

SP400P
Installation & Service Manual



Summary

The SP400P mid range spa pool control system can be installed and configured in many ways for many different pool configurations. Information describing the system, its initial setup options, troubleshooting and after sales service is provided for use by spa pool system integrators and approved service agents.

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1 SP400P System Description

The SP400P spa pool controller is capable of implementing all the features of an intermediate level spa pool up to a maximum system current of 15 or 16Amps.
 (N.B. for Spa Baths use the SP400B controller).

Model	1.5kW Heating Element	2kW Heating Element	3kW Heating Element	Element Style : In Line Tube	Element Style : Heater T	Single Speed Pump Compatible	Two Speed Pump Compatible	Variable Speed Blower Compatible	Single Speed Blower Compatible	Time Clock Compatible	Variable Colour Light Compatible	Single Colour Light Compatible	Mains Lead Fitted	Suitable For Sale In Europe	Max Current Rating
Q400P	■	■	■	■	■	■	■	■	■	■	■	■	■	■	16A
Q400PAU-10	■	■	■	■	■	■	■	■	■	■	■	■	■	■	10A
Q400PAU-15	■	■	■	■	■	■	■	■	■	■	■	■	■	■	15A

The SP400P consists of the following parts.

- SP400P Control Box
- Pool Water Heater (either in line or heater tee model)
- Poolside Touchpad (either oval or rectangular model)
- In Pool Temperature Sensor (optional upgrade)
- Time Control Clock (optional upgrade)



1.1 SP400P Control Box

The SP400P control box contains the main control circuitry and switchgear. It is splash proof while also being vented to allow cooler running and reliable operation. It has waterproof AMP connectors on the outside for connecting pumps, blowers, ozonators etc and other connectors on the inside for connecting the touchpad, in pool temperature sensor, LED light etc. Slots are provided so these cables can enter the splash proof box without being damaged or causing leaks.



1.2 Pool Water Heater

The pool water heater is a separate unit from the control box. It includes a water heating element, an electromechanical over temperature cut-out device and an optical water sensor. It may also include a digital water temperature sensor. The heating element plugs into an AMP connector on the side of the control box and the sensors plug into another connector inside the control box. Only one heater is used, either the heater tee model or the in line model.

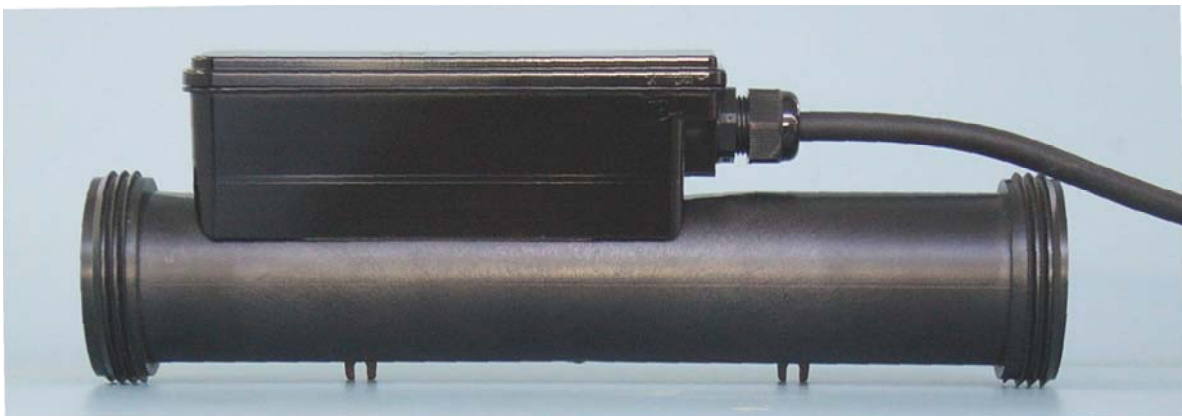
1.2.1 Heater Tee Water Heater

The heater tee water heater comes in 1.5kW and 2.0kW sizes and mounts on top of the spa pump. This model offers backwards compatibility with older Spa-Quip and AMPAC models as well as being good for new pool designs.



1.2.2 In Line Water Heater (check with factory for availability)

The in line water heater comes in 1.5kW, 2.0kW & 3.0kW sizes and mounts in line with the pool's 50mm PVC plumbing. This model's straight through design allows improved water flow rates and it includes a durable flouropolymer coating on the element for long service life.



1.3 Poolside Touchpad

The poolside touchpad provides all the user controls for the SP400P control system. These include buttons for pump, blower and light control as well as temperature settings and other adjustments. A three digit LED display shows temperature readings and various configuration settings. A beeper provides button push feedback and alarm sounds. Only one touchpad is used, either the oval or the rectangular model. Refer to the User's Guide for details of how to operate the touchpad.

1.3.1 Oval Touchpad

The oval touchpad is the default touchpad. It incorporates attractive built in blue LED backlighting for easy night time use and a moulded plastic membrane for good protection from water ingress.



1.3.2 Rectangular Touchpad

The rectangular touchpad is offered as an alternative to the oval model. It is slightly larger and incorporates a welded plastic membrane for good protection from water ingress.



1.4 In Pool Temperature Sensor

The In Pool Temperature Sensor is an optional upgrade over the standard in heater temperature sensor. If an in heater sensor is fitted then the in pool sensor is not required. However, if used, it will give better control over the pool temperature and thermostat cycling operation as well as a more accurate readout of the pool water temperature. It is connected inside the control box.



1.5 Time Control Clock

The Time Control Clock is an optional upgrade which allows the SP400P system to be put into sleep mode at programmed times. This allows the system to be kept silent at night time or power usage to be limited to a controlled time of day for example.



1.6 Additional Loads

The SP400P can control the following additional pool equipment.

- 1 x single speed pump + Aux load (eg second pump or single speed blower)
OR 1 x two speed pump
- Variable speed blower (if Aux load is not fitted)
- Small 24hr circulation pump
- Ozonator (can be wired to be on with the main pump or on 24Hrs per day)
- LED pool light (single colour or variable colour)

1.7 Control Box Model Variations

The design of the SP400P means that all the output sockets are included in every model. Different models are provided with different power supply connections for different markets however. The model numbers are explained below.

Q400PXX-XX

SP400P Spa Pool Controller		Cordset/Voltage	Maximum Total Current Load
	No Suffix	International model 220-240V, no cordset	16A
	UK	United Kingdom model 220-240V, supplied with UK 13A cordset (future)	13A
	AU	Australian / NZ model 220-240V, supplied with AS/NZ 10A or 15A cordset	10A 15A
	JP	Japanese model 200V, no cordset (future)	16A

Currently developed models are as follows (as of July 2006)...

Q400P

Q400PAU-10

Q400PAU-15

Other models are possible. Check with factory for availability.

1.8 Pool Water Heater Variations

There are currently a total of eight different heater options defined for the SP400P. These include heater tee and in line models with varying power ratings and sensors as follows...

Q950151	Heater Assembly SP400P 40mm Heater Tee	1.5kW No temp Sensor
Q950156	Heater Assembly SP400P 50mm Heater Tee	1.5kW No temp Sensor
Q950153	Heater Assembly SP400P In Line	1.5kW Temp Sensor Fitted
Q950155	Heater Assembly SP400P 50mm Heater Tee	1.5kW Temp Sensor Fitted
Q950201	Heater Assembly SP400P 50mm Heater Tee	2.0kW No temp Sensor
Q950203	Heater Assembly SP400P In Line	2.0kW Temp Sensor Fitted
Q950205	Heater Assembly SP400P 50mm Heater Tee	2.0kW Temp Sensor Fitted
Q950300	Heater Assembly SP400P In Line	3.0kW Temp Sensor Fitted

Other feature combinations are possible. Check with factory for availability.

2 SP400P System Configuration Guide

The SP400P Spa Pool control system is designed to be very adaptable. Before commencing system installation, it is important that the pool builder or system integrator understands the capabilities of the SP400P control system in order to put together a system that meets his needs and will give the maximum trouble free operating life.

This involves making several decisions to select the desired components, checking that all the parts will work properly together and ensuring the systems maximum operating current load is within safe limits.

2.1 SP400P System Configuration Checklist

The checklist below is intended as a guide to help the system integrator work through the questions of what equipment is needed to make up the system.

SP400P Spa Pool Controller System Configuration Checklist			
			Tick
1	What model of SP400P Control Box is needed?		
	Consider the target market and the desired maximum current load of the system. Do you need a model with a country specific supply plug or a model that needs to be hard wired but is suitable for many countries (Europe).	Q400P	
		Q400PAU-10	
		Q400PAU-15	
		Other	
2	What type of heater is preferred - Heater T or In Line?		
	Consider need for heater tee compatibility with old plumbing design. Better flow and element coating of in line model.	Heater Tee	
		In Line	
3	What heater rating is needed?		
	Consider target maximum total load, size of pool, type of element (3.0kW available as in line model only).	1.5kW	
		2.0kW	
		3.0kW	
4	What temperature sensor option is preferred?		
	Cheaper and easier in element sensor or better performing in pool sensor.	In Element	
		In Pool	
5	Which touchpad model is preferred?		
	Do you prefer the larger rectangular model or the backlit oval model.	Oval	
		Rectangular	
6	Do you want the optional time control clock?		
	Do you want to control the running times of the spa for silence at night time or time controlled power usage?	Yes	
		No	

7	Is a single speed or two speed main pump required?		
	Consider max total load implications, target market, cost.	1 Speed	
		2 Speed	
8	Is a 24Hr circulation pump wanted?		
	Consider if flow rate is adequate, target market.	Yes	
		No	
9	Is a second single speed pump or blower wanted (Aux load).		
	Main pump must be single speed for this option. Consider target market and whether a variable speed blower would be better instead.	1 Spd Pump	
		1 Spd Blower	
		None	
10	Is an LED light wanted?		
	A Variable Colour Light (SPVCL) can display 12 different colours plus white	SPVCL	
	The Single Colour Light (SPCL).	SPCL	
		None	
11	Is a variable speed blower desirable?		
	Only possible if no single speed Aux load is selected above. (Main pump can be 1 speed or 2 speed).	Yes	
		No	
12	Is a Spa Ozonator desired?		
		Yes	
		No	

2.2 SP400P Maximum Outlet Loadings

Maximum Outlet Loadings	
Ozone socket	220-240V, AC, 50-60Hz, 2.5A
Circ Pump socket	220-240V, AC, 50-60Hz, 2.0A
SPVSB socket	220-240V, AC, 50-60Hz, 7.5A
Aux socket	220-240V, AC, 50-60Hz, 10A
Pump 1 socket	220-240V, AC, 50-60Hz, 10A
Heater socket	220-240V, AC, 50-60Hz, 12.5A

