



# MASTERTEMP™ POOL AND SPA EURO HEATER INSTALLATION AND USER'S GUIDE

## **WARNING** FOR YOUR SAFETY - READ BEFORE OPERATING

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 USA (800) 831-7133

**FOR YOUR SAFETY** - This product must be installed and serviced by authorized personnel, qualified in pool/spa heater installation. Improper installation and/or operation can create carbon monoxide gas and flue gases which can cause serious injury, property damage, or death. For indoor installations, as an additional measure of safety, Pentair Aquatic Systems strongly recommends installation of suitable **Carbon Monoxide Detectors** in the vicinity of this appliance and in any adjacent occupied spaces. Improper installation and/or operation will void the warranty.

Models (240 VAC)	Natural Gas (G20, G25)	Propane Gas (G31)
MT200HD, EURO	461082	461083
MT300HD, EURO	461086	461087
MT400HD, EURO	461090	461091

COUNTRY OF DESTINATION:  
GB, BE, FR, DE



**OWNER:  
Retain For  
Future  
Reference**

**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.

**NOx CLASS 5**

## **WARNING** FOR YOUR SAFETY

- If you do not follow these instructions exactly, a fire or explosion may result, causing property damage, personal injury or loss of life.
- 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.
- Do not place articles or against this appliance.
- Do not use or store flammable materials near this appliance.
- Do not spray aerosols in the vicinity of this appliance while it is in operation.

## 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.

Pentair Water Pool and Spa, Inc. EMEA – Head Office: Industriepark, Wolfstee, Toekomstlaan 30, 2200 Herentals - Belgium.

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10951 W. Los Angeles Ave., Moorpark, CA 93021, USA • (805) 553-5000 • (800) 831-7133

**Technical Data**



**MASTERTEMP™  
POOL AND SPA HEATER**



**General Specifications**

GAS TYPE:  
GAS GROUP:  
GAS SUPPLY PRESSURE:  
TYPE OF APPLIANCE:  
COUNTRY OF DESTINATION:

**FOR YOUR SAFETY**  
Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

**⚠ WARNING!**  
READ THE TECHNICAL INSTRUCTIONS BEFORE INSTALLING THIS APPLIANCE.  
READ THE INSTALLATION AND USER'S GUIDE BEFORE LIGHTING THIS APPLIANCE.

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**MASTERTEMP™ POOL HEATER**



DESIGN AND MANUFACTURED BY PENTAIR WATER POOL AND SPA, INC. TYPE G23

MODEL NO. \_\_\_\_\_  
SERIAL NO. \_\_\_\_\_  
GAS SUPPLY PRESSURE:  
G20: \_\_\_\_\_ mbar, G25: \_\_\_\_\_ mbar  
G31: \_\_\_\_\_ mbar  
TEST POINT PRESSURE \_\_\_\_\_ mbar  
MAX. WORKING PRESSURE 3.45 mbar  
APPLIANCE CATEGORY 2H, 3P, 2E+, 2N, 2ES, 2EI, 2ELL  
COUNTRY OF DESTINATION GB, BE, DE, FR  
YEAR OF MANUFACTURE \_\_\_\_\_  
ELECTRICAL RATINGS:  
VOLTS: \_\_\_\_\_ V  
HERTZ: \_\_\_\_\_ Hz  
AMPS: \_\_\_\_\_ 12 A

THIS HEATER IS EQUIPPED TO BURN \_\_\_\_\_ GAS  
INPUT RATE \_\_\_\_\_ kW  
ORIFICE SIZE \_\_\_\_\_ mm  
OUTPUT \_\_\_\_\_ kW  
ALTITUDE \_\_\_\_\_ 2000 m

MINIMUM CLEARANCE FROM COMBUSTIBLE  
CONSTRUCTED 15 CM REAR, 15 CM TOP  
DO NOT INSTALL THIS HEATER UNDER AN OVERHANG  
LESS THAN 1 METER FROM THE TOP. THE AREA UNDER  
THE OVERHANG MUST BE OPEN ON THREE (3) SIDES.

REFER TO THE OPERATING INSTRUCTIONS FOR  
APPROVED WATER TREATMENT.

APPROVED FOR INDOOR AND OUTDOOR INSTALLATIONS ELECTRICAL COMPLIANCE: IN ACCORDANCE  
WITH LOCAL ELECTRICAL CODES.  
THIS APPLIANCE MUST BE INSTALLED IN ACCORDANCE WITH THE EUROPEAN STANDARD INSTALLATION  
CODES, AND WITH THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.  
Pentair Water Pool and Spa, Inc. 1620 Hawkins Ave., Sanford, NC 27330 USA Label P/N

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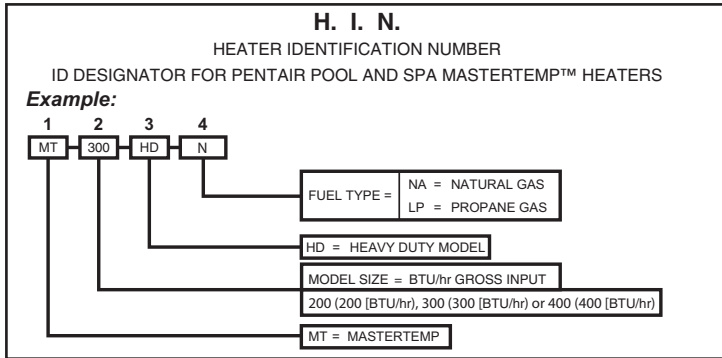
## Heater Identification Information (HIN)

To identify the heater, see the data rating plate on the inner front panel of the heater. There are two designators for each heater, one is the Model Number and the other is the Heater Identification Number (HIN).

### Heater Identification Number (HIN)

The following *example* simplifies the identification system:

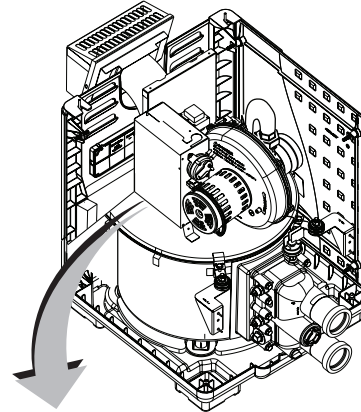
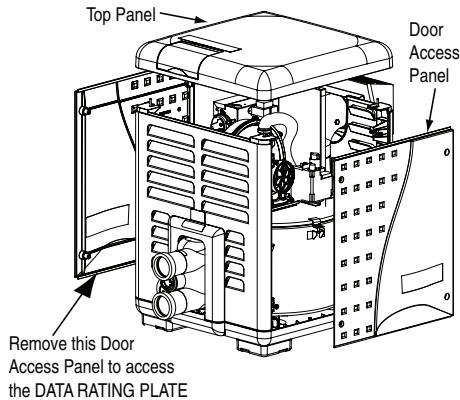
- 1) **MT** : MasterTemp
- 2) **Model Size** : (200, 300 or 400) : Input rating (Gross BTU/hr)
- 3) **Construction** : (HD = Heavy Duty Model)
- 4) **Fuel Type** : (LP = Propane gas or NA = Natural gas)



## Heater Data Rating Plate

The heater data rating plate is located on the inner front panel of the heater. To access the data rating plate, unbolt and remove the side door access panel as shown below.

### Heater Data Rating Plate Location



	<b>MASTERTEMP™ POOL HEATER</b>	
DESIGN AND MANUFACTURED BY PENTAIR WATER POOL AND SPA, INC.		TYPE G23
MODEL NO. _____	THIS HEATER IS EQUIPPED TO BURN _____ GAS	
SERIAL NO. _____	INPUT RATE _____ kW	
GAS SUPPLY PRESSURE:	ORIFICE SIZE _____ mm	
G20: _____ mbar, G25: _____ mbar	OUTPUT _____ kW	
G31: _____ mbar	ALTITUDE _____ 2000.m	
TEST POINT PRESSURE _____ mbar	MINIMUM CLEARANCE FROM COMBUSTIBLE	
MAX. WORKING PRESSURE _____ 3.45 mbar	CONSTRUCTED 15 CM REAR, 15 CM TOP	
APPLIANCE CATEGORY 2H, 3P, 2E, 2N, 2ES, 2EL, 2ELL	DO NOT INSTALL THIS HEATER UNDER AN OVERHANG	
COUNTRY OF DESTINATION _____ GB, BE, DE, FR	LESS THAN 1 METER FROM THE TOP. THE AREA UNDER	
YEAR OF MANUFACTURE _____	THE OVERHANG MUST BE OPEN ON THREE (3) SIDES.	
ELECTRICAL RATINGS:	REFER TO THE OPERATING INSTRUCTIONS FOR	
VOLTS: _____ V	APPROVED WATER TREATMENT.	
HERTZ: _____ Hz	APPROVED FOR INDOOR AND OUTDOOR INSTALLATIONS ELECTRICAL COMPLIANCE: IN ACCORDANCE	
AMPS: _____ 12A	WITH LOCAL ELECTRICAL CODES.	
THIS APPLIANCE MUST BE INSTALLED IN ACCORDANCE WITH THE EUROPEAN STANDARD INSTALLATION CODES, AND WITH THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.		
Pentair Water Pool and Spa, Inc. 1620 Hawkins Ave., Sanford, NC 27330 USA		Label P/N

## CODE REQUIREMENTS / REFERENCES

### Gas Safety (Installation and Use) Regulations, (as amended).

It is the law that all gas appliances are installed by a competent person (e.g. a CORGI registered operative) in accordance with Regulations. Failure to install appliances correctly could lead to prosecution. The installation of the Heater MUST also be in accordance with the current I.E.E.. Wiring Regulations, the European Building Standards, the Bye Laws of the Local Water Undertaking, any relevant requirements of the Local Authority, and Health and Safety document No 635, "Electricity at Work Regulations". Detailed recommendations are contained in the following European Standard Codes of Practice.

Installation must be in accordance with the code requirements:



- Manufacturer's Installation Instructions
- Local Gas Fitting Regulations
- Municipal Building Codes
- EN 437: 2003 + A1 (2009) Test Gases - Test pressures appliances categorizes.
- EN 60335-2-102/A1 - Household and similar electric appliances - Safety - 2- 2012
- BS 6891 Specification for installation of low pressure gas pipe work.
- BS5482:1 Code of practice for domestic butane and propane gas burning installations. Building Regulations Part L1.
- Local Electrical Regulations
- Any other statutory regulations
- EN 15502-1 : 2012 Gas fired heating boilers general requirements test.
- BS 6644 : 2011 Specifications for the installation and maintenance of gas fired hot water boilers between 70Kw - 1.8 mW, (2nd. and 3rd. gas family).

### IMPORTANT NOTICE:

**DO NOT** directly connect any external control device to this appliance, unless noted in this Installation and User's Guide or recommended by the manufacturer. Any installed control device not recommended by the manufacturer could violate the Gas Safety Regulations (the installation and use), the above described regulations and the appliance warranty. The manufacturer's notices **DO NOT** supersede any legal requirements.

## CONSUMER INFORMATION AND SAFETY

THE MASTERTEMP HEATER IS CLASSIFIED AS A CLASS 5 LOW NOX BOILER.

### **WARNING**

Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the heater. Do not use this heater if any part has been under water. Immediately call a qualified service technician to inspect the heater

### **DANGER**

**CARBON MONOXIDE GAS IS DEADLY** – Exhaust from this pool heater contains toxic levels of carbon monoxide, a dangerous, poisonous gas you cannot see or smell.

### **WARNING**

The Consumer Product Safety Commission warns that carbon monoxide is an “invisible killer”. Carbon monoxide is a colorless and odorless gas.


1. Carbon monoxide is produced by burning fuel, including natural gas and propane.
2. Proper installation, operation and maintenance of fuel-burning appliances in the home is the most important factor in reducing carbon monoxide poisoning.
3. Be sure that fuel burning appliances such as heaters are installed by professionals according to manufacturer’s instructions and codes.
4. Always follow the manufacturer’s directions for safe operation.
5. Have the heating system (including vents) inspected and serviced annually by a trained service technician.
6. Examine vents regularly for improper connections, visible cracks, rust or stains.
7. Install battery-operated carbon monoxide alarms. The alarms should be certified to the requirements of the most recent UL, CE, IAS, CSA and IAPMO standard for carbon monoxide alarms. Test carbon monoxide alarms regularly and replace dead batteries.

### **WARNING**

The Consumer Product Safety Commission warns that elevated water temperature can be hazardous. See below for water temperature guidelines before setting temperature.

1. Spa or hot tub water temperatures should never exceed 40° C. A temperature of 37° C. is considered safe for a healthy adult. Special caution is suggested for young children. Prolonged immersion in hot water can induce hyperthermia.
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 37° 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 37° 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 error in regulating water temperatures by as much as -15° 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.

## WARNINGS AND SAFETY INSTRUCTIONS

The MasterTemp pool heaters are designed and manufactured to provide many years of safe and reliable service when installed, operated and maintained according to the information in this manual. Throughout the manual, safety warnings and cautions are identified by the “” symbol. Be sure to read and comply with all of the warnings and cautions.

### **DANGER — CARBON MONOXIDE GAS IS DEADLY**

•• READ OWNERS MANUAL COMPLETELY BEFORE OPERATING. ••

THIS PRODUCT MUST BE INSTALLED AND SERVICED BY A PROFESSIONAL SERVICE TECHNICIAN, QUALIFIED IN POOL HEATER INSTALLATION. Some jurisdictions require that installers be licensed. Check with your local building authority about contractor licensing requirements. Improper installation and/or operation could create carbon monoxide gas and flue gases which could cause serious injury or death. Improper installation and/or operation will void the warranty.


Exhaust from this pool heater contains carbon monoxide, a dangerous, poisonous gas you cannot see or smell. Symptoms of carbon monoxide exposure or poisoning include dizziness, headache, nausea, weakness, sleepiness, muscular twitching, vomiting and inability to think clearly. IF YOU EXPERIENCE ANY OF THE ABOVE SYMPTOMS, IMMEDIATELY TURN OFF THE POOL HEATER, LEAVE THE VICINITY OF THE POOL OR SPA AND GET INTO FRESH AIR IMMEDIATELY. THE POOL HEATER MUST BE THOROUGHLY TESTED BY A GAS PROFESSIONAL BEFORE RESUMING OPERATION.

#### **EXCESSIVE CARBON MONOXIDE EXPOSURE CAN CAUSE BRAIN DAMAGE OR DEATH.**


Install this pool heater far from open windows, doors, vents and other openings, see [page 16](#) for minimum distances.

Pentair strongly recommends that all vents, pipes and exhaust systems be initially and periodically tested for proper operation. This testing can be accomplished by using a hand-held carbon monoxide meter and/or by consulting with a gas professional.

Pool heaters must be used in conjunction with carbon monoxide detectors installed near the pool heater. The carbon monoxide detectors must be periodically inspected for proper operation so as to insure continued safety. Broken or malfunctioning carbon monoxide detectors must be replaced immediately.


 **WARNING** — This heater is equipped with an unconventional gas control valve that is factory set with a manifold pressure of  $1.1 \pm 0.5$  mbar. Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation or service must be performed by a qualified installer, service agency or the gas supplier. If this control is replaced, it must be replaced with an identical control.

**Do not attempt to adjust the gas flow by adjusting the regulator setting.**

 **WARNING** — **Risk of fire or explosion from incorrect fuel use or faulty fuel conversion.** Do not try to run a heater set up for G20, G25 or G31 gas or vice versa. Only qualified service technicians should attempt to convert heater from one fuel to the other. Do not attempt to alter the rated input or type of gas by changing the orifice. If it is necessary to convert to a different type of gas, consult your Pentair dealer. Serious malfunction of the burner can occur which may result in loss of life. Any additions, changes, or conversions required in order for the appliance to satisfactorily meet the application needs must be made by a Pentair dealer or other qualified agency using factory specified and approved parts. The heater is available for use with G20, G25 or G31 gas only. It is not designed to operate with any other fuels. Refer to the nameplate for the type of gas the heater is equipped to use.

- Use heater only with the fuel for which it is designed.
- If a fuel conversion is necessary, refer this work to a qualified service technician or gas supplier before putting the heater into operation.

## WARNINGS AND SAFETY INSTRUCTIONS (continued)

- ⚠ WARNING** — **Risk of fire or explosion from flammable vapors.** Do not store gasoline, cleaning fluids, varnishes, paints, or other volatile flammable liquids near heater.
- ⚠ WARNING** — **Risk of explosion if unit is installed near G31 gas storage.** G31 gas is heavier than air. Consult local codes and fire protection authorities about specific installation requirements and restrictions. Locate the heater away from propane gas storage and filling equipment as specified by the Standard for the Storage and Handling of G31 (latest edition).
- ⚠ WARNING** — **Risk of fire.** Do not place articles on, near or against the heater.
- ⚠ WARNING** — **Risk of burn hazard.** To reduce the risk of injury, do not touch the side heater vent cover when the heater is operating. Side heater vent covers are HOT and can burn when touched causing personal injury. Do not allow children to play on or around heater or associated equipment.
- THE AVERAGE TEMPERATURE OF THE HEATERS FLUE EXHAUST IS 204 DEGREES CELSIUS (° C).**
- 
- ⚠ WARNING** — **Risk of asphyxiation if exhaust is not correctly vented. Follow venting instructions exactly when installing heater.** Do not use a draft hood with this heater, as the exhaust is under pressure from the burner blower and a draft hood will allow exhaust fumes to blow into the room housing the heater. The heater is supplied with an integral venting system for outdoor installation.
- ⚠ CAUTION** — **Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Wiring errors can also destroy the control board.**
- Connect heater to **240 Volt, 50 Hz.**, Single Phase power only.
  - Verify proper operation after servicing.
  - Do not allow children to play on or around heater or associated equipment.
  - Never allow children to use the pool or spa without adult supervision.
  - Read and follow other safety information contained in this manual prior to operating this pool heater.

## GENERAL SPECIFICATIONS

### NOTICE:

- Combustion air contaminated by corrosive chemical fumes can damage the heater and will void the warranty.
- The Combination Gas Control Valve on this heater differs from most appliance gas controls. If it must be replaced, for safety reasons replace it only with an identical gas control.
- The access door panels must be in place to provide proper ventilation. Do not operate the heater for more than five (5) minutes with the access door panels removed.
- This heater is design certified by CERTIGAZ as complying with the Standard for Gas Fired Pool Heaters, and is intended for use in heating fresh water swimming pools or spas.
- The heater is designed for the heating of chlorine, bromine or salt system swimming pools and spas. It should **NOT** be used as a space heating boiler, or general purpose water heater. The heater requires an external **240 VAC** single-phase electric power source.
- The heater should be located in an area where leakage of the heater or connections will not result in damage to the area adjacent to the heater or to the structure. When such locations cannot be avoided, it is recommended that a suitable drain pan, adequately drained, be installed under the heater. The pan must not restrict air flow.
- The heater may not be installed within 3.5 m (11.5 ft.) of the inside surface of a pool or spa unless it is separated by a solid fence, wall or other permanent barrier.



## Section 1: Overview

# MasterTemp™ Pool and Spa Heater

Congratulations on your purchase of a MasterTemp™ 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 MasterTemp is a compact, lightweight, efficient, induced-draft, gas fired high performance pool and spa heater that can be directly connected to 63 mm (2 in) PVC pipe. The MasterTemp also comes equipped with a multifunction temperature controller which shows, at a glance, the proper functioning of the heater. All MasterTemp heaters are designed with a direct ignition device, HSI (hot-surface ignition), which eliminates the need for a standing pilot. The MasterTemp heater operates on 240 VAC 50 Hz.

**SPECIAL INSTRUCTIONS TO OWNER:** Retain this manual for future reference. This instruction manual provides operating instructions, installation and service information for the MasterTemp high performance heater. The information in this manual applies to all MasterTemp models. **READ AND REVIEW THIS MANUAL COMPLETELY**, it is very important that the owner/installer read and understand the section covering installation instructions, and recognize the European Standard Codes of Practice before installing the MasterTemp. Its use will reduce service calls and chance of injury and will lengthen product life. History and experience has shown that most heater damage is caused by improper installation practices.

## IMPORTANT NOTICES

**THIS PRODUCT MUST BE INSTALLED AND SERVICED BY A PROFESSIONAL SERVICE TECHNICIAN, QUALIFIED IN POOL HEATER INSTALLATION.**

**For the installer and operator of the MasterTemp 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 more information or if you have any questions regarding to this pool heater, please contact **Pentair Water Pool and Spa, Inc. EMEA** – Head Office: Industriepark, Wolfstee, Toekomstlaan 30, 2200 Herentals - Belgium or Pentair Water Pool and Spa, USA – at (800) 831-7133 • (919) 566-8000 • (805) 553-5000.

## WARRANTY INFORMATION

The MasterTemp pool heater is sold with a limited factory warranty. *Specific details are described on the warranty registration card which is included with the product.* Return the warranty registration card after filling in the serial number from the rating plate inside the heater.

