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Water, the Liquid of Life
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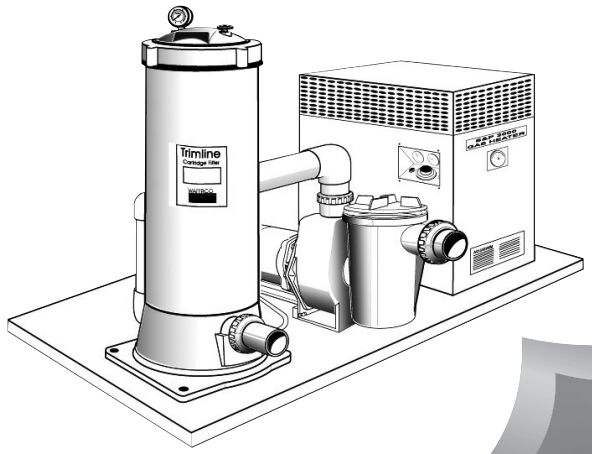
WATERCO

Water, the Liquid of Life

S&P 2000 E series GAS HEATER

OWNERS MANUAL & INSTALLATION GUIDE

S&P 2000E Gas Heater LPG
S&P 2000E Gas Heater Nat. Gas
S&P 2000E Gas Pack LPG
S&P 2000E Gas Pack Nat. Gas



WATERCO

S & P 2000E SERIES

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INTRODUCTION

The S&P 2000E Gas heater is over 80% thermal efficient making it the most economical heater of its type. The heater's cabinet is powder coated with a zinc alum ensuring a long life and its water ways are made of copper, virtually eliminating corrosion. It features a reliable electronic ignition and double air switch (including a 24 hour timer). The heater is available in both natural gas and LP gas.

The S&P 2000E Gas heater is fitted with integral air switch controls to operate the pump / filter operations and air blower function.

To ensure that heater operates as designed, the pump must be connected to the 3 pin socket above the timer control marked pump.

If the pump loses prime or is starved of water, the heater is designed to go to a fail-safe condition and will not operate.

For optimum performance the heater / spa pack should be positioned as close as possible to the spa.

MODEL	GAS PACK NAT	GAS PACK LPG
	100 NG	100 LP
Nominal Gas Consumption	100 MJ/h	100 MJ/h
Heat Output	19.5 kW	19.5 kW
Inlet Test Point Pressure	1.13 kPa	2.75 kPa
Outlet Test Point Pressure	0.875 kPa	2.2 kPa
Injector Diameter	1.4mm	0.85mm
Input: 1Ph. 50hz	240V	240V
Max. Output	10 Amps	10 Amps
S.E.C.V. Approval No.	V93085	V93085
A.G.A. Approval No.	5051	5051
Max. Water Pressure	200 kPa	200 kPa
Overall With	852mm	852mm
Overall Height	970mm	970mm
Overall Depth	500mm	500mm
Temp. Rise Per Hour*	18° C	18° C

* Based upon a 1200 litre spa with cover at an ambient temperature of 13.6°C

Gas Type

The Gas Heater type is indicated by the temporary label affixed to the left hand side of the heater directly above the gas connection point.

WATER CHEMISTRY

S&P 2000E gas heaters have been carefully designed to withstand the harsh environments of spa or bath systems.

Non corrosive (non metallic) materials are used extensively, however metal parts used include the heater elements.

Heater elements can be damaged due to incorrect chemical balance of the spa water. It is **Very important to maintain the chemical balance of your spa**.

Maintaining your spas chemical balance will help prevent corrosion of the heater element and ensure that you have a trouble free long life from your pump.

Failure to maintain correct chemical balance will void warranty.

The chemical balance of water is a relationship between its Ph, total alkalinity, calcium hardness and water temperature.

Testing kits are available to test water yourself or alternately your professional pool and spa shop can test your water to ensure that it is chemically balanced in accordance with the Langelier saturation index.