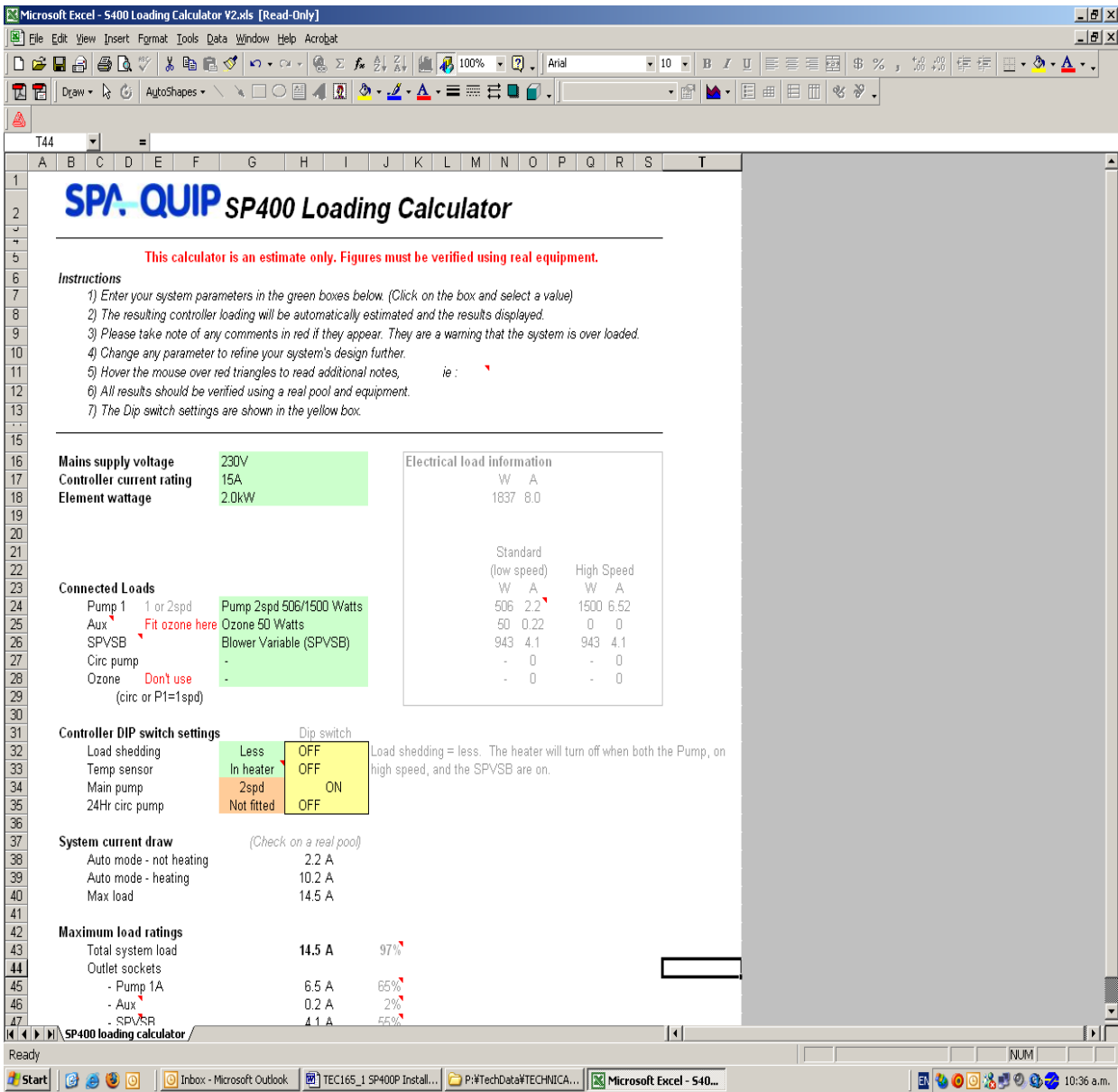
To prevent early system failure the total of the outlet loadings at any time must not exceed the max total load.

Use the loading calculator spreadsheet to check the system in question.

2.3 SP400P Loading Calculator Spreadsheet

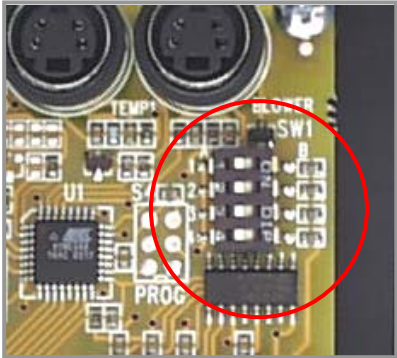
Once the desired equipment is selected it is important to check that the pump and heater ratings used, and the other equipment connected, will not overload the system. A loading calculator spreadsheet is available to help to determine this. To use this spreadsheet you will need the Microsoft Excel (or free OpenOffice Calc) spreadsheet program. To get a copy of the spreadsheet please contact Spa-Quip by email.

To use the spreadsheet simply input the parameters of your designed system in the green boxes. The spreadsheet will then calculate if this is an acceptable combination of loads. If there is a problem you can adjust the loads selected until a suitable combination is reached. A sample of the spreadsheet is shown here for illustration purposes but to get the proper results it must be used on screen.

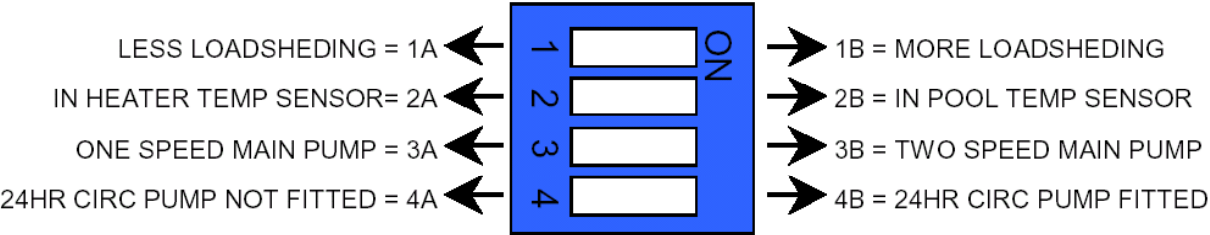


2.4 SP400P Dip Switch Settings

Once the desired range of equipment is selected, the SP400P must be configured to operate correctly with this equipment. This is done by setting the DIP switches inside the control box to the correct settings which match the equipment used. These settings can be worked out with the help of the loading calculator spreadsheet and must be set on every individual SP400P unit used.



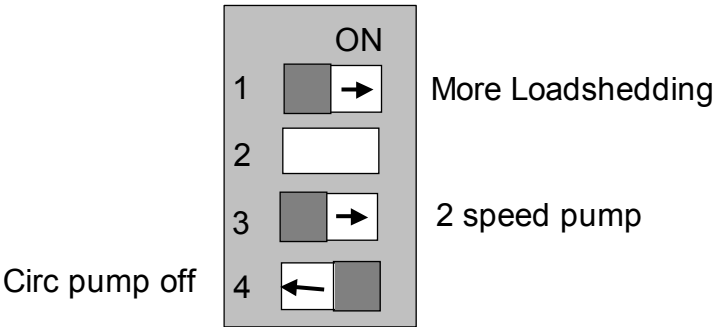
These settings give the SP400P a lot of adaptability and allow the pool builder to use the same model of controller in a range of different spa pool models with quite different configurations. The pool builder must therefore take responsibility for correctly setting these DIP switches to match the actual set up of the system. Refer to the setup guide in



the appendix for more details.

2.5 SP400P with 3kW heater

Care must be taken when installing a 3.0kW heater. The SP400P system is designed as a 15 or 16A max system. The 3.0kW element will draw 12.5A of current (at 240V) leaving only 2.5 or 3.5A for a pump to flow water through the heater tube. For this reason a two speed main pump must be used and the DIP switch settings must be as follows.



The temp sensor can be either in element or in pool (in pool temp sensor recommended). With these DIP switch settings the heater will only operate with the pump in low speed, keeping the system to 15 or 16A max. If any other load is turned on, e.g. blower or pump on high speed, the element will turn off. To be sure, check the maximum current draw with an ammeter.

3 SP400P System Installation

3.1 SP400P Specifications

Specifications	
SP400P control box dimensions	L208mm x W135mm x D91mm
Heater tube pipe diameter	50mm in line element version
Heater T pipe diameter	50mm "T" element version
Heater pressure, max (head of water)	300kPa (30m)
Temp – max controlled	41.5°C
Temp – thermal cut out	50°C +/- 3°C
Temp – max ambient	40°C
Mains cord length	5m (AS/NZ cord)
Rectangular Pool side touchpad – face	118mm x 65mm x 6mm
Rectangular Pool side touchpad – body	92mm x 40mm x 17mm
Rectangular Recommended switch hole	See diagram in section 3.5.2
Oval Pool side touchpad - face	112mm x 49mm x 4mm
Oval Pool side touchpad - body	88mm x 22.5mm x 19mm
Oval Recommended switch hole	See diagram in section 3.5.1
Switch lead length	3m
Supply requirements (Max total loading)	
SP400Pxx-10 models	220-240V, AC, 50-60Hz, 10A
SP400Pxx-15 models	220-240V, AC, 50-60Hz, 15A
SP400P (international model with no cordset)	220-240V, AC, 50-60Hz, 16A

3.2 General Installation Instructions

3.2.1 Plumbing

1. The in line heater element should be plumbed so the water flows past it from left to right when horizontally mounted (water sensor at left hand end) and bottom to top when vertically mounted. **IMPORTANT:** If mounted vertically, the water sensor **MUST** be at the top.
2. The heater T style element should only be mounted horizontally, mounting vertically could lead to problems from air locks at the element boss.
3. When connecting pipework to the heater make sure the 'O' rings are properly seated in the mac union fitting. Hand tighten only. Using tools will distort the fittings. Care must be taken to ensure that all joins are inline, otherwise leaks may occur.
4. Make sure the controller is mounted securely so that vibration is minimised. Mounting to the spa can be made by either cable ties to frame or screws.
5. It is recommended that the pipework has shut off valves so the heater and pump can be removed for service without loss of water.
6. Pressure test the installation to check for leaks.
7. Support all pipework to prevent sagging and to prevent movement when pumps turn on or off.
8. Insulate all pipework to decrease heat loss.

3.2.2 Electrical

1. The spa pool must be connected to a suitable weather protected supply, equipped with a double pole isolating switch, which is of the correct rating and complies with the local wiring regulations. When installing refer to your local wiring code. In particular refer to ECP2 and ECP25 (AS / NZ). Or EN 60364-4-1 and EN 60364-7-1 (EU). The system must be installed in such a way that live parts are not accessible by a person in the pool.
2. Ensure the system is protected by an RCD that meets AS/NZS 61008 or EN61008-1:1995 standards.
3. It is recommended that signal and power wiring be separated to prevent interference and that the unit is supplied from a dedicated power circuit.
4. Loop wires before they enter the unit to prevent water running down them and into the unit.
5. Check all connections are correct and tight.
6. Check that the unit and supply are not overloaded. Use the loading calculator for details.

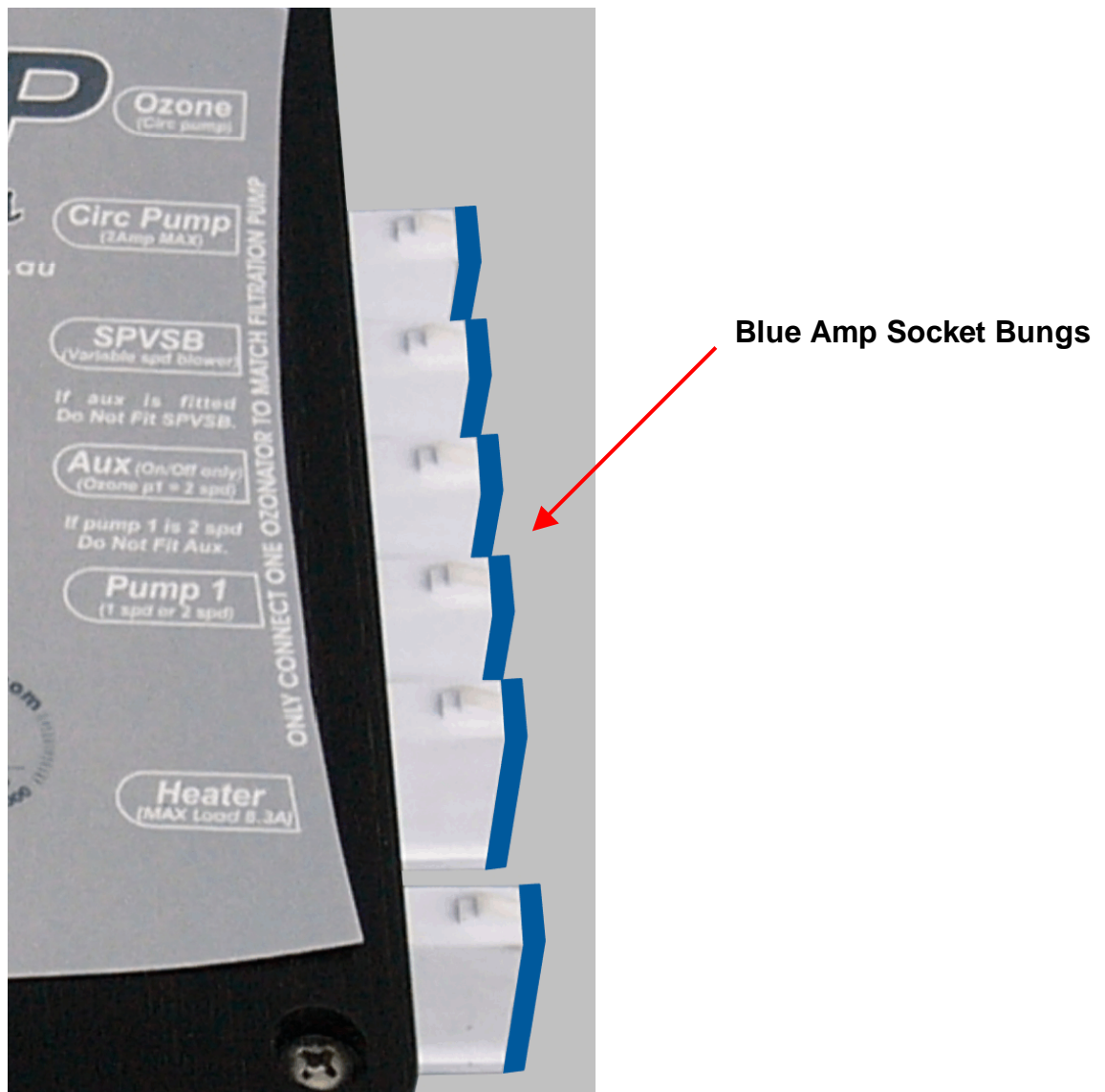
3.3 SP400P Control Box

The SP400P control box should be mounted under the skirt of the spa in a position where it will be easily accessible for the connection of loads etc to the external AMP connectors and internal connectors. External mounting flanges are provided so it can be screwed to a suitable piece of timber work or tied to an upright using large plastic cable ties. Ensure the box is securely mounted so it will not vibrate in transit or in use.

