

MiniMax[®] NT Low NOx Series

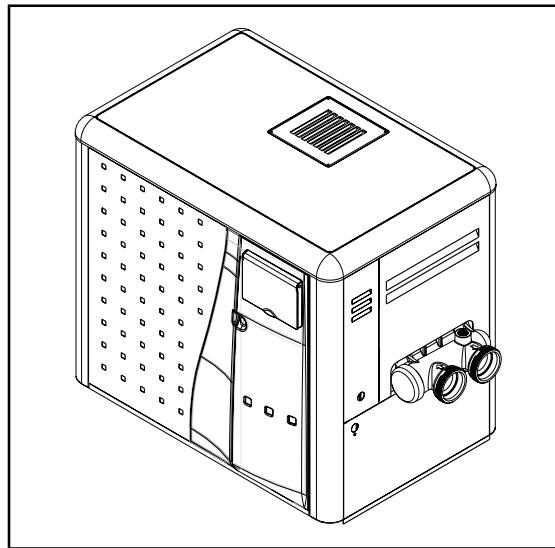
POOL & SPA HEATERS

OPERATION & INSTALLATION MANUAL

⚠ WARNING

FOR YOUR SAFETY - READ BEFORE OPERATING

Warning: If you do not follow these instructions exactly, a fire or explosion may result, causing property damage, personal injury or loss of life. For additional free copies of this manual; call (800) 831-7133.



U.S. Patent Numbers
5,318,007 - 5,228,618
5,201,307 - 4,595,825

To
Consumer
Retain For
Future
Reference

⚠ WARNING

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.

For Your Safety

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 neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or other appliances.

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Introduction

MiniMax NT Low NOx Pool and Spa Heaters

Congratulations on your purchase of a MiniMax NT Low NOx high performance heating system. Proper installation and service of your new heating system and correct chemical maintenance of the water will ensure years of enjoyment. The MiniMax NT Low NOx is a compact, lightweight, efficient, induced-draft, gas fired high performance pool and spa heater that can be directly connected to schedule 40 PVC pipe. The MiniMax NT Low NOx, also comes equipped with the Pentair multifunction temperature controller 7800 which shows, at a glance, the proper functioning of the heater. All HSI (hot-surface ignition) MiniMax NT Low NOx heaters are designed with a direct ignition device (HSI) which eliminates the need for a standing pilot. The MiniMax NT Low NOx requires an external power source (120/240 VAC 50/60 Hz) to operate.

IMPORTANT NOTICES

...For the installer and operator of the MiniMax NT Low NOx 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. If you need any more information, or if you have any questions regarding to this pool heater, please contact Pentair Pool Products, Inc. at (800) 831-7133.

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.

Do not use the heater to protect pools or spas from freezing if the final maintenance temperature desired is below 60° F. as this will cause condensation related problems.

CODE REQUIREMENTS

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.



This instruction manual provides operating instructions, installation and service information for the MiniMax NT Low NOx high performance heater. The information in this manual applies to the MiniMax NT Low NOx 200, 250, 300, and 400 natural gas models.

It is very important that the owner/installer read and understand the section covering installation instructions, and recognize the local and state codes before installing the MiniMax NT Low NOx. History and experience has shown that most heater damage is caused by improper installation practices.

WARRANTY INFORMATION

The MiniMax NT Low NOx pool heater is sold with a limited factory warranty. ***Specific details are described on the back cover of this manual and a copy of the warranty and warranty registration card are included with the product.*** Return the warranty registration card after filling in the serial number from the rating plate inside the heater.

Pentair Pool Products' high standards of excellence include a policy of continuous product improvement resulting in your state-of-the-art heater. We reserve the right to make improvements which change the specifications of the heater without incurring an obligation to update the current heater equipment.

Operation



SAFETY RULES

1. Spa or hot tub water temperatures should never exceed 104° F. A temperature of 100° F. 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.
3. Pregnant women beware! Soaking in water above 100° 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 100° F. 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.
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.

WARNING

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



MINIMAX NT LOW NO_x HSI ELECTRONIC IGNITION LIGHTING/OPERATION - NATURAL GAS**FOR YOUR SAFETY: READ BEFORE LIGHTING****⚠ WARNING**

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

Do not attempt to light the heater if you suspect a natural gas leak. Lighting the heater can result in a fire or explosion which can cause personal injury, death, and property damage.

- A. This heater is equipped with an ignition device which automatically lights the main burners. Do not try to light the burners by hand.
 - B. **BEFORE OPERATING**, smell all around the heater area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- WHAT TO DO IF YOU SMELL GAS**
- Do not try to light any heater.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the Fire Department.
- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it. Call a qualified service technician. Forced or attempted repair may result in a fire or explosion.
 - D. 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 the control system and any gas control which has been under water.
 - E. The MiniMax NT Low NO_x incorporates the Pentair temperature controller 7800 to aid you in the operation of the heater, and to assist in diagnosing a failure in the heater's function.

OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above.
2. Set the thermostat to the lowest setting.
3. Turn off electric power to the heater.
4. This heater is equipped with an ignition device which automatically lights main burners. Do not try to light the burners by hand.
5. Remove the control access door.
6. Push in gas control knob slightly and turn clockwise  to "OFF". (If not on "OFF" position.)
7. Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Follow "B" in the safety information above. If you don't smell gas, go to the next step.
8. Turn knob on gas control counterclockwise  to "ON"; see Figure 1.
9. Replace the control access door.
10. Turn on the electrical power to the heater.
11. Set the thermostat to the desired setting.
12. If the heater will not operate, follow the instructions "To Turn Off Gas To Heater" and call your service technician or gas supplier.

Gas Inlet

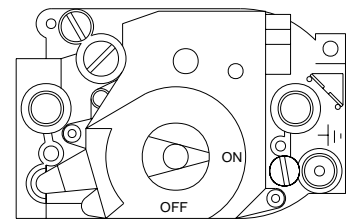


Figure 1. Gas control knob shown in "ON" position.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the heater if service is to be performed.
3. Remove control access door.
4. Push in gas control knob slightly and turn clockwise  to "OFF". **Do not force.**
5. Replace control access door.

Installation Instructions

SPECIFICATIONS

IMPORTANT NOTICE: These installation instructions are designed for use by qualified personnel only, trained especially for installation of this type of heating equipment and related components. Some states require installation and repair by licensed personnel. If this applies in your state, be sure your contractor bears the appropriate license.

OUTDOOR VENTILATION

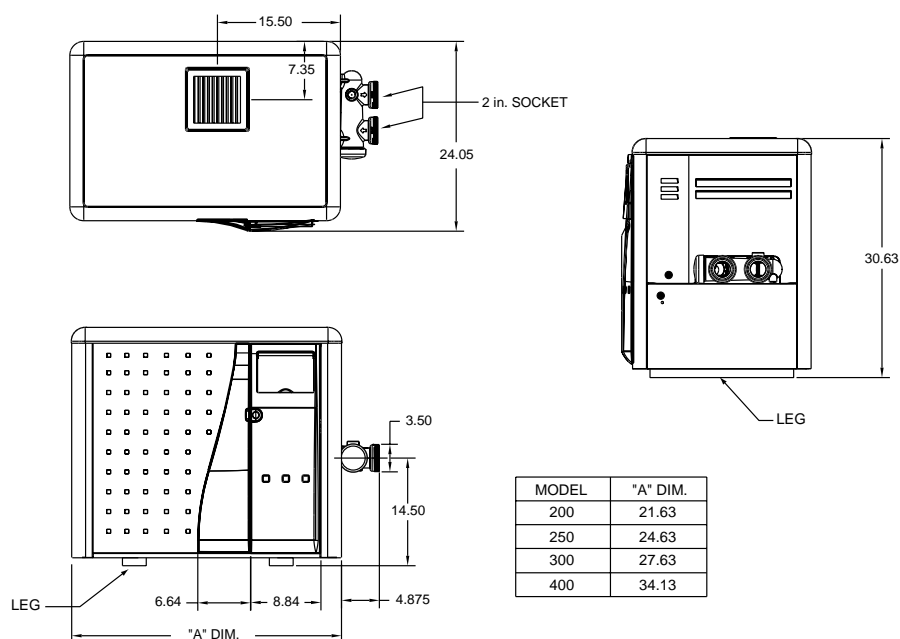


Figure 2.

INDOOR VENTILATION

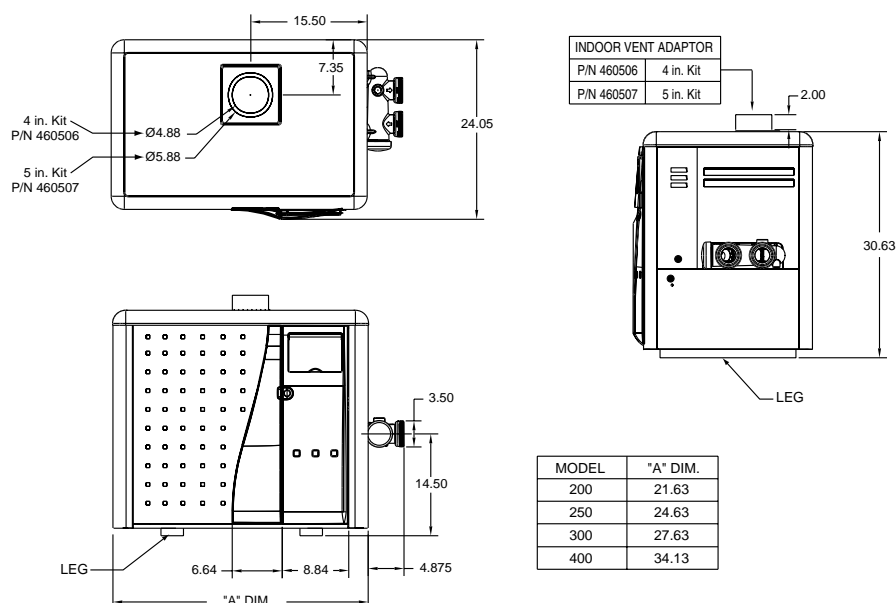


Figure 3.

ELECTRICAL, ALL HSI UNITS

Electrical Rating 50/60 Hz 120 V.A.C. ONLY

NOTE

The transformer is pre-wired at the factory for 120 VAC operation, connect line supply to the line terminal block inside junction box. Use caution in connecting supply to proper Line (L), Neutral (N), and Ground (GND) terminals; see below, Figure 5.

NOTE

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

In Canada: wires must be CSA approved.

WARNING

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

In Canada: CSA standard C22.1 Canada Electrical Code Part 1 and/or local codes.

Always use crimp type connectors when connecting two wires.

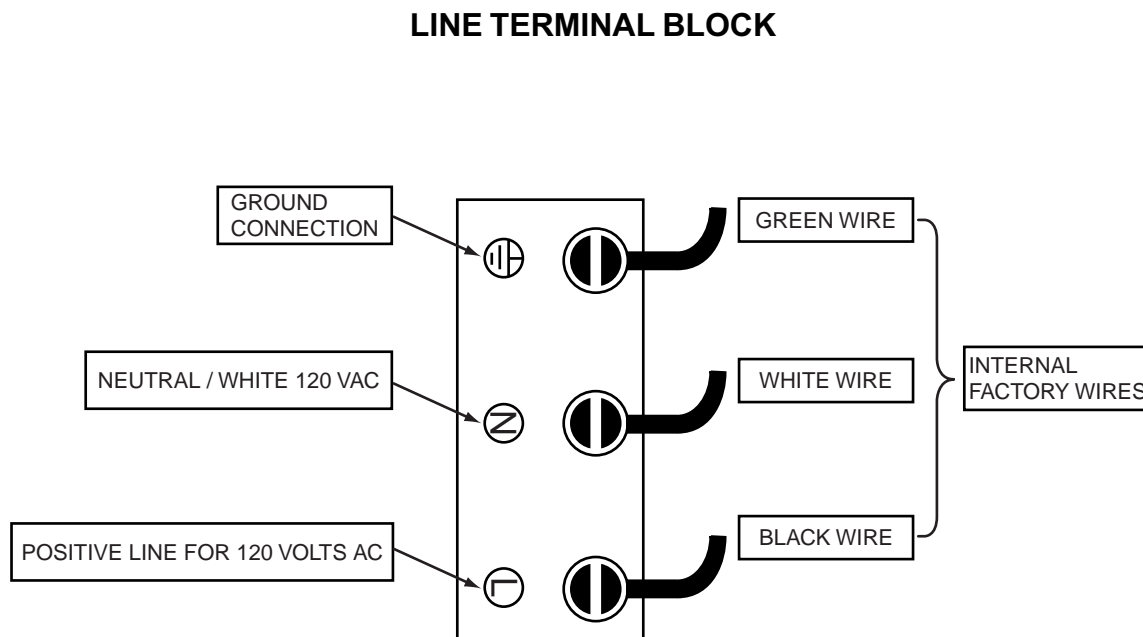


Figure 5.

