	MiniMax Plus								
POOL & SPA HEATERS									
	SERVICE MANUAL								
	AWARNING								
FO Warning: If re	<b>OR YOUR SAFETY - READ BEFORE OPERATING</b> you do not follow these instructions exactly, a fire or explosion may sult, causing property damage, personal injury or loss of life.								
Improper insta damage, pers qualified insta	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.								
<ul> <li>For Your Safety</li> <li>WHAT TO DO IF YOU SMELL GAS</li> <li>Do not try to light any appliance.</li> <li>Do not touch any electrical switch; do not use any phone in your building.</li> <li>Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.</li> <li>If you cannot reach your gas supplier, call the fire department.</li> </ul>									
	Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or other appliances.								
	Pentair Pool Products 1620 Hawkins Ave., Sanford, NC 27330 • (919) 774-4151 10951 West Los Angeles Ave., Moorpark, CA 93021 • (805) 523-2400								

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# **Important Notice**

# MiniMax Plus Pools and Spa Heater

...For the installer and operator of the MiniMax Plus pool and spa heater. 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, in non-stationary installations, or for the heating of salt water.

# CODES

The installation must conform with local codes or in the absence of local codes with the latest National Fuel Gas Code, ANSI Z223.1, and the latest edition of the National Electrical Code, NFPA 70.

Installation in Canada to be made in accordance with the latest CAN/CGA-B149.1 or .2 and CSA C22.1 Canadian Electric Code, part 1.







# **Safety Rules**

- Spa or hot tub water temperatures should never exceed 104° F (40° C). A temperature of 100° F (38° C) is considered safe for a healthy adult. Special caution is suggested for young children.
- 2. 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.
- Pregnant women beware! Soaking in water above 102° F (39° C) 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 100° F (38° C) maximum rule.
- 4. 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 4° F (2.2° C).
- 5. Persons with a medical history of heart disease, circulatory problems, diabetes or blood pressure problems should obtain their physician's advice before using spas or hot tubs.
- 6. Persons taking medication which induce drowsiness, such as tranquilizers, antihistamines or anticoagulants should not use spas or hot tubs.

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Should overheating occur or the gas supply fail to shut off, turn off the manual gas control value 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.

# **Installation Tips**



DO NOT INSTALL HEATER UNDER ANY ROOF OVERHANG NOT HAVING A PROPER RAIN GUTTER.





DO NOT PLACE GAS SUPPLY LINE UNION COUPLING INSIDE OF HEATER JACKET.

(Follow Recommendations of National Fuel Gas Code NFPA 54.)





DO NOT RESTRICT ACCESS TO HEATER WITH PIPING.

# Dimensions

Model	"A" Dim	"B" Dim
150	17 7/8 in.	61⁄2 in.
195/200	20 7/8 in.	9½ in.
250	23 7/8 in.	12½ in.
300	26 7/8 in.	15½ in.
350	29 7/8 in.	18½ in.
400	33 3/8 in.	22 3/8 in.



Outuooi mistanation - with vent Kit										
Model	"A" Dim	"B" Dim	"C" Dim	"D" Dim						
150	17 7/8 in.	6½ in.	7¾ in.	39¾ in.						
195/200	20 7/8 in.	9½ in.	10 in.	42¾ in.						
250	23 7/8 in.	12½ in.	10 in.	42¾ in.						
300	26 7/8 in.	15½ in.	10¼ in.	43¾ in.						
350	29 7/8 in.	18½ in.	13 in.	47¾ in.						
400	33 3/8 in.	22 3/8 in.	17 in.	51¾ in.						

#### Outdoor installation - with vent kit



#### Indoor installation - stack (USA only) Outdoor shelter installation (Canada)

Model	"A" Dim	"B" Dim	"C" Dim	"D" Dim	"E" Dim
150	17 7/8 in.	6½ in.	13 in.	52¾ in.	6 in.
195/200	20 7/8 in.	9½ in.	13 in.	53 7/8 in.	7 in.
250	23 7/8 in.	12½ in.	13 in.	53 7/8 in.	7 in.
300	26 7/8 in.	15½ in.	13 in.	55 in.	8 in.
350	29 7/8 in.	18½ in.	13 in.	56 in.	9 in.
400	33 3/8 in.	22 3/8 in.	17 in.	60¾ in.	10 in.



## Installation - Outdoors

The heater should not be installed closer than 6 inches to any fences, walls or shrubs at any side or back, nor closer than 18 inches at the plumbing side. A minimum clearance of 24 inches must be maintained at the front of the heater.

DOOR

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**Do not install** the heater in locations which will permit the accumulation of leaves or other combustible material around the base of the heater.

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n.(BELOW)

n.(HORIZ) CLEARANCE

**Do not install** the heater in a location that will allow sprinklers to operate near the heater equipment since the water may cause damage to the controls and/or electronics.

Do not install the heater under an overhang of less than three (3) feet from the top of the heater. The area under the overhang must be open on three sides. Overhangs must be such that flue products are not diverted into living spaces. Heaters installed under overhangs must be protected from direct roof water drainage by gutters and the like.

Heater must be installed on a noncombustible floor and at least six inches from any combustible material or wall.

### BASE FOR USE ON COMBUSTIBLE FLOORS SHEET META BLOCKS OLLOW MASONARY BLOCKS, NOT LESS THAN 4" THICK (LAID WITH ENDS UNSEALED AND JOINTS MATCHED FOR AIR CIRCULATION). COVER BLOCKS WITH 24 GA. (MIN.) GALVANIZED SHEET METAL

#### NOTE

OUTDOOR INSTALLATION VENTING GUIDELINES

From the point where the flue products leave the heater, that point MUST be a minimum of (4) feet below, and (4) feet horizontally from or (1) foot above any door, window or gravity inlet to a building.

### **IMPORTANT!**

When installing the heater, consider that high winds can roll over or deflect off adjacent buildings and walls. Normally, placing the heater at least three (3) feet from any wall will minimize downdraft. If it must be installed next to a wall, you should consider installing an outdoor vent kit.

The MiniMax heater has the unique capability of direct schedule 40 PVC plumbing connections.

#### FOR 11/2 & 2 in. SCHEDULE 40 PVC PIPE







#### Valves

When any equipment is located below the water level, valves should be placed in the circulation piping system to isolate the equipment from the pool or spa.

Check valves are recommended to prevent back siphon.

# ACAUTION

When chemical feeders are installed in the circulation of the piping system, make sure the feeder outlet line is down stream of the heater, and is equipped with a positive seal non-corrosive "Check Valve", between the feeder and heater.

#### **Gallons Per Minute**

Model	Min.	Max. *					
150	20	120					
195/200	20	120					
250	30	120					
300	30	120					
350 40 120							
400 40 120							
* Do not exceed the maximum recommended flow rate.							

### Manual By-Pass

Where the flow rate exceeds the maximum 120 GPM, a manual bypass should be installed and adjusted.



# **Reversing Header**

### **Reversible Inlet/Outlet Connections**

The MiniMax heater is factory assembled with right side inlet/outlet water connections. The inlet/outlet header can be reversed for left side water connections **without removing the heat exchanger**.

1. Remove the inspection plates.



2. Disconnect the 2 wires from the high-limit switches except the short jumper wire. Remove the temperature sensing bulb from the inlet/ outlet header and remove the 2 wires from the pressure switch.