For best water ingress protection and vent operation the box should be mounted vertically with the main lid label readable the right way up, the AMP connectors on the right and low voltage cable entries on the left.

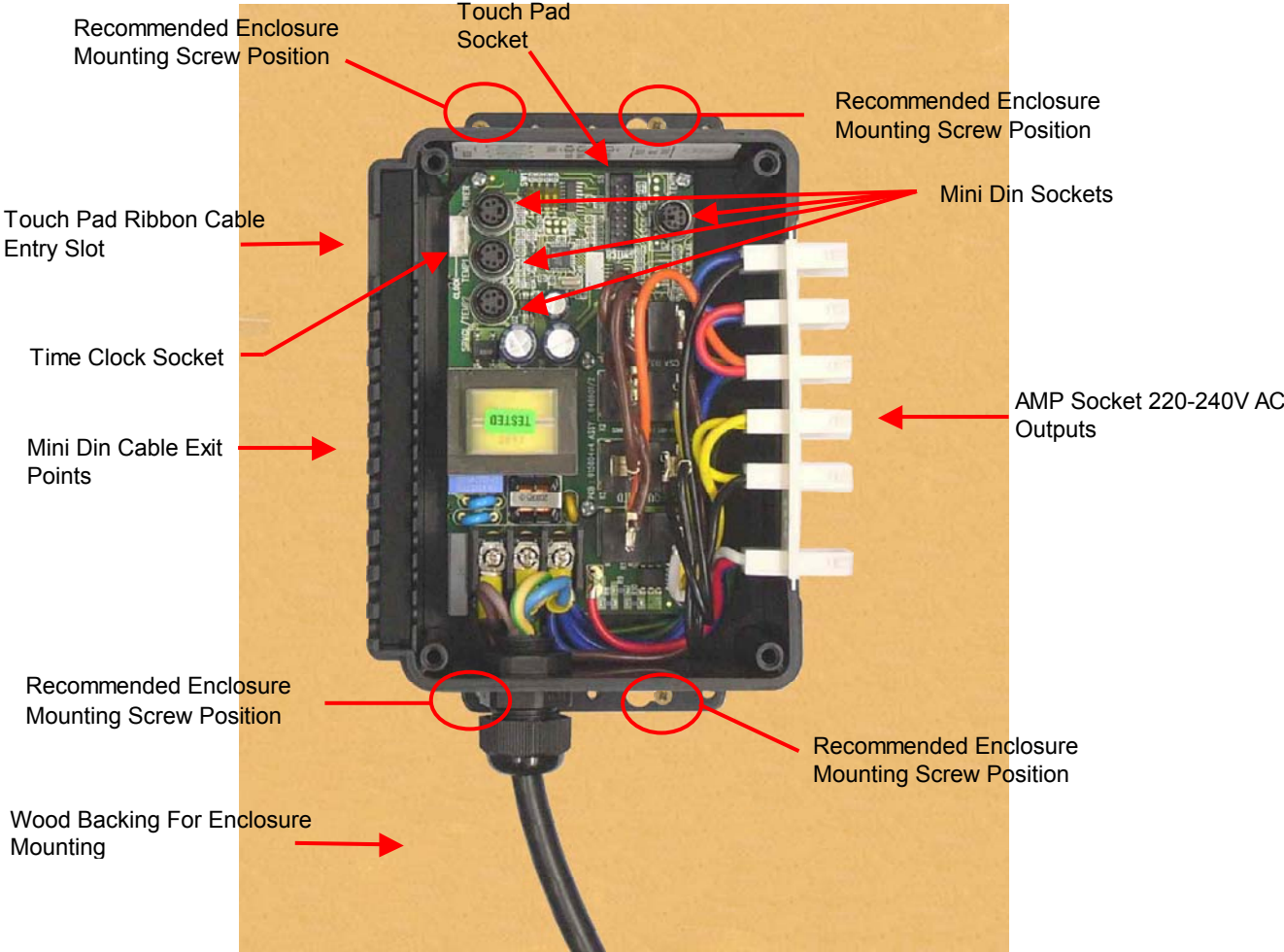
When installing and configuring the system, the pool equipment must all be correctly connected to this control box and the correct DIP switch settings selected inside the control box to match the connected equipment.

All 220-240Vac equipment is connected to the external AMP connectors, e.g. pumps, blowers & ozonators. These connectors are waterproof and allow a lot of connections to be made in a small space. AMP connectors which are not used should have a blue bung fitted to keep them waterproof.



All low voltage equipment is connected to the sockets provided inside the control box, eg touchpad, in pool temperature sensor & LED light. In order to connect these, the lid must be removed using a Philips screwdriver. Slots are provided in the edge of the box for the cables to pass through safely while maintaining the splash proof nature of the box. Take care when replacing the lid that the cables are correctly located in the slots. Note that there are different sized slots so choose ones which best fit the cables.

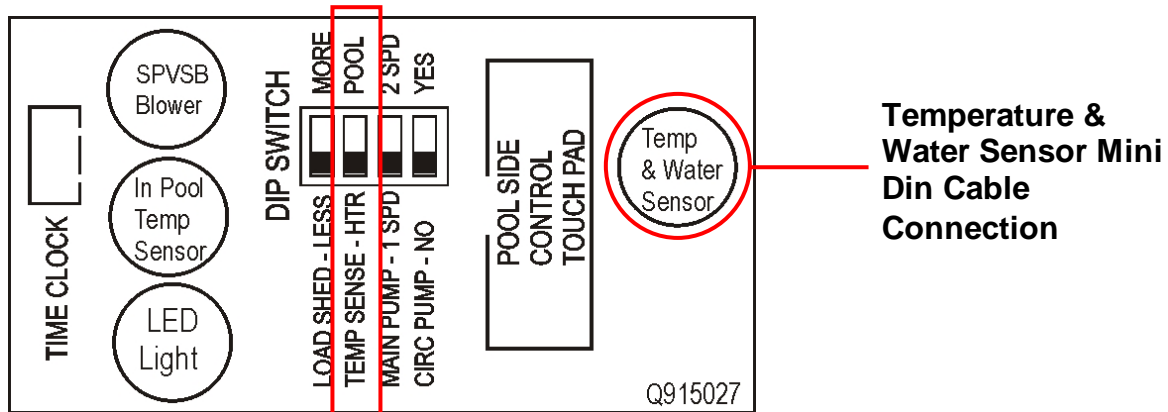
It is important that the power to the SP400P be disconnected when connecting or disconnecting any peripheral equipment to reduce ESD or transient damage to the equipment and also to reduce the risk of electrocution.



3.4 Pool Water Heater

The heating element power cable plugs into the AMP connector marked "Heater" on the side of the control box and the sensor cable plugs into the 6 way mini DIN connector labelled as "Temp & Water Sensor" inside the control box. The "TEMP SENSE" DIP Switch must be set to "HTR" when using the in heater temperature sensor.

3.4.1 Heater Tee Water Heater



The heater tee mounts on the top (outlet) of the pump and the water heater mounts inside the heater tee. The plumbing should be such that the heater is below the normal level of the pool water and there is not a high point at the heater so that the heater will remain flooded with water and air cannot collect in the plumbing at the heater.



3.4.2 In Line Water Heater (check with factory for availability)

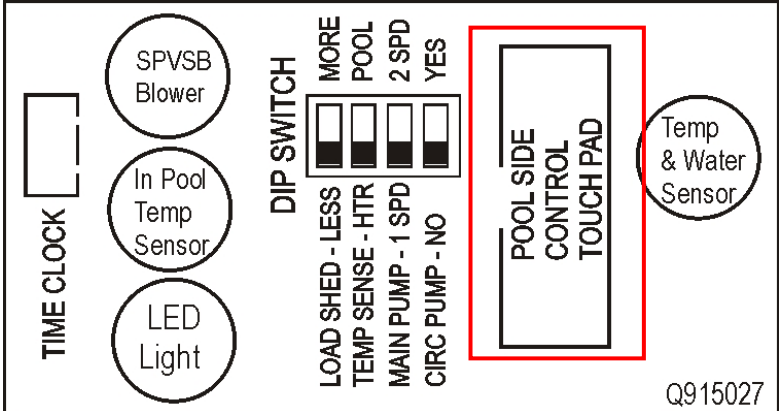
The in line water heater mounts in line with the pool's 50mm PVC plumbing. It can be in the inlet or outlet line of the pump and can be mounted horizontally (preferred) or vertically. When mounted horizontally it should be plumbed so that water enters at the water sensor end (short end) and exits from the other end (long end). Again it should be plumbed so it remains flooded and air cannot collect at the heater. When mounted

vertically it should have the water sensor end (short end) uppermost and must be plumbed so that water enters at the bottom and exits from the top. This should ensure that it remains flooded and air cannot collect at the heater.



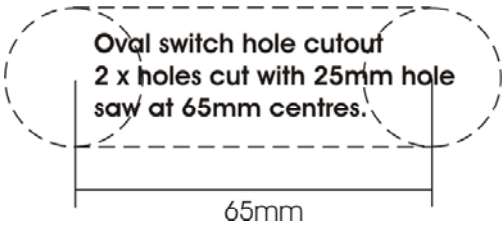
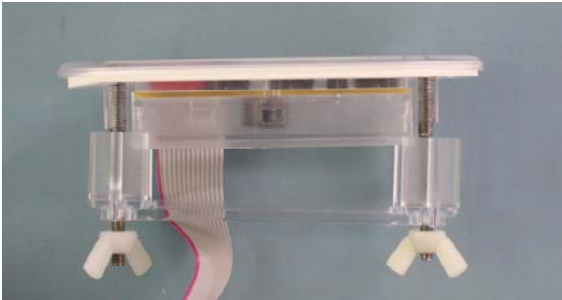
3.5 Poolside Touchpad

The poolside touchpad cable plugs into the 14 way rectangular connector inside the control box labelled “POOLSIDE CONTROL TOUCHPAD”.



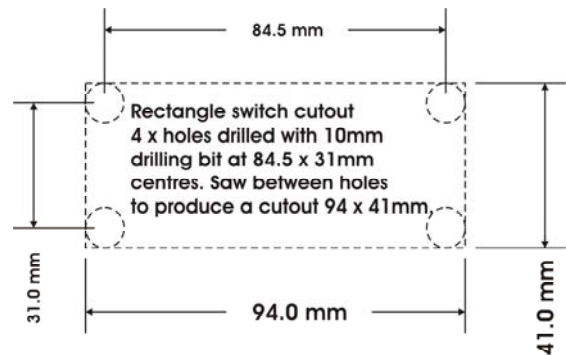
3.5.1 Oval Touchpad

The recommended cut out size for the oval touchpad is shown below. The touchpad is secured by the supplied sticky foam gasket and/or the rear mounting bracket. Peel the protective paper from the gasket before fitting the touchpad in the hole and pressing down. Optionally secure the touchpad by fitting the rear mounting bracket over the two long screws and holding in place with the two wingnuts.

