

VS CONTROL PACK INSTALLATION INSTRUCTIONS



Hot Tub Works
1-800-770-0292

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Congratulations!

You have purchased and are about to install in your spa, the most advanced control system today. The Value Series (VS) control systems were designed using patented M7 temperature and flow sensor technology on a new universal control platform. These features increase the reliability, ease of installation, and serviceability of the control's components. This VS control equipment pack eliminates the need for the failure prone, conventional in-tub temperature sensors, flow switches and pressure switches.

If your hot tub utilizes these types of sensors and switches now, they will no longer be necessary. The existing sensors and switches do not have to be removed though, in fact, they may be better served left in place in order to prevent any leaks. The wires leading to these devices, however, will need to either be removed or tied up neatly.

It is ***extremely*** important that you read and understand the installation instructions before proceeding. This will make the installation easier, quicker, and safer.

If you have any technical questions please contact us:

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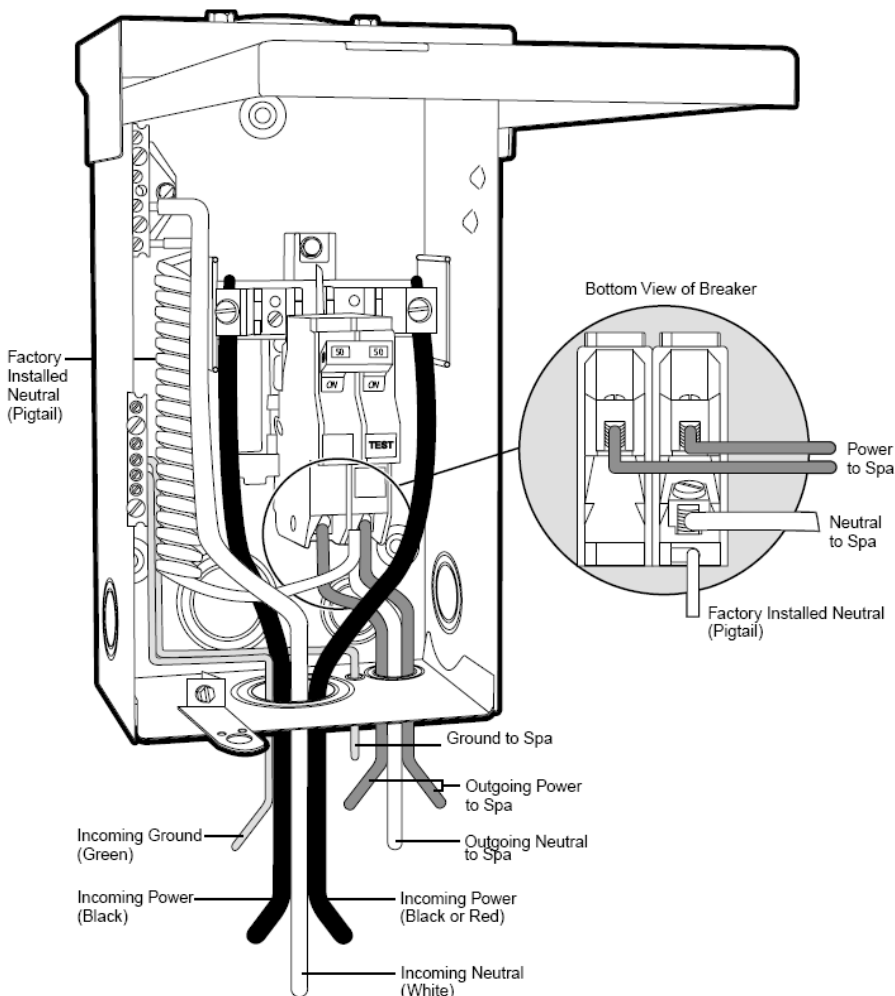
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SAFETY PRECAUTIONS

- * These devices use high voltage and high current.
- * **Electrocution** is possible if care is not taken.
- * Disable the power supply (at the circuit breaker) when connecting or removing any wires to the terminal block and/or when plugging or unplugging any outboard components. This includes, but is not limited to pumps, blowers, ozone generators, stereo systems, topside controls, TV's, lights etc.
- * Use a volt meter to verify that all power is disabled.
- * Do not apply power to test or check any components, until all plumbing and electrical connections are made, the spa is completely filled, and the control box cover is secure. Powering up the spa will be the very last step.
- * Do not stand in water or wet concrete when working on the spa equipment.
- * It is extremely important that the ground connection is intact. This allows the GFCI circuitry to work properly.
- * This control system must be hardwired to the electrical supply with a minimum #8 gauge wire.
- * The only exception to this is a spa that is designed to operate on a 120 volt circuit.
- * 120v powered spas must use a GFCI protected power cord.
- * Do not use extension cords of any type.
- * Contact your local electrical supplier if your current wiring is improper.

ELECTRICAL SUPPLY INFORMATION

The electrical circuit that supplies this controller must include a suitable ground fault circuit interrupter (GFCI) as required by National Electric Code (NEC) article 680-42. This became effective in 1994. If your spa was purchased prior to this it is imperative that a GFCI is added to the circuitry. Hot Tub Works stocks 110V and 220v GFCI kits that are expressly for spa use. Below is a sample of a typical 220V GFCI installation.