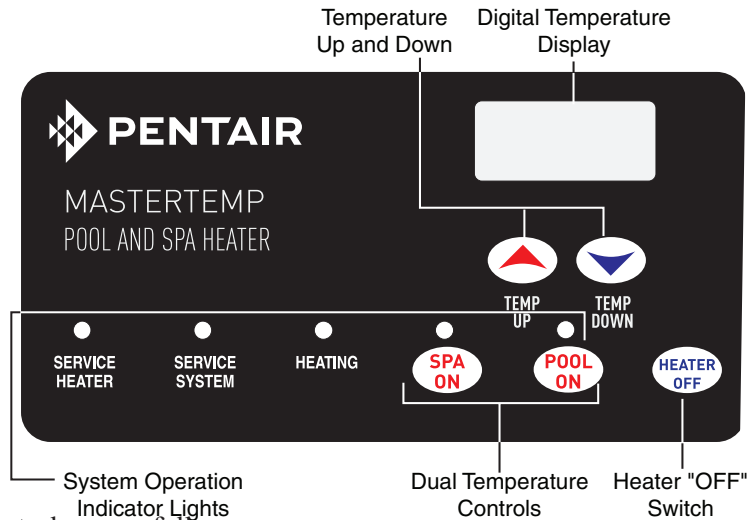
*High standards of excellence include a policy of continuous product improvement results in your state-of-the-art heater. We reserve the right to make improvements which change the specifications of the heater without incurring an obligation to update the current heater equipment.*

**These heaters are designed for the heating of chlorine, bromine or salt system swimming pools and spas or in non-stationary installations, and should never be employed for use as space heating boilers or general purpose water heaters. 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.**

### CAUTION

**OPERATING THIS HEATER CONTINUOUSLY AT WATER TEMPERATURE BELOW 20° C. WILL CAUSE HARMFUL CONDENSATION AND WILL DAMAGE THE HEATER AND VOID THE WARRANTY. Do not use the heater to protect pools or spas from freezing if the final maintenance temperature desired is below 20° C, as this will cause condensation related problems.**

## USING THE HEATER'S CONTROL PANEL



The MasterTemp heater controls are as follows:

- POOL ON** Press this button to control the heater operation by the pool temperature setting.
- SPA ON** Press this button to control the heater operation by the spa temperature setting.
- HEATER OFF** Press this button to switch off the heater.
- ▲ TEMP** Press this button to raise the temperature setting.
- ▼ TEMP** Press this button to lower the temperature setting.

To toggle the display between degrees Centigrade (°C) and degrees Fahrenheit (°F):

1. Press the HEATER OFF button to switch the heater OFF.
2. Press **▲ TEMP** or **▼ TEMP** for five (5) seconds. The display will flash once and change modes (°C to °F or vice versa).
3. Press the HEATER OFF button to switch the heater ON.

When either the **▲ TEMP** or **▼ TEMP** buttons are pressed, the digital display will indicate the temperature setting. After five seconds, the display will return to the actual pool/spa temperature.

In addition to the digital temperature LED display, there are five indicator LEDs:

The **POOL ON** light indicates that the pool water temperature is governing operation of the heater.

The **SPA ON** light indicates that the spa water temperature is governing operation of the heater.

The **HEATING** light comes on and stays on when the heater's burner chamber is firing. This light should be on whenever the burner is on. This light blinks when the heater is calling for heat but not firing. If this light is on but the burner fails to come on, one of the "service" lights should come on, indicating a fault in the system.

The **SERVICE SYSTEM** light indicates that there is insufficient water flow to the heater. If the pump is operating, this usually indicates that the filter and/or skimmers should be cleaned (some filters may require back-washing). If the light remains on after the filter/skimmers have been serviced, the system should be checked by a qualified service technician.

The **SERVICE HEATER** light indicates a fault in the heater or its controls. If this light comes on, shut down the heater (See "TO TURN OFF GAS TO THE APPLIANCE" on page 4), and have a qualified service technician check the system.

### **WARNING**

**Risk of explosion or fire causing burns or death if safety interlocks are disabled. DO NOT** attempt to operate heater when SERVICE HEATER light is on or if blower or burner will not start. Instead, follow instructions under "To Switch Off Gas to the Appliance," and call a qualified service technician to repair unit.

# Section 1: Operation Instructions

## BASIC SYSTEM OPERATION

**Start pump, make sure the pump is running and is primed, to close the water pressure switch and supply power to heater.** Be sure the pool and/or spa is properly filled with water. Follow the Lighting/Operating instructions below.

## MASTERTEMP HSI ELECTRONIC IGNITION LIGHTING/OPERATION

### FOR YOUR SAFETY: READ BEFORE LIGHTING

#### **WARNING**



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

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



**WARNING! DO NOT INTERFERE WITH ANY SEALED COMPONENTS. THIS CAN ONLY BE DONE BY A QUALIFIED SERVICE PROFESSIONAL.**

THE MASTERTEMP HEATER IS INTENDED FOR INSTALLATION WITH A METERED GAS PRESSURE REGULATOR.

### START-UP AND OPERATION

**START-UP AND SHUTDOWN INSTRUCTIONS ARE ON THE LABEL ATTACHED TO THE COVER OF THE APPLIANCE CONTROL BOX.**

NOTICE: UPON INSTALLATION THE INSTALLER MUST INSTRUCT THE USER IN THE OPERATION AND SAFETY DEVICES AND PROVIDE A COPY OF THE HEATER'S USER'S GUIDE.

### BEFORE START-UP

- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burners. Do not try to light the burners by hand.
  - B. **BEFORE OPERATING**, smell all around the appliance 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 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.
  - C. Use only your hand to turn the gas control on or off. Never use tools. If you cannot change the ON/OFF setting 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. Do not operate the pool heater unless the pool or spa is properly filled with water.
- F. Before operating the appliance for the first time or after it has been off for an extended time, perform the following checklist:
    1. Remove debris or other articles from inside the heater and the area around the heater and its exhaust vent. Make sure the ventilation openings are clear of debris or obstruction. For installations in an enclosed space, make sure openings for combustion and ventilation air are unobstructed.
    2. Keep heater area clear and free from combustibles, flammable liquids and chemicals.
    3. Check that all water connections are tight.
    4. Water must be flowing through the heater during operation. Make sure that pool/spa is filled with water and have pump operating. Check that water flow is unobstructed from the appliance. When operating for the first time or after an extended shut-down, run filter pump for several minutes to clear all air from the system.

## OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information on (page v - vii).

2. Set both pool and spa thermostats to the lowest settings.

3. Turn off all electric power to the appliance.

4. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

5. Turn **off** the outside external manual shut-off gas valve, see Figure 1.

6. Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Follow “B” in the “Before Start-up” instructions (page 3). If you don’t smell gas, go to the next step.

7. Turn **on** the outside external manual shut-off gas valve, see Figure 1.

8. Set 3-way valves on inlet and outlet to pool or spa, as appropriate.

9. Turn on all electric power to the appliance.

10. Press either the POOL ON or SPA ON button switch on the operating control.

11. Set the thermostat to desired setting (**NOTICE:** Set point must be above actual water temperature or burner will not fire). See page 2 “OPERATING THE CONTROL PANEL”.

12. The blower should come on immediately, and after about 20 seconds, the burner should fire. When operating for the first time, the burner may not fire on the first try because of air in the gas line. If it does not fire at first, push the OFF switch, wait five minutes, and again push the POOL or SPA ON switch. The burner should fire after about 20 seconds. You may have to repeat this until all of the air has cleared the gas line.

13. The burner should fire until the pool/spa temperature reaches the desired temperature set on the thermostat. The blower will continue to run for about 45 seconds after the burner shuts off. If any of the safety interlocks should open during burner operation, the burner shuts off immediately, but the blower continues to run for about 45 seconds. Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the appliance.

14. If the appliance will not operate, follow the instructions below “TO TURN OFF GAS TO THE APPLIANCE”, and call your service technician or gas supplier.

15. If the electrical power is lost while the heater is running, the heater will retain all program settings and the unit will come back to it’s original mode and settings once the power is restored.

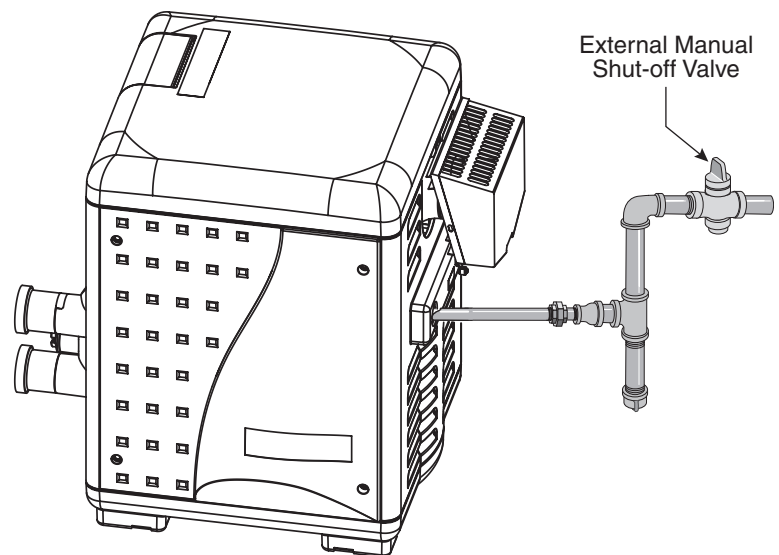


Figure 1.

## TO TURN OFF GAS TO APPLIANCE

1. Press the OFF button on operating control.

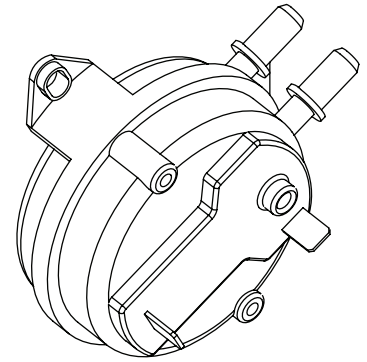
2. Switch off all electric power to the unit.

3. Turn **off** the outside external manual shut-off gas valve, see Figure 1.

## SAFETY CONTROLS

### AIR FLOW SWITCH (AFS)

The air flow switch, (see Figure 2), is a safety device used to insure that the combustion air blower (fan) is operating and has been designed to monitor the vacuum (negative) pressure within the blower housing. The air flow switch is factory set and is connected upstream of the ignition module. The ignition module does not operate unless the air pressure switch and all safety switches are closed.



Air Flow Switch

Figure 2.



### WARNING

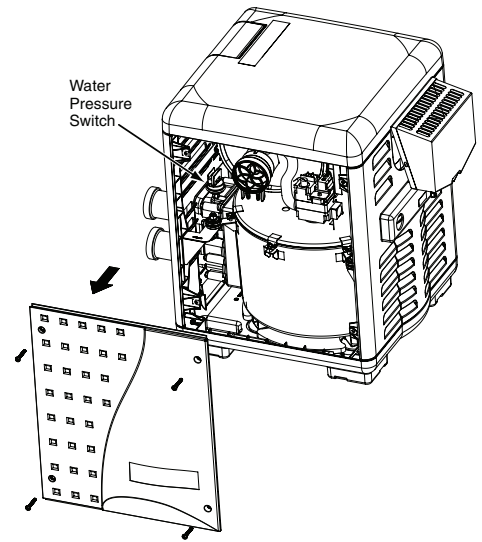
**HAZARDOUS PRESSURE. DO NOT BYPASS THE WATER PRESSURE SWITCH OR RENDER IT INOPERABLE.**

### WATER PRESSURE SWITCH

The water pressure switch, (see Figure 3). If the water flow is restricted, the water pressure switch may prevent the burner from firing and cause the “Service System” light to go on. If the light remains on after the filter has been serviced, have a qualified service technician check the system.

For deck-level heater installations, the Water Pressure Switch is factory set at 0.2 bar (3.00 psi). **NOTE:** See, *Below Pool Level Installation instructions on page 10*. If the pressure switch is .3M (1 ft.) below or above the pool water level, reset the switch so that it is open when the pump is off and closed when the pump is running. Turn the star-wheel on the switch clockwise

() to raise setting (heater below the pool) and counterclockwise () to lower the setting (heater above the pool – see Figure 4. Test the switch after resetting. **NOTICE:** When the heater is mounted more than 1.5M (5 ft.) above or 1.2M (4 ft.) below the deck level, a Pressure Switch is no longer adequate. A Flow Switch must be installed instead.

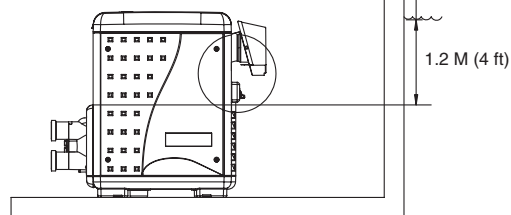


**NOTICE:** Heater operation with incorrect Pressure Switch setting may cause operation with no water flow. Operation of the heater without sufficient water flow may severely damage it and **will void the warranty**.

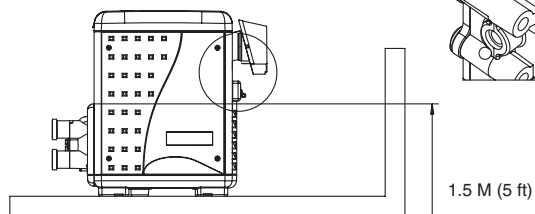
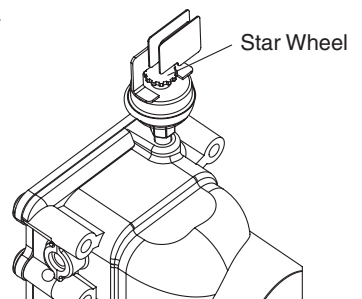
### HIGH LIMIT SWITCH

A “High Limit”, is a safety device that opens the electrical circuit and shuts off the heater based on a water temperature set point within the “High Limit Device”. The MasterTemp series of heaters contains two (2) high limit devices which are located on the main inlet / outlet header (see page 41 item 6).

Turn star wheel **clockwise** to raise pressure set point if pressure switch is more than 1.2 M (4 ft) below water level



A reference scale is on the back of pressure switch



Turn star wheel **counterclockwise** to lower pressure set point if pressure switch is more than 1.5 M (5 ft) above water level

Figure 3.

## SAFETY CONTROLS, (continued)

### OPERATION OF IGNITION MODULE

The Ignition Module, (see Figure 5), is microprocessor based and operates on 24VAC supplied by the transformer. The control utilizes a microprocessor to continually and safely monitor, analyze, and control the proper operation of the gas flame holder. The module with the presence of the flame sensor, using flame rectification, allows the heater to operate.

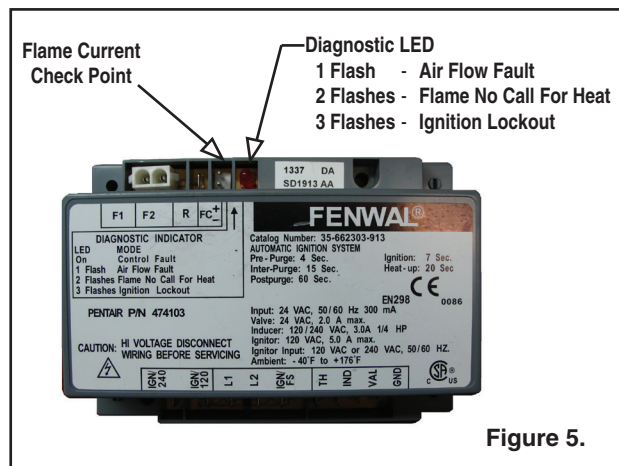


Figure 5.

## TEMPERATURE SETTING

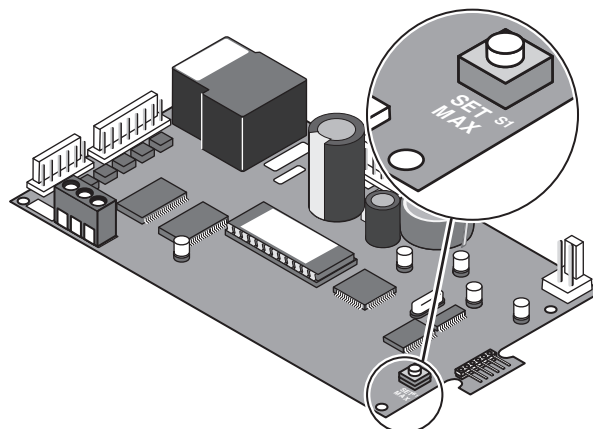
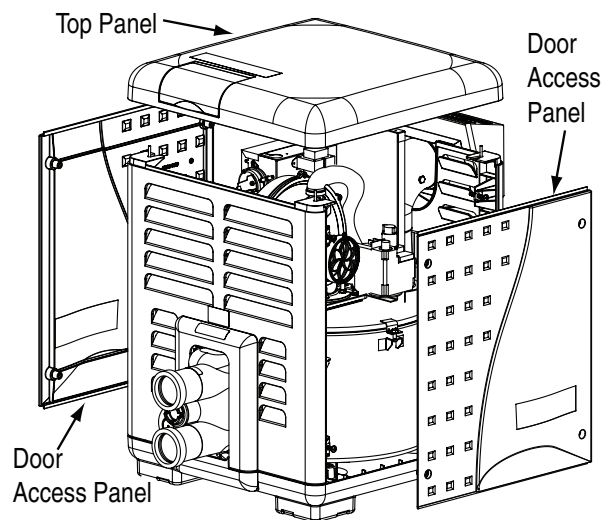
The heater comes factory set at 25.6° C (78° F) for the pool mode and 37.8° C (100° F) for the spa mode. Using the up and down arrows, you can set the pool/spa thermostats to a minimum temperature of 18.3° C (65° F), or a maximum of 40° C (104° F). If you desire to heat only one body of water, the thermostat is capable of an off mode. As an example, if you only wish to heat the spa and not the pool, simply depress and hold the pool down arrow, and the thermostat will lower its setting to 18.3° C (65° F) then go to an off mode. *See below to change the heater's factory set temperature settings.*

## MAXIMUM TEMPERATURE SET POINT

1. Unbolt and remove the door panels (see Figure 6).
2. Access the control panel board on the underside of the top cover. Locate the yellow button on the corner of the control board.
3. Push the **Max. Temp. Set Point** button on the back of the control board (see Figure 7).

The following sequence should happen:

1. The unit turns on and the **POOL ON** light will turn on.
2. Press the **▲ TEMP** or **▼TEMP** button (on TOP of the control panel) to set maximum pool temperature.
3. Wait up to 30 seconds; the **POOL ON** light will turn off and the **SPA ON** light will turn on. To override the time delay, push the **Max. Temp. Set Point** button again.
4. Press the **▲ TEMP** or **▼TEMP** button on the control panel and set maximum spa temperature to 40°C (104° F) or less.
5. Wait up to 30 seconds; the **SPA ON** light will turn off and the unit will shut down. To override the time delay, push the **Max. Temp. Set Point** button again.
6. Reinstall the access door panels.



## Section 2: Installation

**THIS PRODUCT MUST BE INSTALLED AND SERVICED BY A PROFESSIONAL SERVICE TECHNICIAN, QUALIFIED IN POOL HEATER INSTALLATION. THE MASTERTEMP HEATER IS INTENDED FOR INSTALLATION WITH A METERED GAS PRESSURE REGULATOR.**

Pentair strongly recommends that all vents, pipes and exhaust systems be initially and periodically tested for proper operation. This testing can be accomplished by using a hand-held carbon monoxide meter and/or by consulting with a gas professional.

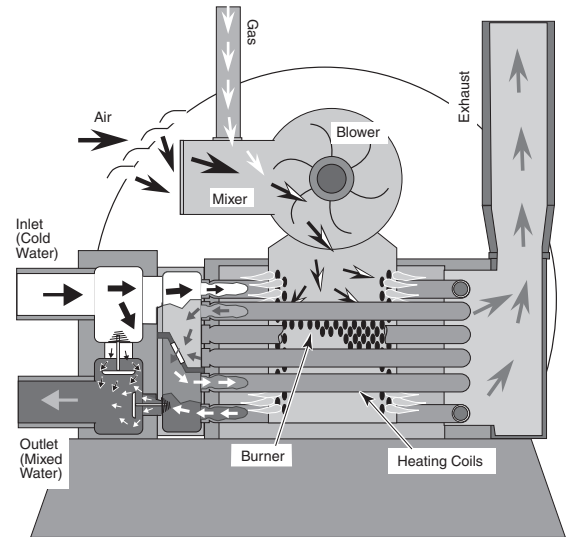
Pool heaters must be used in conjunction with carbon monoxide detectors installed near the pool heater. The carbon monoxide detectors must be periodically inspected for proper operation so as to insure continued safety. Broken or malfunctioning carbon monoxide detectors must be replaced immediately. If not fitted on the heater, the installer must install any safety devices according to the European Standard Codes of Practice.

**NOTICE: UPON INSTALLATION THE INSTALLER MUST INSTRUCT THE USER IN THE OPERATION AND SAFETY DEVICES AND PROVIDE A COPY OF THE HEATER'S USER'S GUIDE (THIS MANUAL).**

### HEATER DESCRIPTION

Figure 8 is a diagram of the heater showing how it operates. Precisely matched orifice plates meter the air and gas into the mixer. The blower draws the air and gas through the mixer and forces it into the burner's flame holder. A sealed heat exchanger surrounds the flame holder, discharging exhaust gases out the flue.