TWO-WIRE OR THREE-WIRE REMOTE HOOK-UP

Before connecting the remote control system please read the following:

1. First turn the gas valve to the "OFF" position and power up the heater, now using the front buttons on the temperature controller, set the "SPA" and "POOL" temperature to the maximum setting, see Page 24.
2. Now turn the heater to the "OFF" mode by using the "OFF" button on the temperature controller, see Page 24 or by using the main power switch located on the bottom of the junction box.
3. With the heater in the "OFF" mode, locate the three tabs on the back of the temperature controller as viewed from the backside, see Figure 6.

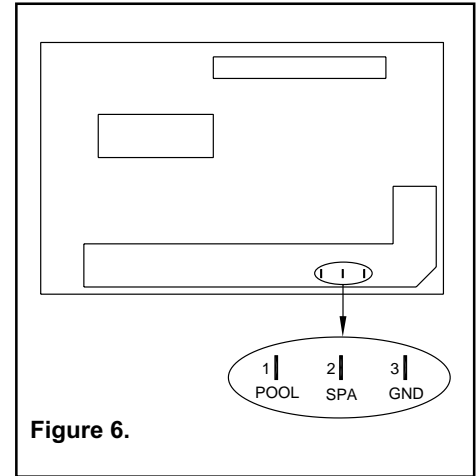


Figure 6.

4. • Two-wire remote with temperature control:

- a) Using 3/16" female quick disconnect connectors, connect one wire to the "GND" tab of the temperature controller, then the second wire to either the "SPA" or "POOL" tab.
- b) Now return power to the heater but leaving the temperature controller in the "OFF" position, see Page 24. (**Note:** If you used the main power switch to turn off the heater, now turn the main power switch on.) At this time the remote system has control over the heater, and will turn it on and off when called for by the remote system thermostat thus keep the pool and spa at the desired temperature.

2 WIRE REMOTE

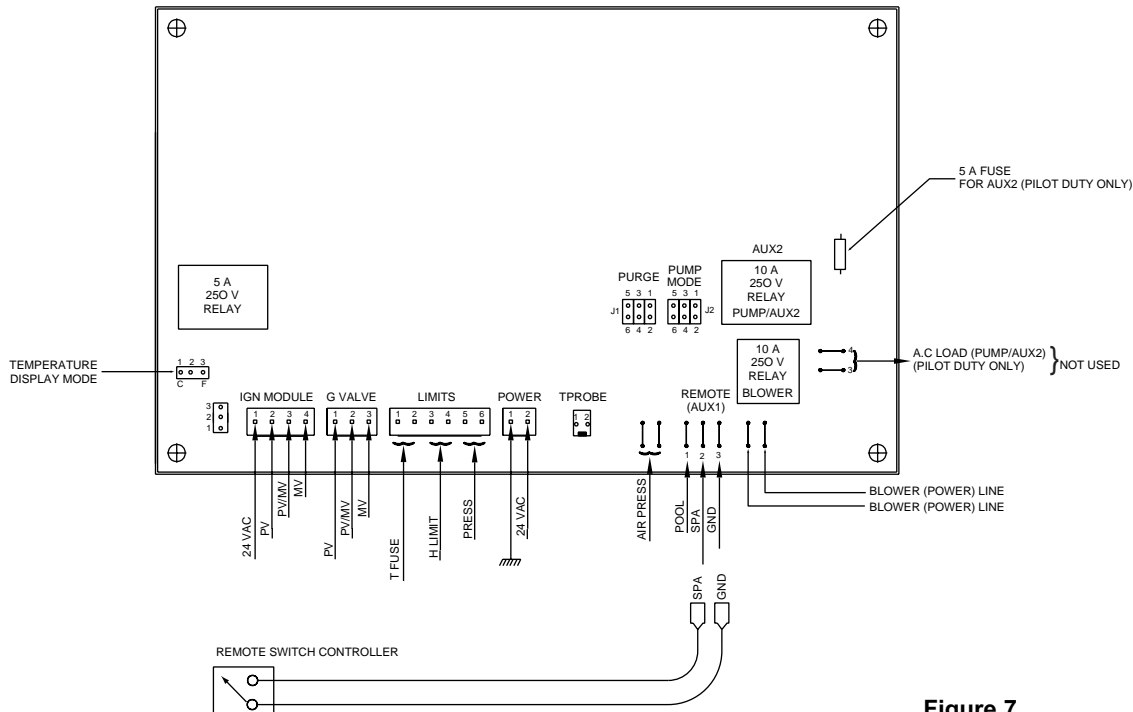


Figure 7.

Three-Wire continued on next page.

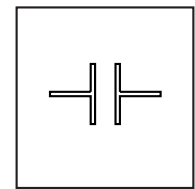
TWO-WIRE OR THREE-WIRE REMOTE HOOK-UP, (cont'd.)

• Three-wire remote:

- a) Using 3/16" female quick disconnect connectors, connect the common wire to the "GND" tab of the temperature controller, then connect the two remaining wires to the temperature controller corresponding to the remote control device, pool wire to "POOL" tab, spa wire to "SPA" tab.
 - b) Now return power to the heater. (**Note:** If you used the main power switch to turn off the heater, now turn the main power switch on.) At this time, the remote system has control over the heater and if pool or spa temperature is below the temperature controller setting, then the heater will try to come on.
 - c) If you desire to reset the temperature settings of the temperature controller, the remote has to be in the desired mode for you to change the particular setting. Example: You wish to raise or lower the pool temperature from the factory setting, you must have the remote system in the pool mode, if you wish to change the spa temperature, you must have the remote system in the spa mode.
5. Now turn on the gas valve to "OPEN" position, the heater is now ready to operate.

NOTE

The heater factory settings are 78° F. for the pool and 104° F. for the spa. When connecting a remote control to the MiniMax, you must install the low voltage thermostat wires in separate conduit from ANY line voltage wires. Failure to follow these instructions will cause the thermostat relay to react erratically. **A Remote hook-up deactivates the selector keys on the front thermostat display panel and gives selection control to the remote.**



AUX

This icon is not a fault icon but instead indicates a remote switching device is connected to the Pentair Temperature Controller 7800, and has overriding selection control of Pentair Temperature Controller 7800.

3 WIRE REMOTE

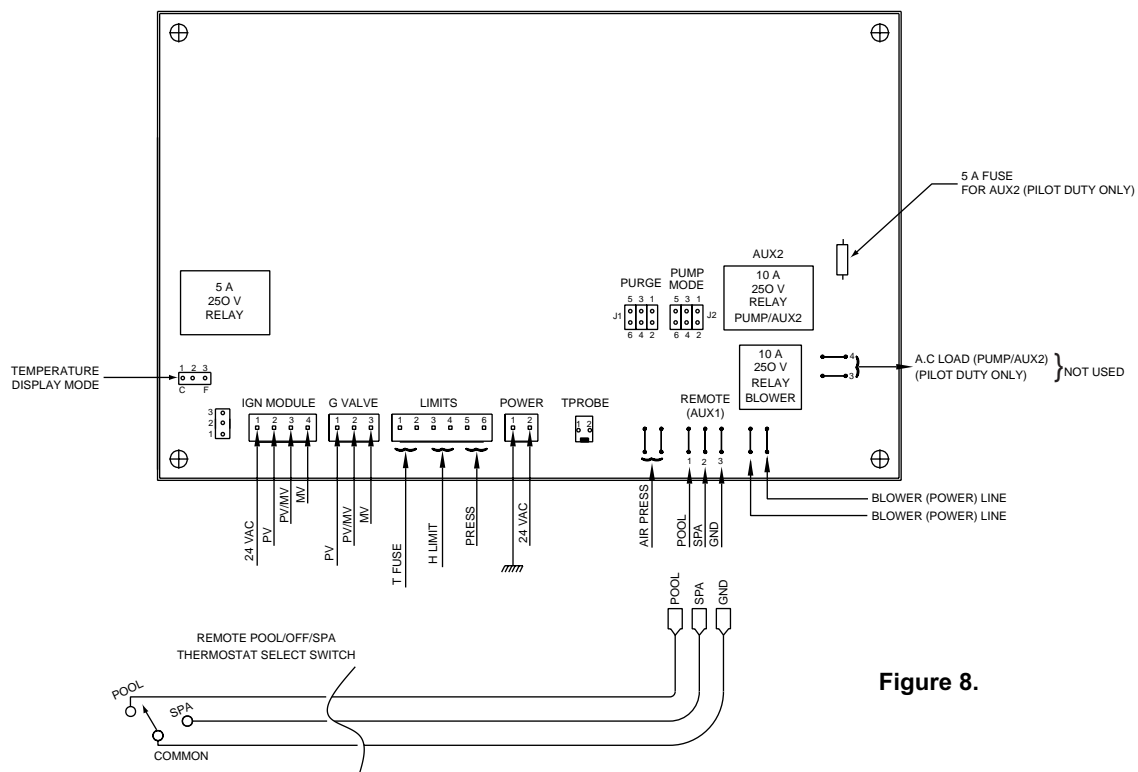
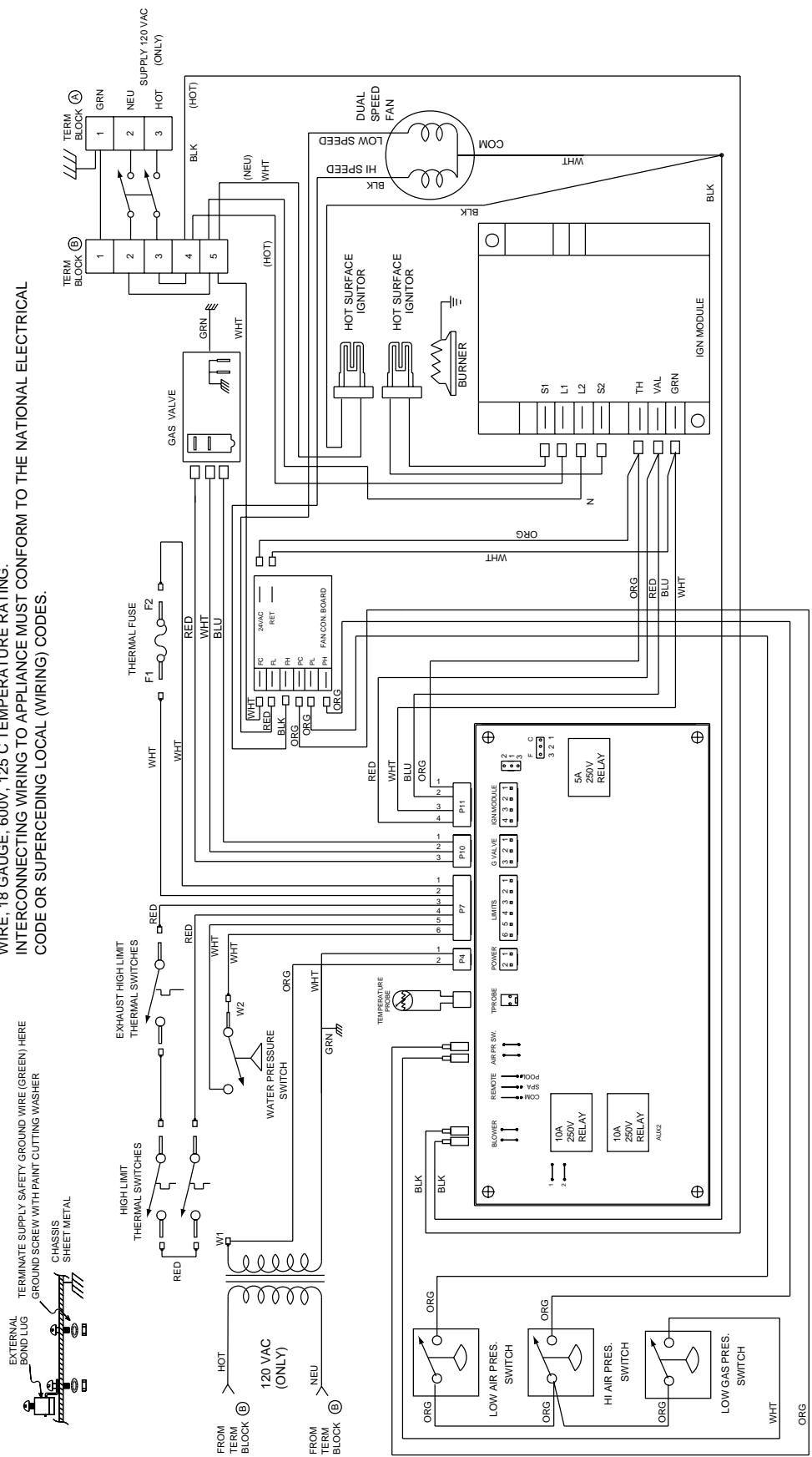


Figure 8.