The water must be maintained at all times to the following:

pH Level	**: Between 7.2 & 7.8.**
Total Alkalinity	**: Between 80 & 150ppm.**
Calcium Hardness	**: Between 150 & 300ppm.**

And within these tolerances be balanced to the Langelier Saturation Index within a range of -0.2 to +0.2.

High levels of chlorine, bromine and ozone can also corrode the heater elements and stainless steel components as well as the pump mechanical seal.

Chlorine levels should not exceed **5.00ppm** and has an ideal range of between **1.5ppm & 3.0ppm**. Chlorine becomes volatile in temperatures above 30 degrees C.

It is recommended that in water that exceeds 30 degrees C, you should use bromine as an effective sanitizer with a similar concentration to chlorine.

Extremely hard water above 300ppm with a high ph level can cause scaling of the heater element. It also causes reduced heating efficiency.

Never does your spa by adding chemicals via your skimmer box.

When adding chemicals always mix them into a bucket of water and evenly disperse the mixture over the spa surface.

Never mix chemicals together and avoid contact with your skin and eyes.

Care should be taken not to inhale chemicals.

Keep chemicals out of reach of children.

Before changing treatment types consult your local pool spa professional for advise.

● *Note: Spa baths need not require any chemical adjustment as with spa baths the water is drained once you have finished the bath. If the bath pump is installed correctly it will empty out the water into the drain.*

It is good practice to flush the bath pump with fresh water after use to remove any soap or oil from the heater element.

INSTALLATION

Important notes for the installer

These installation instructions are designed for use by qualified personnel only, trained especially for installation of this type of heating equipment and related components.

This appliance must be installed in accordance with the manufacturer's installation instructions. Also the installation must comply with Uniform building codes, Water supply By Laws and in accordance with A.G 601 -1988 (Installation code for gas burning appliances and equipment) this appliance is approved for OUTDOOR installation only.

The manufacturer's warranty may be void if, for any reason, the heater is improperly installed and / or operated. Be sure to follow the instructions set forth in this manual.

These heaters are designed for the heating of swimming pools and spas, and should never be employed for use as space heating boilers, general purpose water heaters, or for the heating of salt water.

The heater must be installed on a level surface consisting entirely of, or a combination of, non-combustible materials such as steel, iron, brick, tile, concrete, slate, or plaster. Do not install on carpeting. The heater must be installed to keep specific clearances on all sides for service and inspection. For further information please refer to Gas Fitting Regulations 1979 Regulation 15 (2) ©.

If the heater is installed above or below the pool / spa by a metre a flow switch and isolating valve must be fitted.

● *Note: This heater is fitted with a regulated gas valve suitable for LPG and Natural Gas.*

Clearance for FLUE Terminal (Top of Heater)

Below eaves	500mm
From the ground or above balcony	500mm
From a Gas meter	1000mm
From an Electricity Meter or Fuse Box	500mm
From a Drain or Soil Pipe	150mm
Horizontally from an window, door, non mechanical Air inlet or any other flue terminal, cowl or combustible intake	500mm
Vertically below an open window	1000mm
From a Spa Blower Air Intake	1500mm
From any wall or corner	500mm

Flue terminal must be free from any combustible material.

Installation of Base Plate

The heater or skid pack must be installed on a non combustible surface or material e.g. concrete slab minimum 650mm x 900mm.

Pipe Connections

It is important that all pipe connections are correctly aligned, otherwise component connections with the heater may be damaged.

Environment

In areas subject to extreme cold, frost, or prone to conditions below freezing point, do not leave any water in the heater and pump.

Pipe Sizing

The skid pack needs to be installed to the spa with special attention to the following:

- Use 40mm (class 9 minimum) pipe for installation within 6m.
- Use 50mm (class 9 minimum) pipe for installation beyond 6m.
- Over 12m contact the manufacturer.

Keep the suction lines as short as practical using minimum bends and or elbows. Always fit 2 way isolation valves on the suction and return lines for maintenance purposes. Fit a 3 way valve after filter to enable connection to waste for pool / spa draining.

Gas Connection

The 18mm gas connection is located on the right hand side of the heater and is supplied with a plastic protector insert, this gas inlet is fitted with a _" BSP internal thread.