Installation Instructions:

1. Mount product on a solid structure using the 3 holes provided
2. Remove the appropriate knockout(s) to bring the incoming power wires into the enclosure
3. Connect the 2 incoming power wires (black and black or red) to the lugs in line with the top of the ground fault circuit breakers
4. Connect the incoming neutral wire (white) to the neutral bar
5. Connect the incoming ground wire (green) to the ground bar (ground bar has green screws)
6. Remove the appropriate knockout to feed the outgoing wires to the spa
7. Connect the outgoing power wires to the terminals on the bottom of the ground fault breaker
8. Connect the outgoing neutral to the screw terminal on the ground fault circuit breaker
9. Connect outgoing ground wire to the ground bar

ELECTRICAL SUPPLY INFORMATION MATRIX

Several pack configurations are available.

Please identify your pack by part number on the following matrix. This will give you voltage and amp requirements. It also shows the number and type of outboard components your pack is capable of operating.

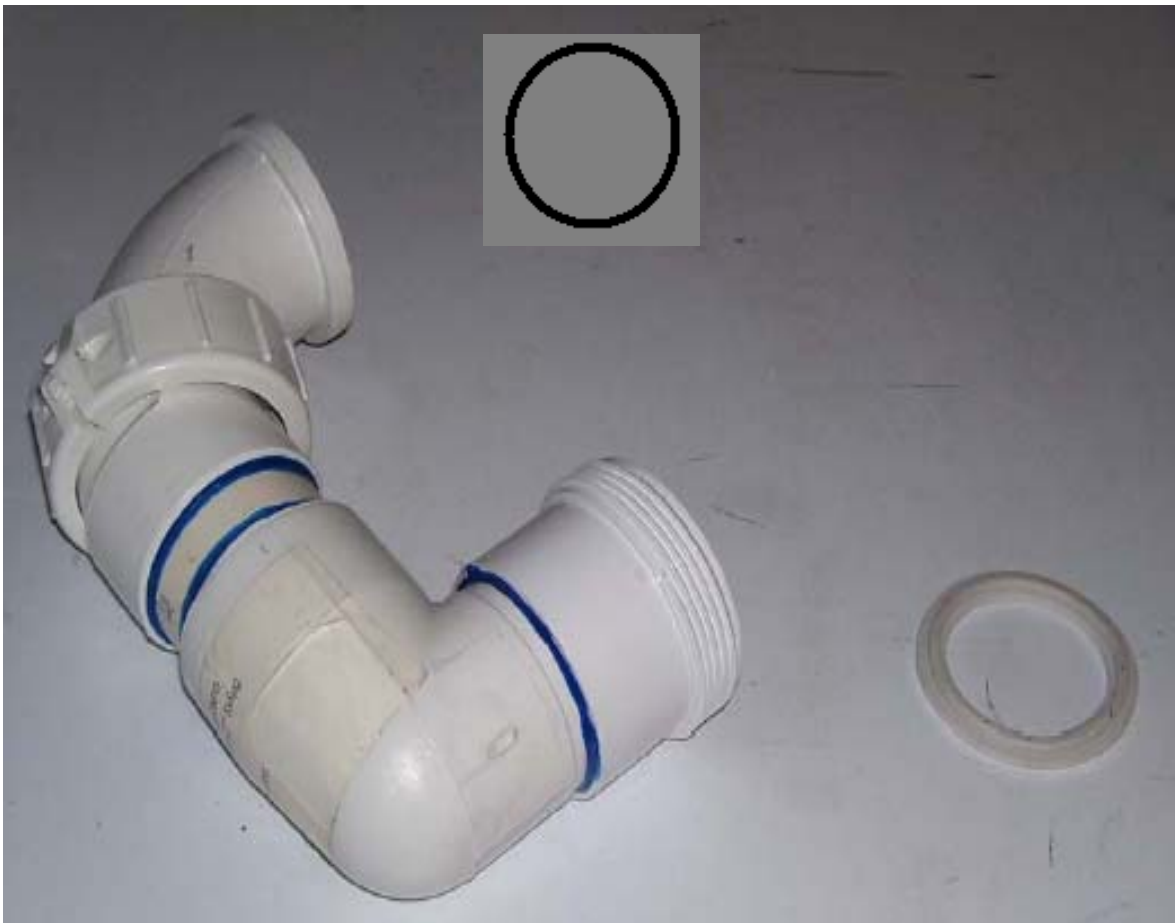
PACK PART NUMBER	PUMP 1	PUMP 2	BLOWER	OZONE	STEREO	CIRC. PUMP	HEATER	VAC	AMPS	BREAKER SIZE
VS501-2HB	240 2hp 2sp	n/a	included	ready	ready	ready	5.5kw	240	32	40 amps
VS501-3HB	240 3hp 2sp	n/a	included	ready	ready	ready	5.5kw	240	32	40 amps
VS501-4HB	240 4hp 2sp	n/a	included	ready	ready	ready	5.5kw	240	32	40 amps
VS501-2H2H	240 2hp 2sp	240 2hp 1sp	n/a	ready	ready	ready	5.5kw	240	32	40 amps
VS501-3H3H	240 3hp 2sp	240 3hp 1sp	n/a	ready	ready	ready	5.5kw	240	32	40 amps
VS501-4H4H	240 4hp 2sp	240 4hp 1sp	n/a	ready	ready	ready	5.5kw	240	32	40 amps
VS510-2H2HB	240 2hp 2sp	240 2hp 1sp	included	ready	ready	ready	5.5kw	240	40	50 amps
VS510-3H3HB	240 3hp 2sp	240 3hp 1sp	included	ready	ready	ready	5.5kw	240	40	50 amps
VS510-4H4HB	240 4hp 2sp	240 4hp 1sp	included	ready	ready	ready	5.5kw	240	40	50 amps
VS501-2H	240 2hp 2sp	n/a	n/a	ready	ready	ready	5.5kw	240	32	40 amps
VS501-3H	240 3hp 2sp	n/a	n/a	ready	ready	ready	5.5kw	240	32	40 amps
VS501-4H	240 4hp 2sp	n/a	n/a	ready	ready	ready	5.5kw	240	32	40 amps
VS501-120-1HP	120V 1 hp 2 speed	n/a	n/a	ready	ready	ready	1.5kw	120	16	20 amps
VS501-120V-1.5HP	120V 1.5 hp 2 speed	n/a	n/a	ready	ready	ready	1.5kw	120	16	20 amps
VS501-120V-1B	120V 1 hp 2 speed	n/a	included	ready	ready	ready	1.5kw	120	16	20 amps
VS501-120V-1.5B	120V 1.5 hp 2 speed	n/a	included	ready	ready	ready	1.5kw	120	16	20 amps