MiniMax NT Low NOx 400 HSI Electronic Ignition Wiring Diagram (SINGLE VOLTAGE)

MiniMax NT 400 Low NOx WIRING DIAGRAM

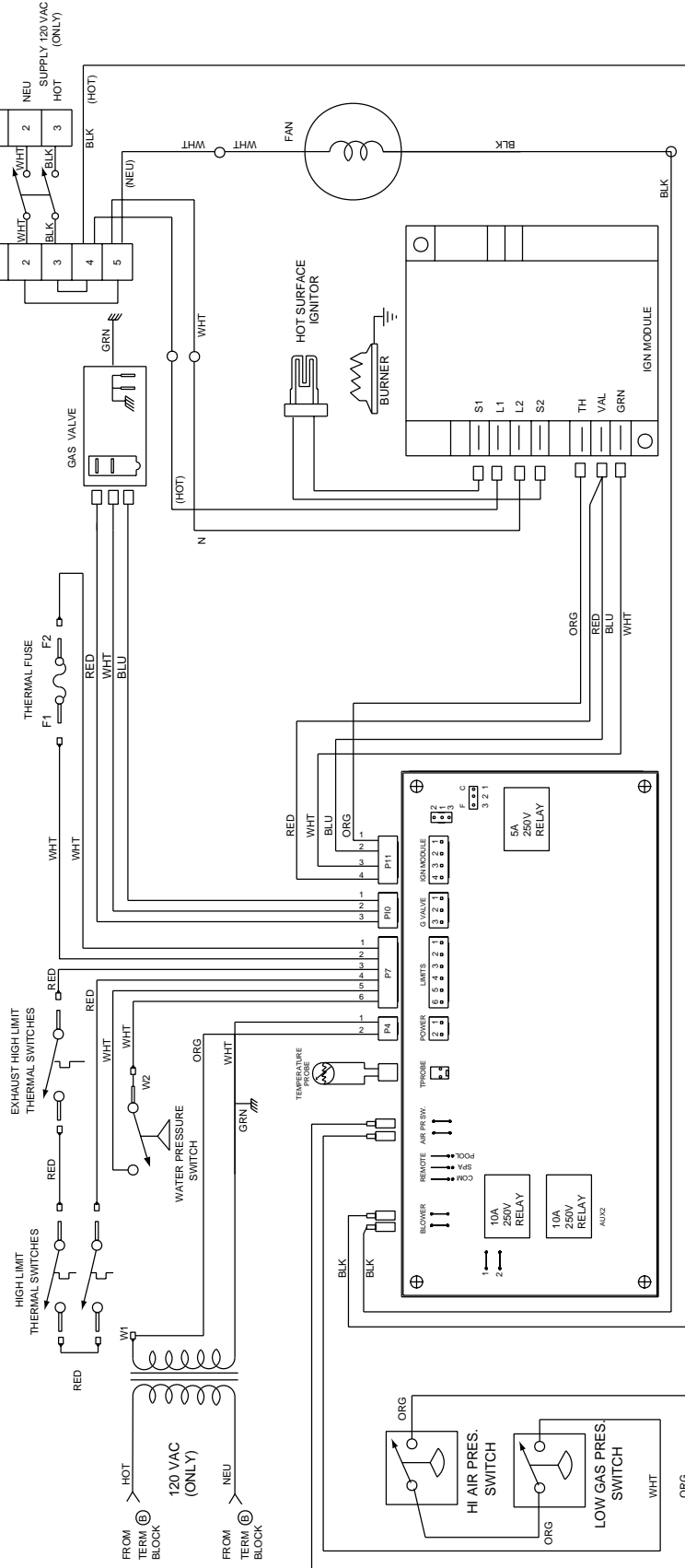
IF ORIGINAL FACTORY WIRING MUST BE REPLACED, INSTALLER MUST SUPPLY UL OR CSA (IF CANADA) APPROVED WIRE, 18 GAUGE, 600V, 105 C TEMPERATURE RATING. THERMAL FUSE WIRING MUST BE REPLACED WITH UL OR CSA (IF CANADA) APPROVED WIRE, 18 GAUGE, 600V, 125 C TEMPERATURE RATING. INTERCONNECTING WIRING TO APPLIANCE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



MiniMax NT Low NOx 250 HSI Electronic Ignition Wiring Diagram (SINGLE VOLTAGE)

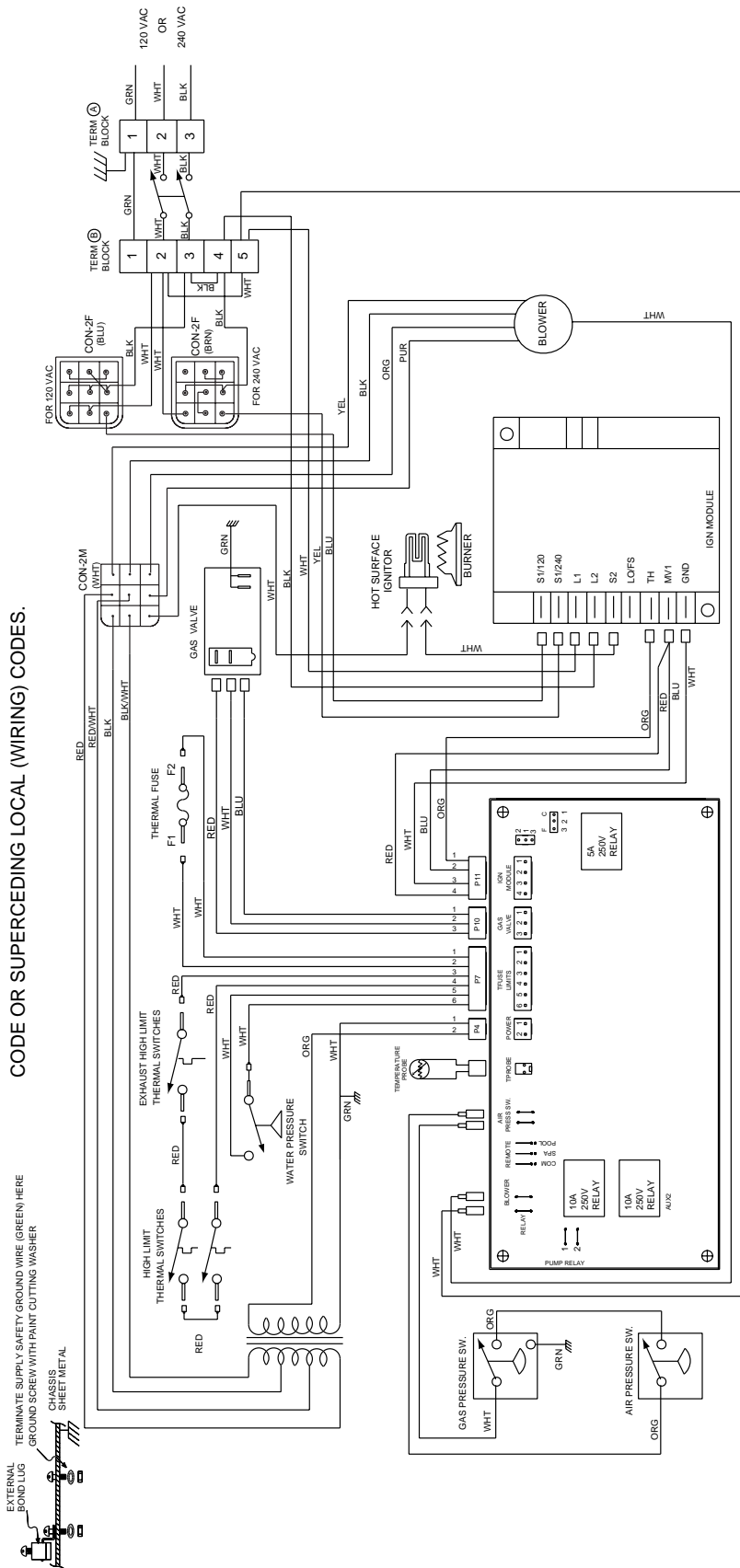
MiniMax NT 250 Low NOx Wiring Diagram

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 SUPERSEDING LOCAL (WIRING) CODES.



MiniMax NT Low NOx (ALL MODELS) HSI Electronic Ignition Wiring Diagram (DUAL VOLTAGE)

MiniMax NT Low NOx ALL MODELS WIRING DIAGRAM
 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, 200° C TEMPERATURE RATING. INTERCONNECTING WIRING TO APPLIANCE MUST CONFORM TO THE NATIONAL ELECTRICAL CODE OR SUPERCEDING LOCAL (WIRING) CODES.



WATER CONNECTIONS

Reversible Inlet/Outlet Connection

The MiniMax NT Low NOx 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.

Reversing Water Connections

Tools required:

- 1/4 in. Screw Driver
- 9/16 in. Socket and Wrench
- 1/2 in. & 9/16 in. Open Wrench

1. Remove the right and left large inspection plates.
2. Disconnect all wires from the high-limit switches except the short jumper wire.
3. Disconnect the pressure switch wiring.
4. Remove the temperature sensing bulb from the inlet/outlet header. **Note:** If needed, you may cut the wire ties holding them together.
5. Remove the 16 bolts holding the main inlet/outlet head and return head in place, exchange the heads, using the new tube seals supplied with the heater, re-install the 16 bolts using moderate torque.
6. Install the temperature sensing probe by passing the wires through the hole provided on the left side of the brace panel. Route wires through the support bracket.
7. Reconnect all the high limit wires and the pressure switch wiring, routing the wires through the same hole as the thermostat sensor wires.
8. Re-install the two large inspection plates on the appropriate side.

PLUMBING

VALVES

When any equipment is located below the surface of the pool or spa, 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.

CAUTION

Exercise care when installing chemical feeders so as to not allow back siphoning of chemical into the heater, filters or pump.

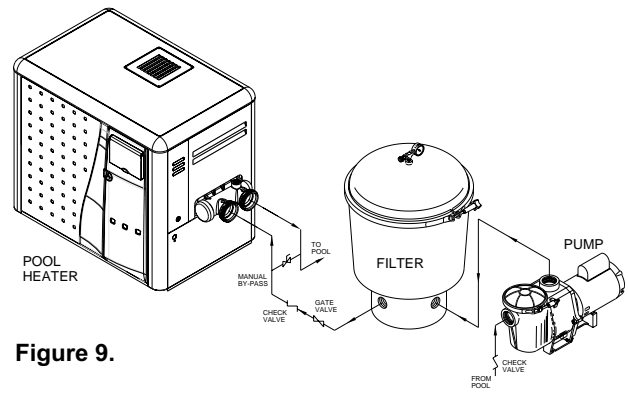


Figure 9.

PLUMBING CONNECTIONS

The MiniMax NT Low NOx heater has the unique capability of direct schedule 40 PVC plumbing connections. A set of bulkhead fittings is included with the MiniMax NT Low NOx to insure conformity with Pentair's recommended PVC plumbing procedure. Other plumbing connections can be used.

CAUTION

Before operating the heater on a new installation, turn on the circulation pump and bleed all the air from the filter using the air relief valve on top of the filter. Water should flow freely through the heater.

Do not operate the heater unless water in the pool/spa is at the proper level.

MANUAL BY-PASS

Where the flow rate exceeds the maximum 120 GPM, a manual bypass should be installed and adjusted. After adjustments are made, the valve handle should be removed to avoid tampering.

Model	Min. (GPM)	Max. (GPM) *
200	20	120
250	30	120
300	30	120
400	40	120

* Do not exceed the maximum recommended flow rate for the connecting piping.

BELOW POOL INSTALLATION

If the heater is below water level, the pressure switch must be adjusted. This adjustment must be done by a qualified service technician. See Page 22, Figure 20.

GAS CONNECTIONS

GAS LINE INSTALLATIONS

Before installing the gas line, be sure to check which gas the heater has been designed to burn. This is important because different types of gas require different gas pipe sizes. The rating plate on the heater will indicate which gas the heater is designed to burn. Table 1, shows which size pipe is required for the distance from the gas meter to the heater. The table is for natural gas at a specific gravity of .65.

When sizing gas lines, calculate three (3) additional feet of straight pipe for every 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 checked to make sure 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. Therefore a reduction of the connecting gas pipe will be necessary. Make this reduction as close to the heater as possible.

The heater and any other gas appliances must be disconnected from the gas supply piping system during any pressure testing on that system, (greater than 1/2 PSIG).

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.

A manual main shut-off valve must be installed externally to the heater.

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

Pipe Sized For Length Of Run In Equivalent Feet Table 1.

Model	1/2 in.		3/4 in.		1 in.		1 1/4 in.		1 1/2 in.		2 in.	
	Nat	LP	Nat	LP	Nat	LP	Nat	LP	Nat	LP	Nat	LP
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'	-	-
400	-	-	-	10'	20'	60'	100'	150'	200'	450'	400'	-

REGULATED MANIFOLD PRESSURE TEST

1. Attach the manometer to the heater jacket.
2. Shut off the main gas valve.
3. Remove 1/8 in. NPT plug on the outlet side of the valve and screw in the fitting from the manometer kit.
4. Connect the manometer hose to the fitting.
5. Turn on the heater.
6. The manometer must read 4 in. WC for natural gas, **while** operating.
7. For adjustment, remove the Regulator Adjustment Cap and using a screwdriver turn the screw clockwise to increase - counterclockwise to decrease gas pressure.

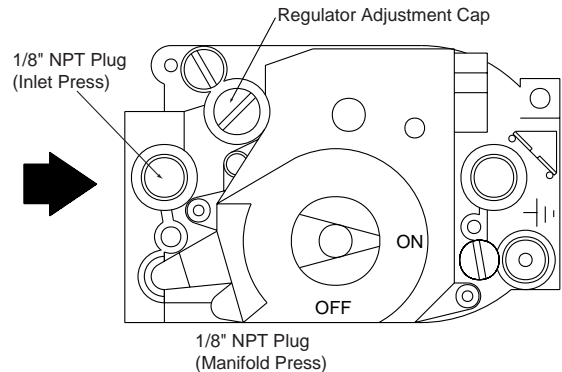


Figure 10.