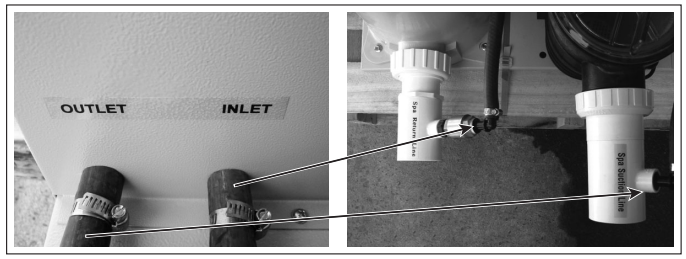
For correct efficiency of heater, supply of gas must be as per data plate and of proper flow rate.

It is recommended that minimum 18mm annealed copper tube is used to connect the heater. An isolating gas cock must be fitted to allow for the removal of the heater for routine servicing.

Use an approved joint sealing compound for all gas threads. Use of non approved substances may block heater jets and VOID WARRANTY.

Heater Inlet Pipe

(Factory connected when complete pack is purchased)
This connection is a copper pipe marked "inlet". This inlet pipe is connected to a high temperature hose byway of a stainless steel hose clamp. Care must be taken not to restrict this pipe or hose.



The water supply to heater must always be filtered to prevent fouling.

The burner manifold pressure must be checked by a qualified installer and may require adjustment. This appliance may only be serviced by an authorized technician.

Heater Outlet Pipe

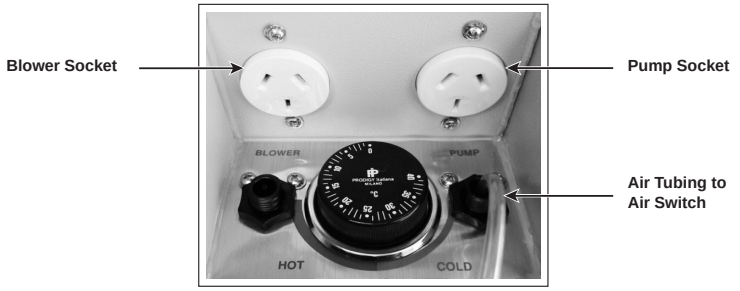
(Factory connected when complete pack is purchased)
Same as "Heater Inlet Pipe"

Pump Requirements

The pump pressure to the heater is important and should not exceed 200 kPa. The minimum working pressure should not be less than 40 kPa. Flow rates necessary to the heater should not be less than 7 lpm and no greater than 16 lpm.

Connections

1. Plug the pump into the right hand socket marked Pump provided at the control panel.
2. Plug the blower if installed into the left hand socket marked Blower (5 amp rated).
3. Connect the air switches of the spa by the air tubing supplied, to the ports below the pump and blower sockets.



- ***Note: Actuation of the air switches in the heater is only guaranteed to 10m when the tubing supplied is installed. Use of larger diameter tubing will not be guaranteed.***

4. Connect the heater main supply flex into a separately switched 10 amp minimum 240 volt power circuit. The plug and lead is located directly below the heater thermostat at the base of the heater. Do not operate on an extension lead, this will void warranty.
5. Connect the spa suction line to the pump.
6. Connect the spa return line to the filter outlet.

OPERATION

Warning : *Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death. Installation and service must be performed by a qualified installer, service agency or the gas supplier.*