Old Pack Removal Instructions

1. Familiarize yourself with the water flow pattern of you existing spa equipment. The pump pulls water into itself and then discharges the water out the side or top. This is crucial in determining how your new control pack will be plumbed. (See page 19.)
2. Turn off the power to the spa at circuit breaker.
3. **CAUTION:** Make sure that power is completely turned off. Some units have a quick electrical disconnect located somewhere close to the spa.
4. Use a volt meter to verify that all power is disabled.
5. Make sure that spa is completely drained.
6. Disconnect the electrical wiring to main terminal block in the existing control box.
7. Unplug or disconnect any plugs to the outboard components such as the pumps, blower, lights, topside control panel, ozone generators, stereo systems, misters, TV's, etc.
8. Disconnect the plumbing lines to all of the outboard components being replaced.
9. Remove the spa pack. It will probably be mounted to plywood or wood stud structure.
10. Remove the spa pump.
11. Remove the topside controls and any other equipment being replaced.
12. After all items are removed, clean up any moisture and debris in the equipment area.

New Pack Installation Instructions

1. Carefully remove your new pack from the shipping carton.
2. Please note the plumbing piece that connects the heater to the pump is shipped separately in the carton. This is done to prevent damage during shipping.
3. The assembly is shown below. The heater connection requires the white gasket, and the pump connection requires the black o-ring.



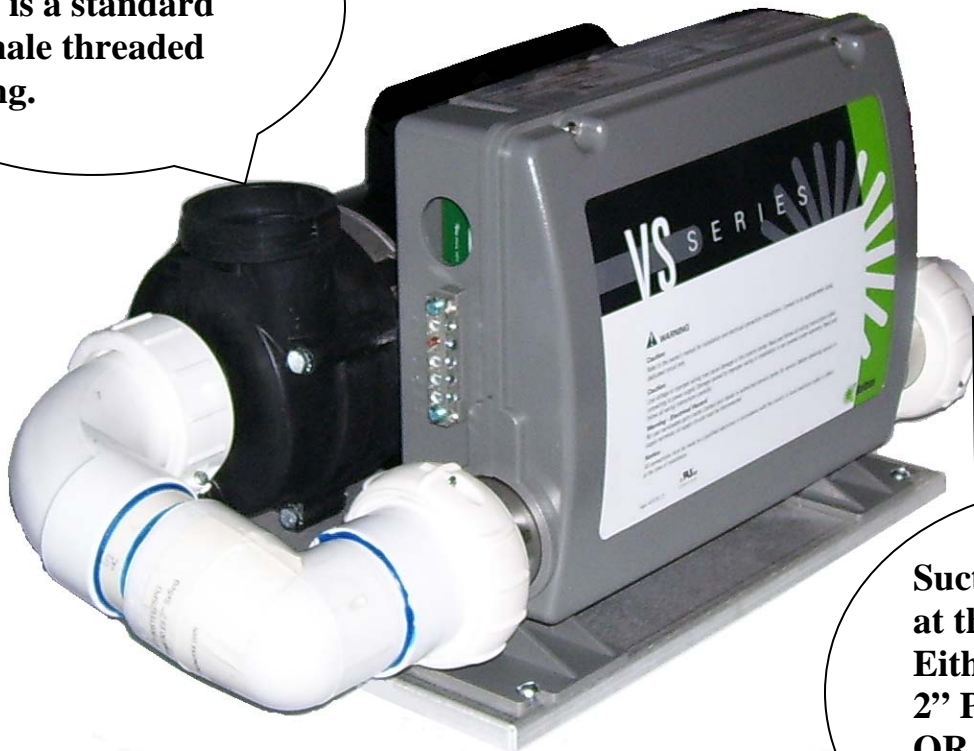
4. Attach the plumbing assembly to the heater and the pump, then hand-tighten the split nuts. Over tightening may cause too much stress on the split nuts and crack them when the pressurized water flows through. Make sure that the o-rings and gaskets are properly installed within their grooves. These unions are designed to be installed and seal without the use of any tools.