⚠ CAUTION
The use of Flexible Connectors (FLEX) is NOT recommended as they cause high gas pressure drops.

MINIMAX NT LOW NOx GAS PRESSURE REQUIREMENTS*

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

INDOOR VENTING—General Requirements

The vent pipe must be the same size or larger. The MiniMax NT Low NOx heaters are capable of a 360-degree discharge rotation and operate with a positive vent static pressure and with a vent gas temperature less than 400° F. The total length of the horizontal run must not exceed the length that is listed below in the tables.

Please note the allowable vent runs for each stack pipe diameter are different and can not be exceeded.

Note that each 90-degree elbow reduces the maximum horizontal vent run by 8 feet and each 45-degree elbow in the vent run reduces the maximum vent run by 4 feet. See the tables below for the maximum vent lengths using a 90-degree and 45-degree elbows. The MiniMax NT Low NOx induced-draft pool and spa heater uses positive pressure to push flue gases through the vent pipe to the outside. This requires a completely sealed vent system—single wall vent pipe with sealed-seams and joints may be used. **Flue gases under positive pressure may escape into the dwelling with any cracks or loose joints in the vent pipe, or improper vent installation.** The vent pipe must be of a sealed-seam construction such as those listed for use with category III appliances. Alternately, single wall or double-wall type B duct which has had duct seams and joints permanently sealed using cements or other suitable means which are rated for use at the flue gas temperatures of 325° F. and are permanent are acceptable. The use of listed thimbles, roof jacks and/or side vent terminals are required; and the proper clearances to combustible materials must be maintained in accordance with type of vent pipe employed—in the absence of a clearance recommendation by the vent pipe manufacturer, the requirements of the Uniform Mechanical Code should be met. **The ventilation air requirements for the MiniMax NT Low NOx heater and can be found on page 17.** It is recommended that vent runs over 18 feet be insulated to reduce condensation related problems and/or the use of a condensate trap in the vent run close to the heater may be necessary in certain installations such as cold climates. The MiniMax NT Low NOx is suitable for through-the-wall venting. Recommended sources for Side-wall vent hood terminals include: The Field Controls Co. (2308 Airport Road, Kingston, NC 28501, (800)742-8368) and Tjernlund Products Inc. (1601 Ninth Street, White Bear Lake, MN 55110, (800) 255-4208)—consult manufacturer for model information and availability.

⚠ CAUTION

Do NOT combine exhaust vent pipes to a common exhaust vent in multiple unit installations. Run separate vent pipes.

45 ft. Maximum Vent Run, 5 in. O.D. vent (Equiv. ft.)			
Additional 90° elbows after first elbow		Additional 45° elbows after first elbow	
Quantity	Reduced Max.	Quantity	Reduced Max.
1 (2 total)	37	(2 total)	41
2 (3 total)	29	(3 total)	37
3 (4 total)	21	(4 total)	33

22 ft. Maximum Vent Run, 4 in. O.D. vent (Equiv. ft.)			
Additional 90° elbows after first elbow		Additional 45° elbows after first elbow	
Quantity	Reduced Max.	Quantity	Reduced Max.
1 (2 total)	14 ft.	(2 total)	18 ft.
2 (3 total)	—	(3 total)	14 ft.
3 (4 total)	—	(4 total)	—

INDOOR INSTALLATION (USA ONLY)
OUTDOOR SHELTER INSTALLATION (CANADA)

See page 17 for (Indoor) Vent Adaptors

All products of combustion and vent gases must be completely removed to the outside atmosphere through a vent pipe which is connected to the stack adaptor. A vent pipe extension of the same size must be connected to the indoor stack adaptor and extended at least 2 feet higher than highest point of the roof within a 10 foot horizontal radius, and at least 3 ft. higher than the point at which it passes through the roof, or as permitted by local code; see Figures 11 and 12. The vent should terminate with an approved vent cap (weather cap) for protection against rain or blockage by snow. Double-wall vent pipe and an approved roof jack shall be employed through the roof penetration.

The heater must be located as close as practical to a chimney or gas vent.

⚠ CAUTION
The heater should be installed at least 5 feet away from the pool or spa.

The heater must be placed in a suitable room on a non-combustible floor or on a non-combustible base and in an area where leakage from heat exchanger or water connections will not result in damage to the area adjacent to the heater or the structure. When such locations cannot be avoided, it is recommended that a suitable drain pan with adequate drainage, be installed under the heater. The pan must not restrict air flow.

Installations in basements, garages, or underground structures where flammable liquids may be stored must have the heater elevated 18 inches from the floor using a non-combustible base. The following minimum clearances from combustible materials must be provided.

	Side	Front	Back	Top
Water Connection	18 in.	24 in.	-	-
Remaining	6 in.	-	6 in.	-
Ceiling Clearance	-	-	-	18 in.*

*To ceiling or roof.

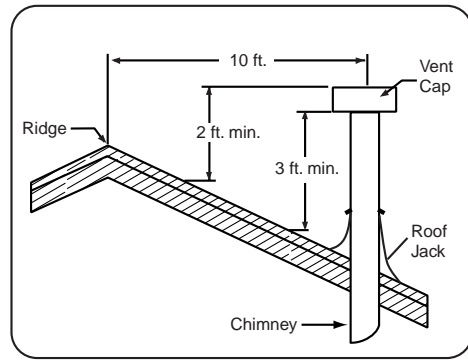


Figure 11.

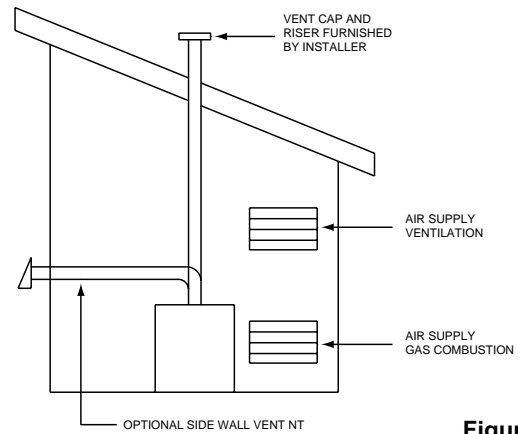


Figure 12.

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.

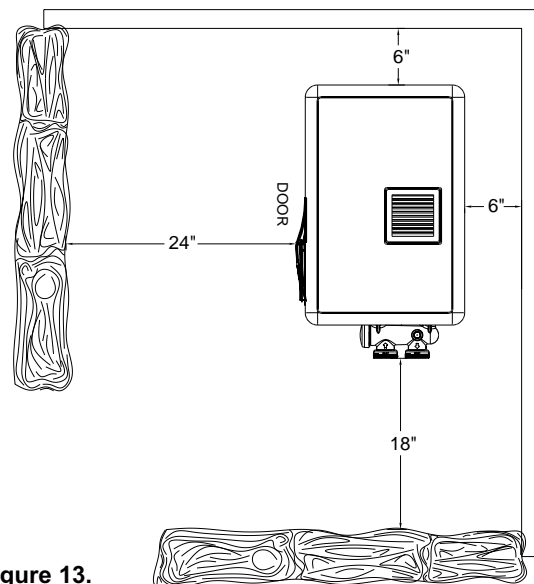


Figure 13.

NOTE

The heater requires **two uninterrupted air supply openings**; one for ventilation and one to supply oxygen for proper gas combustion. The air supply openings should be sized according to Table 2.

Air supply requirements below apply to all MiniMax NT Low NOx heaters.*

Model	REQUIRED AIR SUPPLY	
	Air for Combustion Sq. In.	Air Ventilation Sq. In.
200	200	200
250	250	250
300	300	300
400	400	400

Table 2.

***NOTE**

The openings listed in Table 2 are free open vent area—if the vents incorporate restrictive louvers, the vent openings must be increased to compensate for the area blocked by the louvers (or grills).

INSTALLATION ON FLOORS CONSTRUCTED OF COMBUSTIBLE MATERIALS

The heater may be placed on a “combustible floor” using either of the two methods listed below:

- a) Use Listed Factory Non-combustible Base Kit for use on combustible floors.

Model	Non-Combustible Base Kit
200	471961
250	460509
300	471960
400	460508

- b) Construct a non-combustible base from masonry blocks as illustrated, see Figure 14.

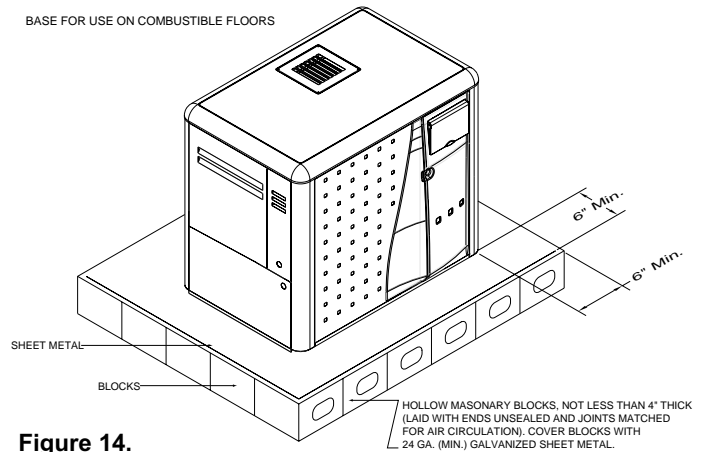


Figure 14.

CAUTION

Chemicals should not be stored near the heater installation. Combustion air can be contaminated by corrosive chemical fumes which can void the warranty.

INDOOR VENT ADAPTORS (FITS ALL MODELS)

The proper draft hood and adaptor must be installed on the heater as shown below and on pages 15 and 16:

Product No.	Vent Dia.
460506	4 in.
460507	5 in.

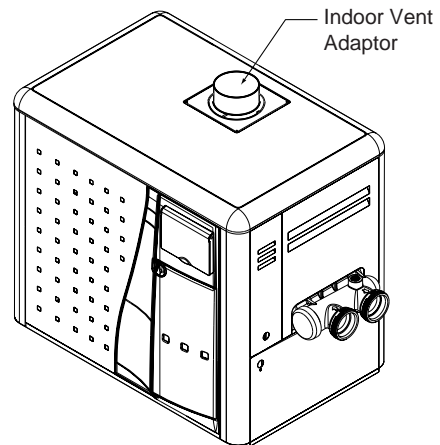
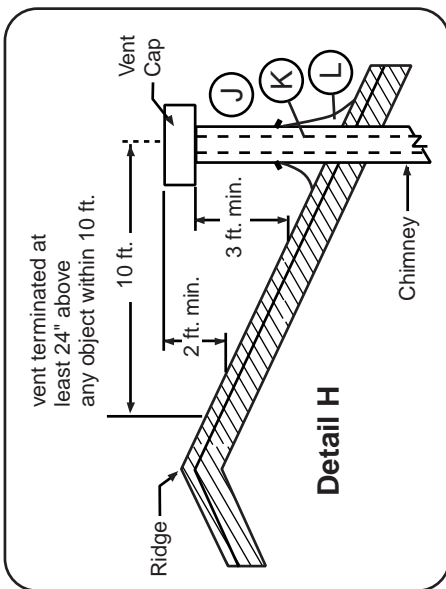


Figure 15.

**INDOOR INSTALLATIONS
MINIMAX NT LOW NOX VENTING GUIDELINES**

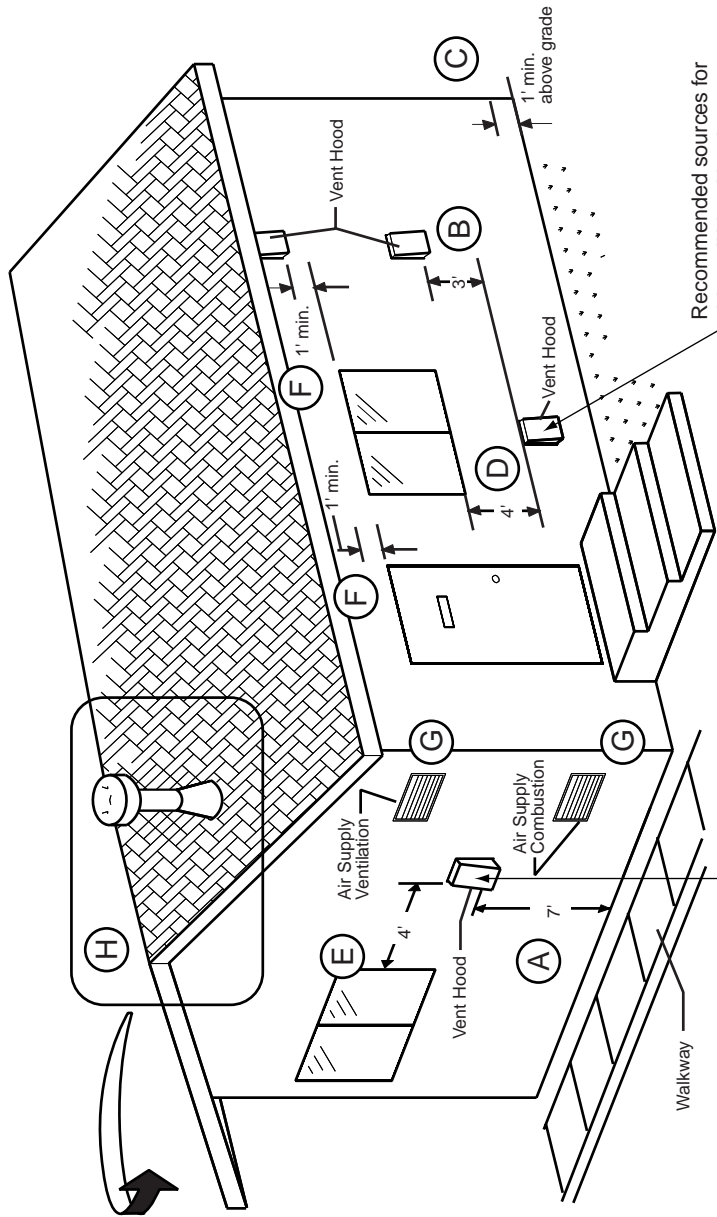


Vent for roof penetration installations:

- (J) must extend at least 3 ft. higher than the point at which it passes through the roof, or as permitted by local code.
- (K) must use a double-wall vent pipe through the roof penetration.
- (L) must terminate with an approved (listed) roof jack, storm collar, and vent/weather cap.