3. Remove the 4 inlet/outlet header bolts.



4. Remove the return header bolts.



- 5. Exchange the inlet/outlet header with the return header. Replace the heat exchanger tube seals.
- 6. Install the temperature sensing bulb, hi-limit and pressure switch wires through the hole provided on the left side of the front panel.



7. Reconnect the 2 high limit wires; the 2 pressure switch wires and install the temperature sensing bulb.



8. Reinstall the inspection plates.

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# **Air Requirements**

#### Vent Requirements

A vent pipe extension of the same size must be connected to the draft hood and extended at least two (2) feet above any obstacle within a 10 foot radius of the vent. The vent should then be capped with an approved weather cap.

#### NOTE

Do not alter the heater draft hood in any way; it has been designed by the manufacturer and approved by A.G.A. for maximum efficiency.

To insure efficient venting, use a  $45^{\circ}$  elbow for horizontal installation when attaching the vent pipe to the draft hood.



### Air Requirements

When a heater is installed indoors, two air openings must be provided. Ideally one opening should be placed at the bottom and one at the top of the room to allow for a free flow of air. If other gas appliances are installed in the same room, you must check to see that they have been provided with the proper size openings, otherwise they may use the air intended for your pool heater.

Model	Air for Combustion Sq. In.	Air Ventilation Sq. In.
150	150	150
200	200	200
250	250	250
300	300	300
350	350	350
400	400	400

Vent Installation



#### The MiniMax heater is shipped standard as an outdoor stackless unit. To install the outdoor vent, or the indoor draft hood:

- 1. Remove the stackless top.
- 2. Install adapter (with screws).
- 3. Install the top cover.
- 4. Install the vent.
- 5. Use the screws to secure the vent assembly.

# **Gas Requirements**

### Gas Line Installations

Before installing the gas line, be sure to check which fuel the heater has been designed to burn. This is important because different types of fuel require different pipe sizes. The rating plate on the heater will indicate which fuel the heater is designed to burn. The chart on this page shows which size pipe is required for the distance from the gas meter/propane tank to the heater.

#### NOTE

When sizing gas lines, calculate three (3) additional feet of straight pipe for every 90 degree elbow used.

When installing the gas line, avoid getting dirt, grease or other foreign material in the pipe as this may cause damage to the gas valve, which may result in heater failure.

The gas meter should be sized to assure that it will supply enough gas to the heater and any other appliances that may be used on the same meter.

The gas line from the meter will usually be of a larger size than the gas valve supplied with the heater. To assure as little restriction as possible, the connecting fittings at the meter should be the same size as the main gas line and the main gas line should be reduced as close to the heater as possible.

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The heater and any other gas appliances must be disconnected from the gas supply piping system during any pressure testing on that system.

The heater and its gas connection must be leak tested before placing the heater in operation. **Do not use flame to test the gas line.** Use soapy water or another nonflammable method.



### **AWARNING**

Do not install the gas line union inside the heater cabinet. This will void your warranty.

	1/2 in.		3/4 in.		1 in.		1¼ in.		1½in.	
Model	Nat	LP	Nat	LP	Nat	LP	Nat	LP	Nat	LP
150	10'	40'	50'	150'	150'	600'	-	-	-	-
200	-	20'	30'	80'	125'	250'	450'	600'	-	-
250	-	10'	20'	50'	70'	150'	250'	500'	600'	-
300	-	-	10'	30'	50'	100'	200'	350'	400'	600'
350	-	-	10'	20'	30'	70'	125'	250'	250'	500'
400	-	-	-	10'	20'	60'	100'	150'	200'	450'

### Testing Gas Pressure

- 1. Push the power switch to "OFF".
- 2. Turn the gas valve knob to "OFF".
- 3. Remove the pressure tap plug on the burner side of the gas valve.
- 4. Attach the Manometer.
- 5. Turn the gas valve knob to "ON".
- 6. Fire the heater and read the Manometer.



### Gas Pressure Requirements\*

	Natural	Propane						
Maximum inlet gas pressure Minimum inlet gas pressure Normal manifold pressure ** 6 WC for 400 model	10 in. WC **5 in. WC 4 in. WC	14 in. WC 12 in. WC 11 in. WC						
*All Readings are taken with the heater firing. Any adjustments made with heater off will give incorrect readings.								

# **Transformer and Remote Wiring**

### Electrical - Rating

#### NOTE

If any of the original wiring supplied with the heater must be replaced, the installer must supply No. 18 AWG 105° C., U.L. approved AWM low energy stranded copper wire or it's equivalent.

#### Transformer Wiring Instructions

The transformer is wired at the Factory for 240V.

**240V** - The red tracer and the black tracer wires are wired together. (Do not connect the tracer wires to any power.) Connect one power supply wire to the solid red wire and the other power supply wire to the solid black wire.

**120V** - To wire the transformer for 120V, twist the red and the red tracer wires together and twist the black and the black tracer wires together. Connect the 120V power supply wires to these wires, one to the red/red tracer, and one to the black/black tracer.

# **A**CAUTION

The heater must be electrically grounded and bonded in accordance with local codes or in absence of local codes, with the latest National Electrical Codes ANSI/NFPA No. 70.



A WARNING

If the transformer is wired for the wrong voltage supply, the transformer will fail.

#### JUMPER REQUIRED IF NO 2 WIRE REMOTE SWITCH **3 Wire Remote** 24 VAC PRESS HILMT TFUSE VALVE IGNITION MOD . . . . . . . . . . . . . SWITCH . . THERMOSTAT CIRCUIT BOARD TPROBE 0 0 **NOTE:** When connecting REMOTE POOL/OFF/SF a remote control to the THERMOSTAT SELECT MiniMax wiring, you must FRONT PANEL POOL/ OFF/SPA THERMOSTAT SELECT SWITCH install the low voltage remote wires in separate conduit from ANY line voltage wires. Failure to follow these instructions PRESS HILMT TFUSE 24 VAC VALVE IGNITION MOD will cause the thermostat RETURN E 0 0 0 0 0 0 0 relay to react erratically. THERMOSTAT CIRCUIT BOARD TPROBE COM POOL 2 Wire Remote 0 0 POOL/ OFF/SPA THERMOSTAT SELECT SWITCH

### Remote Switch Dual Therm IID Only

### MiniMax Plus I.I.D. Wiring Schematic







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# **Starting Operation (I.I.D.)**

### Natural / Propane

**Note:** This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.

### **SAFETY INFORMATION -- IF YOU SMELL GAS, FOLLOW THESE RULES:**

- 1. Shut off gas line or propane tank.
- 2. Immediately call your gas supplier from a neighbor's phone.
- 3. Follow the gas supplier's instructions.
- 4. If you cannot reach your gas supplier, call the fire department.
- 1. Set the thermostat to the lowest setting.
- 2. Push the power switch off.
- 3. Remove the door.
- 4. Push in the gas control knob slightly and turn clockwise to "OFF".
- 5. Wait (5) minutes to clear out any gas. If you then smell gas, STOP! Follow the safety information. If you don't smell gas, go to next step.
- 6. Turn knob on gas control counterclockwise to "ON".
- 7. Replace the door.
- 8. Make sure the pump is running and primed.
- 9. Push the power switch on.
- 10. Set the thermostat to the desired setting.
- 11. The pilot should spark and the pilot should

5. Do not light matches or lighter.

6. Do not try to light any appliance. 7. Do not touch any electrical switch and do

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not use any phone in your building.

ignite, then the heater will fire.

