

Hot Tub & Spa Pump Troubleshooting

The pump is probably the hardest working piece of equipment on your spa. To keep water moving throughout the entire circulation system the pump draws the water from the spa then pumps it on through the filter, heater and back through the jets. Many pumps have a strainer pot or leaf trap that catches any small debris that made it through the skimmer or main drain . By trapping this debris, the pump helps ease the burden placed on the filter, leaving it free to catch the smaller pollutants in the water. This is just one part of a multi-step process to rid the water of impurities before it's sent back into the spa. Keeping your water circulating is one of the best ways to help keep your spa clean. It also requires very little attention from you. You only need to program the system to automatically turn the pump on for a set amount of time each day so all of the water can be filtered thoroughly.

How Pumps Function:

Most pumps are self-priming centrifugal pumps. These pumps must have a vacuum chamber, commonly known as a pump housing. The pump housing must be filled with water in order for any pump to create a vacuum, resulting in your pump pulling the water out of your spa. The pump housing will remain full of water while the pump is on, and will remain full or partially full of water when the pump is shut off.

When you turn on the pump the motor will begin to rotate on high speed, even if you have a dual speed pump. The motor drives the pump impeller, located inside the pumps center portion at the opposite end away from the electrical switch portion of the motor. While the motor is rotating, the tips of the impeller are sealed hydraulically inside of the pump diffuser, this allows self-priming to occur. Self-priming can only happen provided the pump has a diffuser. Some pumps have a separate diffuser, others have the diffuser molded into the pumps cover.

Self-priming pumps are very dependable and simple in design. They require a sufficient supply of water from the spa, and no air in the suction lines. Air could come from a loose strainer cover, a leak in any valve, a pin hole in any suction line or any crack or loose connections in the piping. Your pump should be kept free of dirt and also located where it can be protected from flooding during heavy rain fall. If your pump motor becomes flooded you may have to replace it.

PUMP TROUBLESHOOTING

PROBLEMS	POSSIBLE CAUSES	SOLUTIONS
PUMP WILL NOT PRIME	No water in the pump or strainer basket	If you've just drained and refilled your spa be sure to bleed all the air out of the plumbing system. If your pump has a leaf trap make sure the trap is full of water and empty of debris.

		<p>Lubricate and tighten leaf trap 'o' ring.</p> <p>Check that all valves are open.</p>
	Damaged pump	<p>Does the pump sound normal? If it just hums for a few seconds then shuts down, this is an indication of a frozen motor.</p> <p>Check for debris clogging the impeller.</p> <p>Be sure the impeller hasn't broken.</p>
LOW FLOW & LOW FILTER PRESSURE	Level of water in spa is low	Frequently this results in the surging of water coming thru the jets. Fill your spa.
	Pump basket or skimmer basket is clogged	Clean if necessary.
	Air leak in suction line	This can be determined by the recurrence of air in the filter. The leak must be found and repaired (the common cause of this problem is a loose pipe at the pump inlet).
	Clogged or damaged impeller	Inspect the impeller and clean or repair as necessary.
	Valves are closed	Check and open valves.
LOW FLOW & HIGH FILTER PRESSURE	Dirty filter	If you've recently cleaned your filter try running the cartridge with the filter element removed. Replace the filter element if necessary.
	Valves are closed	Check and open valves.
	Jets are clogged	Inspect and clean (debris clogging the jets is frequently debris from another part that has deteriorated or broke).
MOTOR CYCLES ON AND OFF	Motor is overheating	Check ventilation around pump.
	Improper voltage *	Check for proper voltage at the motor (please see note at the bottom of the page).

	Wiring to motor is undersized *	Determine and correct. (please see note at the bottom of the page)
	Faulty or incorrect electrical connections *	Repair as necessary. (please see note at the bottom of the page)
PUMP DOES NOT OPERATE	Damaged motor	Does the pump sound normal? If it just hums for a few seconds then shuts down, this is an indication of a frozen motor or debris possibly jamming the impeller.
	Power switch is OFF *	Be sure all circuit breakers, GFCI's and switches are on. Check for power at the motor and trace wires back till the problem is found. (please see note at the bottom of the page)
WATER IS LEAKING AROUND THE PUMP AREA	Damaged/worn o-rings, pump housing, shaft seal or loosened plumbing fittings	Determine exact location and cause of leak and repair as necessary.
PUMP HAS BECOME EXCESSIVELY NOISY	Low or no water flow	Determine and correct.
	Bad bearings caused by normal wear or a leaking shaft seal	Replace shaft seal and bearings (it may be better to replace the whole motor rather than just the bearings).

WARNING

Use any of the information contained herein AT YOUR OWN RISK. These instructions are primarily intended for use by qualified personnel specifically trained and experienced in the installation and repair of spas electrical equipment and related system components. Installation and service personnel may be required by some states to be licensed. Persons not qualified should not attempt to install this

equipment nor attempt repairs according to these instructions. Please remember that water and electricity DO NOT MIX. If you are not capable of performing a repair yourself, please contact a local spa professional or a licensed electrician in your area. This information is presented for informational purposes only, and we will not be held liable for any injuries that may result from the repair, troubleshooting or installation of any electrical components in your hot tub or spa.

Hot Tub & Spa Heater Repair, Help & Troubleshooting

WARNING

The information contained here is but the basics. If you feel unsure or uncomfortable in these types of repairs please contact a qualified spa technician. Use any of the information contained herein AT YOUR OWN RISK. These instructions are primarily intended for use by qualified personnel specifically trained and experienced in the installation and repair of spas, electrical equipment and related system components. Installation and service personnel may be required by some states to be licensed. Persons not qualified should not attempt to install this equipment nor attempt repairs according to these instructions. Please remember that water and electricity DO NOT MIX. If you are not capable of performing a repair yourself, please contact a local spa professional or a licensed electrician in your area. This information is presented for informational purposes only, and we will not be held liable for any injuries that may result from the troubleshooting or installation of any electrical components in your hot tub or spa.