Vent pipe extension:

- must be the same diameter as the vent connector.
- must be suitable for use with category III appliances which have flue gas temperatures of less than 400 deg. F.
- may use a single wall vent pipe with permanently sealed seams and joints.



Recommended sources for side wall Vent Hood; see page 15, Section Venting.

Vent termination for side wall installations:

- (A) must be not less than 7 ft. above public walkways.
- (B) must be at least 3 ft. above any outside air intake located within a 10 ft. radius.
- **must NOT** be within 3 ft. of an inside corner of the structure.
- (C) must be at least 1 ft. above grade.
- must be located the following distances away from any door, window, or gravity air inlet:
 - (D) 4 ft. below
 - (E) 4 ft. horizontally
 - (F) 1 ft. above

Air Supply

- (G) See Air Supply Requirements Table.

Figure 16.

(Table 2 on page 17.)

VENTILATION

OUTDOOR INSTALLATION ONLY (Outdoor Shelter Installation in Canada, see page 16)

For outdoor installation with built in vent, the heater must be placed in a suitable area on a level, noncombustible surface. Do not install the heater under an overhang with clearances less than 3 feet from the top of the heater. The area under an overhang must be open on three sides.

Maintain minimum clearances as indicated below. Install a minimum of 4 feet below, and 4 feet horizontally from any opening to a building, see Figure 17.

IMPORTANT!

When locating the heater, consider that high winds can roll over or deflect off adjacent buildings and walls. Normally, placing the heater at least three feet from any wall will minimize downdraft.

NOTE

This unit shall not be operated outdoors at temperatures below -20° F. for natural gas.

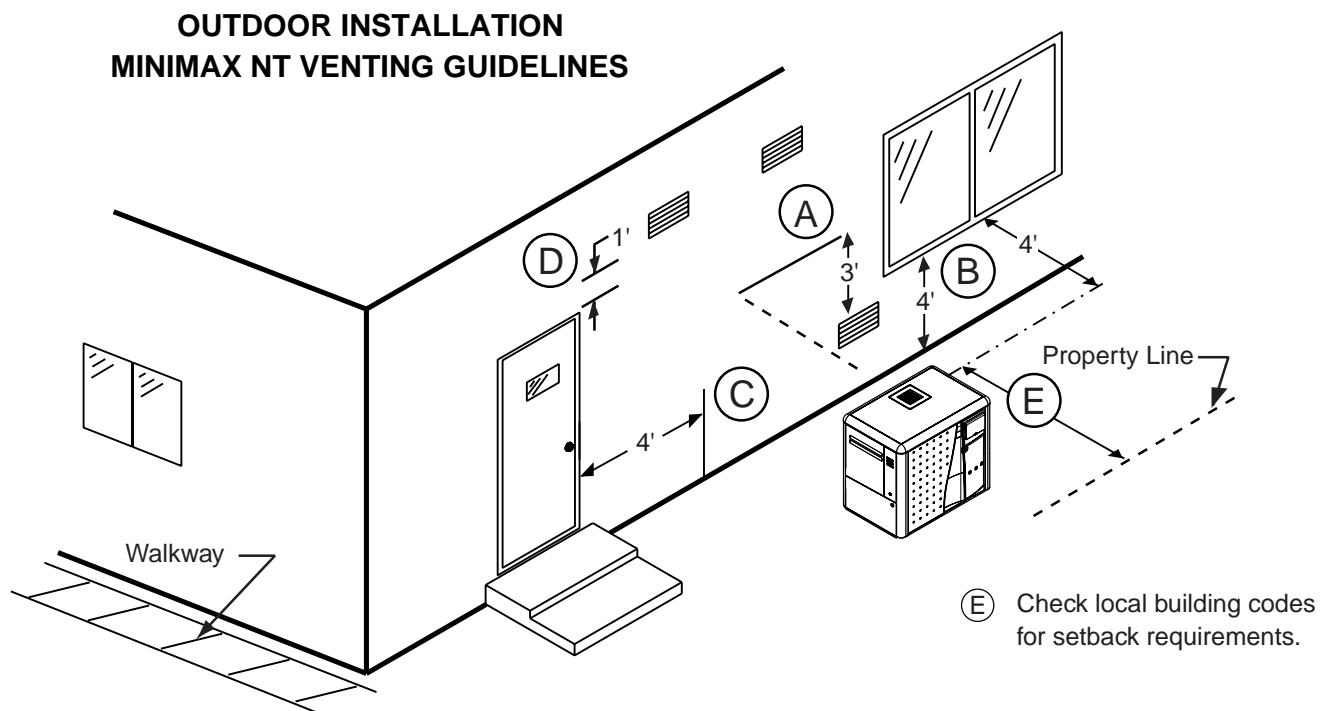


Figure 17.

Vent Termination:

- ★ Must be not less than 7 ft. above public walkways.
- (A) Must be at least 3 ft. above any forced air inlet located within a 10 ft. radius.
- ★ Must be located the following distances away from any door, window, or gravity air inlet:
 - (B) 4 ft. below, or
 - (C) 4 ft. horizontally, or
 - (D) 1 ft. above

GENERAL DESCRIPTION

The MiniMax NT Low NOx Pool and Spa Heater is a fan-assisted induced draft appliance. The MiniMax NT Low NOx is available in 200,000, 250,000, 300,000 and 400,000 btu/hr. capacities and are certified for both indoor and outdoor installations. The MiniMax NT Low NOx version natural gas pool heater must be used for installations in the South Coast Air Quality Management District (SCAQMD)—these heaters are certified to comply with SCAQMD Rule 1146.2 and also meet Ventura Co. APCD Rule 74.11.1.

The MiniMax NT Low NOx is designed to operate both in stackless outdoor installations and in indoor stack vent installations—the indoor installation may be made using Kit 460506 or 460507; see pages 6 and 17, vertical vent pipe or with a horizontal vent pipe and a Listed side-wall vent.

BASIC SYSTEM OPERATION

TO OPERATE HEATER

1. **Start pump, make sure the pump is running and is primed, to close water pressure switch and supply power to heater.**
2. Set thermostat to lowest setting by using up/down arrow keys. See page 24.
3. Push the off key on the Pentair temperature controller 7800 (the amber “off” led will illuminate). See page 24.
4. Open the access doors.
5. Push in the gas control knob slightly and turn the knob clockwise to “OFF”. *See page 5 Natural Gas Instructions.*
6. Wait (5) minutes to clear out any gas. If you then smell gas STOP. Follow the safety information (stated earlier in the lighting instructions section). If you don’t smell gas, go to the next step. *See page 5 Natural Gas Instructions.*
7. Turn the knob on the gas control counter clockwise to the “ON” position. *See page 5 Natural Gas Instructions.*
8. Replace the doors.
9. Push either the “Pool” or “Spa” key to start the heater. **NOTE:** “Pool” key is Factory set at 78° and “Spa” key is set at 104°.
10. Set the thermostat if needed by using the up/down arrows to set the desired temperature.
 - a. Fan motor starts, which closes draft proving switch.
 - b. Ignition module is energized after fan prepurge cycle is completed approximately 2 minutes.
 - c. Check for powering up the (glow coil) hot-surface ignitor by viewing through the sight glass.
11. The ignitor will warm up and then gas valve opens to ignite the main burners.
12. Heater will operate until desired temperature is reached.

SAFETY CONTROLS

AIR PRESSURE (FAN) SWITCH

The air pressure switch is a safety device used to insure that the blower (fan) is operating and has been designed to monitor the vacuum (negative) pressure within the blower housing. The air pressure switch is factory set and is in the ignition module circuit—the ignition module does not operate unless the air pressure switch and all safety switches are closed.

NOTE

Some models of MiniMax NT Low NOx heaters, manufactured before 10-15-01, used both a HIGH and LOW air pressure switch.

WATER PRESSURE SWITCH

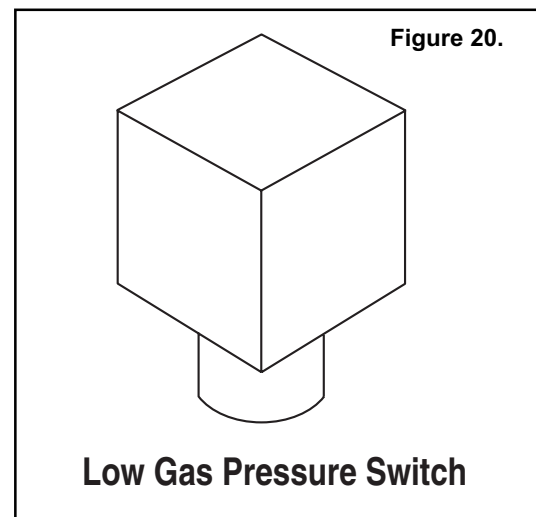
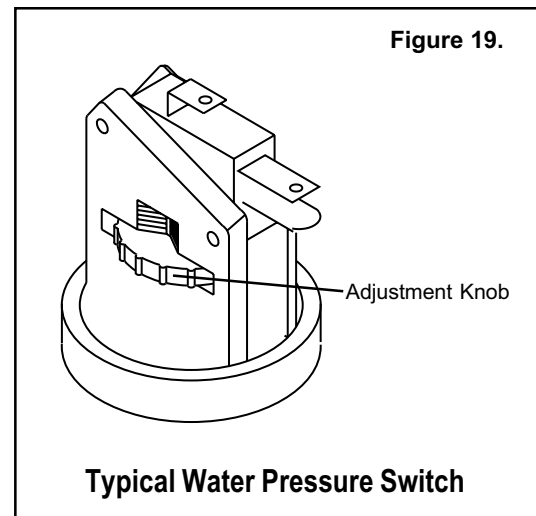
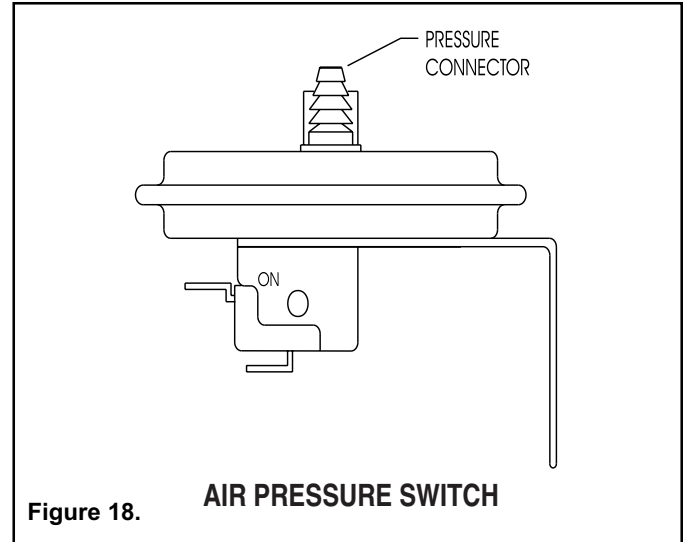
The water pressure safety switch closes when there is a sufficient flow of water to the heat exchanger to safely operate the heater. The switch operation must be verified during initial operation of the heater after installation—the switch is set at 1 PSIG and the switch contacts must not be closed in the absence of water flow. **NOTE:** See, *Below Pool Level Installation instructions on page 13*. The switch may remain closed with no water flow if there is more than a 3 ft. elevation difference between the heater (heat exchanger) and the pool water line—if this is the case, the water pressure switch must be reset to maintain open switch contacts with no water flow.

NOTE

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

LOW GAS PRESSURE SWITCH (LOW NOx Versions Only)

The MiniMax NT Low NOx heater uses a low gas supply pressure switch, ahead of the gas valve, to prevent operation of the heater when the gas supply pressure is below the minimum required for proper operation of the burners. The switch is factory set. In the event that the switch does not close and prevents the firing of the heater, the cause of the low gas supply pressure must be corrected. Typical causes are undersized supply piping, undersized gas meter or low gas regulator setting (gas supply regulator and gas meter problems are typically corrected by your local gas company).