- 12. In new installations where the gas line hasn't been bled, the pilot and main burner combustion sequence may be slower than normal.
- 13. If the heater does not operate as it should, in a reasonable amount of time, read the Troubleshooting Guide portion of this manual.





Gas control knob shown in "ON" position.

### SAFETY LOCKOUT:

This MiniMax Propane Heater is equipped with a 100% safety lockout feature. If the pilot does not light within a maximum of 90 seconds. lockout will occur.

# **Millivolt Lighting Instructions**

- 1. Push in gas control knob slightly and turn clockwise to "OFF".
- 2. Wait five (5) minutes to clear out any gas. If you then smell gas, STOP! Follow information on this page. If you don't smell gas, go to next step.
- 3. Turn knob on gas valve counterclockwise to "Pilot".
- 4. Push the control knob all the way down and hold in.





HONEYWELI

Immediately light the pilot with Presslite matchless ignition system by pressing the red igniter button (located at panel next to the gas valve). Continue to hold the control knob in for one (1) minute after the pilot is lit. Release knob slowly. Pilot should remain lit.

- 5. Turn knob to "ON".
- Reinstall door. 6.
- 7. Set thermostat to desired temperature.

#### NOTE

If the pilot will not stay lit after several tries, turn the gas control knob to "OFF" and call your service technician or gas supplier.

# **Chemical Balance**

#### Pool and Spa Water

Your Pentair Pool Products pool heater was designed specifically for your spa or pool and will give you many years of trouble free service provided you keep your water chemistry in proper balance.

Three major items that can cause problems with your pool heater are improper pH, disinfectant residual, and total alkalinity. These items, if not kept properly balanced, can shorten the life of the heater and cause permanent damage.

### ACAUTION

Heat exchanger damage resulting from chemical imbalance is not covered by the warranty.

#### WHAT A DISINFECTANT DOES -

Two pool guests you do not want are algae and bacteria. To get rid of them and make pool water sanitary for swimming - as well as to improve the water's taste, odor and clarity - some sort of disinfectant must be used.

Chlorine and bromine are universally approved by health authorities and are accepted disinfecting agents for bacteria control.

#### WHAT IS A DISINFECTANT RESIDUAL?

When you add chlorine or bromine to the pool water, a portion of the disinfectant will be consumed in the process of destroying bacteria, algae and other oxidizable materials. The disinfectant remaining is called chlorine residual or bromine residual. You can determine the disinfectant residual of your pool water with a reliable test kit, available from your local pool supply store.

You must maintain a disinfectant residual level adequate enough to assure a continuous kill of bacteria or virus introduced into pool water by swimmers, through the air, from dust, rain or other sources.

It is wise to test pool water regularly. Never allow chlorine residual to drop below 0.6 ppm (parts per million). The minimum level for effective chlorine or bromine residual is 1.4 ppm.

**pH** - The term pH refers to the acid/alkaline balance of water expressed on a numerical scale from 0 to 14. A test kit for measuring pH balance of your pool water is available from your local pool supply store; see pH Chart.

	pH Chart													
Strongly Acid Neutral								Str	ongly	Alk	aline			
0	1	2	3	4	5	6	6 7 8 9 10					12	13	14

Muriatic Acid has a pH of about 0. Pure water is 7 (neutral). Weak Lye solution have a pH of 13-14.

**RULE:** 7.4 to 7.6 is a desirable pH range. It is essential to maintain correct pH, see pH Control Chart.

# If pH becomes too high (over alkaline), it has these effects:

- 1. Greatly lowers the ability of chlorine to destroy bacteria and algae.
- 2. Water becomes cloudy.
- 3. There is more danger of scale formation on the plaster or in the heat exchanger.
- 4. Filter elements may become blocked.

# If pH is too low (over acid) the following conditions may occur:

- 1. Excessive eye burn or skin irritation.
- 2. Etching of the plaster.
- 3. Corrosion of metal fixtures in the filtration and recirculation system, which may create brown, blue, green, or sometimes almost black stains on the plaster.
- 4. Corrosion of copper in the heater, which may cause leaks.
- 5. If you have a sand and gravel filter, the alum used as a filter aid may dissolve and pass through the filter.

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Do not test for pH when the chlorine residual is 3.0 ppm or higher, or bromine residual is 6.0 ppm or higher. See your local pool supply store for help in properly balancing your water chemistry.

**RULE**: Chemicals that are acid lower pH. Chemicals that are alkaline raise pH.

pH Control Chart

6.8 7.0	7.2	7.4 7.6	7.8	8.0 8.2 8.4
Add Soda, Ash or Sodium Bicarbonate	Marginal	Ideal	Marginal	Add Acid

#### ALKALINITY High - Low:

"Total alkalinity" is a measurement of the total amount of alkaline chemicals in the water, and control pH to a great degree. (It is not the same as pH which refers merely to the relative alkalinity/acidity balance.) Your pool water's total alkalinity should be 100 - 140 ppm to permit easier pH control.

A total alkalinity test is simple to perform with a reliable test kit. You will need to test once a week and make proper adjustments until alkalinity is in the proper range. Then, test only once every month or so to be sure it is being maintained. See your local pool dealer for help in properly balancing the water chemistry.

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

- 1. Examine the vent system. Make sure there are no obstructions in the flow of combustion and ventilating air.
- 2. Inspect the heat exchanger for soot. Clean as necessary.
- 3. Remove burner tray and clean burners and main burner orifices.
- 4. Keep the heater area clean and free from combustibles and flammable liquids.



- 5. Check wire ends and wire connections. They should be clean and tight.
- 6. Check the gas pressure as described in this manual.
- 7. To protect controls and cabinet finish, periodically spray with penetrating oil and wipe off.

# **ACAUTION**

Spray with the heater "OFF"; Oil is "Flammable".



### Spring and Autumn Operation

If the pool is being used occasionally, do not turn the heater completely off. Set the thermostat down to 65° F. This will keep the pool and the surrounding ground warm enough to bring the pool up to a comfortable swimming temperature in a shorter period of time.

### Winter Operation

If the pool won't be used for a month or more, turn the heater off at the main gas valve. **Where freezing is possible,** it is necessary to drain the water from the heater. This may be done by opening the drain valve located at the inlet/outlet header allowing all water to drain out of the heater. Use compressed air to blow the water out of the heat exchanger. Also, disconnect the pressure switch, this will prevent freeze damage to the switch.

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If the heater has been drained for freezing condition, do NOT turn "ON" until the system is circulating water.

#### NOTE

Water trapped in the heat exchanger can result in freeze damage to the exchanger or headers. **Freeze damage is specifically not covered by the warranty.** 

#### **Relief Valve**

In some installations, a relief valve is required on the MiniMax Plus. Test the relief valve at least once a year by lifting the valve lever. (A.S.M.E. version varies slightly and has the relief valve pre-installed at factory.)