While the heating system of a spa may seem complicated, it's really quite simple. When conditions are right, electricity travels through some switches and relays, and is applied to the heating element causing it to get hot and the heat transfers to the water. Besides some basic hand tools, a volt/ohm meter and amp meter are necessary for proper testing. Without these test meters, any repairs made to the spa will basically be trial and error and will usually result in parts replaced that weren't actually bad (not that we don't appreciate the business:-). If you're not sure how to use these meters, do not continue with any diagnostic or repair attempts. Call a qualified spa technician!

If the spa is not heating at all the first thing to determine is that the pump is moving water through the system (the heater won't operate if there's not sufficient water being pumped). If the pump is working correctly, the next step is a few electrical tests to determine the problem.

No Heat At All

It could have the same cause, but a heating element is like a light bulb, it either works or it doesn't. If there's absolutely no heat the first thing to test is the heating

element. IS IT GETTING ELECTRICITY? (If you have a 240v heater, you must test for 240 volts directly at the two terminals of the heater. Testing from one terminal to ground will give a proper reading even if the element is bad).

The element IS getting electricity.

If the element is getting electricity the next test is an amp test. If you don't know how to perform an amp test "call a qualified spa technician. Generally, a 120v heater should pull 12.5 amps and a 240 volt heater should pull 25 amps. If you're getting proper amperage draw, move on to "it's getting a little bit warm", below. If you're not getting any amperage draw, you have a bad heater element.

Now the hard part, identifying the replacement element you need. Unfortunately (or fortunately) most all spa manufacturers acquire ALL their parts from elsewhere, assemble them into a spa and slap their name on it. Rarely is the brand of spa relevant in determining a specific replacement part needed. This means that rarely can parts be identified from the brand of the spa. With heaters and heating elements especially, about the only way to identify them is visually. Once you determine your heating element is the culprit and it's been removed from the spa, you can visually match it up to (hopefully) a comparable replacement.

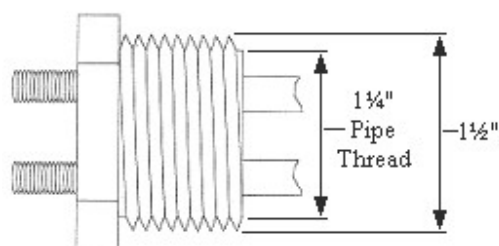
A perfect match is not always possible, and some differences are just fine. Some of the acceptable differences are;

- Difference in physical length. A shorter element is perfectly ok, as long as the other specifications match up. A longer element may not fit the existing housing.
- Slight difference in kilowatt rating. A difference in "kw" rating of 1/2kw is perfectly acceptable. Frequently, a 6kw element will be replaced with a 5.5kw element.

The two most important things are;

- The 'flange', or how the element attaches to the heater housing must be the same (some unusual or obsolete elements may require a different element along with an adapter). If your heater element is threaded, the picture below should give some guidance on sizing and measuring for replacements.

How To Determine Pipe Thread Size



Total Outside Diameter - $\frac{1}{4}$ " = True Pipe Thread Size

- The voltage rating must be the same. An element rated for 120v only, cannot be used in place of a 240v element, however, an element rated for 240v can generally be use in place of a 120v element (sorry no, you wont get any more heat this way).

The element IS NOT getting electricity.

Ok, so the element is not getting any power. Using the light bulb analogy, "the light switch is broken". Using the volt meter, start at the heating element and follow the wiring back until you find the switch or relay that isn't allowing electricity to pass through. If power for the element is fed through a relay and the relay isn't closing, it then must be determined why, or what switch is preventing it. The next step is to determine if the switch is truly bad, or if it's just doing it's job (a high limit switch may be cutting off due to some other problem that's causing the water at it's sensing point to over heat).

Some of the many possibilities for a good switch to appear broken are (and the apparent culprit);

- Low water flow (hi-limit, pressure switch or thermostat)
- A dirty filter (hi-limit, pressure switch or thermostat)
- A clogged tube feeding a pressure switch (pressure switch)
- Magnetic door interlock misaligned (door interlock)
- Heating element shorting out into the water (GFCI tripping)

If all of this doesn't seem to make sense, you feel you need a lot more information or you don't feel comfortable in attempting this type of diagnosis or repair, "call a qualified spa technician".

It's heating some, but not to full temperature

PROBLEMS	POSSIBLE CAUSES	SOLUTIONS
No heat at all	Tripped hi-limit switch	Locate and reset.
	Open doors on spa cabinet	Close the doors.

	Pump isn't pumping any or enough water	Determine problem and repair.
Heater cycling on and off continuously.	Dirty filter	Clean filter cartridge, if in doubt try running the system with the cartridge removed.
	Low water level in spa	Raise water level.
Takes a long time to heat spa.	Dirty filter	Clean filter cartridge, if in doubt try running the system with the cartridge removed.
	Daily filtration and heating cycle not running long enough	Reset time clock.
	Damaged Insulating cover	Many spas, especially electrically heated wont heat up without a proper cover. Repair or replace.
	Bad thermostat	Replace if necessary.
	Hi-limit switch turning off heater prematurely	Replace if necessary.
Leaking at heater	Improper water chemistry	Determine exact location and cause of leak, replace damaged parts and maintain proper water chemistry.

Harmonics, whining or banging noise	Debris or restriction in system	Locate the restriction and remove.
	Low flow	Determine problem and repair.

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