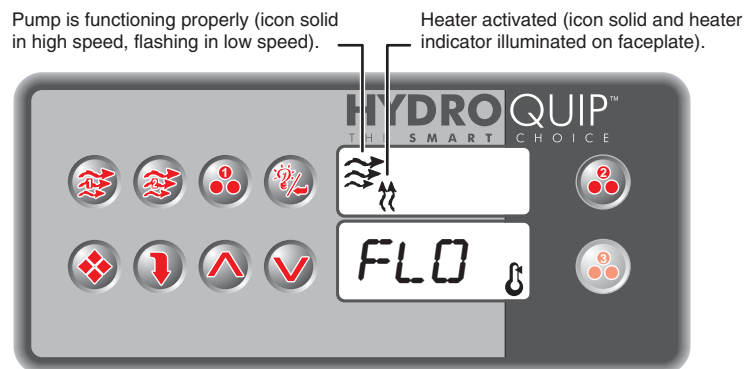


# Error - FLO

With the pump(s) operating properly and “FLO” showing on the lower window of the spaside control you’ve narrowed the problem down to the pressure switch. Perform the following tests to be sure that you have properly diagnosed the problem:

**Note: There must be enough water in the spa for normal use. This error can also be caused by a restricted flow of water caused by debris caught in the plumbing. The heater will not activate while this error is displayed.**

- Verify that the pump(s) is functioning properly. If the pump(s) is not functioning properly, refer to the Pump section that applies.
- Remove the filter and operate as normal. If the error clears, the filter is dirty and requires cleaning. Also check for air locks, closed valves or anything that would restrict the flow of water.
- Check the pressure switch cord connections at the system circuit board as well as at the pressure switch. Check for proper pin to connector alignment and security.
- If you’ve verified that the pump(s) is functioning properly, the filter is not dirty, water shutoff valves are open, there is no debris in the plumbing causing a restricted flow of water and that all connections are secure, the pressure switch requires adjustment. **Refer to page 5 for pressure switch adjustment.**



## Error - FLC

**FLC** will only appear in the lower spaside window when the pump(s) **is not** operating. The error is also a protective feature and is an indication that the pressure switch is in need of adjustment. Perform the following tests to be sure that you have properly diagnosed the problem:

**Note:** There must be enough water in the spa for normal use. The heater will not activate while this error is displayed.

- Disconnect the pressure switch cord at the printed circuit board, if the error does not go away replace the printed circuit board.

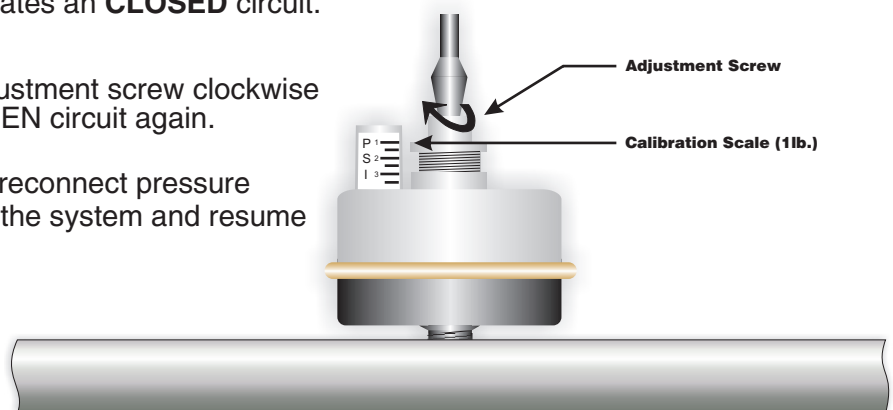
## Pressure Switch Adjustment

The function of the pressure switch is to turn the heater off if the pump stops operating or if there is restricted water flow (dirty filter, obstruction in the spa plumbing etc.).

The pressure switch has been preset at the factory to operate properly in normal conditions. Adjustment or other service may be required if you observe a flow related problem. If adjustment is required, follow the next steps carefully.

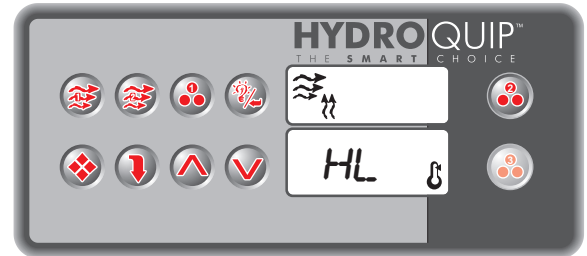
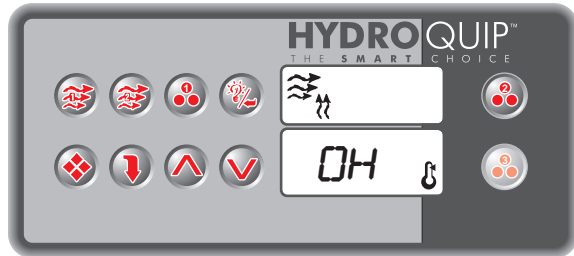
**IMPORTANT:** After any pressure switch adjustment, it is important to test the control by turning on the pump low speed and heater. While operating, unplug the pump, the heater must turn off. If the heater stays on, plug the pump back in and readjust the pressure switch to achieve proper operation.

- 1) With power to system turned OFF, remove the wires from the pressure switch terminals (secure wires safely to prevent any chance of electrical shock).
- 2) Turn power to the system ON. If system automatically starts in low speed, press Down Arrow key to set temperature to its lowest setting (pump will turn off after cool down cycle).
- 3) Place an Ohmmeter across the pressure switch terminals to verify an **OPEN** circuit.
- 4) Rotate the pressure switch adjustment screw **counter-clockwise** until the Ohmmeter indicates an **CLOSED** circuit.
- 5) Then rotate the pressure switch adjustment screw clockwise until the Ohmmeter indicates an OPEN circuit again.
- 6) Turn power to the system OFF and reconnect pressure switch terminals. Reapply power to the system and resume normal operation.



# Error - OH, HL

If “OH” or “HL” appear in the lower spaside display window, an overheat condition has been detected. It is not safe to enter the spa until this error has been corrected.



If the water temperature exceeds 112°F at the systems temperature sensor (located in a plumbing dry-well or in wet-well in the spa) the system will shut off the heater “OH” will appear in the lower spaside window and all other outputs will be disabled (pump(s), blower etc.) until the water temperature drops below 110°F.

If the water temperature exceeds 119°F at the systems high-limit sensor (clamped to the stainless steel heater assembly) “HL” will appear in the lower spaside window and the system will shut off the heater only until the water temperature drops below 110°F. The pump(s), blower and other outputs will stay active.

- Carefully check the heater housing first to see if it is hot to the touch. If it is there may be an obstruction in the plumbing, a dirty filter or closed water shutoff valve. **Power must be cycled off then back on for the system to reset this error.**
- Check the water temperature with an accurate thermometer. If the temperature displayed on the spaside control greatly differs, the temperature sensor may not be fully inserted into the wet-well or may be defective. Inspect the sensor’s circuit board connection (straighten and/or clean pins if needed). If this does not correct the problem, replace the sensor. (Remember to reset power to clear the error)
- It may be necessary to insulate around a temperature or high-limit sensor that is being adversely affected by the ambient (outside) temperature.
- If the weather is extremely hot, remove the spa cover. Running the blower may help cool the water. Add cold water if necessary. (Remember to reset power once the water has cooled)
- Lower the systems set temperature by pressing the Up/Down Arrow key, the “Heater On” indicator should go out. If the indicator stays on, replace the system circuit board.