### Maintenance - Burner Tray Removal

At some time during the life of a heater, you may need to inspect and repair the parts of the heater that allows the gas to flow from the gas supply line into the burners. If the heater won't fire and you wish to check these gas controls:

1. Turn off the gas supply.



- 2. Disconnect the gas union at the heater.
- 3. Remove the gas pipe installed into the gas valve.
- 4. Remove the gas valve holding bracket.
- 5. Remove the gas valve wires.
- 6. Disconnect the ignition wire.
- 7. Slide the burner tray out.



- 8. You can remove the gas valve if you need to check the inlet and outlet screens. (You will have to remove the pilot tubing.)
- 9. Remove the bracket that holds the burners in place.



10. Remove each burner and check for any blockages.



11. Remove the main burner orifices and check for blockage.



#### NOTE

If the heater has been off for the winter or has been installed, but not fired for an extended period of time, insects will crawl into these orifices and the pilot orifice and prevent the heater from firing.

12. Remove the pilot orifice and clean it. (Do not use any sharp object! It will destroy the designed orifice size!)



#### NOTE

You can use this procedure if you have to change fuel-type - natural to propane or vice versa. The parts needed to convert the MiniMax are: **Gas** valve, pilot assembly, main burner orifices and module.

### Maintenance - Desooting

### Common Causes of Sooting

- 1. Low gas pressure.
- 2. Inadequate air supply or inadequate venting.
- 3. Foreign material in burners and orifices; dirt, spider webs, etc.
- 4. Excessive water flow can cause condensation which will contribute to sooting.
- 5. Heater cycling rapidly; fires, shuts down and refires quickly 30-45 seconds.

# To remove a light soot formation without removing the heater exchanger:

1. Remove burner tray.



2. Remove top, inner lid, flue collector and baffles.





- 3. Using a brush with plastic or wood bristles, brush the bottom of the tubes and then the top of the tubes.
- 4. Spray off residue with water. (Repeat steps 3-4 as needed).
- 5. Brush off burners.
- 6. Replace burner tray and baffles, then test fire.

7. If flames burn clean, replace baffles, flue collector, and top.

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#### DO NOT USE WIRE BRUSH!

For heavy soot accumulation which cannot be successfully removed by merely brushing, the heat exchanger must be removed from the heater.

1. Disconnect the plumbing at the flanges. Remove the thermistor, hi-limit wires from the inlet outlet heater.



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When lifting the heat exchanger out of the fire box, use caution so as not to damage the fire wall.

2. Remove the heat exchanger.



- 3. Place exchanger in an area that won't be affected by chemicals or strong detergents.
- 4. After spraying the exchanger with water, use a mixture of detergent and water. Pour, spray or brush on.
- 5. Rinse the solution off of the tubes and inspect them, repeat if necessary.

### Maintenance - Reinstalling Heat

#### **Reinstalling Heat Exchanger**

1. Inspect fire box for damage or cracks that would allow heat to leak out into the outer cabinet and controls.



- 2. Remove any old sealant from fire box.
- 3. Apply new sealant to the fire box using a quality industrial grade R.T.V. or equivalent. The sealant must completely seal the space between the heat exchanger and fire box, so that when the heater is firing, heat does not escape to the outer cabinet.



4. Place heat exchanger into the box and push down firmly, until the heat exchanger sets solidly on the fire box.



5. Reconnect the inlet and outlet flange to the headers (use new flange gaskets), be careful not to move the heat exchanger and break the seal.



6. Reinstall baffles, flue collector, inner lid and top.



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Do not store combustible material, gasoline and other flammable vapor and liquids in the vicinity of this or any other appliance.



# Glossary

- 1. **BURNER:** A device for the final conveyance of gas, or a mixture of gas and air, to the combustion zone.
- 2. **BUTANE:** A hydrocarbon fuel gas heavier than methane and propane and a major constituent of liquefied petroleum gases.
- 3. **CIRCUIT BOARD:** Interprets signals from potentiometers and thermistor.
- 4. **COMBUSTION:** The rapid oxidation of fuel gases accompanied by the production of heat or heat and light.
- 5. **COMBUSTION AIR:** Air supplied in an appliance specifically for the combustion of a fuel gas.
- 6. **CUBIC FOOT OF GAS:** (Standard Conditions). The amount of gas which will occupy 1 cubic foot when at a temperature of 60° F. and under a pressure equivalent to that of 30 inches of mercury.
- 7. **DRAFT HOOD:** (Draft Diverter). A device built into an appliance, or made part of a vent connector from an appliance, which is designed to: (1) assure the ready escape of the products of combustion in the event of no draft, backdraft, or stoppage beyond the draft hood; (2) prevent backdraft from entering the appliance; and (3) neutralize the effect of stack action of a chimney or gas vent upon the operation of the appliance.
- 8. **DOWNDRAFT:** Excessive high air pressure existing at the outlet of chimney or stack which tends to make gases flow downward in the stack.
- 9. **FLASHBACK:** An undesirable flame characteristic in which burner flames strike back into a burner to burn there or to create a pop after the gas supply has been turned off.
- 10. **FLOATING FLAMES:** An undesirable burner operating condition, usually indicating incomplete combustion in which flames leave the burner ports to "reach" for combustion air.
- 11. **FLUE GASES, FLUE PRODUCTS:** Products of combustion and excess air in appliance flues or heat exchangers before the draft hood.
- 12. **GAS VALVE:** A device that allows gas to flow from the gas supply line into the pilot assembly and into the main burners after receiving voltage from the module.
- 13. **HEAT EXCHANGER:** Any device for transferring heat from one fluid to another.
- 14. **HIGH LIMITS:** Devices installed into the outlet side of the inlet/outlet header, designed to shut heater off when water temperature reaches 150° F.
- 15. **IGNITION WIRE:** Heavy duty wire attached to the module and the pilot ignitor, that carries voltage to the pilot ignitor and back to the module to signal the gas valve to open when the pilot flame is established.
- 16. LIQUEFIED PETROLEUM GASES: The terms "Liquefied Petroleum Gases" "LPG" and "LP Gas"

mean and include any fuel gas which is composed predominantly of any of the following hydrocarbons, or mixtures of them: propane, propylene, normal butane or isobutane and butylenes.

- 17. **MANIFOLD:** The conduit of an appliance which supplies gas to the individual burners.
- 18. **MODULE:** Device that sends signals to the pilot ignitor and gas valve. The module starts the pilot spark and main burner sequence.
- 19. **NATURAL DRAFT:** The motion of flue products through an appliance generated by hot flue gases rising in a vent connected to the furnace flue outlet.
- 20. **NATURAL GAS:** Any gas found in the earth, as opposed to gases which are manufactured.
- 21. **ORIFICE:** An opening in an orifice cap (hood), orifice spud or other device through which gas is discharged, and whereby the flow of gas is limited and/ or controlled.
- 22. **PILOT IGNITOR:** Receives spark from module and establishes a pilot flame just prior to main burner ignition.
- 23. **POTENTIOMETER:** Registers desired temperature setting on circuit board.
- 24. **PRESSURE SWITCH:** A normally open switch that closes with adequate water pressure.
- 25. **PRIMARY AIR:** The combustion air introduced into a burner which mixes with the gas before it reaches the port. Usually expressed as a percentage of air required for complete combustion of the gas.
- 26. **PROPANE:** A hydrocarbon gas heavier than methane but lighter than butane. It is used as a fuel gas alone, mixed with air or as a major constituent of liquefied petroleum gases.
- 27. **SOOT:** A black substance, mostly consisting of small particles of carbon, which can result from incomplete combustion and appear as smoke.
- 28. **TRANSFORMER:** A coil device that changes high voltage to low voltage.
- 29. THERM: A unit of heat energy equal to 100,000 Btu.
- 30. **THERMAL CUT OFF:** A one shot soldered pill type fuse that melts and interrupts power to the controls if the temperature becomes to high in the gas valve area.
- 31. **THERMISTOR:** Installed in the inlet/outlet header, senses water temperature and tells circuit board when to shut heater off.
- 32. **VENT:** A device, such as a pipe, to transmit flue products from an appliance to the outdoors. This term also is used to designate a small hole or opening for the escape of a fluid (such as in a gas control).
- 33. **WATER COLUMN:** Abbreviated as W.C. A unit used for expressing pressure.

