

# Installation and Operation Manual



## Atmospheric Model 130A Above-Ground Pool Spa Heater



**READ THIS MANUAL BEFORE INSTALLATION OR OPERATION.**

**WARNING:** If the information in these instructions are not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

### FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors and liquids or other combustible materials in the vicinity of this or any other appliance.

### 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.

Installation and service must be performed by a qualified installer, service agency, or the gas supplier.

**Note:** Retain this manual in order to reference the safety warnings and cautions, installation instructions, operation and maintenance procedures, troubleshooting information, and service and support contact information. Keep this manual and your installation invoice with the appliance or in another safe place.

## WATER CHEMISTRY

**NOTE:** Corrosive water voids all warranties.

Chemical imbalance can cause severe damage to your heater and associated equipment. Maintain your water chemistry according to Table 1. If the mineral content and dissolved solids in the water become too high, scale forms inside the heat exchanger tubes, reducing heater efficiency and damaging the heater. If the pH drops below 7.2, this will cause corrosion of the heat exchanger and severely damage the heater. Heat exchanger damage resulting from chemical imbalance is not covered by the warranty.

For your health and the protection of your pool equipment, it is essential that your water be chemically balanced. The following levels must be used as a guide for balanced water.

### CAUTION

**FREE CHLORINE MUST NOT EXCEED 5 PPM WHICH CAN DAMAGE THE HEATER AND VOID THE WARRANTY.**

### WATER CHEMISTRY TIPS

- Occasional chemical shock dosing of the pool or spa water should not damage the heater providing the water is balanced.

- Automatic chemical dosing devices and salt chlorinators are usually more efficient in heated water, unless controlled, they can lead to excessive chlorine level which can damage your heater.
- Further advice should be obtained from your pool or spa builder, accredited pool shop, or chemical supplier for the correct levels for your water.

### AUTOMATIC CHLORINATORS / CHEMICAL FEEDERS

All chemicals must be introduced and completely diluted into the pool or spa water before being circulated through the heater. Do not place sanitizing chemicals in the skimmer. High chemical concentrations will result when the pump is not running (e.g. overnight).

Chlorinators must feed downstream of the heater and have an anti-siphoning device to prevent chemical back-up into the heater when the pump is shut off. See Figure 1.

**NOTE:** High chemical concentrates from feeders and chlorinators that are out of adjustment will cause rapid corrosion to the heat exchanger. Such damage is not covered under the warranty.

Table 1. Water Chemistry.

Recommended Level(s)	Fiberglass Pools	Fiberglass Spas	Other Pool & Spa Types
Water Temp. (Deg. F)	68 to 88	89 to 104	68 to 104
pH	7.3 to 7.4	7.3 to 7.4	7.6 to 7.8
Total Alkalinity (PPM)	120 to 150	120 to 150	80 to 120
Calcium Hardness (PPM)	200 to 300	150 to 200	200 to 400
Salt (PPM)	<b>6000 MAXIMUM</b>	<b>6000 MAXIMUM</b>	<b>6000 MAXIMUM</b>
Free Chlorine (PPM)*	2 to 3	2 to 3	2 to 3
Total Dissolved Solids (PPM)	<b>3000 MAXIMUM</b>	<b>3000 MAXIMUM</b>	<b>3000 MAXIMUM</b>

\*Free Chlorine Must Not Exceed 5 PPM!

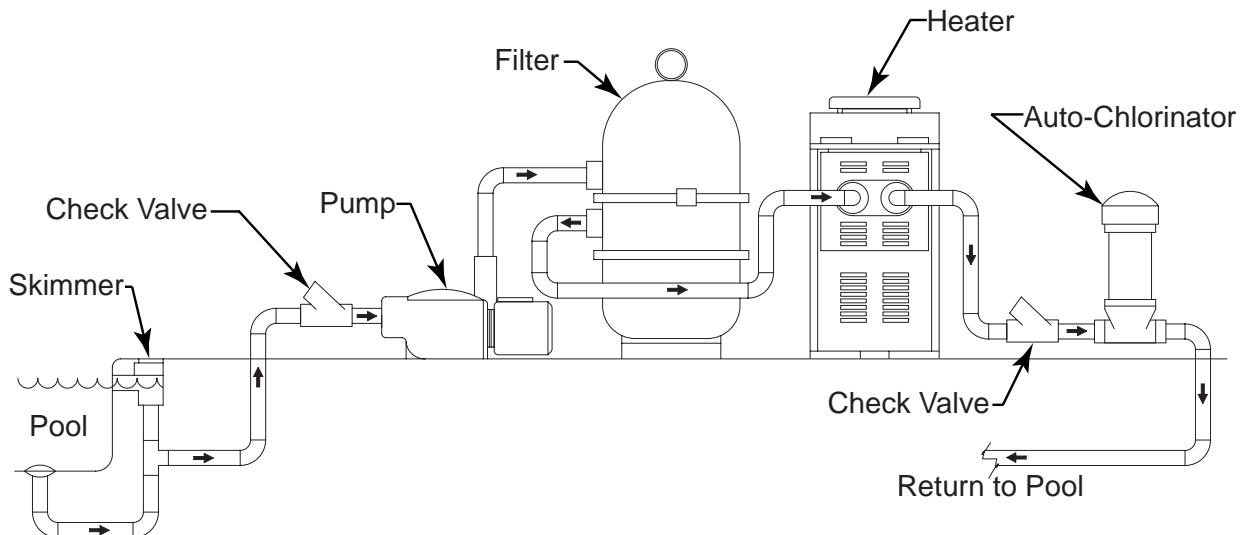


Figure 1. Pool/Chlorinator Setup.

**TABLE OF CONTENTS**

WATER CHEMISTRY .....	ii
TABLE OF CONTENTS .....	1
SAFETY .....	1
Safety Warnings .....	1
Water Temperature Safety .....	2
INTRODUCTION .....	2
Ratings and Certifications .....	2
Model Identification .....	2
Specifications .....	2
Unpacking .....	2
INSTALLATION .....	3
Outdoor Installation .....	3
Indoor Installation .....	4
Combustion and Ventilation Air (Indoor Units Only) .....	5
Vent Piping .....	5
Gas Connections .....	6
Water Connections .....	7
Electrical Connections .....	9
Control Adjustments - Millivolt .....	9
Wiring Diagrams .....	10
Post Start-Up Inspection .....	13
Cold Weather Operation .....	13
MAINTENANCE .....	14
SERVICE .....	14
Water Pressure Switch .....	14
Flame Roll-Out Safety Switch .....	14
High Limits .....	14
Pilot Safety - Millivolt Models .....	15
Burner Tray Removal .....	15
Gas Valve Removal .....	16
Main Burner and Orifice Removal .....	16
Igniter Removal and Cleaning (Electronic) .....	16
Pilot Removal and Cleaning (Millivolt) .....	16
Heat Exchanger Removal .....	16
Tube Cleaning Procedure .....	17
Desooting Procedure .....	17
Immersion Well Replacement - Millivolt .....	17
Replacement Parts .....	17
TROUBLESHOOTING .....	18
Mechanical .....	18
Electrical .....	19
Electronic Control Logic Flowchart .....	21
General - Heater Will Not Fire .....	21

**SAFETY**

This appliance is to be installed and operated by trained personnel in accordance with this Installation and Operation Manual. Be sure to read and understand the entire Installation and Operation Manual before attempting to install or operate this appliance. Pay specific attention to the following Safety section. Failure to follow these warnings could result in a fire or explosion, causing property damage, bodily injury, or death. Should you have any problems understanding the warnings and instructions in this manual, STOP, and get help from a qualified installer, service technician, or the gas supplier.

**SAFETY WARNINGS****DANGER**

**FAILURE TO INSTALL THE DRAFTHOOD ON INDOOR INSTALLATION AND PROPERLY VENT THE HEATER TO THE OUTDOORS AS OUTLINED IN THE VENTING SECTION OF THIS MANUAL CAN RESULT IN UNSAFE OPERATION OF THE HEATER. TO AVOID THE RISK OF FIRE, EXPLOSION, OR ASPHYXIATION FROM CARBON MONOXIDE, NEVER OPERATE THIS HEATER UNLESS IT IS PROPERLY VENTED AND HAS AN ADEQUATE AIR SUPPLY FOR PROPER OPERATION. BE SURE TO INSPECT THE VENT SYSTEM FOR PROPER INSTALLATION AT INITIAL START-UP; AND AT LEAST ANNUALLY THEREAFTER. REFER TO THE VENTING SECTION OF THIS MANUAL FOR MORE INFORMATION REGARDING VENT SYSTEM INSPECTIONS.**

**WARNING**

**TO MINIMIZE THE POSSIBILITY OF IMPROPER OPERATION, SERIOUS PERSONAL INJURY, FIRE, OR DAMAGE TO THE HEATER:**

- ALWAYS KEEP THE AREA AROUND THE HEATER FREE OF COMBUSTIBLE MATERIALS, GASOLINE, AND OTHER FLAMMABLE LIQUIDS AND VAPORS.
- THE HEATER SHOULD NEVER BE COVERED OR HAVE ANY BLOCKAGE TO THE FLOW OF FRESH AIR TO THE HEATER DURING OPERATION.

**CALIFORNIA PROPOSITION 65 WARNING**

**THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS, OR OTHER REPRODUCTIVE HARM.**

**WARNING**

**IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE, OR MAINTENANCE CAN CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE. REFER TO THE USER'S INFORMATION MANUAL PROVIDED WITH THIS HEATER. INSTALLATION AND SERVICE MUST BE PERFORMED BY A QUALIFIED INSTALLER, SERVICE AGENCY, OR THE GAS SUPPLIER.**

**WARNING**

**GASOLINE, AS WELL AS OTHER FLAMMABLE MATERIALS AND LIQUIDS (ADHESIVES, SOLVENTS, ETC.), AND THE VAPORS THEY PRODUCE, ARE EXTREMELY DANGEROUS. DO NOT HANDLE, USE, OR STORE GASOLINE OR OTHER FLAMMABLE OR COMBUSTIBLE MATERIALS IN THE VICINITY OF A HEATER.**

**CAUTION**

**VERIFY PROPER OPERATION AFTER SERVICING.**

**WATER TEMPERATURE SAFETY**

Elevated water temperature can be hazardous. The U.S. Consumer Product Safety Commission has these guidelines:

1. Spa water temperatures should never exceed 104°F (40°C). A temperature of 100°F (38°C) is considered safe for a healthy adult. Special caution is suggested for young children.
2. Drinking of alcoholic beverages before or during spa or hot tub use may cause drowsiness which could lead to unconsciousness and subsequently result in drowning.
3. Pregnant Women Beware! Soaking in water over 102°F (39°C) may cause fetal damage during the first three months of pregnancy resulting in the birth of a brain-damaged or deformed child. Pregnant women should stick to the 100°F (38°C) maximum rule.
4. Before entering the spa or hot tub, users should check the water temperature with an accurate thermometer; spa or hot tub thermostats may err in regulating water temperatures by as much as 4°F (2.2°C).
5. Persons with a medical history of heart disease, circulatory problems, diabetes, or blood pressure problems should obtain a physician's advice before using spas or hot tubs.
6. Persons taking medications which induce drowsiness, such as tranquilizers, antihistamines, anticoagulants, or recreational drugs should not use spas or hot tubs.

**INTRODUCTION**

**RATINGS AND CERTIFICATIONS**

This pool/spa heater is design-certified and tested under the latest requirements of ANSI Z21.56 / CSA 4.7 Standard for Gas-Fired Pool Heaters. The heater can be used either indoors or outdoors. If necessary, the top of the heater can be changed after installation to accommodate indoors or outdoors.