Safety Rules

1. Spa or hot tub water temperatures should never exceed 40 °C (104 °F). A temperature of 38 °C (100 °F) is considered safe for a healthy adult.
2. Special caution is suggested for young children.
3. Drinking of alcoholic beverages before or during spa or hot tub use can cause drowsiness which could lead to unconsciousness and subsequently result in drowning.
4. Pregnant women beware! Soaking in water above 39° C (102° F) can cause fetal damage during the first three months of pregnancy (resulting in the birth of a brain-damaged or deformed child). Pregnant women should stick to the 38° C (100° F) maximum rule.
5. Before entering the spa or hot tub, the user should check the water temperature with an accurate thermometer. Spa or hot tub thermostats may err in regulating water temperatures by as much as 2.2° C. (4° F).
6. Persons with medical history of heart disease, circulatory problems, diabetes or blood pressure problems should obtain their physician's advice before using spas or hot tubs.
7. Persons taking medication which induce drowsiness, such as tranquilizers, antihistamines or anticoagulants should not use spas or hot tubs.
8. Do not store or use gasoline or other flammable vapours and liquids in the vicinity of this or other appliances. Do not place articles on or against this appliance.
9. Should overheating occur turn off the gas supply to the appliance. Do not use this heater if any part has been under water. Immediately call a qualified service technician to inspect the heater and to replace any part of control system and gas control which has been under water.

What to do if you smell gas?

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbour's phone.
- Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Start up Procedure

For your safety : Read before lighting.

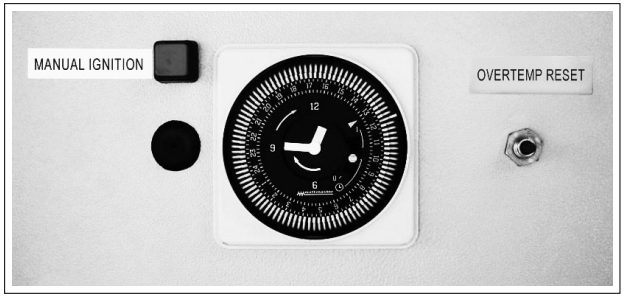
Warning : *If you do not follow these instructions exactly, a fire or explosion may result, causing property damage, personal injury or loss of life.*

Since propane gas is heavier than air, escaping propane will accumulate and remain at ground level. Do not attempt to light the heater. If you suspect a propane leak, lighting the heater can result in a fire or explosion which can cause personal injury, death, and property damage.

Electronic Ignition

1. Turn the gas on. If you smell gas, STOP! Follow the safety information above.
2. When power is applied to the heater and the pump is activated via the air switch or time clock function, the pump pressure is confirmed by the control circuit indicating water is passing through the heater.
3. On confirmation of water pressure, power is switched to the gas control.
4. The control system looks for confirmation that the temperature is required from the adjustable thermostat (provided that the over temperature circuit has not been tripped) the system will activate a 10 second ignition sequence.
5. Should the main burner not ignite, the heater will require manual resetting.

Manual Reset



The manual reset sequence is as follows:-

a. Remove the control access door.

b. Firstly, make sure the gas line has been purged of air to the heater gas valve.

c. Should the burner not ignite, turn the 240 volt power supply off for 5 seconds and then switch it on again.

d. Then press the 1cm x 1cm red lockout switch, located on the front control panel in for 3 – 5 seconds while the pump is running. This should start the igniter sequence to the burner. Should ignition not be achieved, refer to the trouble shooting section.

e. Press the air button on the spa to activate the pump.

f. Turn the adjustable thermostat clockwise till the ignition sequence is activated.

g. The main burner should not ignite (provided the water temperature of the spa is lower than the thermostat setting) and water heating takes place.

Important : *It is recommended that no more than two ignition attempts in succession be performed for natural gas systems. Before further ignition attempts, wait at least five minutes for gas to clear. For propane (LPG) systems allow at least five minutes between ignition attempts for this heavier-than-air gas to safely dissipate. After two unsuccessful ignition attempts with propane, open the burner access door and wait at least thirty minutes before replacing the door to attempt further ignition attempts.*

Water Temperature Adjustment

For convenience and economy the heater are equipped with a thermostat on the front of the heater control panel.