### DIAGNOSTIC LIGHT OPERATION

The circuit board in the MiniMax Plus uses lights that are wired in sequence with the controls. The MiniMax Plus still uses the same controls as the original MiniMax but this method of wiring is more helpful while trouble shooting.

Sequence wiring means that each control is wired separately from the other controls and they are independently attached to the circuit board. This is how the wiring method works to help diagnose a problem.

Power is connected to the board directly from the Transformer. So, if the Transformer is wired correctly and is being supplied with voltage, the Power Light will be "ON".

When you push the Pool/Spa Switch to either position and turn the thermostat knobs to Hot, the voltage is transferred into the circuit board, through the Thermistor, Potentiometer and down to the Remote Control terminals. If the Thermistor and Potentiometer are working the "T"STAT Light will come "ON".

If there is a Remote Control connected to these terminals, the voltage travels to the remote switch and back to the circuit board and the "AUX" Light comes "ON". If there is no remote, there will be a Jumper wire across the remote terminals causing the "AUX" Light to come "ON".

If the voltage comes across the remote control terminals, it will go back into the circuit board and go to the Pressure Switch. If the Pump is On and Primed and there is enough water flow, the Pressure Switch will close and the "PRESS" Light will come "ON".

On the back of the circuit board, there are (3) more lights. "HIGH LIMIT", "THERMAL CUT OFF" and "PILOT VALVE". Voltage must travel to and through the High Limits, Thermal Cut Off and finally to the Orange "Pilot Valve" wire before the Module will start to Spark. And each time the voltage goes through a control, indicating that the control is working, the voltage must go back to the circuit board, where it lights the control indicator light.

With this method of wiring we can easily see which control is not working by looking at the FIRST LIGHT that is NOT LIT because we know that voltage has to pass through the control and back to the board in order for the light to come "ON". If the Light is **NOT** "ON", look at that control first.



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- 1. The POWER Light indicates voltage to the circuit board from the Transformer. On the previous MiniMax heaters, the voltage from the transformer went through a switch and the switch had to be pushed either to Pool or Spa in order for the light to come on. The MiniMax Plus Power Light will be On without pushing the Pool/Spa switch, as long as there is power being supplied to the transformer.
- 2. The T-STAT Light or Thermostat Light will come on if there is voltage to the Potentiometers and they are turned to the Hot Position and the water temperature is below the hot set point.
- 3. The AUX Light or Remote Switch Light will come on if the Remote control is operating properly and/ or is attached to the back of the circuit board correctly. If the heater is not connected to a remote switch, there will be a small jumper wire attached to the circuit board to make the light come on.
- 4. The PRESS Light is attached to the Pressure Switch and will come on if the Pump is On and is pumping enough water to create enough water pressure to close the points on the Pressure Switch.

### DIAGNOSTIC LIGHTS

- 5. The HEAT Light is attached to the MV (Main Valve) terminal on the module. This terminal does not receive voltage until a Pilot Flame has been established. Once the MV terminal has voltage, it tells the Gas Valve to open and gas flows to the Burners and is ignited by the pilot flame.
- 6. The SERVICE Light is a dual purpose light. When the Pilot is sparking, the Service Light will be on until the pilot Flame is established. The Service Light will also be on if there is a problem with the High Limits, Thermal C/O or Pilot Valve on the Module.

#### NOTE

Each Diagnostic Light is wired in sequence. Meaning that the power must pass through the "**T**" **STAT** *first*, the **AUX** *second*, the **PRESS** *third* and then to the **HEAT LIGHT** *fourth*. If any control fails or the wiring to that control does not transfer voltage to that control, the designated light will not be lit. So, by checking for the first light that is **not** on, we suspect that control or connecting wire to be at fault.



### MiniMax Plus Troubleshooting/Check List

- 1. Look at the lights/which ones are on?
- 2. Check for correct voltage on both sides of the transformer.
- 3. Check Ignition wire connections on the module and the pilot ignitor.
- 4. Check position of pilot to the burner and check the components for correct spacing.
- 5. Check the wire harness and wire connections to the circuit board.
- 6. Check for true ground and good ground connections.
- 7. Push the Pool/Spa switch "ON" and turn Pots Cold to Hot.
- 8. Make sure the Pump is running and is primed.
- 9. Remove any Remote Control wires from the heater circuit board and replace the jumper wire while testing.



This list will suggest situations that might cause this symptom.

- 1. Check water temperature if the water has reached the desired temperature, the thermostat will cut off power to the module and the heater will stop firing. In this case the "Power" Light would remain "ON".
- 2. Check the voltage on both sides of the transformer there should be 24VAC on the secondary side to enable the controls to operate. If the voltage is less than required, there is probably a wiring short or the transformer has been incorrectly wired on the primary or supply side. Because the Power Light is not a specific 24VAC light, it will illuminate with less than 24VAC, so even if we see a power light we cannot assume that correct voltage is present.
- 3. The Pool/Spa switch may have inadvertently been switched "OFF" - even though the Pool/ Spa switch does not have to be ON for the Power Light to be ON, it does have to be pushed to either the Pool or Spa position in order to transfer the voltage to the rest of the controls.

### DIAGNOSTIC LIGHTS SHOW "POWER" ONLY!

- 4. Make sure the Thermostat knobs have been turned to "Hot" - because the voltage must pass through the thermostat (potentiometer) first before going to any other control, if the potentiometers or thermistor is not working or disconnected from the circuit board, only the Power Light will be on. If you suspect this may be the problem, first check the thermistor connections on the back of the circuit board. (replace thermistor if necessary) and if you still only see the power light attach a jumper wire across the connections on the potentiometer. When voltage passes through the thermostat circuit (potentiometer/thermistor), whether by normal operation or by jumper wire, the "T"STAT Light will come On.
- 5. If there is a "Remote" switch or control attached to the heater, make sure that it has been switched to "ON" or change it to manual operation. To be absolutely sure the Remote is not keeping the heater off, disconnect the remote wires from the back of the circuit board and attach a jumper across the two terminals.
- 6. Last, but not least check the wiring diagram to see if all the wires are connected to the correct control terminals.



### POWER / T-STAT ONLY!

This list will suggest situations that might cause this symptom.

- 1. Remote Control switch "OFF" switch remote to "Service" or "Manual" or remove remote control wiring and replace jumper wire on back of circuit board.
- 2. Control wires attached to wrong terminals or not connected **check wiring Schematic and wiring connections.**
- 3. Defective circuit board check voltage at remote control terminals on the back of circuit board. If you don't see voltage, replace the board.