**WARNING**

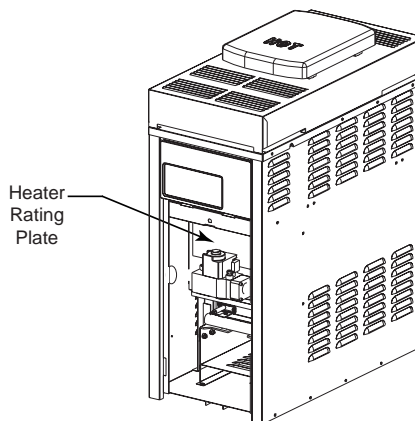
**USE OF ANY PARTS NOT MANUFACTURED AND/OR APPROVED BY THE MANUFACTURER WILL VOID THE WARRANTY.**

**AMBIENT TEMPERATURE RATING OF COMPONENTS**

- Millivolt heater +32°F to +175°F
- Electronic heater only -40°F to +175°F

**MODEL IDENTIFICATION**

The model identification number and heater serial number are found on the heater rating plate.



**Figure 2. Location of Heater Rating Plate.**

The model identification number will be similar to P-R130A-EN-X, where:

- "EP" designates an Electronic heater using Propane gas
- "EN" designates an Electronic heater using Natural gas
- "MP" designates a Millivolt heater using Propane gas
- "MN" designates a Millivolt heater using Natural gas
- "P" prefix designates plastic (Polymer) headers
- "X" suffix designates Cupro-Nickel tubing
- "C" suffix designates Copper tubing

**SPECIFICATIONS**

**Table 2. 130A Specifications.**

Heater Model	Input (BTUH)	Gas Connection (NPT)	Water Connection	Shipping Weight (lbs.)
130A	130,000	1/2"	1-1/2" or 2" NPT	Standard Heater w/Stackless Top 140

**UNPACKING**

On receipt of the heater it is suggested that visual checks are made for external damage to the shipping carton. If the carton is damaged, make a note to that effect on the Bill of Lading when signing for the shipment. Remove the heater from the shipping packaging. Report any damage to the carrier immediately.

On occasion, items are shipped loose. Be sure that the correct number of packages are received, as indicated on the Bill of Lading.

Claims for shortages and damages must be filed with the carrier by consignee. Authorization to return goods must be received from the factory prior to shipping. Goods returned to the factory without an authorized Returned Goods Receipt number will not be accepted. All returned goods are subject to a restocking charge.

When ordering parts, specify the model and serial number of the heater. When ordering under warranty conditions, specify the date of installation. Records of the installation must be provided, when requested, to substantiate a claim.

Debits for defective replacement parts will not be accepted and will only be replaced in kind per the manufacturer's standard warranties.

## INSTALLATION

### INSTALLATION CODES

Installations must be in accordance with local, state, provincial, and national codes, laws, regulations and ordinances. In the absence of local codes, installations must be in accordance with the latest editions of the:

- National Fuel Gas Code, ANSI Z223.1/NFPA 54
- National Electrical Code, ANSI/NFPA 70
- For Canada only: CAN/CGA B149.1 and .2 installation Code (B149.1 and .2) and CSA C22.1 C.E.C. Part 1 and Part 2

**NOTE:** The heater should not be located in an area where possible water leakage will 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, with adequate drainage, be installed under the heater. The pan must not restrict combustion air flow.

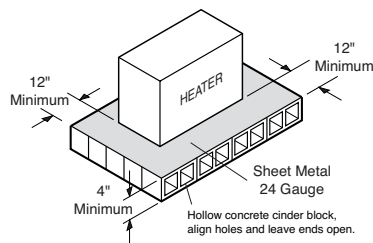
### CLEARANCES

The required minimum clearances from combustible surfaces are shown in Table 3.

### BASE INSTALLATION

Heater must be mounted on a level base, such as cementable slab, cement blocks or another non-combustible surface. An alternate method for providing a base for combustible floors is illustrated. Heaters may not be installed on carpeting.

ALTERNATE METHOD FOR PROVIDING A NON-COMBUSTIBLE BASE



**Table 3. Required Minimum Clearances from Combustible Surfaces.**

<b>CLEARANCE FROM COMBUSTIBLE CONSTRUCTION</b>	
<b>INDOOR INSTALLATIONS:</b>	
Top* - 42"	Back - 6"
Front - Alcove	Right Side - 6"
Vent - 6"	Left Side - 12"
<b>OUTDOOR INSTALLATION:</b>	
Top* - Unobstructed	Right Side - 6"
Back - 6"	Left Side - 12"

\*Clearance from top of vent terminal.

When installed according to the listed minimum clearances from combustible construction, the pool heater can be serviced without removing permanent construction around the heater.

However for ease of servicing, we recommend a clearance of at least 24" in the front, and at least 18" on the rear. This will enable the heater to be serviced in its installed location, that is, without movement or removal of the heater.

Clearances less than these may require removal of the heater to service either the heat exchanger or the burner tray. In either case, the heater must be installed in a manner that will enable the heater to be serviced without removing any structure around the heater.

### OUTDOOR INSTALLATION

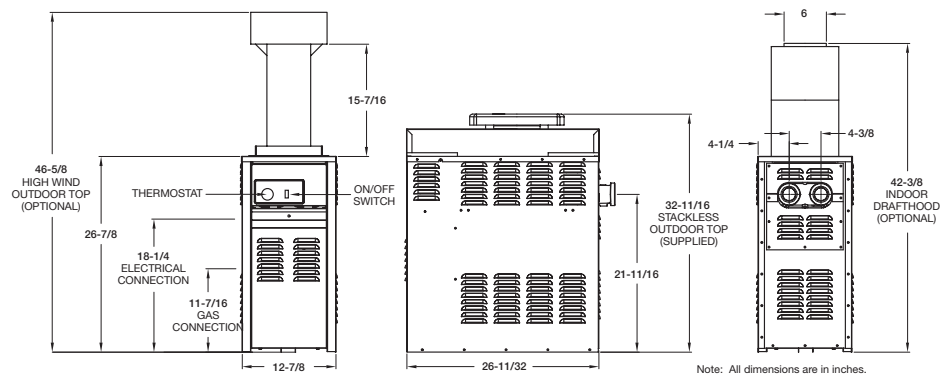
**NOTE:** This heater is design-certified for outdoor installation when equipped with the approved top(s) for outdoor use.

### WARNING

**THE HEATER SHOULD NOT BE LOCATED IN AN AREA WHERE WATER SPRINKLERS, OR OTHER DEVICES, MAY CAUSE WATER TO SPRAY THROUGH THE CABINET LOUVERS AND INTO THE HEATER. THIS COULD CAUSE INTERNAL RUSTING OR DAMAGE ELECTRICAL COMPONENTS, AND VOID THE WARRANTY.**

### DIMENSIONS

**Figure 3. 130A Dimensions.**



**WARNING**

**DO NOT INSTALL WITHIN 3 FEET OF A HEAT PUMP OR AN OUTDOOR CONDENSING UNIT. STRONG AIR INTAKE FROM THIS TYPE OF EQUIPMENT CAN DISTURB THE COMBUSTION PROCESS AND CAUSE DAMAGE OR PERSONAL INJURY.**

**HEATER WITH OUTDOOR STACKLESS TOP**

Heaters must not be installed under an overhang of less than 3 ft from the top of the heater. Three sides must be open in the area under the overhang. Roof water drainage must be diverted away from heaters installed under overhangs with the use of gutters.

- For U.S. installations, the point from where the flue products exit the heater must be a minimum of 4 ft below, 4 ft horizontally from, or 1 ft above any door, window or gravity inlet into any building. The top surface of the heater shall be at least 3 ft above any forced air inlet, or intake ducts located within 10 ft horizontally. See Figure 6.
- For installations in Canada, pool heaters shall not be installed with the top of the vent assembly within 10 ft below, or to either side, of any opening into the building. Refer to the latest revisions of CAN/CGA-B149.1 and B149.2

**OUTDOOR HIGH-WIND TOP**

**NOTE:** The outdoor high-wind top is optional equipment and does not come standard with the heater. Use the following part numbers.

P/N 004301 (Green)                      P/N 011558 (Gray)

**HIGH WIND CONDITIONS (OUTDOOR UNITS ONLY)**

In areas where high winds are frequent, it may be necessary to locate the heater a minimum of 3' from high vertical walls, or install a wind-break so the heater is not in direct wind current.

In areas of daily high winds, it may be necessary to replace the outdoor stackless top with a stack adapter in combination with a wind-resistant/weather-proof outdoor stack. See Figure 4.

The outdoor stack serves the same function as the low-profile stackless top and should be installed in accordance with the same clearance requirements. Follow the installation instructions provided with the High Wind Kit for installation.

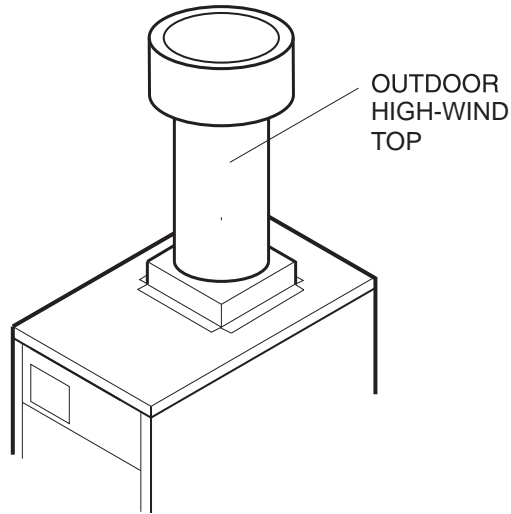


Figure 4. Outdoor High-Wind Top.

**INDOOR INSTALLATION**

The heater is design-certified for indoor installation when equipped with the approved draft hood.

**NOTE:** For Canada, indoor installation is restricted to an enclosure that is not occupied and does not directly communicate with an occupied area. Refer to the latest edition of CAN/CGA-B149.1 and B149.2 for specific requirements.

Locate heater as close as is practical to a chimney or gas vent. Heater must always be vented to the outside. See Vent Piping section for details. Minimum allowable space is shown on the nameplate. Follow the installation instructions provided with the Indoor Draft Hood Kit for installation.

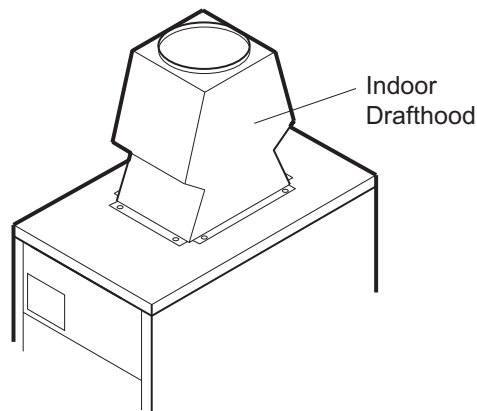


Figure 5. Indoor Draft Hood.

**INDOOR DRAFTHOOD**

**NOTE:** The indoor draft hood is optional equipment and does not come standard with the heater. Use the following part number.

P/N 003723



**COMBUSTION AND VENTILATION AIR**

(INDOOR UNITS ONLY)

The heater must have both combustion and ventilation air. Minimum requirements for net free air supply openings are one opening that is 12 inches from the ceiling for ventilation, and one opening that is 12 inches from the floor for combustion air as outlined in the latest edition of the National Fuel Gas Code, ANSI Z223.1 (Canada-CAN/CGA-B149.1 and B149.2) and any local codes that may have jurisdiction.

**ALL AIR FROM INSIDE THE BUILDING**

Each opening shall have a minimum net free area of 130 sq. in.

**ALL AIR FROM OUTDOORS**

When air is supplied directly from outside of building, each opening shall have a minimum net free area of 33 sq. in.