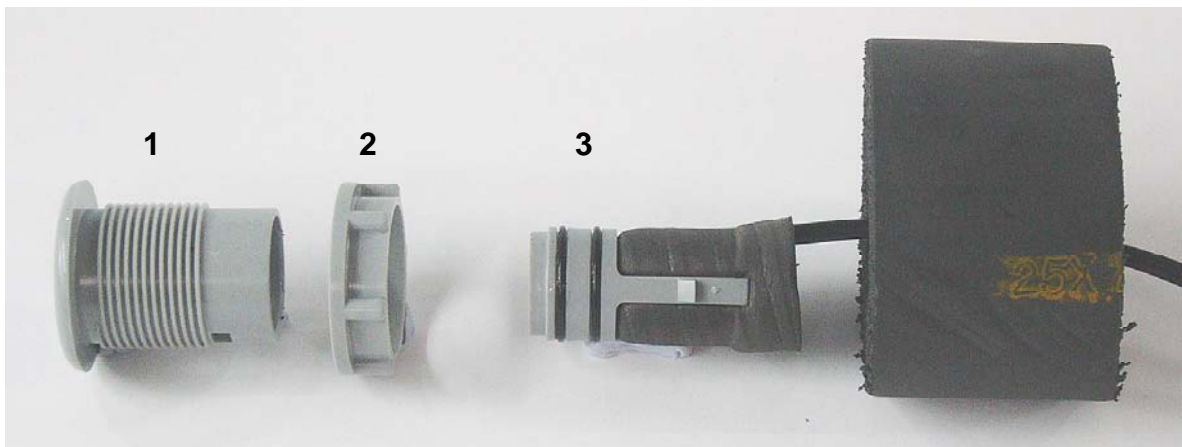


3.5.2 Rectangular Touchpad

The recommended cut out size for the rectangular touchpad is shown below. The touchpad is secured by the supplied sticky foam gasket. Peel the protective paper from the gasket before fitting the touchpad in the hole and pressing down. Alternatively seal the touchpad in place using silicone sealant.



3.6 In Pool Temperature Sensor

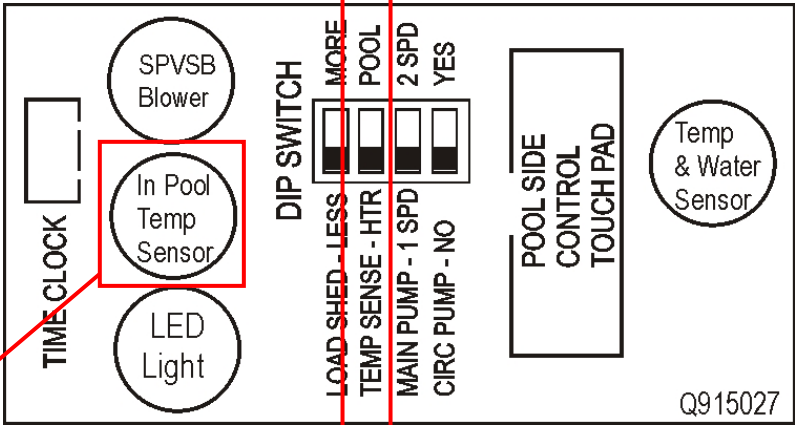


The in pool temperature sensor fits in the body (number 1 in the diagram) which mounts into a 35mm hole in the pool shell and is secured with the locking (2). Use silicone or similar for a water proof seal. Slide in the sensor slug (3) into the body. There should be enough silicone grease to make it water tight. It is important that the foam plug is pushed as far as it will go into the body. Fit the large foam insulation over the entire assembly. The finished installation should look like the picture on the right, with the sensor insulated from the underskirt ambient temperature. This will help give an accurate measurement of the water temperature.

The in pool temperature sensor cable plugs into the 4 way mini DIN connector inside the control box labelled "In Pool Temp Sensor".



Note that only one temperature sensor should be connected, either an 'in-heater' temp sensor or an 'in-pool' temp sensor, but not both at the same time. The "TEMP SENSE" DIP Switch must be set to "POOL" when using the in pool temperature sensor.

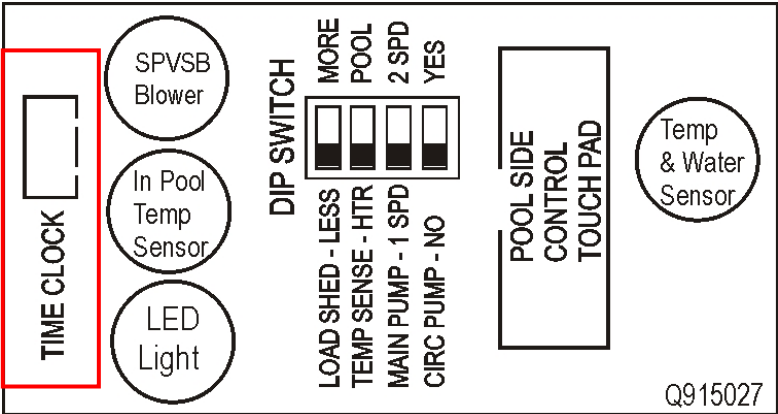


In Pool Temperature Sensor Mini Din Cable Connection

3.7 Time Control Clock

The Time Control Clock mounts under the spa in a convenient location next to the SP400P control box. It can be mounted with two screws to a convenient piece of timber work.

The Time Control Clock cable plugs into the 4 way connector labelled "TIME CLOCK" inside the control box.

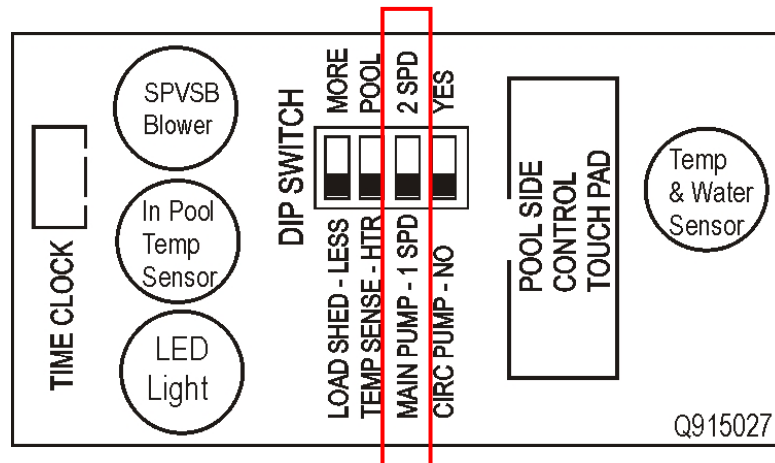


3.8 Additional Loads

The main additional loads are pumps, blowers and ozonators which are connected to the AMP connector outlets on the side of the control box. Some loads also connect to the internal low voltage connectors inside the control box.

3.8.1 Pump 1

Pump 1 can be either a 1 speed pump or a 2 speed pump and must be connected to the AMP socket marked "Pump 1 (1 spd or 2 spd)". Either pump will use the same AMP outlet. The "MAIN PUMP" DIP switch must be set according to the type of pump fitted. This pump should be plumbed to feed the pool's jets and circulate water through the heater, filter and ozone injector (if fitted). (Unless a 24Hr circ pump is used – see below).



3.8.2 Aux Pump or Blower (Single Speed)

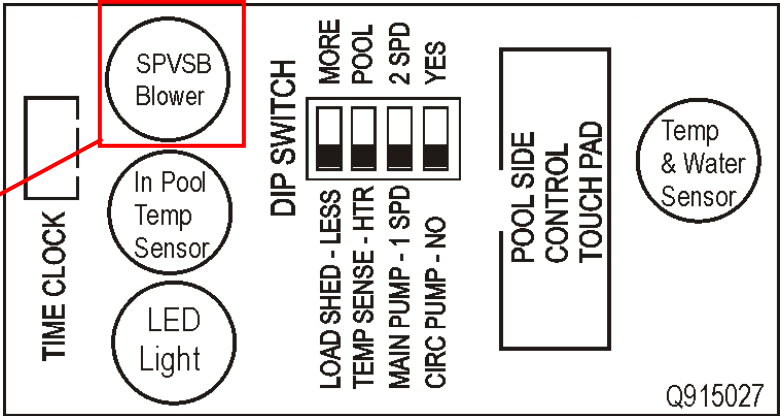
If a 2 speed pump is used as Pump 1 then the single speed Aux load can't be used. A variable speed blower can still be used however (see below).

If a 1 speed pump is used as Pump1 then a single speed Aux load is optional and can be a single speed pump or blower or other mains load suitable for on/off control. It must be connected to the socket marked "Aux (On/Off only)". This pump or blower should be plumbed to feed jets or injectors as desired. When installing blowers, follow the blowers installation guide to ensure enough air flow is maintained and no water can get into the blower.

3.8.3 Variable Speed Blower (SPVSB)

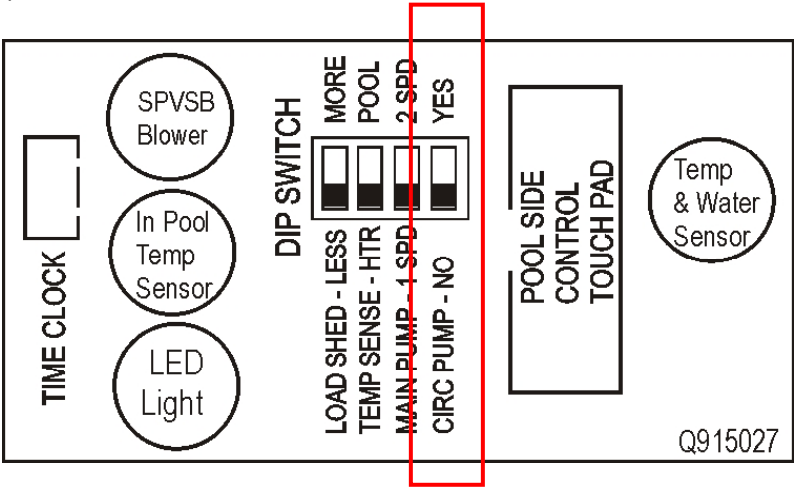
If a single speed Aux load is fitted (see above) then no variable speed blower can be used. Otherwise a variable speed blower is allowed. It must be connected to the AMP socket marked "SPVSB (Variable spd blower)". This socket is always powered (except when in an error condition) and so can only be used for a Spa Power Variable Speed Blower (SPVSB) the control cable must also be plugged in to the Mini Din connector in side the control box labelled "SPVSB Blower". This blower should be plumbed to feed injectors as desired. When installing blowers, follow the blowers installation guide to ensure enough air flow is maintained and no water can get into the blower.

Spa Power Variable Speed Blower Mini Din Connection



3.8.4 24Hr Circ Pump

A small circulation pump can be installed which will circulate water through the heater, filter and ozone injector (if fitted). It must be connected to the AMP socket labelled “CIRC PUMP (2 Amp MAX)”. This will be used instead of Pump 1 to automatically heat and filter the pool water. If this pump is installed, the “CIRC PUMP” DIP switch must be set to yes (fitted).



3.8.5 Ozonator

The ozone operation and connection is dependent on the pump option selected to circulate the water for normal temperature and filtration maintenance. The options are 24Hr circ pump, 1 speed main pump or 2 speed main pump.

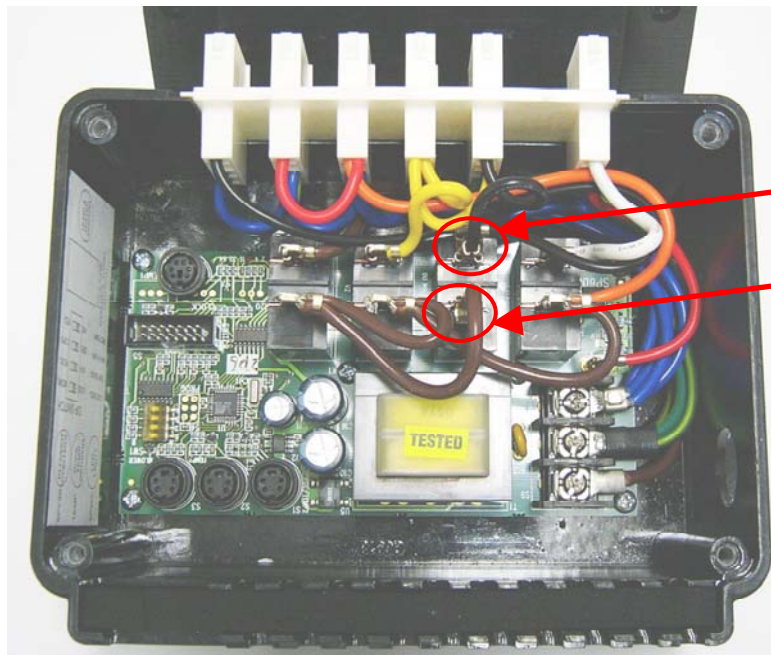
Use the table to see where the Ozonator should be connected.