5. Place your new control pack so it aligns with the existing plumbing. The discharge side of the pump is shown pointed upward and it will mate with a standard 2" threaded pump union. The suction side starts at the heater. You have two choices to end with, either a standard 2" slip fitting **OR** 2" threaded heater union split nut. Please be sure to use the new o-rings and gaskets supplied. Old o-rings may not seal properly and cause leaks at these unions.
6. Contact Hot Tub Works if you need any additional plumbing supplies or technical support.

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Discharge side of pump to the jets. This is a standard 2" male threaded fitting.

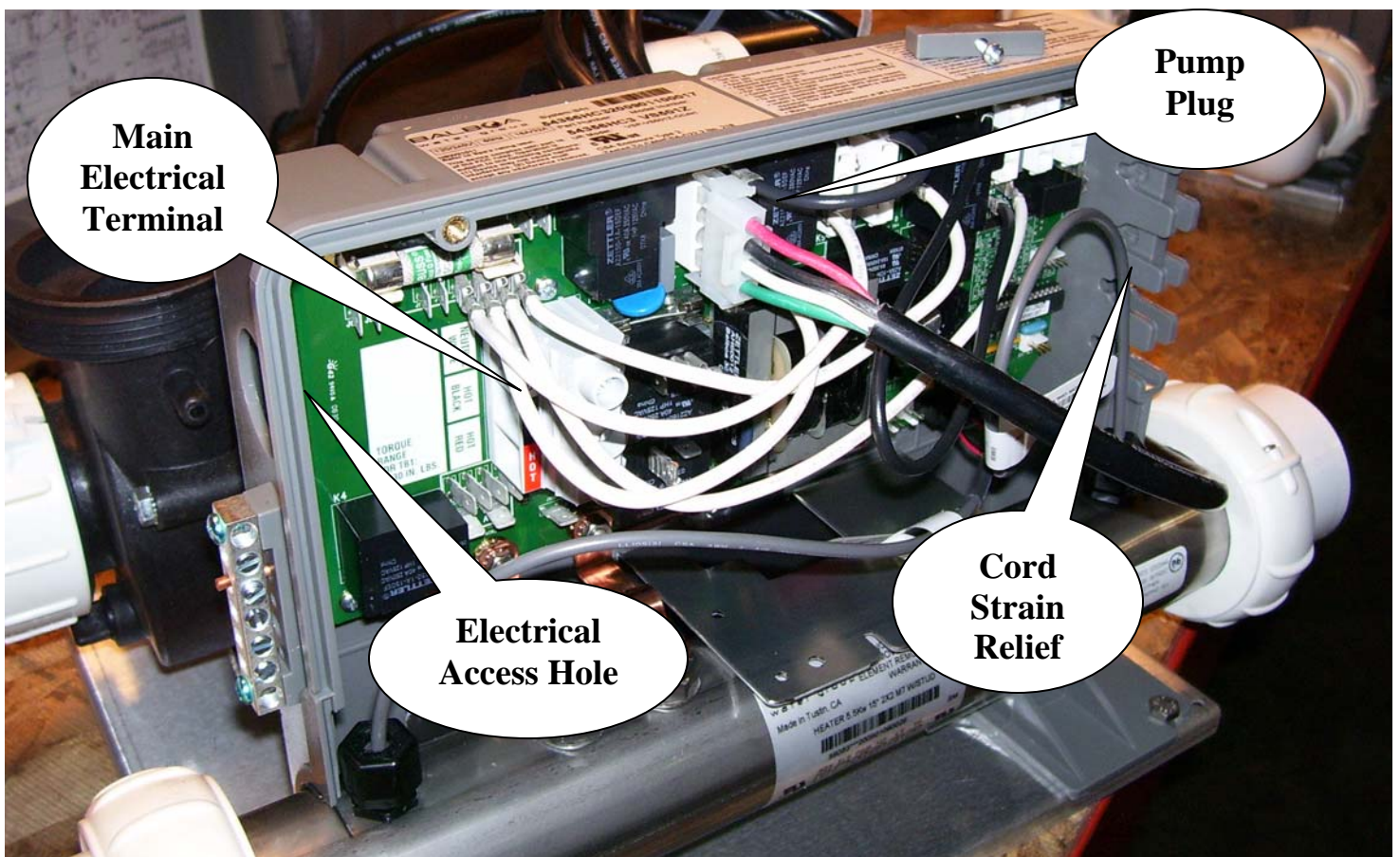


Suction side starts at the heater. Either a standard 2" PVC slip fitting **OR 2" threaded split nut.**

7. Once the plumbing is aligned you can connect it and proceed to fasten down the pack base to the floor of the equipment compartment. There are four mounting holes in corners of the aluminum base. Be sure the integrity of the flooring or beams is strong enough to support and hold the base in place. If the flooring or beams is uneven or rotted, now is the time to level it out, replace, or reinforce any weak areas.
8. It is important to keep your new equipment level to ensure proper function.
9. Open the cover of your new pack by removing the two top Phillips head screws. The bottom is hinged, so you will need to pull the cover down, then towards you to remove it.