# Troubleshooting *POWER / TESTAT / AUX / PRESS / SERVICE /*

This list will suggest situations that might cause this symptom.

- 1. Check the 3 lights on the back of the Circuit Board. These 3 lights are connected to 3 different controls in this order **#1 High Limit. #2 Thermal C/O. #3 Pilot Valve.**
- If the Pilot Valve light is Off, check the wiring from the circuit board to the module Red wire should be attached to the MV terminal White wire should be attached to the MV/PV terminal Blue wire should be attached to the PV terminal and the Orange wire should be attached to the #6 Terminal. There will be 2 Ground wires attached to the Module. #4 Ground wire to the Gas Valve. #5 Ground wire to the cabinet.
- 3. If all the wiring is correct and still no Pilot Valve light, pull the Orange wire off of the #6 Terminal at the Module and test the wire for 24VAC if there is 24VAC, that means the Board is O.K. and the Module is defective. If you do not see 24VAC at the wire, the Board is defective.
- 4. If the Thermal C/O Light is out the Thermal C/O is defective.
- 5. If the High Limit Light is out the High Limit is keeping the Heater off, (see Service Light).





### THE SERVICE LIGHT

This list will suggest situations that might cause this symptom.

- 1. The primary responsibility for the Service Light is to illuminate whenever there is a trial for pilot. After the Pilot Ignitor sparks, gas flows through the pilot orifice where it is ignited by the spark and a pilot flame is established, the spark goes out and the Service Light goes out. If the Service Light stays On and the pilot continues to spark and still **no** pilot flames is established **check for:** 
  - A. Gas line NOT bled.
  - B. Pilot Orifice plugged.
  - C. No Voltage at P.V. Terminal at Gas Valve.
  - D. Defective Gas Valve.
- 2. The Service Light will also come On if the Pilot goes out due to a bad or loose ignition wire or anything that would cause the pilot to restart the spark sequence. So if the Service Light comes On and the heater stops firing and then the heater fires and the Service Light goes out, simulating a Rapid Cycle, it can be caused by a loss or weak signal to the Module, by the Pilot.
- 3. The Service Light will come On if the water temperature in the Header reaches the High Limit Switch Temperature (150 degrees). To confirm this, check the 3 lights on the back of the board. (The High Limit Light is the first one in sequence.) If the Hi-Limits were causing the cycling, the 3 lights would flash Off and On as the heater shut down and refired.



If a weak pilot signal causes the cycling, the Service Light will go On and Off, but the High Limit Light will remain On. If water temperature causes the cycling, the Service Light will go On and Off **AND** the High Limit Light will go On and Off as well.



If the pilot flame has been established but the main burners won't fire:

1. Check for voltage at the Red wire (MV) on the gas valve. If there **is 24VAC present**, the gas valve should open allowing gas to flow to the main burners where the pilot will ignite the gas and you should have combustion. If this does not happen the gas valve may be defective.



2. If the is "NO" voltage at the Red wire, at the gas valve, test for voltage at the #1 Terminal on Module (Red Wire).

If there is 24VAC present, the Wire Harness is defective.

If there is 0 volts, the Module is defective.



### CYCLES RAPIDLY

If the heater fires, shuts down and refires every 30-45 seconds and the Service Light comes On and goes Off alternately with the Heat Light, this indicates that the High Limit Switches (installed into the inlet/outlet header) are sensing a temperature of 150 degrees.

This is generally caused by a lack of water inside the heat exchanger, while the heater is firing.

### Things To Look For:

- 1. The pump is worn out.
- 2. The pump doesn't pump enough water.
- 3. The pump impeller is plugged.
- 4. A valve on the return side of the heater has been turned off.
- 5. The pump is a 2 speed and is on low speed.
- 6. Something blocking the water flow to the exchanger.
- 7. The flow valve is defective or damaged.

#### NOTE

The flow valve is installed in the inlet/outlet header and allows water to by-pass when the heater is not firing. When the heater fires, the flow valve forces more cold water into the exchanger by closing the by-pass opening.

You can test the flow valve by removing it from the heater and placing the power element in hot water. If the power element rod extends and forces the by-pass disc to move toward the mounting plate and retracts when placed in cold water, the flow valve is O.K., but if it does not move, replace the power element.

The power element is copper, so water with a low pH (7.4 or lower) and or water velocity (too much flow) will cause the element to fail and the heater will cycle rapidly.

#### If there is not enough water in the heat exchanger to prevent the heater from cycling, the inlet/outlet header will be too hot to touch.

If you check all the water related causes of rapid cycling and do not find the problem, the cycling may be caused by an electrical nuisance shut down. (Wiring connections, inadequate grounding, pilot ignitor defective or not aligned properly or defective ignition wire.) If you have followed the directions "**BEFORE**" troubleshooting, the wiring possibilities should be minimal.

# NOTE

Either Flow Valve will work in ALL MiniMax heaters.







Newest - Production Date 8/99

When the pilot will not light or stay lit, there are five possible causes:

- 1. A weak or defective pilot generator.
- 2. A plugged or partially plugged pilot orifice.
- 3. A short in the control wiring.
- 4. A defective pilot safety in the gas valve.
- 5. Not enough gas.

#### NOTE

Before any testing is started; (1) Clean out the pilot orifice. (2) Install a new pilot generator. (3) Clean all wire connections and make sure they are attached to the correct controls and terminals. (4) Turn the gas on.

On the Honeywell Millivolt gas valve there are three screw terminals located on top of the valve. One terminal will be marked TH/PP. On this terminal, one pilot generator wire and one wire from the control wiring in attached. The other two terminals will be marked T.H. and P.P. separately. The other pilot generator wire should be attached to the terminal marked P.P. The other heater control wire will be attached to the remaining terminal marked T.H.

Attach your millivolt meter leads to the two pilot generator terminals. Turn gas valve knob to "PILOT" and push down. Light the pilot. If the millivolt meter reading drops below zero, simply reverse your millivolt meter leads. The meter should read at least 500 M.V. (millivolts) and in some instances, go as high as 650 M.V. (pilot only). With a new generator and clean pilot orifice installed, if you release the gas valve knob and the pilot goes out, the gas valve is defective.

Before you replace gas valve, disconnect the 2-TH wires so that the gas valve won't be receiving any false signals from any of the controls or wiring causing the pilot flame to go out. Now, if the pilot won't stay lit, replace the valve. If the pilot stays lit, with control wires removed, there is a short in the wiring.

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#### PILOT LIT - BURNERS WON'T FIRE

#### **Before This Test**

- 1. Is the pump running and primed?
- 2. Is the filter clean? Are you sure?
- 3. Are all switches on?
- 4. Are the thermostats turned up?
- 5. Are there any valves that would prevent water from reaching heater?
- 6. Clean main burner orifices.

Attach a jumper wire to the two TH terminals on the gas valve. If the valve opens and the burners fire, the gas valve is "OK". If the burners "do not" fire, gas valve is defective.

This test bypasses all the other heater controls. So you instantly know if the problem is in the gas valve or the controls.

If the heater fires, remove the jumper wire from the gas valve and attach it to each individual control to find out which one is keeping the heater off.