**CAUTION**

**COMBUSTION AIR MUST NOT BE CONTAMINATED BY CORROSIVE CHEMICAL FUMES WHICH CAN DAMAGE THE HEATER AND VOID THE WARRANTY. DO NOT STORE CHLORINE, BROMINE, BAQUASIL OR ACID IN THE SAME ROOM AS THE HEATER.**

**VENT PIPING**

Vent piping the same size as the draft hood outlet is recommended, however, when the total vent height is at least 10 ft (draft hood relief opening to vent terminal), the vent pipe size may be reduced as specified in the National Fuel Gas Code, ANSI Z223.1 (Canada - CAN/CGA-B149.1 and B149.2). As much as possible, avoid long horizontal runs of

vent pipe and too many elbows. If installation requires horizontal runs, the vent pipe must have a minimum of 1/4 in. per ft rise and should be supported at not more than five foot intervals. Plumbers tape, criss-crossed, will serve to space both horizontal and vertical piping. Gas vents supported only by the flashing and extending above the roof more than five feet should be securely guyed or braced to withstand snow and wind loads. We recommend use of insulated vent pipe spacers through the roof and walls.

For protection against rain or blockage by snow, the vent pipe must terminate with a vent cap which complies with local codes or, in the absence of such codes, the latest edition of the National Fuel Gas Code, ANSI Z223.1 (Canada - CAN/CGA-B149.1 and B149.2).

The discharge opening must be a minimum of 2 ft vertically from the roof surface and at least 2 ft higher than any part of the building within 10 ft. Vent stack shall be at least 5 ft in vertical height above the draft hood outlet. The vent cap location shall have a minimum clearance of 4 ft horizontally from, and in no case below, unless a 4 ft horizontal distance is maintained, from electric meters, gas meters, regulators and relief equipment.

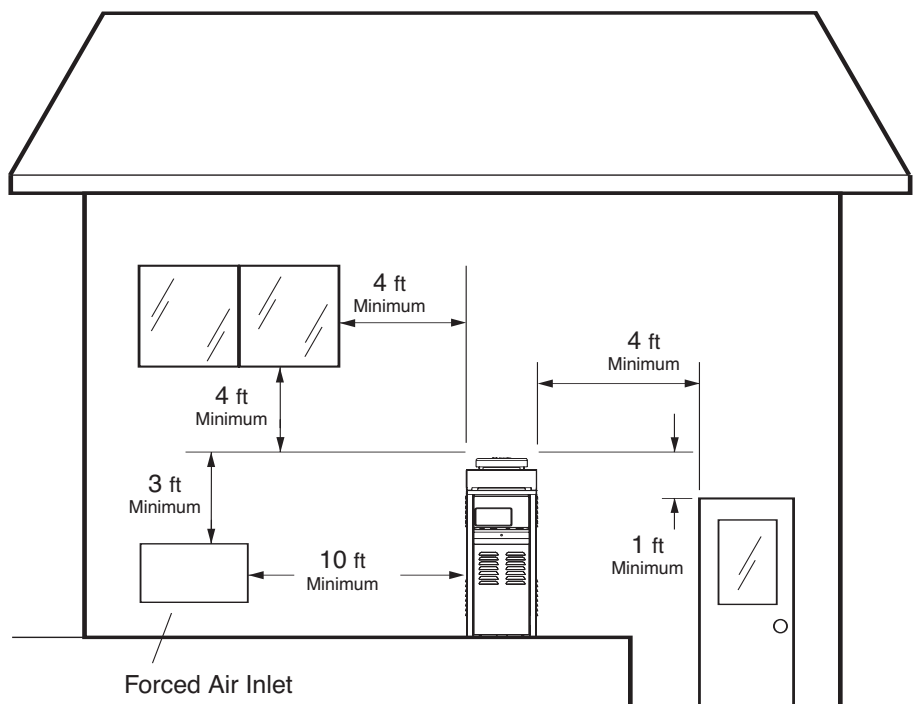


Figure 6. Outdoor Installation Clearances.

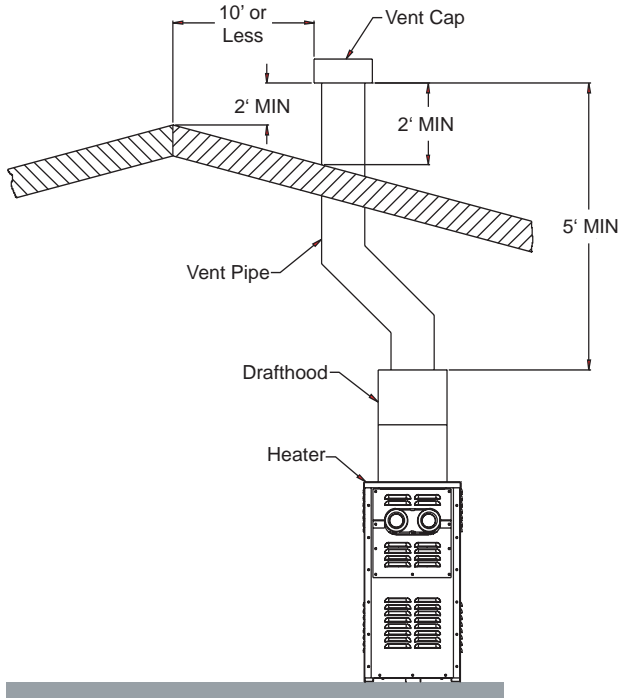


Figure 7. Vent Piping Requirements.

The weight of the vent stack or chimney must not rest on heater drafthood. Support must be provided in compliance with applicable codes. The heater top and drafthood must be readily removable for maintenance and inspection. Vent pipe should be adequately supported to maintain proper clearances from combustible construction.

Type "B" double-wall or equivalent vent pipe is recommended. However single-wall metal vent pipe may be used as specified in the latest edition of the National Flue Gas Code ANSI Z223.1 (Canada - CAN/CGA-B149.1 and B149.2).

**GAS CONNECTIONS**

Gas piping must have a sediment trap ahead of the heater gas controls, and a manual shut-off valve located outside the heater jacket. All gas piping should be tested after installation in accordance with local codes.

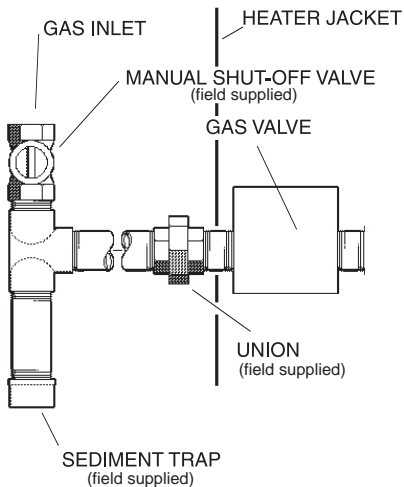


Figure 8. Gas Line Sediment Trap.

**CAUTION**

THE HEATER AND ITS MANUAL SHUT-OFF VALVE MUST BE DISCONNECTED FROM THE GAS SUPPLY DURING ANY PRESSURE TESTING OF THAT SYSTEM AT TEST PRESSURES IN EXCESS OF 1/2 PSIG (3.5 KPA). THE HEATER AND ITS GAS CONNECTIONS SHALL BE LEAK TESTED BEFORE PLACING THE APPLIANCE IN OPERATION. USE SOAPY WATER FOR LEAK TEST. DO NOT USE OPEN FLAME.

NOTE: Do not use Teflon tape on gas line pipe thread. A flexible pipe sealant suitable for LP gases is recommended.

**GAS PRESSURE REGULATOR**

If adjustment is needed, remove seal and turn adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure.

Table 4. Gas Pressure.

Gas Pressure*	Natural Gas	Propane Gas
Max Inlet (static)	10.5" W.C.	13" W.C.
Min Inlet (dynamic)	7" W.C.	11" W.C.
Manifold Gas (dynamic)	3.5" W.C.	10" W.C.

\*Static means without heater operating. Dynamic refers to heater operating.

**GAS PRESSURE ADJUSTMENT LOCATIONS**

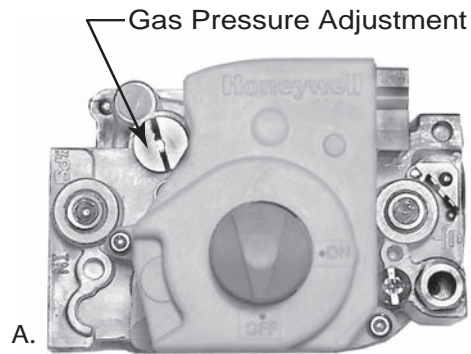


Figure 9A. Honeywell DSI VR 8205 Gas Valve.

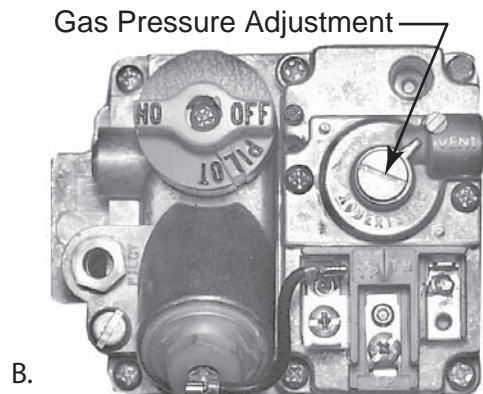


Figure 9B. Robertshaw MV Gas Valve.



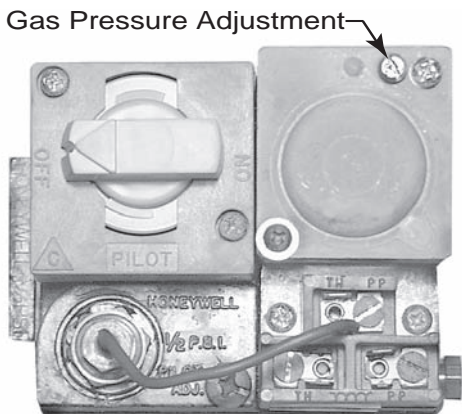


Figure 9C. Honeywell MV Gas Valve.

**ELECTRONIC IGNITION GAS VALVES**

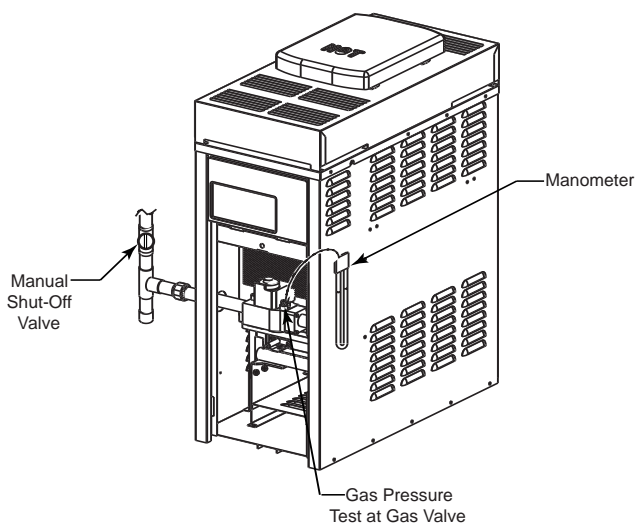


Figure 10. Location of Gas Pressure Adjustment.

**PIPE SIZING FOR GAS CONNECTIONS**

Table 5. Maximum Equivalent Pipe Length.