63 mm (2 in - UK) PVC water piping connects directly to the manifold/header on the heat exchanger using 63 mm (2 in - UK) PVC slip unions provided with the heater. The outer manifold remains cool; no heat sinks are required. A thermal regulator and an internal bypass regulate the water flow through the heat exchanger to maintain the correct outlet temperature. The heater operator control panel board assembly is located on top of the heater.



### SEQUENCE OF OPERATION

An electronic temperature sensing **thermistor** in the manifold adapter inlet controls the heater operation. When the inlet water temperature drops below the temperature set on the **operating control**, the **burner controller** supplies power to the combustion **air blower** through a series of **safety interlocks**. The interlocks consist of:

- the **pressure switch (PS)**, which senses that the pump is running,
- the **high limit switch (HLS)**, which opens if the heat exchanger outlet temperature goes above 55° C (131° F), and
- the **air flow switch (AFS)**, which senses the pressure drop across the air metering orifice,
- the **automatic gas shut-off (AGS) switch**, which opens if the heat exchanger outlet temperature goes above 60° C (140° F).
- the **inlet temperature control switch**, which opens if the inlet temperature goes above 45° C (110° F).
- the **stack flue sensor (SFS)**, which shuts down the heater if the flue gas temperature reaches 249° C (480° F).

The air flow switch (AFS) senses the pressure drop across the air metering orifice. As soon as there is sufficient air flow, the AFS closes, closing the circuit to the **hot surface igniter (HSI)**, which ignites the fuel mixture. On a call for heat, the blower and HSI are energized. In about 20 seconds, the gas valve opens and ignition occurs. The HSI then switches to a sensing mode and monitors the flame.

The heater is equipped with a digital operating control that enables the user to pre-set the desired pool and spa water temperatures. The control enables the user to select between pool and spa heating, and features a digital display that

## PUTTING THE HEATER INTO SERVICE

If the heater is installed below the level of the pool, or more than 0.6 meters (2 feet) above pool level, the pressure switch setting should be adjusted. See “WATER PRESSURE SWITCH” in the “SAFETY CONTROLS Section” (page 5) and the “CAUTION” under “BELOW POOL INSTALLATION Section” (see page 10).

Before putting the heater into service for the first time, follow the instructions under “BEFORE START-UP” (page 3) in the front of this manual. Check for proper operation of the heater by following the steps under, see page 4 “OPERATION INSTRUCTIONS.”

**Notice: Damage to equipment caused by improper installation or repair will void the warranty.**

## SPECIFICATIONS

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. See Figure 9 for Outdoor Installations.

### DIMENSIONS IN CENTIMETERS & INCHES

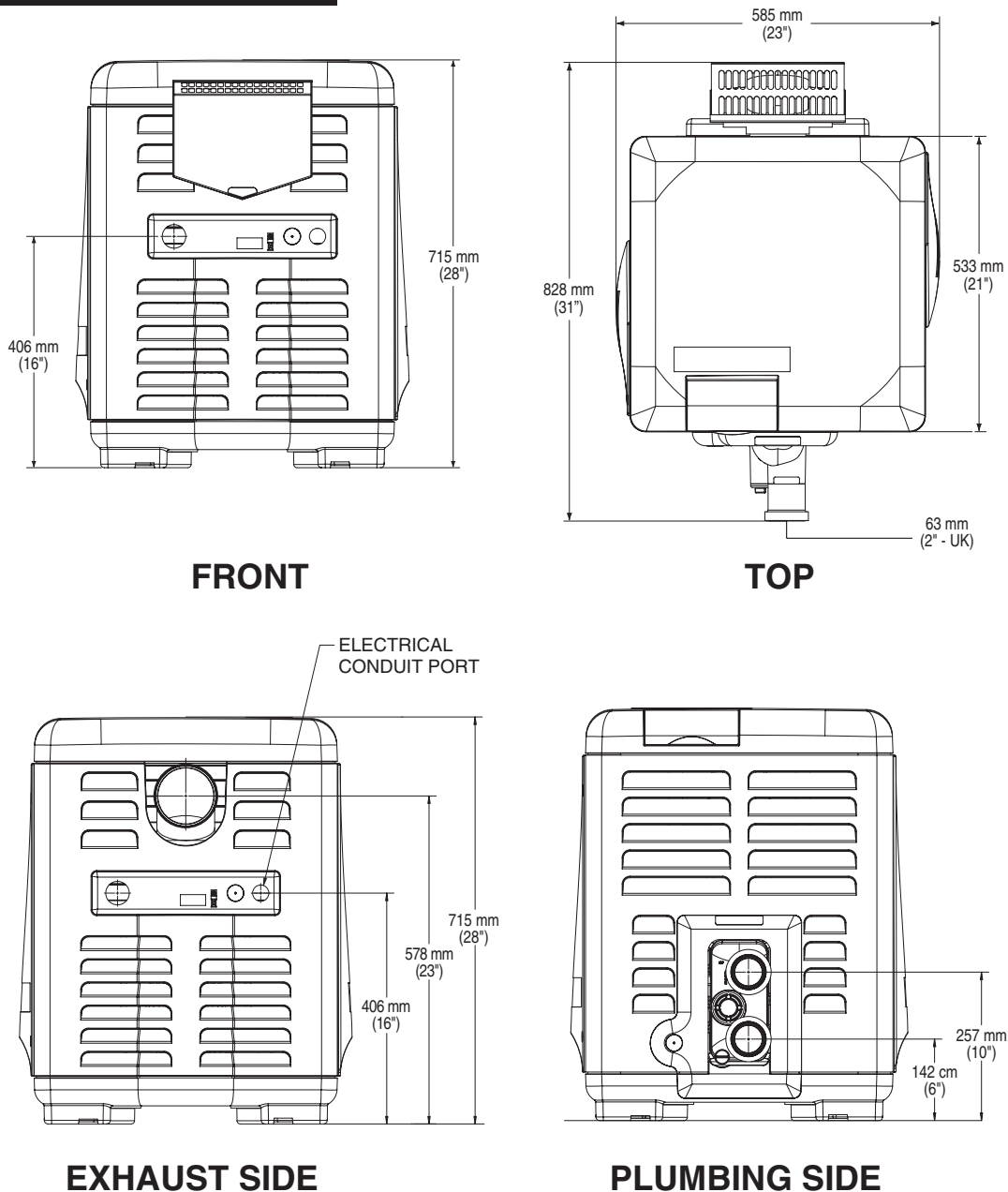


Figure 9.

### EXHAUST SIDE

### PLUMBING SIDE



## PLUMBING CONNECTIONS

The MasterTemp™ heater has the capability of direct PVC water piping plumbing connections. A set of bulkhead fittings is included with the MasterTemp to insure conformity with Pentair’s recommended PVC plumbing procedure. Other plumbing connections can be used. See Figure 11 for plumbing connections.

**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. If a manual by-pass is installed, temporarily close it to insure that all air is purged from the heater.

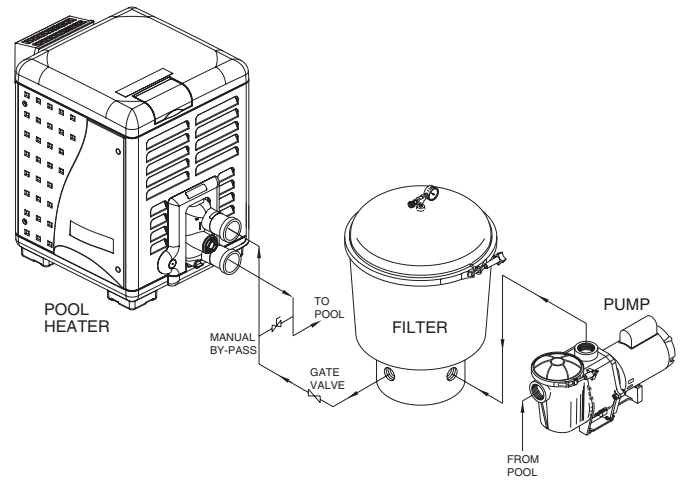


Figure 10.

## 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-siphoning. Back-siphoning is most likely to occur when the pump stops, creating a pressure-suction differential. Do **NOT** sanitize the pool by putting chlorine tablets or sticks into the skimmer(s). When the pump is off, this will cause a high concentration of chlorine to enter the heater, which could cause corrosion damage to the heat exchanger.

**CAUTION**

Exercise care when installing chemical feeders so as to not allow back siphoning of chemical into the heater, filters or pump. 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 noncorrosive “Check Valve”, (P/N R172288), between the feeder and heater.

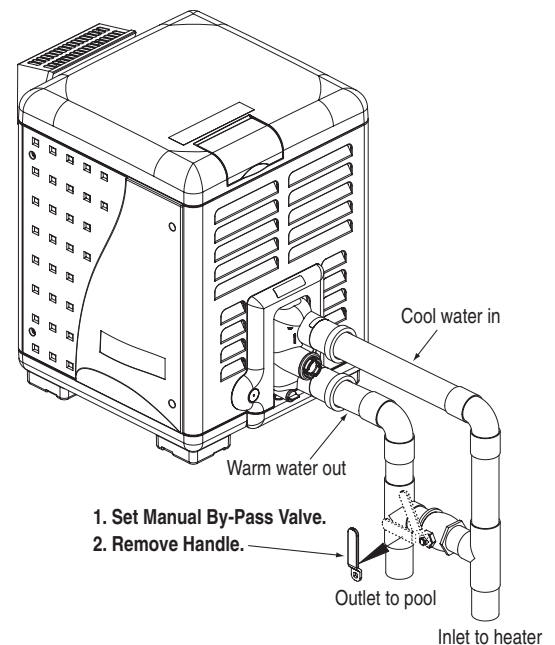
## MANUAL BY-PASS VALVE (WATER FLOW RATE)

A bypass valve **MUST** be installed to regulate water flow to ensure the flow does not exceed the maximum allowed rate of 454 L/m. After installing the bypass valve, adjust the valve to bring the flow rate within the acceptable range. Then remove the valve handle or lock it in place to avoid tampering. See Figure 11.

Model	Min. L/m (GPM)	Max. L/m (GPM) *
200	76 (20)	454 (120)
300	114 (30)	454 (120)
400	152 (40)	454 (120)

\* DO NOT EXCEED THE MAXIMUM RECOMMENDED FLOW RATE FOR THE CONNECTING PIPING.

Table 1.



**See page 33 for Pressure Relief Valve Installations.**

## WATER CONNECTIONS

The heater requires proper water flow and pressure for its operation. See Figure 12 for the recommended installation. The filter pump discharges to the filter, the filter discharges to the heater, and the heater discharges directly to the pool or spa.

A manual bypass valve **MUST** be installed across the heater when the pump flow exceeds 454 L/m (120 GPM). See “WATER FLOW RATE” on page 9 - Table 1 for setting of the manual by-pass valve.

Make sure that the outlet plumbing from the heater contains no shut-off valves or other flow restrictions that could prevent flow through the heater (except for below pool as noted below, or winterizing valves where needed). To switch flow between the pool and spa, use a diverter valve. Do not use any valve that can shut off the flow. Do not use a shut-off valve to isolate the heater unless it is below the level of the pool or spa.

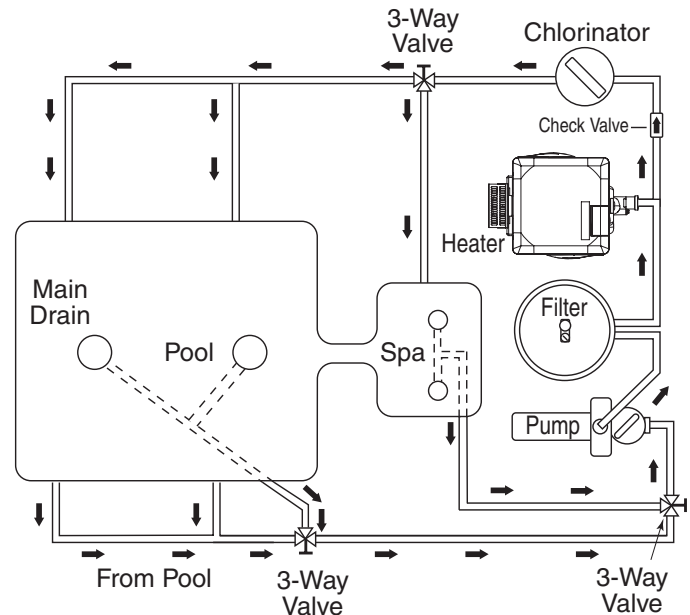
Install the chemical feeder downstream of the heater. Install a chemical resistant one-way check valve between the heater and the chemical feeder to prevent back-siphoning through the heater when the pump is off.

**NOTICE:** If the heater is plumbed in backwards, it will cycle continuously. Make sure piping from filter is not reversed when installing heater.

Connect the heater directly to 63 mm (2 in - UK) PVC pipe, using the integral unions provided. Heat sinks are not required. The low thermal mass of the heater will prevent overheating of the piping connected to the pump even if the heater shuts down unexpectedly. Occasionally a two-speed pump will not develop enough pressure on the low speed to operate the heater. In this case, run the pump at high speed only to operate the heater. If this does not solve the problem, do not try to run the heater. Instead, correct the installation.

Do not operate the heater while an automatic pool cleaner is also operating. If the circulation pump suction is plugged (for example by leaves), there may not be adequate flow to the heater. Do not rely on the pressure switch in this case.

If European Standard Codes of Practice require the installation of a pressure relief valve (PRV), see page 33 for “PRESSURE RELIEF VALVE INSTRUCTIONS”.



## 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 following **CAUTION** before installation.

### ⚠ CAUTION

#### BELOW OR ABOVE POOL INSTALLATION

The Water Pressure Relief Valve Switch is set in the factory at 0.20 bar (3.00 psi). This setting is for a heater installed at pool level. If the heater is to be installed more than 0.3 m above or below, the water pressure switch must be adjusted by a qualified service technician. See page 3, Figure 5.

#### FLOW SWITCH INSTALLATION

If the heater is installed more than 1.5 m above the pool or more than 1.2 m below the pool level, you will be beyond the limits of the pressure switch and a flow switch must be installed. Locate and install the flow switch externally on the outlet piping from the heater, as close as possible to the heater. Connect the flow switch wires in place of the water pressure switch wires.

## **GAS CONNECTIONS**

### **GAS LINE INSTALLATIONS**

The gas supply must be installed in accordance with the *European Standard Codes of Practice for gas installation* as applicable and all applicable local codes.

#### **THE MASTERTEMP HEATER IS INTENDED FOR INSTALLATION WITH A METERED GAS PRESSURE REGULATOR.**

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 2** below shows the recommended gas inlet pipe sizes required for the distance from the gas meter to the heater. The table is for G20 and G25 at a specific gravity of .65 and G31 at a specific gravity of 1.55.

When sizing gas lines, calculate 0.9 additional meters 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. Insufficient gas supply will cause the heater to operate below its designed performance or not at all. 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. If the gas pressure is not adjusted to the correct working pressure, the heater will be over gassed and cause serious damage within minutes. This damage is not covered under the heater warranty.*

Install a manual shut-off valve that conforms with European Standard Codes of Practice, and a sediment trap/drip leg and union located outside the heater panels, see Figure 13. Do not use a restrictive gas cock.

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 6.0 kPa). 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.

#### **NOTE**

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

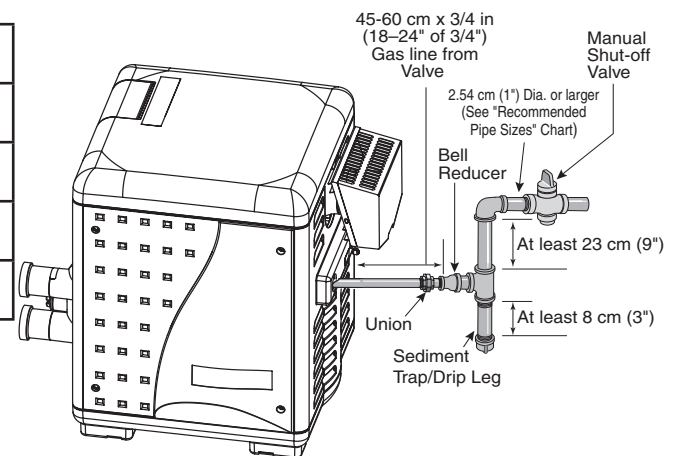
#### **! WARNING**

**DO NOT INSTALL THE GAS LINE UNION INSIDE THE HEATER CABINET. THIS WILL VOID YOUR WARRANTY.**

### **GAS PIPE SIZING**

Heater Size	Distance from the Meter		
	0 to 15 m	16 to 30 m	31 to 60 m
200	25 mm	32 mm	32 mm
300	32 mm	32 mm	40 mm
400	32 mm	40 mm	50 mm

Table 2.



### **SEDIMENT TRAP/DRIP LEG**

Install a sediment trap/drip leg and union located outside the heater panels in accordance with *European Standard Codes of Practice* requirements. Do not use a restrictive gas cock. The sediment trap/drip leg shall be either a tee fitting with a capped nipple in the bottom outlet which can be removed for cleaning, as illustrated in Figure 14, or an other device recognized as an effective sediment trap/drip leg. All gas piping should be tested after installation in accordance with local codes.

## TESTING GAS LEAKS AND GAS PRESSURE

THE MASTERTEMP HEATER IS INTENDED FOR INSTALLATION WITH A METERED GAS PRESSURE REGULATOR. Before operating the heater, the heater and its gas connections must be leak tested. **Do NOT use an open flame to test for leaks.** Test all gas connections for leaks with soapy water.

The gas valve must be completely disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 6.0 kPa (60 mbar).

### TESTING THE GAS PRESSURE THROUGH THE COMBINATION GAS CONTROL VALVE

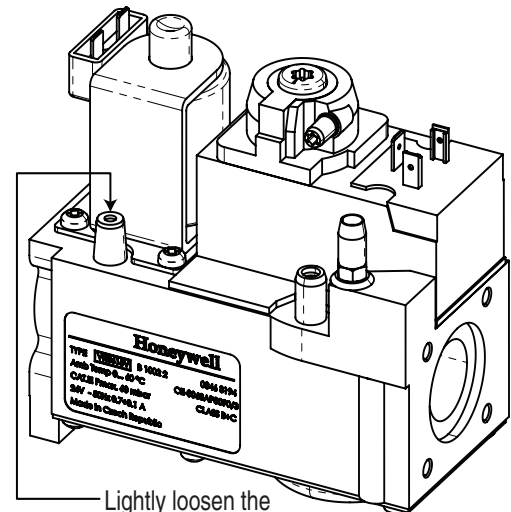
#### ⚠ WARNING

**Risk of fire and explosion.** Alteration, service, or maintenance of the Combination Gas Control Valve can lead to fire or explosion, causing loss of life, personal injury, and/or property damage. **DO NOT ATTEMPT TO ADJUST THE GAS CONTROL VALVE.**

#### These instructions are for the use of qualified service technicians only!

1. Shut off the gas supply to the heater.
2. Loosen the small screw inside the pressure tap as shown in Figure 14.
3. Connect the manometer hose.
4. Open the gas supply to the heater.
5. Turn on the heater.
6. Take the gas pressure reading.
7. Turn off the heater.
8. Shut off the gas supply to the heater.
9. Disconnect the manometer hose.
10. Tighten the small screw inside the pressure tap.
11. Open the gas supply to the heater.
12. Verify that the seal connection in the pressure tap is closed by testing for leaks with soapy water.

**Note:** If the pressure reading is out of range, (see Table 3), regulate the incoming gas pressure.



Lightly loosen the small screw inside the pressure tap, and attach/connect the manometer hose.

### INLET GAS PRESSURE REQUIREMENTS

Description	Type	Gas Supply Pressure
Natural Gas	2H; 2E+; 2N; 2Es, 2Ei; 2ELL (G20/G25)	20-25 mbar
Propane Gas	3P (G31)	37 mbar

**NOTE:** All readings must be taken while heater is operating. Any adjustments or readings made while heater is off will result in performance problems.

Table 3.

This appliance is equipped with an unconventional gas control valve that is factory set with a manifold pressure of  $1.1 \pm 0.5$  mbar. Installation or service must be performed by a qualified installer, service agency, or the gas supplier. If this control valve is replaced, it must be replaced with an identical gas control. The combination gas valve incorporates dual shut-off valves and a negative-pressure regulator. For proper operation, the regulated pressure at the outlet manifold of the valve must be  $1.1 \pm 0.5$  mbar below the reference pressure at the blower mixer inlet, and the gas valve 'VENT' tap must be connected to the end cap air orifice as shown in Figure 14. **DO NOT attempt to adjust the gas input by adjusting the regulator setting. The correct gas regulator setting is required to maintain proper combustion and must NOT be altered.**

## OUTDOOR INSTALLATION

For heaters located outdoors, using the built-in stackless venting system.