SAFETY CONTROLS, (cont'd.)

IGNITION MODULE

The Ignition Module is microprocessor based and operates on 24 VAC supplied by the transformer. The control utilizes a microprocessor to continually and safely monitor, analyze, and control the proper operation of the gas burners. The module with the presence of the flame sensor/ignitor or remote sensor, using flame rectification, allows the heater to operate.

HIGH LIMITS

A “High Limit”, is a safety device that opens the electrical circuit and shuts off the heater based on a temperature set point within the “High Limit Device”. The MiniMax NT Low NO_x series of heaters contains three (3) high limit devices, two (2) are located on the main inlet / outlet header, one sensing the inlet water temperature and one sensing the outlet water temperature. The third high limit is located on the exhaust outlet and senses the temperature of the flue gas.

OPERATION OF IGNITION MODULE

HEAT MODE

- When a call for heat is received from the thermostat supplying 24 VAC to the “W” module terminal, the control will perform a self check routine, flash the diagnostic LED, *on units manufactured prior to 10-15-01*, (located on the module) for up to four seconds and begins the safety timing ignition sequence. After the fan prepurge cycle, the hot surface ignitor is activated for a heat-up period followed by energization of the gas valve for the trial for ignition period.
- When flame is detected during the trial for ignition, the ignitor is deactivated and the gas valve remains energized. The thermostat and main burner flame are constantly monitored to assure the system continues to operate properly. When the thermostat is satisfied and the demand for heat ends, the main valve is de-energized immediately.

FAILURE TO LIGHT-LOCK OUT

Should the main burner fail to light, or flame is not detected during the trial for ignition period, the control will go into lockout and the gas valve will be turned off immediately. The thermostat controller will display a flame failure error (icon/service LED) and recovery from lockout requires a manual reset by either resetting the 7800 Thermostat or removing 24 VAC from the system by turning off main power switch (located on the junction box behind right door) for a period of 5 seconds.

FLAME FAILURE—RE-IGNITION

If the established flame signal is lost while the burner is operating, the control will respond within 1 second. The gas valve is de-energized and the control starts a new ignition sequence in an attempt to relight the burner. If the burner does not relight, the control will go into lockout, requiring a manual reset.

MINIMAX NT LOW NO_x PENTAIR TEMPERATURE CONTROLLER 7800

(See Figure 21, for keypad and Pentair Temperature Controller layout details.)

GENERAL

The MiniMax NT Low NO_x Pentair Temperature Controller 7800 is the heart of the control system. It controls all functions of the heater after first verifying that all safety controls are functioning normally. If a malfunction is detected, the Pentair Temperature Controller 7800 will flag the error with both the RED “Service” LED lighting and a corresponding LCD icon appearing on the Pentair Temperature Controller 7800, pin pointing the affected safety control(s). **NOTE:** The exception is the AUX (REMOTE) LCD icon which appears when a REMOTE Control (or Remote Switch) is connected to the Pentair Temperature Controller 7800, which overrides the “POOL” and “SPA” keypads on the control, giving “ON” selection control to the REMOTE.

BASIC THERMOSTAT OPERATION

The Pentair Temperature Controller 7800 comes pre-programmed for use with the spa temperature set at 104° F. and the pool temperature set for 78° F.— and with default display mode set to display degrees F. (this may be adjusted to display in degrees C. with jumper on back of board), see Figure 21.

You need not do anything further to enjoy your heater other than set it in the pool or spa mode by depressing the key located under the corresponding “POOL” or “SPA” LED light. The LED above the selection will light and the corresponding “POOL” or “SPA” LCD icon on the display will appear.

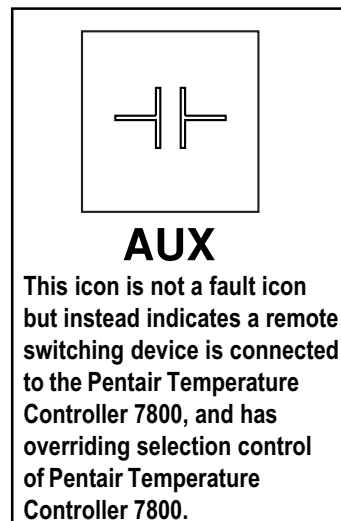
NORMAL OPERATION (NO REMOTE)

Each temperature setting in either POOL or SPA mode is settable independently.

If the Factory’s presetting of 78° F. for “Pool” and 104° F. for “Spa” is not desirable, you may adjust these settings. See page 24 for changing the Factory Temperature Settings. To set the temperature while in SPA mode press the TEMP UP key (with UP arrow) to increase or TEMP DOWN (with DOWN arrow) to decrease the set temperature to that desired.

NOTE: The left hand display indicates the current **real-time** temperature. To set the temperature for POOL mode, first switch to POOL mode by depressing the “POOL” key and repeat the temperature setting procedure in this example. The Pentair Temperature Controller 7800 remembers the last set temperature for both the POOL and SPA mode and you may cycle between the two settings with the POOL and SPA selector keys.

In NORMAL operation, pressing the MODE key allows you the cycle between the right-hand display showing the SET TEMP for the currently active POOL or SPA or the TIME.



(Pentair Temperature Controller 7800 Layout)

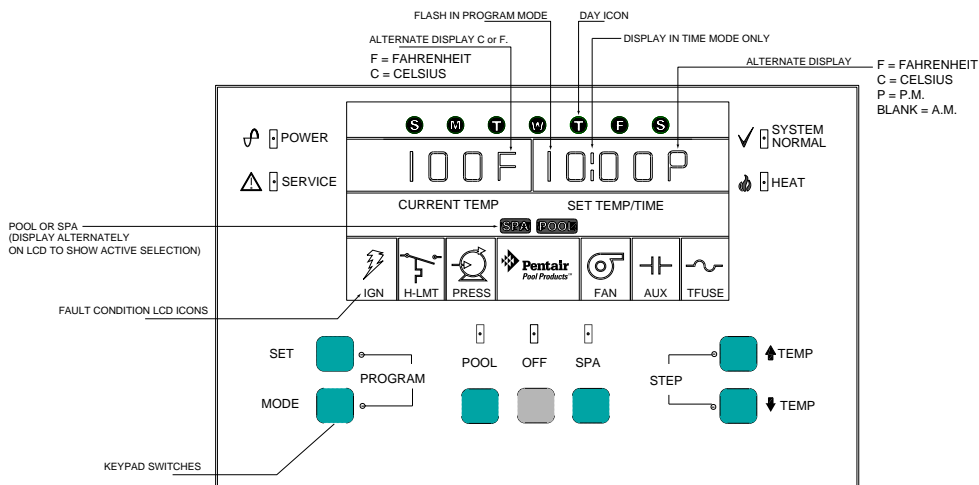
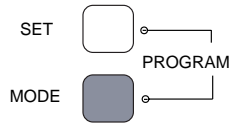


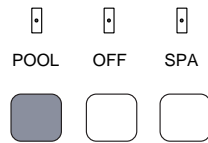
Figure 21.

TO CHANGE THE FACTORY TEMPERATURE SETTINGS:

1. Before changing the temperature, make sure the “*Temperature*” is in the right window, see pages 24 and 25, if “*Time*” is displayed, press the **MODE** key to change to the “*Temperature Mode*”.



2. To change the **Pool Temperature** setting, press the **POOL** key.

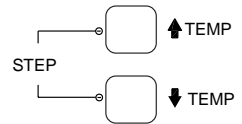


3. To Raise or Lower the **Pool Temperature** setting, press the proper **TEMP** key until the desired setting is displayed.

NOTE: During *Programming* of the **Pool Temperature**, the two buttons on the right are used to



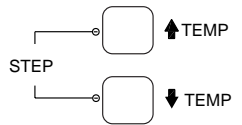
or the display setting numbers.



NOTE: **Pool Temperature** is now set.

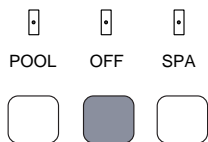
4. You can leave the right window displaying the set “*Temperature*” or by pressing the **MODE** key, you can return to the “*Time*” Mode.

NOTE: To re-set the **Spa Temperature**, follow the above steps 1. through 4. while in the “*Spa Heating*” Mode.

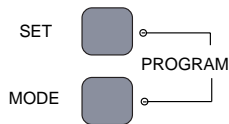


TIME SETTING

1. Make sure heater is turned “**OFF**” and not in the **POOL** or **SPA** “**ON**” Mode.

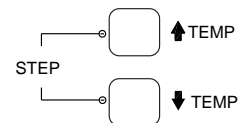


2. Place the Controller in *Programming Mode* by depressing the **SET** and **MODE** buttons at the same time.



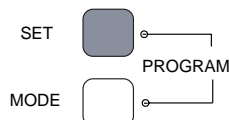
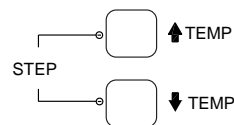
NOTE: During *Programming* of the **Time Setting**, the two buttons on the right

are used to **(Increase Raise)** or **(Decrease Lower)** the display setting numbers.

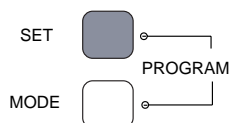
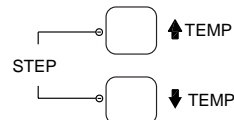


TIME SETTING, (cont'd.)

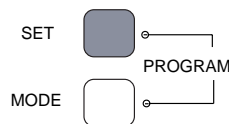
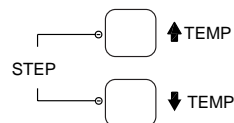
3. The first setting, once you enter the *Programming Mode*, will be the **Day**. The **Day** icon will be flashing. Use the **UP** or **DOWN** arrow **TEMP** keys to locate the appropriate day, then press the **SET** key. The **Day** is now set and the **Hour Time** icon will start to flash.



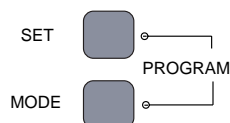
4. With **Hour Time** icon flashing, use the **UP/DOWN** arrow **TEMP** keys. Set the **Hour** to the proper time, “**P**” will show to the right for **PM**, and **blank** for **AM**. Once the proper **Hour** is visible, press the **SET** key. The **Minute** icon's will now start flashing.



5. With the **Minute** icon's flashing use the **UP/DOWN** arrow **TEMP** keys and select the proper **Minute** setting, then press the **SET** key. The **Day** and **Time** are now set and the **Day** icon will be flashing.



6. Press the **SET** and **MODE** keys at the same time to return to the *Operational Mode*.

**NOTE**

During the programming of the CLOCK/DAY function, you touch only the MODE key and a **D** appears in the upper left corner of the “Current Temperature Display Area”, this represents a delay function and will be used for future functions and accessories to the MiniMax NT Low NOx. When the **D** appears, simply stop the programming, “**do NOT touch any key for 30 seconds**”, the controller will automatically return to the operating mode, now by pressing the “SET & MODE keys” at the same time, you will re-enter the programming function, and the **D** icon will disappear.

MAINTENANCE INSTRUCTIONS

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

1. Examine the venting system. Make sure there are no obstructions in the flow of combustion and ventilation air.
2. Visually inspect the main burner and the hot surface ignitor. The normal color of the flame is blue. When flame appears yellow, burners should be inspected and cleaned. Check ignitor for damage.
3. Keep the heater area clear and free from combustibles and flammable liquids.

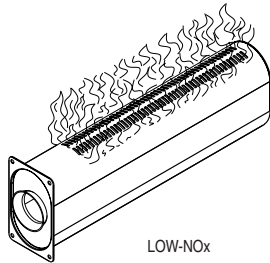


Figure 22.

Pressure Relief Valve

In some installations, a pressure relief valve (PRV) is required on the

MiniMax NT Low NOx. To install a PRV, carefully drill a 3/8 in. hole in center of 3/4 in. NPT port (on main header) being careful to drill only thru wall at bottom of 3/4 in. NPT port and no

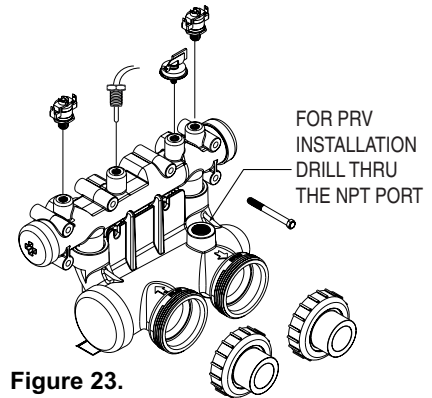


Figure 23.

deeper—now thread in the 3/4 NPT PRV. **NOTE:** (A.S.M.E. version varies from illustration. It is of bronze construction, and is supplied with the A.S.M.E. Section IV, pressure relief valve pre-installed at factory.) Test the relief valve at least once a year by lifting up lever.