## Error - Over Temperature (cont.)

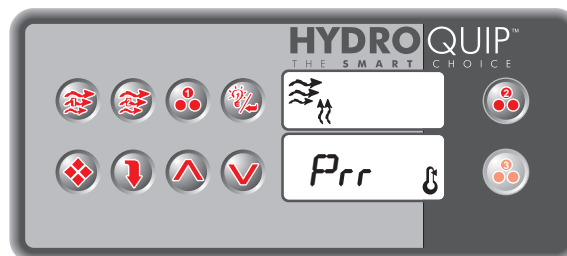
- If the “Heater On” indicator did in fact go out, the pump may be overheating the spa. Lower the duration of the filter cycle as follows:

Press and hold the Program key for 5-seconds or until “**CL**” appears in the spaside display. Continue to press the program key until “**Fdu 1**” appears. This is the duration the spas filter 1 cycle will run. Press the Light/Enter key to access and modify this setting. Use the Down Arrow key to lower the number, which represents the number of hours the filter cycle will be active twice a day. Once the setting has been sufficiently lowered, press the Program key to confirm the change. The display will then revert back to the standard Time/Temp. Repeat above steps, if necessary, on filter cycle #2 (“**Fdu 2**”).

It may be necessary to insulate around a temperature or high-limit sensor that is being adversely affected by the ambient (outside) temperature.


## Error - Prr

If **Prr** appears on the lower spaside display, the temperature sensor has failed. Check the sensors circuit board connection (clean or straighten pins if necessary). If the problem is not resolved the temperature sensor must be replaced. If the problem persists, replace the system circuit board.



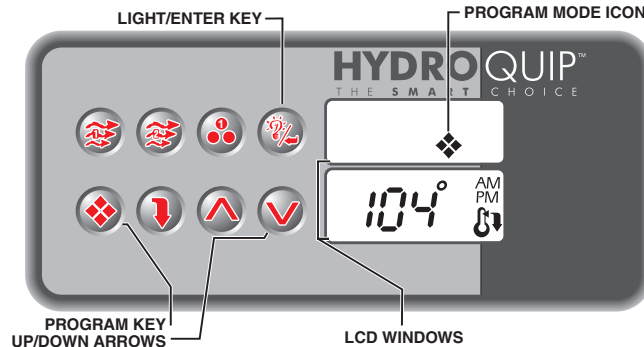
## Freeze Protection

### FREEZE PROTECTION





SMART WINTER MODE - this mode will activate any time the temperature falls below 59°F. This mode will be active for a period of 24-hours. In this mode, if a pump has not been activated in the last 2 hours, the system will automatically turn it on for 1-minute to prevent freezing. The “Filter Cycle” icon  will illuminate while this mode is active.

# Standard Programming

During your troubleshooting process, you may find it necessary to access the “Standard Programming” (customer level) to verify or change settings. Follow the procedures below:



## To Access & Adjust “Standard Programming”:

- Press and hold the  Program key for approximately 5-seconds. The “Program” icon will appear.
- The first parameter is the time setting. The time will appear with the hour flashing.
- Use the   Up & Down Arrow keys to increase or decrease the setting.
- Once the desired setting has been achieved, press the  Program key to save the change and move onto the next parameter. **(See settings below)**

**Time of Day:** This is the first parameter and will appear with the hour flashing. Use the Up or Down Arrow keys to adjust the hour from 00: to 11:. Press the Program key again to adjust minutes, use the Up or Down Arrow keys to adjust the minutes from :00 to :59. Press the Program key to confirm the new setting and move to the next parameter to be programmed.

**AM (Morning) Filter Cycle Start Time:** (“Fon1”) appears in the display. Use the Up/Down Arrow keys to adjust the hour from 00 to 11. Press the Program key again and set the minutes using the Up/Down Arrow keys from 00 to 59. Press the Program key to confirm the new setting and move to the next parameter to be programmed.

**AM (Morning) Filter Cycle Duration:** (“Fdu1”) appears in the display. Use the Up/Down Arrow keys to adjust from OFF to 12. Press the Program key to confirm the new setting and move to the next parameter to be programmed.

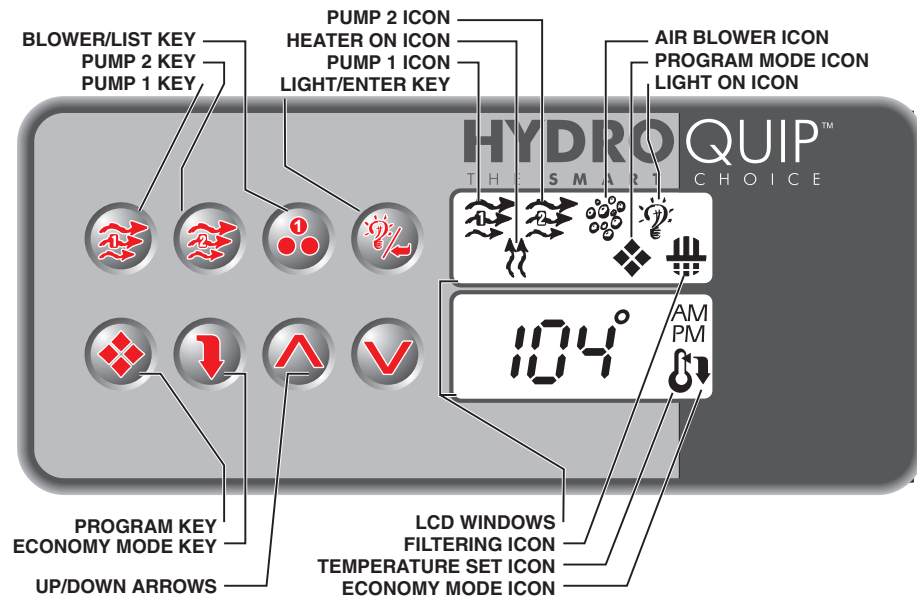
**PM (Evening) Filter Cycle Start Time:** (“Fon2”) appears in the display. Use the Up/Down Arrow keys to adjust the hour from 12 to 23. Press the Program key again and set the minutes using the Up/Down Arrow keys from 00 to 59. Press the Program key to confirm the new setting and move to the next parameter to be programmed.

**PM (Evening) Filter Cycle Duration:** (“Fdu2”) appears in the display. Use the Up/Down Arrow keys to adjust from OFF to 12. Press the Program key to confirm the new setting and move to the next parameter to be programmed.




# Low Level Programming

All of the circuits connected to the system are preprogrammed at the factory. Extreme weather conditions may cause this programming to be reset. If servicing a “Universal” model, the pump voltage may differ from the factory presets requiring these settings to be changed.

Often while troubleshooting the system, these settings will be referred to. You may only need to verify that the settings are correct. The following instructions will take you through accessing the “Low Level Programming”, verifying settings, changing settings and saving those changes.



## To Access “Low Level Programming”:

- Press and hold the  Program key for 20-seconds. When you have successfully entered programming “P1 X” (X representing the setting) will appear. The first parameter being the Pump 1 setting.
- To change the setting (see following page for details) simply press the   Up or Down Arrow keys to increase or decrease the value.
- To save the change and move to the next parameter, press the Program key. **(You must go through all parameters to save changes and exit this mode)**
- Once you’ve gone through all of the programming parameters, a final press of the Program key will reset the spaside control and the standard (Time/Temp) display will appear.