Maximum Equivalent Pipe Length							
Natural Gas 1000 BTU/FT <sup>3</sup> 0.60 Specific Gravity @ 0.5 in. WC Pressure Drop							
Propane Gas 2500 BTU/FT <sup>3</sup> 1.53 Specific Gravity @ 0.5 in. WC Pressure Drop							
	Input	1/2"		3/4"		1"	
Model	(KBTU)	N	P	N	P	N	P
130A	130	15	35	60	145	200	500

**WATER CONNECTIONS**

The heater requires water flow and positive pressure to fire and operate properly. It must therefore be installed downstream of the discharge side of the filter pump. A typical installation is plumbed as follows:

1. The inlet side of the filter is plumbed directly to the discharge side of the filter pump;
2. The outlet side of the filter is then plumbed to the inlet of the heater; and
3. The outlet of the heater is plumbed to the return line to the pool or spa. The pump, filter and heater are thus plumbed in series.

Plumbing from the heater back to the pool or spa must not have any valves or restriction that could prevent flow when the pump is operating.

Heater must be located so that any water leaks will not damage the structure of adjacent area. PVC pipe may be glued directly into optional or field-supplied header unions.

**FLOW RATES**

Table 6. Water Flow Rates.

MODEL	MIN. GPM	MAX. GPM*
130A	20	100

\*NOTE: When flow rates exceed maximum 100 GPM an external auxiliary bypass valve is required. See External Auxiliary Bypass Valve section for details.

**POLYMER HEADERS**

Before attaching the optional 2-inch unions to the In/Out header, make sure the O-rings are properly seated in the grooves. Use AquaLube or equivalent non-petroleum-based lubricant on the O-ring. Hand tighten the unions. Glue PVC piping directly to the unions.

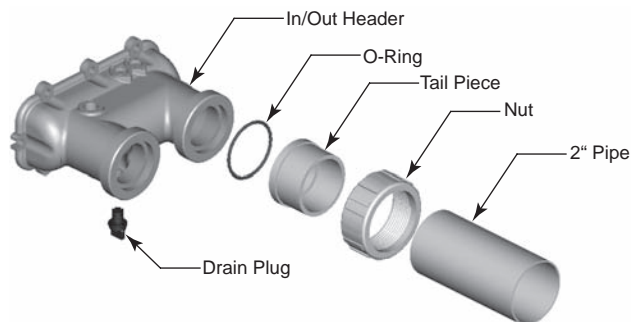


Figure 11. Optional In/Out Header for 2" Installation.

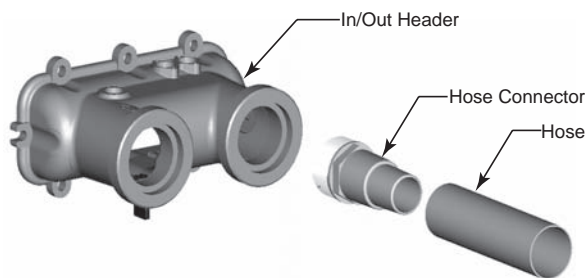


Figure 12. In/Out Header for 1-1/2" or 1-1/4" Hose Connection.

## Installation

High-temperature CPVC header flanges and header flange nuts are available as an option. If there is any possibility of back-siphoning when the pump stops, it is recommended that a check valve (or valves) also be installed in the system.

### INTERNAL AUTOMATIC BYPASS VALVE

A built-in automatic bypass valve is provided in the In/Out header. The internal bypass valve automatically responds to changes in water pressure in the piping system. The proper amount of water flow is maintained through the heater under varying pressures dictated by the conditions of the pump and filter.

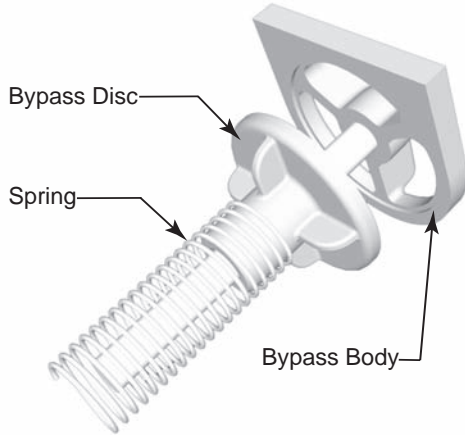


Figure 13. Internal Automatic Bypass Valve

### EXTERNAL AUXILIARY BYPASS VALVE

An auxiliary bypass valve must be used when flow rates exceed 100 GPM. Usually a high-performance pump size larger than one horsepower will exceed this flow rate. This valve is required to complement the function of the automatic bypass valve, particularly when starting the heater in winter or early spring when the spa or pool temperature is below 50°F. It also serves to eliminate needless pressure drop through the heater and accompanying reduction in the flow rate to the spa jets, etc.

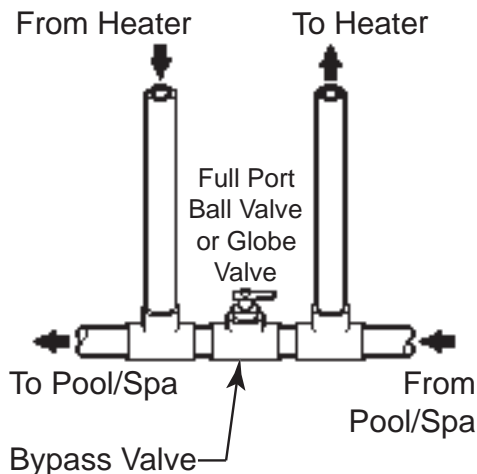


Figure 14. Auxiliary Bypass Valve.

NOTE: Do not use a gate valve as an auxiliary bypass valve.

### AUXILIARY BYPASS VALVE ADJUSTMENT

To set bypass: With clean filter, adjustment is made by feeling the inlet and outlet pipes at the heater. Outlet pipes should be slightly warmer than inlet and comfortable to the touch. If pipe is hot, close bypass; if cold, open bypass.

### PRESSURE RELIEF VALVE INSTALLATION

To conform to local building codes, it may be necessary to install a pressure relief valve. A 3/4" pressure relief valve, having a capacity equal to the BTUH output of the heater to be installed, is recommended for this heater. The maximum pressure relief valve setting is 125 psi. This relief valve needs to be installed on the outlet pipe from the header as noted in Figure 15 below.

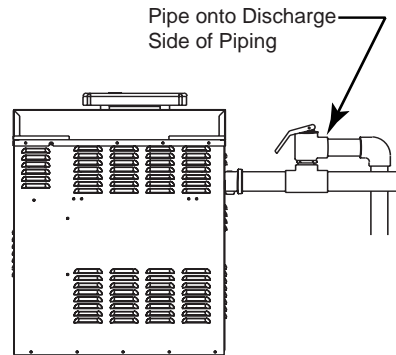


Figure 15. Pressure Relief Valve Installed.

If required, this needs to be installed in a field-supplied fitting external to the heater. The valve shall be installed in a vertical position. Do not overtighten. Install pressure relief valve hand tight plus 1/2 turn.

### WARNING

**TO AVOID WATER DAMAGE OR SCALDING DUE TO RELIEF VALVE OPERATION, DRAIN PIPE MUST BE CONNECTED TO VALVE OUTLET AND RUN TO A SAFE PLACE OF DISCHARGE. DRAIN PIPE MUST BE THE SAME SIZE AS THE VALVE DISCHARGE CONNECTION THROUGHOUT ITS ENTIRE LENGTH AND MUST PITCH DOWNWARD FROM THE VALVE. NO SHUT-OFF VALVE SHALL BE INSTALLED BETWEEN THE RELIEF VALVE AND THE DRAIN LINE.**

Valve lever should be tripped at least once a year to ensure that waterways are clear. If relief valve does not function properly, replace it immediately.

**HEAT EXCHANGER PRESSURE DROP TABLE**

Table 7. 130A Pressure Drop Table.

FLOW	PRESSURE DROP (FT. OF HEAD)
20	5.5
30	8.3
40	8.4
50	8.5
60	8.6
70	8.7
80	10.0
90	12.5
100	14.5

**ELECTRICAL CONNECTIONS**

Be sure that electrical service to the heater has proper overload fuse or circuit breaker protection, wire size and connections which comply with all applicable codes.

**NOTE:** If it is necessary to replace any of the original wiring, use 105°C wire or its equivalent, and/or 150°C wire or its equivalent, like the original wiring. See Figures 18 and 19 for wire ratings.

**MILLIVOLT HEATERS**

The Millivolt models are equipped with a self-generating electrical system in which the electrical current is provided by a pilot generator. No external electrical connections are required.

When installing a remote switch, do not exceed 10 ft of wiring from the heater. Use 18-gauge stranded wire.

**ELECTRONIC HEATERS**

**NOTE:** Electronic heaters require 120 VAC 3-prong power source. Power source must be a wired ground, with ground fault circuit interruption circuitry.

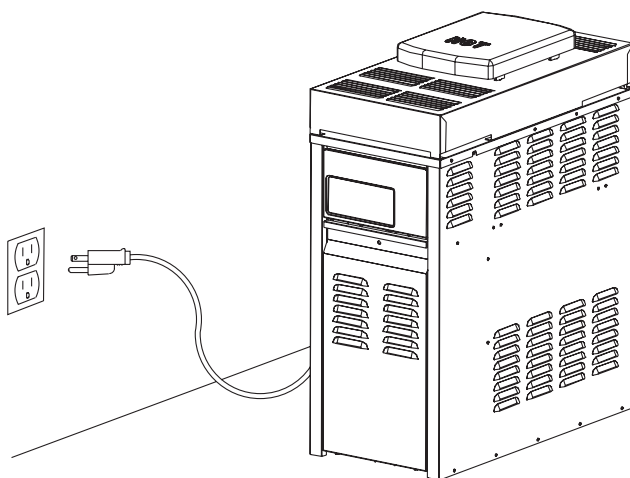


Figure 16. Electronic Heater Power.

The Direct Spark Ignition Device automatically lights the main burners upon a call for heat. The heater is supplied with a transformer for 120 VAC input power hookup.

Heater must be electrically grounded and bonded in accordance with local codes, or, in the absence of local codes, with the latest edition of the National Electrical Code, ANSI/NFPA 70. (Canada - Canadian Electrical Code, CSA C22.1, Part 1 and Part 2.)

**NOTE:** Input power to the heater (120 VAC) can be supplied from the load (pump) side of time clock or directly from the GFCI power source. It is preferred to make connection to the load/pump side of the time clock.

**WARNING**

**RISK OF ELECTRICAL SHOCK. MORE THAN ONE DISCONNECT SWITCH MAY BE REQUIRED TO DE-ENERGIZE THE EQUIPMENT BEFORE SERVICING.**

**CAUTION**

**LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION.**

**CONTROL ADJUSTMENTS - MILLIVOLT**

The pool or spa water temperature is controlled by the thermostat on the upper front panel of the heater. The control center contains an On/Off toggle switch and a thermostat. The switch functions as a means for turning the heater On or Off.

The thermostat is fitted with a means of limiting the upper temperature limit below the maximum level. The knob stop adjustment ring shown in Figure 17 is adjustable by loosening the set screw, rotating the knobstop ring to the desired location, and retightening the set screw.