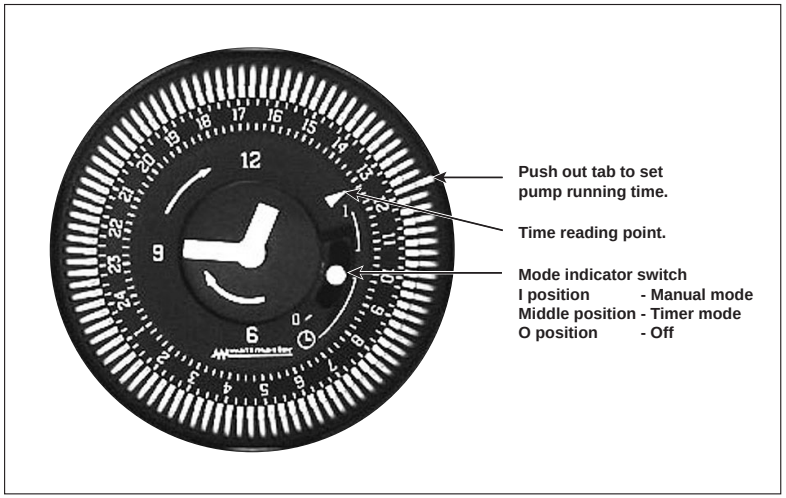
The knob eliminates the need for constant thermostat adjustments. Water temperature is controlled by the adjustable thermostat control knob.

To increase the temperature (max. 40°C), turn the knob clockwise.

To decrease the temperature, turn the knob anticlockwise.

Time Clock Operation

The S&P2000 is fitted with a 24 hour time clock to be used for automatic daily filtration cycle and can also be used for pre-set heating function.



1. Set the current time by rotating the white clock hand in a clockwise direction.
2. To set the time for running your pump push the yellow tabs for the duration you wish the pump to run. Guide the inner numbers.

● *Note: The time reading point is at the white arrow.*

3. For automatic mode running put the mode indicator switch in the middle position.
4. For manual mode operation put the mode indicator in the top position. Remember if the mode indicator is in the bottom position the unit will not operate.

Important : *Remember if the spa thermostat is left set on and the time clock function is set to auto filter, the spa will heat when the pre-set time is reached. Therefore ensure that the thermostat is turned anticlockwise fully when the spa is not required to be heater.*

MAINTENANCE

It is recommended that you check the following items at least every six months and at the beginning of every swimming season.

1. Ensure that the heater flue terminal is not obstructed at any time e.g. tree branches, combustible materials.
2. Visually inspect the main burner. The normal colour of the flame is blue. When the appears yellow, burners should be inspected and cleaned;
3. Keep the burner area clear and free from combustibles and flammable liquids.

Always ensure that maintenance is carried out by a qualified person and that only parts supplied by the manufacturer are used for replacement when necessary.

Insects such as ants and spiders may find their way into the heater and nest. These insects can obstruct the burner assembly making the heater hard to light and give off an irregular flame. The Waterco recommends that the heater should be sprayed with a suitable insect spray.

- This must be done whilst the heater is switched off.
- Do not spray aerosols in the vicinity of this appliance whilst it is operating.

Energy Saving Tips

1. If possible, keep pool or spa covered when not in use. This will not only cut heating costs, but also keep dirt and debris from settling in the pool and conserve chemicals.
2. Set time clock to start circulation system no earlier than day break. The swimming pool loses less heat at this time.
3. For pools that are only used on the weekends, lower the temperature to a range that can be achieved easily in one day.
4. During the winter or while on vacation, turn heater off.
5. Set up a regular program of preventative maintenance for the heater each new swimming season. Check heat exchanger, controls, burners, operation, etc.

To ensure trouble free operation and to maintain the highest efficiency and economy of operation, we recommend that the heater be inspected and cleaned by a qualified person periodically, depending on the frequency and duration of operation, at not less than 12 month intervals.

CONTROL SYSTEM CHECK

** To be carried out by an authorized technician only!*

Refer to the system control wiring diagram located on the inside of the heater door. Use this diagram to check the system.

Turn Off the Mains Power - Remove control box cover.

Recommended Maintenance Schedule for the S&P2000 & 2000E

To ensure long trouble free service from your heater, Waterco recommends that the following routine service be carried out by a qualified technician at 12 month intervals.