Pump 1	One Speed		Two Speed	
Circ	None	Fitted	None	Fitted
Fit Ozonator to this socket	Ozone (Circ pump)	Ozone (Circ pump)	Aux (On/Off only) (Ozone P1=2spd)	Ozone (Circ pump)

NB: An internal wiring change is needed for use with 24Hr circ pump (see over page).

3.8.5.1 Ozone with 24 Hr Circ Pump

If a 24Hr circ pump is used the Ozonator must be connected to the outlet labelled “OZONE (Circ pump)”. However this outlet is normally configured for use with a single speed pump 1 (see below). To make this outlet work correctly with a 24Hr Circ Pump the connection of the ozone phase wire must be changed to make the “OZONE (Circ pump)” outlet run 24hrs so the Ozonator is on when the 24Hr circ pump is operating. The photo below shows the wiring change to make the ozone output active 24hrs.



Move black wire from here

To here to make ozone output active 24hrs

3.8.5.2 Ozone with 1spd Pump 1

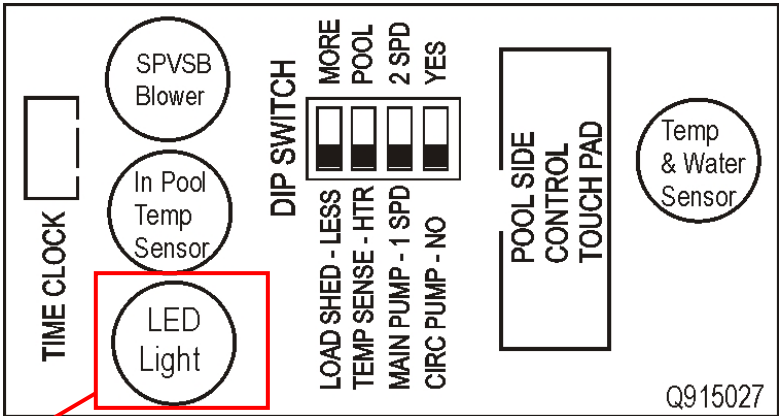
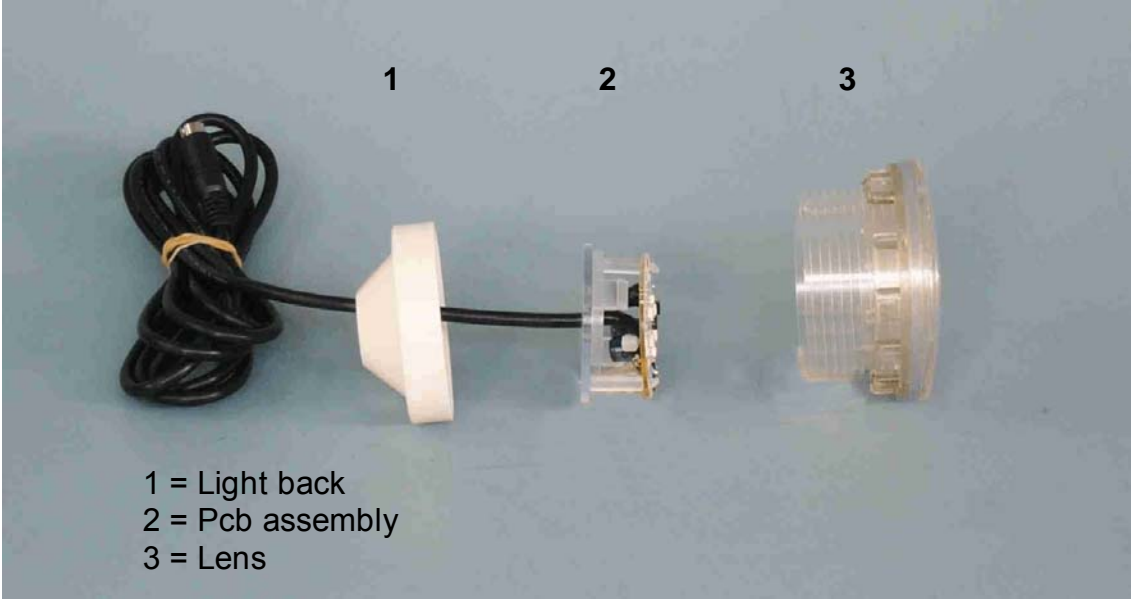
If a single speed pump is installed as Pump 1 and there is no 24Hr circ pump installed, then the Ozonator must be connected to the outlet labelled “OZONE (Circ pump)”. The Ozonator will then come on when pump 1 is running, as it does automatically for temperature and filtration maintenance. This outlet is normally configured for use with a single speed pump 1 so no wiring change should be necessary. If the wiring has already been changed for 24Hr circ pump use, as described above, then the black wire will need to be moved back.

3.8.5.3 Ozone with 2spd Pump 1

If a two speed pump is installed as Pump 1 and there is no 24Hr circ pump installed, then the Ozonator must be connected to the outlet labelled “Aux (On/Off only) (Ozone P1 = 2 spd)”. This outlet will activate the Ozonator when the two speed pump is running on low speed, as it does automatically for temperature and filtration maintenance.

3.8.6 LED Light (single colour light (SPCL) or variable colour light (SPVCL))

The LED Light cable plugs into the 4 way mini DIN connector inside the control box labelled "LED Light". Only one LED light can be connected at any one time. The controller will detect if a light is fitted and whether it is a single colour or variable colour model. It will automatically configure its operation to suit so no DIP switch setting is necessary.

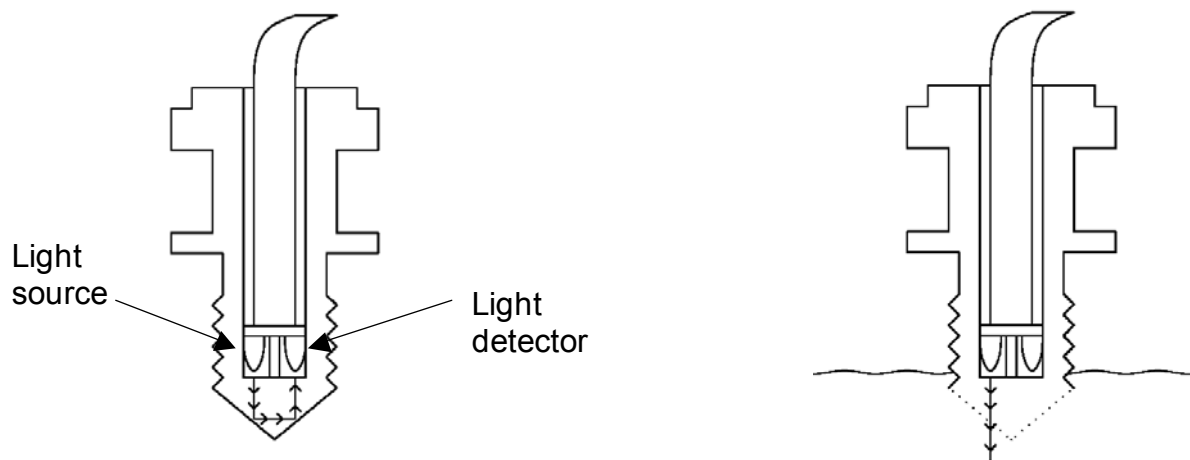


LED Light Mini Din Cable Connection

4 SP400P System Components Explained

4.1 Water Detection

A water detection system is used to tell the controller when the heater tube is flooded with water and therefore when it is safe to turn the element on. Water detection is achieved by optical means, where an optical bolt (water sensor) is mounted in the element assembly. Inside the optical bolt is a light source and a light detector.



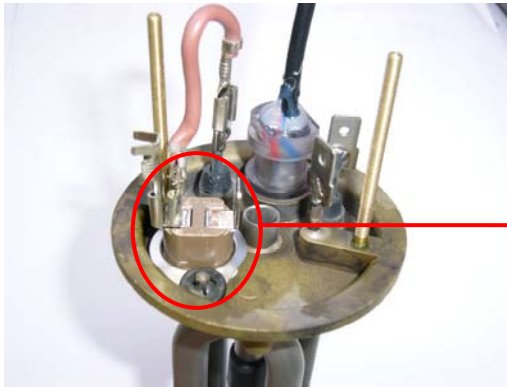
When the tip of the optical bolt is surrounded by air, the light emitted by the light source is reflected back to the light detector as the tip acts like a mirror.

The mirroring effect of the tip is lost once submerged and the detector receives no light.

The optical bolt has many advantages over traditional pressure switches and flow switches; there are no moving parts or adjustments required. Once installed, it is very robust and offers a long service life. The optical bolt is also less sensitive to collecting hair and debris. However care must be taken to ensure that air is not trapped in the heater tube during normal operation. This is especially important when low flow rate pumps are used (e.g. low flow 24Hr circulation pumps), as they may not produce sufficient water flow to clear air from the heater tube. See the 'Circulation pump' section for more information.

The water sensor is connected to the SP400P PCB. Additional circuitry is included on the PCB to check that the water sensor is connected and is functioning correctly.

4.2 Thermal Cut-out



Klixon

Each SP400P heater assembly contains a thermal cut-out device (also known as a klixon). It is an electro-mechanical device that acts as a switch. When heated above 50°C (+/-3°C) it switches off, disconnecting the heater element. When it cools below 38°C it switches on and reconnects the element. It is tightly coupled (thermally) to the brass element boss so that the element will be switched off if it gets too hot.

There is also an associated electronic detection circuit that is used to sense if power is getting to the element. If the thermal cut out has operated this circuit will sense a lack of power at the element and the controller will fault with Error 6. The controller will not attempt to recover from this condition. It will need to be reset by pushing the UP, DOWN & PUMP buttons simultaneously to clear the fault once the thermal cut-out has cooled below 38°C and automatically reset.

4.3 Temperature sensor



The SP400P heater normally comes with a temperature sensor built into the element assembly which communicates with the controller via a data link. It is housed in a tubular pocket that extends into the heater's water flow. The temperature sensor is sealed into the pocket and connects to the SP400P PCB. This sensor configuration is known as 'in-heater' temperature sensing.

'In-heater' temperature sensing is the most convenient method of sensing the pool's water temperature as it is built into the controller, however it is not the most accurate. It will generally provide good temperature regulation of the pool if used in conjunction with a high flow rate pump and good pool insulation.

A large hysteresis is required if an In Heater sensor is used. Here the pump and element are turned on when the sensed temperature is below the target temperature by the hysteresis amount and turned off when up to temperature. A large hysteresis is required because the water in the heater will cool down when the pump is off at a different rate to the main body of water in the pool (generally much faster). If the pipe work is poorly insulated the system can cycle rapidly (thermally) resulting in the pump & element turning on and off frequently thus shortening equipment life and irritating the user. If the pipe work or pool cabinet is well insulated, the heater does not cool down much below the pool temperature and can result in poor temperature control of the pool.

A better method exists. It is called 'in-pool' temperature sensing. In this method a temperature sensor is mounted in the pool shell so that it is able to directly sense the pool water temperature. This is a far more accurate method of detection and allows the use of tighter hysteresis in the temperature control software. It is much less affected by differing insulation designs and ambient temperatures.



'In-pool' temperature sensors use the same digital temperature sensing device as the 'in-heater' sensors. For accurate sensing of the pool water the digital sensor in the 'in-pool' sensor needs to be tightly coupled (thermally) to the pool water and insulated from any other ambient temperature effects i.e. under skirt ambient. This is achieved by mounting the sensing device to a stainless steel disk and then packing the case of the sensor with insulation. Additional closed cell foam insulation (supplied) must then be placed around the sensor when mounted in situ. Note It is recommended that the in pool temperature sensor be mounted mid way up the spa wall, mounting it in the foot well may cause faster cycling.