# Low Level Programming (cont.)

## Programming Parameters and Internal Settings:

### 1 - PUMP #1 (main pump):

- Display: **P1 X**
- Setting for X: **1 = Single-Speed**  
**2 = Dual-Speed**

### 2 - Pump #2 (jet pump):

- Display: **P2 X**
- Setting for X: **0 = Not Installed**  
**1 = Single-Speed**  
**2 = Dual-Speed**

### 3 - Blower:

- Display: **bL X**
- Setting for X: **0 = Not Installed**  
**1 = On/Off**  
**2 = Dual-Speed**  
**3 = Three-Speed**

### 4 - Light:

- Display: **LI X**
- Setting for X: **0 = Not Installed**  
**1 = 12V - On/Off**  
**2 = 12V - Three Intensities**  
**3 = 12V - Three Intensities and one 120V output**

### 5 - Ozone:

- Display: **O3 X**
- Setting for X: **0 = Not Installed**  
**1 = On with Filter Cycle**  
**2 = Always On**  
**3 = Programmable\***

\* When a Circ. Pump is used, you can then program the Ozonator to be turned on periodically to sanitize the water.

### 6 - Circulation Pump:

- Display: **CP X**
- Setting for X: **0 = Not Installed**  
**1 = On 24-Hours**  
**2 = Therm. Controlled \*\***  
**3 = Always On \*\***

\*\* Shuts off when temperature is 4°F over set point

### 7 - Auxiliary Output:

- Display: **AU X**
- Setting for X: **0 = Not Installed**  
**1 = (1) Comp. On/Off**  
**2 = Fiber Optic Ready**  
**3 = (2) Comp.'s**  
**(1) On / (2) On (1) Off /**  
**(1 & 2) On / Both Off**

### 8 - High Current/Low Current:

- Display: **Cu X**
- Setting for X: **0 = Low Current (Heater off when both pumps are in high-speed)**  
**1 = High Current (No Limitation)**

### 9 - Spaside Control:

- Display: **TC X**
- Setting for X: **0 = 8-Key Control**  
**1 = 10-Key Control**

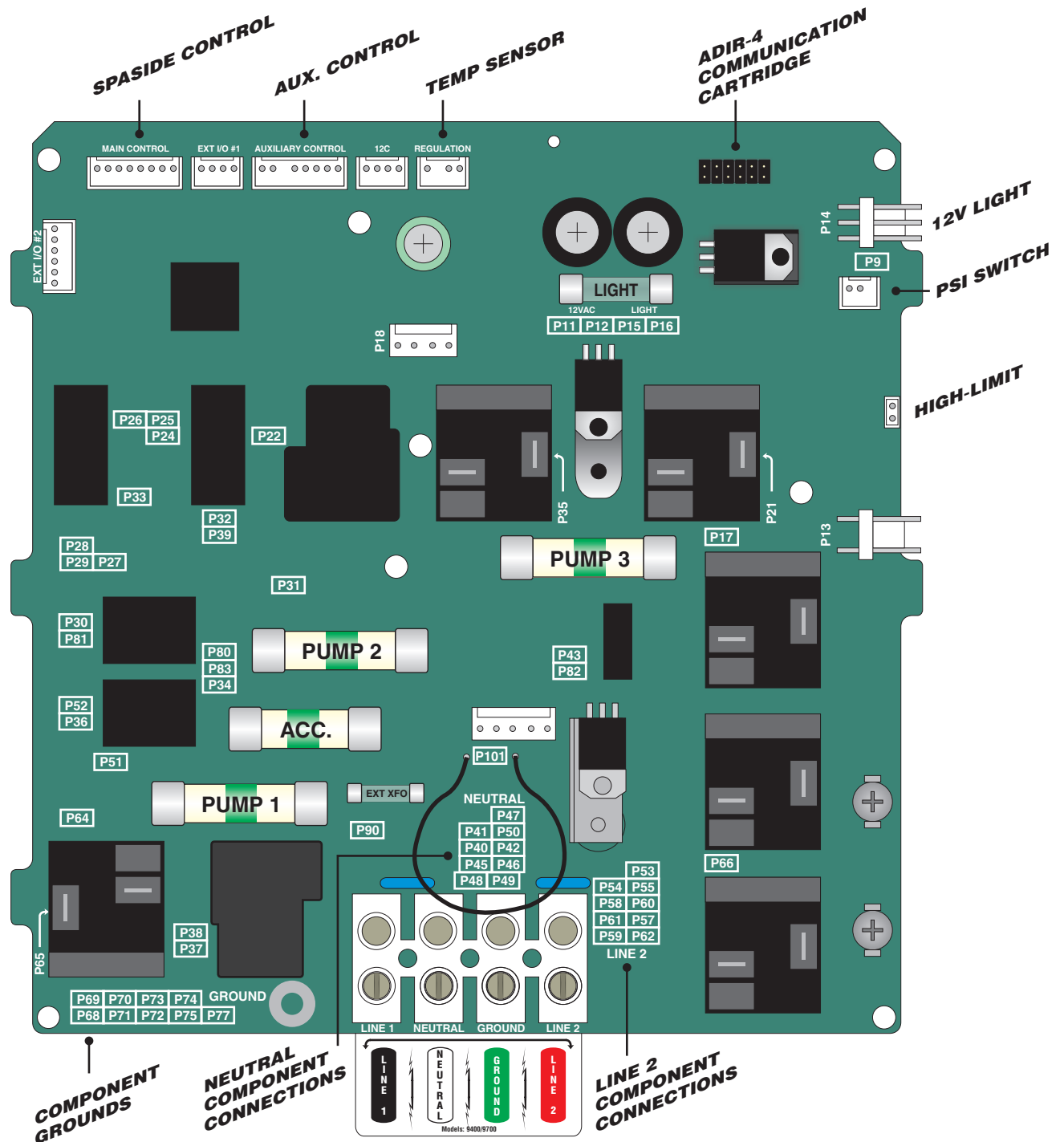
\*\* For the 4°F Over Temp Filter Cycle (OTFC) to activate, two conditions are required:

- The circulation pump setting must be set to 03 (see "6" above).
- The temperature of the water at 4°F over the set temperature and below 108°F.

When these two conditions are met, the OTFC will start twice a day, once at 7AM and once at 7PM. The Circ Pump and Ozone will be turned on for 2-hour's at each of the times mentioned.