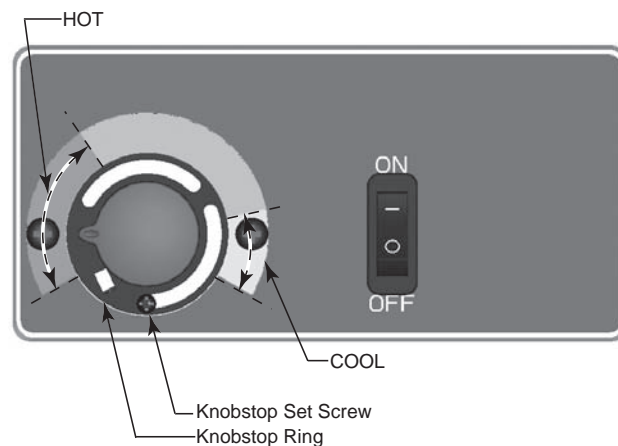
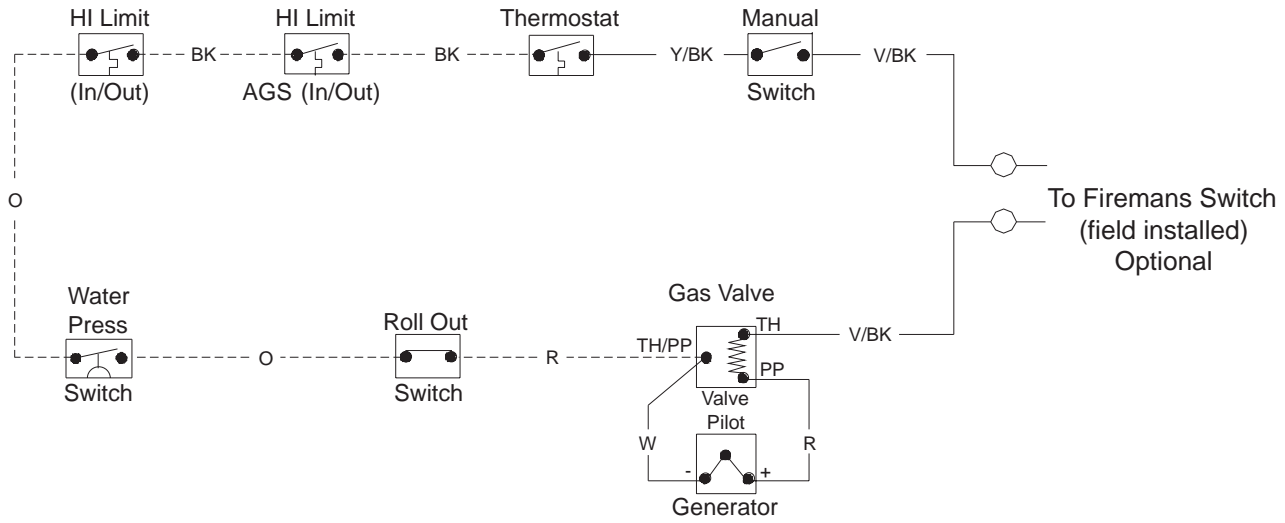


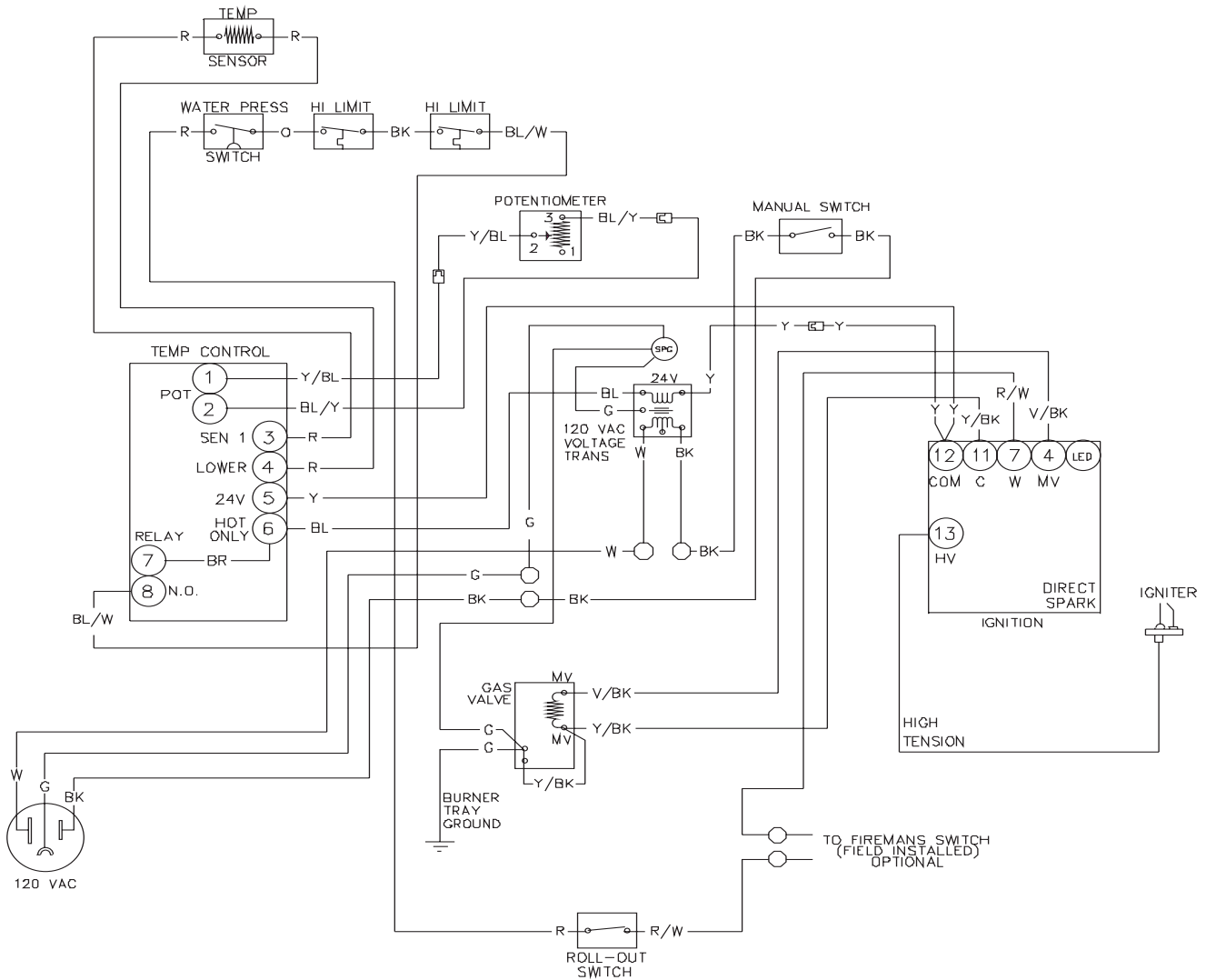
Figure 17. Water Temperature Thermostat.

**NOTE:** Maximum temperature is 104°F.

**WIRING DIAGRAMS**



**Figure 18. Wiring Diagram - Millivolt Models.**





**Figure 19. Wiring Diagram - Electronic Models.**

## FOR YOUR SAFETY READ BEFORE OPERATING

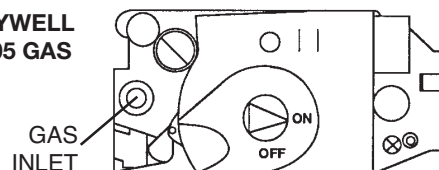
**WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.**

- A. This appliance 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 near 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 electric switch; do not use any phone in your building.
  - \*Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- \*If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, do not try to repair it. Call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.


## OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above.
2. Set the thermostat to the lowest setting.
3. Turn off all electrical power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burners. Do not try to light the burners by hand.
5. Remove heater door panel.
6. Turn gas control knob clockwise  to "Off".
7. Wait 5 minutes to clear out any gas. If you then smell gas, **STOP!** Follow "B" in the safety information above. If you don't smell gas, go to the next step.
8. Turn gas control knob counter-clockwise  to "On".
9. Replace heater door panel.
10. Turn on all electrical power to the appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

**HONEYWELL  
VR 8205 GAS  
VALVE**



## SHUT-OFF PROCEDURES

1. Set the thermostat at the lowest setting.
2. Turn off all the electrical power to the appliance if service is to be performed.
3. Remove heater door panel.
4. Turn gas control knob clockwise to "Off." 
5. Replace heater door panel.

**FOR YOUR SAFETY READ BEFORE OPERATING**

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

- A. This appliance has a pilot that must be lit by hand. When lighting the pilot, follow these instructions exactly.
- B. BEFORE LIGHTING, smell all around the appliance area for gas. Be sure to smell near 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 electric switch; do not use any phone in your building.
- \*Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.

\*If you cannot reach your gas supplier, call the fire department.

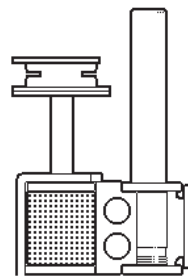
- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, do not try to repair it. Call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

**LIGHTING INSTRUCTIONS**

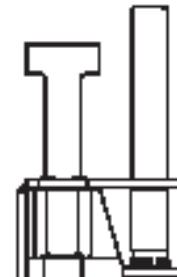
1. **STOP!** Read the safety information above.
2. Set the thermostat on the lowest setting.
3. Turn On/Off switch to the "Off" position.
4. Remove heater door panel.
5. Push in gas control knob slightly and turn clockwise to "Off".

**NOTE:** Knob cannot be turned from "Pilot" to "Off" unless knob is pushed in slightly. Do not force.

6. Wait 5 minutes to clear out any gas. If you then smell gas, **STOP!** Follow "B" in the safety information above. If you don't smell gas, go to the next step.
7. Locate pilot mounted on the right side panel of the burner tray.



HONEYWELL PILOT  
Fig.# 8083.0



ROBERTSHAW PILOT  
Fig.# 8084.1

8. Turn gas control knob counter-clockwise to "Pilot"
9. Place flame to end of pilot tube. Push in control knob all the way and hold to light pilot. Continue to hold control knob in for about one minute after the pilot is lighted, release knob and it will pop back up. Pilot should remain lighted. If it goes out, repeat steps 5 through 9. If knob does not pop up when released, stop and immediately call your service technician or gas supplier.
10. Stand to the side of the heater and turn the gas control knob counter-clockwise to "On".
11. Replace heater door panel.
12. Turn On/Off switch to the "On" position.
13. Set thermostat to the desired setting.



Fig.# 9265

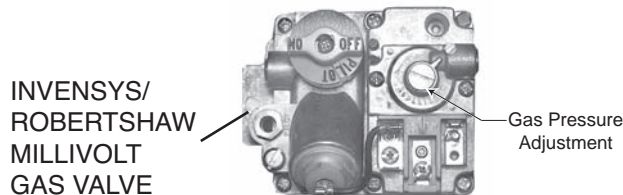


Fig.# 9263

**SHUT-OFF PROCEDURE**

1. Set the thermostat to the lowest setting.
2. Turn On/Off switch to the "Off" position.
3. Remove heater door panel.
4. Push the gas control knob slightly and turn clockwise to "Off". Do not force.
5. Replace heater door panel.



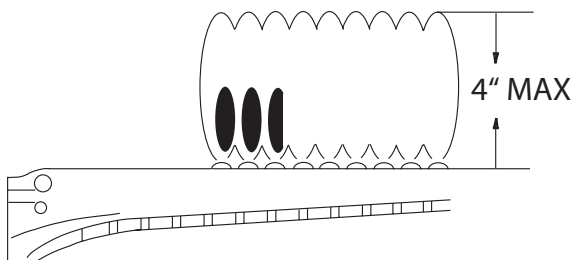
**POST START-UP INSPECTION**

Feel the inlet and outlet pipes. Outlet pipe should be only slightly warmer than the inlet. It should not be hot.

**WARNING**

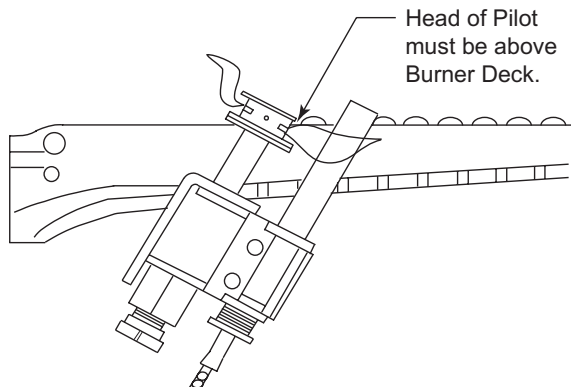
**SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, TURN OFF THE MANUAL GAS CONTROL TO THE APPLIANCE.**

With the heater on, remove the door and make a visual check of the pilot and burner. The flame should be blue with a well-defined pattern.