### DANGER

**CARBON MONOXIDE GAS IS DEADLY** – Exhaust from this pool heater contains carbon monoxide, a dangerous, poisonous gas you cannot see or smell. Symptoms of carbon monoxide exposure or poisoning include dizziness, headache, nausea, weakness, sleepiness, muscular twitching, vomiting and inability to think clearly. IF YOU EXPERIENCE ANY OF THE ABOVE SYMPTOMS, IMMEDIATELY TURN OFF THE POOL HEATER, LEAVE THE VICINITY OF THE POOL OR SPA AND GET INTO FRESH AIR IMMEDIATELY. THE POOL HEATER MUST BE THOROUGHLY TESTED BY A GAS PROFESSIONAL BEFORE RESUMING OPERATION.

**EXCESSIVE CARBON MONOXIDE EXPOSURE CAN CAUSE BRAIN DAMAGE OR DEATH.**

### WARNING

**Risk of explosion if a unit burning G31 is installed in a pit or other low spot.** G31 is heavier than air. Do not install the heater using propane in pits or other locations where gas might collect. Consult the European Standard Codes of Practice building code officials to determine installation requirements and specific installation restrictions of the heater relative to propane storage tanks and filling equipment. Installation must meet the requirements for the Standard for the Storage and Handling of Liquid Petroleum Gases. Consult local codes and fire protection authorities about specific installation restrictions.

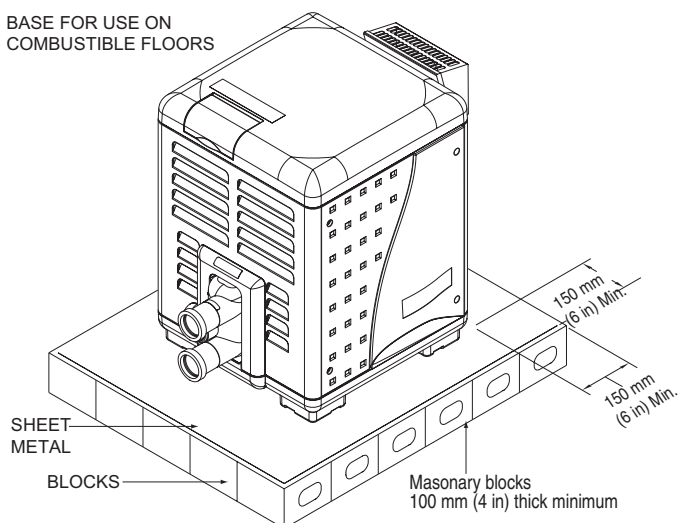
Locate the heater in an open, unroofed area and on a level surface that is protected from drainage or run-off. Install the heater in an area where leaves or other debris will not collect on or around the heater.

It is recommended that a non-combustible base be a platform under the heater constructed of hollow masonry blocks, not less than 100 mm (4 in) thick (laid with ends unsealed and joints matched for air circulation). Cover blocks with 0.75 mm (0.03 in) minimum galvanized sheet metal, see [Figure 15](#).

To avoid damage to the electronic components in the heater, take care to prevent prolonged exposure to driving sources of water (such as lawn sprinklers, heavy roof runoff, hoses, etc.). Avoid operation in persistent, extreme, moist or salty environments.

In extreme weather, shut down the heater and disconnect the power to it until the weather has moderated. In areas subject to hurricanes or very high winds, purchase the Bolt Down Bracket Kit, P/N 460738, see [Figure 16](#).

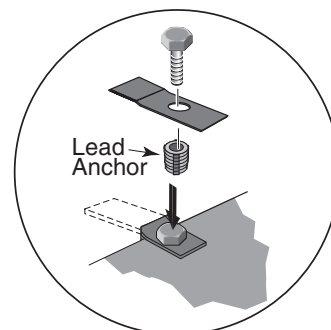
BASE FOR USE ON  
COMBUSTIBLE FLOORS



Hollow masonry blocks, not less than 100 mm (4 in) thick, (laid with ends unsealed and joints matched for air circulation). Cover blocks with 0.75 mm (0.03 in) minimum galvanized sheet metal.

**Figure 15.**

For Heater mounting bolts and clamps, purchase separately Bolt Down Bracket Kit, Part No. 460738.



**Figure 16.**

## HEATER CLEARANCES – OUTDOOR

### IMPORTANT!

- In an outdoor installation it is important to ensure water is diverted from overhanging eaves with a proper gutter/drainage system. The heater must be set on a level foundation for proper drainage.
- This unit shall not be operated outdoors at temperatures below -7° C.

If the heater is located under a roof or deck overhang, there must be at least 1 meter (3 ft.) of clearance between the bottom of the overhang and the top of the heater exhaust vent, see Figure 17. If the heater is under a roof or deck overhang, the space around the heater must be open on three sides.

For minimum exhaust vent clearances for building openings, see below Figure 18.

Orient the heater for convenient access to the water connections and the gas and electrical connections.

Check the European Standard Codes of Practice for setback (property line) requirements.

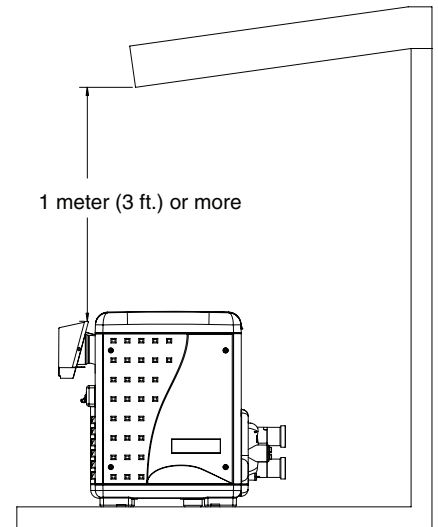


Figure 17.

### ⚠ CAUTION

If installing the heater next to or near an air conditioning unit or a heat pump, allow a minimum of 92 cm (36 in.) between the air conditioning unit and the heater.

### OUTDOOR INSTALLATION VENTING GUIDELINES

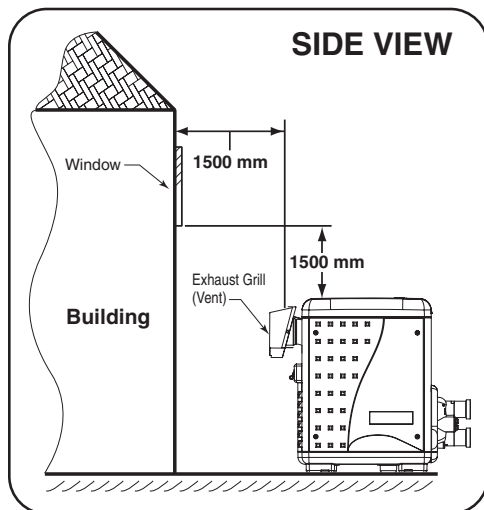
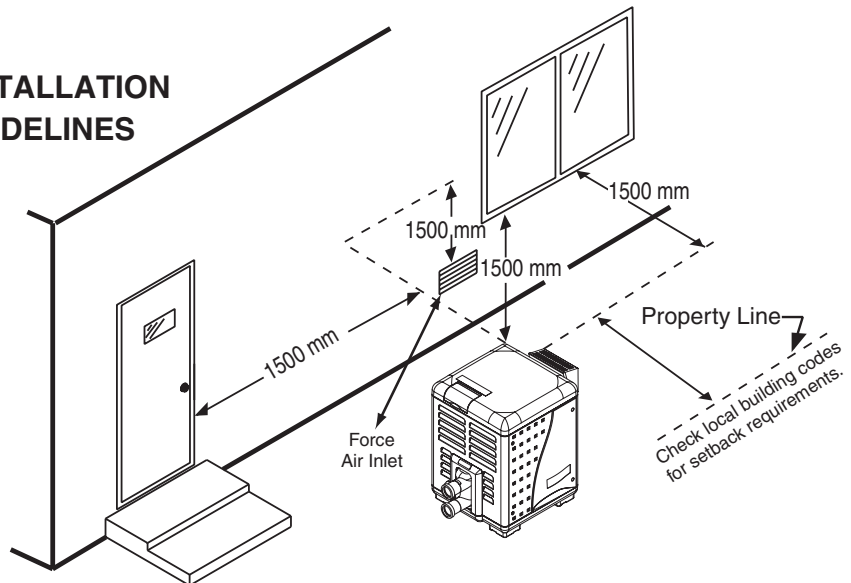


Figure 18.



#### Vent Termination:

- Must be installed at least 1500 mm away from the building wall openings, and at the following distances away from any door, window, or gravity air inlet.
- The heater must also have **no** obstructions above it.

### ⚠ WARNING

**Risk of fire and explosion.** Do not spray aerosols in the vicinity of the heater while it is in operation. Chemicals should not be stored near the heater installation. Combustion air can be contaminated by corrosive chemical fumes which can damage the heater and will void the warranty.

# INDOOR VENTING — General Requirements

If you are considering connecting this heater to a pre-existing vent system, make sure that the vent system meets the appropriate venting requirements as given in this manual on pages 15-20. If not, replace the vent system. **DO NOT** use a draft hood with this heater. The MasterTemp heaters are capable of a 270-degree discharge rotation and with a vent gas temperature less than 204° C (400° F). The total length of the horizontal run must not exceed the length that is listed in **Table 5** on **page 17**.

# HEATER CLEARANCES — General Requirements

## INDOOR INSTALLATION AND OUTDOOR SHELTER

The following clearances must be maintained from the nearest walls: (See Figure 19, 20 & 21)

- TOP** ..... 15 cm (6 in)
- EXHAUST SIDE** ..... 15 cm (6 in.)
- HEADER SIDE** ..... 15 cm (6 in.)
- DOOR PANELS\*** ..... 15 cm (6 in.)

**Note** (\*) For service access it is advisable to allow for sufficient clearance on at least one door panel. The heater is designed for installation on combustible flooring. For installation on carpeting, the heater must be mounted on a metal or wood panel that extends at least 10 cm (4 in) beyond the base of the heater. **Note: Wall sensitive to heat (for example wood), must be protected by a suitable insulation.** If the heater is installed in a closet or alcove, the entire floor shall be covered by the panel. On an outdoor shelter installation, the exhaust discharges into a vent pipe. Orient the heater so that the vent pipe does not interfere with adjustment of the operating controls. The control panel located on the top panel can be rotated to any of the three sides of the heater for easy access. However, the control panel must not be located on the side where the vent is located.

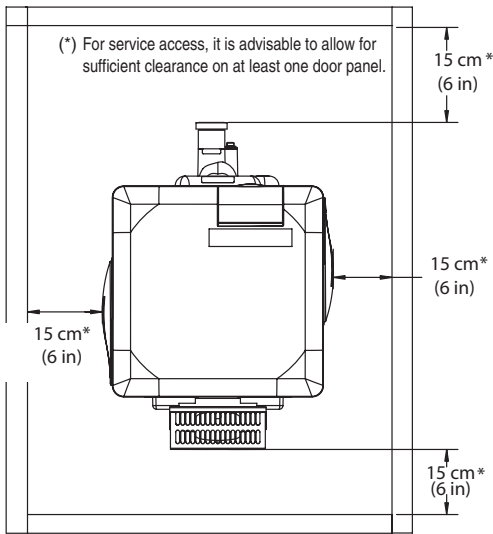


Figure 19.

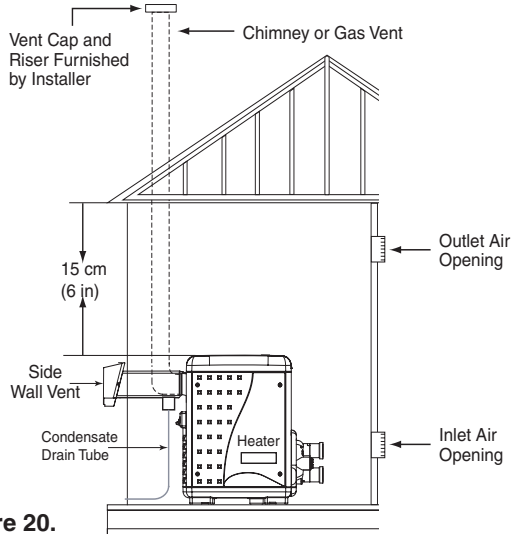


Figure 20.

## OUTSIDE VENT COVER REMOVAL

**THE HEATER IS SUPPLIED FROM THE FACTORY WITH A BUILT-IN STACKLESS OUTSIDE VENT FOR OUTDOOR INSTALLATION. REMOVE THE OUTSIDE VENT COVER FOR OUTDOOR SHELTER INSTALLATION.**

## COMBUSTION AIR SUPPLY

For indoor installation, the heater location must provide sufficient air supply for proper combustion and ventilation of the surrounding area in accordance with European Standard Codes of Practice. The minimum requirements for the air supply specify that the room in which a heater is installed should be provided with two permanent air supply openings; one within 30 cm (12 in) of the ceiling, the other within 30 cm (12 in) of the floor for combustion air, in accordance with the European Standard Codes of Practice as applicable, and any local codes that may apply. These openings shall directly, or through duct, connect to outdoor air.

**Pentair Water Pool and Spa, Inc. does not recommend indoor installations that do not provide combustion air from outside the building. (Continue on next page)**

## COMBUSTION AIR SUPPLY (CONTINUED)

### *Air Supply Requirements Guide for MasterTemp™ Heaters*

Minimum Net Free Open Area for Each Opening* (Square Inches/Centimeters)				
Model	All Air From Inside Building		All Air From Outside Building	
	Combustion	Vent	Combustion	Vent
200	200 sq. in. 1290 cm <sup>2</sup>	200 sq. in. 1290 cm <sup>2</sup>	50 sq. in. 323 cm <sup>2</sup>	50 sq. in. 323 cm <sup>2</sup>
300	325 sq. in. 2097 cm <sup>2</sup>	325 sq. in. 2097 cm <sup>2</sup>	80 sq. in. 516 cm <sup>2</sup>	80 sq. in. 516 cm <sup>2</sup>
400	400 sq. in. 2580 cm <sup>2</sup>	400 sq. in. 2580 cm <sup>2</sup>	100 sq. in. 645 cm <sup>2</sup>	100 sq. in. 645 cm <sup>2</sup>

\* Area indicated is for one of two openings; one at floor level and one at the ceiling.

**CAUTION**

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

**NOTE** \*: Vent must be at least 2.4 m (8 ft) away from nearest vertical surface. Vents extending 1.5 m (5 ft) or more above the roof must be braced or guyed. Consult your local code officials for detailed information.

Table 4.

### **VENT INSTALLATION – INDOOR INSTALLATION OR OUTDOOR SHELTER**

**FLUEING MUST BE IN ACCORDANCE WITH EUROPEAN STANDARD CODES OF PRACTICE.** Always vent the heater to the outdoors (see above NOTE\*). Vent the heater vertically using double wall vent connector pipe. Locate the heater so as to minimize the length of horizontal venting and the number of vent elbows required. Horizontal vent runs must slope to allow exhaust condensate to drain and it is recommended to have a condensate drain as described in the venting installation instructions.

### **Direct Air Intake Duct with 76 mm (3 in - UK) PVC Pipe (Indoor Installation)**

For indoor heater installations where combustion air supply might be insufficient, the MasterTemp Heater is certified for a direct air intake duct using a 76 mm (3 in - UK) PVC pipe (Pentair P/N 461031). If outside air is drawn through the PVC duct directly into the heater, the PVC pipe can be installed in accordance with the following requirements: The air intake opening **MUST** be installed at least 30.5 cm (12 in.) above the roof line or normal snow levels for free air flow. The Category I or III exhaust vent termination cap must have at least 1.8 m (6 ft.) minimum vertical clearance from air intake duct. (See Figure 21 below).

**WARNING!**

DO NOT USE PVC PIPE FOR FLUE EXHAUST VENT. FLUE EXHAUST VENT TEMPERATURES CAN BE IN EXCESS OF 204° C. FLUE EXHAUST VENT **MUST BE** CATEGORY I or CATEGORY III METAL VENT.

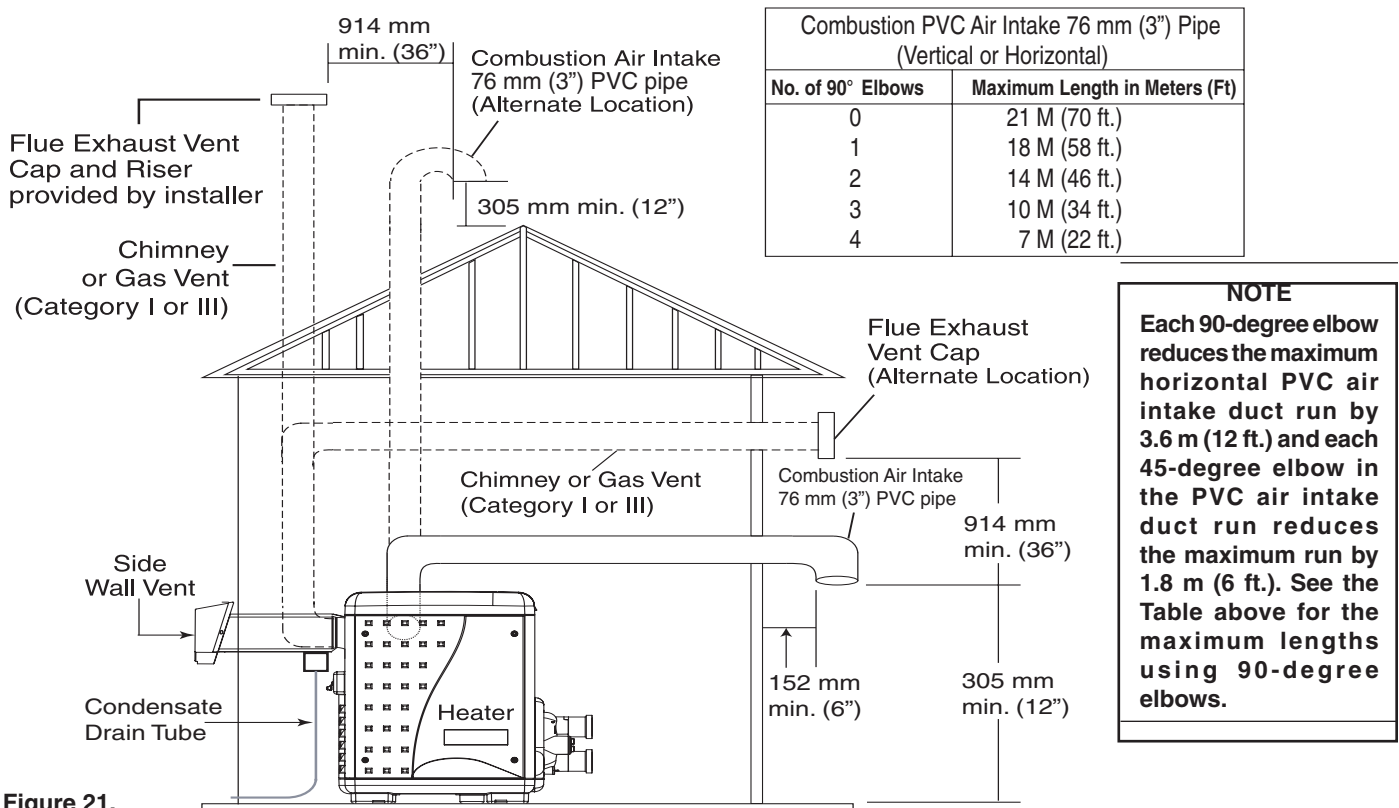


Figure 21.



## **HORIZONTAL OR VERTICAL VENTING - USING SINGLE-WALL STAINLESS GAS VENT (SEE FIGURE 22, 23, & 24 ON PAGE 19)**

Vent the heater either horizontally or vertically using an optional vent adapter of the 150 (6 in) or 102 mm (4 in) special gas approved **stainless steel** vent pipes. Installation must be in accordance with all local codes and ordinances/or the latest edition of the local code standards and/or local codes. The heater, when installed, must be electrically grounded and bonded in accordance with local codes. Do not use a draft hood with this heater. Install the vent according to the vent manufacturer's detailed instructions. **Note:** Keep a 150 mm (6 in) minimum clearance between the vent pipe and combustible surfaces. Follow the vent manufacturer's instructions and code requirements. Do not place any insulating materials around the vent or inside the required clear air space surrounding the vent. See Table 5 for maximum permissible vent lengths.

### **NOTE**

***The allowable vent runs for each vent pipe diameter are different and can not be exceeded.***

Each 90-degree elbow reduces the maximum horizontal vent run by 3.6 m (12 feet) and each 45-degree elbow in the vent run reduces the maximum vent run by 1.8 m (6 feet). See Table 5 for the maximum vent lengths using 90° elbows.

152 mm (6 in.) or 102 mm (4 in) Special Gas Vent (Vertical or Horizontal)*	
No. of 90° Elbows	Maximum Length in Feet (M)
0	11.6 m (38 ft.)
1	8 m (26 ft.)

Table 5. (\*) Minimum vent length is 305 mm (1 ft.) or in accordance with vent manufacturer's instruction, and local and national codes. Horizontal vents 1 m (3 ft) or less in length do not require a condensate tee, but must slope down toward the outlet at 2 cm to the meter (1/4 in / ft.) to allow condensate to drain.