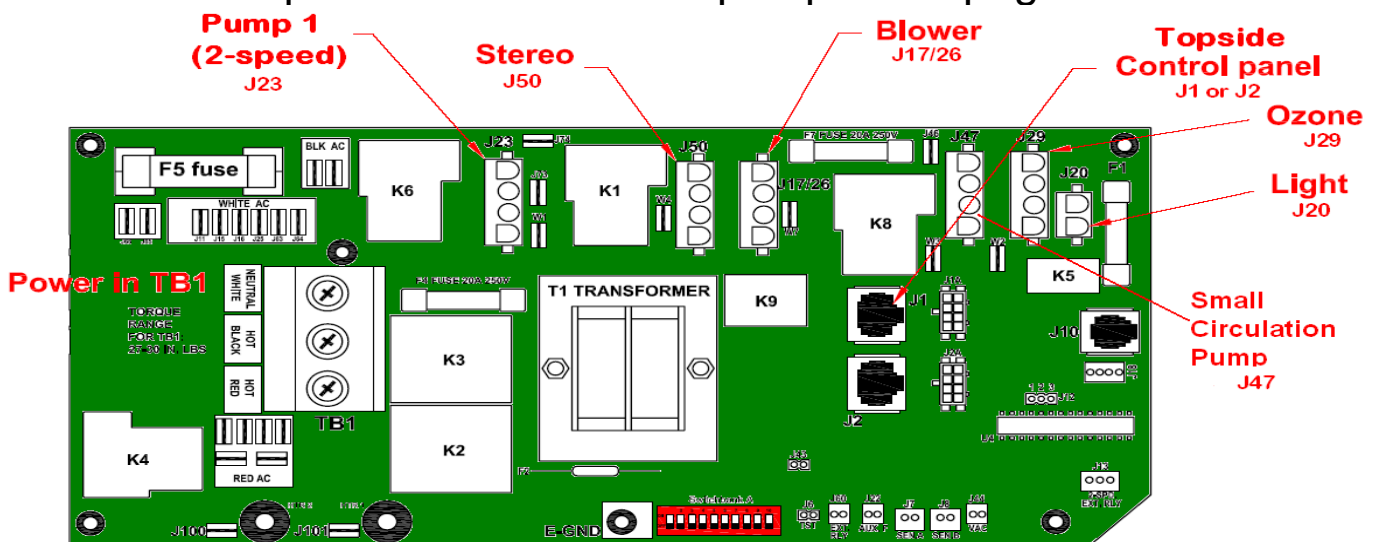


9. There is a wiring diagram on the backside of your control box cover. Notice the circuit board, switch-bank, and the receptacles for all of your outboard components plugs. Also note how the main electrical power enters through the hole on the left side and connects to the main electrical terminal. The grounding and bonding bar is outside the control box on the left side. All outboard component wires enter from the right side and feed through the cord strain relief mechanism.