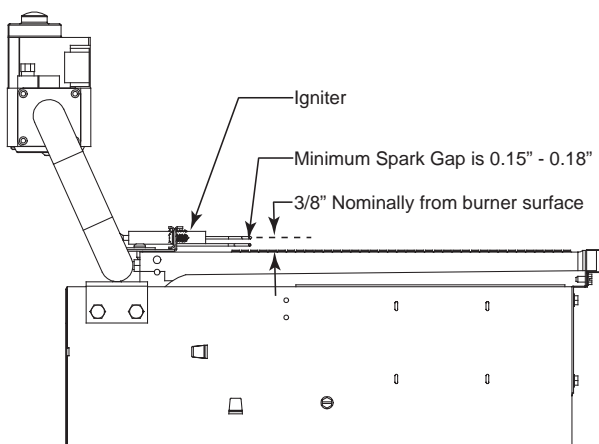


**Figure 20. Correct Main Burner Flame Pattern.**

A yellow or "floating" flame indicates restricted air openings or incorrect orifice size. Should this occur, shut the heater off and contact the installer or gas supplier.



**Figure 21. Millivolt Pilot Burner Flame.**



**Figure 22. DSI Igniter Location.**

**COLD WEATHER OPERATION**

**MODERATE CLIMATE**

Heater operation can continue during short-term cold spells. When temperatures are between 0° and 32°F, flow (continuous pump operation) must be maintained.

**CAUTION**

**DO NOT USE THE HEATER TO MAINTAIN WATER TEMPERATURES JUST ABOVE FREEZING OR FOR FREEZE PROTECTION. WHEN HEATER IS USED DURING FREEZING WEATHER, CARE MUST BE TAKEN TO AVOID FREEZE-UPS. CONTINUOUS PUMP OPERATION IS A MUST. ADDITIONAL PROTECTION MAY BE REQUIRED. THE HEATER IS NOT WARRANTED AGAINST FREEZE-UPS.**

**COLD CLIMATE**

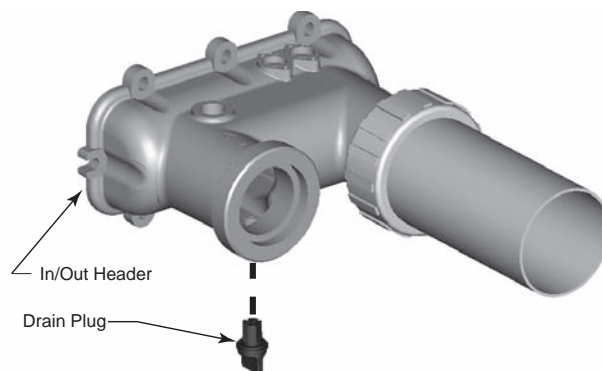
Prolonged operation with water temperatures below 50°F is not recommended. When starting the heater with water temperatures below 50°F, operate the heater continuously until higher temperatures are reached. Operating the heater for prolonged periods with pool water below 50°F can seriously damage the heater, and is not covered by the warranty.

For cold climate areas, please follow the winterizing procedures listed in the next section.

**WINTERIZING THE POOL/SPA HEATER**

Heaters installed outdoors in freezing climate areas may be shut down for the winter. Observe the following procedure for winterizing the heater.

1. Turn off gas valve, manual gas valve, and electrical supply to the heater.
2. Open drain plug located on the In/Out header, under the water pipes.



**Figure 23. In/Out Header Drain Plug Location.**

3. Open the union fittings on the In/Out water lines to break any vacuum in the system. Alternatively, remove the 2 wires from the water pressure switch and unscrew the water pressure switch to break any vacuum in the system.

## MAINTENANCE

The following preventative maintenance is to be performed one month after start-up and semi-annually thereafter.

1. Inspect top of heater and drafthood for soot, a sticky black substance around finned tubes and "V" baffles, and open flue gas passageways. Any visible soot should be cleaned for proper operation. See the Desooting Procedure in the Service Section.
2. Clean main burners and pilot burner of dust and lint.
3. Inspect and operate all controls, gas valve and pressure relief valve (if equipped).
4. Make visual check of the burner and pilot flames. Flame pattern on the main burner and pilot is illustrated in the Post Start-Up Inspection section. Yellow flame means restriction of the air openings. Lifting or blowing flame indicates high gas pressure. Low flame means low gas pressure. Should these occur, shut the heater off and contact your gas supplier or qualified service agency.
5. On indoor heaters, clean room intake openings to ensure adequate flow of combustion and ventilation air.
6. Keep area around heater clear and free from combustible materials, gasoline and other flammable and corrosive vapors and liquids.

## SERVICE

### WATER PRESSURE SWITCH

The water pressure switch, ensures that the heater operates only when the filter pump is in operation. It is located on the In/Out header. It is factory set at 1.75 PSI for deck-level installations. When the heater is located below the level of the spa or pool, it may be necessary to adjust the pressure switch to compensate for the no-flow static head. If it is necessary to adjust the water pressure switch, utilize the following procedure.

#### CAUTION

**DO NOT ADJUST THE PRESSURE SWITCH UNTIL ALL AIR HAS BEEN EVACUATED FROM THE SYSTEM AND THE WATER FLOW RATE MEETS THE REQUIREMENTS LISTED IN TABLE 6.**

### WATER PRESSURE SWITCH ADJUSTMENT

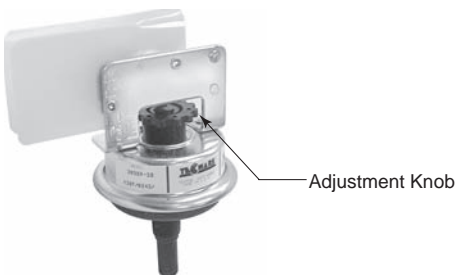


Figure 24. Water Pressure Switch Adjustment.

1. With pump and heater on, turn adjustment knob clockwise until a click is heard from the gas valve.
2. Turn adjustment knob counter-clockwise 1/4 turn.
3. Turn pump off and on several times. Heater should shut off immediately. If it does not, repeat the above steps.

NOTE: If heater is installed outside of the limits shown, a higher pressure rated (11 psi) switch may be used. A flow switch, mounted and wired adjacent to the heater, may be used in place of the factory-mounted pressure switch. See Illustrated Parts List for 11 psi water pressure switch.

### TWO-SPEED PUMPS

In some cases, the flow on the low-speed is insufficient to operate the heater. This is apparent when the water pressure switch cannot be further adjusted or if the heater makes banging noises or shuts off on high limit. In these cases, the pump must be run at high speed when heating the water.

#### CAUTION

**DO NOT OPERATE THE HEATER WITHOUT THE FUNCTION OF A PROPERLY ADJUSTED WATER PRESSURE SWITCH OR FLOW SWITCH.**

### FLAME ROLL-OUT SAFETY SWITCH

Heaters are equipped with a thermal cutoff device to prevent flame roll-out in the event the heat exchanger becomes blocked. This is a "single-use" type fusible link or thermal fuse, that must be replaced when disabled by an over-temperature condition, caused by excessive restriction in the heat exchanger flue passage, roll-out, high winds, etc.



Figure 25. Flame Roll-Out Safety Switch.

### HIGH LIMITS

The heater is equipped with two automatic high limits. Both are located in the In/Out header. Both are set to open at 135°F.

NOTE: An erratic high limit is often characteristic of an internal heat exchanger problem, e.g. scale build-up, defective bypass. Refer to Troubleshooting section.

### HIGH LIMIT REMOVAL



Figure 26. High Limit Switch.

1. Shut off main electrical power switch to heater.
2. Remove In/Out inspection panel.

3. Remove defective high limit and replace with a new high limit.
4. Replace inspection panel.

#### PILOT SAFETY - MILLIVOLT MODELS

Heaters equipped with the standing pilot (Millivolt system) have pilot generators which act as a safety device to shut off the flow of gas to the main burners and the pilot burner in case the pilot flame is extinguished. The pilot burner must be manually re-lighted to place the heater in operation again. Refer to the lighting instructions provided on the heater label.

#### BURNER TRAY REMOVAL

1. Shut off main electrical power switch to heater.
2. Shut off gas upstream of heater.
3. Remove front door.
4. Disconnect gas line from gas valve.
5. Remove (2) screws that mount burner tray to unit, and (2) screws that secure gas valve to jacket.
6. Disconnect wires that terminate at gas valve.
7. Disconnect hi-tension wire from igniter.
8. Remove (1) screw that mounts ground wire to burner tray.
9. Slide out burner tray.
10. Reverse above procedure to reinstall.

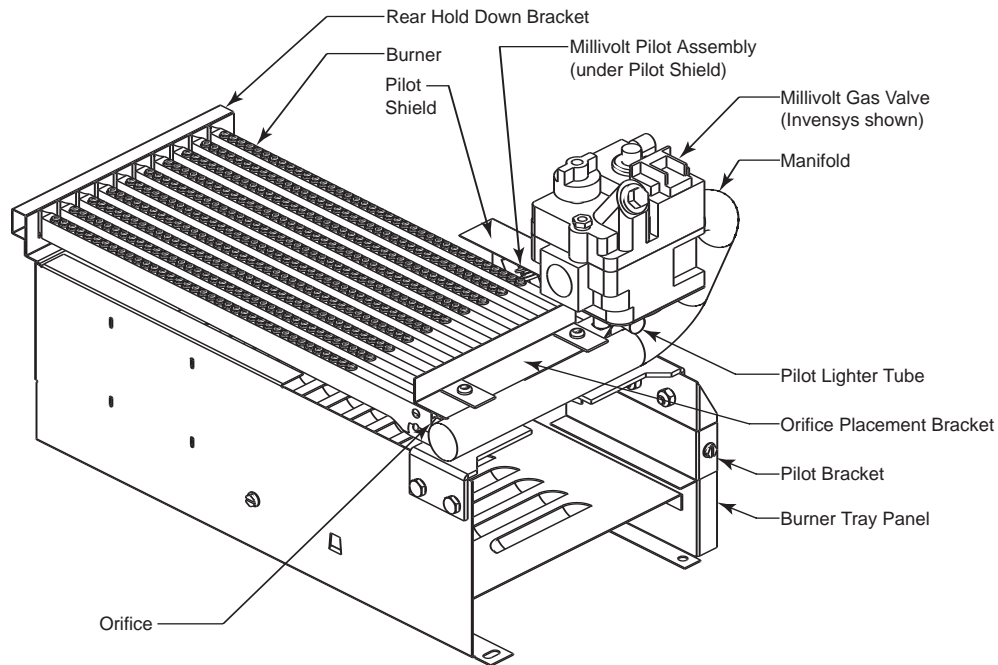


Figure 27. Millivolt Burner Tray Assembly.