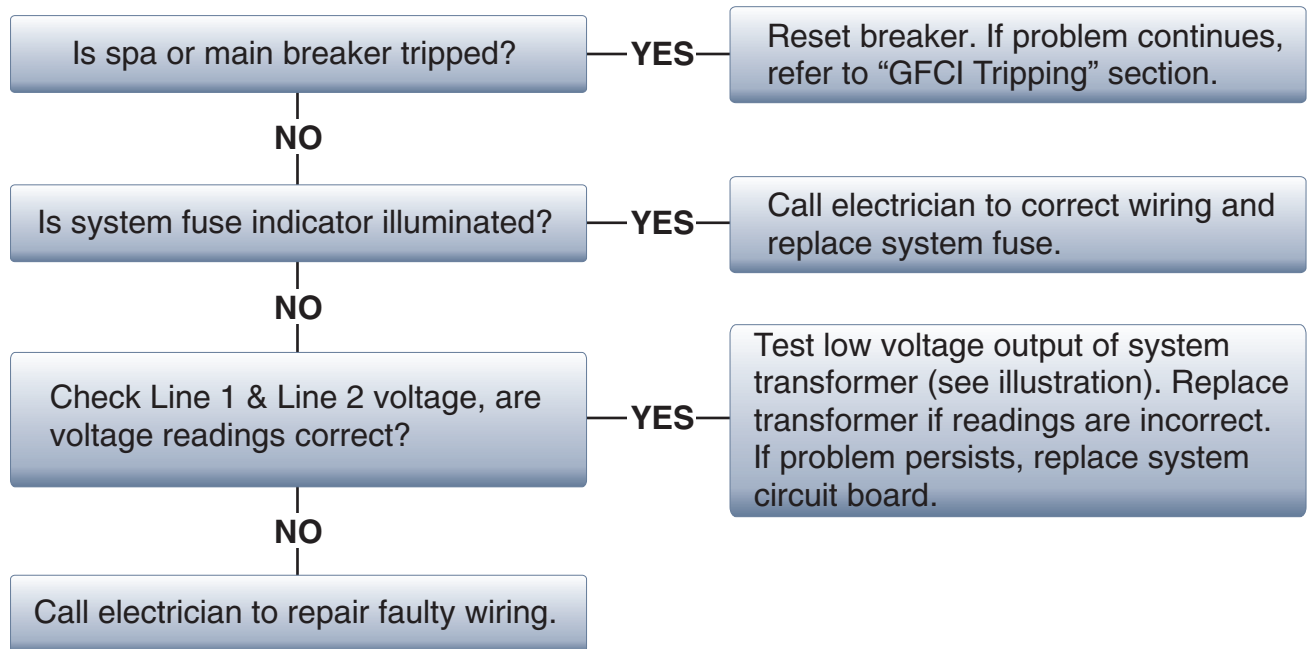
# Circuit Board Layout

Throughout the troubleshooting process you will need to refer to this layout as a reference. To troubleshoot Universal Systems it is important to note that the neutral (white wire w/color coded connector) will ultimately determine that circuit's voltage (connected to Neutral or Line 2). Always consult the system wiring diagram included with each control (located on the inside faceplate).

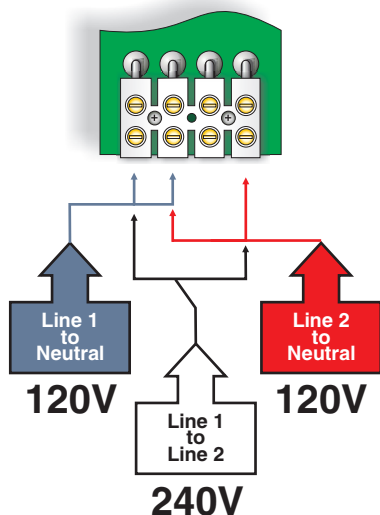


# Nothing Works!

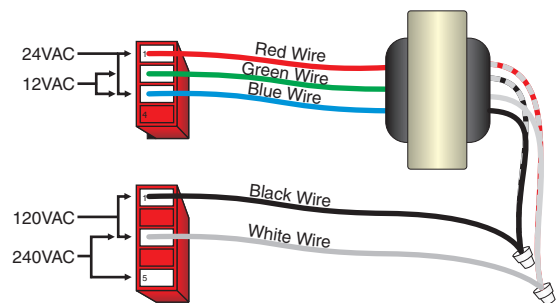
The following troubleshooting tree has been designed as a guideline to assist the technician with a quick diagnosis of the problem.



Always confirm incoming voltage.



Testing Low Voltage



Wiring will vary from 120V to 240V. If Black wire is inserted in location 5, the voltage supplied to the transformer is 240VAC.

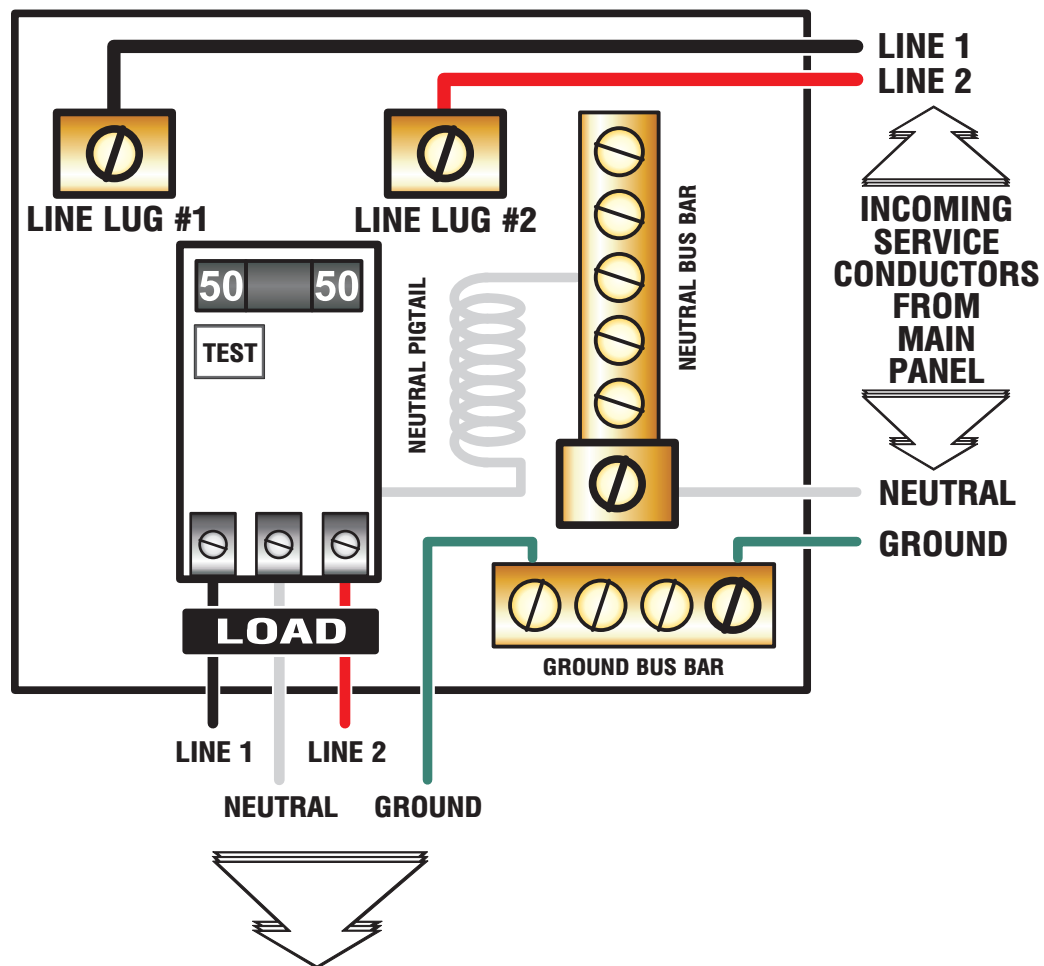
**CAUTION - Remove power to system prior to accessing the internal control wiring or before changing fuses.**

# GFCI Tripping!

When a GFCI circuit breaker is used in the installation of your spa, it is important that it has been properly installed. Often this component has been improperly installed causing the breaker to trip the instant the system is turned on. Below is an illustration of a typical GFCI breaker installation.