#### PRESSURE SWITCH

If heater fires when you jumper the pressure switch, the switch is suspect. Before replacing the switch, make sure wire terminals are clean and tight, the pressure switch tube is clear and the filter is clean. If all the tests and checks prove positive, replace pressure switch.

#### THERMOSTAT

If you attach a jumper wire to the thermostat terminals or wires and the heater fires, the thermostat is suspect. Before replacing, check wire terminals, make sure they are tight and clean, and make sure the thermostat sensing bulb is inserted into the inlet/outlet header.

#### HI-LIMITS - OFF/ON SWITCH -THERMAL CUTOFF

Use the same jumper wire procedure on the High-Limits, Off/On Switch and Thermal Cut/Off.

#### SLOW CYCLE LOW GAS PRESSURE

If the gas pressure is too low, the pilot will light, because the pilot doesn't require much gas. When the main burners fire, they require a lot of gas, so they steal gas from the pilot. The pilot flame diminishes and the pilot generator loses power or the millivolts decrease and when the millivolts reach gas valve drop out, the valve shuts off.

#### MILLIVOLT

When main burners shut down, the gas pressure increases in the pilot tube, until the pilot flame heats the generator enough to cause the gas valve to open and the main burners refire.

This sequence may take as long as 5 - 10 minutes. You need a millivolt meter to diagnose this problem. The meter will read 250 MV when heater fires, but as the gas is robbed from the pilot, the millivolts will drop lower and lower until the gas valve shuts down and then the millivolts will increase until the generator has enough power to open the valve again.

#### IF FIRE BOX IS DAMAGED

When the fire box is damaged enough to allow the heat to leak out onto the thermostat wire, the thermostat sensing bulb will tell the heater to shut off prematurely.

You can spot this problem by watching the millivolt meter. When the heater fires the reading should be close to 250 MV. As the thermostat wire heats up and travels to the sensing bulb. The millivolts increase slowly until they reach 500-600 MV or open circuit and the heater shuts off. Also if you turn the thermostat up one or two degrees, the heater will refire and then shut down. This sequence will repeat until you cannot turn the thermostat up any further.



# **MiniMax Electronic Wiring**

### MAY 1991 - 1997



#### MINIMAX WIRING DIAGRAM (MILLIVOLT) DUAL THERM

ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THIS HEATÉR MUST BE REPLACED. INSTALLER MUST SUPPLY (NO. 18 AWG 105° C U.L. & C.S.A. FOR CANADA) COPPER WIRE.



# MiniMax Millivolt Wiring

AFTER 1-15-01

IF ORIGINAL FACTORY WIRING MUST BE REPLACED, INSTALLER MUST SUPPLY UL OR CSA (IF CANADA) APPROVED WIRE, 18 GAUGE, 600V, 105 C° TEMPERATURE RATING. THERMAL FUSE WIRING MUST BE REPLACED WITH UL OR CSA (IF CANADA) APPROVED WIRE, 18 GAUGE, 600V, 125 C° TEMPERATURE RATING. INTERCONNECTING WIRING TO APPLIANCE MUST CONFORM TO THE NATIONAL ELECTRICAL CODE OR SUPERCEDING LOCAL (WIRING) CODES.



# **Tests and Adjustments**

- 1. Push power switch off.
- 2. Turn gas valve knob off.
- 3. Remove pressure tap plug.
- 4. Attach the Manometer.
- 5. Turn gas valve knob on.
- 6. Push power switch on.
- 7. Fire heater and read Manometer.

MiniMax Gas Pressure Requirements						
	Natural	Propane				
Maximum inlet gas pressure Minimum inlet gas pressure Normal Manifold pressure ** 6 WC for model 400	10" WC 5" WC** 4" WC	14" WC 12" WC 11" WC				

#### These measurements must be read while heater is firing.

NOTE: If pressure is low, check meter and line size.

#### Heaters installed below water level require adjustment of the pressure switch.

- 1. Backwash filter and clean the pump hair and lint basket before making any adjustment to the pressure switch.
- 2. Switch the circulation pump on and make sure it is primed.
- 3. Push the heater power switch on and set the thermostats to their highest temperature settings.
- 4. Clean the locktight off of the pressure switch adjustment knob threads.
- 5. Turn the adjustment knob clockwise or away from the micro-switch, until the heater shuts down.



**Counter-Clockwise** 

- 6. Turn the adjustment knob counter-clockwise 1/2 turn and the heater should refire.
- 7. Turn the pump off and the heater should shut down. If heater does not shut down, repeat procedure.
- 8. Switch pump off and on several times to assure proper adjustment.

#### NOTE

If pool is more than 1 floor above or one floor below, the pressure switch may have to be replaced with a flow switch.







### **VENT TEST**

A quick check of your venting installation. Allow heater to operate for 15 minutes. Close the doors in the room. then strike a wooden match and blow out the flame. With the match smoking, hold next to the draft hood. If the smoke is pulled up into



the vent and out of the room, the venting is correct. If it does not, you must make venting corrections.

**MINIMAX PLUS HEATER - ALL MODELS - Replacement Parts** 



### MiniMax Plus (Only) Parts List

ITEM	DESCRIPTION	QTY	150	195/200	250	300	350	400
1	Vent kit assy. (indoor)	1	460227	460228	460230	460231	460233	460234
1a	Vent kit assy. (outdoor)	1	460237	460222	460223	460224	460225	460226
2	Return header	1	070994	070994	070994	070994	070994	070994
3	Bracket washer	2	074216	074216	074216	074216	074216	074216
4	Bolt HH 3/8" x 2"	4	073739	073739	073739	073739	073739	073739
5	Bolt 3/8" - 16 x 1 1/2"	4	070416	070416	070416	070416	070416	070416
6	Washer 3/8" ID 1" OD	4	072180	072180	072180	072180	072180	072180
7	Tube seal gasket	18	070951	070951	070951	070951	070951	070951
8	Transformer - w/circuit breaker - dual voltage	1	471360	471360	471360	471360	471360	471360
9	Thermostat circuit board - IID	1	470179	470179	470179	470179	470179	470179
10	Module natural gas	1	073584	073584	073584	073584	073584	073584
	Module propane gas	1	073585	073585	073585	073585	073585	073585
11	Junction Box	1	470122	470122	470122	470122	470122	470122
12	Thermostat knob	2	470184	470184	470184	470184	470184	470184
13	Switch rocker (single pole & double throw)	1	470186	470186	470186	470186	470186	470186
	Control panel assy. (complete) - IID Nat	1	470295	470296	470297	470298	470299	470187
14	Control panel assy. (complete) - IID Pro	1	470987	470988	470989	470990	470991	470992
	Control panel assy. (complete) - Millivolt	1	471020	471021	471022	471023	471024	471025
15	Door - IID or Millivolt	1	075468	075604	075488	075605	075606	075490
16	Manifold burner	1	070256	075525	070257	075526	075527	070258
	Gas valve natural - IID	1	073998	073998	073998	073998	073998	073998
17	Gas valve propane- IID	1	073999	073999	073999	073999	073999	073999
	Gas valve natural - Millivolt	1	075457	075457	075457	075457	075457	075457
	Gas valve propane - Millivolt	1	075458	075458	075458	075458	075458	075458
18	Pilot tube - IID	1	075191	075191	075192	075192	075193	075193
	Pilot tube - Millivolt		075471	075471	075471	075471	075471	075471
	Burner tray assy. natural (complete) - IID	1	073752	075499	073751	075500	075501	073750
19	Burner tray assy. propane (complete) - IID	1	073906	075508	073905	075509	075510	073904
	Burner tray assy. natural (complete) - Millivolt	1	075493	075496	075494	075497	075498	075495
	Burner tray assy. propane (complete) - Millivolt	1	075502	075505	075503	075506	075507	075504
			2 EA.	3 EA.	4 EA.	5 EA.	6 EA.	7 EA.
20	Burner		070230	070230	070230	070230	070230	070230
20a	Burner with Pilot Bracket	1	470550	470550	470550	470550	470550	470550
21	Pressure switch	1	470190	470190	470190	470190	470190	470190
22	Combustion chamber assy. (complete)	1	073858	075586	073857	075587	075588	073856
23	Valve drain 3/4"	1	072134	072134	072134	072134	072134	072134
24	Presslite igniter assy.	1	075459	075459	075459	075459	075459	075459
25	Valve relief 3/4" 50# - ASME or Local Code	1	072138	072138	072138	072138	072138	072138
26	Thermostat Millivolt	1	072022	072022	072022	072022	072022	072022
27	Flow valve assy., Standard (complete)	1	471424	471424	471424	471424	471424	471424
	Flow valve assy., ASME (complete)	1	073989	073989	073989	073989	073989	073989
28	Flow valve gasket	4	074015	074015	074015	074015	074015	074015
29	Bolt 3/8" - 16 x 2 1/2	2	075492	075492	075492	075492	075492	075492
30	Quick flange Kit	1	075284	075284	075284	075284	075284	075284