4.4 Spa Power Variable Colour Light (SPVCL)

All SP400P controllers can operate one 'Spa Power Variable Colour Light' (SPVCL) . Utilising the latest in efficient LED lighting technology, the SPVCL offers long life and a range of vibrant colours to make any pool look stunning. The SPVCL is controlled via the controller's poolside touchpad. Installation is as per a standard 2.5 inch pool light.

Features

- Energy efficient design. Maximum 12V power drawn is approximately 1W.
- Light output exceeds that of a typical 9W bulb using filter lenses
- Typical LED life of 50,000hrs to 100,000hrs compared to a normal incandescent bulb life of between 5,000hrs to 10,000hrs
- At end of life LED light still works but is half as bright
- Energy efficient design means the SPVCL runs far cooler than a normal bulb
- Perfectly matched primary colours support smooth colour mixing



4.5 Spa Power Single Colour Light (SPCL)

For an alternative lighting option, a blue or white coloured light is available. This will install and operate in the same way as its variable colour cousin.

4.6 Spa Power Variable Speed Blower (SPVSB)

SP400P controllers can control one 'Spa Power Variable Speed Blower' (SPVSB). The SP400P will automatically sense that a SPVSB has been connected and will make the variable speed functionality available on the touch pad.

The cleverly designed SPVSB has been produced to accompany the latest Spa Power range of controllers. It contains all the required speed control circuitry and simply plugs into a controller for both power feed and speed control. The SPVSB is then controlled via the controller's poolside touchpad, and the user can control the airflow in the pool simply by pressing a button.



The SPVSB is then controlled via the controller's poolside touchpad, and the user can control the airflow in the pool simply by pressing a button.

SPVSBs are available in two models: with or without a fitted power supply. Those without (Q5602-XXX) are intended for use only with a Spa Power controller. Whereas those with a power supply (Q5603-XXX) can be used either with a controller or in a stand-alone configuration with their own dedicated touchpad

4.7 Circulation Pump

The use of small circulation pumps that run for long periods of time with low flow rates is becoming more common in the spa pool industry. These pumps are used to circulate water through the pool's filter, heater and ozone systems and offer low power usage and silent operation. They are generally between 80W and 375W and have flow rates of up to approx 200l/m.

The SP400P controllers have been designed to operate in conjunction with small circulation pumps but care must be taken to ensure that the following points are considered.

1) Air must not collect in the heater tube or heater Tee.

The water detector may sense any air trapped in the heater tube or heater T, causing the controller to think the heater is empty and resulting in it faulting with 'Err 1 Prime Failed'. Also froth in the heater tube may still activate the water sensor while failing to cool the element boss, resulting in thermal cut-out operation (Error 6).

2) There must be sufficient water flow through the heater tube or heater Tee.

If the water is not flowing through the heater tube fast enough then the heat energy will build up in the water and element boss. This will lead to large temperature rises and at worst case will cause the thermal cut out to activate. This will lead to an Error 6 condition and the controller will beep. The controller will need to be reset by pushing the UP, DOWN & PUMP buttons simultaneously to clear the fault once the heater tube water temperature has dropped below 38°C. The thermal cut out will automatically reset below this temperature.

The thermal cutout is set to operate at 50°C +/- 3°C. This gives a maximum allowable element boss temperature of 47°C. If the pool is set to 41.5°C there is room for a maximum water temperature rise of 5.5°C. From this requirement the pump must be carefully matched to the size of the element. If the pump is too weak, the unit may fail under thermal cutout condition (Er6).

Heating water with low flow rates may cause the layer of water in contact with the element to boil. As the water boils it changes state and produces bubbles. These bubbles must be able to escape from the heater tube or they may gather and finally be detected by the water sensor causing a no water error.

Due to the temperature rise caused by low flow rates, it is advised that an 'in-pool' temperature sensor be used. This will provide the required accurate temperature control of the pool.

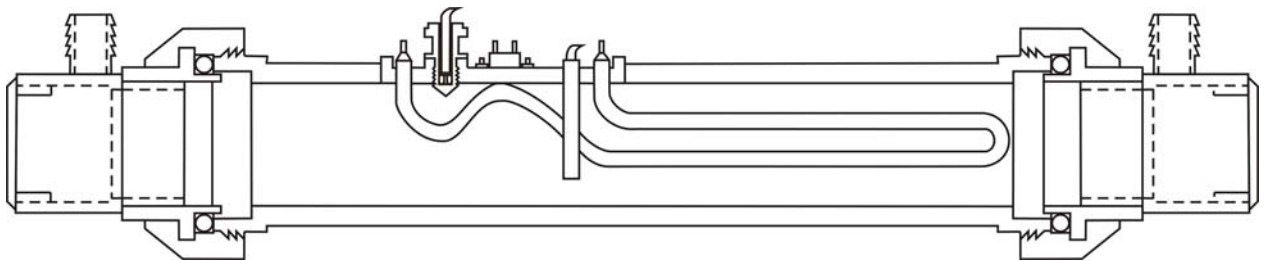
When using an injector to introduce ozone gas into the circulation pump's water circuit, it is necessary to consider the water flow rates, both in the heater tube and the ozone injector. It is also important to situate the injector 'down stream' of the controller for air bubble reasons. See 'Ozone systems' for more detail. In order to maintain sufficient water flow it is recommended that an injector bypass system be implemented.

4.8 Plumbing for Circulation Pumps

It is essential that no air bubbles can collect in the heater tube.

The following plumbing configurations have proven to be helpful.

- Mount the controller on a slight incline so that the water outlet is raised. This will aid the air to flow out of the heater tube.
- Plumb the controller with 45° or 90° 50mm elbows (facing up) then step the pipe down to the required diameter or plumb 50mm water manifolds into unions as shown below.



Other circulation pump tips

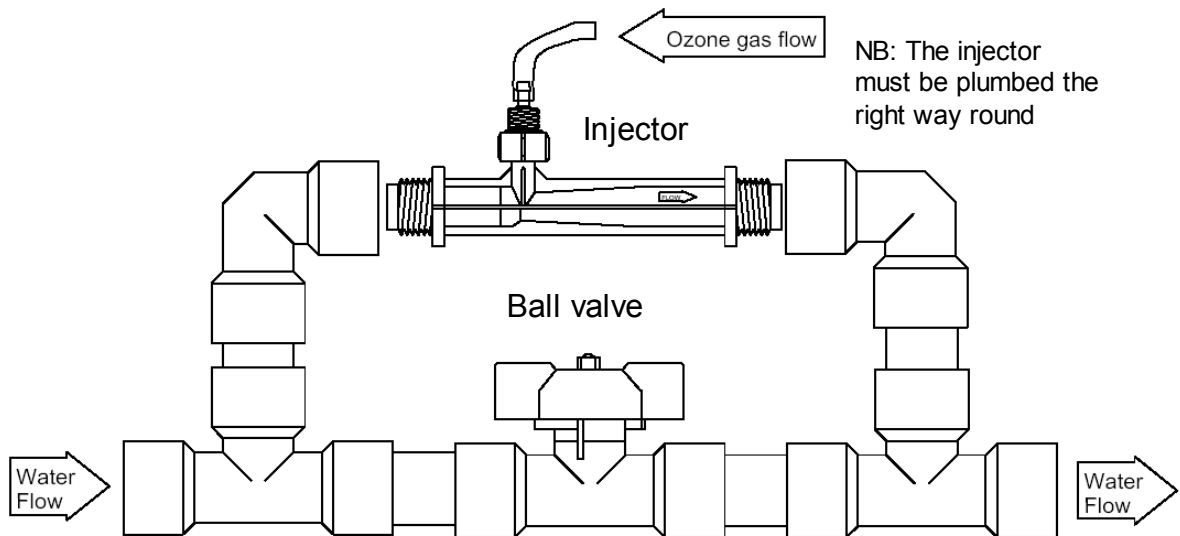
- Circulation pumps are designed for low flow rates so they have small impellers that are easily blocked. Be careful not to allow debris to enter the pump when changing a filter or use the pump without a filter.
- Due to low flow rates, it is recommended that a skimmer type spa filter be used to allow the pump to remove floating matter from the pool's surface.
- Make sure the pump is not starved for water flow as cavitation and/or air locking can occur.

4.9 Ozone Systems

All SP400P controllers are equipped with a choice of ozonator outlet sockets. The correct socket must be used to ensure that the ozonator comes on when the appropriate pump is running. This will provide ozonation of the pool water during the filtration period.

Ozone background information

- Ozone does not affect the pH balance.
- Ozone reduces total dissolved solids in water.
- Ozone helps to reduce the amount of chemicals required to treat a pool.
- Ozone kills bacteria, viruses, cysts, yeast, moulds, and mildew.
- Ozone is a gas that is generated from fresh air and is dissolved into the pool water.
- Ozone has more oxidising potential than chlorine gas and bromine.
- Ozone can be generated by UV light or corona discharge (CD). Corona discharge uses a high voltage to produce a spark. Generally CD ozonators produce more ozone than UV ozonators. Both types have a limited service life.



When using an injector to introduce the ozone gas into the water, it is recommended that a water by-pass be used in parallel with the injector. See diagram above. A by-pass will allow the water flow rate through the injector to be tailored (by adjusting the ball valve) so that the correct ozone gas flow and therefore gas to water mixture is delivered. It will also ensure the water flow rate through the heater is maximised. Refer to your ozonator's installation instructions for more information.

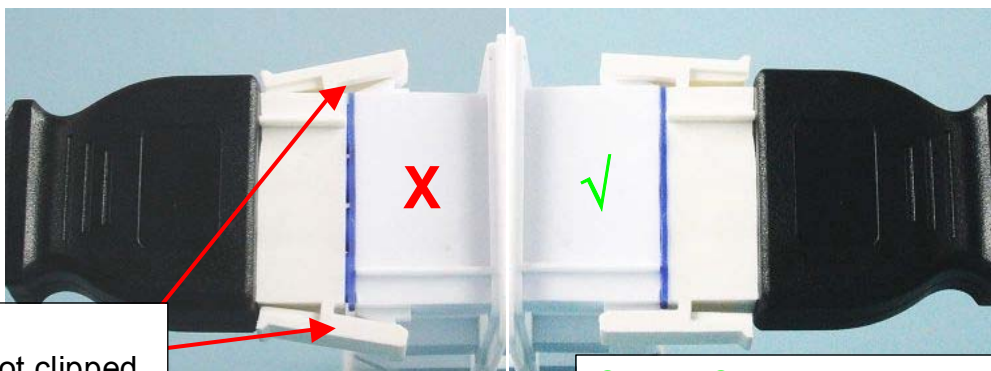
The best use of any generated ozone gas, is to dissolve it into the water and try to keep it dissolved in the water as long as possible.

Tips:

- A low water flow rate through the injector produces a low gas flow rate and results in higher ozone gas concentration and better ozone absorption into the water.
- Also a low injector water / gas flow rate produces small fine bubbles that are suspended in the water. This is better than large bubbles that rise straight to the pool's surface and let the gas escape.
- Ozone production is dependant on the condition of the air fed into the ozonator. Try to keep the air clean, dry and cool. Try to pipe the air into the ozonator's input from outside the spa shell.
- Be careful of ozone when in the gaseous state as it will damage unsuitable plastics very quickly.
- Ozonators (UV and CD) have a service life. This can be prolonged if they are not used 24hrs a day. Most CD systems producing 50mg/hr of ozone gas need to run for about 4-8hrs per day at most to treat the water.
- Some ozonators require a minimum air flow rate to cool the ozone unit. Refer to your ozonator's instructions for more detail. Some ozonators require the injector to produce a slight suck when blocked off with a finger whereas others require a specific flow rate that can be estimated by timing the injector sucking water out of a bottle.

4.10 AMP Plugs

All SP400P controllers are fitted with AMP style connectors. All peripheral equipment can be ordered with AMP cordsets for use with these controllers. Each cordset will have an identifying label on the side. It is important that the locking mechanism is engaged on the AMP plug to secure the connection and to protect against mechanical vibration and water ingress. The plug is pushed home and the plastic tabs engage onto the socket as shown on the right. All plug and socket pairs should have a silicone gasket seal to protect against water and any socket without a plug should have a bung as shown in the picture on the right.