**WARNING:** Refer to Circuit Breaker Manufacturers installation instructions. This illustration is meant to be a guide for Field Technicians and is not intended to override or substitute the instructions supplied with the circuit breaker.

## TYPICAL INSTALLATION

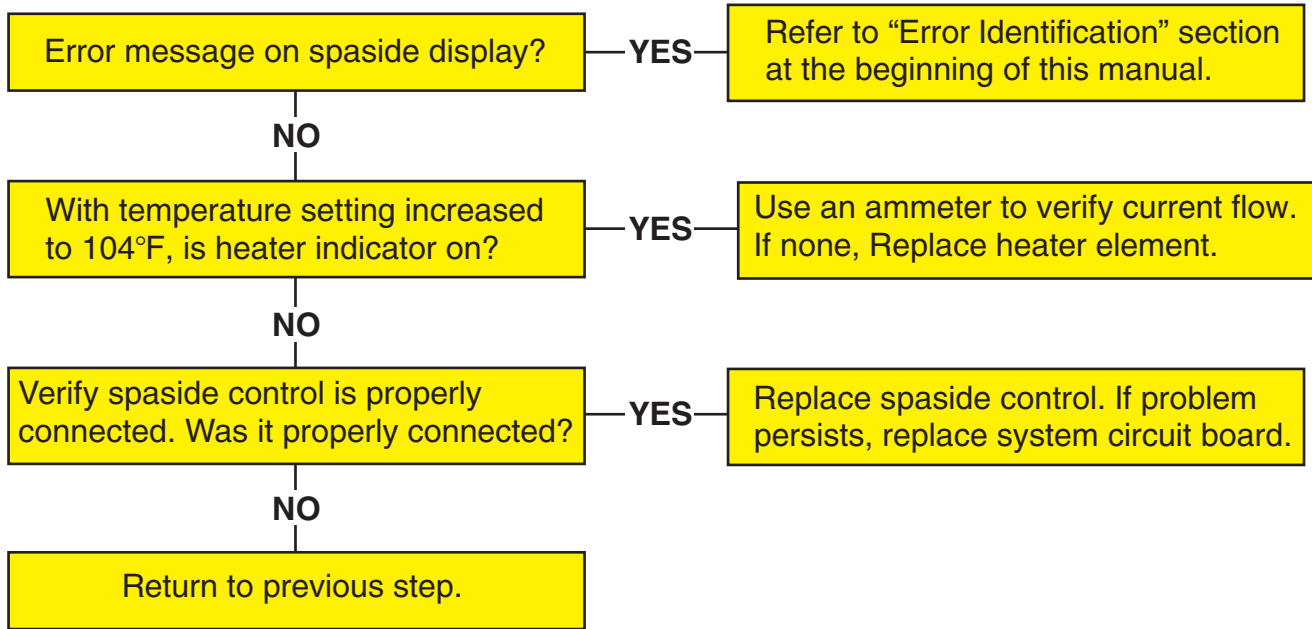


### TO SPA CONTROL SYSTEM

LOAD NEUTRAL MUST BE CONNECTED  
DIRECTLY TO GFCI AS SHOWN

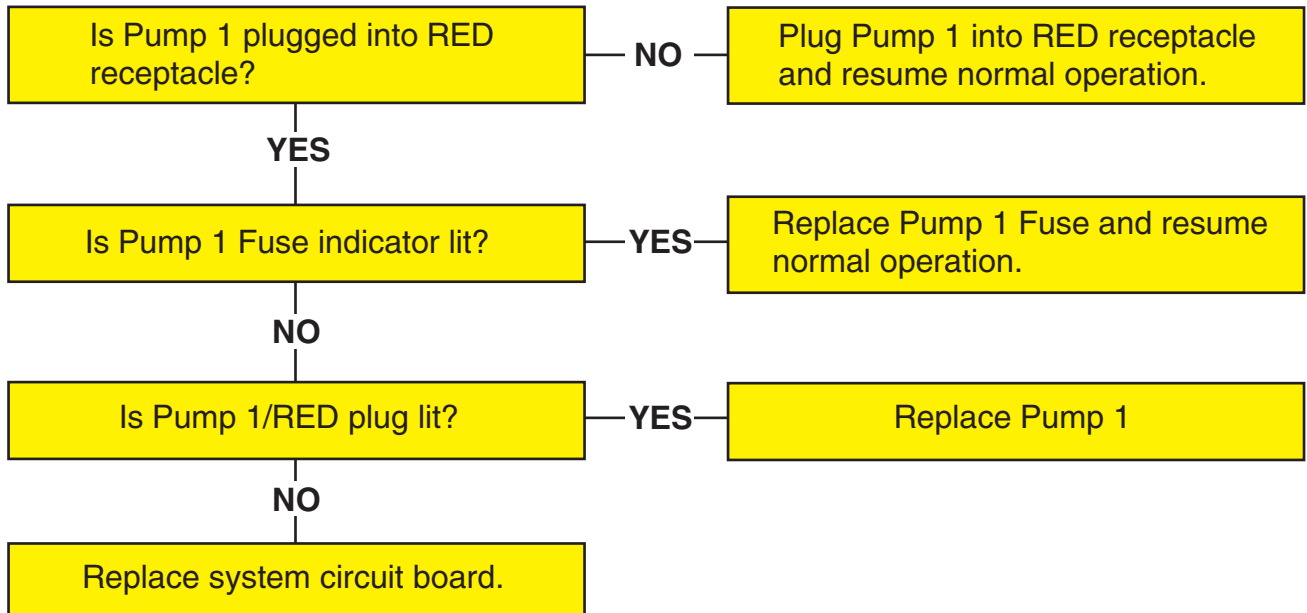
# No Heat

Press the Up Arrow key and increase the temperature to its highest setting. Verify that the heater indicator on the spaside control is illuminated.