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. Reduce the pool thermostat setting to 78° F. or lower. This is accepted as being the most healthy temperature for swimming by the American Red Cross.
3. Use an accurate thermometer.
4. When the proper maximum thermostat settings have been determined, tighten the thermostat knob stopper.
5. Set time clock to start circulation system no earlier than daybreak. The swimming pool loses less heat at this time.
6. For pools that are only used on the weekends, it is not necessary to leave the thermostat set at 78° F. Lower the temperature to a range that can be achieved easily in one day. Generally, this would be 10° F. to 15° F., if pool heater is sized properly.
7. During the winter or while on vacation, turn the heater off.
8. Set up a regular program of preventative maintenance for the heater each new swimming season. Check heat exchanger, controls, burners, operation, etc.

SPRING AND FALL 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. For areas where there is no danger of water freezing, water should circulate through the heater all year long, even though you are not heating your swimming pool. The MiniMax NT Low NOx should not be operated outdoors at temperatures below 0° F. for propane and -20° F. for natural gas.

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 (see Figure 23.), allowing all water to drain out of the heater. It would be a good practice to use compressed air to blow the water out of the heat exchanger. (*See additional notes under Important Notices in Introduction.*)

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 condition.

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.

CAUTION

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 Table 3.

Table 3. pH Chart

Strongly Acid	Neutral	Strongly Alkaline
0 1 2 3 4 5 6	7 8 9 10	11 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 Table 4.

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.

CAUTION: 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.

Table 4. 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 about 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.

NORMAL OPERATION SEQUENCE

(Refer to Figure 21 of Pentair Temperature Controller 7800 keyboard)

The heater features a fully automated firing start-up and shutdown sequence under the control of the MiniMax NT Low NOx Pentair Temperature Controller 7800.

Now that the heater has been properly installed and wired for either remote operation or local operation, and you have setup the Pentair Temperature Controller 7800 temperature setpoints as described earlier in manual in Thermostat section, the following is the normal operating sequence when the heater turns on and the thermostat calls for heat for the pool or spa.

1. The fan will start beginning the heater's safety prepurging cycle which lasts for 2 minutes. If at anytime during the prepurge cycle the Pentair Temperature Controller 7800 detects that a safety control is not working due to either a safety control malfunction or other unsafe condition the firing sequence will stop until the unsafe condition is removed— "the fault icon related to the problem will illuminate".
2. After proper completion of the prepurge cycle, the hot surface ignitor (glow coil) will turn on (preheat) for 40 seconds. Once the 40 seconds is passed, the main gas valve will open. At this time, if flame is not safely established and is detected by the flame sensing circuit, the ignition module and Pentair Temperature Controller 7800 will shut down and will display an ignition fault and illuminate the red service light. *Please note that on initial firing of heater when gas supply piping is full of air or after long period of non-operation of the heater it is normal for the first ignition attempt to not complete.* To clear the fault condition power to the Pentair Temperature Controller 7800 must be cycled to reset system. If heater continues to fail to light have heater inspected by a qualified service person before placing heater back in service.

Insufficient waterflow (pump icon displays), excessive water temperature (high limit icon) cause a "soft-lockout" of the firing sequence—which means if the cause of the problem clears by itself (or with human intervention ie., turning on pump, etc.) such as a slow to prime water pump finally pumping adequate waterflow causing the water pressure (safety) switch to close, the ignition sequence automatically restarts again.

The other category of fault conditions lead to a "hard lockout" of the firing sequence which require a qualified service person to correct before the heater is returned to service. In "hard lockout" the heater must be manually reset (by toggling power to Pentair Temperature Controller 7800) after correction of the fault condition.

Examples of causes of "hard lockouts" include inadequate gas supply pressure and/or failure of fan or fan pressure switches, which all appear as air/gas pressure faults illuminating "blower fan" fault icon and RED "service required" LED.

- After normal firing of the heater (main burners) the heater will continue to operate until the temperature setpoint is reached (thermostat satisfied). As the pool/spa loses heat the heater will refire and continue to operate cycling automatically to maintain the selected temperature setpoint for either the pool or spa. ***If at anytime during the firing of the heater an unsafe condition is detected the heater will stop firing and an automatic safe shutdown sequence will begin. Investigate and have corrected the cause of the abnormal firing termination before placing heater back in operation.***

Please Note: During the firing of the heater, you decide to change to the pool or spa selection by depressing the selector key for “POOL” or “SPA”, the heater will first acknowledge the new selection by flashing the new selection’s corresponding selection LED “POOL” or “SPA”, however, the heater will first complete a safe shutdown sequence before automatically switching to the new selected setting and safely initiating a new firing sequence using the the new temperature setpoint. During this automatic crossover sequence the keyboard on the Pentair Temperature Controller 7800 will not accept any further keying until the cycle completes—the exception is you may still stop the heater with the “OFF” key.

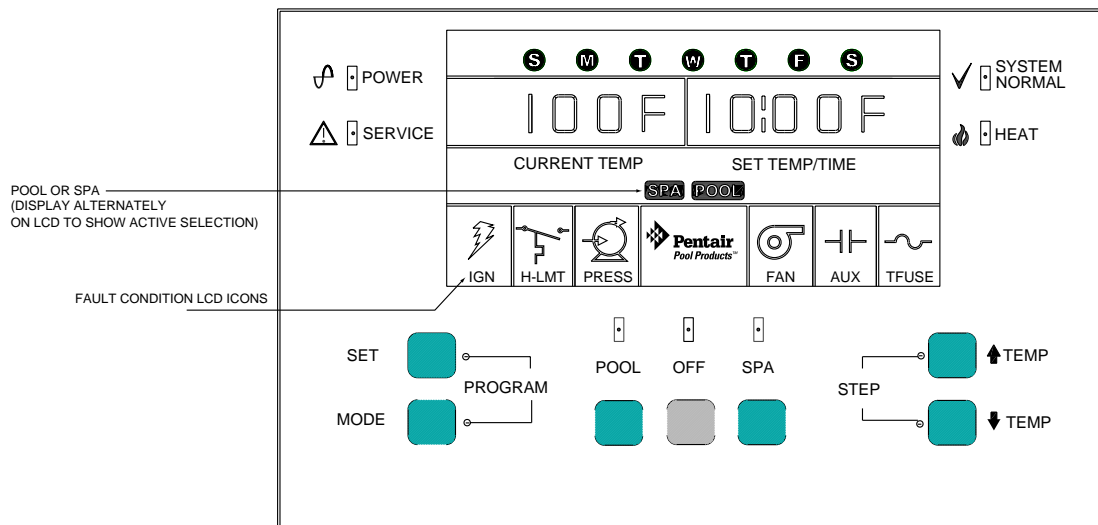
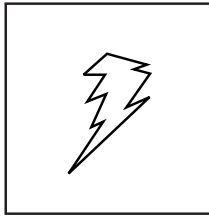


Figure 24.

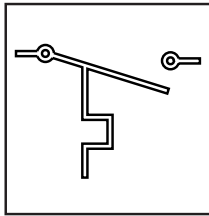
Illustration of Pentair Temperature Controller 7800 with all fault icons displayed for clarity.

LEGEND OF FAULT ICONS AND TYPE OF PROBLEMS FLAGGED



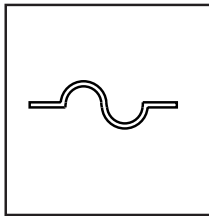
IGN

This fault icon displays whenever there is an unexpected loss of flame. This condition may arise from air in gas supply line or malfunction of flame detection circuit or related hardware. This is a hard lockout condition requiring a manual reset to clear.



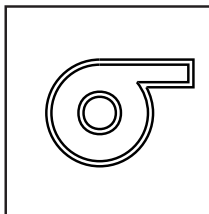
H-LMT

This fault icon displays whenever one or more of safety temperature limit switches open to flag an excessive temperature condition. This is a soft lockout condition and if the condition clears the fault icon will clear and normal operation of heater will proceed.



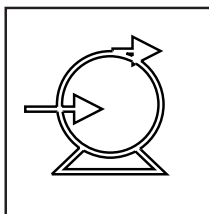
TFUSE

This fault icon displays whenever the thermal fuse has opened due to a flame roll-out or other abnormal condition causing excessive temperatures in the cabinet. The cause of the fault must be corrected and the one-shot fuse replaced before icon can be cleared.



FAN

This fault icon displays whenever there is a failure of either the low gas pressure switch (due to low pressure or switch failure) or additionally the fan and/or air pressure switch circuit has failed resulting in an open safety circuit. The nature of these faults are mission critical for the safe operation of the heater and result in a hard lockout. The cause of the fault must be corrected and the heater will require a manual reset by toggling the power supplied to the 7800 Controller to clear the fault.



PRESS

This fault icon displays whenever insufficient waterflow causes the water pressure switch to fail to close. This is a soft lockout condition and will clear by itself if the waterflow is restored. The icon will then clear and if the heater was attempting to fire the cycle will restart and continue.

SERVICE CHECKS—IGNITION MODULE

Service Checks	
Symptom	Cause/Cure
1. Dead	A. Miswired B. Transformer bad C. Fuse/Circuit breaker bad D. Bad control (check LED for steady on)
2. Thermostat on—no ignition	A. Miswired B. Bad thermostat no voltage at terminal W
3. Valve on, no ignitor	A. Defective ignitor B. Miswired C. Bad control (check voltage at ignitor)
4. Ignitor on, no valve	A. Valve coil open B. Open valve wire C. Bad control (check voltage between V1 & V2)
5. Flame okay during TFI, no flame sense (after TFI)	A. Bad ignitor B. Bad S1 wire C. Poor ground at burner D. Poor flame (check flame current)

FLAME SENSOR CURRENT CHECK

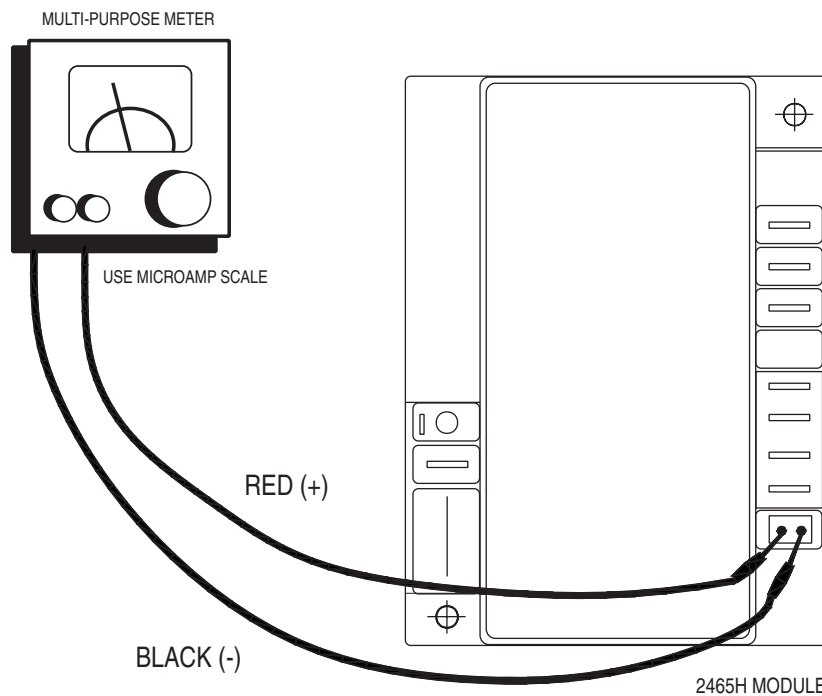


Figure 25.

SERVICE CHECKS

Flame current is the current which passes through the flame from the sensor to ground. The minimum flame current necessary to keep the system from lockout is 0.7 microamps. To measure flame current, connect an analog DC microammeter to the FC1/FC2 terminals per figure. Meter should read 0.7 μ A or higher. If meter reads below "0" on scale, meter leads are reversed. Disconnect power and reconnect meter leads for proper polarity.