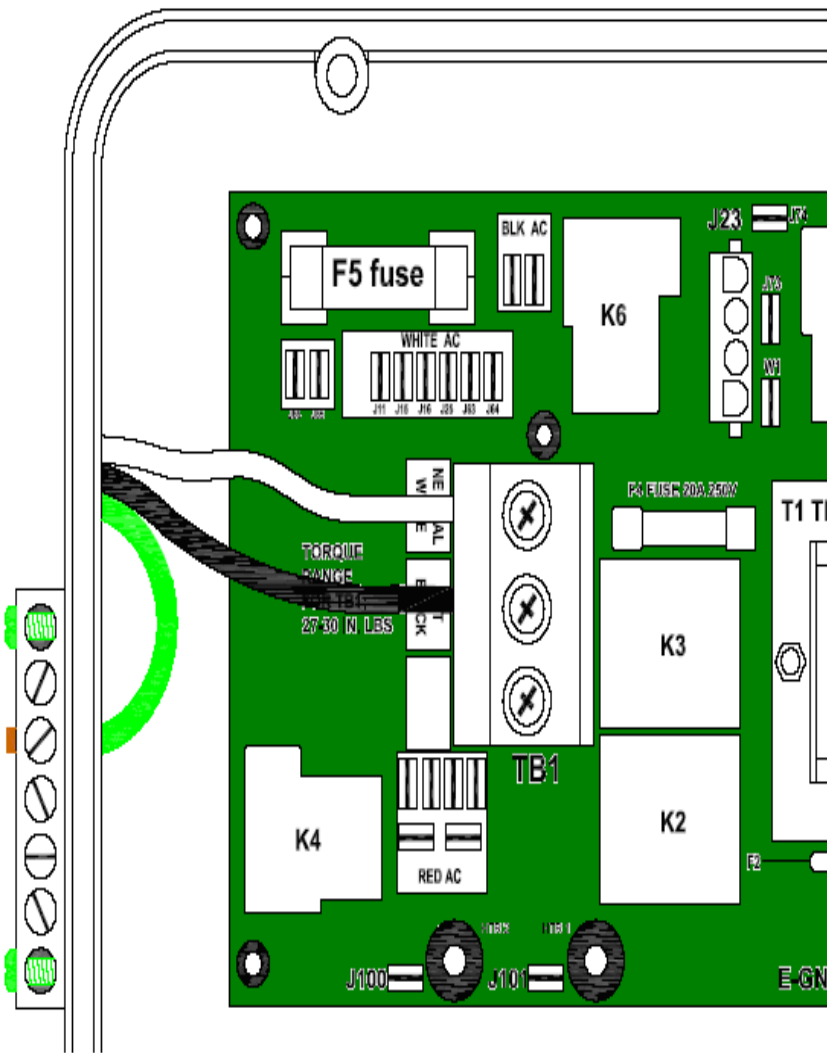
CONNECTING OUTBOARD COMPONENTS

1. New power cords are supplied for all outboard components. It is recommended that you install the new cords. Before removing the old cords, please note the wires terminate on the outboard components. You will need to connect your new cord wires in exactly the same positions the old ones were in. You may consider taking a picture or drawing a simple diagram of the wire terminals to help you remember.
2. Plug in all the outboard components to their designated receptacles. The diagram below shows the plug locations on the **VS501** series circuit boards. For twin pump systems without a blower, plug the second pump into the blower receptacle (J17).
3. For twin pump systems with a blower, you must use the **VS510** series circuit boards. There is another smaller circuit board below the main one with a receptacle for the second pump. See page 17.



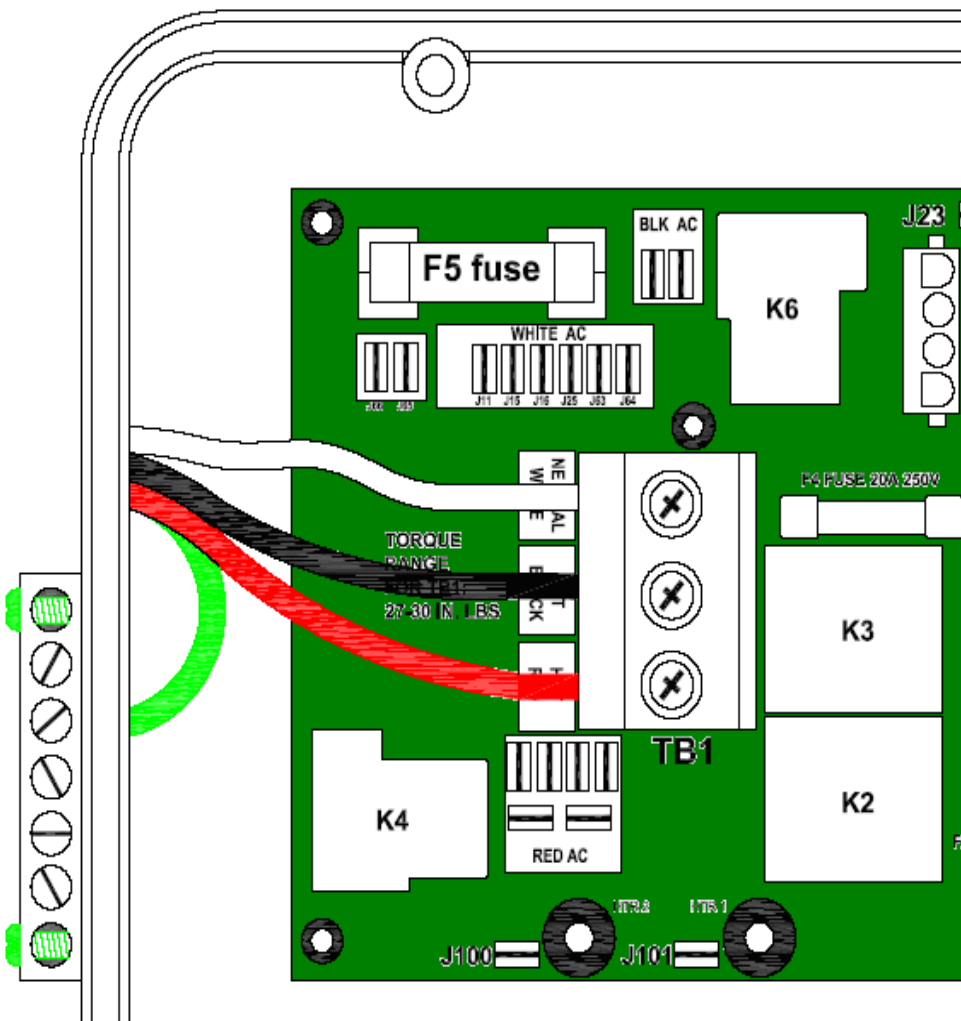
120 VOLT WIRING DIAGRAM VS501 SERIES CONTROL SYSTEMS

The torque range is 27-30 inches per lb.