# No Pump 1

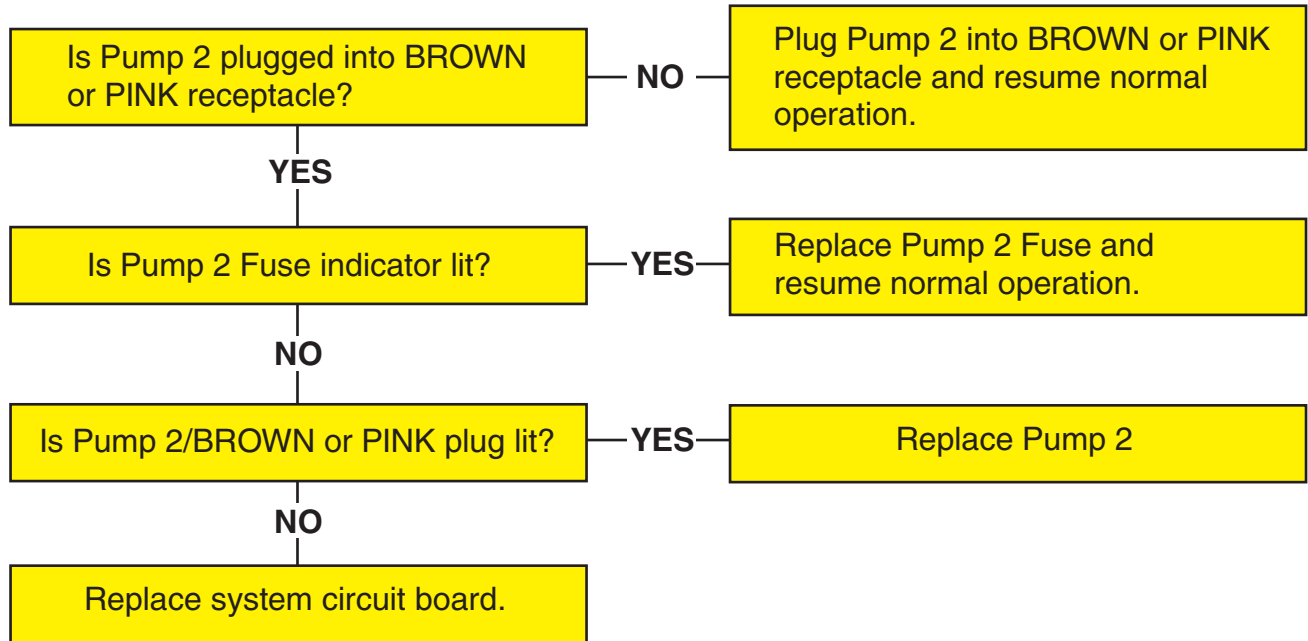
It is uncommon for a pump to just fail. Keep in mind that improper wire and/or breaker size can cause premature failure. Press Pump 1 key, verify the Pump 1 icon appears in spaside display.





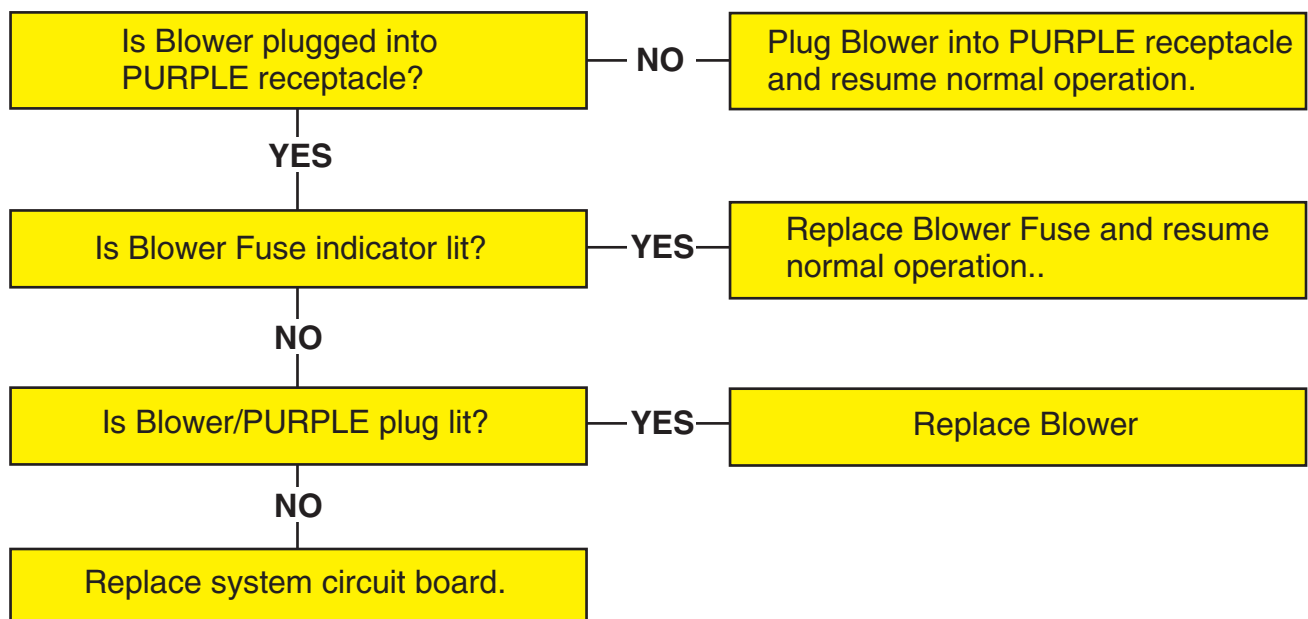
## No Pump 2

It is uncommon for a pump to just fail. Keep in mind that improper wire and/or breaker size can cause premature failure. Press Pump 2 key, verify the Pump 1 icon appears in spaside display.



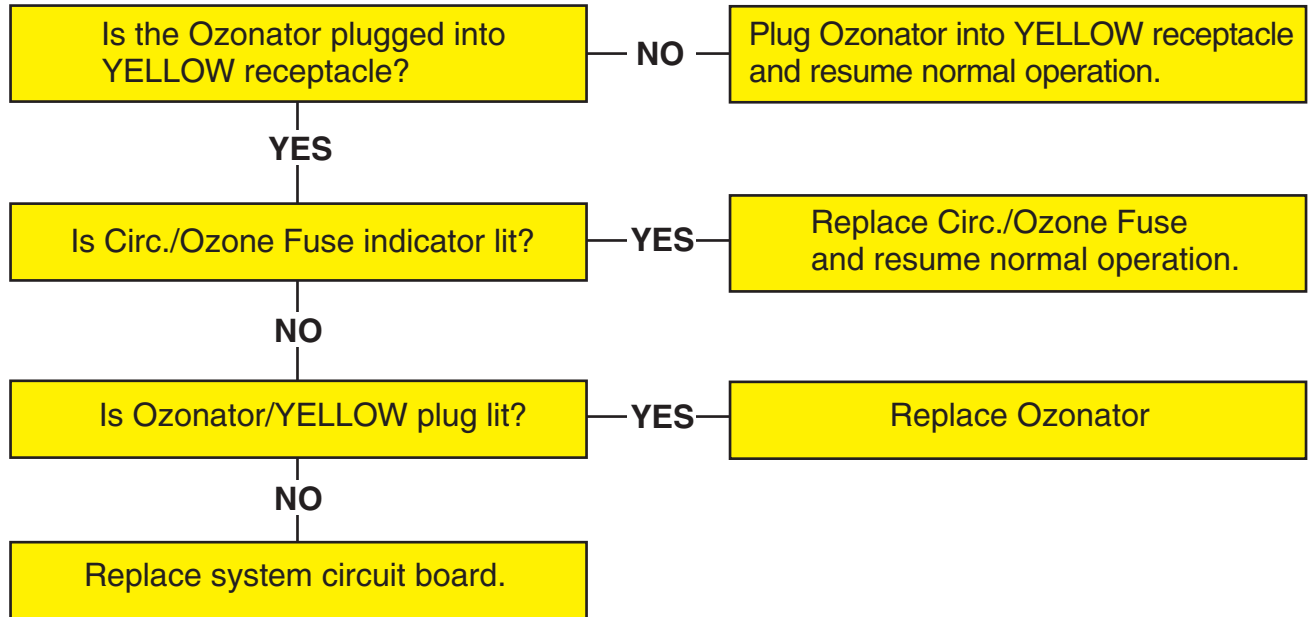
## No Air Blower

Press Blower key, verify the Blower indicator is illuminated on spaside control.