### **NOTE**

It is recommended that vent runs over 5.4 m (18 feet) may need to 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. Horizontal vents 1 m (3 ft) or less in length do not require a condensate tee. The MasterTemp heater is suitable for through-the-wall venting.

***Flue gases 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 and for operating temperatures less than 204° C (400°F). Vent pipe construction will be according to local code standards, approved non-corrosive material, such as stainless steel. A condensate trap may be needed. The use of "Approved" 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 MasterTemp heater can be found on page 18.*** It is recommended that vent runs over 5.4 M (18 ft) may need to 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. Horizontal vents 1 M (3 ft) or less in length do not require a condensate tee. The MasterTemp heater is suitable for through-the-wall venting.

**NOTE: After installation, installer must check for correct and safe operation of the heater.**

## CONNECTING SINGLE-WALL STAINLESS STEEL VENT TO THE HEATER

Metallic:

1. Order an optional appliance adapter kit, (*Pentair offers optional appliance adapter kits, call our Customer Service dept.*):  
- Part No. 77707-0086 for Saf-T Vent® or Saf-T Ven® CI. - Part No. 77707-0087 for Z-Vent. (UK only). To order this optional adapter kit, please contact Pentair sales at Industriepark, Wolfstee, Toekomstlaan 30, 2200 Herentals - Belgium.
2. Remove the outside vent cover.
3. Install the Appliance Adapter in the Vent Body of the heater (located under the outside Vent Cover). Before connecting the Appliance Adapter to the Vent Body, wet a clean cloth or paper towel with isopropyl alcohol (rubbing alcohol) and vigorously wipe the socket of the Vent Body. Immediately wipe the cleaned surfaces dry with a clean cloth or paper towel. Repeat for the exterior of the heater end of the Appliance Adapter. Attach the appliance adapter to the vent body using the adhesive specified by the vent manufacturer, following the vent manufacturer's instructions.

### WARNING

**Risk of carbon monoxide poisoning if adapter is improperly attached.** Mechanical connections (such as screws) can cause cracking and leaks in the adapter. Do **NOT** drill holes or use screws to connect the appliance adapter to the heater vent body. Attach with manufacturer's specified adhesive.

### WARNING

**Risk of fire or asphyxiation if vent is not assembled according to manufacturer's instructions or if vent parts from different manufacturers are mixed.** Vent parts from different manufacturers ARE NOT interchangeable. Mixing parts from more than one manufacturer may cause leaks or damage to vent. When installing a vent, pick one manufacturer and be sure that all vent parts come from that manufacturer and are specified by the manufacturer for your system. Follow manufacturer's instructions and local code requirements carefully during assembly and installation.

4. Install vent pipe so that it can expand and contract freely as the temperature changes. Support the vent pipe according to applicable codes and vent manufacturer's instructions. Pipe support must allow the vent pipe free movement out and back, from side to side, or up and down as necessary, without putting a strain on the heater or vent body. It is recommended to slope the horizontal pipe down to condensate trap at least 2cm/m (1/4 in per foot). Install "Approved" condensate drains at low points where condensate might collect. Plumb condensate drains to a drain through hard piping or high-temperature tubing such as silicone rubber or EPDM rubber – do not use vinyl or other low temperature tubing. Follow drain manufacturer's installation instructions.
5. Use an "Approved" fire stop for floor and ceiling penetrations. Use an "Approved" thimble for wall penetrations. Use an "Approved" roof flashing, roof jack, or roof thimble for all roof penetrations. Do not fill the space around the vent (that is, the clear air space in the thimble or fire stop) with insulation. The roof opening must be located so that the vent is vertical.
6. **Vent Termination – Vertical** (See Figure 22, 23, & 24), for height of vent termination above the roof. Use an "Approved" vent terminal specified by local and national codes and your manufacturer's instructions. A roof termination must be vertical.
7. Make sure entire installation is sealed according to approved standard.

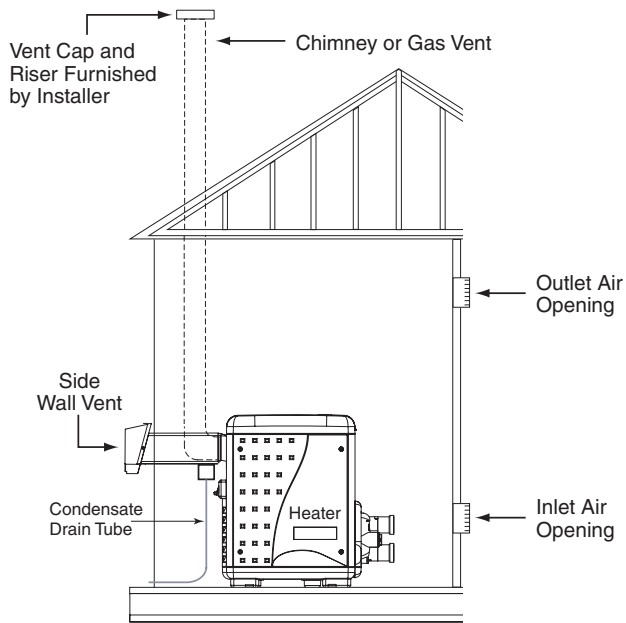


Figure 22

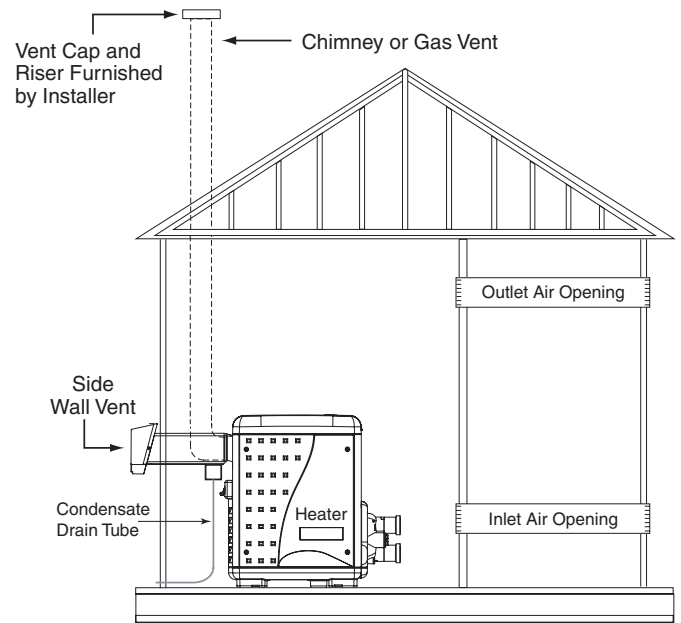


Figure 23.

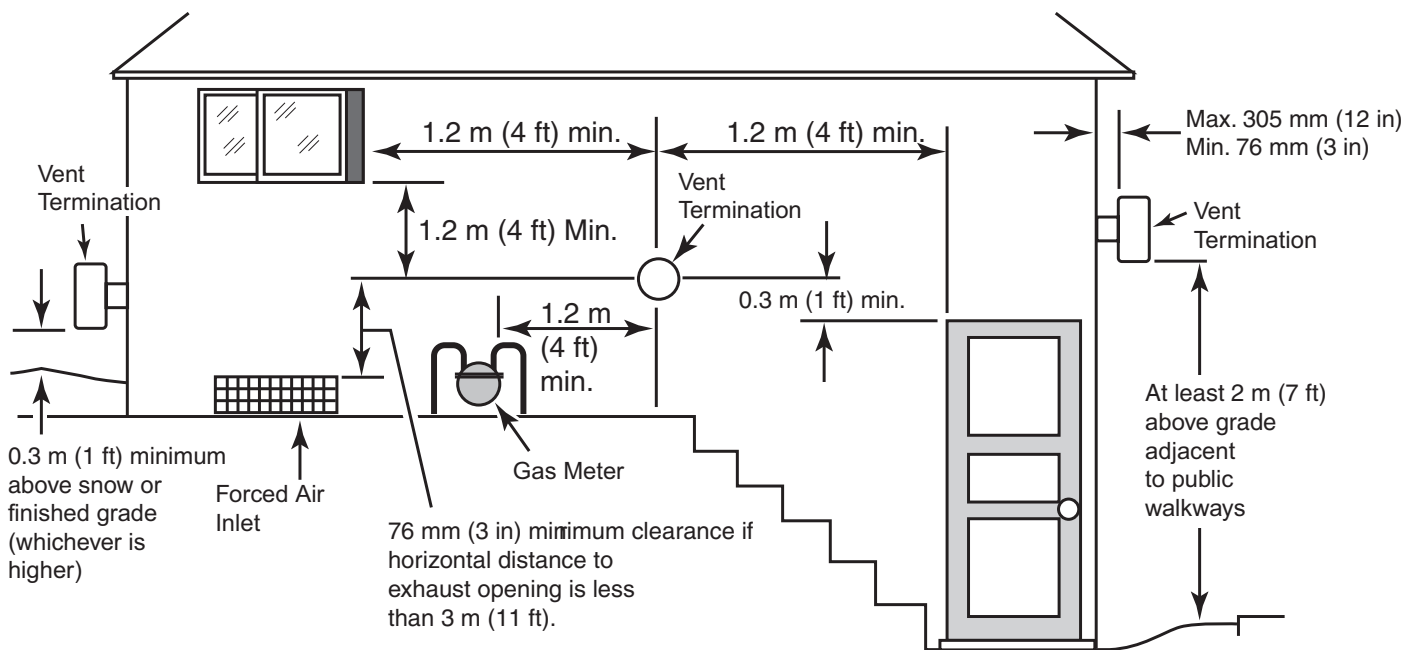


Figure 24.

### 8. Vent Termination – Horizontal

The terminal must be located (See Figure 23):

- at least 76 mm (3 in) and at most 305 mm (12 in) out from the wall (see Figure 24), following the vent manufacturer's instructions
- at least 304 mm (12 in) above finished grade or the normally expected snow accumulation level, whichever is higher
- at least 1.2 M (4 ft) below or horizontally from, or 0.3 M (1 ft) above, any doors or windows or gravity air inlet to a building
- at least 0.9 M (3 ft) above any forced air inlet located within 3 M (10 ft)
- at least 1.2 M (4 ft) horizontally from electric meters, gas meters, regulators and relief equipment
- at least 2.1M (7 ft) above grade adjacent to walkways or similar traffic areas

## Corrosive Vapors and Possible Causes

Area	Likely Contaminants
Chlorinated swimming pools and spas	Pool or spa cleaning chemicals. Acids, such as hydrochloric or muriatic acid.
New construction and remodeling areas	Glues and cements, construction adhesives, paints, varnishes, and paint and varnish strippers. Waxes and cleaners containing calcium or sodium chloride.
Beauty parlors	Permanent wave solutions, bleaches, aerosol cans containing chlorocarbons or fluorocarbons.
Refrigeration plants or various industrial finishing and processing plants	Refrigerants, acids, glues and cements, construction adhesives.
Dry cleaning and laundry areas	Bleaches, detergents, or laundry soaps containing chlorine. Waxes and cleaners containing chlorine, calcium or sodium chloride.

## CONTROL PANEL INDEXING

On an outdoor shelter installation, the exhaust discharges into a vent pipe. Orient the heater so that the vent pipe does not interfere with adjustment of the operating controls. The control panel located on the top panel can be rotated to any of the three sides of the heater for easy access, see Figure 25.

1. Remove the bolts from the door panels. Remove both door access panels.
2. Remove the four corner nuts that secure the top panel. Lift the top panel upward to remove the top panel.
3. Rotate the top panel to the desired position located at 90° angles. *Note that the control panel must **NOT** be located on the side where the vent is located.*
4. Replace the top panel down onto the side panels. Be sure that there are no wires caught under the panel.
5. Secure the top panel using the four corner nuts.
6. Reattach the door access panels.

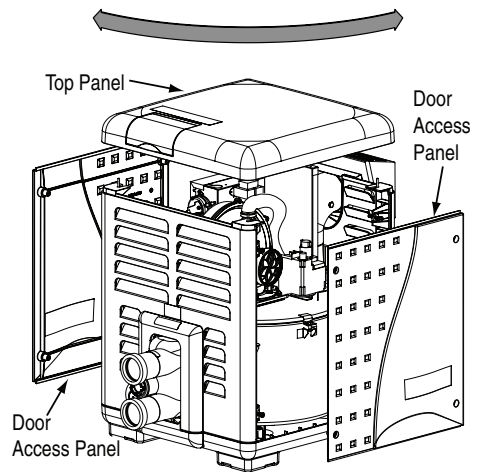


Figure 25.

For Heater mounting bolts and clamps, purchase separately Bolt Down Bracket Kit, Part No. 460738.

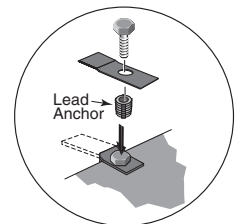


Figure 26.

## FINAL INSTALLATION CHECK

After installation, the installer **MUST** test and check that the heater is operating and functioning properly.

Some building codes require that the heater be anchored to the equipment pad or platform to withstand high wind pressures created during hurricanes. A Bolt Down Bracket Kit, P/N 460738, is available with anchor clamps designed to hold the unit to the equipment pad in high wind conditions, see Figure 26. Installation of the anchor clamps are recommended in all installations.

## ELECTRICAL CONNECTIONS

Electrical Rating 50 Hz 240 Volts AC, single phase.

### ⚠ CAUTION

This heater is designed to operate at 240 VAC. It is not recommended to be connected to OR operate on a 208 VAC.

### NOTE

If any of the original wiring supplied with this heater must be replaced, installer must supply (1.16 mm, 600V, 105° C, IEC approved low energy stranded) copper wire or it's equivalent.

Please read the boxes headed “IMPORTANT! READ ME FIRST!” on pages 25 and 29 before proceeding.

- All wiring must be in accordance with all applicable codes and **must be wired by a licensed electrician to the European Standard Codes of Practice wiring rules.**
- The heater, when installed, must be electrically grounded and bonded in accordance with European Standard Codes of Practice. A bonding lug is provided on the outside of the panel under the vent for this purpose.
- Electrical power circuits to the pool heater must follow European Standard Codes of Practice.
- All wiring between the heater and devices not attached to it, or between separate devices which are installed in the field, must be “Type T” wire rated for 35°C rise.
- The filter pump should run continuously when the heater is on, and for at least 15 minutes after the heater turns off.** Any switches in the pump circuit (including circuit breakers) that can disconnect the pump must also disconnect the heater.
- Do not wire single-pole switches, including protective devices, into a grounded line. The heater is not sensitive to polarity.

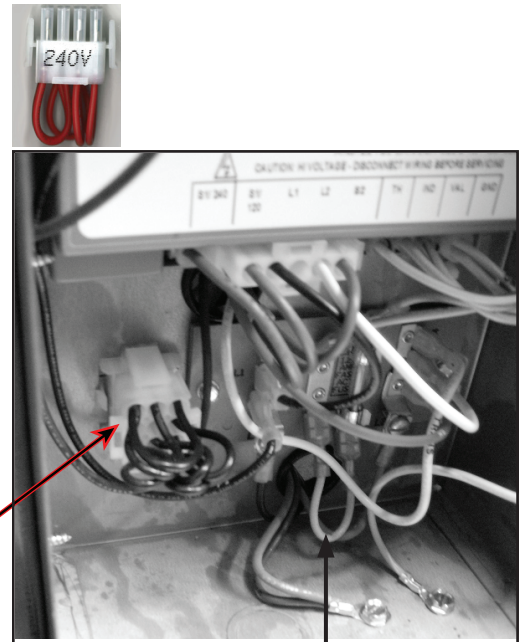


Figure 27. Fireman's Switch Jumper

*Use the provided waterproof wire nuts when connecting the power supply.*

A time clock controlling the filter pump should have a low-voltage Fireman's Switch that switches off the heater at least 15 minutes before shutting off the pump.

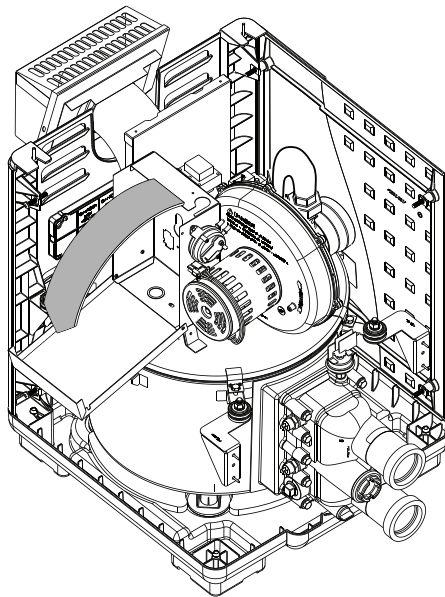
### CONNECTION OF FIREMAN'S SWITCH OR REMOTE CONTROL

### ⚠ CAUTION

If, while there is line voltage connected to the heater, you touch either line voltage terminal with any 24VAC wire that is connected to the control board (including the Fireman's Switch jumper), you will immediately destroy the control board and void the warranty.

## REMOTE CONTROL CONNECTIONS

1. Switch off power to heater at main circuit breaker panel.
2. Unbolt and remove the access door panels.
3. Open control box cover (see Figure 28).
- 4a. *To connect a 2-Wire Control (such as Pentair's IntelliTouch™ or EasyTouch™ Control Systems) or a timer:*
  - Remove the factory installed jumper from the Fireman's Switch terminals. **(See Figure 27 on page 21).**
  - Connect wires between the Fireman's Switch terminals on the heater and the relay. Connect wires from the controller or timer to the Fireman's Switch. Controller, timer or relay should be sized to handle 24VAC at 0.5 Amp (because it will be completing the 24VAC control board circuit on the heater as shown in Figure 30). **DO NOT** apply line voltage to the Fireman's Switch terminals. Use 18 gauge (1.16 mm) wire with a minimum 1.2 mm (3/64 in.) thick insulation rated for a temperature rise of at least 105° C.
  - Knock-outs are provided to route the wires through the bottom of the control box and past the junction box.



**Figure 28.**

- 4b. *To connect a 3-Wire Control:*
  - Connect wires between the control board terminals on the heater and the external relays, as shown in Figure 30 on page 26. Use at least 2 relays per heater, to allow for an "OFF setting" on each heater mode. Select relays that can handle logic level switching. **DO NOT** apply line voltage to control board terminals.
  - Move jumper (as shown in Figure 30 on page 23) to enable external control and to disable the heater membrane pad's "Pool ON" and "Spa ON" buttons (the "OFF" key on the membrane pad remains functional).
  - Knock-outs are provided to route the wires through the bottom and the top of the control box and past the junction box.
5. Close control box cover.
6. Re-install the access door panels.

To control heaters that are operated in parallel, connect wiring at same locations on heater as 2-Wire or 3-Wire Control. It is imperative that each control circuit is isolated from the other control circuits, to avoid that current will flow from one heater to another through the control circuits.

**NOTICE:** The fuse for the Fireman's Switch is a 1.25 Amp 31.75 mm x 6.35 mm fast blow fuse, which is commonly available.