1. Check and clean flueways, combustion chamber and gas jets.
2. Check gas pressure at test point and adjust if necessary.
3. Check correct burner operation.
4. Test the operation of the igniter and flame detection circuit.
5. Check the operation of the pressure switch and the high limit thermostat.
6. Check all connections for gas and or water leaks.
7. Remove any debris from around the heater, inside and out.
8. Clean the heater cabinet and flue terminal.
9. Check the time clock and air switch operation.
10. Check and test the flame rod and igniter rod and cables.

TROUBLE SHOOTING

Troubleshooting - general

POSSIBLE CAUSE	REMEDY
Heater will not come on	
Automatic ignition system fails	Check if electrical connections are correct and securely fastened – If YES, contact a qualified service person. Also check water level and filter.
Pump not running	Place pump in operation or Switch pump on.
Pump air locked	Check for leaks or disconnect the hose lead from the filter, block the hose lead and start the pump to prime the system.
Filter dirty	Clean filter.
Pump strainer clogged	Clean strainer.
Defective wiring or connection	Contact a qualified service person to repair or replace wires.
Defective pressure switch	Contact a qualified service person to replace the switch.
Defective gas controls	Contact a qualified service person.
On-Off switch in "OFF" position	Turn switch to "ON".
Heater Short Cycling (Rapid On and Off Operation)	
Insufficient water flow	Clean filter and pump strainer.
Defective wiring	Contact a qualified service person to repair or replace wires.
Defective or stuck by-pass valve	Contact a qualified service person.
Defective hi-limit and / or thermostat	Contact a qualified service person.
Heater Makes Knocking Noises, Make sure all valves on systems are open. Check that the filter and skimmer are clean.	
Heater operating after pump has shut off	Shut off gas supply and contact a qualified service person. A flow switch is required.
Heater exchanger scaled	Shut off gas supply and contact a qualified service person.

Trouble Shooting – Ignition Control E.F.D 501

Thermostat calls for heat	No	1. Check that power to the heater is turned on. 2. Check that the gas is turned on. 3. Check water flow and look for any possible blockages in the filter and skimmer. 4. Check if the heater requires a manual reset. 5. Check thermostat and all safety switches, replace as necessary. 6. Check line voltage to appliance, check low voltage transformer, (if present), check wiring and all connections. Repair and replace as necessary. Check water flow, filter and skimmer. 7. Check and adjust the pressure switch anti-clockwise. ***Note: After adjustment of the pressure switch, check that the pressure switch is activated when there is no flow to the heater.***
Yes		
Spark across electrode gap	No	1. Check spark at high voltage stud on the EFD 501 control. If spark is present replace either the high voltage lead or ignition electrode. 2. Check fuse on lead between EFD 501 control and the thermostat T10 active wire.
Main burner lights	No	1. Turn the gas on next to the appliance and or the meter. 2. Check the position of the ignition electrode, adjust if necessary. 3. Check for the correct voltage to the gas valve if voltage is present (warning 240 volts), test the Transformer. If voltage is not present, replace the EFD 501.
Yes		
Spark stops when the flame is present	No	1. Test power point conductivity with tester. 2. Check the control ground lead (green) and H.V. lead for continuity, replace if necessary. 3. Check that ignition electrode is continuously washed with flame, adjust if necessary.
Yes		
Main burner on until demand for heat ends	No	1. Check water flow and look for any possible blockages in the filter and skimmer. 2. Poor ground can occur using extension leads to the heater or a poor ground at the power source. If ground is poor or intermittent, shut downs will occur occasionally even though operation is normal at the time of checkout. 3. Check the ignition electrode for cracks or wear on the ceramic insulator which will cause shorts to ground.
Heater cycle ends system shut off	No	1. Check thermostat and other safety switches correct operation. Replace as necessary. 2. Remove valve lead from the gas valve. If valve shuts off, recheck safety switches(warning 240 volts). If not replace the gas valve. 3. If above checks are OK, replace the EFD 501 control. 4. If the heater is installed above or below the pool / spa by a metre a flow switch is required.
End of procedure		1. Repeat procedure trouble free operation result

- ***Note: Only qualified technicians familiar with model EFD501 should attempt to install or trouble shoot the system. EFD 501 controls are not field repairable.***