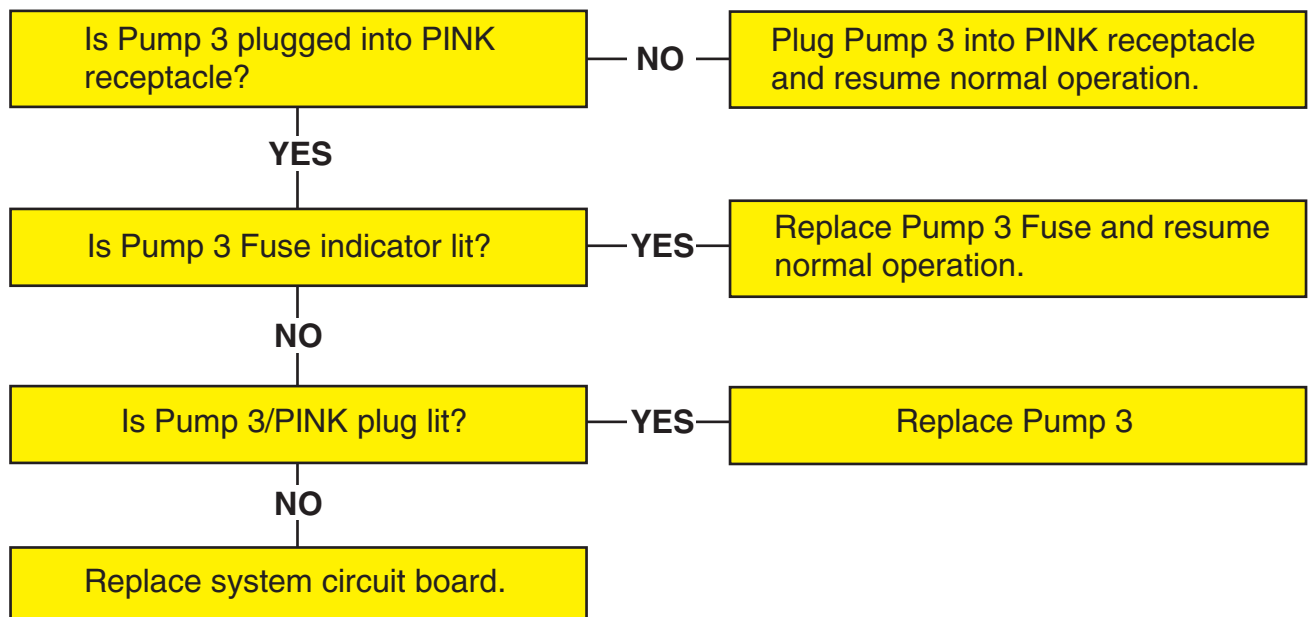
## No Ozone

**IMPORTANT** - A filter cycle **MUST** be active before the Ozonator will operate. Refer to “Standard Programming” to activate a filter cycle prior to troubleshooting the Ozone circuit.



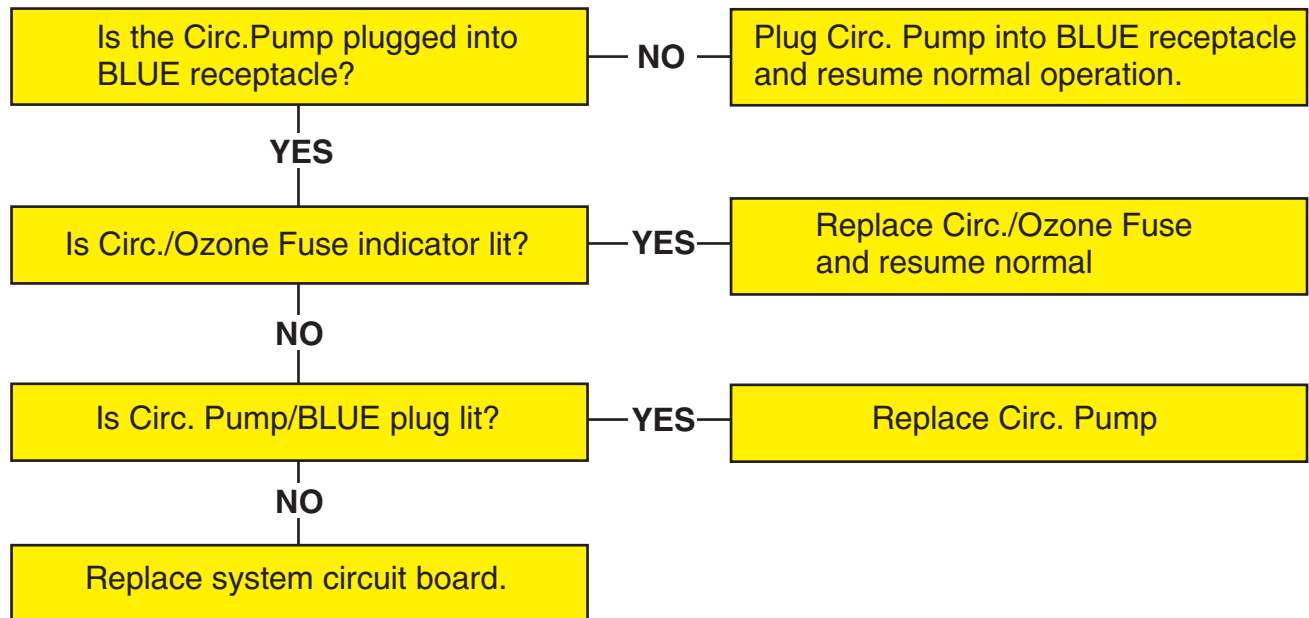
## No Pump 3

It is uncommon for a pump to just fail. Keep in mind that improper wire and/or breaker size can cause premature failure. Press Pump 3 key, to activate pump circuit.



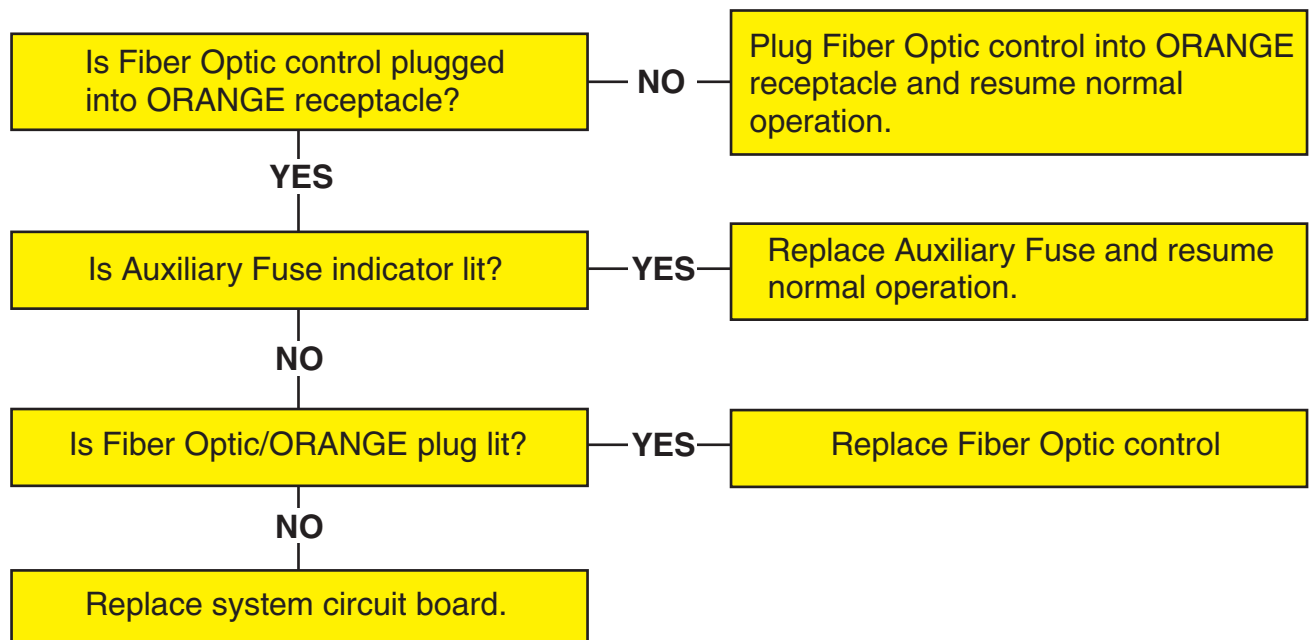
## No Circulation Pump

**IMPORTANT** - Check “Low Level Program” to verify operation, pump may be in “Over Temp” shut down (4°F over set temperature).