INCORRECT
Locking arms not clipped
into securing tabs

CORRECT
Locking arms locked into socket

5 Diagnostics

The SP400P controller has extensive self-diagnostic capabilities. In the event of a problem it will sound an alarm (beep) and indicate an error number according to the nature of the problem. Pushing the Air/Aux button will mute the alarm but if left alone it will stop after four minutes. The error numbers and their meanings are listed below.

5.1 Error 1 (H2O) = PRIME FAILED

This is a special case in that it is not a latching error. It is not necessarily a problem with the SP400P itself but indicates that no water is being detected in the heater. The LED display will show "H2O". Pressing the Pump button will run the pump associated with the heater (Pump1 or Circ Pump) for 10 or 60 seconds respectively, to try to flood the heater tube. Normal operation will resume if successful. If unsuccessful, Error 1 (H2O) will be indicated again.

- *Check valves and jets are open correctly, filters are not blocked, pumps are working and that there is enough water flow through the heater tube.*
- *Check that air is not trapped in the heater tube. See the 'Circulation Pump' section.*
- *Check for leaks (water or air) in pipe work, O-rings, seals and loose fittings. If there is air around the water sensor the controller will think the heater is empty. This may occur if there is a small leak so that the water drains out of the heater over time.*
- *If there is water flow then the water sensor may be dirty or faulty. Remove and inspect, replace if necessary. Check the water sensor to circuit board connection for water, corrosion or fouling.*
- *When all other options have been exhausted change the circuit board.*

5.2 Error 2 not used.

5.3 Errors 3-8 latching errors.

With any Error 3-8, spa operation will stop and not continue until the controller is reset. The controller can only be reset by pushing the UP, DOWN and PUMP buttons simultaneously. The controller will remain in an error condition even when turned off and on again at mains power, it will only continue normal operation after the UP, DOWN and PUMP buttons are pushed simultaneously (see below).

5.4 Error 3 = STUCK BUTTON

This error indicates that one of the buttons in the touch pad is stuck or has been held down for more than one minute. This may be caused by water getting into the touch pad or by damage to the touch pad or its cable, or by the pool cover pressing on the touchpad.

- *Inspect the touch pad for damage; test the operation of each button by checking that they all feel the same.*
- *Check the touch pad to main circuit board connection and the cable itself for any damage or corrosion.*
- *Disconnect the touch pad and run the controller for one minute. If it cuts out on Error 3, then the problem is in the controller.*
- *When all other options have been exhausted change the main circuit board.*

5.5 Error 4 = NO WATER SENSOR

This error indicates a problem with the optical water sensor in the heater. It may be caused by the sensor being disconnected or by damage to the sensor.

- *Check the water sensor to circuit board connection for water, corrosion or fouling.*
- *Check water sensor lead for damage*
- *Check that the water sensor lead plug is connected.*
- *Remove the water sensor and inspect, replace if necessary.*
- *When all other options have been exhausted change the circuit board.*

5.6 Error 5 = OVERTEMPERATURE

This error indicates that the digital temperature sensor in the heater or pool has detected a temperature of 45°C or more. This is not necessarily a problem with the SP400P itself. It might be caused by excessive pump use during hot weather. In this case reduce the filtration time and increase the sleep time.

- *Check that another source of heat is not heating the pool excessively. Look at pumps operating for long durations, solar heating, heat pumps, lighting etc.*
- *Check that the ambient temperature is not above or close to 45°C.*
- *If an in heater temperature sensor is used check that there is adequate water flow through the heater. Check that the filter and pump are not blocked and that the jets and valves are open.*
- *Measure the pool temperature and verify the controller's reading. If the controller has an in heater sensor then circulate the water for a few minutes first. If the controller is reading an incorrect temperature then the temperature sensor may be damaged or faulty. Connect another sensor and check that the controller is operating correctly. If it is then change the temperature sensor, if not change the circuit board.*

5.7 Error 6 = THERMAL CUTOUT TRIPPED

This error indicates that the safety electromechanical over temperature cut out on the heater has operated. This is not necessarily a problem with the SP400P. It may have occurred from an air lock around the element, high temperatures during shipping, or failure of the pump. This automatic cut out will only reset once the element has cooled below about 38 °C. The unit must then be reset before it will resume operation. Manually push the UP, DOWN and PUMP buttons simultaneously to reset.

- *Check valves are open correctly; pumps are working and that there is adequate water flow through the heater tube.*
- *Check that filters are clean and jets are open.*
- *Check thermal cutouts in pumps and other equipment. (Run pump directly from mains to see if it over heats and cuts out.)*
- *Check all connections in the controller are tight and clean.*
- *Make sure air cannot collect in the heater tube. Refer to the 'Circulation Pump' and/or 'Ozone' sections of this manual when using these systems.*
- *When all options have been exhausted change the circuit board.*

5.8 Error 7 = STUCK RELAY

This error indicates a problem with the heater control circuitry inside the unit.

- *Check that there are no short circuits across the relay terminals or associated wiring.*

- *Check that all internal wiring is correct and that terminals are tight and clean.*
- *When all options have been exhausted change the circuit board.*

5.9 Error 8 = NO TEMPERATURE DATA

This error indicates a problem with the digital temperature sensor in the heater or pool. It might be caused by the sensor being disconnected or by damage to the sensor or cable.

- *Make sure there is only one sensor plugged into the circuit board. Either 'in-heater' or 'in-pool' sensor not both.*
- *Check the temperature sensor to circuit board connection for water, corrosion or fouling.*
- *Connect another sensor and check that the controller is operating correctly. If it is then change the temperature sensor, if not change the circuit board.*
- *Check temp sensor lead for damaged*
- *Check that the temp sensor lead plug is connected.*

6 Troubleshooting

6.1 The thermal cutout keeps tripping.

- *Check that there is adequate water flowing through the heater tube and that the plumbing is not blocked.*
- *Check that filters are clean and jets are open.*
- *Check thermal cutouts in pumps and other equipment.*
- *Manually reset spa by pushing the UP, DOWN and PUMP buttons simultaneously after spa element has cooled.*
- *Check the pump is not heating the pool. A large pump running continuously will heat the pool until the power to it is cut.*
- *If a small circulation pump is in use check there is enough flow through the heater tube and that air is not collecting in the heater tube. Try to measure the flow from the circ pump outlet jet. This can be done by holding a hose on the jet's outlet and timing how long it takes to fill a bucket. Aim for more than 40 L/m. i.e. it should take no longer than 30 seconds to fill a 20 litre bucket.*
- *The unit is faulty and needs to be returned for service.*

6.2 The unit won't power up.

- *Check there is power to the unit and that the control panel is plugged in correctly.*
- *Check the control panel for damage or corrosion. Try another control panel.*
- *Check all connections are correct, tight and clean.*
- *Replace the unit.*

6.3 The unit leaks.

- *First ascertain where the leak is.*
- *Mac-unions. Check that there are O-rings in the mac-unions. Check that the unions are tight, aligned and not distorted.*
- *Heater tube. Inspect the water sensor body for cracks and O-ring location. Tighten or replace if necessary. Tighten the element boss screws to compress the O-ring.*
- *Replace the heater tube if required.*

6.4 The RCD or Ground Fault Device keeps tripping out.

- *Check for shorts to earth and loose, dangling wires. Check the element earth leakage. Try disconnecting equipment piece by piece until you can identify what is causing the fault.*
- *Check that the RCD is not also an overcurrent circuit breaker. If it is, make sure it is rated for motor start up surges and is not overloaded.*
- *Make sure the unit is not drawing too much current from the supply – see loading calculations.*
- *Check for damage to wiring, pumps, blowers, and lights.*
- *Check for leaks around live parts.*
- *Check earth connections.*
- *Check the supply is wired correctly.*
- *Some older switchboard ELCBs are not compatible with EMC filtered equipment and must be replaced. Ensure ELCB meets the AS/NZS61008 standard*
- *The ELCB may be faulty and require replacement.*

6.5 My pool is getting too hot.

- *Check that another source of heat is not heating the pool excessively. Look at pumps operating for long durations, solar heating, heat pumps, lighting etc.*
- *In extreme climatic conditions where there is a high ambient temperature the normal operation of the unit and pump can cause the pool to over heat. To counter this, remove the pool cover over night to allow the pool to cool. Be sure the pool is safe to leave uncovered. Consider access by children, animals etc.*
- *Increase sleep time and minimise filtration time.*

7 Part Replacements

Every precaution has been taken to insure the highest quality and reliability is delivered in each SP400P. However in the unlikely event that something does go wrong, it is normally a simple operation to replace the faulty section of the controller or the entire controller if necessary.

To avoid unnecessary part replacement it is important that the fault be diagnosed correctly. Refer to the diagnostics and trouble shooting sections before attempting to change any parts. Only authorised service agents should attempt to change parts.

Most problems are caused by something obvious so remember to check the obvious first: connections, power supply, pumps, water flow, and leaks...
Refer to the wiring diagram when checking connections.

7.1 Heater Element Assembly

Removal

Disconnect from the supply. Close the water valves so that the heater unit (in line or heater tee type) can be removed without draining the pool or causing a flood. Loosen the lock rings on the mac-unions and disconnect the in line heater tube from the pipe work or the heater unit from the heater tee (don't lose the O-rings).

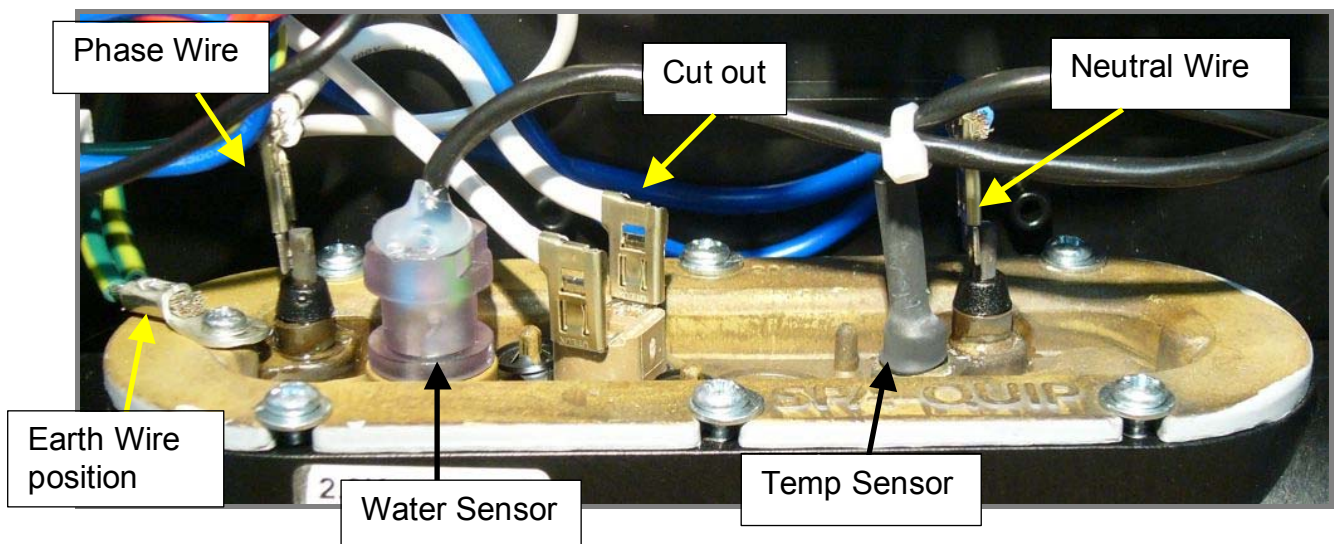
Unplug the heater from the "Heater" AMP plug on the control box. Unplug the sensor cable from the "Temp & Water Sensor" mini DIN socket inside the control box.