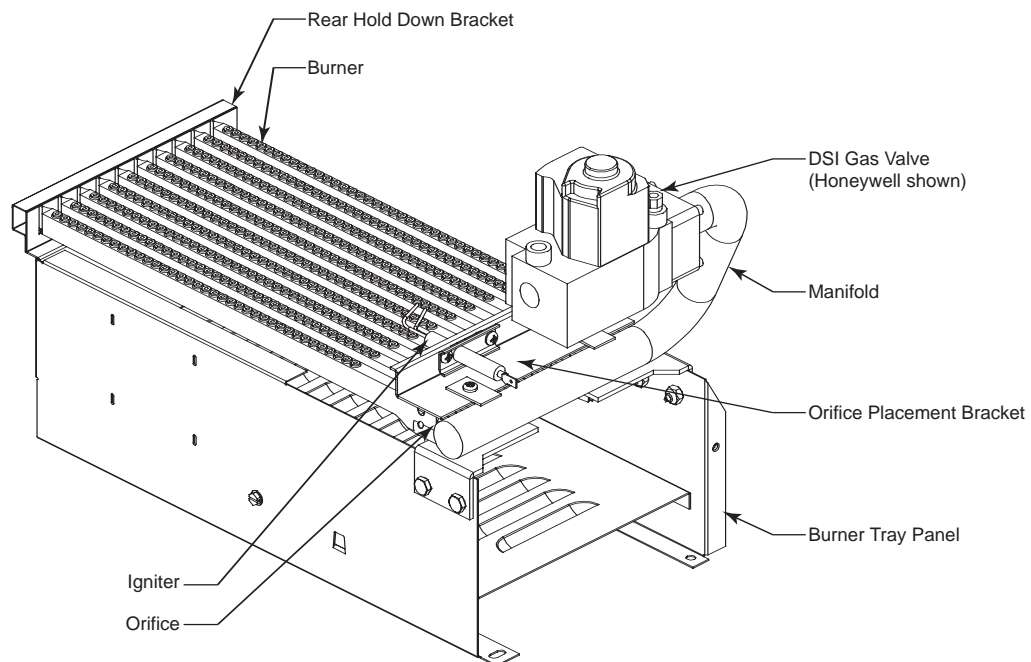


Figure 28. DSI Burner Tray Assembly.

### GAS VALVE REMOVAL

1. Remove burner tray from heater as described in the Burner Tray Removal section.
2. Disconnect pilot tubing (if removing a Millivolt valve).
3. Disconnect wires to gas valve.
4. Unscrew gas valve from manifold.
5. Reverse above procedure to reinstall.

### MAIN BURNER AND ORIFICE REMOVAL

1. Remove burner tray.
2. Remove screws from rear burner hold-down bracket.

**NOTE:** If the heat exchanger is sooted badly, the burner hold-down bracket and spacer can become distorted from direct-flame impingement and this usually necessitates replacement of these parts.

3. Lift burners from slotted spacers and slide from orifices. Clean with a wire brush.
4. Orifices usually do not need to be replaced. To clean, run either copper wire or wood toothpick through orifice. Do not enlarge hole. To remove orifice, use a socket wrench and remove from manifold. Do not overtighten when reinstalling.
5. Reverse above procedure to reinstall.

### IGNITER REMOVAL AND CLEANING (ELECTRONIC)

1. Disconnect high tension wire from igniter.
2. Remove (2) screws that mount the igniter to the burner tray.
3. Remove igniter from burner tray.
4. Reverse above procedure to reinstall.

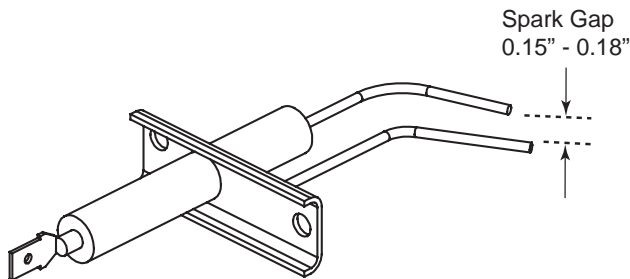


Figure 29. Direct Spark Igniter.

### PILOT REMOVAL AND CLEANING (MILLIVOLT)

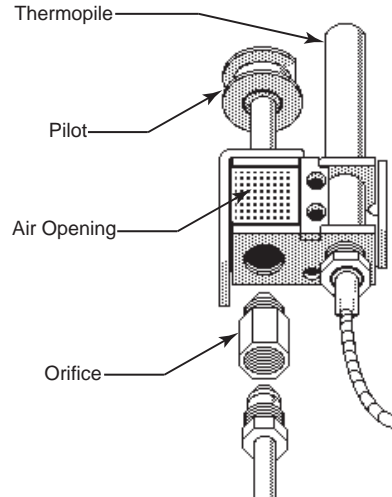


Figure 30. Honeywell Millivolt Pilot.

1. Disconnect pilot tubing and wires from gas valve.
2. Remove pilot assembly from burner tray.
3. Remove pilot from bracket.
4. Remove pilot orifice and air opening (Honeywell MV unit only), and clean with wire or small brush.

### CAUTION

**DO NOT ENLARGE HOLE IN PILOT ORIFICE.**

5. Reverse above procedure to reinstall.

### HEAT EXCHANGER REMOVAL

1. Shut water, gas and electricity off, close valves and relieve pressure, then remove relief valve. Remove side inspection panels.
2. Remove top jacket holding screws. Remove the jacket top.
3. Remove the four (4) screws holding down the flue collector. Remove the flue collector.
4. Remove upper in/out access panel.
5. Disconnect all electrical wiring from in/out header.
6. Remove temperature sensor from in/out header.
7. Disconnect flange nuts on In/Out header.
8. Set aside heat exchanger side baffles.
9. Lift heat exchanger straight up using caution not to damage refractory.
10. Reverse above procedure to reinstall.

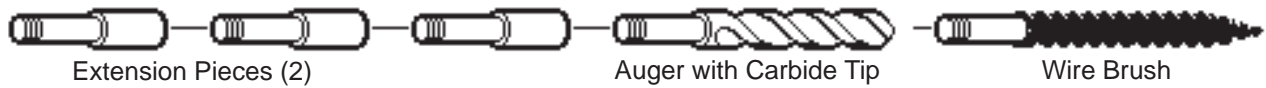


Figure 31. Tube Cleaning Tool.

### TUBE CLEANING PROCEDURE

Establish a regular inspection schedule, the frequency depending on the local water conditions and the severity of service. Do not let the tubes clog up solidly. Clean out deposits over 1/16" in thickness.

**NOTE:** Please remove heat exchanger from heater prior to reaming or removing debris.

After reaming, mount the wire brush in place of the auger and clean out debris remaining in the tubes.

Another method is to remove the heat exchanger, ream tubes and immerse heat exchanger in non-inhibited de-scale solvent for severe scale build-up.

### DESOOTING PROCEDURE

#### CAUTION

**SOOT MAY BE COMBUSTIBLE. WET SOOTED SURFACES COMPLETELY PRIOR TO CLEANING. DO NOT USE STEEL WIRE BRUSH.**

Soot will clog areas between fins and cause eventual tube failure. Any sign of soot at the base of the burners or around the outer jacket indicates a need for cleaning.

1. Remove top and flue collector from cabinet.
2. Remove "V" baffles from heat exchanger, including side baffles.
3. Remove burner tray.
4. Remove heat exchanger from the heater and wash with a garden hose, making sure soot is removed from spaces between fins.
5. Reverse above procedure to reinstall.

**NOTE:** In extreme cases it may be necessary to do high-pressure cleaning at a local car wash. **DO NOT WIRE BRUSH.**

### IMMERSION WELL REPLACEMENT - MILLIVOLT



Figure 32. Immersion Well Assembly.

1. Shut off water to heater and drain heat exchanger.
2. Remove access panel on water connection side.
3. Remove old immersion well with bushing and sleeve.
4. Install replacement well in header.

**NOTE:** Installation in polymer header should be hand tight plus 1/2 turn.

### REPLACEMENT PARTS

**NOTE:** When ordering parts, it is important that the heater model number, serial number, and type of gas are specified.

Any part returned for replacement under standard company warranties must be properly tagged with a return parts tag, completely filled in with the heater serial number, model number, etc., and shipped to the Company freight prepaid.

If determined defective by the Company and within warranty, a like part or equal substitution will be returned, freight collect. Credit will not be issued.

**MANUFACTURER:**  
2151 EASTMAN AVENUE  
OXNARD, CA 93030

## TROUBLESHOOTING

### MECHANICAL

These instructions are intended for use by qualified personnel who are specifically trained and experienced in the installation of this type of heating equipment and related system components. Installation and service personnel may be required by some states to be licensed. Persons not qualified shall not attempt to install this equipment nor attempt repairs according to these instructions.

<u>PROBLEM</u>	<u>CAUSE</u>	<u>SOLUTION</u>
<b>Harmonics, or whining noise</b>	*Debris or restriction in system..... Low flow.....	Locate the restriction and remove. Flush system and clean. Scale forming in heat exchanger - clean heat exchanger and check pool pH and total alkalinity.
<b>Outlet pipes hot to touch</b>	Low flow.....	Scale forming in heat exchanger - clean heat exchanger and check pool pH and total alkalinity.
<b>Heater going on and off continuously</b>	Dirty filter..... Low water level in pool..... External bypass setting out of adjustment..... *Pressure switch out of adjustment....	Clean or replace filter. Raise water level.  Adjust bypass. Adjust pressure switch.
<b>Liming or scale forming in exchanger</b>	Pool water..... Bypassing too much water.....	See Water Chemistry section. Inspect bypass for movement, if no movement, replace.
<b>Sooting</b>	High flow rates.....  *Air starvation..... *Improper venting..... *Insects or debris clogging burner intake ports.....	Reduce by adding manual bypass valve. Adjust manual bypass valve until heater outlet water temperature is between 105°F and 110°F. (Refer to Figure 14.) Refer to installation instructions. Follow recommended installation instructions.  Clean burners.
<b>Pilot outage</b>	Low gas pressure..... Restricted pilot..... Weak pilot generator.....	Adjust gas pressure. Clean pilot. Replace pilot.
<b>Yellow lazy flame</b>	Low gas pressure..... *Insects or debris clogging burner intake ports.....	Adjust gas pressure.  Clean burners.
<b>Outer jacket very hot (paint blistered)</b>	*Broken refractory caused by shipping damage or improper combustion..... Excessive sooting of heat exchanger..	Replace refractory panels. Determine cause of sooting & correct.
<b>Takes too long to heat pool or spa</b>	Under-sized heater.....  Filter not running long enough..... Dirty filter..... Gas line or meter undersized..... *Debris in gas line.....	Calculate heating capacity of heater: $\frac{\text{Htr. output(BTUH)}}{\text{Pool gallonage} \times 8.33}$ This does not take into account heat loss due to weather. Reset time clock. Clean filter. Refer to installation instructions. Remove debris or blow out gas line.
<b>Leaking at well</b>	Overacid..... Over chlorination.....	Replace well and maintain proper water chemistry. Check location of chlorinator and backflow preventer.
<b>Leaking at heat exchanger</b>	Overacid..... Over chlorination.....	Replace heat exchanger and maintain proper water chemistry. Check location of chlorinator and backflow preventer.
<b>Gasket brittle and leaking - (overheated)</b>	Heater running after pump shuts off.... Refractory damage..... Sooted heater.....	See Pressure Switch Adjustment. Replace refractory. Determine cause of sooting and correct.

\* Indicates symptom which usually occurs on initial start-up.



**ELECTRICAL**

**STANDING PILOT MILLIVOLT**

The following information is presented for use by qualified service personnel only.

1. Filter must be on with adequate water flow through heater.
2. Gas valve must be in "ON" position. Thermostat set higher than pool water temperature.
3. Jumpers are for temporary check only. If left in place, they could cause the heater to burn up.