# MASTERTEMP WIRING DIAGRAM (3-WIRE SYSTEM)

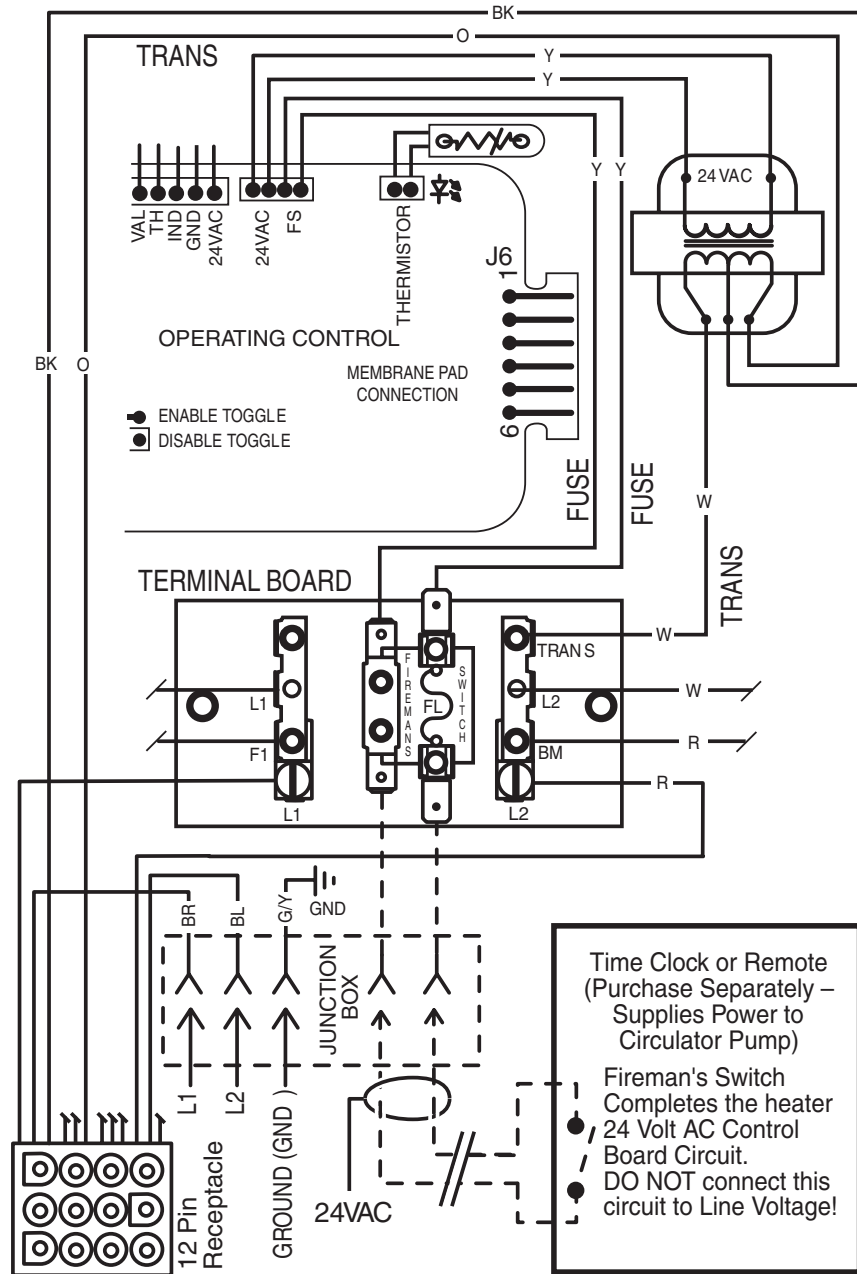
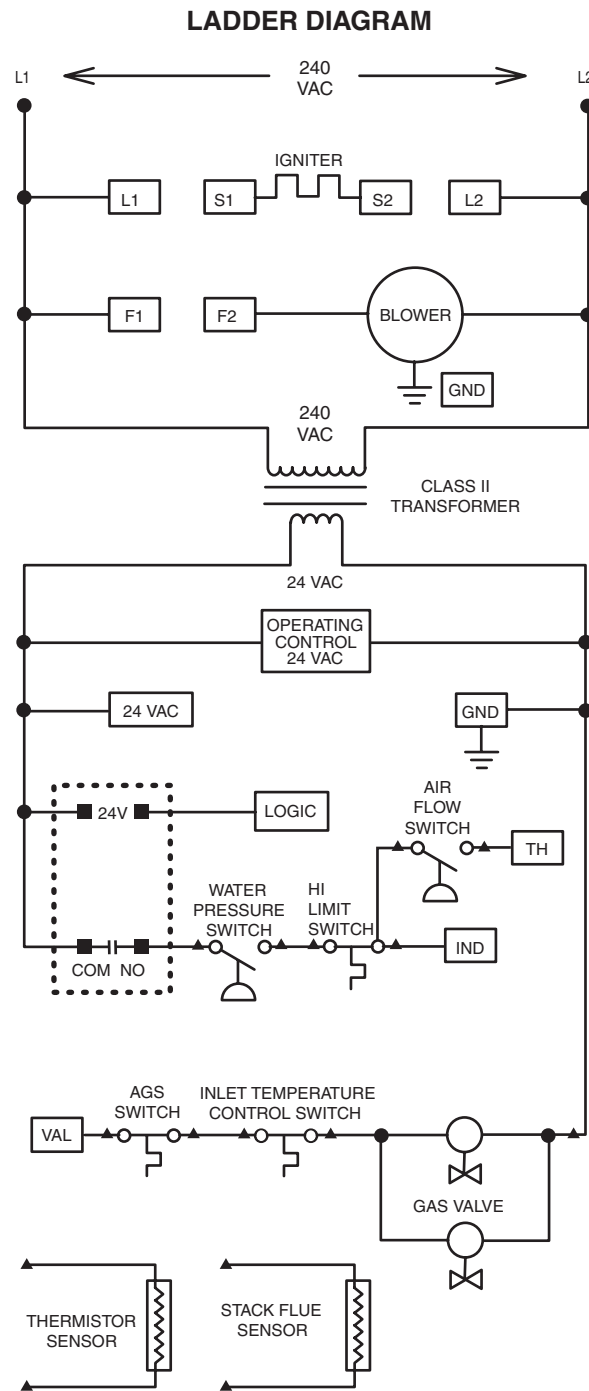


Figure 29.

# MASTERTEMP WIRING DIAGRAM

## (3-WIRE SYSTEM)



**NOTES:**

- 1.) 

L1	L2	F1	F2	S1	24 VAC
S2	GND	IND	VAL	AND	TH

ARE CONNECTED ON THE IGNITION MODULE.

- 2.) ▲ PIN AND SOCKET CONNECTOR.
- 3.) IF ANY OF THE ORIGINAL WIRES AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, THEY MUST BE REPLACED WITH TYPE 105° C OR ITS EQUIVALENT.

**Figure 30.**



# Section 3: Troubleshooting

## Initial Troubleshooting

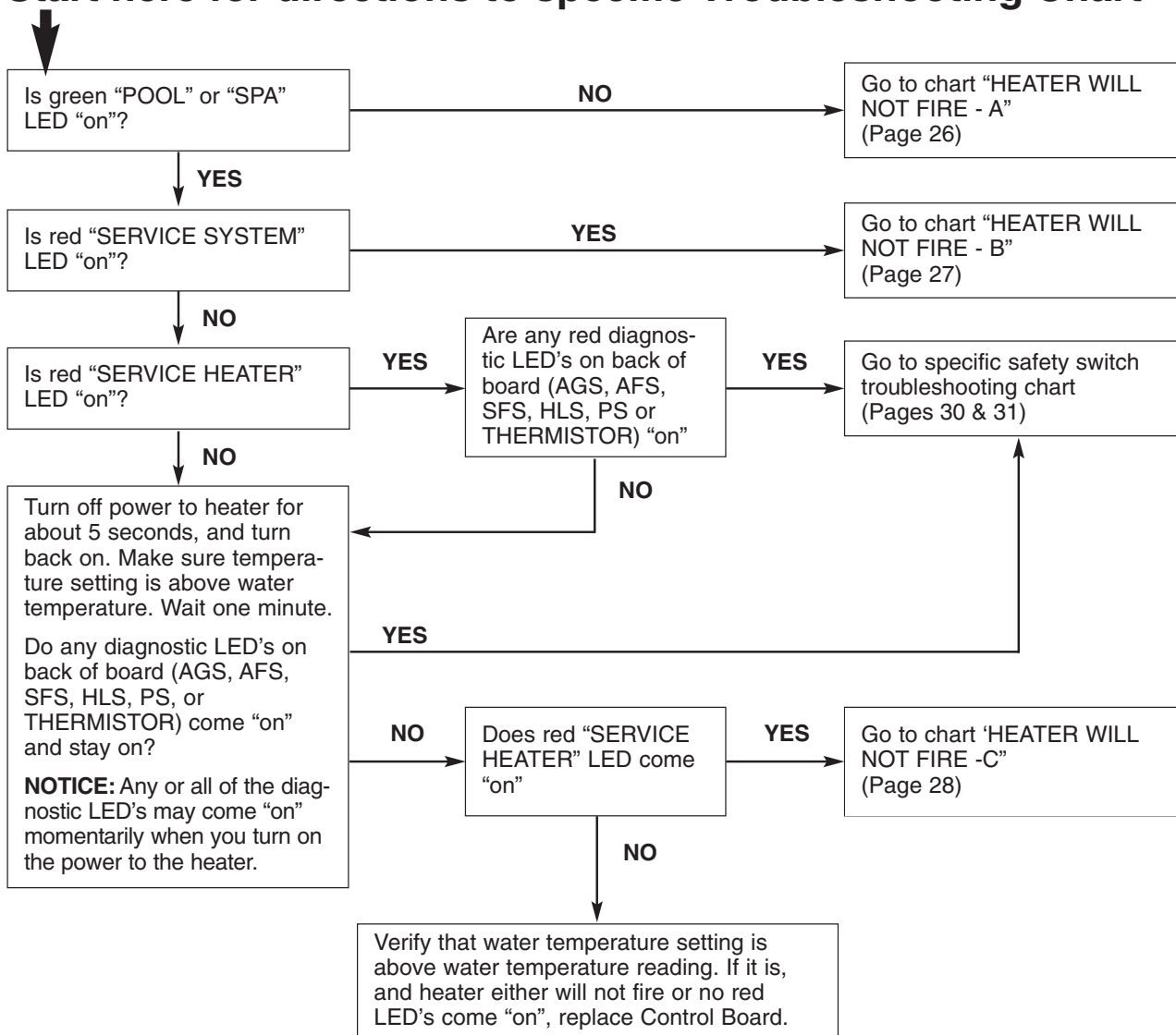
Only qualified, trained service technicians with appropriate test equipment should service the heater. Remember that all parts of the system affect heater operation. Before starting this troubleshooting procedure, make sure that the pump is running correctly, that there are no blockages in the system, that the valves are correctly set and that the time clock is correctly set and is running.

### IMPORTANT! READ ME FIRST!

#### READ THE FOLLOWING CAREFULLY:

1. Check the line voltage to your heater. This heater operates on 240 Volts AC.
2. Remove the covers and check the 12-pin plug in the back of the control box. The plug must match the voltage in the heater circuit.
3. If the 12-pin plug is not plugged into the back of the control box, plug in the **RED** 240 volt plug.

### Start here for directions to specific Troubleshooting Chart

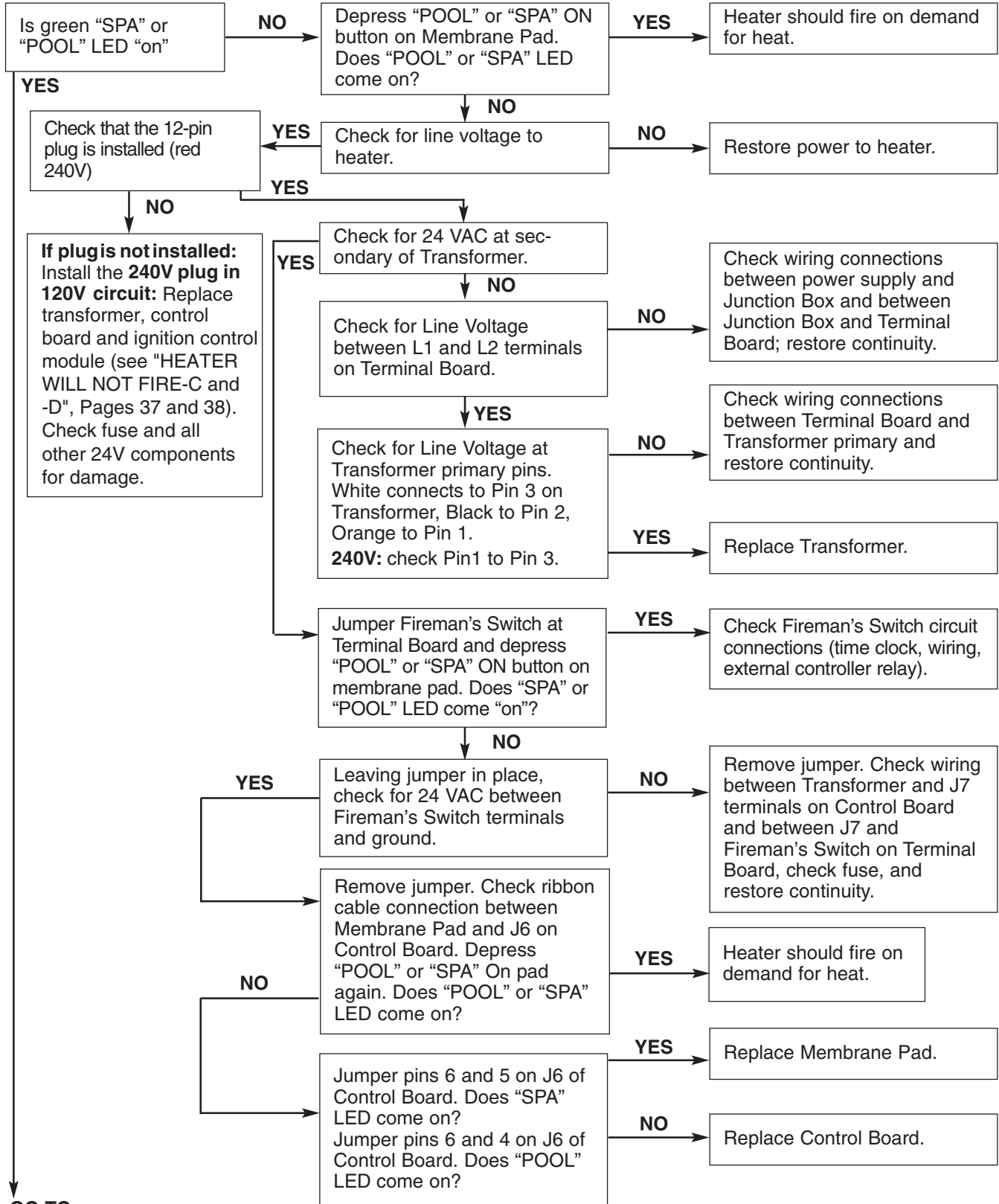


**⚠ WARNING** Hazardous voltage. Can shock, burn or kill. Disconnect power before servicing any components.

**⚠ WARNING** Fire and Explosion hazard. Do not jumper switch terminals to remedy a failed safety switch.

# Heater Will Not Fire - A

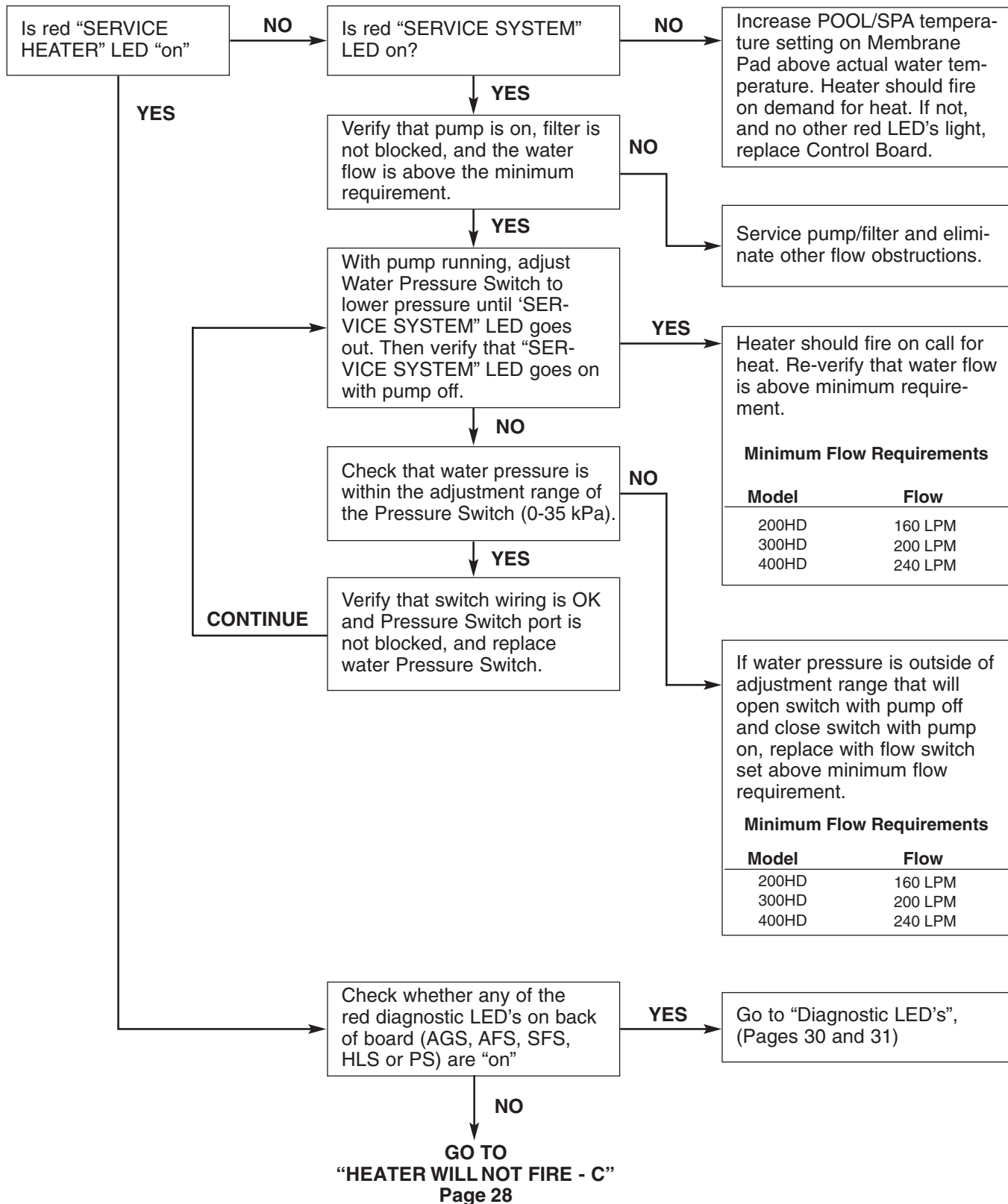
## Start



GO TO  
**"HEATER WILL NOT FIRE - B"**  
 Page 27

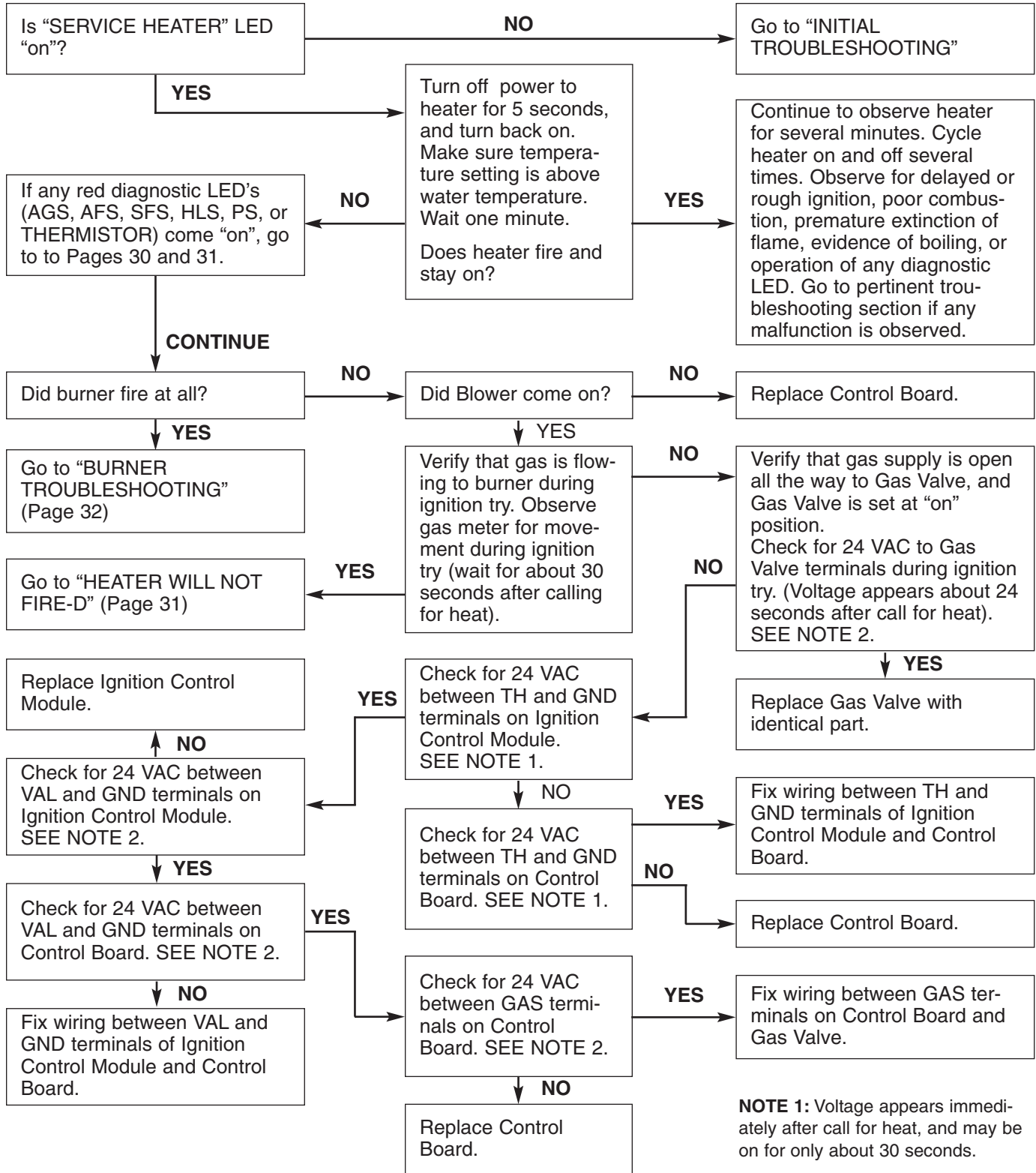
# Heater Will Not Fire - B

## Start



# Heater Will Not Fire - C

## Start



**NOTE 1:** Voltage appears immediately after call for heat, and may be on for only about 30 seconds.

**NOTE 2:** Voltage appears about 24 seconds after call for heat, and may be on for only about 7 seconds.

## Heater Will Not Fire - D

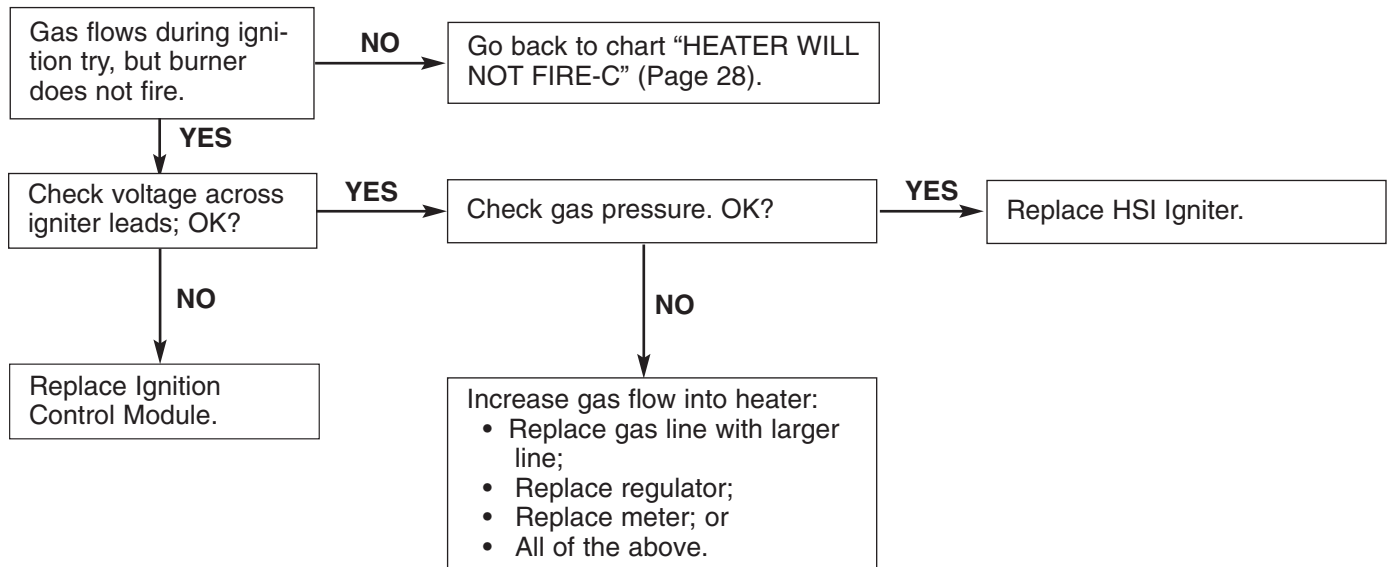
### IMPORTANT! READ ME FIRST!