Troubleshooting - General

<i>Possible Cause</i>	<i>Remedy</i>
Heater will not come on	
Automatic ignition system fails	Check if electrical connections are correct and securely fastened – If YES, call serviceperson.
Pump not running	Place pump in operation
Pump air locked	Check for leaks
Filter dirty	Clean filter
Pump strainer clogged	Clean strainer
Defective wiring or connection	Repair or replace wires
Defective pressure switch	Replace switch
Defective gas controls	Call serviceperson
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	Repair or replace wiring
Defective flow valve or out of adjustment	Call serviceperson
Defective hi-limit and/or thermostat	Call serviceperson

Heater Makes Knocking Noises, Make sure all valves on system are open

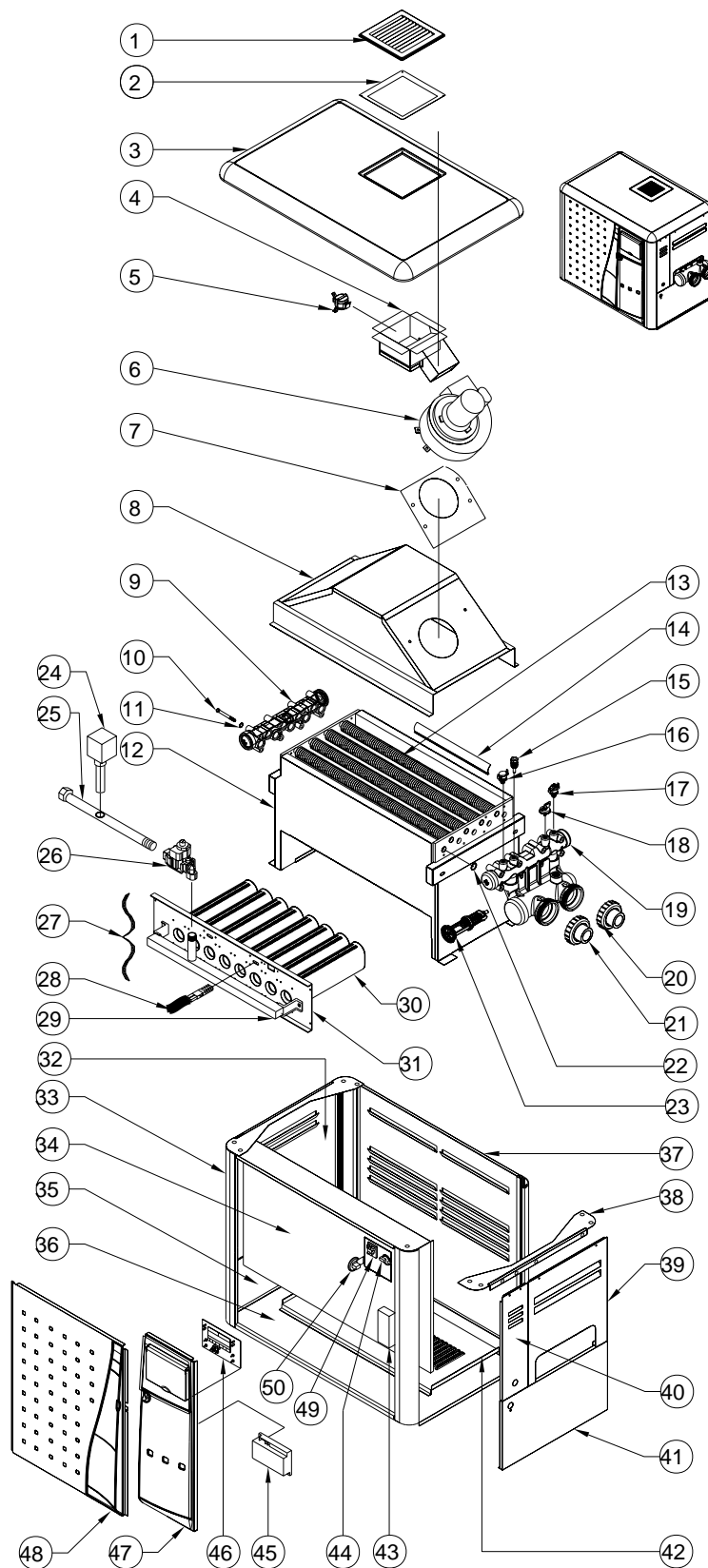
Heater operating after pump has shut off	Shut off gas supply and call serviceperson
Heater exchanger scaled	Shut off gas supply and call serviceperson

⚠ CAUTION

Please consult the latest edition of the "MiniMax NT Low NOx Service Manual" for complete service and repair instructions. Repairs should only be attempted by properly trained service personnel.

MINIMAX NT LOW NOx HEATER - (Single Voltage)

MiniMAX NT Low NOx, Single Voltage

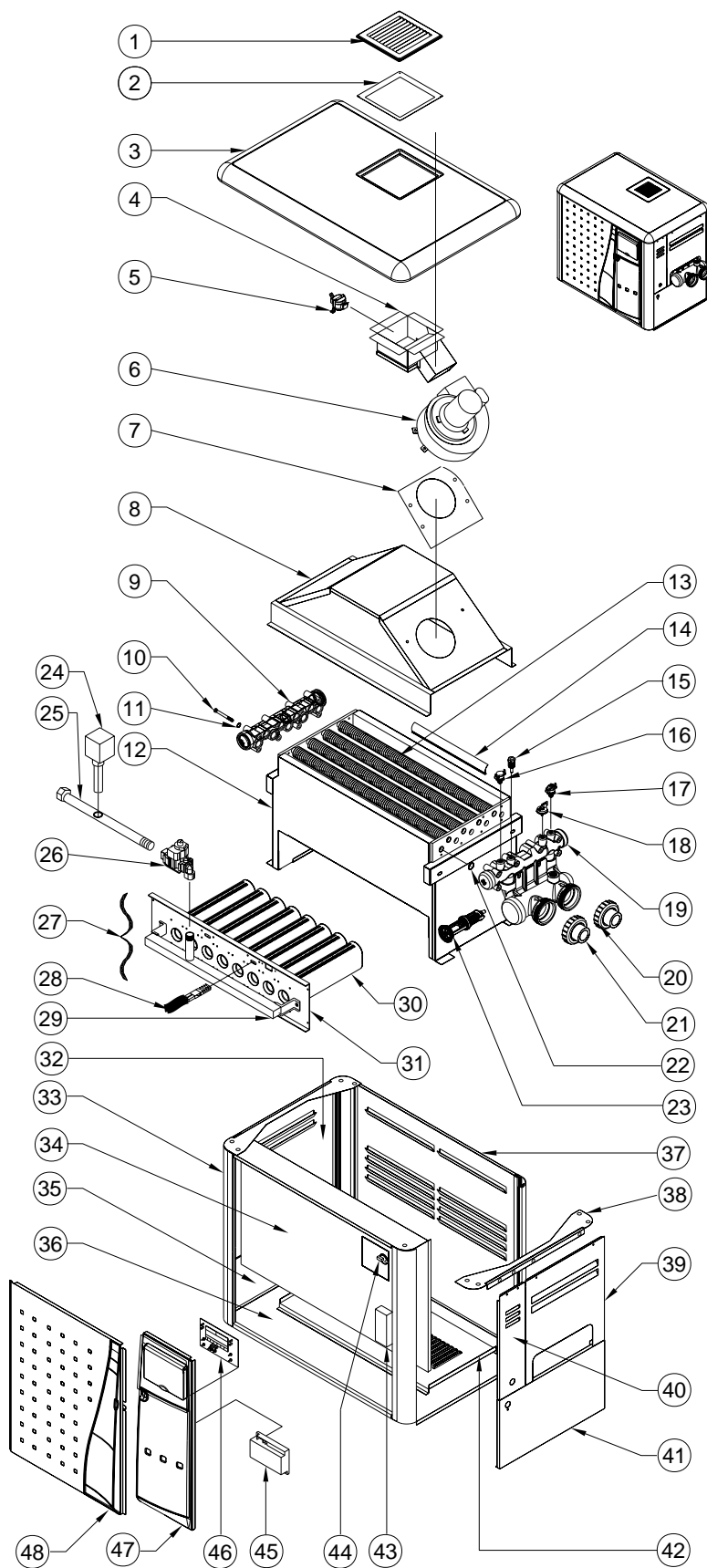


MiniMax NT Low NOx Single Voltage Replacement parts				
ITEM	DESCRIPTION	QTY.	250	400
1	Exhaust Grill	1	471592	
2	Gasket, Exhaust Grill	1	471701	
3	Top Cover	1	471692	471591
4	Exhaust Assy.	1	471995	471996
5	Shut-off Safety Switch, Exhaust	1	471714	
6	Blower	1	471741	
7	Gasket, Blower	1	471610	
8	Flue Collector Assy.	1	472007	472005
9	Return Manifold Assy.	1	471991	
10	Bolt, Heat Exchanger	16	471622	
11	Washer, Heat Exchanger	16	072184	
12	Fire box Assy.	1	471835	471821
13	Heat Exchanger Assy.	1	471785	471838
14	Baffle, Heat Exchanger	8 / 16 (250 / 400)	471641	471640
15	Thermistor Probe	1	471566	
16	HI-Limit Thermostat-115° F.	1	471587	
17	Hi-Limit Thermostat-150° F.	1	471694	
18	Water Pressure Switch	1	471672	
19	Main Manifold Assy.	1	471992	
20	Adapter, Bulkhead Ring	2	274440	
21	Adapter, Bulkhead, 2 in.	2	471441	
22	Gasket, Fin Tube, Seal	18	070951	
23	Flow Valve Assy.	1	471750	
24	Gas Pressure Switch	1	471506	
25	Sub-Manifold, Gas Supply	1	471597	
26	Gas Valve-Natural Gas	1	471601	
27	Burner Tray Assy.	1	471836	471822
28	Igniter	1 / 2 (250 / 400)	471696	
29	Gas Manifold Assy.	1	472003	472001
30	Burner	5 / 8 (250 / 400)	471668	
31	Face Plate	1	471819	471820
32	Jacket, Upper Panel, Left	1	471575	
33	Jacket Corner	4	471581	
34	Jacket Divider	1	471651	471580
35	Jacket, Lower Panel, Left	1	471647	
36	Base	1	471645	471573
37	Jacket Back	1	471669	471574
38	Bracket, Jacket Side	2	471768	
39	Jacket, Upper Panel, Right	1	471576	
40	Jacket, Upper Subplate	2	471767	
41	Jacket, Lower Panel, Right	1	471577	
42	Base Heat Shield	1	471646	471579
43	Control Box Assy.	1	471994	
44	Air Pressure Switch (High)	1	471743	
45	Module, Ignition Control	1	471562	
46	Temperature Controller	1	471565	
47	Right Door Assy.	1	471727	
48	Left Door Assy.	1	471659	471726
49	Fan Speed Cross-over Board	1	N/A	471859
50	Air Pressure Switch (Low)	1	N/A	471428
NA	Gas Orifice, 0-2000 Ft (Not Shown)	5 / 8 (250 / 400)	471984	
NA	Thermal Cut-off (Not Shown)	1	075173	
NA	Transformer, 40 VA (Not Shown)	1	471571	
NA	Transformer, .5 KVA, Dual Voltage(Not Shown)	1	471887	

Note: Some parts are not listed in above, please contact Customer Service Department for detail

MINIMAX NT LOW NO_x HEATER - (Dual Voltage)

MiniMAX NT Low NO_x, Dual Voltage



MiniMax NT Low NOx Dual Voltage Replacement parts

ITEM	DESCRIPTION	QTY.	200	250	300	400
1	Exhaust Grill	1		471592		
2	Gasket, Exhaust Grill	1		471701		
3	Top Cover	1	471885	471692	471886	471591
4	Exhaust Assy.	1		472014		472013
5	Shut-off Safety Switch, Exhaust	1		471714		
6	Blower	1	471938	471883		471884
7	Gasket, Blower	1		471610		
8	Flue Collector Assy.	1	472008	472007	472006	472005
9	Return Manifold Assy. Non-ASME	1		471991		
10	Bolt, Heat Exchanger, Non-ASME	16		471622		
11	Washer, Heat Exchanger	16		072184		
12	Fire box Assy.	1	471904	471835	471922	471821
13	Heat Exchanger Assy. Non-ASME	1	471910	471785	471928	471838
14	Baffle, Heat Exchanger	8/16(200,250,300/400)	471642	471641	471896	471640
15	Thermistor Probe	1		471566		
16	HI-Limit Thermostat-115° F.	1		471587		
17	Hi-Limit Thermostat-150° F.	1		471694		
18	Water Pressure Switch	1		471672		
19	Main Manifold Assy. Non-ASME	1		471992		
20	Adapter, Bulkhead Ring	2		274440		
21	Adapter, Bulkhead, 2 in.	2		471441		
22	Gasket, Fin Tube, Seal	18		070951		
23	Flow Valve Assy.	1		471750		
24	Gas Pressure Switch	1		471506		
25	Sub-Manifold, Gas Supply	1		471597		
26	Gas Valve-Natural Gas	1		471601		
27	Burner Tray Assy.	1	471905	471836	471923	471981
28	Igniter	1		471696		
29	Gas Manifold Assy.	1	472004	472003	472002	472001
30	Burner	4/5/6/8(200/250/300/400)		471668		
31	Face Plate	1	471871	471819	471873	471977
32	Jacket, Upper Panel, Left	1		471575		
33	Jacket Corner	4		471581		
34	Jacket Divider	1	471827	471651	471826	471580
35	Jacket, Lower Panel, Left	1		471647		
36	Base	1	471829	471645	471828	471573
37	Jacket Back	1	471861	471669	471874	471574
38	Bracket, Jacket Side	2		471768		
39	Jacket, Upper Panel, Right	1		471576		
40	Jacket, Upper Subplate, Right	2		471767		
41	Jacket, Lower Panel, Right	1		471577		
42	Base Heat Shield	1	471831	471646	471830	471579
43	Control Box Assy.	1		472015		
44	Air Pressure Switch	1	471747	471743		471569
45	Module, Ignition Control	1		471893		
46	Temperature Controller	1		471565		
47	Right Door Assy.	1		471985		
48	Left Door Assy.	1	471900	471659	471918	471726
NA	Gas Orifice, 0-2000 Ft (Not Shown)	4/5/6/8(200/250/300/400)		471984		
NA	Thermal Cut-off (Not Shown)	1		075173		
NA	Transformer, 40 VA (Not Shown)	1		471571		

Note: Some parts are not listed in above, please contact Customer Service Department for detail

NOTES



Because *reliability* matters most

MiniMax NT Low NOx Heaters Limited Warranty

Your MiniMax NT Low NOx 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 NT Low NOx 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, Inc.

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