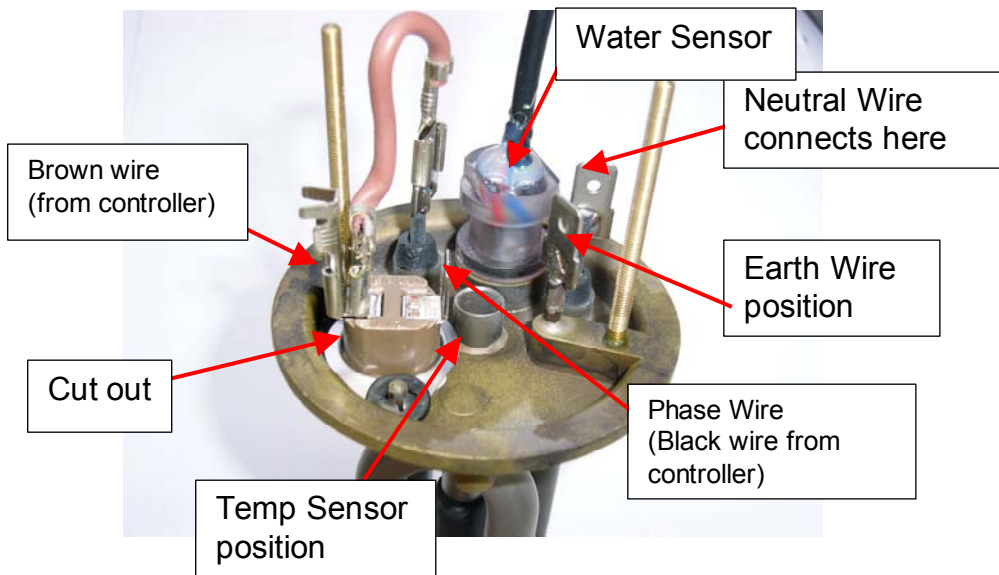
Remove the in line element cover or heater tee element cover by loosening the screws or nuts. Note the connections inside the unit so that they may be disconnected and reconnected later on.

Disconnect the heater element wiring using a pair of pliers to grip each terminal in turn—don't pull on the wire itself. Disconnect the two wires from the thermal cut out, disconnect the earth wire, disconnect the element phase and neutral wires. Unplug the water sensor and temperature sensor from the sensor extension cable.

Installation

Installation is the reverse of removal, but remember to soak up any water in the unit. Check the replacement element is the same rating as the old one and check the connections are correct and tight. (Refer to the appropriate wiring diagram) Turn the water back on, bleed air from pipe work and reconnect power. Check the operation of the unit and check for leaks.





7.2 Water Sensor

Removal

Disconnect from the supply. Isolate the water supply and drain the heater tube or heater tee so that the water sensor can be removed without draining the pool or causing a flood. Disconnect the plug from the extension cable. Unscrew the sensor from the element boss. Alternatively follow the instructions for the Heater Element Assembly above to gain access to the water sensor.

Installation

Lubricate the water sensor O-ring with a little silicon grease if it is not already lubricated. Slide the O-ring over the water sensor and screw the water sensor into the element boss until the O-ring is seated inside the recess and the sensor body starts to tighten up on the O-ring or boss. Then back the sensor off $\frac{1}{4}$ of a turn. This will insure that the water sensor's body is not in contact with the element boss and is not under too much tension. If the water sensor is over tightened or its body is hard up against the element boss it will crack and leak.



Plug the sensor into the extension cable. Soak up any water in the unit, reconnect the water, bleed air from pipe work and reconnect power supplies. Check the operation of the unit and check for leaks.

7.3 In Element Temperature Sensor

Removal

Unplug from the extension cable and the sensor should pull out from the element boss. The heatshrink may hold on to the metal but it will wiggle free.

Installation

Insert the sensor all the way into the element pocket and use a sleeve of heatshrink tubing (or similar) to hold the sensor in place and to seal the pocket. The pocket must be sealed to ensure that the sensor is reading the water temperature accurately and is not affected by the enclosure temperature.



7.4 Circuit Board

Taking anti-static precautions.

The main anti-static precaution to take is to make sure your body is at the same electric potential as the circuit board. To do this **first disconnect the power**, then touch the neutral terminal on the mains terminal block. Now you can handle the circuit board.

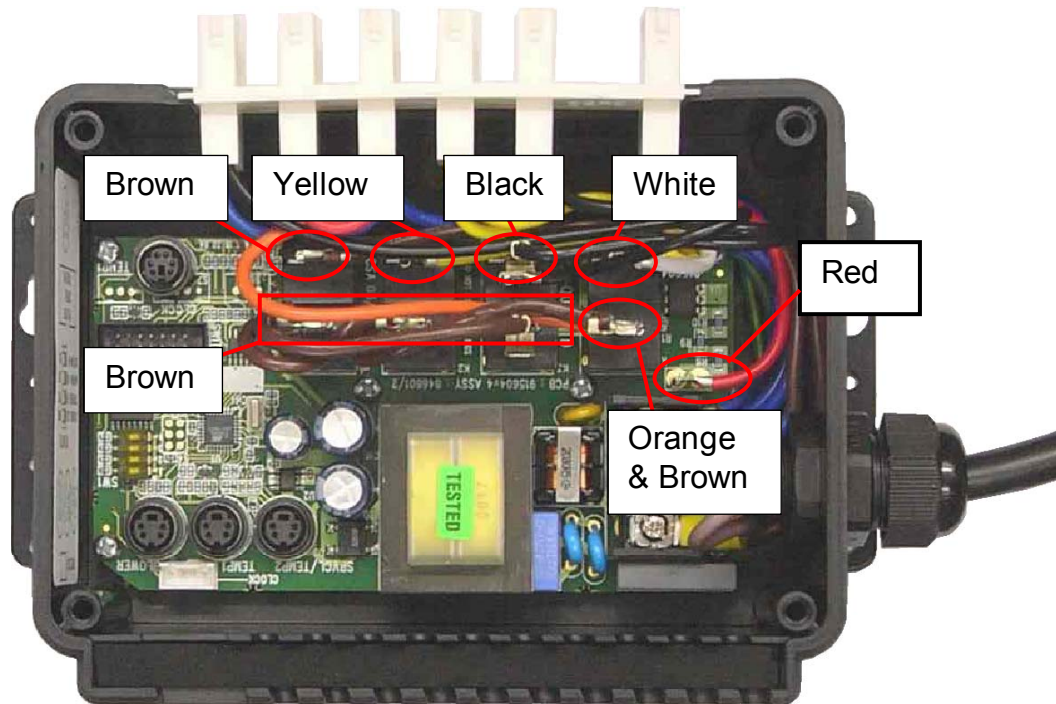
Removal

Disconnect from the supply. Note where each wire is connected on the circuit board and relays. Disconnect all wires, the cable ties will hold the wires in position for reassembly so don't cut them. When disconnecting terminals, use a pair of pliers to grip the terminals, not the wire, and then pull the terminal off. Remove all of the six screws that hold the circuit board to the housing and lift the circuit board out of the unit.

Installation

Taking antistatic precautions as above, screw the circuit board into place using the six screws. Reconnect all wires and check that all connections are correct and tight. (Refer to the appropriate wiring diagram) Reconnect the power to the unit.

Reset the set temperature and filtration as desired. If a new circuit board is fitted, check the dip switches are set correctly.



8 Frequently Asked Questions

8.1 Can I make it load shed?

Yes, refer to the dipswitch settings information in the Set up guide for your model – see the appendix.

8.2 Can I mount the SP400P on its back / front / upside down?

No, any of these mounting positions will compromise the water resistance of the enclosure.

8.3 Can I run a standard incandescent pool light from the SP400P?

Yes, but it must be used with a separate transformer and controlled by the Aux outlet.

9 Warranty Information

9.1 SPA-QUIP product warranty for Australia and New Zealand.

The Spa-Quip warranty is very simple and is designed to protect your purchase over the first two years, as follows. The first 12 months after purchase there is a full in-field warranty cover on faulty parts or workmanship. Over the following 12 months there is a bench warranty. The product must be returned, freight paid, to Spa-Quip where it will be repaired at no cost and returned to you free of charge. A bench warranty does not include the cost of local service people to remove or re-install the equipment.

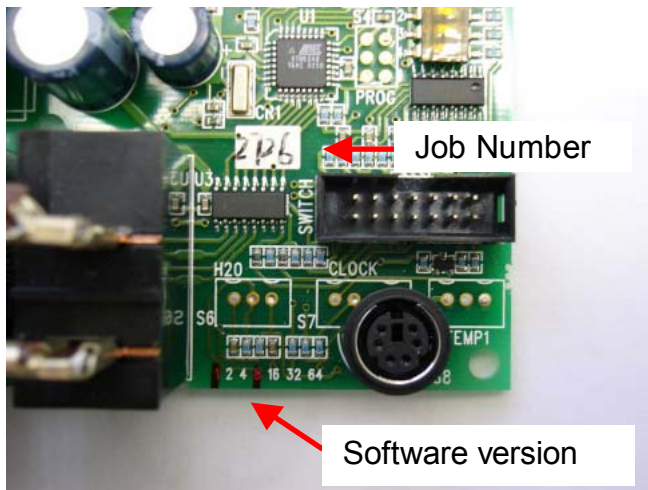
9.1.1 Terms and conditions.

- 1 This warranty applies to all states and territories of Australia and New Zealand only and is subject to the provisions of the Trade Practices Act (Aust), the Goods and Consumer Protection Legislation of the various Australian states and the Consumers Guarantee Act 1993 (NZ) as applicable.
- 2 The warranty period commences on the date of original purchase of the equipment. Evidence of this date of original purchase must be provided when claiming repairs under warranty. It is recommended you retain all receipts in a safe place as failure to provide proof of purchase will result in warranty being refused.
- 3 This warranty is subject to due compliance by the original purchaser with all directions and conditions set out in the installation and Operating Instructions. Failure to comply with these instructions, damage or breakdown caused by fair wear and tear, negligence, misuse, incorrect installation, water in the control enclosure or element, chemical or additives in the water, inadequate protection against freezing, rain or other adverse weather conditions, corrosive or abrasive water, lightning or high voltage spikes or though unauthorised persons attempting repairs are not covered by this warranty. The product must only be connected to the voltage shown on the nameplate and with a correctly rated cable.
- 4 Without limiting the original purchaser's entitlement under the Trade Practices Act (Aust), the Goods and Consumer Protection Legislation of the various Australian states or the Consumers Guarantee Act 1993 (NZ), Spa-Quip shall not be liable for any loss of profits or any consequential, indirect or special loss, damage or injury of any kind whatsoever arising directly or indirectly from the product or defect.
- 5 Replaceable, wearing items such as pump seals, filter cartridges, light bulbs etc. are not covered by this warranty.
- 6 Equipment used for working displays or demonstration is not covered by this warranty.

10 Identification

Each SP400P has a unique serial number which is displayed on a sticker attached next to the circuit board and on the unit's lid label and warranty card.

The PCB also has a version number, job number and software version number. The job number is hand written and the software version number is found by adding up the crossed out numbers. For example in the picture the job number is 2706 and the numbers 1 and 8 have been crossed out indicating the software version is 9.



The element power rating is identified by a sticker on the side of the heater tube and is also stamped into the element boss.

11 Part Numbers for Spares Ordering

Description	Part number
SPVCL	Q3704 / Q3708
SPCL	Q3705 / Q3709
SPVSB	Q5602-AMP
Heater Assy 40mm HtrT 1.5kW No temp Sensor	Q950151
Heater Assy 50mm HtrT 1.5kW No temp Sensor	Q950156
Heater Assy 50mm In Line 1.5kW	Q950153
Heater Assy 50mm HtrT 1.5kW	Q950155
Heater Assy 50mm HtrT 2.0kW No temp Sensor	Q950201
Heater Assy 50mm In Line 2.0kW	Q950203
Heater Assy 50mm HtrT 2.0kW	Q950205
Heater Assy 50mm In Line 3.0kW	Q950300
SP400 Digital Time Clock Assembly	Q921016
SP400P controller circuit board, all models	Q846602
SP400P switch, all models	Q71093 (oval) Q71092 (rectangular)
Water sensor	Q915441A
In-pool temperature sensor	Q915445
In element temperature sensor	Q915439
Wiring harnesses	Q927085

12 Contact Details

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 Email: service@spa-quip.com.au
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 Ph (649) 415 8622, Fax (649) 415 8621
 Email: service@spa-quip.co.nz
 Web site: <http://www.spa-quip.co.nz>