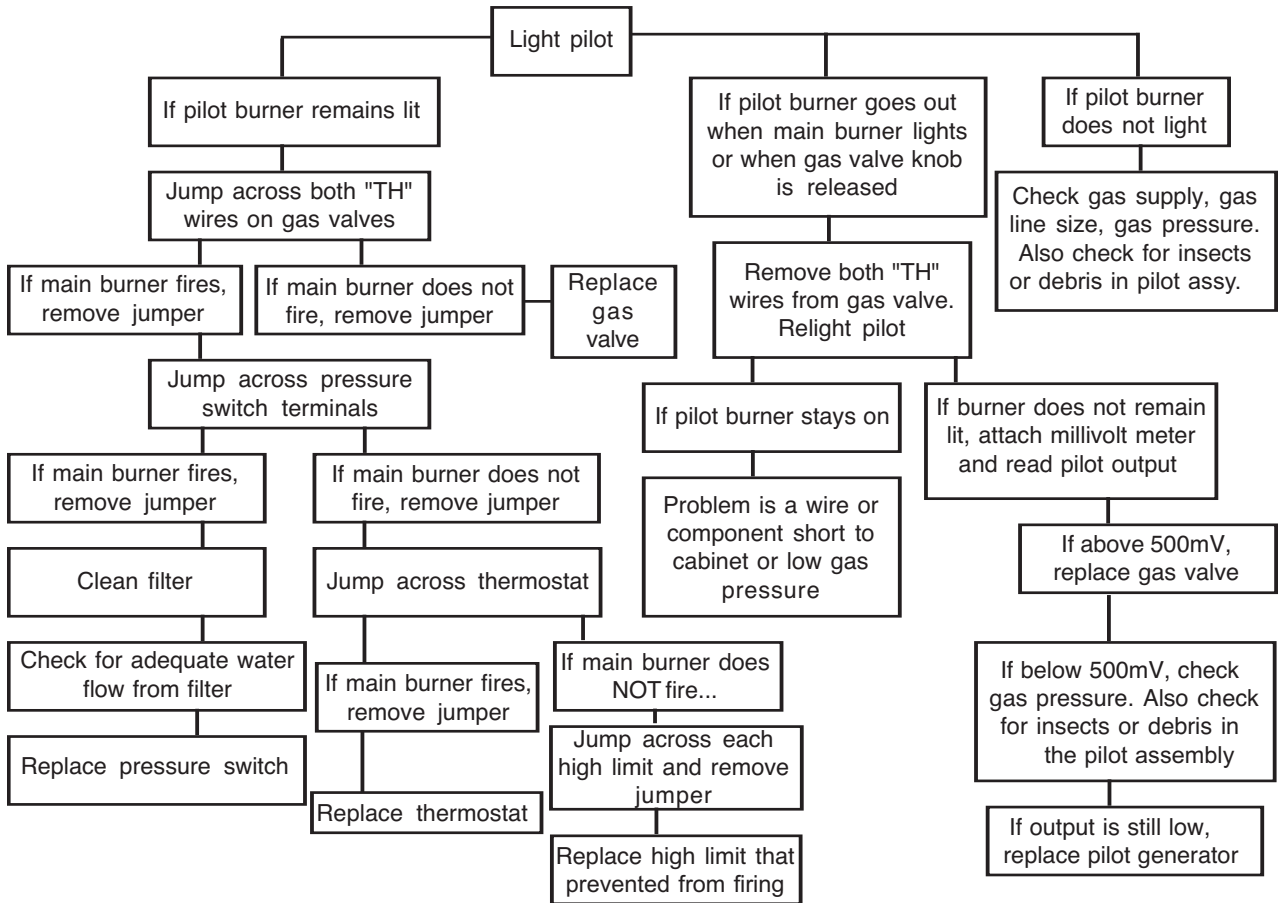


Figure 33. Millivolt Troubleshooting Flowchart.

**TERMINAL BLOCK WIRING**

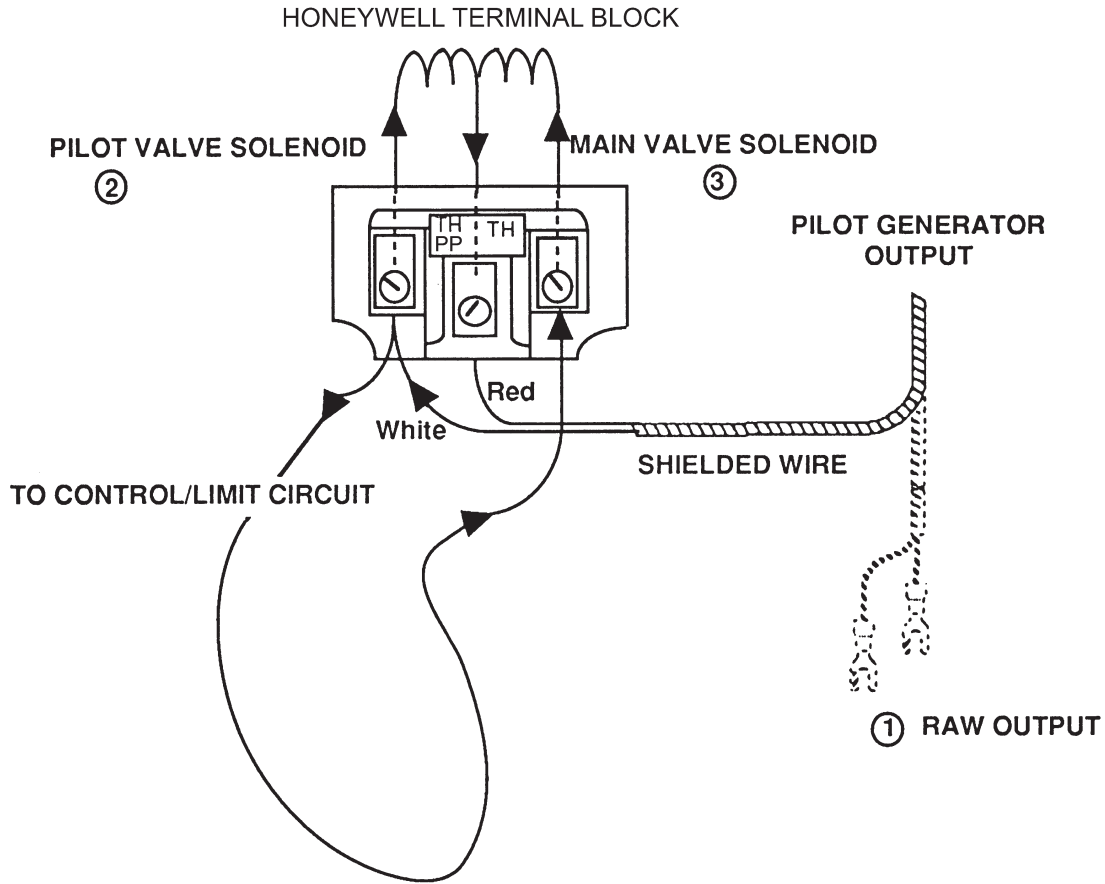
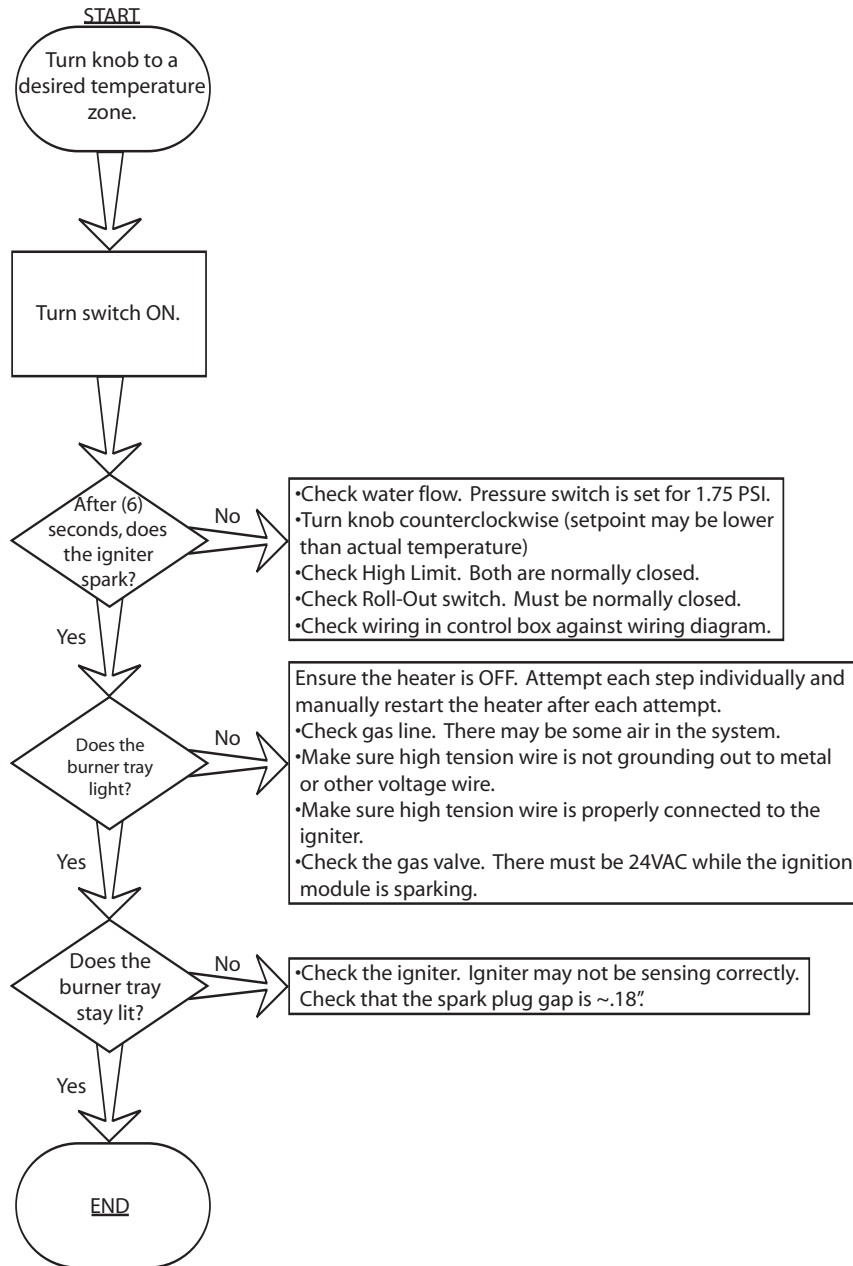


Figure 34. Terminal Block Wiring.

1. Raw Output ( $700\text{mV} \pm 100$ )  
 Pilot generator disconnected from valve (knob must be held down to keep pilot on).  
 White – Negative  
 Red + Positive
  
2. Pilot Load ( $500\text{mV} \pm 100$ )  
 Pilot generator connected to valve-Power applied to pilot solenoid.  
 TP(Thermopile-Robertshaw)  
 PP(Power Pile-Honeywell)  
 TH TP – Common (Invensys)  
 TH PP – Common (Honeywell)
  
3. Main Valve Load ( $200\text{mV} \pm 100$ )  
 Control/Limit circuit closed (All switches "ON")  
 TP(Thermopile-Robertshaw)  
 PP(Power Pile-Honeywell)  
 TH TP – Common (Invensys)  
 TH PP – Common (Honeywell)

**ELECTRONIC CONTROL LOGIC FLOWCHART**



**Figure 35. Control Logic Flowchart.**

**GENERAL - HEATER WILL NOT FIRE**

If there is no electrical power, it may be that the home "circuit breaker" has tripped. Try re-setting it.

If there is electrical power but the heater will not fire check the following:

1. The time clock must be in the "ON" position.
2. The pump strainer basket may be full. If so remove debris.
3. The filter may be dirty. If so, backwash or clean filter. (To tell if the filter is dirty, look to see if the filter pressure will be higher than usual).
4. The pump may have lost its prime and be running dry. Check the pressure on the filter. If there is no pressure; then there is not enough moving water (or the gauge is broken). Try to get the pump to run at its normal flow rate.