#### IMPORTANT! READ ME FIRST!!

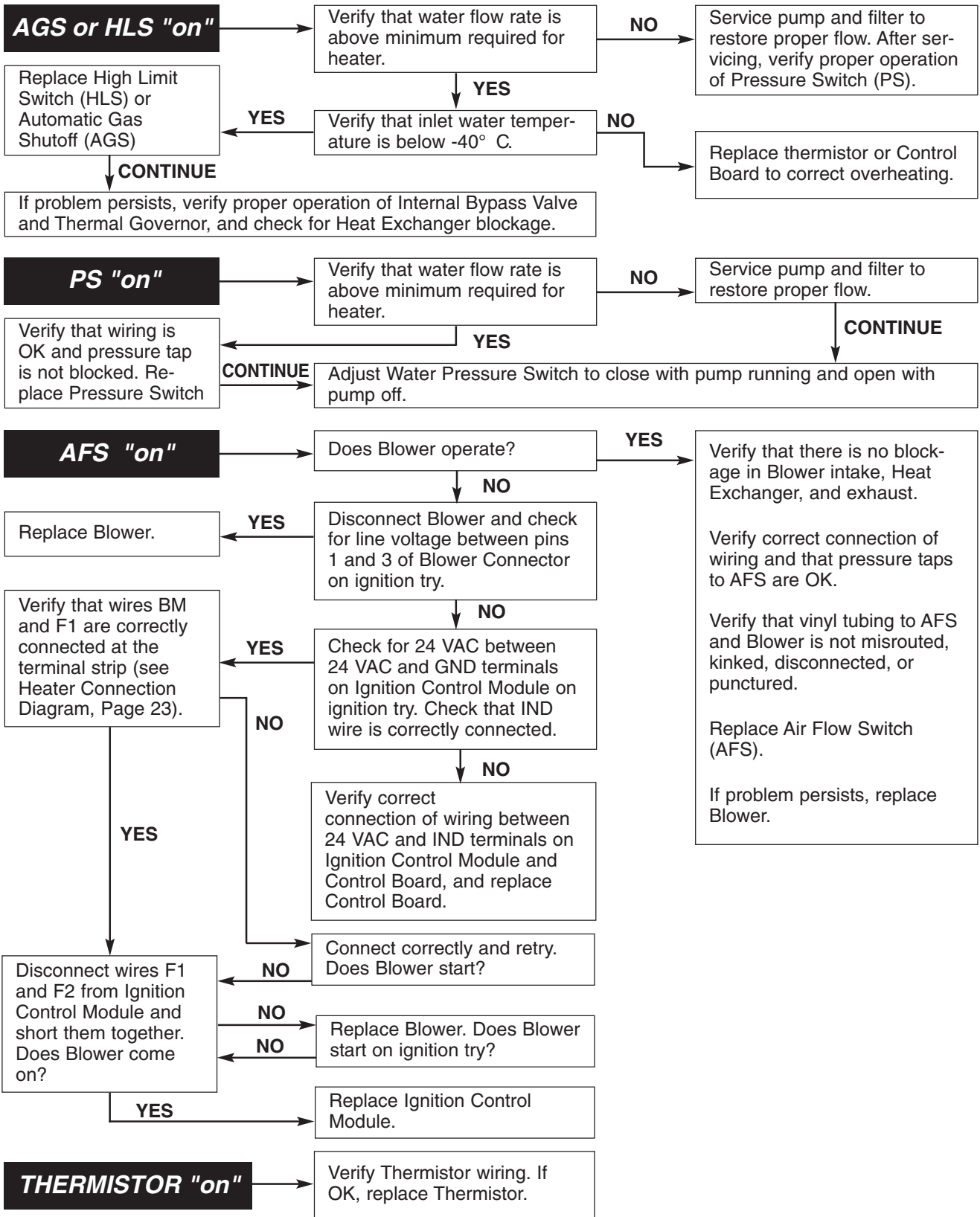
If your heater is correctly connected to **240 Volts AC**, the Ignition Control Module (ICM) will convert the 240VAC to an intermittent pulse to the ignitor. Digital meters don't read this type of signal well. (An analog meter will give a better reading than a digital meter). If the ICM is bad, your volt-

meter will read either 0 VAC or 240 VAC. If your ICM is good, your meter will read some voltage between 0 and 240 VAC. Exactly what reading you get will depend on the meter, but with a good ICM, the reading won't be 0 VAC or 240 VAC, but somewhere in between.

## Start

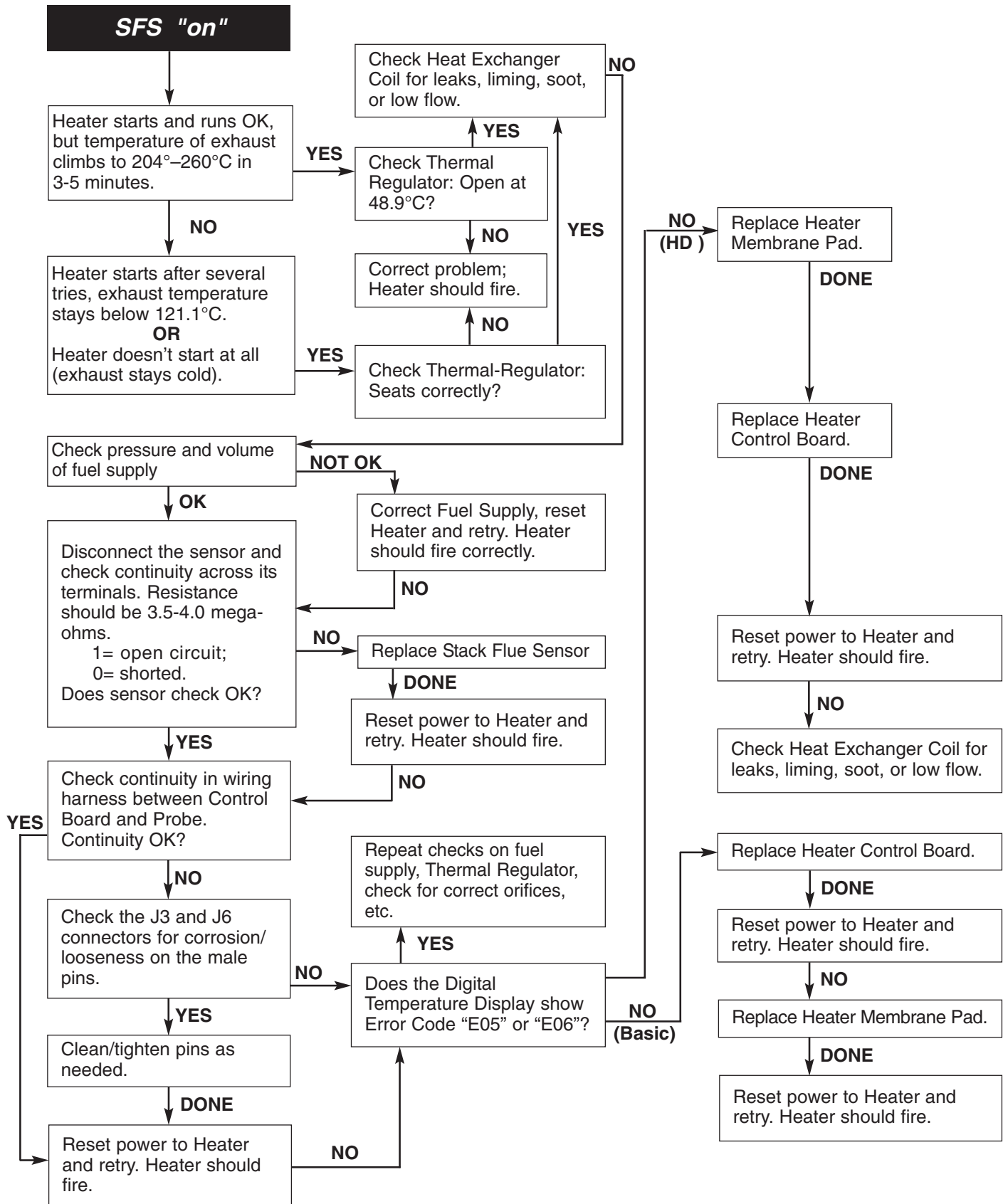


## Diagnostic LED's: AGS, AFS, HLS, PS, THERMISTOR



**CAUTION** Do not jumper a safety switch to remedy a failed switch. **NOTE:** ES1 is a spare and should be jumpered.

## Diagnostic LED's: SFS



## Burner Troubleshooting

<b>SYMPTOM</b>	<b>CAUSE</b>	<b>REMEDY</b>
Loud, high-pitched whine.	Flame is too rich.	Verify pressure tap between gas valve and blower inlet. See page 10 and verify that the gas regulator setting is $1.1 \pm 0.5$ mbar.  Contact a qualified technician or service agency to replace the gas orifice.
Flame is “fluttery.” Exhaust may have acrid smell or burner may fail to stay lit.	Flame is too lean.	See page 10 and verify that the gas regulator setting is $1.1 \pm 0.5$ mbar  Contact a qualified technician or service agency to replace the gas orifice.
Combustion appears normal, but flame does not stay lit.	Flame current is not being sensed.	Check for wet or damaged igniter with low resistance to ground. Replace with new igniter.  Verify burner flameholder is properly grounded.  Replace Ignition Control Module.

## Heat Exchanger Troubleshooting

<b>SYMPTOM</b>	<b>CAUSE</b>	<b>REMEDY</b>
Boiling in heat exchanger. May be accompanied by “bumping” sounds.	Low water flow to heater. Heat exchanger plugged.  Bypass valve stuck open. Thermal governor stuck closed.	Service pump and or filter. Service heat exchanger. Correct water chemistry. Service bypass valve. Replace thermal governor.
Sweating.	Thermal governor failed.	Replace thermal governor.



## Section 4: Maintenance Instructions

### CARE AND MAINTENANCE

#### ⚠️ WARNING

**DO NOT interfere with any sealed components. This must be done by a qualified service professional.**  
**RISK OF FIRE or explosion from flammable vapors. Do not store gasoline, cleaning fluids, varnishes, paints, or other volatile flammable liquids near heater or in the same room with heater.**

The following maintenance is recommended every six months and at the start of every swimming season:

1. Inspect the heater panels and venting system to make sure that there are no obstructions to the flow of ventilating air or burner exhaust.
2. Keep the area in and around the heater clear and free from combustible materials, gasoline and other flammable vapors and corrosive liquids.
3. If applicable, test the operation of the pressure relief valve by lifting the valve lever. (See below for “PRESSURE RELIEF VALVE” instructions.)
4. Test for proper operation of the pressure switch. (See “WATER PRESSURE SWITCH” for testing instructions.)
5. Check pipe and fittings for cracks or breaks. The combustion air blower is permanently lubricated, and does not require periodic lubrication. The burner does not require maintenance or adjustment by the user. Call a qualified service technician if you suspect that the burner may require maintenance.

### DE-LIMING THE HEATER

#### ⚠️ WARNING



**Working with muriatic acid can be dangerous.** When cleaning elements always wear rubber gloves and eye protection. Add acid to water, do not add water to acid. Splashing or spilling acid can cause severe personal injury and/or property damage.

Should a heater require de-liming, this may be accomplished by circulating a solution of 30% Muriatic Acid. This process should only be performed by a person of sufficient skill. The heater **MUST** be disconnected from the pool plumbing, gas plumbing, and electric. The heater may be placed on its side with the water manifold “up”. The diluted muriatic acid may be recirculated until visible bubbles are no longer produced. Before being restored to service, the heater water ways should be completely rinsed with regular tap water.

### PRESSURE RELIEF VALVE

Local codes may require installation of a pressure relief valve (PRV). Purchase separately and install a 19 mm (.75 in) pressure relief valve complying with the local Plumbing Codes, having a capacity equal to the Mega Joule (MJ/hr) rating of the heater. The relief pressure of the valve **MUST NOT EXCEED 344 kPa**. The relief valve must be installed vertically. To install the valve, use a 19 mm x 89 mm (.75 x 3.5 in) brass nipple at the manifold, the two brass elbows and nipples are (user supplied), as illustrated in Figure 32. **DO NOT** place any valve between the manifold adapter and the relief valve.

To avoid water damage or scalding from operation of the relief valve, install a drain pipe in the outlet of the pressure relief valve that will direct water discharging from the valve to a safe place for disposal. Do not install any reducing couplings or valves in the drain pipe. The drain pipe must be installed so as to allow complete drainage from the valve and drain line. *The relief valve should be tested at least once a year by lifting the valve lever.*

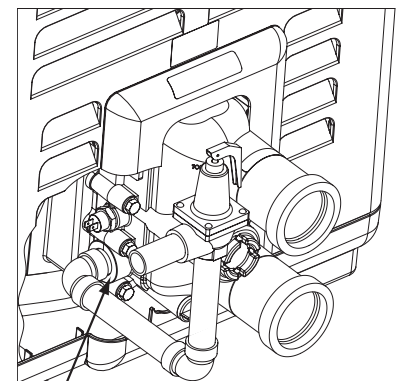


Figure 31.

#### ⚠️ WARNING

**Explosion hazard.** Any heater installed with restrictive devices in the piping system downstream from the heater, (including check valves, isolation valves, flow nozzles, or therapeutic pool valving), must have a relief valve installed as described above.

## AFTER START-UP

### CHECKING WATER FLOW

#### WARNING

**Fire or flooding hazard.** If the unit overheats and the burner fails to shut off, follow instructions under “To Turn Off Gas to the Appliance”, page 4, and call a qualified service technician to repair unit.

After start-up, the outlet water pipe should feel slightly warmer than the inlet pipe. If it feels hot, or if you hear the water in the heater boiling, there may not be enough water flow to the appliance. Make sure that the filter is not plugged. If water temperature remains high but the unit continues to operate, turn off the appliance and call your service technician.

### SPRING AND FALL OPERATION

If the pool is only used occasionally, lower the pool thermostat to 20° C (68° F) and leave the heater on. This will keep the pool and the surrounding ground warm enough so that the heater should restore the pool to a comfortable temperature within about one day.

### WINTER OPERATION

#### CAUTION

- Operating this heater continuously at water temperatures below 20° C (68° F.) will cause harmful condensation and will damage the heater and void the warranty.
- If the heater has been drained for freezing condition, do NOT turn “ON” until the system is circulating water.
- 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.
- When starting the heater for the swimming season with a water temperature below 10° C (50° F), the heater may be used to heat the water; however, make sure that the heater operates continuously until the water temperature reaches the heater’s minimum setting of 20° C (68° F). During cold weather, if there is no danger of freezing, operate the filter pump continuously even if the heater is not operating. If air temperatures are expected to drop below freezing 0° C (32° F), shut down the heater and winterize it.

For outdoor heaters in freezing climates, shut the heater down and drain it for winter as follows:

1. Turn off electrical supply to the heater and pump.
2. Close the external manual shut-off gas valve (located outside the heater).
3. In colder climates where they may be required, open drain cock located on the bottom of the manifold adapter, and drain the heat exchanger and manifold adapter completely. If heater is below pool water level, be sure to close isolation valves to prevent draining the pool (isolation valves are not required and should not be used on heaters installed above pool water level except when needed for winterizing valves). Assist the draining by blowing out the heat exchanger through the pressure switch fitting with low pressure compressed air (less than 35 kPa or 5 PSI).

#### WARNING

**Explosion hazard.** Purging the system with compressed air can cause components to explode, with risk of severe injury or death to anyone nearby. Use only a low pressure (below 35 kPa or 5 PSI), high volume blower when air purging the heater, pump, filter, or piping.

4. Remove the Water Pressure Switch. Plug the port in the manifold to prevent bugs and dirt from getting into the manifold.
5. Drain the plastic inlet/outlet manifold through the outlet pipe. If the pipe does not drain naturally to the pool, install a drain cock in the outlet pipe to drain the manifold.
6. Cover air inlet grate with a plastic bag to prevent bugs, leaves, etc., from getting into the heater.

**NOTICE:** Water trapped in the heater can cause freeze damage. Allowing the heater to freeze voids the warranty.

To return the heater to service after winterizing:

1. Close drain cock and fittings.
2. Before starting the heater, circulate water through the heater for several minutes until all air noises stop. See also “BEFORE START-UP AND OPERATION” (page 3) and “CARE AND MAINTENANCE” (page 33).

*(See additional notes under Important Notices in Introduction.)*

## **MAINTAINING POOL TEMPERATURE**

To maintain pool temperature, make sure that the heater switch and valving are reset to pool settings after using the spa.

### **ENERGY SAVING TIPS**

1. Keep the pool or spa covered when not in use. This will reduce heating costs, reduce water evaporation, conserve chemicals and reduce load on the filtering system.
2. Reduce pool thermostat to 26° C (78° F) or lower; reduce spa temperature to 38° C (100° F). This is accepted as being the most healthy temperature for swimming by the American Red Cross.
3. Use a time clock to start the filter pump at 6 AM or later. The swimming pool loses less heat after daybreak.
4. For pools used only on weekends, lower the thermostat setting by 12° C to 9° C (10° F to 15° F) during the week to reduce heat loss. A properly sized heater will restore normal temperature within one day.
5. Turn the heater off when the pool will not be used for an extended period.
6. Follow a regular program of preventive maintenance for the heater each new swimming season. Check operation of the heater and its controls.

## **CHEMICAL BALANCE**

### **POOL AND SPA WATER**

Your Pentair 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.

Water chemistry should follow good swimming pool water chemistry practices. When using a chlorinator, install it down stream from the heater and at a lower level than the heater outlet. Install a corrosion resistant positive seal “Check Valve”, (P/N R172288), between the heater and the chlorinator to prevent concentrated chemicals from back-siphoning into the heater. Back-siphoning is most likely to occur when the pump stops, creating a pressure-suction differential. Do NOT sanitize the pool by putting chlorine tablets or sticks into the skimmer(s). When the pump is off, this will cause a high concentration of chlorine to enter the heater, which could cause corrosion damage to the heat exchanger.

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.

## CHEMICAL BALANCE, (continued)

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 6.

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 6.

### 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 tubing.
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 tubes 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.