240V WIRING DIAGRAM FOR VS501 AND VS510 SERIES CONTROL SYSTEMS

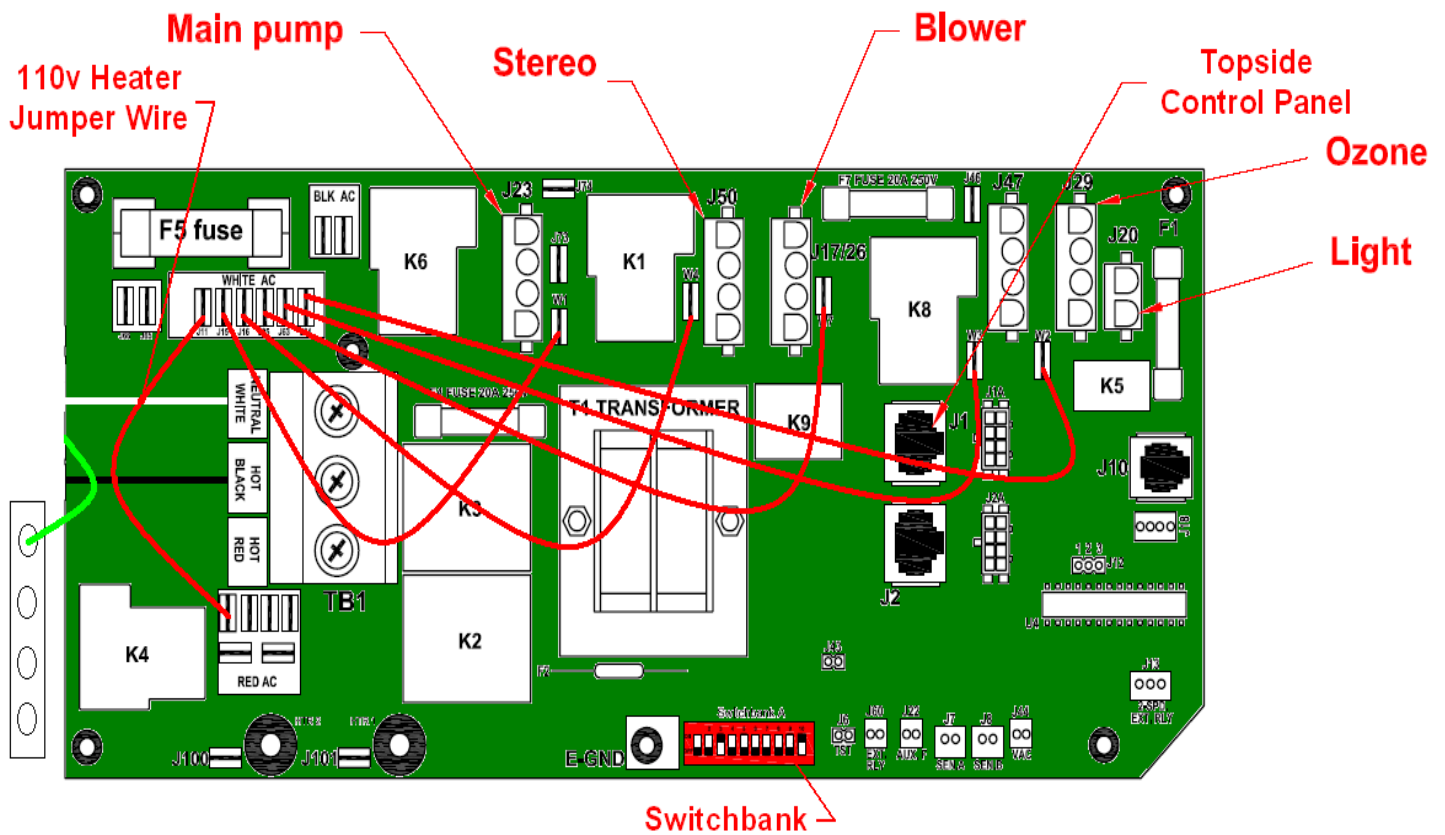
The torque range is 27-30 inches per lb.



110v Spa Jumper Wire Locations

Below are the 110v jumper wire locations. All the outboard components must be rated for 110v. All jumper wires must connect the outboard components receptacles to the White AC block.

For 110v 1.5kw heaters there is an extra jumper wire located on the backside of the control box. Use this jumper wire to connect J11 in the White AC to J32 in the Red AC.