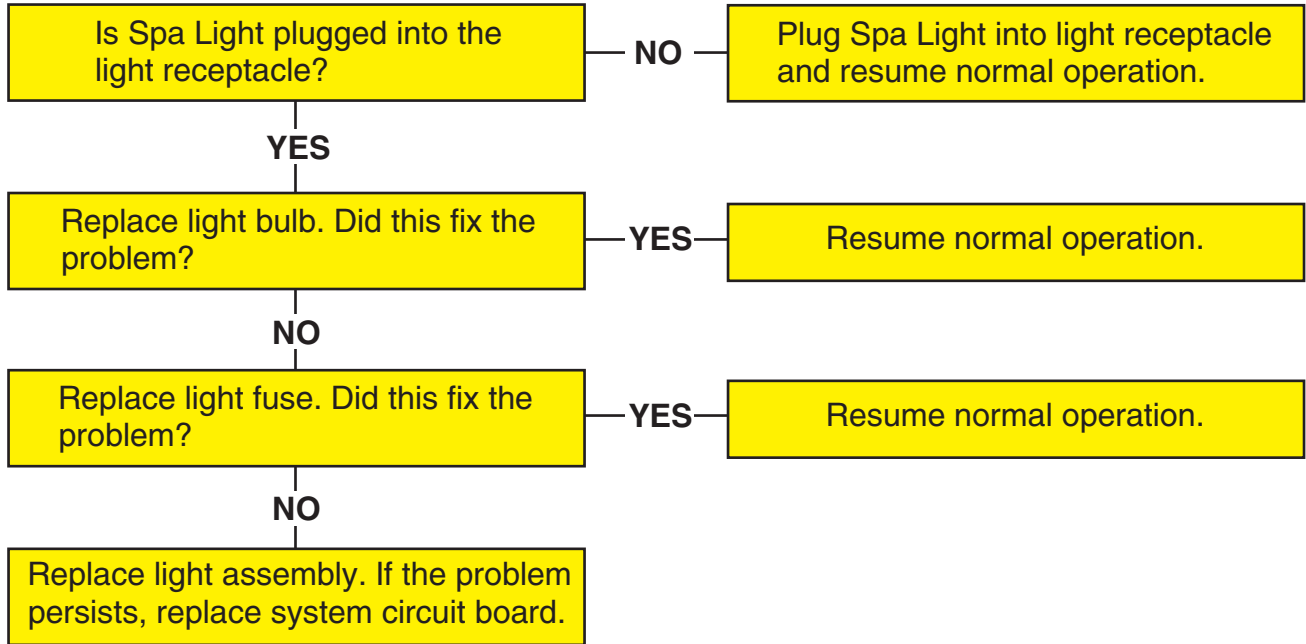
## No Fiber Optic

**IMPORTANT** - Check “Low Level Program” to verify setting, the AUX setting must be 1.



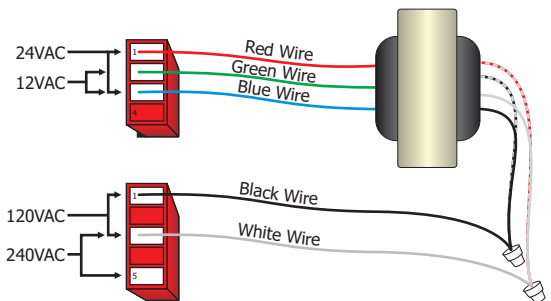
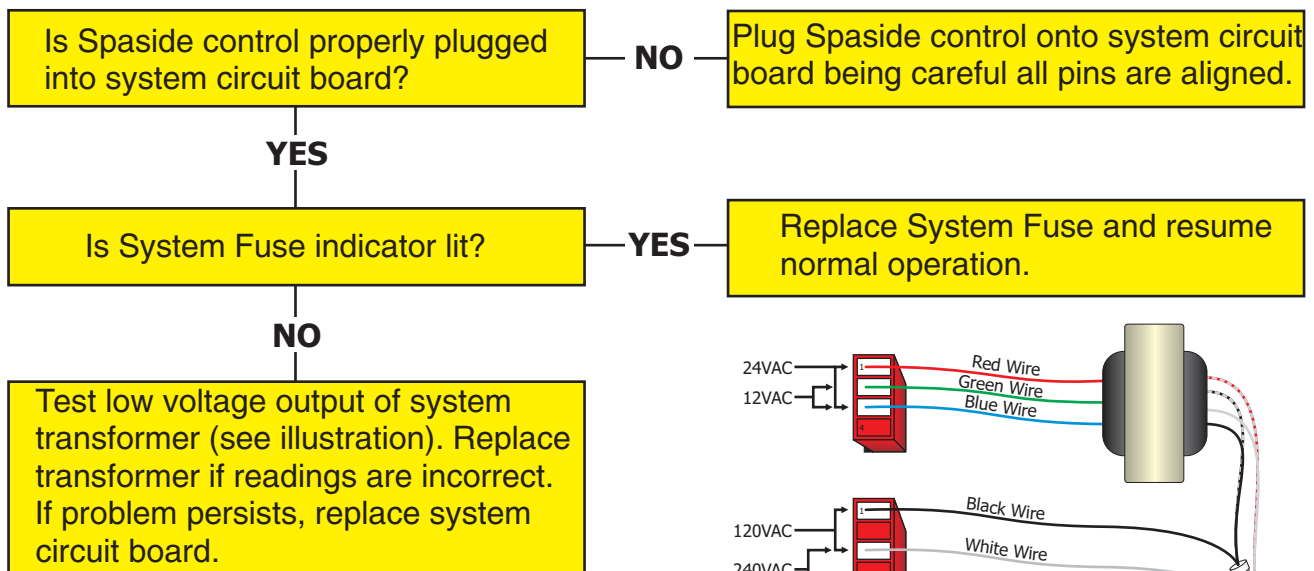
# No Spa Light

The spa Light circuit is protected by its own fuse, with no diagnostic light. Check “Low Level Programming” to verify operation (12V or 120V, single or multiple intensities).



# No Spaside Operation

**IMPORTANT** - Check “Low Level Program” to verify setting (8 or 10 key control).



Wiring will vary from 120V to 240V. If Black wire is inserted in location 5, the voltage supplied to the transformer is 240VAC.



For more information, contact our knowledgeable Technical Support team.  
**Open:** 8:00am to 5:00pm Mon-Fri



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