### ALKALINITY High or 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.

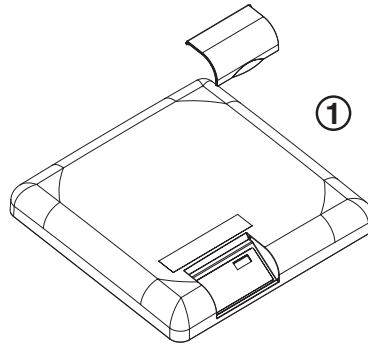
## WATER CHEMISTRY PARAMETERS

Disinfectant levels	Minimum	Ideal	Maximum
Free Chlorine, ppm	1.0	2.0-4.0	5.0
Combined Chlorine, ppm	None	None	0.2
Bromine, ppm	2.0	4-6	10.0
Other Sanitizers	Levels not established. Consult local health department before use.		
<b>Chemical Values</b>			
pH	7.2	7.4-7.6	7.8
Total Alkalinity (Buffering), ppm as CaCO <sub>3</sub>	60	80-100	180
Salt	2000	3200	5000**
Total Dissolved Solids, ppm	N/A	N/A	1,500 ppm > TDS at startup*
Calcium Hardness, ppm, as CaCO <sub>3</sub>	150	200-400	500-1,000
Heavy Metals	None	None	None
<b>Biological Values</b>			
Algae	None	None	None
Bacteria	None	None	Refer to Local Code

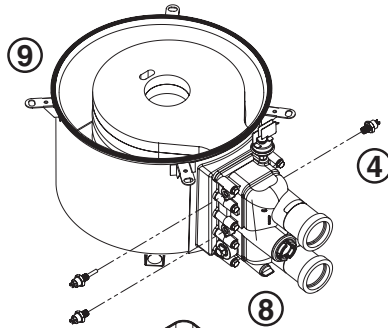
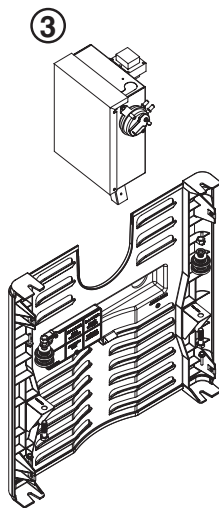
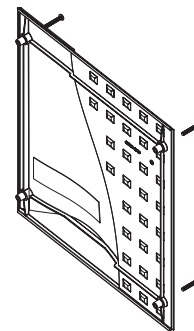
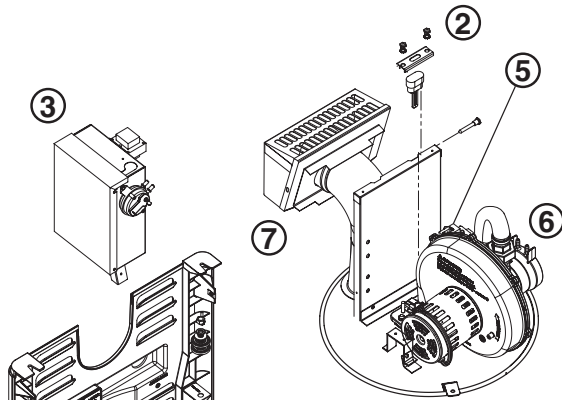
Table 6. **Note:** Failure to adhere to the listed water chemistry parameters may result in premature failure of the heat exchanger and will void the warranty. \*Start-up TDS includes source water TDS and any other inorganic salt added at start-up.

# Section 5: Replacement Parts

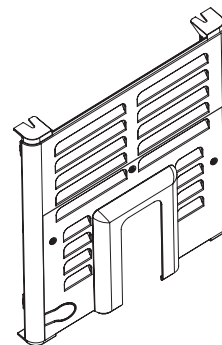
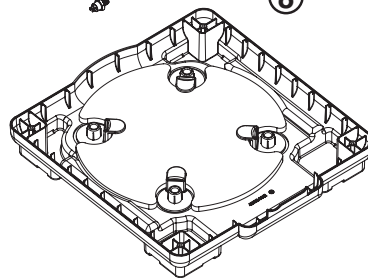
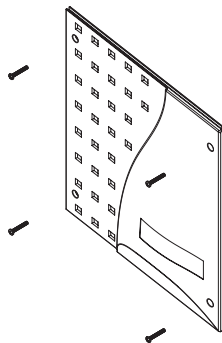
For complete Electrical System parts breakdown (Key Nos. 1 through 4), see Page 41.



For complete Burner System parts breakdown (Key Nos. 5 through 7), see Page 39.



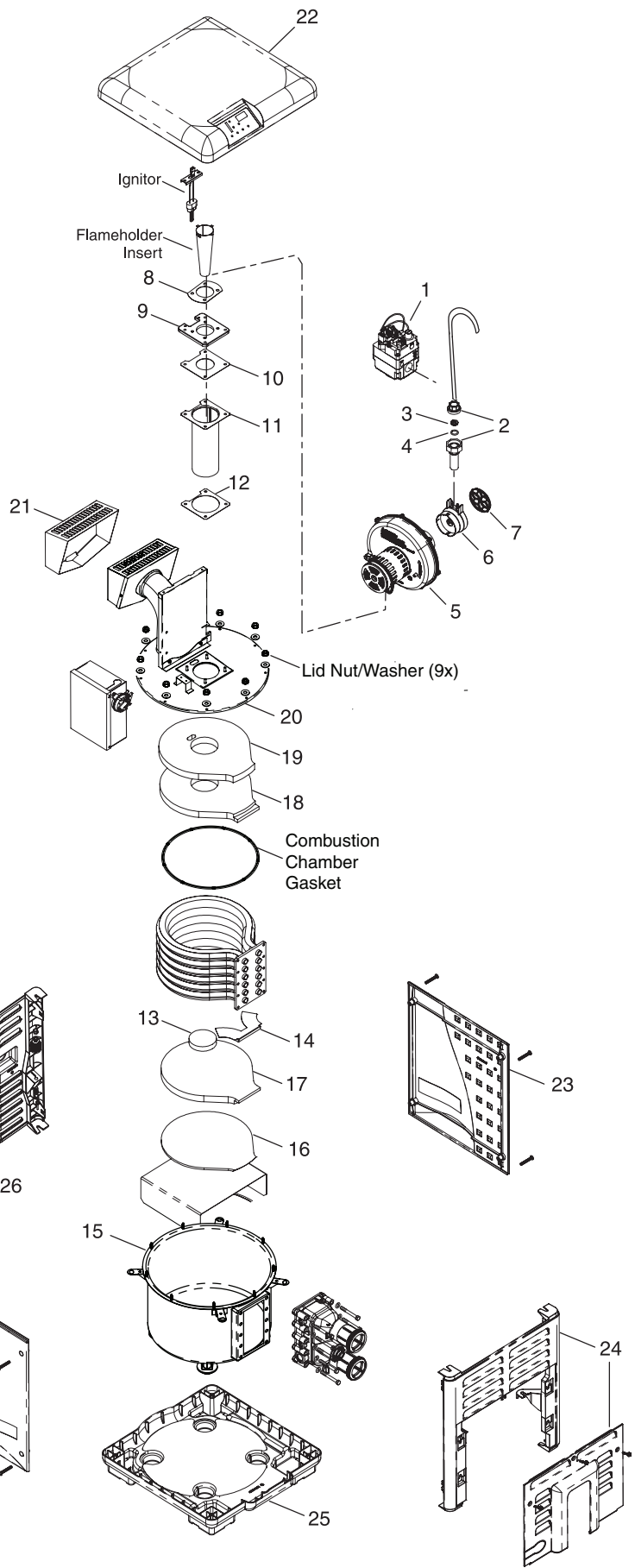
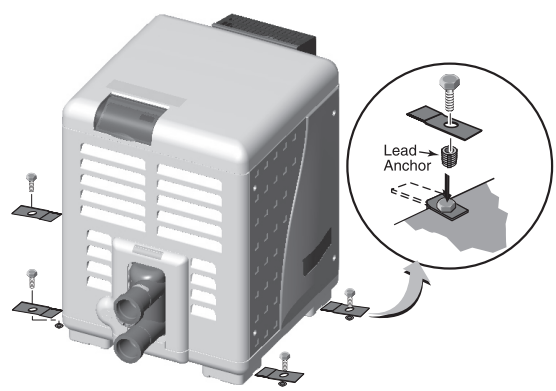
For complete Water System parts breakdown (Key Nos. 8 through 9), see Page 40.



**Repair Parts are available from your Pentair dealer.**  
 If your dealer cannot supply you, call Customer Support

# REPLACEMENT PARTS

For Heater mounting bolts and clamps, purchase separately Bolt Down Bracket Kit, Part No. 460738.



## REPLACEMENT PARTS

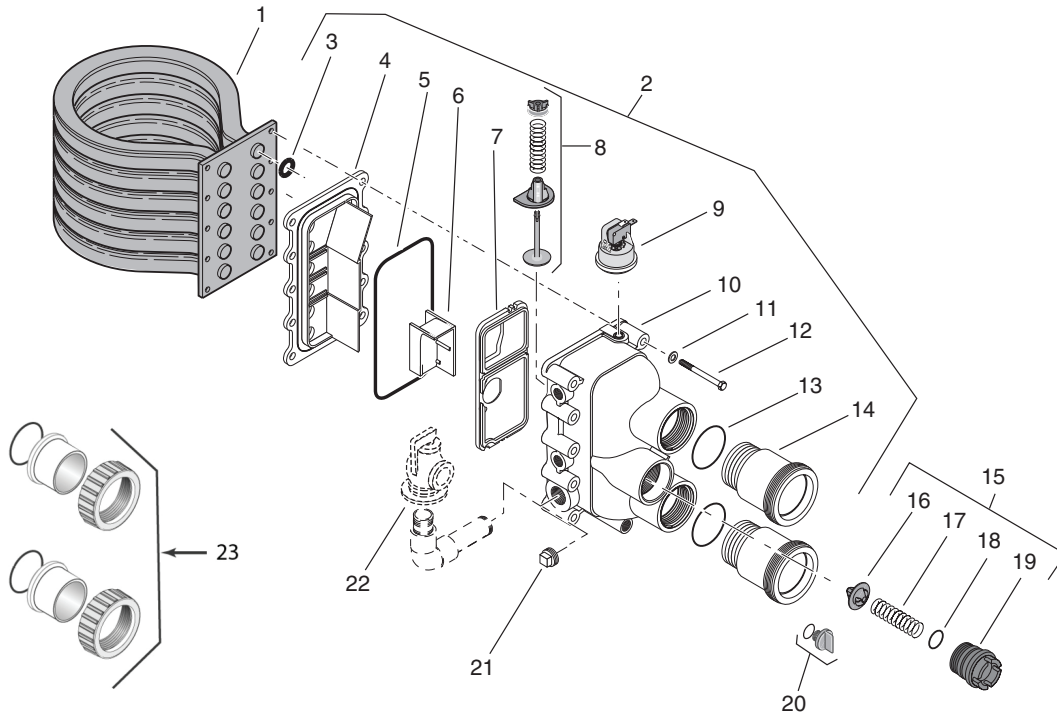
## REPAIR PARTS – BURNER SYSTEM

Key No.	Part Description	Qty.	Model		
			200NA 200LP	300NA 300LP	400NA 400LP
1	Gas Valve Assembly	1	474133Z	474133Z	474133Z
2	19 mm Union	2	38404-4097S	38404-4097S	38404-4097S
3	Gas Orifice	1			
4	Gas Orifice O-Ring	1			
	• Gas Orifice Kit – NG (Incl. Key Nos. 3 and 4)†		474136	474135	474134
	• Gas Orifice Kit – Propane (Incl. Key Nos. 3 and 4)†		474139	474138	474137
	• NG to Propane Conversion Kit (Incl. Key Nos. 3 and 4)†		474142	474141	474140
	• Propane to NG Conversion Kit (Incl. Key Nos. 3 and 4)†		474145	474144	474143
5	Air Blower [50 Hz]	1	474104Z	474104Z	474104z
	• Air Orifice Kit (Includes Key Nos. 6 and 7)				
6	Air Orifice	1	474107Z	474106Z	474105Z
7	Air Orifice Grill				
	• Blower/Adapter Plate Gasket Kit (Includes Key Nos. 8, 9, 10, 12)	1	77707-0011	77707-0011	77707-0011
	• Flameholder Kit (Includes Key Nos. 10, 11, 12, 13 and on 300 & 400 Models Only - Flameholder Insert)	1	77707-0202	77707-0203	77707-0204
8	Blower/Adapter Plate Gasket	1			
9	Blower Adapter Plate	1			
10	Flameholder/Adapter Plate Gasket	1			
11	Flameholder Assembly	1			
12	Flameholder/Combustion Chamber Gasket*	1			
13	Flameholder Insulation Cap	1			
	• Flameholder Insert	1			
14	Condensate Evaporator Plate	1			
15	One Piece Metal Chamber/Combustion Chamber Assembly	1	474957	474957	474957
	• Insulation Kit (Includes Key Nos. 13, 14, 16, 17, 18 and 19)	1	77707-0008	77707-0008	77707-0008
16	Bottom Outer Insulation Blanket*				
17	25.4 mm Bottom Inner Insulation				
18	25.4 mm Top Insulation				
19	Top Outer Insulation Blanket*				
	• Lower Enclosure Insulation	1	42001-0074S	42001-0074S	42001-0074S
20	One Piece Metal Elbow/Combustion Chamber Cover Assembly	1	474958	474958	474958
	• Combustion Chamber Gasket	1	474952	474952	474952
21	Metal Vent Cover Assembly	1	474172Z	474172Z	474172Z
22	Heater Top	1	42002-0034Z	42002-0034Z	42002-0034Z
23	Side Panel {Service Panel}	1	42002-0039Z	42002-0039Z	42002-0039Z
24	Side Panel {Manifold}	1	42002-0033Z	42002-0033Z	42002-0033Z
25	Heater Bottom	1	42002-0031Z	42002-0031Z	42002-0031Z
26	Side Panel {Flue Stack}	1	42002-0032Z	42002-0032Z	42002-0032Z
27	J-Box Cover	1	42002-0041Z	42002-0041Z	42002-0041Z
28	Screw Kit, Panel	1	474292	474292	474292

(\*) Not available separately

(†) Not included with heater. Order separately.

## REPLACEMENT PARTS



### REPAIR PARTS – WATER SYSTEM

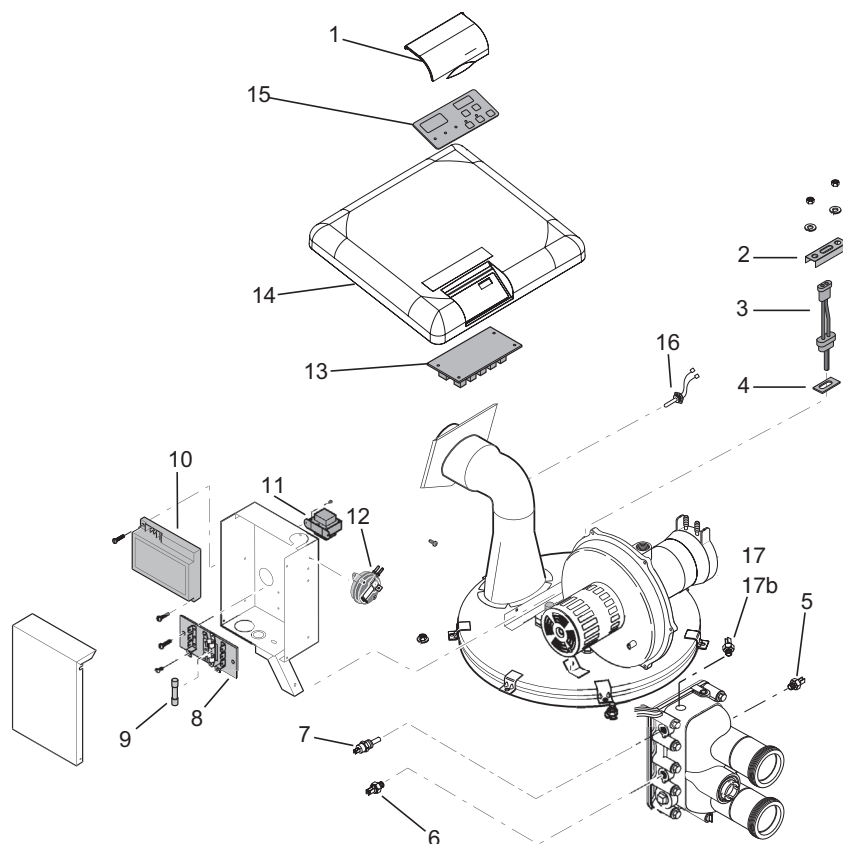
Key No.	Part Description	Qty.	Model		
			200NA 200LP	300NA 300LP	400NA 400LP
1	Tube Sheet Coil Assembly Kit (HD Series) (Includes Key No.3)	1	474062	474064	474065
2	Manifold Kit (Includes Key Nos. 3-14, 21, and Key Nos. 5-7, 17 in "Electrical System", Page 51	1	474391	474392	474392
3	Coil/Tubesheet Sealing O-Ring Kit	( )	77707-0117(6)	77707-0118(10)	77707-0119(12)
4	Manifold Bottom Plate	1			
5	Manifold O-Ring	1			
•	O-Ring Kit (Incl. Key Nos. 3, 5)	1	77707-0120	77707-0120	77707-0120
6	Manifold Insert*	1			
7	Manifold Baffle Plate	1			
8	Manifold Bypass Valve	1			
9	Water Pressure Switch	1	42001-0060S	42001-0060S	42001-0060S
10	Manifold	1	See No. 2	See No. 2	See No. 2
11	5/16" Washer, S.S.	10			
12	5/16"-18 x 2-3/4" Hex Cap Screw	10			
13	Connector Tube O-Ring	2			
14	Connector Tube Kit (Includes 1 Connector Tube and 1 O-Ring)	2	77707-0017	77707-0017	77707-0017
15	Thermal Regulator Kit (Incl. Key Nos. 16, 17, 18, 19 and Spring Clip)	1	77707-0010	77707-0010	77707-0010
16	Thermal Regulator (Includes Spring Clip)	1	38000-0007S	38000-0007S	38000-0007S
17	Thermal Regulator Spring	1			
18	Thermal Regulator Cap O-Ring	1	35505-1313	35505-1313	35505-1313
•	Thermal Regulator Spring Clip	1			
19	Thermal Regulator Cap	1			
20	Drain Plug	1	U178-920P	U178-920P	U178-920P
21	3/4" Pipe Plug	1	U78-60ZPS	U78-60ZPS	U78-60ZPS
22	Pressure Relief Valve (Recommended - Purchase Separately)	1	38674-0719	38674-0719	38674-0719
23	2-in Union Adapter Kit	2	PKG188	PKG188	PKG188

\* Not available separately.

• Not illustrated.



# REPLACEMENT PARTS



## REPAIR PARTS – ELECTRICAL SYSTEM

Key No.	Part Description	Qty.	Model		
			200NA 200LP	300NA 300LP	400NA 400LP
1	Heater Display Cover	1	42002-0035	42002-0035	42002-0035
2	Igniter Bracket	1	42001-0030S	42001-0030S	42001-0030S
3	Igniter/Igniter Gasket Kit Incl. Key Nos. 3 and 4)	1	77707-0054	77707-0054	77707-0054
4	Igniter Gasket	1	42001-0066S	42001-0066S	42001-0066S
5	Automatic Gas Shutoff Switch (AGS)	1	474368Z	474368Z	474368Z
6	High Limit Switch	1	474369Z	474369Z	474369Z
7	Thermistor	1	42001-0053S	42001-0053S	42001-0053S
8	Terminal Board	1	42001-0056S	42001-0056S	42001-0056S
9	Fireman's Switch Fuse (31.75 mm X 6.35 mm)	1	32850-0099	32850-0099	32850-0099
10	Fenwal Ignition Control Module	1	474103Z	474103Z	474103Z
11	Transformer, 120/240V	1	42001-0107S	42001-0107S	42001-0107S
12	Air Flow Switch	1	42001-0061S	42001-0061S	42001-0061S
13	Control Board Kit (NA, LP Series)	1	42002-0007S	42002-0007S	42002-0007S
•	Heater Wiring Harness	1	474163Z	474163Z	474163Z
14	Heater, Top	1	42002-0034Z	42002-0034Z	42002-0034Z
15	Membrane Pad (NA, LP Series)	1	472610Z	472610Z	472610Z
16	Stack Flue Sensor	1	42002-0024S	42002-0024S	42002-0024S
17	Inlet Temperature Control Switch (1/8" thread)	1	474363Z	474363Z	474363Z
17b	Inlet Temperature Control Switch (1/4" thread)		475147Z	475147Z	475147Z

## Notes

## Notes

## Notes

## Notes

## SAVE THESE INSTRUCTIONS



Pentair Water Pool and Spa, Inc. EMEA – Head Office: Industriepark, Wolfstee, Toekomstlaan 30, 2200 Herentals - Belgium.

Pentair Aquatic Systems USA:

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10951 West Los Angeles Ave., Moorpark, CA 93021 – USA • Customer Support: (800) 831-7133 or (805) 553-5000

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