ITEM	DESCRIPTION	QTY	150	195/200	250	300	350	400
31	Bushing in/out Lexan	2	070544	070544	070544	070544	070544	070544
22	Sleeve, rubber in/out 2"	2	071895	071895	071895	071895	071895	071895
32	Sleeve, rubber in/out 11/2"	2	070229	070229	070229	070229	070229	070229
33	Safety Shutoff	2	071017	071017	071017	071017	071017	071017
34	Main header (in/out)	1	070985	070985	070985	070985	070985	070985
35	Heat exchanger (without heads)	1	074452	075628	074451	075629	075630	074074
35	Heat exchanger (with heads)	1	470364	470365	470366	470367	470368	470369
			8 ea.	8 ea.	8 ea.	8 ea.	16 ea.	16 ea.
36	Baffle		070277	075559	070276	075560	070277	070278
37	Baffle hold down (2) baffles on 400	1	073810	073810	073810	073810	073810	073810
38	Flue collector	1	073864	075622	073863	075623	075624	073862
39	Outdoor Top assy.	1	470471	470472	470473	470474	470475	470476
40	Lightback Shield (Natural Gas units only)	1	075783	075784	075785	075786	075787	075788
* [	lot Shown							
*	Plastic mounting bracket		070715	070715	070715	070715	070715	070715
*	Wire Kit - Harness		470965	470965	470965	470965	470965	470965
*	Wire Harness assy prior to 11/1/97	1	073732	073732	073732	073732	073732	073732
*	Wire Kit - Millivolt		075511	075511	075511	075511	075511	075511
*	Screw 8 x 1/4" HH		071703	071703	071703	071703	071703	071703
*	Screw 8 x 1/2" HH		071698	071698	071698	071698	071698	071698
*	Screw 6 x 1/4"		071716	071716	071716	071716	071716	071716
*	Screw 10 -32 x 1/4"		071659	071659	071659	071659	071659	071659
*	Screw 10-32 x 3/16		075692	075692	075692	075692	075692	075692
*	Bushing 1/2"		070551	070551	070551	070551	070551	070551
*	Therm knob stopper	2	470414	470414	470414	470414	470414	470414
*	Bolt 5/16" - 18 x 3/4'	2	073725	073725	073725	073725	073725	073725
			3 ea. N	4 ea. N	5 ea.	6 ea.	7 ea.	8 ea. N
	Orifica main humar natural		or P	or P	N or P	N or P	N or P	or P
*			073727	073727	073727	073727	073727	073727
*	Dillet returner JUD	1	0/3/28	0/3/28	0/3/28	073728	073728	073728
*	Pilot - Natural - IID	1	4/1204	4/1204	4/1204	471204	4/1204	471204
*	Pilot - propane - TD	1	4/1205	471205	471205	471205	471205	471205
*	Pilot - natural - millivolt	1	4/1292	4/1292	4/1292	4/1292	4/1292	4/1292
*	Pilot - propane - minivoit	1	4/1291	4/1291	4/1291	4/1291	4/1291	4/1291
L ^	Pliot - generator		0/1515	0/1515	0/1515	071515	071515	071515
			0/51/3	0/51/3	0/51/3	0/51/3	0/51/3	075173
	I nermistor (probe) complete		4/0180	4/0180	4/0180	4/0180	4/0180	4/0180
	Power element (flow-valve)		4/01/8	4/01/8	4/01/8	4/01/8	4/01/8	4/01/8
	Pilot rainshield		4/1293	4/1293	4/1293	4/1293	4/1293	4/1293
×	Pilot electrode (only)		4/1328	4/1328	4/1328	4/1328	4/1328	4/1328
×	Stem, thermostat control	2	4/0181	4/0181	4/0181	4/0181	4/0181	4/0181
*	Accessory Bag/Quick Flange Kit	1	0/5284	0/5284	0/5284	0/5284	0/5284	0/5284
*	Bracket adapter Q379 pilot MV		471271	471271	471271	471271	471271	471271

### MiniMax Plus (Only) Parts List, contd.

# NOTES

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Because reliability matters most

# MiniMax Plus and PowerMax Heaters Limited Warranty

Your MiniMax Plus pool heater is another quality product from Pentair Pool Products Inc. and is backed by the following warranty.

1. The following parts are warranted for 5 years from date of purchase:

The MiniMax Plus and PowerMax cabinet and combustion chamber, the main burners and burner manifold, the inlet/outlet header and the return header. This warranty does not cover rusting or corrosion on cabinets or burners that does not affect the heater's operation.

2. The following parts are covered for 2 years from date of purchase:

The automatic flow control valve, all controls, heat exchanger, pilot generator and the pilot assembly.

This warranty only applies to the original purchaser.

3. This warranty shall not apply to any units or parts which have been subject to accident, negligence, alteration, abuse, misapplication or misuse.

The above warranty applies only if the heater is installed and operated in complete compliance with the installation and operation manual provided with each unit. Copies of this manual are available by writing to Pentair Pool Products Inc., at the address below.

Pentair Pool Products Inc., assumes no liability except for the repair or replacements of parts as specified above. Ship defective parts or equipment along with serial number and purchase date, transportation prepaid to the address below. Purchaser shall be responsible for freight charges for return of merchandise to purchaser. Some states do not allow exclusion or limitation of incidental or consequential damages so the above may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

#### HEATER SERIAL NUMBER

(Please Fill In)

Pentair Pool Products 1620 Hawkins Ave., Sanford, NC 27330 • (919) 774-4151 10951 West Los Angeles Ave., Moorpark, CA 93021 • (805) 523-2400