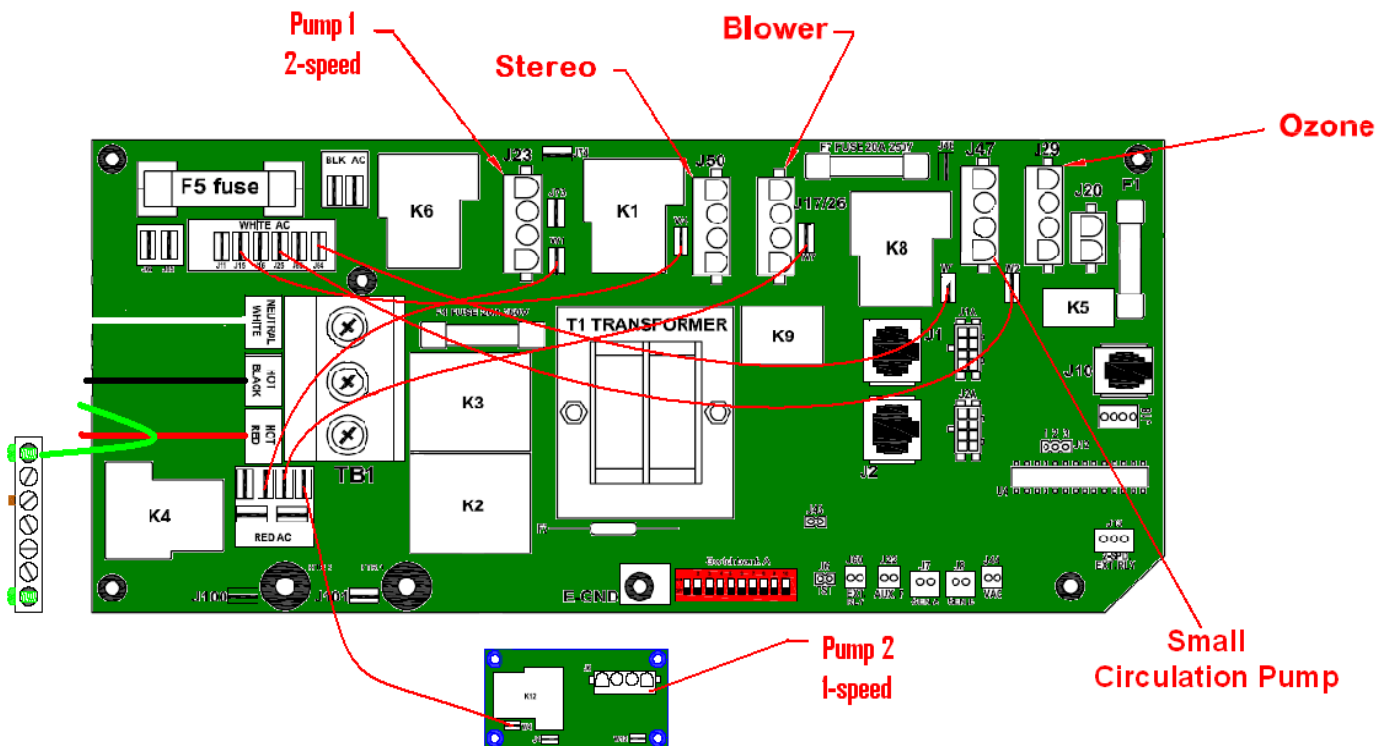


240V SPA JUMPER WIRE LOCATIONS

220v outboard components must have their jumper wires connect to the Red AC block. 110v rated outboard component must have their jumper wires connect to the White AC block. Below is an example of a spa that has both 110v and 220v rated outboard components.

Pump 1, the blower, and pump 2 are all 220v rated and their jumper wires must connect to the Red AC block.

The stereo, small circulation pump, and ozone generator are 110v rated and their jumper wires connect to the White AC block.



VS501 Dipswitch Settings

Up = ON

Down = OFF

<u>Switch #</u>		<u>Action</u>		
1:	Test Mode (normally OFF)			
2:	(modes)	ON: Standard mode only OFF: Standard/ Economy/ Sleep mode enabled		
3:	(control panel)	ON: Mini-oval control panel enabled OFF: Digital or Lite Duplex panel enabled		
4:	Aux Freeze (must be off)			
5 & 9:	Pump 1 speeds and circulation modes			
	<u>5</u>	<u>9</u>	<u>Circ Mode</u>	<u>Pump 1 speed</u>
	OFF	OFF	Non-circ	2-speed
	ON	OFF	circ = low speed	1-speed
	OFF	ON	24 hours, 3 degree	1-speed
	ON	ON	24 hours, 3 degree	2-speed
6:	(amps)	ON: 50Hz OFF: 60Hz		
7:	(button layout)	ON: Requires second control panel OFF: Blower/Pump 2, Pump1, Temp, Light		
8:	(temperature)	ON: Celsius OFF: Fahrenheit		
10:	(low amp) (high amp)	ON: Heater disabled during high speed operation OFF: Heater on during high speed operation		

IMPORTANT

1. Make sure that the ground connections are solid.
2. If you have outboard components that did not come with the pack, **make sure** that they are **grounded** properly (usually a green wire). There are extra grounding and bonding connections on the left side of the control box. The torque range is 27-30 inches per lb.
3. Make sure all electrical components are bonded (usually a bare copper wire) as well as any metal objects within five feet of the spa.
4. Replace the cover on the plastic controller box.
5. Turn the power on at the quick disconnect (if applicable) and the main breaker. Or if you have an 110v operated spa, plug in your GFCI protected power cord and then turn the power on at the main breaker.
6. If the GFCI trips, turn the power off at the quick disconnect and the main breaker and go back and check all of your connections.
7. If the control panel activates please see the laminated 8 ½ X 11" operation instructions that came with your pack and proceed as directed.

PARTS LIST

Contact us at:
1-800-770-0292

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www.HotTubWorks.com

<u>Part Description:</u>	<u>Part Number</u>
<u>Heater:</u>	
240v 5.5kw	B58083
120v 1.5kw	B58083
<u>Copper Heater Straps</u>	B30039
<u>Sensors:</u>	
Hi-limit	B32016
Temperature	B32016
<u>Topside Control Panels:</u>	
Mini Oval (VS501)	B52144
Deluxe Digital (VS510)	B53189-01
<u>Circuit Boards:</u>	
VS501	54357-03
VS510	54372-02
<u>Light Assembly:</u>	
LED Light	2-21089 1-LED27

